

ISSUING OF SOUTH AFRICAN CIVIL AVIATION TECHNICAL STANDARDS

The Director of Civil Aviation hereby issues the South African Civil Aviation Technical Standards (SA CATS) as detailed in the Schedule. The SA CATS shall commence on the date of commencement of the Civil Aviation Regulations, 2011.

SCHEDULE

SOUTH AFRICAN CIVIL AVIATION TECHNICAL STANDARDS

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INTRODUCTION

1. General

Section 163 of the Civil Aviation Act, 2009, empowers the Director of Civil Aviation to issue technical standards for civil aviation on the matters which are prescribed by regulation.

2. Purpose

The technical standards contain the standards, rules and requirements which are applicable in respect of particular Parts of the Regulations.

Each reference to a technical standard in this document, is a reference to the corresponding regulation in the Civil Aviation Regulations, 2011, for example, technical standard 11.06.1 refers to regulation 11.06.1 of the Regulations.

The abbreviation “CAR” is used throughout this document when referring to any regulation.

The abbreviation “TS” refers to any technical standard.

3. Schedules and notes

Guidelines and recommendations in support of any particular technical standard, are contained in schedules to, and/or notes inserted throughout the technical standards.

SA-CATS 11

Procedures for making regulations and technical standards, granting exemptions and notifying differences

List of technical standards

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11.05.1 INSTITUTION OF THE COMMITTEE

1. Appointment of Members of the Committee

- (1) All users and service providers who have an interest in airspace construction and utilisation shall be represented on the committee by organisations and not on an individual basis.
- (2) Commercial and general aviation organisations, mandated members and statutory bodies that wish to be appointed as a member of NASCOM shall apply in writing to the Director stating the reasons and intent of becoming a member.
- (3) Members recognised by the Director shall appoint individuals to represent their organisation on NASCOM.
- (4) Observers may be permitted to attend meetings at the discretion of the Chair.

11.05.6 SUBMISSION OF PROPOSAL

1. Process of Submitting Proposals

- (1) Submissions or proposals for recommendation to the Director shall be made in the form of an appropriately detailed working paper.
- (2) Submissions or proposals for information on future planned developments shall be made in the form of an appropriately detailed information paper.
- (3) Working and Information papers shall be submitted to the NASCOM Secretariat at least six weeks in advance of the meeting in which they are to be presented.
- (4) The format of these papers is available on the SACAA website.
- (5) Graphic presentations shall accompany submissions proposing demarcation of airspace boundaries and shall be clear and should include pertinent data such as vertical and lateral limits, adjacent aerodromes and existing airspaces
- (6) Where known third parties may be affected, adequate consultation shall be made with such parties or their legal representatives and the records thereof shall be made available to the committee. Any agreements or dispensations with such parties must be recorded and made available to the committee.
- (7) A clear indication of what is intended by the proposal and what action is sought from the Director shall be given.
- (8) Any safety considerations, both positive and negative, shall be clearly indicated (a safety case may be required).
- (9) Proposers who submit working papers may be requested to present such at the committee meeting, however proposers who submit information papers will not be required to make any presentation.
- (10) The AIRAC cycle shall be taken into account for implementation purposes. Proposers should note that after approval by the Director, any airspace change shall be published according to the AIRAC cycle in the IAIP allowing a minimum of 56 days before the effective date of implementation.

SA-CATS 12
Aviation Accident and Incident

List of technical standards

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12.01.4 DESIGNATION OF INVESTIGATOR

1. Conditions, requirements, rules, procedures and standards for a designation

The conditions and requirements for and the rules, procedures and standards connected with the designation of an investigator are the following:

1.1 Requirements

- (1) The candidate must –
 - (a) have qualifications similar to that of a senior air traffic controller, flight inspector, airworthiness inspector or an authorised officer appointed as an accident investigator; and
 - (b) have successfully completed an approved training course in accident investigation; or
 - (c) have proven experience in accident and incident investigation.
- (2) The candidate must have sufficient ability in reading, speaking and understanding the English language to enable such candidate to duly exercise the powers of a designated investigator.
- (3) The candidate must be a fit and proper person to duly exercise the powers of a designated investigator.

1.2 Rules

Once designated, the investigator must –

- (1) conduct all accident and incident investigations allocated by the investigator-in-charge to such investigator in the manner prescribed in TS 12.03.2;
- (2) report back to the investigator-in-charge on every accident and incident investigation;
- (3) maintain competency; and
- (4) stay abreast of new developments regarding accident and incident investigation, both locally and internationally.

1.3 Procedures

- (1) Any person who desires to be designated as an investigator must apply in writing to the Director.
- (2) An application for the designation as an investigator must be accompanied by proof that the applicant complies with the conditions, requirements and standards contained in this technical standard.
- (3) The Director may, after due consideration of the application, designate the applicant as an investigator.
- (4) The Director may designate the applicant as an investigator for the period determined by the Director, which period may not exceed one year, calculated from the date of designation.
- (5) The Director may withdraw a designation if –
 - (a) it becomes evident that the designated investigator does not comply with the provisions of this technical standard; or
 - (b) the withdrawal is necessary in the interests of aviation safety.
- (6) The designated investigator must, upon the withdrawal of the designation by the Director, forthwith surrender the document referred to in CAR 12.01.4(4) to the Director.

1.4 Standards

The candidate must comply with the conditions, requirements and rules contained in this technical standard.

12.01.5 DESIGNATION OF *PRO TEM* INVESTIGATOR

1. Conditions, requirements, rules, procedures and standards for a designation

The conditions and requirements for and the rules, procedures and standards connected with the designation of a pro tem investigator are the following:

1.1 Requirements

- (1) The candidate must –
 - (a) hold or have held a licence issued in terms of the Act or have been employed by the South African Air Force and obtained a similar qualification;
 - (b) be a security and safety officer of a company; or
 - (c) be a designated investigator.
- (2) The candidate must have sufficient ability in reading, speaking and understanding the English language to enable such candidate to duly exercise the powers of a designated pro tem investigator.
- (3) The candidate must be a fit and proper person to duly exercise the powers of a designated pro tem investigator.

1.2 Rules

Once designated, the pro tem investigator must –

- (1) conduct all accident and incident investigations allocated by the investigator-in-charge to such investigator in the manner prescribed in TS 12.03.2;
- (2) report back to the investigator-in-charge on every accident and incident investigation;
- (3) maintain competency; and
- (4) stay abreast of new developments regarding accident and incident investigation, both locally and internationally.

1.3 Procedures

- (1) Any person who desires to be designated as a pro tem investigator must apply in writing to the Director.
- (2) An application for the designation as a pro tem investigator must be accompanied by proof that the applicant complies with the conditions, requirements and standards contained in this technical standard.
- (3) The Director may, after due consideration of the application, designate the applicant as a pro tem investigator.
- (4) The Director may designate the applicant as a pro tem investigator for the period determined by the Director, which period may not exceed one year, calculated from the date of designation.
- (5) The Director may withdraw a designation if -
 - (a) it becomes evident that the designated pro tem investigator does not comply with the provisions of this technical standard; or
 - (b) the withdrawal is necessary in the interests of aviation safety.
- (6) The designated pro tem investigator must, upon the withdrawal of the designation by the Director, forthwith surrender the document referred to in CAR 12.01.5(5) to the Director.

1.4 Standards

The candidate must comply with the conditions, requirements and rules contained in this technical standard.

12.01.6 DESIGNATION AND ACCEPTANCE OF ACCREDITED REPRESENTATIVE

1. Conditions, requirements, rules, procedures and standards for a designation

The conditions and requirements for and the rules, procedures and standards with regard to the designation of an accredited representative are the following:

1.1 Conditions

The accredited representative must be an aircraft accident and incident investigator with a minimum of five years in the investigation profession.

1.2 Requirements

- (1) The candidate must have the necessary qualifications and experience in aircraft accidents/incidents investigation and knowledge of the ICAO requirements.
- (2) The candidate must have sufficient ability with regard to the reading, speaking and understanding of the English language to enable such candidate to duly exercise the powers of an accredited representative.
- (3) The candidate must be physically fit and able to duly exercise the powers of an accredited representative.

1.3 Rules

- (1) Once designated, the accredited representative must –
 - (a) assist the investigator in charge with the investigation of accidents and serious incidents;
 - (b) supervise and manage the work carried out by his or her designated advisers;
 - (c) report back to the investigator in charge on his or her findings regarding the accident or serious incident.

1.4 Procedures

- (1) On receipt of the notification from the State of Occurrence, the Director shall –
 - (a) notify the State of Occurrence by any means appropriate of the intention to appoint an accredited representative;
 - (b) appoint an accredited representative and forward his or her details to the State of Occurrence;
 - (c) follow the appointment of the accredited representative, all communication between the States will be via the accredited representative.
- (2) The accredited representative may request the Director to appoint advisers, as prescribed in technical standard 12.01.7, to assist him or her.
- (3) The accredited representative shall assist the investigator in charge with the investigation until no longer required by the investigator in charge, or on his or her request.
- (4) The accredited representative shall provide any information relevant to the investigation to the investigator in charge, on request.
- (5) Should the aircraft be an aircraft registered in South Africa and the base station be in South Africa, the accredited representative shall facilitate site visits when required to do so by the investigator in charge.

1.5 Standards

The candidate must comply with the conditions, requirements and rules contained in this technical standard.

12.01.7 DESIGNATION OF ADVISOR

1. Conditions, requirements, rules, procedures and standards for a designation

The conditions and requirements for and the rules, procedures and standards connected with the designation of an adviser are the following:

1.1 Conditions

The candidate must be independent.

1.2 Requirements

- (1) The candidate must have the necessary qualifications and experience in the particular field where the expertise is required.
- (2) The candidate must have sufficient ability in reading, speaking and understanding the English language to enable such candidate to duly exercise the powers of a designated adviser.
- (3) The candidate must be a fit and proper person to duly exercise the powers of a designated adviser.
- (4) If the Director designates an adviser as a human factors adviser, such adviser must be a designated aviation medical examiner with accident investigation training or an aviation psychologist.

1.3 Rules

Once designated, the adviser must –

- (1) assist the investigator-in-charge in the investigation of accidents and serious incidents;
- (2) if such adviser is a human factors adviser, assist in determining if the accident was caused by human factors, such as physical, physiological, medical or social factors, or a combination thereof;
- (3) report back to the investigator-in-charge on his or her findings regarding the accident or serious incident;
- (4) maintain competency; and
- (5) stay abreast of new developments, both locally and internationally.

1.4 Procedures

- (1) Any person who desires to be designated as an adviser must apply in writing to the Director.
- (2) An application for the designation as an adviser must be accompanied by proof that the applicant complies with the conditions, requirements and standards contained in this technical standard.
- (3) The Director may, after due consideration of the application, designate the applicant as an adviser.
- (4) The Director may designate the applicant as an adviser for the period determined by the Director, which period may not exceed one year, calculated from the date of designation.
- (5) The Director may withdraw a designation if -
 - (a) it becomes evident that the designated adviser does not comply with the provisions of this technical standard; or
 - (b) the withdrawal is necessary in the interests of aviation safety.

1.5 Standards

The candidate must comply with the conditions, requirements and rules contained in this technical standard.

12.01.10 ESTABLISHMENT OF CONFIDENTIAL AVIATION HAZARD REPORTING SYSTEM

1. Hazards and incidents

- (1) Hazards are negative indications of a safety trend, or a possibility for an incident or accident.

- (2) Hazards include, but are not confined to, human factor errors, inadequate fire and rescue services, bird sighting at aerodromes or in migration, issues such as runway markings which are difficult to see, lack of diligence given to aeronautical information circulars, poor communications, ignorance about dangerous goods, incorrect perceptions of ATC or pilots, ergonomics, confusion about which frequency to use, visual illusions, medical problems, lack of or misunderstanding of legislation, prevalence for near collisions, passenger behaviour, poor ramp standards.
- (3) Many incidents are reportable to the Director in terms of Part 12 of the CAR. These incidents must not be sent as a CAHRS report. In such cases, if this is reported to the designated body or institution, the reporter must be advised of the correct method for such reporting. The designated body or institution will still maintain the confidentiality of such a reporter and will not forward the report to the Director. However, the nature of the hazard may be used for awareness purposes.
- (4) Confidential aviation hazard reporting is a tool for accident prevention in that hazards are identified before there is loss of life, injury or damage, i.e. loss. It is not a statistical tool. It is non-punitive.
- (5) For further information on identification of hazards and confidential reporting refer to ICAO Technical Publication "Accident Prevention Manual" (Doc 9422).

2. Procedures

The confidential aviation hazard reporting system is operated as follows:

- (a) Reporting and receipt of reports
- (b) Allocation of reference
- (c) Place in safe keeping
- (d) Make contact with reporter, if necessary, for further information
- (e) Destruction of name and other details of reporter
- (f) De-identify report
- (g) Referral to others, if necessary
- (h) Publication of some reports
- (i) Summary of reports
- (j) Place on file
- (k) Data exchange.

2.1 Receipt of reports

- (1) A dedicated post office box is maintained. The key is kept by a designated person(s) who undertakes to collect the mail and hand unopened to the analysts.
- (2) Reports may be submitted on the CAHRS form or by any other medium.
- (3) Reports received by fax will not be guaranteed confidential.
- (4) Receipts may be accepted on electronic media but will not be guaranteed confidential unless methods for such confidential reporting have been developed and proven reliable.
- (5) Reports may be submitted by anyone in the aviation industry or who is concerned about safety in aviation.
- (6) It is preferable that the reporters provide names and phone numbers so that analysts can contact them for further information, if necessary.
- (7) Anonymous reports, i.e. without a name or phone number, will be accepted. However, less significance may be attributed to such a report as the reporter cannot be contacted for further relevant information which may be required for analysis.

2.2 Allocation of reference

A reference shall be allocated for the report and will be used for any correspondence or publication of the report where relevant.

2.3 Safekeeping

All reports with identifying information retained are kept in safekeeping (safe or locked cupboard or room). Only the analysts have access to the documentation until reports have been de-identified.

2.4 Make contact with reporter, if necessary, for further information and feedback

- (1) Contact with the reporter may be made only by the analyst. Extreme sensitivity is exercised when phoning the reporter bearing in mind that if his or her identity is revealed, the repercussions could be detrimental to the reporter and the future of the reporting system.
- (2) When the reporter is contacted, he or she is advised of the action to be taken, that identifying information will be removed and that all records of the reporter will be destroyed.

2.5 Destruction of name and contact details of reporter

- (1) Once the analyst has obtained any necessary further information from the reporter the name and contact details are removed from the report form.
- (2) The method in which this is done, is determined by the designated body or institution, such as by phone or by return of the section of the report which contains the name.

2.6 De-identify report

- (1) All reports are de-identified through the removal of identifying information from a report in a method that alters the information so that the reporter cannot be identified.
- (2) Each report is treated on its own merit.
- (3) Generic terms are used to replace this information, e.g. types of aircraft, aerodromes, routes.
- (4) It is accepted that with some reports the inevitable results of de-identification results in non-specific apparently ineffective information. The relaxing of de-identification may place the credibility of the confidentiality of the system in jeopardy.
- (5) De-identification is always conducted even if the reporter indicates otherwise.

2.7 Referral to others if necessary

- (1) Unless a report indicates imminent catastrophe, referral is not immediate. A time lag between occurrence and referral enhances confidentiality as the report does not appear so specific. This reduces the possibility of a "witch hunt" response or easy identification of the reporter.
- (2) The analysts identify relevant organisations, authorities, companies, etc, which may benefit from knowledge of a hazard and refer the report to them.
- (3) Referrals include a clause that this information has not been verified, but is in the interests of aviation safety and is for information.

2.8 Publication of some reports

- (1) De-identified reports may be published by the designated body or institution in a feedback publication and reports may be used by any other media for the purposes of aviation safety.
- (2) Any method of publication may be used if it is deemed to be suitable for the widest relevant group.
- (3) The analysts may withhold some de-identified reports from publication, e.g. if a report is not seen to be related to aviation safety, or if, even if de-identified, the reporter could still be recognised. However, this does not prevent the analysts from providing relevant organisations with the basic hazard.

2.9 Summary of reports

- (1) A summary of reports is maintained, and a copy is sent to the Director quarterly.
- (2) Such summaries are available on request by any sector of the aviation industry.

2.10 Filing and data retrieval

- (1) All de-identified reports are filed by whatever means the designated body or institution finds suitable.

- (2) All de-identified reports are preserved.
- (3) The filing system is such that retrieval is simple.

2.11 Data exchange

- (1) Any reasonable request for copies of de-identified reports will be made available on request to any person. The designated body or institution has the right to refuse a request if there appears any risk of the reporter being identified.
- (2) International guidelines and protocols on data exchange are followed.

3. Manner in which system is operated

3.1 Administration

- (1) Credibility in the confidentiality of the system is of the utmost importance. Those involved in the analysis require an approachable personality, have the respect of the industry, have experience in aviation and a knowledge of human factors. An analytical person with a conceptual rather than focussed approach is essential.
- (2) An analyst is a person designated to analyse confidential reports and is entrusted with the identifying details.
- (3) An assistant analyst is any person who assists the analyst but who is not provided with identifiable information.
- (4) The number of analysts is determined by the designated body or institution. Analysts may be employees of the designated body or institution or be retained for remuneration or on a voluntary basis. Analysts are selected for their expertise, confidentiality and sensitivity, with an understanding of human factors. They must not be in the employ of any aviation operator, aerodrome operator or air traffic service unit.
- (5) Assistant analysts are selected for their expertise and may be in the employ of an aviation operator, aerodrome operator or air traffic service unit.

4. Advisory committee

- (1) The designated body or institution must establish an advisory committee. Terms of reference for the advisory committee are set out below:
 - (a) To detect significant aviation safety trends arising from hazard reports;
 - (b) to identify those safety trends that may be appropriate for investigation by other committees or working groups;
 - (c) communicate pertinent findings concerning safety to the Director or appropriate sectors within the industry;
 - (d) to provide expert opinion, information and assistance as and when required for hazard analysis;
 - (e) to disseminate information and alert bulletins to the disciplines that make up the aviation industry;
 - (f) to monitor the methodology, analysis and feedback of the confidential aviation hazard reporting system (CAHRS); and
 - (g) to assist the analysts in the editing of publication material.
- (2) The committee must comprise of expert technical representatives from a wide variety of sectors including employer and employee groups, aircraft owners and manufacturers, airlines and general aviation, engineering and maintenance, recreational flying, air traffic services, etc.
- (3) The committee must meet regularly but not less than twice per year.

12.02.2 NOTIFICATION OF INCIDENTS

1. Air traffic service incidents

- 1.1 An air traffic service unit must notify the Director of –
- (1) in the case of a procedural or facility-related air traffic service incident, in the appropriate form prescribed by the Director.
 - (2) in the case of an international or AIRPROX air traffic service incident, in the appropriate form contained in the SACAA website.
 - (3) in the case of a GNSS-incident, on the appropriate form contained in the SACAA website.
- 1.2 Air traffic service units shall notify the Director of any GNSS incident notification received, using the appropriate form contained in the SACAA website.

12.03.2 ACCIDENT OR INCIDENT INVESTIGATION PROCEDURES

1. Procedures to be followed

In an accident or incident investigation, the investigator-in-charge, investigator and pro tem investigator must follow the procedures contained in the ICAO Manual of Aircraft Accident and Incident Investigation, in addition to the provisions of the CAR and other instructions which may be issued by the Director or, in the case of an investigator or *pro tem* investigator, issued by the investigator-in-charge.

12.05.1 REPORTING

1. Submission of preliminary and final accident report

The investigator-in-charge must submit the preliminary and final report regarding an accident investigation to the Director in the format contained in this technical standard.

2. Format

The format of a preliminary and final report is as follows:

- (1) Title;
- (2) synopsis;
- (3) contents; and
- (4) appendices.

3. Title

The title of a preliminary and final report must comprise:

- (1) Name of the operator or owner;
- (2) manufacturer;
- (3) model;
- (4) nationality and registration marks of the aircraft; and
- (5) place and date of the accident.

4. Synopsis

- (1) A synopsis must briefly describe all relevant information regarding –
 - (a) notification of accident to national and foreign authorities;
 - (b) identification of the investigator-in-charge;
 - (c) identification of investigators, accredited representatives and advisers;
 - (d) organisation of the investigation;
 - (e) authority releasing the report; and
 - (f) date of publication.
- (2) A synopsis must contain a brief summary of the circumstances leading to the accident.

5. Contents

The contents of the preliminary and final report must comprise the following headings:

- (1) Factual information;
- (2) analysis;
- (3) conclusions; and
- (4) safety recommendations.

6. Appendices

The appendices must consist of all the relevant statements, documents, photographs, sketches, transcripts, drawings and information pertaining to the accident investigation concerned.

7. Factual information

The following factual information must be contained in the preliminary and final report:

(1) History of the flight

A brief narrative is required giving the following information:

- Flight number, type of operation, last point of departure, time of departure (local time or UTC), point of intended landing.
- Flight preparation, description of the flight and events leading to the accident, including reconstruction of the significant portion of the flight path, if appropriate.
- Location (latitude, longitude, elevation), time of the accident (local time or UTC), whether day or night.

(2) Injuries to persons

Completion of the following (in numbers):

Injuries	Crew	Passengers	Others
Fatal			
Serious			
Minor			
None			

(3) Damage to aircraft

A brief statement of the damage sustained by aircraft in the accident (destroyed, substantially damaged, slight damaged, no damage).

(4) Other damage

A brief description of damage sustained by objects other than the aircraft.

(5) Personnel information

- (a) Pertinent information concerning each of the flight deck crew members including: age, validity of licences, ratings, mandatory checks, flying experience (total and on type) and relevant information on duty time.
- (b) Pertinent information regarding other relevant personnel, such as air traffic services, maintenance.

(6) Aircraft information

- (a) A brief statement on airworthiness and maintenance of the aircraft (indication of deficiencies known prior to and during the flight to be included, if having any bearing on the accident).
- (b) A brief statement on performance, if relevant, and whether the mass and centre of gravity were within the prescribed limits, during the phase of operation related to the accident. (If not and if of any bearing on the accident give details.)
- (c) Type of fuel used.

- (7) Meteorological information
 - (a) A brief statement on the meteorological conditions appropriate to the circumstances including both forecast and actual conditions, and the availability of meteorological information to the flight crew.
 - (b) Natural light conditions at the time of the accident (sunlight, moonlight, twilight, etc.).
- (8) Aids to navigation
Pertinent information on navigation aids available, including landing aids such as ILS, MLS, NDB, PAR, VOR, visual ground aids, etc. and their effectiveness at the time.
- (9) Communications
Pertinent information on aeronautical mobile and fixed service communications and their effectiveness.
- (10) Aerodrome information
Pertinent information associated with the aerodrome, its facilities and conditions, or with the take-off or landing area if other than an aerodrome, if relevant.
- (11) Flight recorders
The location of the flight recorder installation in the aircraft, their condition on recovery and pertinent data available therefrom, if relevant.
- (12) Wreckage and impact information
General information on the site of the accident and the distribution pattern of the wreckage; detected material failures or component malfunctions. Details concerning the location and state of the different pieces of the wreckage are not normally required unless it is necessary to indicate a break-up of the aircraft prior to impact. Diagrams, charts and photographs may be included in this section or attached in the Appendices.
- (13) Medical and pathological information
Brief description of the results of the investigation undertaken and pertinent data available therefrom, if relevant.
- (14) Fire
If fire occurred, information in the nature of the occurrence, and of the fire fighting equipment used and its effectiveness, if relevant.
- (15) Survival aspects
A brief description of search, evacuation and rescue, including response time, location of crew and passengers in relation to injuries sustained, failure of structures such as seats and seat-belt attachments, if relevant.
- (16) Tests and research
Brief statements regarding the results of tests and research, if relevant.
- (17) Organisational and management information
The following information is required:
Pertinent information concerning the organisations and their management involved in influencing the operation of the aircraft. The organisations include, for example, the operator or owner; the air traffic services, airspace, aerodrome and weather service agencies; and the regulatory authority. The information could include, but not be limited to, organisational structure and functions, resources, economic status, management policies and practices, and regulatory framework.
- (18) Additional information
Any relevant information not already included in paragraphs (a) to (q) shall be included.
- (19) Useful or effective investigation techniques
When useful or effective investigation techniques have been used during the investigation, briefly indicate the reason for using these techniques and refer here to the main features as well as describing the results under the appropriate headings in paragraphs (a) to (r).

8. Analysis

Analyse, as appropriate, only the information documented in technical standard 12.01.2(7) and which is relevant to the determination of conclusions of causes.

9. Conclusions

List the findings and causes established in the investigation. The list of causes must include both the immediate and the deeper systemic causes.

10. Safety recommendations

As appropriate, briefly state any recommendations made for the purpose of accident prevention and any resultant corrective action.

11. Appendices

Include, as appropriate, any other pertinent information considered necessary for the understanding of the report.

SA-CATS 21

Airworthiness requirements

List of technical standards

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21.01.3 REPORTING OF FAILURES, MALFUNCTIONS AND DEFECTS

1. Occurrences

The occurrences referred to in CAR 21.01.3(1), which must be reported, are the following:

- (1) Fires caused by a system or equipment failure, malfunction, or defect.
 - (2) An engine exhaust system failure, malfunction, or defect which causes damage to the engine, adjacent aircraft structure, equipment or components.
- (3) The accumulation or circulation of toxic or noxious gases in the crew compartment or passenger cabin.
- (4) A malfunction, failure or defect of a propeller control system.
- (5) A propeller or rotorcraft hub or blade structural failure.
- (6) Flammable fluid leakage in areas where an ignition source normally exists.
 - (7) A brake system failure caused by structural or material failure during operation.
- (8) A significant aircraft primary structural defect or failure caused by any autogenous condition (fatigue, understrength, corrosion, etc.).
- (9) Any abnormal vibration or buffeting caused by a structural or system malfunction, defect or failure.
- (10) An engine failure.
 - (11) Any structural or flight control system malfunction, defect or failure which causes an interference with normal control of the aircraft or which derogates the flying qualities.
- (12) A complete loss of more than one electrical power generating system or hydraulic power system during a given operation of the aircraft.
- (13) A failure or malfunction of more than one attitude, airspeed or altitude instrument during a given operation of the aircraft.

2. Exceptions

The provisions of CAR 21.01.3 do not apply to the following:

- (1) Failures, malfunctions or defects which the holder of a type certificate, production certificate, supplemental type certificate, ZA-PMA or ZA-TSO authorisation –
 - (a) determines were caused by improper maintenance, or improper usage;
 - (b) knows were reported to the Director by another person; or
 - (c) has already reported in terms of Part 12.
- (2) Failures, malfunctions or defects in products, parts or appliances manufactured by a foreign manufacturer under a type acceptance certificate issued in terms of Part 21.

21.02.3 AIRWORTHINESS DESIGN STANDARDS

1. Gliders, power-assisted gliders, and touring gliders

- (1) Gliders, power-assisted gliders, and touring gliders must be designed to and comply with the following standards for the issuing of a type certificate:
Joint Airworthiness Requirements Part 22: Sailplanes and powered sailplanes.
 - (2) Gliders, power-assisted gliders, and touring gliders imported from a foreign country and assembled here must meet the above requirements or similar requirements prescribed by an appropriate authority and have been certified and released for export by an appropriate authority as such to qualify for the issuing of a type acceptance certificate.
- 2. Very light aeroplanes (VLA)**
- (1) Very Light Aeroplanes must be designed to and comply with the following standards for the issuing of a type certificate:
Joint Airworthiness Requirements – Very light aeroplanes.
 - (2) VLA's imported from a foreign country and assembled in South Africa must meet the above requirements or its equivalent and have been certified and released for export by an appropriate authority as such to qualify for the issuing of a certificate of airworthiness.
- 3. Aeroplanes: Normal, utility, acrobatic and commuter category**
- (1) Compliance for type certification must be shown with the Federal Aviation Administration (FAA) airworthiness requirements as stated in FAR Part 23 (as amended on the date of application for certification).
 - (2) Aeroplanes imported from a foreign country and assembled here must meet at least FAR Part 23 or equivalent and have been certified by an appropriate authority and release for export as such.
 - (3) Designs to requirements other than FAR Part 23 may be accepted by the Director, if considered practical as regards language, standard, etc., to qualify for the issuing of a certificate of airworthiness.
- 4. Aeroplanes: Transport category**
- (1) Compliance for type certification must be shown with the Federal Aviation Administration (FAA) airworthiness requirements as stated in FAR Part 25 (as amended on the date of application for certification).
 - (2) Aeroplanes imported from a foreign country must meet at least the FARs as stated at the time of original certification by an appropriate authority and have been certified by an appropriate authority and released for export as such. Designs to requirements other than the FARs may be accepted by the Director, if considered practical as regards language, standard, etc., to qualify for the issuing of a type acceptance certificate.
- 5. Rotorcraft: Normal category (maximum certificated mass 2 700 kg or less)**
- (1) Compliance for type certification must be shown with the Federal Aviation Administration (FAA) airworthiness requirements as stated in FAR Part 27 (as amended on the date of application for certification).
 - (2) Rotorcraft imported from a foreign country must meet at least the FARs as stated above or equivalent and have been certified by an appropriate authority and release for export as such. Designs to requirements other than the FARs may be accepted by the Director, if considered practical as regards language, standard, etc., to qualify for the issuing of a certificate of airworthiness.
- 6. Rotorcraft: Transport category**
- (1) Compliance for type certification must be shown with the Federal Aviation Administration (FAA) airworthiness requirements as stated in FAR Part 29 (as amended on the date of application for certification).
 - (2) Rotorcraft imported from a foreign country must meet at least the FARs as stated above or equivalent and have been certified by an appropriate authority and release for export as such. Designs to requirements other than the FARs may be accepted by the Director, if

considered practical as regards language, standard, etc., to qualify for the issuing of a certificate of airworthiness.

7. Manned free balloons

- (1) Manned free balloons must be designed to and comply with the following standards:
Federal Aviation Administration FAR Part 31: Airworthiness Standards: Manned free balloons, for the issuing of a type certificate.
- (2) Manned free balloons imported from a foreign country must meet the above or its equivalent and have been certified and released for export by an appropriate authority as such to qualify for the issuing of a certificate of airworthiness.

8. Non-rigid airships

- (1) Non-rigid airships must be designed to and comply with the following standards:
 - (a) FAR 21 – Design Handbook:
 - (b) British Civil Airworthiness Requirements: Section Q, Non-rigid airships (Gust requirements),

for the issuing of a type certificate.

- (2) Non-rigid airships imported from a foreign country must meet the above standard or its equivalent and have been certified and released for export by an appropriate authority as such as to qualify for the issuing of a certificate of airworthiness.

9. Rigid airships

(Reserved.)

10. Remotely piloted aircraft

(Reserved.)

11. Engines

- (1) Compliance for type certification must be shown with the Joint Airworthiness Requirements as stated in Part 33 (as amended on the date of application for certification).
- (2) Engines imported from a foreign country and assembled in South Africa must meet at least the JARs as stated above or equivalent and have been certified by an appropriate authority and released as such. Engines manufactured to requirements other than the JARs may be accepted by the Director, if considered practical as regards language, standard, etc.

12. Propellers

- (1) Compliance for type certification must be shown with the Federal Aviation Administration (FAA) Airworthiness Requirements as stated in FAR Part 35 (as amended on the date of application for certification).
- (2) Propellers imported from a foreign country and assembled in South Africa must meet at least the FARs as stated above or equivalent and have been certified by an appropriate authority and released as such. Propellers manufactured to requirements other than the FARs may be accepted by the Director, if considered practical as regards language, standard, etc.

13. Avionics

- (1) Compliance for type certification must be shown with the Federal Aviation Administration (FAA) Airworthiness Requirements as stated in FAR Part 21 (as amended on the date of application for certification).
- (2) Avionics imported from a foreign country must meet at least the FARs as stated above or equivalent and have been certified by an appropriate authority and released as such. Avionics manufactured to requirements other than the FARs may be accepted by the Director, if considered practical as regards language, standard, etc.
- (3) Radio equipment to be installed in an aircraft must be of a type approved by the Director as per document RAD/GEN 1.
- (4) JAR – all weather operation.

14. Equipment

- (1) Any other component, instrument, appliance, material, etc. installed or intended to be installed or used in or on an aircraft is considered as equipment. Note that Unit Load Devices (ULD) are included in this group.
- (2) Compliance must be shown with FAA standards and test procedures as stated in FAR Part 21 (as amended on the date of application for certification).
- (3) Equipment imported from a foreign country and assembled in South Africa must meet at least the FARs as stated above or equivalent and have been certified by an appropriate authority and released as such. Equipment manufactured to requirements other than the FARs may be accepted by the Director if considered practical as regards language, standard, etc.

21.02.7 FLIGHT TESTS

1. Requirements

The requirements referred to in CAR 21.02.7(3), according to which flight tests must be carried out, are the following:

1.1 Flight tests

- (1) Each applicant for an aircraft type certificate must take the tests listed in subparagraph (2) of this paragraph. Before making the tests the applicant must show –
 - (a) compliance with the applicable structural requirements;
 - (b) completion of necessary ground inspections and tests;
 - (c) that the aircraft conforms with the type design; and
 - (d) that the Director received a flight test report from the applicant containing the results of the tests.
- (2) Upon showing compliance with subparagraph (1) the applicant must make all flight tests that the Director finds necessary –
 - (a) to determine compliance with the applicable requirements; and
 - (b) to determine whether there is reasonable assurance that the aircraft, its components, and its equipment are reliable and function properly.
- (3) Each applicant must show for each flight test (except in the case of a glider or a manned free balloon) that adequate provision is made for the flight test crew for emergency egress and the use of parachutes.
- (4) Except in gliders and manned free balloons, an applicant must discontinue flight tests until the applicant shows that corrective action has been taken, whenever –
 - (a) the applicant's test pilot is unable or unwilling to make any of the required flight tests; or
 - (b) items of non-compliance with requirements are found that may make additional test data meaningless or that would make further testing unduly hazardous.
- (5) The flight tests prescribed in paragraph (2)(b) must include –
 - (a) for aircraft incorporating turbine engines of a type not previously used in a type certificated aircraft, at least 300 hours of operation with a full complement of engines that conform to a type certificate; and
 - (b) for all other aircraft, at least 150 hours of operation.

1.2 Flight test pilot

Each applicant for normal utility, acrobatic, or transport category aircraft type certificate must provide a person holding an appropriate pilot licence and rating to make the flight tests required.

1.3 Flight test instrument calibration and correction report

- (1) Each applicant for a normal, utility, acrobatic or transport category aircraft type certificate must submit a report to the Director showing the computations and tests required in

connection with the calibration of instruments used for test purposes and in the correction of test results to standard atmospheric conditions.

- (2) Each applicant must allow the Director to conduct any flight tests that he or she finds necessary to check the accuracy of the report submitted under subparagraph (1).

21.04.4 DATA REQUIREMENTS

1. Standards for flight manual

Document LS/15 applies until this section has been reviewed. (AIC 18.4 of 15 December 1998).

21.06.2 PRODUCTION INSPECTION SYSTEM

1. Procedures for making determinations

The procedures for making determinations referred to in CAR 21.06.2(2), must provide a means for determining at least the following:

- (1) Incoming materials, and bought or subcontracted parts, used in the finished product must be specified in the type design data, or must be suitable equivalents.
- (2) Incoming materials, and bought or subcontracted parts, must be properly identified if their physical or chemical properties cannot be readily and accurately determined.
- (3) Materials subject to damage and deterioration must be suitably stored and adequately protected.
- (4) Processes affecting the quality and safety of the finished product must be accomplished in accordance with acceptable industry specifications.
- (5) Parts and components in process must be inspected for conformity with the type design data at points in production where accurate determinations can be made.
- (6) Current design drawings must be readily available to manufacturing and inspection personnel, and used when necessary.
- (7) Design changes, including material substitutions, must be controlled and approved before being incorporated in the finished product.
- (8) Rejected materials and parts must be segregated and identified in a manner that precludes installation in the finished product.
- (9) Materials and parts that are withheld because of departures from design data or specifications, and that are to be considered for installation in the finished product, must be processed through the Materials Review Board. Those materials and parts determined by the Board to be serviceable must be properly identified and reinspected if rework or repair is necessary. Materials and parts rejected by the Board must be marked and disposed of to ensure that they are not incorporated in the final product.

2. Materials Review Board

- (1) The Materials Review Board referred to in CAR 21.06.2(3), must include representatives from the inspection and engineering departments of the manufacturing organisation.
- (2) All records of Materials Review Board action must be maintained by the manufacturing organisation for a period of two years.
- (3) All inspection records must be maintained, identified with the completed product where practicable, and retained by the manufacturing organisation for a period of at least two years.

21.06.4 TESTS FOR AIRCRAFT ENGINES

1. Test run

- (1) The test run referred to in CAR 21.06.4, must include the following:
 - (a) Break-in runs that include a determination of fuel and oil consumption and a determination of power characteristics at the rated maximum continuous power or thrust and, if applicable, at rated take-off power or thrust;

- (b) at least five hours of operation at rated maximum continuous power or thrust. For engines having a rated take-off power or thrust higher than rated maximum continuous power or thrust, the five-hour run must include 30 minutes at rated take-off power or thrust.
- (2) The test run may be made with the engine appropriately mounted and using current types of power and thrust measuring equipment.

21.11.2 APPLICATION FOR EXPORT AIRWORTHINESS APPROVAL

1. Mass and balance report

- (1) The mass and balance report referred to in CAR 21.11.2(3)(b)(ii)(bb), must include at least the following information:
 - (a) Aircraft nationality and registration letters, make, model and serial number;
 - (b) the date on which the mass was determined and centre of gravity computed;
 - (c) the datum point used; and
 - (d) the necessary calculations.
- (2) A specimen mass and balance report is contained in FAA Advisory Circular AC 43.13-1A.

SCHEDULES

Schedule 1: Microlight minimum speed

Any aeroplane qualifies as a microlight when its maximum gross mass, useful load and minimum speed complies with the requirements as stated below.

- 1. A one or two seat aeroplane whose minimum speed at gross mass is less than 65 km/h (or 35.1 knots or 40.39 mph) and having a maximum gross mass of:
 - 300 kg for a landplane, single-seater
 - 350 kg for an amphibian, or a pure seaplane, single-seater
 - 450 kg for a landplane, two-seater
 - 500 kg for an amphibian or a pure seaplane, two-seater.
- 2. The minimum speed will be calculated by taking into account the wing area, the possible presence of high-lift devices and the gross weight, according to the provisions of paragraph 6.
- 3. The aeroplane may also qualify as a microlight by a flight demonstration of minimum level speed at gross weight (in this case, it must fly over a 500 m course). The measured speed will be the average of the timed speed in both directions. The component of the wind perpendicular to the course must not exceed 10 km/h. The measured speed will be corrected for air density (15 C, 1013.2 mb, 0m).
- 4. The useful weight to be considered must be at least equal to 90 kg per seat and
 - a full charge of fuel or 15 kg, whichever is less, for a single-seater, or
 - a full charge of fuel or 22 kg, whichever is less, for a two-seater.
 The useful weight as defined in the present paragraph will be called “nominal FAI useful weight”.
- 5. If the real useful weight of an aeroplane is less than the nominal FAI useful weight, the aeroplane may qualify as a microlight if its minimum speed is less than the following:

Min speed limit –

$$\sqrt{\frac{\text{empty weight} + \text{real useful weight}}{\text{empty} + \text{nominal FAI useful weight}}} \times 65 \text{ km/h}$$

(weights in kg).

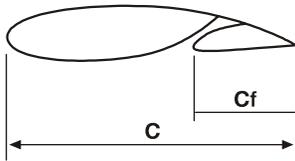
6. CALCULATED MINIMUM SPEED

Min speed =

$$\sqrt{\frac{207.6 \times \text{gross weight}}{C_L \times S}} \text{ (km)}$$

(weights in kg – area in m²).

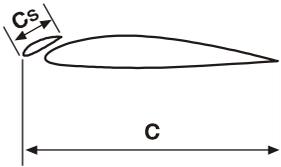
7. CALCULATION FOR CL FOR COMBINATIONS OF HIGH-LIFT DEVICES



FLAP

To be considered, flap chord should be such that

$$0.05 \leq \frac{C_f}{C} \leq 0.025$$



SLAT

To be considered, slat chord Cs should be such that

$$0.04 \leq \frac{C_s}{C} \leq 0.15$$



of considered

30° max for a normal flap

20° max if flap is also used for roll control (“flaperon”)

Lifting surface	CL	Maximum value
Airfoil alone	1.45	1.45
Airfoil + plain flap	$1.45 + 0.0875 \frac{C_f}{C} \times o_f$	2.10
Airfoil + split flap	$1.45 + 0.1125 \frac{C_f}{C} \times o_f$	2.29
Airfoil + slotted flap	$1.45 + 1000 \frac{C_f}{C} \times o_f$	2.20
Slat + airfoil	1.95	1.95
Slat + airfoil + plain flap	$1.45 + 0.1063 \frac{C_f}{C} \times o_f$	2.75
Slat + airfoil + split flap	$1.45 + 0.875 \frac{C_f}{C} \times o_f$	2.61
Slat + airfoil + slotted flap	$1.45 + 0.1250 \frac{C_f}{C} \times o_f$	2.89

8. DETERMINATION OF CL x S

8.1 Aeroplanes with no aerodynamic devices for pitch control (this includes weight-shift aeroplanes)

S = horizontal projection of all lifting surfaces (m²)

CL = 1.45.

8.2 Other aeroplanes (including canard, tandem, flying wings, “classical”,)

- All calculations are done on the horizontal projections of all lifting surfaces, (lift being positive or negative). The global projection will be divided into elements (S1, S2, Sn) according to the presence or not of high-lift devices (see example). CL for all possible combinations are defined in paragraph 7.
- The surface affected by a high-lift device is the lifting surface directly comprised within the span of this high-lift device.
- Moving surfaces used for pitch control will not be considered as high-lift devices.
- Relative chord of flaps (Cf/C) will not be considered higher than 0.25.
- Deflection of flaps (of) will not be considered more than 30 .
 - In case of flaperons (flaps used for roll control), only symmetrical deflection up to 20 will be considered.
- $CL \times s = 0.80 (CL_1 \times S_1 + CL_2 \times S_2 + \dots + CL_n \times S_n)$.

8.3 About the wing area

There are so many different and interesting ways to design a flying machine that it is almost impossible to define a special rule for each.

It should be noted that some parts of the total wing area produce no additional lift but add manoeuvrability and stability.

This is the reason for the 0.80 factor in the formula for DL x s.

9. EXAMPLES

9.1 Trike (weight shift), single-seater wing area 10,0 m²

empty weight, equipped 110 kg

fuel tank 25 litres

gross weight 200 kg

(a) Minimum speed limit (see paragraph 5)

$$\sqrt{\frac{110+90}{110+105}} \times 65 + 0.964 \times 65 = 62.7 \text{ km/h}$$

(b) Calculated minimum speed (see paragraph 6)

$$V_{\text{mini}} = \sqrt{\frac{207.6 \times 200}{11.45 \times 10}} = 53.5 \text{ km/h}$$

accepted as microlight

9.2 Classical aircraft, two-seater, no high-lift devices

wing area 12,2 m²

empty weight, equipped 250 kg

fuel tank 28 litres

declared gross weight 360 kg

minimum speed 65 km/h (calculated)

(a) Minimum speed limit

$$\sqrt{\frac{250+110}{250+200}} \times 65 + 0.964 \times 65 = 58.14 \text{ km/h}$$

(b) Calculated minimum speed

$$V_{\text{mini}} = \sqrt{\frac{207.6 \times 360}{11.45 \times 12.2}} = 65 \text{ km/h}$$

NOT accepted as microlight

This aircraft is a "false" two-seater, as the declared gross weight will obviously be exceeded in flight. Any attempt of exaggerated empty weight versus gross weight will be discouraged by the provisions of paragraphs 5 and 6.

9.3 Classical aircraft, single-seater

wing area (total) 9,26 m²

empty weight, equipped 160 kg

fuel tank 30 litres

useful weight 105 kg

gross weight 265 kg

(a) Minimum speed limit

$$\frac{160 \times 105}{160 + 105} \times 65 = 65 \text{ km/h}$$

(b) Calculated minimum speed (see illustration)

	Si area	CLi	DLi x Si
S1 : wing + slat	3.40	1.95	6.630
S2 : wing + slat + plain flap (*)	1.20	2.75	3.300
S3 : wing + plain flap (*)	2.80	2.1	5.880
S4 : wing into fuselage	0.6	1.45	0.870
S5 : tailplane	1.26	1.45	1.827

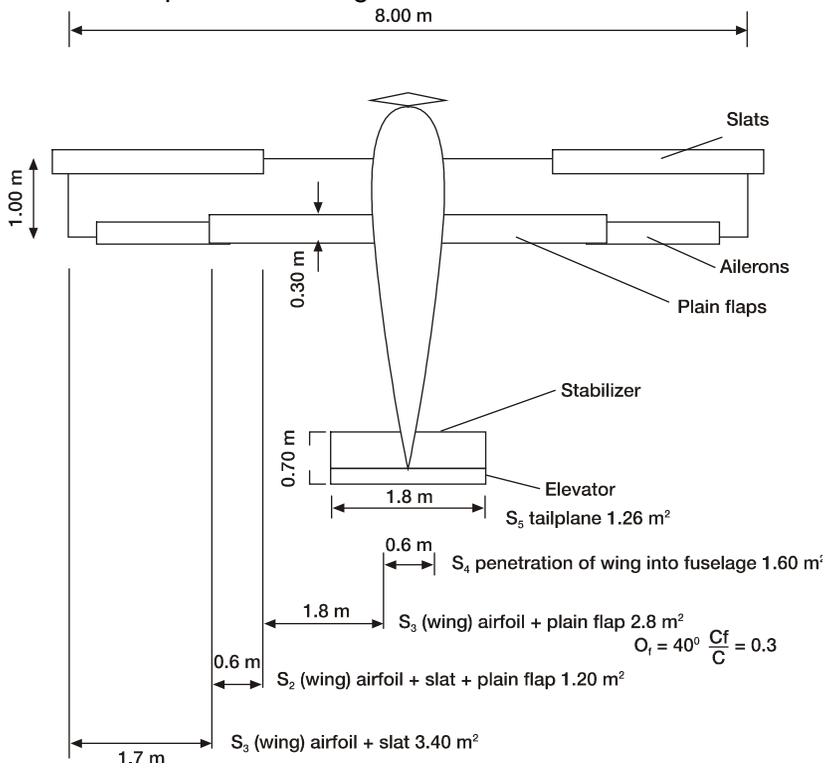
$\frac{C_f}{C}$ (*) $\frac{C_f}{C} = 0.30$ (0.25 considered)

Of = 40° (30° considered)

CL x S = 0.80 (6.63 + 3.39 + 5.88 + 0.87 + 1.827) = 14.806 m²

$$V_{mini} = \sqrt{\frac{207.6 \times 265}{14.806}} = 61 \text{ km/h}$$

accepted as microlight.



SA-CATS 24

Airworthiness Standards: Non-Type Certificated Aircraft

List of technical standards

24.01.2 AIRWORTHINESS

1. Amateur built aircraft
2. Production built aircraft
3. Veteran aircraft
4. Ex-military aircraft
5. Microlight aeroplanes
6. Helicopters
7. Gyroplanes and gyrogliders

8. Gliders, including power-assisted and touring gliders
9. Hang-gliders including powered hang-gliders
10. Paragliders, including powered paragliders
11. Parachutes
12. Manned captive and free balloons
13. Airships
14. Model aircraft
15. Other aircraft
16. Light sport aeroplanes

24.01.4 AIRCRAFT DOCUMENTATION

1. Documents to be submitted for approval

24.01.5 INSTRUMENTS, EQUIPMENT AND PLACARDS

1. Minimum equipment
2. Placards

24.02.2 REQUIREMENTS

1. Proving flights
2. Typical documentation
3. Annual inspection

24.02.3 ISSUING

1. Proving flights

24.03.3 APPROVED ORGANISATIONS

1. Test authorities approved for the certification of hang-gliders, paragliders and parachutes

ANNEXURES

Annex A Checklist for aerodynamic analysis

24.01.2 AIRWORTHINESS

1. AMATEUR-BUILT AIRCRAFT

[Note: The following is applicable to all first designs, which include the prototype of a production-built aircraft (as defined). Where in respect of other categories of aircraft it is prescribed that they shall meet the design standards of amateur- or production-built aircraft, the requirement is that, at one stage or another, these standards were met, and that such can be proven by means of documentation.

The above is of importance especially in respect of the requirements for static testing. E.g.: only the prototype of a production-built aircraft needs to be static tested to ultimate loads. Other first designs need to be tested to limit loads only.

Similarly and unless otherwise stated, proving flights are required for first designs, including the prototype of a production-built aircraft, only. However, a proving test flight for the issue of an authority to fly is always required in respect of each and every individual aircraft.

Attention is also drawn to the fact that as soon as a constructor deviates from an approved build standard the aircraft type approval becomes invalid. Permission for the deviation (modification) needs to be obtained, and (new) proving flights may be required.]

1.1 Engineering design analysis

- (1) The owner of an amateur-built aircraft shall ensure that proof of engineering design analysis for the aircraft or type of aircraft is available, validated and traceable.
- (2) The engineering design analysis for an amateur-built aircraft shall include the following:
 - (a) the design criteria basis;
 - (b) a schedule of how compliance with the design criteria basis is proposed;
 - (c) a predicted performance analysis prior to commencing of proving flights;
 - (d) an aerodynamic analysis appropriate to the type of aircraft, in accordance with the checklist attached as Annex A;
 - (e) a structural analysis appropriate to the type of aircraft; and
 - (f) an analysis of the power plant/s and propeller/s (if applicable) and of the systems appropriate to the type of aircraft.

1.2 Design criteria

In the design of an amateur-built aircraft, the following conditions must be met:

- (1) The aircraft must be able to withstand the maximum loads to be expected in service without any permanent deformation or any deformation which may interfere with the safe operation of the aircraft. See Section 1.7 “Static tests”.
- (2) The aircraft structure must be designed to be able to withstand ultimate loads; that is the limit loads multiplied with a safety factor as specified in the relevant subgroup.
- (3) The aircraft must not have any apparent unsatisfactory features of design and construction.
- (4)
 - (a) It is desirable, but not prescribed, that the constructor makes use of approved aircraft components, such as engines, propellers, wheels, instruments, avionics, electrical components and similar items. Structural components of other aircraft that are still airworthy may also be used.
 - (b) Where items, including materials, not normally approved for aircraft construction are to be used, the constructor shall prove to the Director or, if applicable, to the organisation approved for the purpose in terms of Part 149, as the case may be, that the item, items or materials have characteristics which make them suitable in all respects for the intended purpose and meet the design criteria referred to in Section 1.1(2)(a).
 - (c) The items, referred to in subparagraph (b) above, include engines and propellers, provided that no adverse characteristics of the engine, propeller, or engine-propeller combination are evident.
- (5) The constructor remains fully responsible for the integrity of the aircraft. Any inspections made by an inspector, to determine that such aircraft has been built from acceptable materials and in accordance with normal aircraft construction procedures, are carried out on the basis of the information given by the constructor to the inspector, and by careful study of the relevant drawings.
- (6) Where applicable, suitable means must be provided to minimize the possibility of carburettor icing.
- (7) The complete power plant installation, including the propeller, as installed in the aircraft, must undergo a test sequence as determined in the design criteria referred to in Section 1.1(2)(a).
- (8) Only fuel of a grade that will not cause destructive detonation and will minimize the possibility of vapour locks shall be used.

[Note: Airworthiness standards that are acceptable to the Director include –

- (a) *BCAR Section K ‘Light Aircraft’*
- (b) *FAR 23 ‘Light Aircraft’*
- (c) *JAR-VLA ‘Very Light Aircraft’*
- (d) *AFNOR – The French ACPULS certification*
- (e) *DHV – The German ‘Gute Siegel’ certification*

- (f) USHGA – The US Hang Gliding Association
- (g) AHGF – The Australian Hang Gliding Federation
- (h) SHV – The Swiss Hang Verein certification
 - (i) SAPA – The South African Parachute Association reserve parachute testing procedure
 - (i) DULV.]

1.3 Construction

- (1) The materials used in the construction of the aircraft shall be those normally accepted for aircraft use or their equivalents. If other materials are used, the constructor must be satisfied that they are in all respect satisfactory for the intended purpose. If called upon to do so, he or she shall supply information to the Director or, if applicable, the organization designated for the purpose in terms of Part 149 of the CAR as the case may be, on the qualities of the materials used. When wood (preferably spruce) is used, careful selection of quality is essential. Particular attention must be paid to the direction of the grain.
- (2) The workmanship used in the construction of the aircraft shall be of the highest standard. Constructors must use recognised aeronautical workshop practices. Document FAA AC 43-13 may be used for guidance.
- (3) All welding shall be done by the holder of a Category X 5 welding rating, issued in terms of Part 66 or Part 145 of the CAR. The welder's particulars must be noted in the aircraft logbook.
- (4) The builder or owner of the aircraft shall keep, during the construction process, full recorded details of the process, the materials used, and the dimensions of the parts and components. This is called the build standard of the aircraft.

1.4 Inspections

- (1) An owner, not conversant with the technical requirements concerning the construction of the aircraft, shall have his or her aircraft inspected at various stages of construction by an Approved Person (AP), with the appropriate inspection rating for the type of aircraft, in order to prevent at an early stage the possibility of undesirable features.
- (2) At all times, before the covering of any major component, including the closure of wooden box spars, the structure shall be made available for inspection by an AP, with the appropriate inspection rating for the type of aircraft, who shall be responsible for the completion of paragraph 8 of appropriate, and make the appropriate entry in the airframe logbook of the aircraft.
- (3) When completely assembled, with engine, essential instruments and equipment in place, the aircraft shall again be made available for inspection by an AP, with the appropriate inspection rating for the type of aircraft, who shall be responsible for the completion of paragraph 10 of Form CA24.01.2, and make an appropriate entry in the aircraft logbook certifying the work or inspection carried out.

[Note: The inspections referred to in subparagraphs (2) and (3) are required in order to establish that –

- (a) *workmanship during construction and assembly of components conforms to good aeronautical practices and procedures;*
- (b) *the materials used in the primary structure, the control systems, and in any other stressed parts are, in all respects, suitable for the intended purpose; and*
- (c) *the construction is, in all respects, essentially similar to that of the latest issue of the drawings or altered drawings and build standard.]*

1.5 Determining the mass and centre of gravity of the aircraft

- (1) The empty mass of the aircraft (including the mass of equipment and instruments necessary for the safe operation of the aircraft) and its centre of gravity shall be determined in accordance with Manual AC-43-13-1B and recorded on Form CA24.01.2, to be signed by

the owner, before any proving flight authorization will be issued by the Director or, if applicable, the organization designated for the purpose in terms of Part 149 of the CAR.

- (2) In the case of a weight-shift controlled aircraft, the applicant must provide the centre of gravity and the height difference or angle between the front wheel and the main gear.

[Note: Determining the line of centre of gravity for a weight-shift controlled aircraft is usually done by hanging the aircraft, using the attachment point between wing and the rest of the fuselage.]

1.6 Instruments, equipment and placards

- (1) Instruments

An amateur-built aircraft shall be equipped with the instruments prescribed in Part 91, Part 94 and Part 96, as applicable for the operation of the particular type of aircraft, unless exempted in terms of this Part.

- (2) Equipment

An amateur-built aircraft shall be equipped as prescribed in Part 91, Part 94 and Part 96, as applicable for the operation of the particular type of aircraft, unless exempted in terms of this Part.

- (3) Placards

The following placards shall be installed in an amateur-built aircraft, unless exempted in terms of this Part:

- (a) In a prominent position in full view of the pilot and all passengers, and in capital letters of not less than 3 mm high:

WARNING

AMATEUR-BUILT AIRCRAFT

THIS AIRCRAFT IS NOT REQUIRED TO COMPLY WITH ALL THE REGULATIONS FOR TYPE-CERTIFICATED AIRCRAFT

TO BE OPERATED FOR SPORT OR RECREATIONAL PURPOSES ONLY

YOU FLY IN THIS AIRCRAFT AT YOUR OWN RISK

(or the relevant other reference for the class or sub-group of the particular non-type certificated aircraft, such as “PRODUCTION-BUILT AIRCRAFT”, “MICROLIGHT AIRCRAFT”, “VETERAN AIRCRAFT”, “EX-MILITARY AIRCRAFT”):

Provided that the note “to be operated for sport or recreational purposes only” may be left off if the aircraft has been approved for commercial air transport operations in terms of Part 96;

- (b) on the instrument panel(s):

OPERATE UNDER VMC ONLY

MAXIMUM PERMISSIBLE AIRSPEED kts IAS

MAXIMUM PERMISSIBLE ENGINE SPEED rpm

MAXIMUM PERMISSIBLE MASS kg

Any additional limitation indication such as temperature, pressure, which the Director or, if applicable, the organization designated for the purpose in terms of Part 149 of the CAR as the case may be, deems necessary:

Provided that the note “Operate under VMC only” may be left off if the aircraft has been approved for instrument flight;

- (c) a fire-proof plate on the instrument panel, containing the following information:

- (i) Name of the constructor or manufacturer;
- (ii) Aircraft type and model;
- (iii) Aircraft registration letters and serial or build number;
- (iv) Engine make and model and horse power;
- (v) Date of manufacture.

- (4) Exemptions

The following non-type certificated aircraft are exempted from the requirements prescribed in terms of subparagraph (3):

- (a) hang-gliders, including powered hang-gliders;
- (b) unmanned balloons;
- (c) model aircraft;
- (d) paragliders, including powered paragliders and paratrikes; and
- (e) single-seat aircraft, unless used for "hire and fly".

1.7 Static tests

- (1) Static tests are to be carried out on the aircraft before its first flight.
- (2) The primary aircraft structure shall be tested to the limit loads for which the aircraft will be registered.
- (3) A designated airworthiness representative shall witness the static test and sign the static test report, referred to in subparagraph (5).
- (4) The aircraft may not have any detrimental permanent deformation or any deformation during and after the static test that may interfere with the safe operation of the aircraft. In addition, there shall be full and free movement of the controls while under maximum limit loads.
- (5) A static test report shall be submitted to the Director or, if applicable, the organization designated for the purpose in terms of Part 149 of the CAR as the case may be, with the relevant documentation for the application of a proving flight authority.

1.8 Proving flights

- (1) On conclusion of the static test program, the aircraft shall undergo proving flights to determine performance, handling and strength substantiation to the extent set out in subparagraph (4).
- (2) Before any proving flights are undertaken, the owner of the aircraft shall apply for a Proving Flight Authority as per CAR 24.02.1 and be in the possession of such a Proving Flight Authority, issued in terms of CAR 24.02.3(4).
- (3) The following conditions shall apply to any proving flights:
 - (a) The flights shall be conducted with the aircraft loaded to various masses and ultimately to within 2% of the aircraft's proposed maximum all-up mass (MAUM) in order to determine the following:
 - (i) climb performance;
 - (ii) the altitude at which the rate of climb falls to 50 feet per minute. For multi-engine aircraft, firstly with all engines operating and then with the critical engine feathered or stopped as the case may be;
 - (iii) lateral, longitudinal and directional stability and stalling characteristics;
 - (iv) the maximum level flight speed attainable;
 - (v) the engine operating conditions (temperatures, carburettor icing tendencies);
 - (vi) the accuracy of the airspeed indicating system; and
 - (vii) such other factors as the Director or, if applicable, the organisation designated for the purpose in terms of Part 149 of the CAR as the case may be, considers necessary.
 - (b) The results so obtained above shall be entered in the airframe logbook. This information must be as complete as possible in order to provide sufficient data to the new owner in case of a change of ownership.
 - (c) A final flight test shall be carried out at the maximum airspeed (Vne) for which the owner wants the aircraft to be approved. The aircraft structure shall then be subjected to the maximum acceleration forces (limit loads), for which it was designed.
 - (d) For the flight, referred to in subparagraph (c) above, the following shall apply:
 - (i) a recording accelerometer in working condition shall be carried;
 - (ii) where possible, the pilot shall wear a parachute; and

- (iii) arrangements shall be made to permit easy evacuation of the aircraft in the case of a mishap.
 - (e) The maximum airspeed, referred to in subparagraph (c), shall be chosen by the owner but must at least be 10% more than the maximum level flight speed attainable.
 - (f) The maximum acceleration chosen varies with the type of operation to be conducted, and the minimum acceptable to the Director or, if applicable, the organization designated for the purpose in terms of Part 149 of the CAR as the case may be, will be in accordance with the limit loads as stated for each subgroup of aircraft.
- (4) During the course of proving flights, the following flight experience shall be gained in respect of the aircraft:
- (a) a minimum of 25 hours of flight time when an approved or type-certificated aircraft engine is installed; or
 - (b) a minimum of 40 hours of flight time when any other engine is installed; or
 - (c) in the case of the first importation of a production-built aircraft, a minimum of 20 hours, or more at the discretion of the Director; and
 - (d) such other tests or flight experience as the Director considers necessary.
- (5) During the course of the proving flights, a record shall be kept of the flight history of the aircraft. The following information shall be recorded on Form CA24.01.2:
- (a) the duration of each individual flight counted towards the flight times required in terms of subparagraph (4);
 - (b) a statement of the purpose of each flight; i.e. determining stall characteristics, controllability, or proficiency in preparation for the final flight test as per subparagraph (3)(c);
 - (c) details of any mishaps, incidents or defects (no matter how trivial these may appear to be), and of any other experience encountered and not considered to be entirely normal; and
 - (d) details of all repairs and modifications made to the aircraft, its engines or installed equipment, which updates the build standard.

[Note: Guidance material on how to conduct proving flights can be found in FAA AC 90-89 "Amateur-built Aircraft Flight Testing Handbook" issued by the FAA in conjunction with the US Experimental Aircraft Association (EAA).]

1.9 Noise standards

Any person who applies for the issue of an Authority to Fly for a non-type certificated aircraft shall comply with the necessary changes with the appropriate noise standards as prescribed in Part 36 of the regulations.

1.10 Engine emission and fuel venting certification

Any person who applies for the issue of an Authority to Fly for a non-type certificated aircraft shall comply with the necessary changes with the appropriate provisions of Part 34 of the regulations.

1.11 Hang-glider towing installations

- (1) The requirements of this subsection are applicable where approval for the aerotowing of a single hang-glider is intended.
- (2) The maximum all-up mass of the hang-glider to be aerotowed, including pilot and all equipment, shall be selected by the applicant but shall not exceed 200 kg.
- (3) The maximum hang-glider towing speed VT shall be selected by the applicant. VT shall be at least 1,3 VSI, where VSI is the stalling speed of the aeroplane in the cruising configuration without a hang-glider in tow.
- (4) The aeroplane shall have proof and ultimate factors of safety of not less than 1,0 and 1,5 respectively, when loads equal to 1,2 of the nominal strength of the weak link are applied through the towing hook installation in the conditions shown below, simultaneously with the

loads arising from the most critical normal accelerations at the speed VT within the limits of the limit and ultimate loads set for the aeroplane.

The conditions applicable are:

- (i) the speed is assumed initially to be at the maximum glider towing speed VT; and
- (ii) the load at the towing hook installation is assumed to be acting in each of the following directions, relative to the longitudinal centre line of the aeroplane:
 - (aa) horizontally backwards
 - (bb) backwards and upwards at 40° to the horizontal
 - (cc) backwards and downwards at 20° to the horizontal
 - (dd) horizontally backwards and 25° sideways in both directions
- (5) The towing hook shall be of a quick-release type. It shall be established that with loads equal to 10 percent and 180 percent of the nominal strength of the weak link is applied to the towing hook in each direction prescribed in subparagraph (4) and the release control is operated:
 - (a) the cable will be released;
 - (b) the released cable is unlikely to cause damage to, or become entangled with any part of the aeroplane; and
 - (c) the pilot effort required shall not be less than 20 Newton or greater than 100 Newton.
- (6) The release control shall be so located that it can be operated by the pilot without having to release any of the primary controls.
- (7) The maximum strength of any weak link which may be interposed in the towing cable shall be established. For the determination of loads to be applied for the purpose of this subsection, the strength of the weak link shall not be less than 900 Newton.

[Note: Further information may be found in the Australian Airworthiness Design Requirements for weight-shift controlled aeroplanes, and in the book 'Towing Aloft' by Dennis Pagen and Bill Bryden, ISBN 0-936310-13-8, published by Sport Aviation Publications, P O Box 101, Mingoville, PA 16856 USA.]

2. PRODUCTION-BUILT AIRCRAFT

[Note: Attention is drawn to the note under section 1 "Amateur-built aircraft" section 2 prescribes the additional requirements to be met for the design to qualify for aircraft type approval in terms of CAR 24.02.10. Additional requirements are generally in respect of the prototype (first design) aircraft only.]

2.1 Engineering design analysis

The engineering design analysis for a production-built aircraft shall –

- (a) for the prototype meet the provisions of Section 1.1; and
- (b) include for a production design, after successful completion of the proving flights with the prototype, with reference to the design analysis submitted in terms of paragraph (2) of Section 1.1, and based on the results of all proving flights, the following:
 - (i) recorded, validated performance analysis for complete flight and mass envelope;
 - (ii) recorded, validated aerodynamic analysis for complete flight and mass envelope;
 - (iii) recorded, validated and detailed structural analysis;
 - (iv) validated and detailed production status engineering design for each part, component and assembly of the aircraft; and
 - (v) recorded, validated and proven power plant and propeller (if applicable) and systems analysis for the production status power plant or plants and systems.

2.2 Aircraft type approval

- (1) The requirements for the construction, design, flight performance, power plant, operational and continued airworthiness shall be based on either the FAR Part 23, FAR Part 27, BCAR, JAR or equivalent requirements, or any other standard as prescribed for a particular sub-

- group. In all cases, the requirements shall be not less than the requirements prescribed for amateur-built aircraft in Section 1.
- (2)
 - (a) In respect of an imported production-built aircraft, the build standard to which it was manufactured, shall be submitted with the documents for registration of the aircraft. This build standard is considered confidential information and the foreign manufacturer may send it directly to the Director or, if applicable, the organization designated for the purpose in terms of Part 149 of the CAR, as the case may be. Where insufficient data for evaluation by the Director is submitted, a full proving flight programme may be demanded.
 - (b) Notwithstanding the provisions of subparagraph (a), the Director may, but is not compelled to waive these requirements in the case of a production-built aircraft approved by an appropriate authority.
 - (c) The complete build standard of a locally to be manufactured production-built aircraft shall be submitted to the Director or, if applicable, the organisation designated for the purpose in terms of Part 149, as the case may be, as part of the application for the Authority to Fly of the prototype.
 - (d) Any revision to the build standard, made at a later stage, shall be submitted by the organisation approved in terms of Subpart 3 of Part 24, or its local agent, to either the Director or the designated organisation, as the case may be, for evaluation.
 - (3) In the case of the prototype of a production-built aircraft, static tests shall have been carried out to ultimate loads. The ultimate static test shall show that the aircraft equals or exceeds a safety factor of 1,5.
 - (4) Except as provided for in Section 1.8(4)(c), following the grant of an Authority to Fly to the prototype aircraft, no static tests or proving flights shall be required for any subsequently manufactured or assembled production-built aircraft of the type, provided that an inspection of each individual aircraft shall be required to show compliance with the approved build standard. An appropriately rated test pilot shall carry out a final flight test on each individual aircraft to satisfy the requirements for the issue of an Authority to Fly to that particular aircraft.
 - (5) In the case of the first locally assembled imported production-built aircraft it shall be test flown by a pilot who is the holder of a valid Class I or Class II test flight rating, to establish whether the aircraft meets the performances as advertised in the Flight Manual, and whether the aircraft may be safely operated under the weather and geographic conditions prevailing in South Africa. Additional proving flights in terms of Section 1.8(4)(c) may be conducted by an appropriately rated pilot.
 - (6) Should the test flights, referred to in subparagraph (5), be unsatisfactorily, and an Authority to Fly refused on the basis thereof, no further import permits shall be granted for that type of production-built aircraft, unless revisions to the build standard or new performance test data have been submitted and approved by the Director or, if applicable, the organisation approved for the purpose in terms of Part 149, as the case may be, suggesting that the shortcomings have been corrected. The provisions of subparagraph (5) shall apply with the necessary changes to the first aircraft imported following any modifications.
 - (7) The organisation approved in terms of Subpart 3 of Part 24 to manufacture or assemble a production-built aircraft for which the prototype has been issued with an Authority to Fly shall in respect of each further aircraft to be built or assembled ensure that –
 - (a) materials, parts and components used conform to those approved for the building standard;
 - (b) a proper inspection and test flight programme is in place to satisfy the requirements of subparagraph (4);
 - (c) each aircraft is available for inspection by the Director or the organization approved for the purpose in terms of Part 149, as the case may be; and

- (d) at all times the technical data and drawings of the build standard, necessary to determine whether the aircraft and its components conform to the build standard, are available at the place of manufacture or assembly of the aircraft.
- (8) Where a production-built aircraft has been delivered in the form of a kit for self-assembly, its owner shall meet the provisions of Section 1.3 and Section 1.4. Any deviation from the build plan or assembly instructions shall be considered to be a modification, requiring the approval of the Director, or the organisation designated for the purpose in terms of Part 149, as the case may be.
- (9) Where an aircraft is built locally according to the building standard of a production-built aircraft for which an Authority to Fly already has been issued, the provisions of this technical standard, except for subparagraph (3), shall with the necessary changes apply.

3. VETERAN AIRCRAFT

3.1 General

- (1) The owner of a veteran aircraft shall ensure that the aircraft is maintained according to –
 - (a) the latest maintenance manuals and schedules approved for the aircraft by the manufacturer; and
 - (b) any additional maintenance instructions issued by the Director.
- (2) Whenever the owner of a veteran aircraft intends to make modifications to a veteran aircraft that would have been considered to be a change to the type certificate, the owner shall comply with the provisions of SubPart 3 of Part 21 of the CAR, before applying for a new Authority to Fly.
- (3) The issuing of an Authority to Fly is dependent on the aircraft meeting acceptable airworthiness standards, as prescribed in this Document. Where the service life of the aircraft, as determined by the original manufacturer, has expired, the owner shall provide proof that the service life can be safely extended, and prescribe in his or her approved maintenance schedule or maintenance control manual, as the case may be, the procedures to be followed in monitoring the aircraft's critical components.

3.2 Aircraft documentation

- (1) The owner of a veteran aircraft shall submit to the Director copies of the manufacturer's original maintenance and operating manuals, should the Director not already be in the possession of such documents, and shall submit to the Director for his or her approval any proposed amendments to such manuals.
- (2) Where no such manuals can be produced, the owner shall submit to the Director for his or her approval any document that will support the development of replacement manuals.

4. EX-MILITARY AIRCRAFT

4.1 General

As many ex-military aircraft are of complex design and have equipment and systems that are more complicated and demanding than civil aircraft of comparable mass and size, and which equipment or systems may require particular skills, not normally found amongst licensed AMEs or AMOs, specialist facilities and equipment may have to be provided or arranged for by the owner of such aircraft, and specialist maintenance personnel identified and contracted for the maintenance of the aircraft, before the granting of, and as a condition of an Authority to Fly.

4.2 Maintenance support requirements

- (1) Before permission will be granted for the importation of an ex-military aircraft –
 - (a) the following information, to the extent available, shall be submitted to the Director:
 - (i) General:
 - (aa) country of manufacture
 - (bb) number of aircraft of type manufactured
 - (cc) last year of manufacture

- (dd) organisations that operate or have operated the aircraft type
 - (ee) accident history of aircraft type, excluding those caused by military operations
 - (ff) primary mission purpose; e.g. trainer, fighter, bomber, etc.
 - (gg) standard equipment list
 - (hh) mass and balance information
 - (ii) list of documentation available
 - (jj) manufacturer's support available
 - (kk) spare part position
 - (ii) Aircraft specific:
 - (aa) date of manufacture
 - (bb) hours flown
 - (cc) flight cycles
 - (dd) service life
 - (ee) accident history, including operational damage incurred
 - (ff) date last flown
 - (gg) current location
 - (hh) modification status
 - (ii) status of aircraft, engine and propeller logbooks or similar documents reflecting the aircraft's history
 - (jj) current equipment list;
 - (b) the Director may require the applicant to pay for the costs of an inspector to visit the current location of the aircraft, and the original manufacturer or the current operator. The purpose of the visit would be to inspect the general condition of the aircraft, and to validate the maintenance, training and operational requirements for the aircraft;
 - (c) the Director will investigate the aircraft type and its complexity, to determine the level of equipment and technical skill required to maintain the aircraft to an airworthy standard.
- (2) The Director may approve an aircraft maintenance engineer or an aviation maintenance organisation licensed in terms of Part 66 or Part 145, as the case may be, to carry out maintenance on the aircraft and release it for flight, if such person or organisation has demonstrated to the satisfaction of the Director that any of the requirements, determined by the investigation referred to in paragraph (1)(c), can be met.
 - (3) In the case of an ex-military jet aeroplane, an ex-military aeroplane with a maximum certificated mass in excess of 5 700 kg, or an ex-military helicopter with a maximum certificated mass in excess of 3 175 kg, the owner or operator shall draw up and have approved by the Director a Maintenance Control Manual in accordance with the provisions of Technical Standard 43.02.3 in Document SA-CATS 43. The Maintenance Control Manual shall include the Memorandum of Agreement between the owner of the aircraft and the approved maintenance personnel or organisations, approved by the Director for the purpose.
 - (4) The owner shall designate one person who will be responsible for the maintenance oversight, the liaison between owner and maintenance personnel, and the liaison with the Civil Aviation Authority on airworthiness matters.
 - (5) The owner of ex-military jet aircraft shall ensure that all the service data of the aircraft, both past and present, be kept up to date and remain available for scrutiny inspections.
 - (6) In respect of aircraft without historical service data the owner shall submit to the Director, as part of the Maintenance Control Manual, a schedule which satisfies the Director that the "on-

condition” airworthiness of the aircraft is ensured. Such schedule shall have been drawn up by a suitably qualified organisation approved in terms of Part 147 of the CAR.

- (7) Where an ex-military aircraft is still supported by its original manufacturer, the owner shall comply with any airworthiness directives or similar instructions issued by the manufacturer. It is the owner’s responsibility to arrange for a technical subscription service for him or herself, as well as for the Civil Aviation Authority.

1.3 Specialised equipment and systems

- (1) Many ex-military aircraft contain specialised technical equipment or systems, particular either to the role of the aircraft or the conditions under which it was designed to operate, or both. From a design consideration, the Director may grant an Authority to Fly on the basis of a reasonable military service accident record but discounting military action and high-risk training.
- (2) Specialised systems include:
 - (a) oxygen, either liquid or gaseous;
 - (b) pressurisation;
 - (c) ejection seats;
 - (d) flying clothing;
 - (e) emergency and back-up systems, brake-parachutes etc.;
 - (f) instrumentation for flight under Instrument Flight Rules (IFR);
 - (g) external fuel tanks, pylons etc.;
 - (h) digital flight systems;
 - (i) electronic flight instrument system.
- (3) To maintain the service record under civil control, the aircraft shall be maintained as far as possible to the standards used in military service. Its minimum equipment list, required in terms of Part 94 or Part 96, shall prescribe which equipment shall be serviceable before the commencement of a particular operation.
- (4) In order to support these foregoing principles, the aircraft shall be maintained in accordance with the instruction manuals used whilst in military service (e.g.: Aircrew Notes, Ministry of Defence Maintenance Schedules, etc.). Where considered necessary for a safe operation in the civil environment, the Director may issue additional instructions. All such manuals and additional instructions shall be listed in the Maintenance Control Manual.
- (5) Where specialised equipment, facilities or personnel are required to ensure the serviceability of the equipment (e.g. ejection systems), these shall be provided by approved personnel or organisations as referred to in subparagraph (2) of section 4.2.
- (6) Digital Flight Systems and Electronic Flight Instrument Systems
Where an aircraft has digital flight systems or electronic flight instrument systems (EFIS) in whole or in part, their use shall require the approval of the Director.
- (7) Modifications
The disarming or removing of jettison circuits, gun sights or auxiliary equipment is considered to be modifications, requiring the approval of the Director.

5. MICROLIGHT AEROPLANES

5.1 Design standards

Non-type certificated microlight aeroplanes shall meet the design criteria of either amateur-built aircraft or production-built aircraft.

5.2 Classification perimeters

- (1) For an aeroplane to be classified as a microlight aeroplane, the following perimeters need to be met:
 - (a) minimum flying speed at maximum take-off mass to be less than 65 km/h;
 - (b) maximum take-off mass of –
 - (i) 300 kg for a single-seater landplane;

- (ii) 330 kg for a single-seater amphibian or seaplane;
 - (iii) 450 kg for a two-seater landplane; or
 - (iv) 495 kg for a two-seater amphibian or seaplane.
- (2) For the purposes of establishing conformity with subparagraph (1)(b), the following payloads are to be included:
- (a) Per seat: 84 kg.
 - (b) The lesser of full fuel load or –
 - (i) 15 kg in the case of a single-seater; or
 - (ii) 22 kg in the case of a two-seater.
- (3) The perimeters referred to in subparagraph (1) apply also to aircraft that are foot-launched (hang-gliders) or having a wing of a non-rigid structure (paragliders).

6. HELICOPTERS

6.1 Design standards

- (1) Non-type certificated helicopters shall meet the design criteria of either amateur-built aircraft or production-built aircraft.
- (2) Design loads:
- (a) The load conditions and requirements of FAR 27 Subpart C – Strength requirements (or its equivalent) shall be considered in the design of the aircraft.
 - (b) FAR Part 27 paragraphs 27.301, 27.309, 27.321, 27.337, 27.339, 27.3441, 27.361, 27.547 and 27.549 shall be complied with.

7. GYROPLANES AND GYROGLIDERS

7.1 Design standards

- (1) Non-type certificated gyroplanes and gyrogliders shall meet the design criteria of either amateur-built aircraft or production-built aircraft.
- (2) A rotor brake and rotor RPM gauge shall be installed.
- (3) Design loads:
- (a) The load conditions and requirements of the British BCAR section S and of FAR 27 Subpart C – “Strength Requirements” (or their equivalent) shall be considered in the design of the gyroplane or gyroglider.
 - (b) FAR Part 27 paragraphs 27.301, 27.309, 27.321, 27.337, 27.339, 27.3441, 27.361, 27.547 and 27.549, as applicable to gyroplanes and gyrogliders, shall be complied with.

8. GLIDERS, INCLUDING POWER-ASSISTED AND TOURING GLIDERS

8.1 Design Standards

- (1) Non-type certificated gliders, including power-assisted and touring gliders, shall meet the design criteria of either amateur-built aircraft or production-built aircraft, or the requirements of Part 22 of the JAR, or of FAR 31.
- (2) The wing loads of power-assisted and touring gliders shall not exceed the following:
- (a) mass
 - (b) $(\text{span})^2 \leq 3 \text{ kg/m}^2$
- (3) The maximum all-up mass of –
- (a) a glider shall not exceed 750 kg; and
 - (b) a power-assisted and a touring glider shall not exceed 850 kg.
- (4) The seating capacity of any glider shall not exceed two.

9. HANG-GLIDERS, INCLUDING POWERED HANG-GLIDERS

9.1 Design Standards

Non-type certificated hang-gliders, including powered hang-gliders, shall meet the design criteria of either amateur-built aircraft or production-built aircraft to the extent applicable.

9.2 Classification perimeters

- (1) Hang-gliders shall meet the same classification perimeters to the extent applicable as set for microlight aeroplanes. These perimeters are:
 - (a) minimum flying speed at maximum take-off mass to be less than 65 km/h;
 - (b) maximum take-off mass of –
 - (i) 300 kg for a single-seater hang-glider; and
 - (ii) 450 kg for a two-seater hang-glider.
- (2) For the purposes of establishing conformity with subparagraph (1)(b), the following payloads are to be included:
 - (a) Per seat: 84 kg.
 - (b) The lesser of full fuel load or –
 - (i) 15 kg in the case of a single seater; and
 - (ii) 22 kg in the case of a two-seater.

9.3 Towing Equipment Standards

- (1) Hang-gliders are often launched by means of any of these five methods of towing:
 - (a) Static tow line
 - (b) Pay-out winch and platform launch
 - (c) Pull-in or static winch
 - (d) Reflex static winch
 - (e) Aerotow
- (2) All releases fitted to hang-gliders must release at any angle and at any load that may be applied during tow. All releases must be infallible and must only release upon pilot activation (with the exception of automatic release systems which are sometimes used in training). Weak links built into the bridle that trigger release are not recommended. Rope or string releases are not recommended as string loops used in these releases may twist and fail to release.
- (3) The maximum all-up mass of a hang-glider to be aerotowed, including pilot and all equipment, shall not exceed 200 kg.
- (4) Full details on acceptable standards may be found in the Towing Procedures Manual of the Hang-Gliding Federation of Australia, and in the book “Towing Aloft” by Dennis Pagen and Bill Bryden, ISBN 0-936310-13-8, published by Sport Aviation Publications, P O Box 101, Mingoville, PA 16856 USA.

9.4 Approved design standards

The design standards issued by the approved organisations listed in Technical Standard 24.04.3 are acceptable to the Director.

10. PARAGLIDERS, INCLUDING POWERED PARAGLIDERS

10.1 Design Standards

- (1) Non-type certificated paragliders, including powered paragliders, shall meet the design criteria of either amateur-built aircraft or production-built aircraft to the extent applicable.
- (2) Design loads:
 - (a) To the extent applicable, the load conditions and requirements of the British CAR section 6 (or its equivalent) shall be considered in the design, in addition to UK CAA Paper No. 848.
 - (b) A stress analysis of the canopy shall be submitted.

10.2 Classification perimeters

- (1) Paragliders shall meet the same classification perimeters to the extent applicable as set for microlight aeroplanes. These perimeters are:
 - (a) minimum flying speed at maximum take-off mass to be less than 65 km/h;
 - (b) maximum take-off mass of –
 - (i) 300 kg for a single-seater paraglider; and
 - (ii) 450 kg for a two-seater paraglider.

- (2) For the purposes of establishing conformity with subparagraph (1)(b), the following payloads are to be included:
 - (a) Per seat: 84 kg.
 - (b) The lesser of full fuel load or –
 - (i) 15 kg in the case of a single seater; and
 - (ii) 22 kg in the case of a two-seater.

10.3 Towing Equipment Standards

- (1) Paragliders are often launched by means of any of these four methods of towing:
 - (a) Static tow line
 - (b) Pay-out winch and platform launch
 - (c) Pull-in or static winch
 - (d) Reflex static winch
- (2) All releases fitted to paragliders must release at any angle and at any load that may be applied during tow. All releases must be infallible and must only release upon pilot activation (with the exception of automatic release systems which are sometimes used in training). Weak links built into the bridle that trigger release are not recommended. Rope or string releases are not recommended as string loops used in these releases may twist and fail to release.
- (3) Full details on acceptable standards may be found in the Towing Procedures Manual of the Hang Gliding Federation of Australia, and in the book “Towing Aloft” by Dennis Pagen and Bill Bryden, ISBN 0-936310-13-8, published by Sport Aviation Publications, P O Box 101, Mingoville, PA 16856 USA.

11. PARACHUTES

11.1 Design Standards

- (1) Main parachutes shall be manufactured by an organisation, approved in terms of Part 147 or Part 148 to standards developed in-house.
- (2) Reserve parachutes shall meet the design standards of ZS-TSO C27(c) or later version.
- (3) Harnesses for pilot and passenger, and for the reserve parachute shall –
 - (a) meet the design standards of ZS-TSO C27(c) or later version; or
 - (b) have been approved by an authority recognised for the purpose by the Director.

12. MANNED CAPTIVE AND FREE BALLOONS

12.1 Design Standards

- (1) Non-type certificated manned balloons shall meet the design criteria of either amateur-built aircraft or production-built aircraft.
- (2) Design loads:
The load conditions and requirement of the US FAR 31 Subpart C “Strength Requirements” document or its equivalent shall be complied with.

13. AIRSHIPS

13.1 Design Standards

- (1) Non-type certificated airships shall meet the design criteria of either amateur-built or production-built aircraft.
- (2) Design loads:
 - (a) The load conditions and requirements of FAR 31 Subpart C “Strength Requirements” (or its equivalent), as well as those of BCAR section Q or FAA P-8110-2, Change 1 “Airship Design Criteria”, that are applicable, shall be complied with.
 - (b) AC 21.17-1A, Change 1, provides acceptable criteria for the design of non-rigid airships.

14. MODEL AIRCRAFT

14.1 General Characteristics of Model Aircraft

- (1) The general characteristics of model aircraft are set by the Federation Aeronautique Internationale and may be found in section 4 of its document ABR, Part 4 C.
- (2) Unless otherwise stated, model aircraft shall meet the following general specifications:

- (a) maximum flying weight with fuel 25 kg;
 - (b) maximum surface area 5 m²;
 - (c) maximum loading 5 kg/m²;
 - (d) maximum swept volume of piston motor(s) 250 cm³;
 - (e) electric motors power source maximum no-load voltage 42 volts;
 - (f) metal-bladed propellers are prohibited.
- (3) Model helicopters shall meet the following general specifications:
- (a) Maximum weight with fuel 5 kg;
 - (b) maximum swept area of the lifting rotor(s) counting only once any superimposed areas 3 m²;

Provided that in the case of co-axial model helicopters whose rotors are further than one rotor diameter apart, the total area of both rotors is counted;

- (c) piston motor swept volume maximum 10 cm³;
 - (d) rubber motor no restrictions.
- (4) Free-flying model aircraft Free-flying model aircraft that are neither radio- or line-controlled shall not have a maximum mass exceeding 5 kg.
- (5) Noise limitations:
- (a) Noise limitations shall be applied to powered model aircraft categories, with 96 dB (A) at 3 meters for any category, which does not have approval for any other noise rule. Specific noise measuring procedures are to be developed by relevant national body in which model aircraft operators are associated.
 - (b) Noise limits do not apply to model aircraft with electric motors.

15. OTHER AIRCRAFT

15.1 Design Standards

Non-type certificated aircraft other than those provided for in the above sections 3 to 14 shall meet the design criteria of either amateur-built aircraft or production-built aircraft.

16. LIGHT SPORT AEROPLANES

16.1 Design standards

Non-type certificated light sport aeroplanes shall meet the design criteria of either amateur-built aircraft or production built aircraft.

16.2 Classification parameters

- (1) For an aeroplane to be classified as a light aeroplane, the following parameters need to be met:
- (a) Maximum gross take-off mass of:
 - (i) 600 kilograms for land planes;
 - (ii) 650kg for amphibian and sea planes.
 - (b) Maximum stall speed with no flaps deployed at MAUW 45 knots;
 - (c) Maximum speed in level flight maximum continuous power 150 knots;
 - (d) Two place maximum;
 - (e) Single, non-turbine engine;
 - (f) Unpressurised cabine.
- (2) For the purpose of establishing conformity with sub-paragraph (1) (a), the following payloads are to be included:
- (a) 80 kilograms per seat;
 - (b) Full fuel tank or 40kg (whichever is greater);
 - (c) Luggage mass as specified by the manufacturer;
 - (d) Safety rescue system if one is fitted;
 - (e) All standard and additional equipment and systems as fitted.

24.01.4 AIRCRAFT DOCUMENTATION

1. Documentation to be submitted for approval

- (1) The owner of a non-type certificated aircraft, or the manufacturer of a production-built aircraft, as the case may be, classified in the subparagraphs (a) to (g) of CAR 24.01.1(2) of shall submit to the Director or, if applicable, the organization designated for the purpose in terms of Part 149 of the CAR as the case may be, for approval aircraft documentation in the form of a Flight Manual and a Maintenance Schedule. These documents shall be submitted after all static and proving flight tests in terms of Sections 1.9 and 1.10 have been carried out satisfactorily.
- (2) The flight manual shall describe the flight control and flight limitations of the aircraft and cover both normal and emergency procedures.
- (3) The contents shall be in the following order:
 - (a) general;
 - (b) limitations;
 - (c) normal procedures;
 - (d) emergency procedures;
 - (e) performance data;
 - (f) mass and balance;
 - (g) optional equipment and changes to above sections due to incorporation of optional equipment.
- (4) The general section shall contain the following information:
 - (a) aircraft make;
 - (b) aircraft model;
 - (c) aircraft serial or build number;
 - (d) aircraft registration number;
 - (e) name of the original constructor of the aircraft; and
 - (e) include a colour photo of the particular aircraft showing the nationality and registration marks.
- (5) The Maintenance Schedule shall be in the format prescribed in regulation 24.03.1, and shall describe which items are to be inspected in what manner during mandatory inspections.
- (6) The manufacturer of a production-built aircraft, in addition to the documents prescribed in paragraph (1), shall submit for approval a maintenance manual and a part list. The maintenance manual shall describe all maintenance required to ensure continued airworthiness of the aircraft. The part list shall identify the various parts used in the manufacture of the aircraft, to facilitate part replacement in accordance with the build standard.

24.01.5 INSTRUMENTS, EQUIPMENT AND PLACARDS

1. Minimum equipment

- (a) The minimum equipment prescribed in CAR 24.01.5 for each sub-group of aircraft shall be the minimum equipment as prescribed by CAR 24.01.2(5)(a) and Part 91, Part 94 or Part 96 to the extent applicable to the operation of the particular type of non-type certificated aircraft.
- (b) Whenever a non-type certificated aircraft is used for training purposes, a suitable and serviceable communication system between instructor and student shall be available for use.
- (c) For each seat, approved types of safety belts or harnesses must be installed in accordance with FAA AC 43-13.2A.

2. Placards

Hang-gliders, paragliders and parachutes shall carry a label, stating the manufacturer's name, date of manufacture, a serial number, the quality controller's signature, pilot mass rating and, if applicable, the class rating.

24.02.2 REQUIREMENTS

1. Proving Flights

The requirements in respect of proving flights and of performance, handling and strength tests are those prescribed in Section 1.8 for the respective sub-groups of aircraft.

2. Typical documentation

Typical documentation required to show compliance with the provisions of subregulation (1) of CAR 24.02.2 will be the foreign certificates of de-registration and permits, or a certificate of non-registration, as well as the standards and substantiation to which the aircraft was built and approved.

3. Annual Inspection

The annual inspection, referred to in CAR 24.02.2(5)(d) is the annual inspection prescribed in SA-CATS 44.

24.02.3 ISSUING

1. Proving Flights

The requirements in respect of proving flights are those prescribed in Section 1.8 for the respective sub-groups of aircraft.

24.03.3 APPROVED ORGANISATIONS

1. Test authorities approved for the certification of hang-gliders, paragliders and parachutes.

The following test authorities have been approved by the Director or the organisation designated for the purpose in terms of Part 149, as the case may be, for the certification of hang-gliders, paragliders and parachutes:

- (a) AFNOR (The French ACPULS certification)
- (b) AHGF (The Australian Hang Gliding Federation)
- (c) BCAR (British Civil Aviation Regulations)
- (d) DHV (The German GUTE SIEGEL certification)
- (e) DULV (Deutsche Ultraliecht Verein)
- (f) HMA (US Hang-gliding Manufacturers Association)
- (g) SAPA (The South African Parachute Association reserve parachute testing procedure)
- (h) SHV (The Swiss Hang Verein certification)
- (i) USHGA (The United States Hang Gliding Association)

ANNEXURES

Annex A

CHECKLIST FOR AERODYNAMIC ANALYSIS

(Include as applicable)

1. AEROPLANES

- 1.1 Aeroplane type
- 1.2 Intended aeroplane application
- 1.3 Aeroplane configuration:
 - (a) Wings
 - (b) Fuselage
 - (c) Empennage
 - (d) Power plant range
- 1.4 Wing details:
 - (a) Plan form
 - (b) Wing span
 - (c) Wing cord at root and at tip

- (d) Wing area
 - (e) Wing aspect ratio
 - (f) Wing thickness (%) at root and at tip
 - (g) Wing location
 - (h) Airfoil at root and at tip
 - (i) Spar material
 - (j) Wing rib material
 - (k) Skin material
 - (l) Lift augmentation devices
- 1.5 Undercarriage configuration and type

SA-CATS 34

Engine emission certification

List of technical standards

34.02.1 FUEL VENTING STANDARDS

- 1. Fuel venting standards

34.02.2 RECOGNITION OF FOREIGN FUEL VENTING CERTIFICATION

- 1. Standards

34.03.1 ENGINE EMISSION STANDARDS

- 1. Engine emission standards

34.03.2 RECOGNITION OF FOREIGN ENGINE EMISSION CERTIFICATION

- 1. Standards

34.02.1 FUEL VENTING STANDARDS

1. Fuel venting standards

The fuel venting standards referred to in CAR 34.02.1 are the appropriate fuel venting standards contained in Part II of Annex 16, Volume II.

34.02.2 RECOGNITION OF FOREIGN FUEL VENTING CERTIFICATE

1. Standards

The standards that apply for the recognition of a foreign fuel venting certificate are the appropriate fuel venting standards referred to in TS 34.02.1.

34.03.1 ENGINE EMISSION STANDARDS

1. Engine emission standards

The engine emission standards referred to in CAR 34.03.1 are the appropriate engine emission standards contained in Part III of Annex 16, Volume II.

34.03.2 RECOGNITION OF FOREIGN ENGINE EMISSION CERTIFICATE

1. Standards

The standards that apply for the recognition of a foreign engine emission certificate are the appropriate engine emission standards referred to in TS 34.03.1.

SA-CATS 36 Noise Certifications

List of technical standards

36.00.2 NOISE STANDARDS

1. General
2. Noise standards for microlight aeroplanes

36.00.3 RECOGNITION OF FOREIGN NOISE CERTIFICATION

1. Standards

FIGURES

Figure 1: Microlight aeroplane flight procedure

36.00.2 NOISE STANDARDS

1. General

The noise standards referred to in CAR 36.00.2 are the appropriate noise standards contained in Annex 16, Volume I.

2. Noise standards for microlight aeroplanes

The average noise emittance limit of a microlight aeroplane at full power and a height of 500 ft AGL may not exceed 78 dBA when measured under the following conditions and procedures:

2.1 Environmental conditions

- (1) Wind speed may not exceed 15 km/h at any time during test.
- (2) Cloud base to be 5 000 ft AGL minimum.
- (3) Cloud cover to be 4/8 maximum.
- (4) No other air traffic is allowed in a 4 000 meter radius from the measurement position during any measurements.
- (5) The test must be conducted during normal daylight hours.

2.2 Test equipment

- (1) The equipment to be used, must consist of a sound level meter capable of giving an indication in dBA with a fast time response. The test equipment must be supplied with a separate sound calibrated and a wind screen.
- (2) The test equipment must comply with the characteristics specified for Type 1 instruments in the publication No. 651 of the International Electrotechnical Commission.
- (3) The equipment must be verified for compliance with the relevant specifications by the supplier on delivery of the equipment. The equipment must be calibrated annually thereafter by the South African Bureau of Standards.

2.3 Certification

- (1) All tests must be conducted by a person qualified in the use of test equipment, in the presence of an authorised officer or inspector of the CAA and/or a person approved by the body or institution designated by the Director in terms of Part 149 of the CAR.
- (2) Depending on the results, a noise certificate may be issued by the person conducting the test. All documentation must be completed in triplicate, a copy to be handed to the persons referred to in subparagraph (1) and the original to be kept by the manufacturer/owner. All microlight aeroplanes certified for production must have a copy of the noise certificate attached to the airframe logbook before delivery to the prospective owner.
- (3) Approved manufacturers must supply all the relevant information on the noise certificate e.g. powerplant (type, horsepower), propeller (type, number of blades, diameter, pitch), gearbox ratio, noise reduction equipment, etc.
- (4) Attached to the above certificate must be the following information regarding the test equipment:
 - (a) Make
 - (b) Model
 - (c) Serial number of the equipment
 - (d) Serial number of the microphone
 - (e) Serial number of the calibrator and the sound pressure level value and frequency of the calibrator
 - (f) The certificate number and date of the last verification by the SABS.

2.4 Compliance by similarity

Manufacturers/owners may obtain compliance by proving similarity to aeroplanes already tested and passed as described. When requesting compliance by similarity, proof must be submitted, in writing, to show aircraft configuration, engine, propeller arrangement, noise reduction equipment, etc, to be identical to the model previously approved.

2.5 Compliance date

All microlight aeroplanes must comply with the above noise requirements.

2.6 Extensions

Manufacturers/owners of microlight aeroplanes which cannot comply with the limits as stated, may request written extension for a maximum period of six (6) months, during which period a second test may be conducted to prove compliance. No further extension will be granted.

2.7 Validity

Microlight aeroplanes tested in accordance with this standard, will remain legal unless the test configuration is altered. This includes items such as changing the propeller pitch, propeller diameter, propeller make and exhaust. Any change will require a re-test. Approved persons will certify that the aircraft configuration has not been changed, as per the noise certificate attached to the aircraft logbook during annual inspections.

2.8 Test procedure

- (1) Test equipment:
 - (a) The equipment must be set up with its measurement microphone between 1.2 and 1.5 meters AGL. It must be fitted with a wind screen of which the sound attenuation characteristics are such that it will not affect the accuracy of the measurement.
 - (b) The equipment must be set to "A" weighting and "FAST" response.
Before and after each set of readings, the calibration of the equipment must be checked by means of the sound calibrator in accordance with the instructions of the manufacturer. If the calibration readings of the equipment before and after each set of readings does not

coincide to within 1.5 dB, the readings obtained must be discarded and the calibration of the equipment controlled before the test is proceeded with.

- (c) The equipment must be operated strictly in accordance with the instructions from the manufacturer.
- (2) Test site:
- (a) The test site must consist of a level piece of hard ground surface of radius of at least 10 meters. The surface may consist of hard ground free from any vegetation, compacted gravel, asphalt or concrete.
 - (b) No buildings, trees or other obstacles may be within 250 meters from the measurement position.
- (3) Flight procedure:
- The aeroplane must be flown in the test pattern as per Figure 1. All tests must be conducted at full power and at a height of 500 ft AGL. The flight path must pass directly over the measurement microphone position while a height of 500 ft AGL is maintained over the measurement microphone. Four traverses must be made, each from a different direction.
- (4) Measurements:
- (a) Readings must be taken of the maximum value indicated by the test equipment during the particular overflight. Note must be taken that the difference between the minimum reading with the aeroplane at the furthest position from the test site and the maximum reading during the overflight must be at least 10 dB. Less than that is an indication that the environmental background noise level cause an error in the readings of more than 1 dB.
 - (b) The differences between the four readings must not exceed 3 dB. If the differences exceed 3 dB, then the test must continue until four consecutive readings are obtained of which the largest difference between the readings does not exceed 3 dB.
 - (c) The four readings must be combined by taking the arithmetic average. The average value shall not exceed 78 dBA.

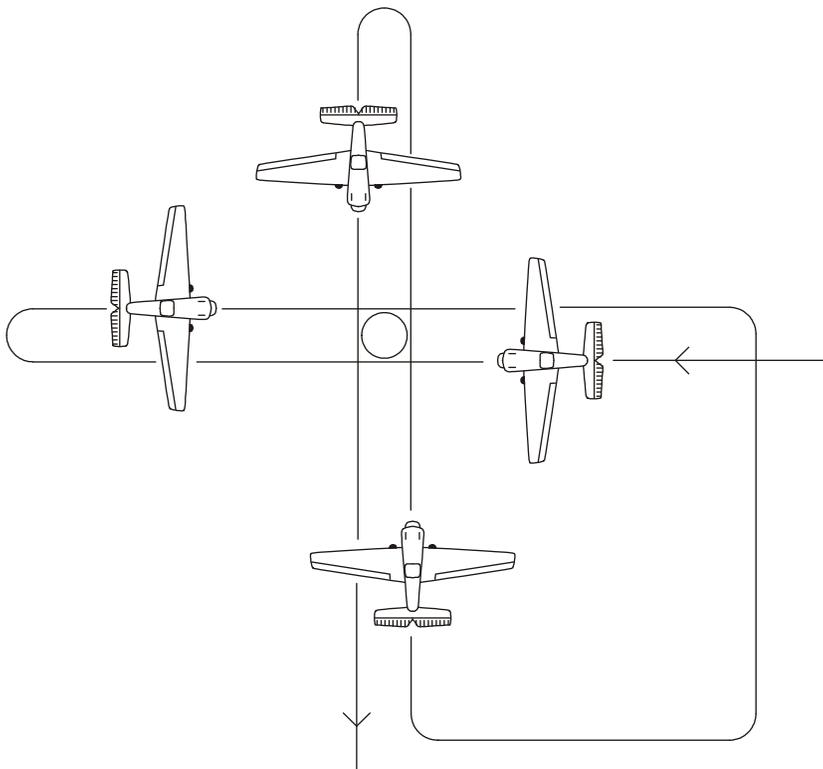
36.00.3 RECOGNITION OF FOREIGN NOISE CERTIFICATE

1. Standards

The standards that apply for the recognition of a foreign noise certificate are the appropriate noise standards referred to in TS 36.00.2.

FIGURES

Figure 1: Microlight aeroplane flight procedure



Test pattern to be flown as shown. Maximum radius from test point to be 1 000 meters at any time during test.

SA-CATS 43

General maintenance rules

List of technical standards

43.01.3 LOGBOOKS

1. Format

43.01.8 LOSS OF LOGBOOKS

1. Procedure for opening new logbooks

43.02.2 PERSONS TO CARRY OUT MAINTENANCE

1. Pilots

43.02.3 CARRYING OUT OF MAINTENANCE

1. Maintenance control manual
2. Maintenance programme

43.02.5 OVERHAUL, REPAIR AND SUBSTITUTION OF MAJOR COMPONENTS

1. Reinstatement of C of A following an accident or incident
2. Overhauls: General
3. Overhaul of components and installed equipment
4. Engine overhauls
5. Propeller overhauls
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43.02.6 MAINTENANCE FOR IFR OPERATIONS

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43.02.7 MASS AND BALANCE

1. Procedure to establish mass
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43.02.8 MANDATORY INSPECTIONS

Section A: General

Section B: Maintenance schedule for aeroplanes with an MCM of 5 700kg or less (minimum requirements)

Section C: Maintenance schedule for helicopters with an MCM of 3 175kg or less (minimum requirements)

Section D: Maintenance schedule for aeroplanes with an MCM in excess of 5 700kg and helicopters with an MCM in excess of 3 175kg (minimum requirements)

Section E: Maintenance schedule for gliders including power-assisted and touring gliders (minimum requirements)

Section F: Maintenance schedule for manned balloons (minimum requirements)

Section G: Maintenance schedule for airships (minimum requirements)

43.02.9 AIRSPEED INDICATOR AND ALTIMETER SYSTEM TEST AND INSPECTIONS

1. Test and inspections

43.02.10 ATC TRANSPONDER TEST AND INSPECTIONS

1. Test and inspections

43.02.11 EMERGENCY LOCATOR BEACON TESTS AND INSPECTIONS

1. Tests and inspections

43.02.13 NON-DESTRUCTIVE TESTING

1. Personnel qualification standards
2. NDT testing standard practices

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43.02.17 TEMPORARY AND PERMANENT REPAIRS AFTER ACCIDENTS OR INCIDENTS

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2. Deviation cards
3. Logbook entries
4. Compass swing areas and equipment
5. Qualifying experience for compensation of compasses

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2. ETOPS manual
3. Maintenance training programme
4. ETOPS parts control programme

43.02.20 RVSM OPERATIONS

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2. Maintenance facilities
3. Maintenance requirements

43.03.1 MAINTENANCE RECORDS

1. Flight folios
2. Recording of maintenance

43.03.3 RECORDING OF MAJOR REPAIRS AND MODIFICATIONS

1. Manner of recording overhaul
2. Processing

43.04.4 CERTIFYING AFTER INSPECTION

1. Statement

43.04.5 CERTIFYING AFTER MAINTENANCE

1. Statement
2. Form of certificate of release to service

43.04.6 DISCREPANCIES

1. Statement

APPENDICES

Appendix 1: Schedule of times between overhaul and life-limited parts for aeroplanes with a mcm of 5 700kg or less or helicopters with a mcm of 3 175kg or less

Appendix 2: Propeller midlife inspection and repair requirements

43.01.3 LOGBOOKS

1. Format

- (1) The approved format of the logbooks prescribed in CAR 43.01.3 is the format available through the South African Government Printer.
- (2) The approved logbook makes provision for the recording of –
 - (a) airframe, engine and propeller particulars;
 - (b) major defects and damage;
 - (c) compass check swings;
 - (d) Class 1 product substitution;
 - (e) compliance with airworthiness directives, both recurrent and non- recurrent action;
 - (f) compliance with service bulletins, service letters and similar documents, both recurrent and non-recurrent action;
 - (g) engine components;
 - (h) Class II product overhaul;
 - (i) scheduled inspections; and
 - (j) scheduled and non-scheduled maintenance and defect rectification on airframe, engines, propellers and accessories and any relevant matter.
- (3) Page 2 of the approved logbook contains instructions with regard to the opening of the logbook and the recording of entries therein.

43.01.8 LOSS OF LOGBOOKS

1. Procedure for opening new logbooks

- (1) The registered owner shall submit to the Director an affidavit detailing the circumstances leading to the loss of the logbook(s).
- (2) The person or organisation responsible for the opening of a new logbook –

- (a) may consult relevant records at the premises of the Civil Aviation Authority and at the prescribed fee obtain copies of relevant pages;
 - (b) obtain any further information required to open the substitute logbook(s) so that these comply with the relevant regulations and technical standards, copies of which shall be supplied to the Director;
 - (c) shall provide proof of overhaul of all Class I and all installed Class II products;
 - (d) shall research and certify that all relevant Airworthiness Directives, Service Bulletins or Service Letters declared mandatory by the Director have been complied with;
 - (e) shall certify that the aircraft, its engine(s) and in particular its tubular engine mountings (if applicable) have been inspected for corrosion; and
 - (f) shall in the substitute logbook(s) detail and certify the inspection(s) and test(s) carried out to ensure that the aircraft, engine or propeller and their components is indeed serviceable.
- (3) The total hours operated or the times since overhaul of the relevant aircraft, engine(s) or propeller(s) shall be mutually agreed upon between the owner, maintenance organisation(s) and the Director.
- (4) The substitute logbook(s) shall be inspected by an Airworthiness Inspector of the CAA who will date and insert the Director's authorisation to open the substitute logbook.
- (5) In the event of all relevant documentation having been lost, all documents required for the issue of a Certificate of Airworthiness or Authority to Fly must be prepared in accordance with this technical standard, and the aircraft and its documents shall be re-inspected by an Airworthiness Inspector of the CAA.

43.02.2 PERSONS TO CARRY OUT MAINTENANCE

1. Pilots

The maintenance that the holder of a pilot licence, other than a student pilot licence or learner's certificate, with an appropriate rating issued in terms of Part 61 or Part 62 may carry out is limited to the following items on an aeroplane with a maximum certificated mass of 5 700 kg or less or a maximum approved passenger seating configuration of nine seats or a helicopter with a maximum certificated mass of 3 175 kg or less or a maximum approved passenger seating configuration of nine seats:

- (1) Emergency/*en route* maintenance comprising of the following, provided that only approved materials, parts and components are used:
 - (a) changing of tyres and tubes and repairing punctures;
 - (b) servicing landing gear shock struts with air;
 - (c) correcting defective locking wire and split pins;
 - (d) replenishing hydraulic fluid in the hydraulic fluid reservoir;
 - (e) small simple repairs to fairings, non-structural cover plates and cowlings by means of stop drilling cracks and fitting small patches or reinforcements which will not change contours or interfere with proper airflow;
 - (f) replacing side windows where such work does not interfere with the primary system;
 - (g) replacing safety belts;

- (h) replacing seats or seat parts where such work does not involve any removal, dismantling or interference with a primary structure system;
- (i) replacing pre-fabricated fuel and oil lines, provided that a fuel flow check is carried out in accordance with TS 43.02.8, Section A.2(6) "fuel flow checks";
- (j) replacing any electrical bulb, reflector, lens or fuse of navigation and landing lights;
- (k) replacing or cleaning spark plugs and setting spark plug gaps;
- (l) cleaning fuel and oil strainers;
- (m) replacing batteries and checking fluid level and specific gravity;
- (n) replacing tail wheels and tail-wheel springs;
- (o) changing engine oil;
- (p) removing and installing such dual controls as is designed for easy removal and installation;

(q) replacing the following instruments by others of the same type which have such markings as may be indicated in the appropriate owners manual:

- (i) airspeed indicator;
- (ii) altimeter;
- (iii) engine speed indicator for each engine;
- (iv) oil pressure gauge for each engine; and
- (v) fuel contents gauge,

Provided that a pitot static check is carried out in accordance with TS 43.02.9 for subparagraphs (i) and (ii) above;

(2) Whenever it is necessary to carry out maintenance of this nature, the pilot must –

(a) notify the aircraft maintenance organisation or aircraft maintenance engineer normally responsible for the maintenance of the aircraft to assist in –

- (i) supplying parts, if required;
- (ii) giving technical advice;
- (iii) supplying maintenance publications, where required; and

(b) ensure that any maintenance work done, is correctly recorded in the aircraft flight folio, including particulars of –

- (i) maintenance publications referred to;
- (ii) parts replaced (serial numbers where applicable);
- (iii) parts repaired; and
- (iv) tests carried out (if applicable).

(3) Entries in the aircraft flight folio must be accompanied by the pilot's signature, licence number and the date of entry.

(4) Unless the pilot is the holder of an aircraft maintenance engineer licence with an appropriate rating, such pilots may on no account sign an aircraft logbook in the column intended for the signature of the holder of an aircraft maintenance engineer licence or aircraft maintenance organisation approval.

43.02.3 CARRYING OUT OF MAINTENANCE

1. Maintenance control manual

The Maintenance Control Manual (MCM) prescribed by CAR 43.02.3(f), which may be issued in separate parts, shall contain the following information:

- (a) Description of the procedures required to ensure that –
 - (i) each aircraft, covered by the MCM, is maintained in an airworthy condition;
 - (ii) the operational and emergency equipment, necessary for an intended flight, is serviceable;
 - (iii) the Certificate of Airworthiness or the Authority to Fly, as the case may be, and the Certificate of Release to Service remains valid for each aircraft covered by the MCM.
- (b) the administrative arrangements between the operator and the approved maintenance organisation;
- (c) the maintenance procedures and the procedures for completing and signing off maintenance that is based on a system other than that of an approved maintenance organisation;
- (d) names and duties of the person or persons who are required by the MCM to ensure that all maintenance is carried out in accordance with the MCM with regard to an Approved Maintenance Programme. The design and application of the operator's Maintenance Programme shall observe Human Factors principles;
- (e) a description of the methods used for the completion and retention of the maintenance records;
- (f) a description of the procedure for monitoring, assessing and reporting maintenance required by the operator of an aircraft in terms of Subpart 9 of Part 121.
- (g) a description of the procedures for complying with the service information reporting requirements to the aircraft manufacturer and to the Director;
- (h) a description of the procedures for implementing action resulting from mandatory continuing airworthiness information and procedures for assessing continuing airworthiness information, issued by the organisation responsible for the type design of the aircraft covered by the MCM;
- (i) a description of establishing and maintaining a system of analysis and continued monitoring of the performance and efficiency of the Maintenance Programme in order to correct any deficiency in that programme;
- (j) a description of procedures for ensuring that unserviceable items affecting airworthiness are recorded in the flight folio and rectified or deferred in the flight folio in accordance with the MEL;
- (k) a description of procedures for controlling deferred defects, clearing them on return to base, or extending them for a time period acceptable to the Director;
- (l) a description of extending deferred defects over and above the time period acceptable to the Director, and the number of times an extension may be applied for, taking into account the category of severity in each case;
- (m) a description of procedures for controlling recurring defects, the reporting system to be established, and system to effect corrective action;
- (n) a description of procedures for controlling the removal and use of parts from other aircraft, the control and certification of such action and the controlling of TBO records when this occurs;
- (o) a description of the procedure for advising the Director of significant in-service occurrences;
- (p) a description of aircraft types and models to which the manual applies.

2. Maintenance programme

The maintenance programme for each aircraft referred to in section 1(d) above shall contain the following information:

- (a) maintenance tasks and the intervals at which these are to be performed, taking into account the anticipated utilisation of the aircraft;
- (b) when applicable, a continuing structural integrity programme;
- (c) procedures for changing, or deviating from, paragraphs (a) and (b) above; and
- (d) when applicable, condition monitoring and reliability programme descriptions for aircraft systems and powerplants.

43.02.5 OVERHAUL, REPAIR AND SUBSTITUTION OF MAJOR COMPONENTS

1. Reinstatement of C of A following an accident or incident

To reinstate the validity of a certificate of airworthiness deemed suspended as a result of an aircraft having been involved in an accident or incident that rendered one or more Class I products unserviceable, the following applies:

- (a) Such maintenance as is necessary shall be carried out in accordance with approved manuals, structural repair manuals, or authorised repair schemes or other approved data.
- (b) A mandatory periodic inspection (MPI) or other inspection as prescribed in technical standard 43.02.8 shall be carried out if the major primary structure, the engine(s) or the propeller(s) have been damaged.
- (c) A test flight shall be done by an appropriately rated test pilot, and the performance recorded in accordance with regulation 43.02.16.
- (d) All documents pertaining to the repairs of an aircraft that sustained damage to the primary structure, engine(s) or propeller(s), shall be inspected by an Airworthiness Inspector of the CAA or a person authorised by the Director after the necessary repairs have been carried out.
- (e) Copies of the certificates relating to maintenance (CRMs) in respect of all repairs affected shall be submitted to the Director within 48 hours of the certificate of release to service (CRS) having been completed and certified.

2. Overhauls: General

- (1) Any overhaul must be carried out in accordance with the manufacturer's current overhaul manuals. Mandatory Airworthiness Directives, Service Bulletins, Service Letters and Service Instructions must be embodied as directed.
- (2) Where no manufacturer's instructions or recommendations have been issued, such components or equipment must be overhauled as and when their condition shows that this is necessary to keep the aircraft serviceable. The work involved must be executed in accordance with good aeronautical practices and procedures.
- (3) Overhauls shall be recorded and certified in the appropriate logbook(s) by the holder of an appropriately rated licence or approval.
- (4) The required record of fits and clearances shall be made in the sequence indicated in the respective manuals.
- (5) Imported Class 1 products may not be fitted to an aircraft unless an export certificate of airworthiness from the State of manufacture, remanufacture or overhaul, or other data that is acceptable to the Director, has been submitted to the Director.
- (6) No person may certify an extension to any component unless such extension has been approved by the Director in terms of the regulations and unless all recorded history for that component is traceable and amended up to date.

- (7) Tubular engine mountings shall be inspected at the time of the engine overhaul, propeller strikes or whenever an engine is changed for signs of external and internal corrosion, cracks and other damage by magnaflux, dye penetrant or any other NDT inspection procedure acceptable to the Director.
- (8) The record of the overhaul must include a statement that the mountings have been inspected and, if damage is found, the repairs certified.

3. Overhaul of components and installed equipment

The overhaul of all components and items of equipment installed on aircraft must be executed at such times as is recommended by the manufacturer.

4. Engine overhauls

- (1) The engine overhauls specified in Appendix 1 are mandatory for all aircraft. All components specified in the engine type certificate must either be overhauled concurrently with the engine, unless the manufacturer has directed otherwise, or be substituted by an identical, serviceable item. The engine must then be tested as a complete unit in accordance with the manufacturer's instructions.
- (2) The overhaul of turbine engines must be executed in accordance with the manufacturer's current instructions and recommendations not later than the times specified therein. The overhaul of any Class I or II product or item of equipment of such engines and not specified in Appendix 1 must be carried out as recommended by the relevant manufacturer.
- (3) The engine and its Class II products, notably the ignition system, the fuel system, and (when fitted) the turbo charging system must be overhauled according to the requirements of their manufacturers, unless otherwise directed by the Director.
- (4) The engine together with the Class II products specified in subsection (3) must be tested as one unit on a test bench or in an airframe with a calibrated instrument test panel and, if necessary, a test club and engine baffles in accordance with the manufacturer's laid down procedures and prior to the overhaul being certified.
- (5) An engine shall be completely overhauled together with all components specified in the engine type certificate such as but not limited to components of the fuel system, the ignition system and (if applicable) the turbo charging system –
 - (a) where the engine has been subjected to significant external heat, e.g. fire;
 - (b) where the engine has been submerged in water;
 - (c) when the engine has suffered substantial damage;
 - (d) when an engine installed in an aircraft has exceeded the manufacturer's recommended time between overhauls;
 - (e) where no historical records for the engine can be found.
- (6) In cases where the engine has been struck by lightning and there are witness marks on the propeller the manufacturer's recommendations must be complied with.
- (7) A copy of the overhaul record shall be submitted to the Director by the AMO certifying the installation of the engine in the aircraft within 48 hours of the CRS for an aircraft having been completed and certified by the AMO concerned, or if approved data exists, after flight tested in an aircraft in accordance with the approved data.
- (8) It will be permissible for the holder of an aircraft maintenance organisation approval with the appropriate rating to certify extensions, approved by the Director, to the times between overhauls specified for turbine engines, subject to compliance with the following conditions:
 - (a) the person certifying any extension may, on being satisfied from the logbook history trend monitoring records and oil sample analysis of the engine concerned, extend the overhaul time up to the next MPI or other prescribed inspection due. Such

extension shall not exceed 10% of the original TBO recommended by the manufacturer;

- (b) turbine engines that have been granted TBO escalation by the engine manufacturer may not be granted a further extension over and above the TBO escalation;
- (c) on each occasion that an extension to the TBO of a Class I product is granted, the person certifying such extension must ensure that a conformance test has been carried out and that the performance of the product under test is in accordance with the performance given in the appropriate flight manual. Such person must certify in the appropriate logbook an entry to the following effect:

"I hereby certify that I, in accordance with the provisions of(insert a reference to the applicable MCM, manufacturer's maintenance manual, or specific exemption granted by the Director on which authority the extension is certified), have satisfied myself that the maintenance records, performance, condition and record history of (insert the name of the product or component concerned, giving a description and quoting part and serial number) since new or last overhaul is such that it can be operated with safety for a further hours of flight time and I hereby authorise such extension."

Signature:

Licence No.:

Date:

5. Propeller overhauls

Propellers must be overhauled at the times specified in Appendix 1 and 2 irrespective of the Part of the CAR in which the aircraft is operated.

6. Substitution of products, components and parts

- (1) The substitution of products, components and parts with new items, considered to be desirable or essential by the manufacturer of the product, component or part, or recommended after a specified time in service, must be effected at the times recommended by the manufacturer in its applicable manuals, Service Bulletins, Service Letters, Service Instructions or other similar technical information that refer thereto.
- (2) Products, components and parts of which the manufacturer has classified the substitution as essential or mandatory after a specified time in service must be substituted not later than the time prescribed. Where a manufacturer bases the life of an item on factors other than flight times, e.g. number of landings, cycles or calendar periods, such records must be kept in the logbook or other approved recording system in respect of such items to ensure that their expiry dates are not exceeded.
- (3) The substitutions shown in Appendix 1 and 2 are those that the Director considers to be mandatory. Such substitutions must be effected not later than the times prescribed.
- (4) Any substitution must be recorded, together with the item's serial and part number and its historical record, where applicable. Where the part is being substituted with a used part, the time or cycles in service since new or since overhaul must be recorded. No part may be fitted to an aircraft for which traceable records are not available. It shall be the aircraft maintenance organisation's responsibility to ensure that any part received comes from a reliable source and is serviceable, and that the storage limitations have not been exceeded. Substitutions must be certified by the holders of an appropriately rated licence or authorisation.
- (5) In addition to the records prescribed in paragraph (4), a separate record of life-limited and TBO items shall be kept in respect of each aircraft to ensure that limitations are not

exceeded. This record shall be updated within 48 hours of any item having been overhauled, replaced or substituted.

43.02.6 MAINTENANCE FOR IFR OPERATIONS

1. Inspections

Whenever an inspection or maintenance is carried out on communication, navigation and surveillance equipment in an aircraft, required for use under IFR, the inspection or maintenance shall include the following items:

- (a) Examine the maintenance records for service history and compliance with the applicable maintenance rules.
- (b) Inspect and test the bonding of mounting racks and shock mounts for a maximum resistance of 0.05 ohms.
- (c) Check the VSWR of the transmission lines and aerials of the following:
 - (i) VHF Comm;
 - (ii) HF Comm (T/R to antenna coupler).

[Note: VSWR less than 1.5:1 is desirable but must not exceed 3:1.]

- (d) Inspect and test the ADF sense antenna for insulation resistance.
- (e) Ensure antenna coax cable of the proper length.
- (f) Inspect and test the HF antenna for integrity and insulation resistance.
- (g) Inspect and test the operation of ILS receivers with an approved ramp test set, including –
 - (i) testing flag warnings for modulation failure, centre line accuracy, sense and course widths;
 - (ii) testing the audio function; and
 - (iii) carrying out $\pm 1^\circ$ test for freedom of meter movement, sense and course width.
- (h) Inspect and test the operation of VOR with an approved ramp test set, including –
 - (i) testing flag warnings for modulation failure;
 - (ii) omni-radial resolving, and radio magnetic indicators, accuracy at 30° intervals; and
 - (iii) testing the audio function.
- (i) Inspect and test the operation of marker receiver with an approved ramp test set including –
 - (i) testing operations of 400, 1 300 and 3 000 Hz tones and associated lamps; and
 - (ii) where fitted, operation of hi/lo sensitivity.
- (j) Inspect and test the operation of DME with an approved ramp test set, including –
 - (i) testing range accuracy, ground speed reading, if applicable; and
 - (ii) testing the audio function.
- (k) Inspect and test the operation of transponder in accordance with the requirements of this schedule.
- (l) Carry out a full functional check of the ground proximity warning system (GPWS), if applicable.
- (m) Check all other communication, navigation and surveillance equipment installed on the aircraft, not mentioned above, in accordance with the aircraft manufacturer's or equipment manufacturer's requirements or with any other approved data, to ensure that safety standards are not compromised.

43.02.7 MASS AND BALANCE

1. Procedure to establish mass

- (1) Remove excessive dirt, grease and moisture from the aircraft.
- (2) Place the aircraft in a level-flight attitude, as prescribed by the manufacturer.
- (3) Where practical, establish the mass inside a closed building to prevent mass-meter errors introduced by wind.
- (4) Use only approved mass meters as prescribed in CAR 43.02.7(4).
- (5) Use mass meters in accordance with their manufacturer's instructions. The mass meters must be positioned at the stations called out by the aircraft's manufacturer. These points shall be clearly indicated in the mass and balance report and be in accordance with the aircraft manufacturer's specifications.
- (6) Obtain the necessary publications (i.e. maintenance manual, flight manual, etc.) before commencing with the procedures.
- (7) Ensure that the aircraft conforms to the definition of its "empty mass" configuration: engine coolant, unusable fuel, total oil, total hydraulic fluid, any fixed ballast, and all items of fixed equipment as per its approved equipment list. Any extra items must be removed before computation.
- (8) Comply with the requirements of CAR 43.02.3 in respect of the manner in which maintenance must be carried out.

2. Form

- (1) The mass and balance data as prescribed in CAR 43.02.7 shall be recorded on Form CA43-17.
- (2) The mass and balance report shall include at least the following information:
 - (a) aircraft nationality and registration letters, make, model and serial number;
 - (b) date on which mass was determined and centre of gravity computed;
 - (c) datum point used;
 - (d) the necessary calculations made;
(A specimen mass and balance report is given in FAA Advisory Circular AC 43.13-1 B.)
 - (e) reference number of applicable publications used; and
 - (f) the signature and licence or approval number of the person who was responsible for establishing the mass and the computing of the centre of gravity; and
 - (g) a copy of the mass and balance report must be submitted to the Director.

3. Aircraft documentation

- (1) The person who was responsible for establishing the mass and the computing of the centre of gravity of the aircraft shall make an appropriate entry in the airframe logbook of the aircraft concerned. The date of the entry shall coincide with the date appearing on the mass and balance report.
- (2) The person referred to in subsection (1) shall ensure that the approved equipment list is available, certified and up to date, and that the new mass and balance data is entered in the appropriate documentation of the aircraft concerned.
- (3) If an approved equipment list is not available for the aircraft, such a list shall be compiled and submitted to the Director for approval.

43.02.8 MANDATORY INSPECTIONS

This Technical Standard comprises the following Sections and Parts:

Section A: General

1. General instructions
2. Inspections
3. Associated documents

Section B: Maintenance Schedule for Aeroplanes with an MCM of 5 700 kg or less

Section C: Maintenance Schedule for Helicopters with an MCM of 3 175 kg or less

**Section D: Maintenance Schedule for Aeroplanes with an MCM in excess of 5 700 kg and
Maintenance Schedule for Helicopters with an MCM in excess of 3 175 kg**

Part 1. Approval and General Instructions

1. Approval
2. Abbreviations
3. Definitions
4. General instructions
5. Scheduled and unscheduled maintenance inspections
6. Overhaul or substitution
7. Mandatory modification and special inspections
8. Certificates of release to service
9. Avionics, Instrumentation and Electrical
10. Amendments
11. Aircraft inspection report
12. Duplicate inspections
13. Rectification of unsatisfactory items
14. Associated documents

Part 2. Scheduled and Unscheduled Inspections

Part 3. Overhauls and Substitution of Class I and Class II Products

Part 4. Airworthiness Directives and Other Service Information

Part 5. Documentation

Part 6. Reliability Programme

[Under development]

Section E: Maintenance Schedule for Gliders, including Power-assisted and Touring Gliders

Section F: Maintenance Schedule for Manned Balloons

Section G: Maintenance Schedule for Airships

[Under development]

Appendix 1 Schedule of TBOs and Life-Limited Parts for Small Aeroplanes and Small Helicopters

Appendix 2 Propeller Mid-Life Inspections and Repair Requirements

Annex A Inspection Reminder

SECTION A: GENERAL

1. General instructions

- (1) Unless the Director has granted written exemption from compliance with any of the requirements contained in its maintenance schedule, no aircraft may be flown unless it is airworthy and all the mandatory maintenance required by its maintenance schedule and by the manufacturer has been carried out when due and has been certified by an appropriately rated licence holder, persons authorised in terms of Part 24 or Part 145, or such other person approved by the Director.
- (2) The onus for ensuring that an aircraft is kept airworthy rests on the registered owner or operator of the aircraft. Maintenance schedules are prepared to assist him or her in ensuring that, as far as possible in the light of available information and experience, the aircraft is maintained in an airworthy condition by scheduling the required maintenance through a programme of inspections and overhauls based on the intended operational usage of the aircraft. Such programme may be calendar-hours-flown or cycles-based.
- (3) The maintenance requirements contained in an aircraft's maintenance schedule constitute the minimum requirements considered necessary for the satisfactory maintenance of the aircraft to which the schedule applies. However, in the performing of maintenance on an individual aircraft, due regard must be given to its age, type of operations, climatic and housing conditions and any other factors which may affect the airworthiness of such an aircraft. Consequently, a maintenance schedule must not be construed as absolving the owner, the licensed aircraft maintenance engineer or the approved aircraft maintenance organisation from ensuring that any additional maintenance found to be necessary or as required by the Director is carried out.
- (4) Nothing in a maintenance schedule is to be construed as relieving the pilot-in-command of an aircraft from his or her responsibility regarding flight preparation as prescribed in CAR 91.02.7.

It is the duty and responsibility of the pilot-in-command to ensure that unusual occurrences, defects or suspected faults, coming to his or her notice during operations and which affect or may affect the serviceability and safety of the aircraft, are recorded in the aircraft's flight folio as and when they occur and are reported to the appropriate maintenance personnel for investigation or rectification.

Any defects shall be cleared prior to further flight. When away from base, instructions regarding rectification and certification must be sought and recorded. All

rectification away from base must be entered and certified in the aircraft's flight folio and transferred in the appropriate logbook(s) within 48 hours after the aircraft returns to base.

- (5) Maintenance required to be carried out in accordance with the provisions of a maintenance schedule must be accomplished under such working conditions and with the use of such tools, equipment, test apparatus and technical information as will ensure completion to standards acceptable to the Director.

Where the use of special equipment or test apparatus is recommended by the manufacturer of the products involved, such equipment or apparatus, or an acceptable approved equivalent method is to be used. Whenever the tools, equipment or test apparatus referred to in this paragraph are used, it must be ensured that they are in good working order and condition and that the person using them is familiar with their use.

Precision measuring tools, equipment, test apparatus and items such as gauges and indicators must be checked annually or as often as deemed necessary by the manufacturer or as required by the Director. Such equipment shall be checked for accuracy and correct calibration.

Where the security or tightness of nuts, unions and other fasteners is required to be checked, such checking must be done with the aid of the appropriate calibrated tools, where required, and to approved standards.

- (6) Maintenance away from base may only be performed at an approved AMO or at a facility approved by the Director where equipment, test facilities and spares for the type of maintenance to be undertaken are available. All the necessary manuals and catalogues for the particular aircraft shall be available. Prior to the commencement of such maintenance, the AMO or facility shall advise the Director of its intention to carry out the maintenance and supply the following information:

- (a) Aircraft registration.
- (b) Name of the organisation to carry out the maintenance, and approvals held.
- (c) Location where the intended maintenance is to be performed.
- (d) Type of maintenance to be carried out.
- (e) Name and licence or approval number(s) of the person(s) responsible for the maintenance.

- (7) When mandatory inspections are to be carried out away from base, the Accountable Manager referred to in Part 145 shall indicate what tools, spares and documentation have to be on hand to satisfactorily carry out the work on the aircraft.

[Note: When an aircraft maintenance organisation holds only one set of tools or manuals, and these tools or manuals are sent away to the facility where the above referred-to away-from-base maintenance is to be performed, the relevant privileges granted to the organisation may not be exercised at its approved main base of operation until such time as the tools and necessary manuals have been returned.]

- (8) Failure to comply with any applicable mandatory requirement or part of a maintenance schedule invalidates the validity of the aircraft's certificate of airworthiness unless exemption has been obtained from the Director in terms of Part 11 of the CAR.
- (9) The applicable aircraft logbooks must be available when scheduled maintenance is carried out. Should the aircraft logbooks not be available for perusal and completion, the aircraft may not be released to service.

2. Inspections

(1) Types of inspections

Inspections consist of the following:

- (a) Inspections as recommended by the manufacturer.
- (b) Mandatory periodic inspections.
- (c) Progressive inspections.
- (d) Block inspections.
- (e) Other inspections.

(2) Recommended inspections

The inspections referred to in subsection (1)(a) are recommended. However, when the contents of the recommended inspection indicate that the airworthiness of the aircraft may be affected, they must be complied with in respect of aircraft utilised in commercial air transport operations, and in the case of other aircraft whenever so directed by the Director.

(1) Mandatory inspections

- (a) The inspections referred to in paragraphs (1)(b) and (c) must be accomplished in order to validate or revalidate the Certificate of Airworthiness –

(i) on all aircraft imported into South Africa for the purpose of obtaining a certificate of registration before such aircraft may be put into service;

(ii) on new aircraft built in the Republic;

(iii) when an aircraft has sustained damage, as prescribed in CAR 43.02.5;

(iv) at any time before the next routine inspection is due, should circumstances warrant such action: thus more than once annually or at frequencies less than 100 hours of flight time, should circumstances so dictate.

(b) Mandatory Periodic Inspections (MPI)

(i) A mandatory periodic inspection must be carried out at 100-hours of flight time intervals since the last MPI or within a 12-month period, whichever comes first. (This means that if an aircraft is operated for less than 100 hours of flight time per annum, it will

undergo an MPI once within a 12-month period regardless of hours flown.)

- (ii) In carrying out an MPI, the following requirements must be observed:
 - (aa) No MPI may be attempted without the use of an individualised check-list conforming in all essential respects to the manufacturer's requirements, and supplemented by the requirements addressed in Sections B, C, E or F, as applicable. Such check-list may be one compiled by the aircraft manufacturer, provided it is sufficiently comprehensive to cover the complete aircraft and installed equipment. The check-list, used during any inspection, must be retained by the certifying licence holder for the appropriate period as prescribed in the CAR.
 - (bb) All relevant logbooks must be on hand during an MPI.
 - (cc) Before commencing an inspection, the relevant areas must be exposed to assess the condition of the areas under inspection.
 - (dd) Serviceability of the aircraft must be determined by a thorough inspection in accordance with the manufacturer's recommendations and standard inspection practices and procedures.
 - (ee) It must be ascertained that the requirements of all mandatory repairs, modifications and special inspections have been met and that the mandatory replacement of components and parts has been carried out.
 - (ff) An aircraft inspection report CA43.02 "Aeroplanes", CA43.03 'Helicopters', CA43.04 "Gliders" or CA43.05 'Manned Balloons' must be completed and together with a copy of the certificate of release to service of an aircraft forwarded to the Director within 48 hours after completion of the MPI.
 - (iii) No extension is to be granted in respect of calendar times. Thus: an aircraft operating on an annual limit may not be flown after the 12-month period of validity has lapsed. In such a case a special flight permit is to be requested from the Director to fly the aircraft to a base where the required inspection can be carried out.
- (c) Progressive inspections
- (i) An owner or operator may request permission from the Director to introduce a system of progressive inspections to replace the 100-hours mandatory periodic inspection. Such programme of progressive inspections must have been extracted from approved data and ensure that the work required by the mandatory periodic inspection is spread over the approved intervals between successive inspections.

The owner or operator must obtain written approval from the Director for approval to maintain the aircraft on such a particular programme. Full details of the manner in which he or she proposes to implement the programme, together with all relevant data to substantiate the request, must be accompany the request.

- (ii) Inspections on aircraft that are on an approved progressive inspection programme must be carried out at the intervals prescribed by such programme, provided that, if the programme has not been completed within a 12 months period, the aircraft shall undergo the remainder of its progressive inspection programme before it is being released to service. (This means that the aircraft shall complete its progressive inspection programme always within a 12-months period, if not in a lesser period.)
- (iii) An aircraft inspection report form CA43.02 "Aeroplanes" or CA43.03 "Helicopters" must be completed and forwarded annually on the anniversary of the date on which the programme commenced, together with a copy of the certificate of release to service to the Director.
- (iv) The provisions of paragraph (b) shall apply with the necessary changes.

(2) Block inspections

- (a) Aeroplanes with a maximum certificated mass in excess of 5 700 kg, and helicopters with a maximum certificated mass in excess of 3 700 kg, may be inspected and maintained in accordance with an approved maintenance schedule divided in blocks.
- (b) Where the maintenance schedule shows only the items to be inspected at each check, without detailing for what aspect or condition these items are to be inspected, the user of the maintenance schedule shall compile check sheets from approved data, which sheets shall indicate in detail the inspection requirements.
- (c) Scheduled and unscheduled maintenance inspections shall be carried out in accordance with the provisions of Section C.

(3) Other inspections

(a) Duplicate inspection

A duplicate inspection of all control systems must be carried out after the initial assembly and at any time the systems are disturbed in any way. The purpose of the duplicate inspection is to verify that the manufacturer's specifications and requirements have been met in detail.

An initial inspection of the control system must be made and certified immediately after the maintenance is completed. A duplicate inspection of the controls being worked on must be made by a person referred to in CAR 43.04.1 prior to further flight. See also CAR 43.04.8.7 "Duplicate Inspection of Controls".

(b) Non-scheduled maintenance inspections

- (i) During operations an aircraft may be subject to –
 - (aa) hard/overweight landings;
 - (bb) operations outside the normal flight envelope e.g. - exceeding placarded speed for flaps or landing gear, exceeding aircraft design speeds and loads, etc.;
 - (cc) severe air turbulence or severe manoeuvres;
 - (dd) lightning strikes;
 - (ee) foreign-object damage;
 - (ff) unconfined engine failures;
 - (gg) towing - involving high drag/side loads due to ground handling; or
 - (hh) any manoeuvre not catered for in the aeroplane flight manual.
- (ii) If any of the foregoing occur, the manufacturer's recommendations must be followed. If no specific procedures are prescribed for a particular aircraft, the Director must be approached for guidance.

(c) Propeller and rotor blade strikes

- (i) Following any propeller strike, whether rotating or as prescribed in the manufacturer's recommendations, a complete propeller and engine disassembly and shock load inspection is mandatory and must be accomplished prior to further flight.

All propeller, engine and applicable exhaust-driven Class II products, such as but not restricted to magnetos, propeller governors, alternators, generators, hydraulic pumps, turbochargers, fuel pumps and vacuum pumps for which there are overhaul instructions available, shall be inspected internally and externally in accordance with the manufacturer's requirements, and to the extent necessary, to ensure continued safe operation of the propeller, engine and component parts.

The organisation responsible for the above mentioned inspections shall also ensure that the required testing, as prescribed by the manufacturer of the propeller, engine or component involved, is carried out in accordance with such requirements.

- (ii) All procedures and parts as detailed in the relevant engine, propeller and component overhaul/repair manuals, IPCs, ADs, SBs, SLs and SIs shall be adhered to. Reference shall also be made to the relevant AICs.
- (iii) The following shall be substituted when executing a shock-load inspection:
 - (aa) All propeller parts as detailed in the overhaul/repair manuals and IPCs.
 - (bb) All engine gaskets, seals, induction and rocker drain hoses, or any other hose that has become brittle, and all locking devices.
 - (cc) All crankshaft bearing or bearing inserts (main and connecting rods), and reduction gear shaft bearing or bearing inserts, where applicable.
 - (dd) All connecting rod bolts and nuts.
 - (ee) All counterweight retention parts (for counterweight-equipped engines).
 - (ff) All piston rings.
 - (gg) All shock absorbing rubbers (magneto and alternator drives).
 - (hh) All stressed bolts, such as crankshaft gear attaching bolts, camshaft gear attaching bolts, crankshaft alternator drive gear attachment bolts (where applicable), stationary drive gear bolts (reduction gear train), and all other parts that do not meet the manufacturer's service limitation requirements, as well as any incorrect or unapproved parts.
 - (ii) All engine mounting rubbers and the engine mounting(s) and attachments shall be x-ray, magnaflux or dye-penetrant inspected and replaced as required.
 - (jj) In the case of a turbine engine, any additional recommendations by the manufacturer to the foregoing shall be met.
- (d) In the event of a helicopter rotor strike, the manufacturer's recommendations are to be met.

(4) Fuel-flow checks

Fuel flow checks must be carried out and the results recorded in the maintenance records as follows:

- (a) At each MI on all aircraft with gravity-feed fuel tank systems.
- (b) After any maintenance performed on the fuel system, including the replacement of fuel lines, components or tanks.
- (c) At any time the operator encounters fuel system starvation problems.

3. Associated documents

- (1) During the maintenance of aircraft due regard must be given to –

- (a) the contents, recommendations or requirements of the relevant manuals, IPCs, ADs, SBs, SLs, SIs or other similar technical information produced by the manufacturers of the airframe, engine, propeller and installed equipment; and
 - (b) additional requirements issued by the Director, including those contained in Aeronautical Information Circulars and in any publications, issued by the State of manufacture or State of type design of the aircraft, which may prescribe or amplify techniques to be followed in the maintenance of aircraft; e.g. British Civil Aircraft Inspection Procedures and United States of America Federal Aviation Administration handbooks AC-43-13-1 (Acceptable Methods, Techniques and Practices) and AC-43-13-2 (Acceptable methods Techniques and Practices - Aircraft Alterations) or their successor publications.
- (2) All relevant information and requirements referred to in subsection (1) must be either contained in, listed, or otherwise associated with the check-list required to be used in terms of section 2(3)(b)(ii)(aa) for each specific aircraft.
- (3) In the event of any conflict between the requirements or instructions issued by a manufacturer and those by the Director, the provisions of the latter shall prevail.
- (4) It is a requirement that all relevant aircraft documents be available, at the time of inspection and that such documents be current and up to date, and that no inspection may be certified unless requirements in respect thereof have been satisfied.
- (5)(a) The registered owner or operator shall ensure that a control system is in place ensuring that the requirements of all applicable ADs, as well as any SBs, SLs, SIs or other service information classified as mandatory, are complied with as specified in each directive before the aircraft is released to service.
- (b) “Mandatory” in this context means:
- (i) the airworthiness directive (AD) is issued by either the Director or by the appropriate authority of the State of the type certificate holder;
 - (ii) the Director instructs that a SB, SL, SI or other service information, issued by a manufacturer shall be complied with;
 - (iii) the Director instructs that a SB, SL, SI or other service information, relating to the safety of the aircraft, shall be complied with in respect of an aircraft, including its components or parts, that is operated in terms of an air service licence or is utilised for the provision of flying training (other than the training of its registered owner).
- (c) In respect of an aircraft that is not used for the provision of a commercial air transport operation or in flying training (other than for the training of its registered owner), compliance with any SB, SL, SI or other service information, issued by a manufacturer, shall be at the discretion of the

aircraft's owner, in which case he or she shall comply with the provisions of paragraph (d).

- (d) Whenever an owner, referred to in subregulation (c), decides not to comply with a particular SB, SL, SI or other service information, issued by a manufacturer in respect of his or her aircraft, this shall be recorded in the appropriate logbook as "SB (etc.) No. ____ NOT COMPLIED WITH".
- (6) Requirements quoted in ADs are periodically revised. Each person carrying out mandatory maintenance shall ensure that such publications are up to date when used, and shall also ensure that any retrospective action required by any publication revision is complied with as and when required.
- (7) Modifications and special inspections shall be accomplished not later than the time or date specified against each item. Should the certifying person find that, due to circumstances beyond his or her control, he or she is unable to comply with the manufacturer's instructions regarding the specified time or date, written exemption from compliance must be requested and an acceptable alternate means of compliance must be submitted to the Director for consideration together with all substantiating data. Such approval must be obtained prior to further flight.
- (8) Deferred modifications or special inspections shall be accomplished as soon as the circumstances requiring the postponement no longer exist, but in any event not later than the written extension granted by the Director. An alternate method of compliance may be considered by the Director upon submission of acceptable substantiating data.
- (9) Modifications and special inspections required by the manufacturer of the airframe, engine, propeller, component or installed equipment are made known by way of SBs, SLs, SIs, modification bulletins or other similar technical information. Such information is generally classified by the manufacturer to indicate the degree of essentiality. Licence holders or authorised persons who certify the inspections are to ensure that their organisation possesses and keep up-to-date all such information that is to be brought to the notice of the aircraft owner or operator. No aircraft may be released to service if not all applicable Airworthiness Directives have been complied with as yet.
- (10) Where applicable in terms of subsection (5)(b)(ii), modifications and special inspections, classified by a manufacturer as mandatory, shall be carried out in accordance with the manufacturer's instructions not later than the time or date specified by them, but in the event of any difficulties in complying therewith, the provisions of subsection (7) above shall apply with the necessary changes.
- (11) The accomplishment of any modification or special inspection is to be recorded in the appropriate logbook on the page provided for and to be certified by the licensed or authorised person who performed the maintenance. See also subsection (5)(d) above in respect of any non-compliance.

SECTION B: MAINTENANCE SCHEDULE FOR AEROPLANES WITH AN MCM OF 5 700 KG OR LESS (MINIMUM REQUIREMENTS)

Provided the Maintenance Schedule is drawn up in accordance with this Technical Standard, it serves as the approved aircraft maintenance schedule for the particular aeroplane, without the

need to forward it to the Director for his or her approval. However, any deviation from the provisions of this Technical Standard shall require the prior approval of the Director.

SAMPLE LAYOUT OF CHECK-LIST, CONTAINING MINIMUM REQUIREMENTS

1. General:

Aircraft type	Registration Z	S/N
Engine type (give full designation)		
Engine serial number(s)	No. 1	No.2
Propeller/s type (as applicable)	No. 1	No.2
Propeller/s serial number(s)	No. 1	No. 2

2. Hours of operation

Airframe Total time	Hrs	Landings If applicable
Cycles if applicable		
Engine(s) since new or last overhaul and date of last overhaul		
No.1	Hrs	Cycles
No.2	Hrs	Cycles
No. 1 Date of O/H		No. 2 Date of O/H
Propeller(s) since new or last overhaul/mid-life inspection and date of last overhaul		
No.1	Hrs	Cycles
No.2	Hrs	Cycles
No. 1 Date of O/H		No. 2 Date of O/H

3. Mass and balance

Date last established

4. Component overhauls due

List

5. Aircraft documentation

C of A No.	Currency date:	Available and current
C of R No.	Radio station Licence No.:	Currency date

6. Record of avionics equipment installed (name, type and serial nos.):

VHF	ADF	RADAR
HF	DME	GPS
TXPDR	STORMSCOPE	OTHER

MPI MINIMUM CHECK-LIST

[Note: Only the minimum requirements for an MPI are listed. The manufacturer’s check sheets must be integrated in the appropriate places for the check-list to be acceptable as an approved aircraft maintenance schedule for a particular make and type of aircraft.]

1. Remove or open all necessary inspection panels, access doors, fairings and cowlings and thoroughly clean the aircraft, engine and propeller.
2. Inspect the metal, Fibreglas or fabric skin for deterioration, distortion, cracks, corrosion and other evidence of failure and defective or insecure attachments.
3. Inspect the interior of the fuselage hull, empennage, centre section, wings, control surfaces for deterioration, distortion, cracks, corrosion and other evidence of failure and defective or insecure attachments.
4. Inspect fabric-covered wings interior cross bracing brackets, bracing rods and the wing rib lacing cords for proper tightness or failure and correct as necessary.
5. Inspect fuel tanks for condition, leaks and corrosion on the tanks and in the tank bays. Integral tank interiors for sealing and microbiological growth. Sender units for condition.
6. Inspect registration and other markings for conformity.
7. Where applicable, ensure that all water drain holes are open.
8. Inspect area beneath floor including, lines, hoses, wires, control cables and pulleys for condition, cleanliness, security, routing and proper functioning.
9. Seats for condition and apparent defects, seat rails for condition, wear, locking mechanisms and stops. Safety belts and harnesses for wear, attachment and buckles.
10. Windshields and windows for cleanliness, distortion, crazing, cracks, delimitation, deterioration and breakage.
11. Instruments for poor condition, mounting, marking, placarding, and where practicable: proper operation.
12. Test pitot and static systems with calibrated test equipment for freedom from obstructions and leaks. Drain water traps.
13. Inspect compass for discolouration and bubbles, check for freedom of rotation and ensure that compass has been swung in accordance with the requirements and periods specified in Technical Standard 43.02.18.
14. Check altimeters and airspeed indicators for accuracy. Carry out a pitot static check with calibrated test equipment. (Note: this check needs to be carried out only once per annum.) See also TS 43.02.9.
15. Batteries, terminals and boxes for condition, corrosion, attachment, installation, venting and proper charge.
16. Inspect general condition of all bungee cords for wear, serviceability and correct colour coding. Bungee cords must be replaced on condition or every five years, whichever occurs first, or in accordance with the manufacturers recommendation.
17. Inspect main and nose or tail landing gear for wear, play, corrosion, rigging, oleos, latches, torque links, rods, doors and locking mechanisms. Operate landing gear through five fault-free cycles or follow the manufacturer's recommendations. Record findings, if applicable.
18. Inspect tyres for wear, cuts and abrasion. Wheels for condition, wear, damage and corrosion. Carry out NDT inspections as required. Brakes for condition, wear, wear pins, pads, drums discs and callipers as required.
19. Flying controls and trim tabs for damage, wear, corrosion, play, freedom of movement and condition. Attachment brackets, operating components, rods and rod ends for damage, wear, play and freedom of movement. Balance weights for security of attachment. Check aileron travel and aileron trim tab(s) and record:

Right Aileron

Up

down

<u>Left Aileron</u>	Up	down
<u>Trim tab</u>	L. H.	R. H
	Up	down

20. Check flap travel and record:

Up	intermediate	down
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(as applicable)

21. Inspect and record rudder and elevator or stabiliser travels and correct sense:

Rudder left	right
Rudder trim tab: L	R
Elevator up	down
Elevator trim tab: Up	down

(as applicable)

22. Carry out fuel flow checks:

Left:	Auxiliary Left
Right	Auxiliary Right
All	Off

23. Check that the propeller has been overhauled within the time limit specified by the manufacturers and that of the provisions of Appendix 1 and 2 have been met.

24. Record cylinder blow-by for each engine(s):

Left Hand Engine	/80	/80	/80	/80	/80	/80	/80	/80
Right Hand Engine	/80	/80	/80	/80	/80	/80	/80	/80

25. Inspect wooden propellers for condition. Check that propeller hub bolts are correctly torqued and bolt holes for excessive compression of the front and rear faces due to over tightening.

26. Inspect installed avionics equipment for proper operation. See Also TS 43.02.6, TS 43.02.10 and TS 43.02.11, as applicable.

27. Carry out a systems check flight and operationally check all systems:

Do you consider the aircraft serviceable: Yes/No

If no, give reason(s):

Pilot's Name: Licence No.:

Signature:

Instructions:

1. All flexible hoses shall be renewed as prescribed by the manufacturer. In cases where the manufacturer does not specify the replacement of hoses, all fluid and pneumatic carrying flexible hoses shall be renewed every eight years. Record part numbers of any hoses replaced in the appropriate logbook(s).

2. Ensure that the aircraft empty mass has been established and revised up to date in accordance with the requirements of CAR 43.02.7, and that the established mass has been recorded in the flight manual or other approved document on the prescribed form as detailed in Technical Standard 43.02.7.

3. An aircraft may not be released for service unless the following documentation has been checked for availability, applicability and being up to date:

Certificate of registration No.

Certificate of airworthiness. No.

Currency date

Radio Station licence:

Expiry date

Certificate of release to service of an aircraft.

Approved flight manual:

P/No.:

Revision date/number:

Approved mass and balance data and equipment list.

Approved flight folio.

Approved minimum equipment list, if applicable.

Inspection reminder as prescribed in Annex A.

Record next inspection due hrs. and date.

4. Airframe, engine(s) and propeller(s) logbooks:

- (a) Record all Airworthiness Directives complied with during this inspection.
- (b) Record all recurring Airworthiness Directives complied with during this inspection.
- (c) Record all Service Bulletins complied with during this inspection.
- (d) Record of Service Letters embodied during this inspection.
- (e) Record of modifications embodied during this inspection.
- (f) Record of other service instructions embodied during this inspection.
- (g) Record of all service instructions, considered mandatory by the manufacturer but, in terms of Section A, subparagraphs 3(5)(c), not embodied at the instruction of the owner.

I hereby certify that in carrying out the foregoing specified maintenance, all the requirements prescribed in the Civil Aviation Regulations, that are applicable thereto have been complied with.

Date

Signature

LICENCE OR OTHER APPROVAL NO.:

AMO Name

Licence No.

1. Before the inspection, remove or open all necessary inspection panels, access doors, fairings and cowlings and thoroughly clean the aircraft, engine, gearbox and rotors.
2. Inspect the metal, Fibreglas or fabric skin for deterioration, distortion, cracks, corrosion and other evidence of failure and defective or insecure attachments.
3. Inspect the interior of the fuselage hull, empennage, centre section, rotor blades for deterioration, distortion, cracks, corrosion and other evidence of failure and defective or insecure attachments.
4. Inspect fuel tanks for condition, leaks and corrosion on the tanks and in the tank bays. Integral tank interiors for sealing and microbiological growth. Sender units for condition.
5. Inspect registration and other markings for conformity.
6. Where applicable ensure that all water drain holes are open.
7. Inspect area beneath floor including, lines, hoses, wires, control cables and pulleys for condition, cleanliness, security, routing and proper functioning.
8. Seats for condition and apparent defects, seat rails for condition, wear, locking mechanisms and stops. Safety belts and harnesses for wear, attachment and buckles.
9. Canopy windshields and windows for cleanliness, distortion, crazing, cracks, delimitation, deterioration and breakage.
10. Instruments for poor condition, mounting, marking, placarding, where practicable: proper operation.
11. Test pitot and static systems with calibrated test equipment for freedom from obstructions and leaks. Drain water traps.
12. Inspect compass for discolouration and bubbles, check for freedom of rotation and ensure that compass has been swung in accordance with the requirements and periods specified in Technical Standards 43.02.18.
13. Check altimeters and airspeed indicators for accuracy. Carry out a pitot static check with calibrated test equipment. (Note: this check needs to be carried out only once per annum). See also Technical Standard 43.02.9.
14. Batteries, terminals and boxes for condition, corrosion, attachment, installation, venting and proper charge.
15. Inspect general condition of all drive belts for wear, serviceability. Drive belts must be replaced on condition or in accordance with the manufacturer's recommendation.
16. Main and tail rotor gearboxes, rotorheads, drive trains for condition, corrosion, freedom of movement and balancing as required.
17. Inspect main, nose landing gear or skids for wear, play, corrosion, rigging, oleos, latches, torque links, rods, doors and locking mechanisms. Operate landing gear through five fault free cycles or follow the manufacturer's recommendations and record findings, if applicable.
18. Inspect tyres for wear, cuts and abrasion. Wheels for condition, wear, damage and corrosion. Carry out NDT inspections as required. Brakes for condition, wear, wear pins, pads, drums discs and callipers, as required.
19. Flying controls and trim tabs for damage, wear, corrosion, play, freedom of movement and condition. Attachment brackets, operating components, rods and rod-ends for damage, wear, play and freedom of movement. Balance weights for security of attachment.
20. Carry out fuel flow checks:

Left	Auxiliary Left
Right	Auxiliary Right

All: Off

21. Check that the rotor blades have been overhauled within the time limit specified by the manufacturer.

22. Record cylinder blow-by for each engine(s):

/80 /80 /80 /80 /80 /80 /80 /80

/80 /80 /80 /80 /80 /80 /80 /80

23. Check installed avionics equipment for proper operation. See also TS 43.02.6 (when applicable), TS 43.02.10 and TS 43.02.11.

24. Carry out a systems check flight and operationally check all systems:

Do you consider the aircraft serviceable: Yes/No

If no, give reason(s):

Pilot's Name: Licence No.:

Signature:

Instructions:

1. All flexible hoses shall be renewed as prescribed by the manufacturer. In cases where the manufacturer does not specify the replacement of hoses, all fluid and pneumatic carrying flexible hoses shall be renewed every eight years. Record part numbers of any hoses replaced in the appropriate logbook(s).
2. Ensure that the helicopter empty mass has been established in accordance with the requirements of CAR 43.02.7, and that the established mass has been recorded in the flight manual or other approved document on the prescribed form, as detailed in Technical Standard 43.02.7.
3. A helicopter may not be released for service unless the following documentation has been checked for availability, applicability and being up to date:

Certificate of registration No.

Certificate of airworthiness No.

Currency date

Radio Station licence

Expiry date

Certificate of release to service.

Approved flight manual P/No.

Part 2 – Scheduled and unscheduled maintenance inspections

Part 3 – Overhauls or substitution of Class I and II products

Part 4 – Airworthiness Directives and mandatory modifications

Part 5 – Documents

Part 6 – Reliability programme

PART 1: APPROVAL AND GENERAL INSTRUCTIONS

1. General

This maintenance schedule contains the minimum requirements in respect of the maintenance and inspections prescribed aeroplanes with an MCM of 5 700 kg or less and for helicopters with an MCM of 3 275 kg respectively, utilised in commercial air transport operations.

2. Approval

- (1) This schedule becomes effective on the date specified by the Director and supersedes any previously approved maintenance schedule for the aircraft concerned, if any.
- (2) Any amendment to this maintenance schedule shall require the prior approval of the Director.
- (3) This maintenance schedule is approved in terms of the powers granted to me by the Act and shall become effective on (date).

Signed:

Date:

DIRECTOR FOR CIVIL AVIATION

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REVISION STATUS

REVISION NUMBER	INCORPORATED BY	DATE

3. Abbreviations

AD–Airworthiness Directive

AIC–Aeronautical Information Circular

AME–Aircraft Maintenance Engineer

AMO–Aircraft Maintenance Organisation
AMS–Approved Maintenance Schedule
BCAR–British Civil Aviation Requirements
CAR–Civil Aviation Regulations
CATS–Civil Aviation Technical Standards
CD–Compact Disc
CDL–Configuration Deviation List
C of A–Certificate of Airworthiness
C of R–Certificate of Registration
CRS–Certificate of Release to Service
CPCP–Corrosion Prevention Control Programme
CRM–Certificate Relating to Maintenance
DDM–Dispatch Deviation Manual
DGAC–Direction Generale de l'Aviation Civile
Director–Director for Civil Aviation
FAA–Federal Aviation Administration
FAR–Federal Aviation Regulations
HRS–Hour
IPC–Illustrated Parts Catalogue
JAA–Joint Aviation Authorities
JAR–Joint Aviation Requirements
MCM–Maximum Certificated Mass
MCM–Maintenance Control Manual
MEL–Minimum Equipment List
MMEL–Master Minimum Equipment List
MPD–Maintenance Planning Document
MTM–Maximum Certificated Take Off Mass
PI–Progressive Inspection
P/N–Part Number

RVSM–Reduced Vertical Separation Minimum

SACAA–South African Civil Aviation Authority

SB–Service Bulletin

SI–Service Instruction

SL–Service Letter

S/N–Serial Number

SRM–Structural Repair Manual

TBO–Time Between Overhaul

4. Definitions

In this Schedule, unless inconsistent with the context, the following terms shall have the meanings of descriptions assigned to them (see also Part 1 of the CAR):

“**Aircraft**” means an aircraft as defined in the Act, including its engines, propellers, rotors, components, parts, equipment instruments, accessories and materials.

“**Airworthy**” means, when used in relation to an aircraft, that the aircraft is serviceable and meets all the requirements prescribed for the issuing of a certificate of airworthiness and such other requirements as have been prescribed for the continuing validity of such a certificate.

“**Approved Maintenance Schedule**” means a document compiled by an owner or operator and approved by the Director that defines the procedures for ensuring the sustained airworthiness of the aircraft to which it relates, its components, installed systems and equipment.

“**Check for condition**” means that the products, component/part or other item referred to must be inspected for cleanliness, corrosion, wear, deterioration, delimitation, cracks, dents, scores, cuts, scratches, distortion, bowing, evidence of overheating, freedom from obstruction, fouling, leaks, correct locking and any other unacceptable feature not specifically mentioned herein. “Inspect for condition” and “Examine for condition” have corresponding meanings.

“**Direct supervision**” means, in relation to the maintenance of an aircraft, that the person exercising the supervision personally maintains such surveillance of all maintenance being performed, as is necessary to ensure that it is being properly carried out, and that this person is readily available in person for consultation with the person doing the work.

“**Large aeroplane**” means an aeroplane with an MCM in excess of 5 700 kg.

“**Large helicopter**” means a helicopter with an MCM in excess of 3 175 kg.

“**Maintenance**” means all work carried out in accordance with manufacturers’ recommendations and approved maintenance schedules and includes inspection, adjustment, substitution, rectification, repair, modification, overhaul and testing.

“**Progressive inspection**” means the continuous airworthiness inspection of an aircraft at scheduled intervals in accordance with procedures approved by the Director.

“Serviceable” means, when used in relation to an aircraft, that the aircraft has been maintained and inspected in accordance with the requirements of the approved maintenance schedule and that all adjustments and rectification's, found to be necessary, have been satisfactorily made.

“Serious defect” means a defect that would result in the aircraft becoming unserviceable, due to damage to its major primary structure, and no longer meeting its type certification basis.

5. General instructions

- (1) The onus for ensuring that an aircraft is kept airworthy rests on the registered owner/operator of the aircraft. This maintenance schedule has been prepared to ensure that, as far as possible in the light of information and experience available, the aircraft to which it refers is effectively maintained in an airworthy condition by scheduling the required maintenance during its operational life with a programme of inspections and overhauls, based on normal operational usage of the aircraft.
- (2) The routine maintenance, scheduled inspections, structural integrity inspections, overhaul, modification, major repairs and structural repairs on the aircraft to which this maintenance schedule refers shall be undertaken and certified by an appropriately rated approved Aircraft Maintenance Organisation (AMO) only.
- (3) It is the duty and responsibility of the flight crew operating the aircraft to ensure that unusual occurrences, defects or suspected faults, coming to their notice and that may affect the serviceability and safety of the aircraft, are recorded in the flight folio as and when they occur, and are reported to an appropriately approved Aircraft Maintenance Organisation for investigation or rectification. When away from base, instructions regarding their rectification and certification must be sought and recorded.
- (4) All rectification carried out away from base must be entered and certified in the aircraft's flight folio and transferred into the aircraft's logbook/s within 48 hours after the aircraft returns to base.
- (5) A defect, allowable in terms of the MEL, DDM or CDL, must be entered in the flight folio and the aircraft may continue to operate if the defect is not considered to have an adverse affect on the safety of the aircraft. Repetitive entries in the flight folio shall give the reason for the deferment and shall be certified by the holder of valid type certification issued by an approved Aircraft Maintenance Organisation.
- (6) The AMO responsible for the maintenance of the aircraft, to which this schedule relates, will draw up a maintenance planning document (MPD) to ensure compliance with:
 - (a) all information issued by the manufacturers of the aircraft, its engines, propellers, instruments and installed equipment relating to the maintenance, inspection, repair, modification and overhaul of these items;
 - (b) any requirements, including those contained in Airworthiness Directives and such SBs, SLs and SIs classified mandatory by the manufacturer or the Director, and Aeronautical Information Circulars (AICs), issued by the Director; and
 - (c) the Civil Aviation Regulations.

In the unlikely event of the aircraft is not utilised in commercial air transport operations or for the provision of flight training, the provision of subparagraph 3(5)(c) in Section A of Technical Standard 43.02.8 applies.

- (7) The terms “check”, “inspect” and “examine for condition”, where used in this maintenance schedule, shall mean that the part, component or item referred to is required to be

inspected for cleanliness, corrosion, wear, deterioration, cracks, dents, scores, cuts, scratches, distortion, bowing, evidence of overheating, freedom from obstruction, fouling, leaks, security, correct locking and any other unacceptable feature not specifically mentioned herein, as applicable, and to an extent considered to be commensurate with its known condition at the last inspection and with the known usage or abuse it has undergone since then.

- (8) Any part, component or item, found to be adversely affected, shall be rendered serviceable or substituted by such rectification as is necessary, and no check required by this maintenance schedule shall be considered to be complete until all items found unsatisfactory have been effectively rectified.
- (9) Nothing in this maintenance schedule shall be construed as:
 - (a) absolving the owner or operator or the AMO from ensuring that any additional maintenance found necessary for the continued airworthiness of the aircraft is carried out; or
 - (b) relieving the pilot-in-command of the aircraft from complying with the requirements of this schedule that are applicable to him or her.
 - (c)

6. Scheduled and unscheduled maintenance inspections

- (1) Scheduled and unscheduled maintenance inspections shall be carried out in accordance with the requirements of Part 2 of this maintenance schedule.
- (2) Where Part 2 of this maintenance schedule shows only the items to be inspected at each check, without detailing what they are to be inspected for, the user of the maintenance schedule shall compile check sheets from approved data which shall indicate in detail the inspection requirements.
- (3) Amendments to this maintenance schedule must be submitted for approval by the aircraft owner or operator of the aircraft to which the schedule refers. Therefore, maintenance organisations are not entitled to request any changes to this maintenance schedule unless such request is accompanied by written authority from the owner or operator, as the case may be.
- (4) If the aircraft, to which this maintenance schedule relates, sustains a serious defect, its certificate of airworthiness shall automatically become invalid. The certificate will be revalidated once an inspection and repair of the aircraft has been performed to the satisfaction of the Director by a person or body of persons acceptable to him or her, and the Director has satisfied himself or herself that the aircraft can once again be operated safely.

7. Overhaul or substitution

- (1) The aircraft and its components or installed equipment shall be overhauled or substituted in accordance with current instructions prescribed in paragraph 4(6) of Part 1 of this schedule and at such times as is prescribed in Part 3.
- (2) If the Director considers it necessary, in the interests of safety, to prescribe a TBO for items for which the manufacturer has not prescribed an overhaul life, such life limitation shall be recorded in Part 3 of this Schedule.

- (3) If the owner of the aircraft, to which this maintenance schedule refers, wishes to extend any TBO specified in Part 3 of this Schedule, he or she shall apply in writing for the temporary amendment of this Schedule. Such application must be supported by adequate information substantiating the temporary amendment applied for. The application must follow the procedure as prescribed in regulation 43.02.1.
- (4) In addition to the aircraft logbooks or approved recording system, a separate record of life-limited and TBO items shall be kept, to ensure that limitations are not exceeded. This record shall be updated within 48 hours of any component having been overhauled, replaced or substituted.
- (5) The record. specified in paragraph (4) above, shall include a section to indicate compliance with any recurring ADs, manufacturer's mandatory requirements, such as SBs, SIs and SLs, and applicable structural integrity inspections, corrosion prevention control programme (CPCP), or any other requirement called out in a maintenance planning document (MPD). See also subparagraph 3(5)(d) of Section A of Technical Standard 43.02.8.
- (6) Whenever a record system is introduced, it shall be subject to acceptance by the Director, and no procedural changes that affect the validity of this Schedule shall be made to the system without the prior approval of the Director.
- (7) No calendar and cycle limitations imposed by the manufacturer may be extended without prior approval of the Director.
- (8) The recording system, to be used to ensure compliance with this Schedule, shall be as follows:

(Please indicate fully the method of record keeping to be adapted.)

8. Mandatory modification and special inspections

- (1) Unless the Director has approved an amendment to this Schedule, compliance with all modifications or special inspections that the manufacturer of the aircraft, its engines, propellers, instruments and installed equipment considers mandatory by a certain date or time shall be met by that date or time. Failure to comply with the aforementioned requirements will invalidate the C of A. See also subparagraphs 3(5)(c) and (d) of Section A of Technical Standard 43.02.8.
- (2) Part 4 of this Maintenance Schedule may contain a list of modifications and special inspections, hereinafter referred to as Airworthiness Directives (ADs), that are issued by the State of Type Design, State of Type Certificate Holder, State of Manufacture or the Director. These may include some of the modifications and inspections referred to in paragraph (1) above, or may be additional thereto. Compliance shall be met in accordance with the requirements contained in the applicable AD and not later than the time stated therein. In the event of any conflict between the modifications and special inspections classified as essential and mandatory by the manufacturer or ADs issued by the Director, the provisions of the latter shall prevail.
- (3) Revisions, cancellations or additions to the Part, referred to in subparagraph (2) above, will be issued as necessary. The requirements shall be complied with not later than the time or date specified. In the event where compliance cannot be met, the requirements of paragraph (2) above shall apply with the necessary changes.

9. Certificates of release to service

- (1) A Certificate of Release to Service, as prescribed in Part 5 of this Schedule and issued in accordance with the requirements of the Civil Aviation Regulations, as amended, shall be valid for the interval between any successive checks or on completion of an inspection cycle required by this Maintenance Schedule
- (2) When a Certificate of Release to Service becomes invalid due to an aircraft sustaining a defect, its validity will be restored when the defect, that caused it to become invalid, is rectified and such rectification has been certified by a person authorised in terms of CAR 43.04.1, and the Director has satisfied himself or herself that the aircraft can be operated safely.
- (3) When compliance with any Scheduled check is extended in terms of paragraph 2 of Part 2 of this Schedule, the person(s) extending the check shall issue a new Certificate of Release to Service valid only for the extended period.
- (4) Should the aircraft sustain a serious defect, the Certificate of Release to Service ceases to be valid as such. The Certificate of Airworthiness issued for the aircraft also ceases to be valid.
- (5) An aircraft may not be released to service with any unsatisfactory items or deferred defects without approval from the Director.

10. Avionics, instrumentation and electrical

- (1) The routine maintenance, overhaul, modification and repair of avionics, instrumentation and electrical equipment shall be performed only under the direct supervision of, and be certified by, a person holding an appropriately rated certificate of approval issued by the holder of an approved Aircraft Maintenance Organisation.
- (2) According to CAR 43.02.2(3) the routine maintenance, scheduled inspections, structural integrity inspections, overhaul, modification, major repairs and structural repairs on aeroplanes with a maximum certificated mass in excess of 5 700 kg or on helicopters with a maximum certificated mass in excess of 3 175 kg shall be undertaken and certified by an appropriately rated approved Aircraft Maintenance Organisation (AMO) only.

Therefore, no person shall sign a release to service for avionics, instrument or electrical systems, unless that person has been authorised by, and holds the necessary certification issued by, an approved aircraft maintenance organisation. Thus the holder of an AME category A or C licence may not exercise this privilege in respect of the aircraft to which this schedule relates.

11. Amendments

- (1) This maintenance schedule specifies the minimum maintenance considered necessary to maintain the aircraft to which it refers in an airworthy condition. No amendment to this maintenance schedule may be made without the prior written approval of the Director.
- (2) Subparagraph (1) is not to be construed as prohibiting any additional maintenance, not specifically mentioned in this schedule, that may be required to ensure that the aircraft can be operated safely. Such maintenance may be undertaken without the approval of the Director, provided the latter is advised of such requirement and an application for the

amendment of this maintenance schedule is made accordingly. The Director may waive the amendment requirement.

- (3) Amendments to this Maintenance Schedule shall become effective on the date of approval by the Director or otherwise as indicated in subparagraph 1(5) of Part 1 of this Schedule.
- (4) The user of this Maintenance Schedule shall, prior to use, ensure that it has been amended to date.

12. Aircraft inspection report

An aircraft inspection report form CA 43.02 shall be submitted at intervals not exceeding 12 months, commencing on the date of validation of the C of A. If the aircraft is unserviceable at the time when the applicable form should be completed and submitted, the interval may be extended until the aircraft is airworthy again.

13. Duplicate inspections

- (1) A duplicate inspection of all engine and flight control systems shall be carried out after initial assembly and at any time the systems have been disturbed in any way. The purpose of the duplicate inspection is to verify that the manufacturer's specifications and requirements have been met in full.
- (2) An initial inspection of the control system shall be made and certified by a person in possession of a valid Aircraft Maintenance Engineer's (AME) licence, or who has been approved by the Director as an Inspector in an organisation, or holds company certification as prescribed in Part 145 of the Civil Aviation Regulations immediately after the maintenance is completed and before the aircraft is flown. Persons qualified to perform and certify duplicate inspections are:
 - (a) A type-rated AME or person holding valid company certification in terms of Part 145 of the Civil Aviation Regulations.
 - (b) An AME, holding a valid licence for the particular category, but not type-rated.
 - (c) The holder of valid company certification on a similar type.
 - (d) The holder of a valid airline transport pilot licence rated on the type concerned, if the persons referred to in subparagraphs (a), (b) or (c) are not available.

14. Rectification of unsatisfactory items

- (1) When during any inspection or at any other time any part, product, component or item is found to be unserviceable or, in the opinion of the supervising licensed aircraft maintenance organisation is unlikely to remain serviceable under normal operating conditions during the period preceding the next scheduled inspection, such rectification action as the supervising person considers to be necessary shall be taken to restore or extend the serviceability of the part, component or item prior to returning the aircraft to service.
- (2) All deferred defects shall be transferred from the flight folio and all work involved in restoring the serviceability of any part, component or item shall be clearly recorded in the relevant logbook or other approved recording system and be certified by an appropriately rated person or certificate holder.

- (3) Where aircraft are operating away from base for any length of time, copies of the above mentioned flight folios shall be submitted every seven (7) days to the base in the Republic where the records are normally kept.
- (4) The Certificate of Airworthiness is invalid until the unsatisfactory items have been rectified or the items have been deferred in accordance with the approved MEL, DDM or CDL requirements.

15. Associated documents

- (1) During the maintenance of the aircraft to which this schedule applies due regard shall be given to:
 - (a) the contents, recommendations or requirements of the relevant manuals, SBs, SLs, SIs or other similar technical information produced by the manufacturer and, where applicable, the engine, propeller and installed equipment; and
 - (b) additional requirements issued by the Director, including those contained in SA-CATS 43, AICs and in any publication issued by the authorities of the country of the type certificate holder that may prescribe or amplify techniques to be followed in the maintenance of aircraft, such as but not limited to British Civil Aircraft Inspection Procedures and United States of America Federal Aviation Administration handbooks AC. 43.13-1 (Acceptable Methods, Techniques and Practices - Aircraft Alternations), or their successor publications, Ageing Aircraft Programme, Corrosion Prevention Control Programme, and the Aircraft's Structural Repair Manual (SRM).

[Note: All relevant information and requirements, referred to in subparagraphs (a) and (b) above, must be either contained in, listed, or otherwise associated with the check-list required to be used for the aircraft.]

- (2) In the event of any conflict between the requirements or instructions issued by a manufacturer and those of the Director, the provisions of the latter shall prevail.
- (3) It is a requirement that all relevant aircraft documents be available at the time of inspection and that such documents are current and amended to date. No inspection is to be certified unless all requirements in respect thereof have been satisfied.
- (4) The following is a list of documents which are to be valid, current or amended to date, as the case may be, and shall be checked prior to the aircraft being released to service:
 - (a) Certificate of Registration No.
 - (b) Certificate of Airworthiness No.
 - (c) Currency date
 - (d) Radio Station Licence No.
 - (e) Currency date
 - (f) Certificate of Release to Service
 - (g) Approved Flight Manual
 - (h) Mass and Balance and Equipment List data
 - (i) Flight Folio
 - (j) MEL
 - (k) Aircraft logbook/s
 - (l) Reduced Vertical Separation Minimum (RSVM) certificate (if applicable)
 - (m) Noise certificate (if applicable)
 - (n) Engine emission certificate (if applicable)

- (o) Fuel venting certificate (if applicable)
- (p) Approved Maintenance Schedule

PART 2: SCHEDULED AND UNSCHEDULED INSPECTIONS

1. The complete periodic inspection cycle of time-limited and maintenance checks shall be as follows:

Check to be done at intervals not exceeding

(Specify)
2. Notwithstanding the requirements contained in paragraph 1, it shall be permissible under this schedule for an appropriately certificated person nominated by the Accountable Manager of an approved aircraft maintenance organisation, as referred to in Part 145, to extend any scheduled check by not more than ten per cent where the aircraft manufacturer or type certificate holder has approved such an extension: Provided that –
 - (a) the person has inspected the aircraft and satisfied himself or herself that the aircraft can be operated safely for the extended period;
 - (b) his or her authority for the extension is entered in the aircraft logbook prior to the aircraft being operated for the extended period;
 - (c) a certificate of release to service has been made out and certified in the correct manner; and
 - (d) the number of hours extended is deducted from the next scheduled inspection period by an equal amount.
3. During the extended period all other scheduled checks and inspections falling due must be carried out within the times specified in paragraph 1, but these may also be extended subject to the above requirements having been satisfied.
4. The Director may extend any scheduled inspection by a further 2% if the operator has an acceptable reliability programme in place and the operator can prove that safety will not be jeopardised.
5. No extension may be granted in respect of calendar times. Thus, an aircraft may not be flown without written approval from the Director after a calendar period of validity has lapsed.
6. During operations an aircraft may be subjected to –
 - (a) hard or overweight landings;
 - (b) operations outside the normal flight envelope; i.e. aircraft design speed or placarded speed of flaps or landing gear;
 - (c) severe air turbulence or severe manoeuvres;
 - (d) lightning strikes;
 - (e) foreign-object damage;
 - (f) propeller strikes;
 - (g) towing - including high drag or side loads due to ground handling.

If any of the foregoing occurs, the manufacturer's recommendations shall be followed. If no specific procedures are prescribed for the particular type of aircraft, the Director must be consulted, and an alternate method of compliance be submitted for approval, based on approved data from a person or body of persons responsible for the continued airworthiness of the aircraft.

7. Fuel flow checks are to be carried out in accordance with the aircraft's maintenance manual and the results recorded:
 - (a) at any time the fuel system has been worked on; and
 - (b) at any time the operator encounters fuel system starvation problems.
8. Installed avionics equipment shall be checked for proper operation. See also TS 43.02.6, TS 43.02.10 and TS 43.02.11.

PART 3: AND SUBSTITUTION OF CLASS I AND II PRODUCTS

1. Listed in Table 1 are extension intervals that the Director allows to be granted to the Time Between Overhauls in respect of the aircraft and installed equipment. These extension periods may NOT be granted, if the manufacturer has stipulated an escalation programme approved by the Director. Escalation programmes do not qualify for these extensions.
2. An appropriately certified person nominated by the Accountable Manager of an approved aircraft maintenance organisation may extend any TBO listed in Table 1 as follows:

Table 1		
Prescribed TBOs		Maximum extension period permitted, unless the Director approves otherwise
(i)	Up to 3 000 hours	100 hours
(ii)	3 001 to 6 000 hours	200 hours
(iii)	6 001 to 9 000 hours	300 hours
(iv)	9 001 to 12 000 hours	400 hours

Provided that he or she has satisfied himself or herself from the performance, condition and recorded history and approved data for the component concerned that it can be operated safely for the extended period and that his or her authority for the extension is entered, in accordance with paragraph 3 below in the appropriate logbook or other appropriate approved record prior to the component concerned is operated for the extended period.

3. On each occasion that an extension is granted in terms of paragraph 2 above, the person authorising the extension shall certify the following entry in the appropriate logbook:

"I hereby certify that I have satisfied myself, after consulting approved data and historical records of its performance since new or last overhaul, and the condition of (name the

product or component concerned giving a description and quoting part and serial number), the latter is such that it can be operated safely for a further hours of flight time. I hereby authorise such extension.

The current total airframe hours are

Signature

Approval/Licence No.

Date

4. The current status of life-limited products and parts, whether it be hours, cycles or calendar time must be available.
5. No calendar and cycle limitations imposed by a manufacturer may be extended without prior approval of the Director. Application with respect to this type of extension must be made in accordance with CAR 43.02.1.
6. A copy of TBO components must be attached to this Part.

PART 4: AIRWORTHINESS DIRECTIVES AND OTHER SERVICE INFORMATION

1. Airworthiness Directives (ADs) which concern the aircraft to which this maintenance schedule applies (including installed equipment) are dealt with in this Part.
2. The registered owner or operator shall ensure that a system is in place ensuring that the requirements of all applicable ADs, as well as any SBs, SLs, SIs or other service information classified by the manufacturer as mandatory, are complied with as specified in each directive before an aircraft is released to service.
3. "Mandatory" in this context means:
 - (a) the airworthiness directive (AD) is issued by either the Director or by the appropriate authority of the State of the type certificate holder;
 - (b) the Director instructs that a SB, SL, SI or other service information, issued by a manufacturer shall be complied with;
 - (c) in respect of an aircraft, including its components or parts, operated in terms of an air service licence or utilised for the provision of flying training (other than the training of its registered owner), any SB, SL, SI or other service information enhancing the safety of the aircraft (whether classified by the manufacturer as mandatory or not);
 - (d) in respect of aircraft that are not used for the provision of a commercial air transport operation or in flying training (other than for the training of its registered owner), compliance with any SB, SL, SI or other service information, issued by a manufacturer, shall be at the discretion of the aircraft's owner;
 - (e) whenever an owner decides not to comply with a particular SB, SL, SI or other service information, issued by a manufacturer in respect of his or her aircraft, this shall be recorded in the appropriate logbook as

"SB (etc.) No. NOT COMPLIED WITH".

4. Requirements quoted in ADs are periodically revised. Each user of this schedule shall ensure that such publications are up to date when used, and shall also ensure that any

retrospective action required by any publication revision is complied with as and when required.

5. Modifications and special inspections shall be accomplished not later than the time or date specified against each item. Should the certifying person find that, due to circumstances beyond his or her control, he or she is unable to comply with the manufacturer's instructions regarding the specified time or date, written exemption from compliance must be requested and an acceptable alternate means of compliance must be submitted to the Director for consideration together with all substantiating data. Such approval must be obtained prior to further flight.
6. Deferred modifications or special inspections shall be accomplished as soon as the circumstances requiring the postponement no longer exist, but in any event not later than the written extension granted by the Director. An alternate method of compliance may be considered by the Director upon submission of acceptable substantiating data.
7. Modifications and special inspections required by the manufacturer of the airframe, engine, propeller, component or installed equipment are made known by way of SBs, SLs, SIs, modification bulletins or other similar technical information. Such information is generally classified by the manufacturer to indicate the degree of essentiality. Licence holders or authorised persons who certify the inspections required by this schedule are to ensure that their organisation possesses and keeps up to-date all such information that is to be brought to the notice of the aircraft owner or operator. No aircraft may be released to service with Airworthiness Directives that have not been complied with as yet.
8. All modifications and special inspections classified by the manufacturers as mandatory shall be carried out in accordance with the manufacturer's instructions not later than the time or date specified by them, but in the event of any difficulties in complying therewith, the provisions of paragraph 5 above shall apply with the necessary changes.
9. The accomplishment of any modification or special inspection is to be recorded on the page provided for in the appropriate logbook and certified by the licensed or authorised person who performed the maintenance.

PART 5: DOCUMENTATION

Insert copy of Certificate of Release to Service for aeroplanes with an MCM in excess of 5 700 kg and helicopters with an MCM in excess of 3 175 kg, as prescribed in Annexure B 2, and amended to reflect the details of the issuing AMO.

SECTION E: MAINTENANCE SCHEDULE FOR GLIDERS INCLUDING POWER-ASSISTED AND TOURING GLIDERS (MINIMUM REQUIREMENTS)

Provided the Maintenance Schedule has been drawn up in accordance with this Technical Standard it serves as the Approved Aircraft Maintenance Schedule for the particular glider without the need to forward it to the Director for his or her approval. However, any deviation from the provisions of this Technical Standard shall require the prior approval of the Director.

SAMPLE LAYOUT OF CHECK-LIST, CONTAINING MINIMUM REQUIREMENTS

1. General:

Glider type	Registration Z
Manufacturer	S/No.
Date of manufacture	Total Flying Hours
Total Launches	Engine Type *
S/No.	Hrs. Since New/OH
Propeller Type *	S/No.
Hrs. Since New/OH	Registered Owner:

* Delete whichever is not applicable

2. Hours of engine operation (if applicable):

Engine since new or last overhaul and date of last overhaul *

No. 1	Hrs. No. 1	Date of O/H
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Propeller since new or last overhaul/mid-life inspection and date of last overhaul *

No.1	Hrs. No. 1	Date of O/H
------	------------	-------------

* Delete whichever is not applicable

3. Mass and Balance:

Empty Mass	kg	Date last established:
------------	----	------------------------

Empty Centre of Gravity	Date last established:
-------------------------	------------------------

4. Component overhauls due:

(List:)

5. Aircraft documentation:

C of A No.	Currency date:
------------	----------------

Available and current	C of R No.
-----------------------	------------

Radio station Licence No.	Currency date:
---------------------------	----------------

6. Record of Avionics equipment installed (Name, type and serial nos.):

VHF	ADF	RADAR
HF	DME	GPS
TXPDR	STORMSCOPE	OTHER

Notes:

1. ***The minimum requirements for the annual inspection are the manufacturer's requirement, integrated with the requirements addressed in the Minimum Check-list.***
2. ***The serviceability of an item is to be indicated by initialling the block against the item, to be countersigned on the job card by the person who inspected the work.***
3. ***A list of the names of all technical and certifying personnel, their signatures and initials shall be attached to the check-list for identification purposes.***
4. ***During any maintenance it will be the responsibility of the aircraft maintenance organisation to verify if Class I and Class II products correspond with the aircraft documentation and determine if the correct data are affixed to these products as applicable. If data plates are omitted, the Director must be notified prior to releasing the glider to service, stating what measures have been taken to ensure that the component is not a non-certificated part.***
5. ***In the case of touring glider, it may be advantageous to combine the maintenance schedule for an aeroplane, as listed in Section B of TS 43.02.8, with the maintenance schedule for a glider.***

MPI MINIMUM CHECK-LIST

Before the inspection, remove or open all necessary inspection panels, access doors, fairings and cowlings and thoroughly clean the aircraft, engine and propeller (if fitted).

1. **Nose fairing** – Check to ensure that it is firm and undamaged.
2. **Pot pitot/ventilator** – The pitot firmly mounted. Connecting tube undamaged. Check operation of ventilator control.
3. **Front skid / Shock absorbers / Wheel** – Check attachment points of skid or wheel for wear and looseness. Check skid wear plate for wear holes or pieces bent back. Rubber shock absorber blocks not cracked or broken, firmly mounted to both fuselage and skid. Wheel running true without play in bearings. Bearings clean and lubricated. Tyre serviceable.
4. **Front fuselage structure** – Inspect both inside and outside for cracks or impact-damage, with particular emphasis on fuselage bottom.
5. **Release hook assemblies** – Clean and not lubricated. Operate the release to establish that the overcentre lock is operating. (An audible “click” is heard as the lock activates.) Ensure that the operating cable is long enough for the release to operate properly. Where a belly hook is fitted, check the back release by applying a spring balance through a set of Tost rings. Pull down at an angle of 83° +/- 7° to the bottom of the hook body. The back release must operate at a load of 16 kg to 24 kg. In the event that the back release has been immobilized, a placard must be placed on the instrument panel, stating “**DO NOT WINCH – AEROTOW ONLY**”. Gliders to be launched by winch **MUST** have a functional back release.

6. **Main wheel / brake assembly** – Ensure that the main wheel runs true, bearings are quiet, brakes operate and are properly adjusted. Check retract linkages for excess play. Ensure that all mounting brackets are firm and that the retract locks down with a positive over-centre.
7. **Canopy, locks, jettison** – The canopy must be clear, free of distortion, crazing and cracks, and visibility through it not impaired. Hold-down locks must operate smoothly. The jettison must be operational and correctly placarded.
8. **Harness(es)** – Inspect harness straps for excess wear. Ensure that attachment points to fuselage are firm. Ensure that all quick-release systems operate smoothly.
9. **Seat pan assembly(ies)** – Inspect for damage, cracks or loose attachment points. Where the seat-pan base is close to the cockpit floor, ensure that pneumatic tubing and electrical wiring are not pinched.
10. **Cockpit floor structures** – Inspect for damage or cracks. Ensure that all bulkheads, supporting release hooks and control systems are still solidly mounted and firm.
11. **Rudder pedal assemblies** – Inspect for free movement. Check the rudder pedal assembly for cracks in the welds or tubes. Ensure that all joints are lubricated. Check that adjustment mechanisms work smoothly. Inspect visible parts of operating cables for wear and strand breakage. Pay particular attention to the cable adjoining the metal swage.
12. **Rudder control circuits / stops** – Inspect the stops for excessive wear or damage. Inspect the visible parts of the control cable for wear and rust. If push-rods are used, check for wear and rust. Ensure that all joints are properly lubricated and function correctly. Ensure that the stop is reached prior to the limit of the control surface deflection. (The latter is the purpose of the stop.)
13. **Elevator control circuits / stops** – As for item 12.
14. **Aileron control circuits / stops** – As for item 12. Ensure that on both sides the aileron going down does not go further than the specified angle. This is important.
15. **Trimmer control assemblies** – Inspect all cables for wear. Ensure that the system is properly lubricated and operates smoothly. Where trim is activated by an external tab on a control surface, ensure that the tab hinges are not excessively worn and that all attachment points and linkages are firm. Ensure that there is no excessive play in the trim tab.
16. **Airbrake control circuit** – Operate airbrakes and ensure: equal deployment on each side; brake-closed locks operate correctly; no excess wear in hinges and linkages, the system is lubricated and operates smoothly; airbrakes do not open too far and go over the centre, thus preventing closure; adjustment of the wheel brake does not restrict airbrake movement (often the airbrake activates the wheel brake).
17. **Wheel brake controls** – Ensure that wheel brake controls operate smoothly and are adjusted correctly. This is particularly important where wheel brakes operate off the same control circuit as the airbrakes. See also item 16.
18. **Instrument panel assemblies** – The panel must be firmly mounted and all instruments mounted with the correct number of bolts, etc. Instrument faces must be easy to read, glass unbroken. Tubing and wiring behind the panel must be neat and tidy, not hanging down

where it can be damaged when entering the cockpit. Pay special attention to pinched tubes or suspected joints.

19. **Pitot / static system** – Inspect the tubing for poor joints or wear. Ensure that the system is operational by lightly banging a cupped hand over the pitot or static. Do NOT blow into them.
20. **ASI calibration** – Ensure that the airspeed indicator is operational and suitable for the glider concerned. It must register low enough for the stall speed, and high enough for the V_{ne} (never-to-exceed speed). See TS 42.02.9 for additional information.
21. **Altimeter** – Must be of the sensitive type, adjustable to ambient pressure in millibars and calibrated in feet. Additional altimeters (e.g. calibrated in meters) may be carried. See TS 43.02.9 for additional information.
22. **Electrical installations / fuses** – All electrical systems must operate properly and be protected with some sort of fuse system. Inspect wiring for wear and general tidiness.
23. **Battery / corrosion** – Inspect the battery and connecting wires for condition and corrosion. Ensure that the battery mounting is secure and firm.
24. **Oxygen system** – Inspect pipes for wear, particular on the high-pressure side of the system. Ensure that the oxygen bottle is free of any visible rust or corrosion, and that it is firmly mounted. No oil must be present in the oxygen installation as it can ignite spontaneously in pure oxygen.
25. **Avionics installation and placarding** – Check that the transceiver and navigation equipment (if installed) is operational and equipped with the correct frequencies for the area where the glider is to be flown. The aircraft registration must be placarded above the transceiver. See TS 43.02.10 if an ATC transponder, and TS 43.02.11 if an emergency locator beacon has been installed.
26. **Water ballast system** – Inspect all plumbing where visible for leaks. Where a tail tank is fitted, it is essential that the tail tank dump mechanism is in perfect working order and that it operates when the main ballast system dumps.
27. **Removable ballast installation** – Ensure that the ballast retaining mechanism is firm and undamaged. Seat pan ballast should be secured to the seat.
28. **Speed / mass / manoeuvre placards** – These must be installed in the cockpit and be readable.
29. **Wing attachments** - Inspect both wing and fuselage attachment points for damage, cracks or excessive wear.
30. **Control systems in center section** – Inspect for excess wear or play. Ensure there is no rust or corrosion, and that all joints are properly lubricated. Inspect tubing for cracks.
31. **Equipment stowed in center section** – Ensured that any equipment stowed here is properly tied down and cannot in any way foul the center section control system.
32. **Center section fairing** – Check for cracks or damage and ensure that all attachment systems operate correctly.

33. **Mainplane struts / wires** – Check that attachment points are firm and undamaged, struts are not dented, bent or corroded, and that wires are not corroded and the ends not damaged.
34. **Rear fuselage (internal)** – Look carefully for loose bulkheads, bent longerons, bent control rods, worn cable pulleys, cracks, corrosion or any other damage. A small mirror is useful here.
35. **Rear fuselage (external)** – Inspect for cracks or impact damage, particular near the tail skid or wheel and in front of the fin.
36. **Tailplane attachments** – Inspect attachment points for excess wear, cracks or looseness. With tailplane mounted, check for excess play when the tip is moved vertically, as well as fore and aft.
37. **Fin structure** – Inspect for cracks or damage, particularly where the front of the fin joins the fuselage.
38. **Rudder assembly and hinges** – Carefully inspect the bottom of the rudder for cracks or damage. Upper and lower hinges – try to move the rudder fore and aft, as well as sideways. Any sign of movement indicates loose or worn hinges. Ensure that the mass balance weights are firm. Ensure that any gap-sealing tapes or mylar tapes are well stuck down.
39. **Tailplane elevator assembly** – Check that play within linkage system is within limits; mass balance weights firm (usually on all-flying tailplanes); hinges not worn; mylar tapes, particular sealing top of elevator, firm and protected by an additional safety tape ahead of and partially overlapping the mylar tape. The latter is critical on most modern gliders.
40. **Tail skid / wheel** – Ensure that tail skid is firmly attached to fuselage and wearing surface still useable. Check wheel is running true, tyre is useable and bearings are lubricated and silent.
41. **Mainplane structure (port)** – Inspect spar ends and area around retaining pin bushes for cracks or damage. Check root rib for cracks near the shear webs, as well as the fuselage-carrying lugs. Ensure the skin show no cracks, with particular emphasis on the leading edges and around the top of the airbrake box. Inspect wingtip skids for cracks and excess wear.
42. **Aileron / hinge assembly (port)** – Check aileron control circuit for excess play (permissible play is given in the glider's manual). Check hinge wear by applying a fore and aft load to the aileron in the hinge area. Inspect the aileron for damage, particularly the underside near the tip. If the aileron has been repaired or re-sprayed, it may be necessary to remove it to check the mass balance. This can be critical on gliders that are not fitted with flutter dampers. Ensure each aileron moves the same amount on each side. Ensure any gap-sealing tapes or mylar are well stuck down.
43. **Airbrake / spoiler assembly** – Inspect linkage for wear and corrosion, Ensure all top cover tension springs and retaining washers are intact. Since most airbrakes are top surface only, and the boxes are sealed, check the inner corners very carefully for signs of water or control-rod rusting.

44. **Flaps** – Ensure that play in the linkage, etc. is within specified limits. Apply for and aft load to flap in the hinge area and observe any excess movement (hinge wear). Inspect flap for cracks and damage. Place flaps in full negative position and check that sealing tapes are not too tight and restricting movement. The same applies to the aileron tapes.
45. **Mainplane structure (starboard)** – See item 41.
46. **Aileron / hinge assembly (starboard)** – See item 42.
47. **Airbrake / spoiler assembly (starboard)** – See item 43.
48. **Range of controls** – Ensure that all controls move as much as indicated in the manual. Ensure that sealing tapes do not restrict movement.
49. **Drag chute(s)** - Check that chutes are not damaged, lines are all undamaged and not tangled. Operate deploy and release mechanisms to ensure correct action.
50. **Bonding / vents / drains** – Wherever visible, ensure that copper bonding (earth) straps or braided copper wire are correctly attached to control rods and aircraft structure. It is important that all vents and drains are open and functional. E.g., water ballast leakage that finds its way into the tail area and accumulates there could cause very serious C of G problems, and possibly loss of control.
51. **Lubrication** – All control linkage joints that can be reached and seen must be clean and lubricated.
52. **Cleanliness and loose articles** – This item is self-explanatory.
53. **Mandatory mod's / inspections** – See item 3 'Associated documents' in Section A of Technical Standard 43.02.8 for guidance in respect of mandatory inspections and modifications. Check the glider's logbook in respect of their status.
54. **Colour coding of controls** – Self-explanatory.
55. **Logbook entries** – Inspect with the owner the aircraft's logbook and ensure that it is up to date.
56. **Placarding** – Ensure that all placards are in place as per the manual and in accordance with CAR Parts 24 and 96 in respect of a non-type certificated glider.
57. **Minimum cockpit load placard** – Repeat from previous inspection, unless repairs or re-finishes have been carried out.
58. **Maximum cockpit load placard** – See item 57.
59. **Registration letters** – Ensure that registration letters have been correctly displayed. Under-wing letters to be no smaller than 500 mm high; fuselage, no smaller than 300 mm high. Where this is not possible, due to the rear fuselage diameter of the glider, the Director may approve marks of a lesser height, provided they are not less than 150 mm in height and can be easily identified. For full instructions, see SA-CATS 47.
60. **Wing-beat frequency** – The natural frequency of the wings is established, and the count is taken, when the minimum input is required to maintain the beat. It is best done with a soft main wheel and no tail dolly. This test is extremely important, as it could be the first indication of spar or shear web damage.

61. **Compass** – Establish that it is operational and not totally inaccurate. See TS 43.02.18 for further information.
62. **Fuel tanks** – If applicable, inspect fuel tank(s) for condition, leaks and corrosion of the tank(s) and in the tank bay(s). Integral tank interiors for sealing and microbiological growth. Sender units for condition.
63. **Fuel flow check** – If applicable, see paragraph (6) of item 2 'Inspections' in Section A of TS 43.02.8.
64. **Cylinder blow-by test** – If applicable, carry out as per engine manufacturer's instructions and record on inspection checklist.
65. **Wooden propeller inspection** – If fitted, inspect wooden propeller for condition. Check that propeller hub bolts are correctly torqued. Check bolt holes for excessive compression of the front and rear faces due to over tightening. Check that the propeller has been overhauled within the time limit specified by the manufacturer and that the provisions of Appendix 1 and 2 of TS 43.02.8 have been met.

Carry out a systems check flight and operationally check all systems.

Do you consider the aircraft serviceable: Yes/No

If no, state reason(s):

Pilots Name:

Licence No.:

Signature:

INSPECTION CHECK-LIST

To be used when carrying out the inspection of a glider

Item	Description	Status*	Initials	Remarks
1	Nose Fairing			
2	Pot Pitot Ventilator			
3	Front Skid/Shock Absorbers			
4	Front Fuselage Structure			
5	Release Hook Assemblies			
6	Main Wheel/Brake Assembly			
7	Canopy, Locks, Jettison			
8	Harness(es)			
9	Seat Pan Assembly(ies)			
10	Cockpit Floor Structure			

11	Rudder Pedal Assemblies			
12	Rudder Control Circuit/Stops			
13	Elevator Control Circuit/Stops			
14	Aileron Control Circuit/Stops <u>Right Aileron:</u> Up Down <u>Left Aileron:</u> Up Down			
15	Trimmer Control Assemblies Check aileron trim tab(s) and record: <u>L.H.</u> <u>R.H.</u> Up Up Down Down:			
16	Air Brake Control Circuit			
17	Wheel Brake Controls			
18	Instrument Panel Assemblies			
19	Pitot/Static System			
20	ASI Calibration			
21	Altimeter			
22	Electrical Installation/Fuses			
23	Battery/Corrosion			
24	Oxygen System			
25	Radio Installation/Placarding			
26	Water Ballast System			
27	Removable Ballast Installation			
28	Speed/Mass/Manoeuvres Plac's			
29	Wing Attachments			
30	Control Systems – Centre Section			
31	Equipment Stowed – Centre Section			
32	Centre Section Fairing			
33	Mainplane Struts/Wires			
34	Rear Fuselage (internal)			
35	Rear Fuselage (external)			
36	Tailplane Attachments			
37	Fin Structures			
38	Rudder Assembly and Hinges			<u>Rudder</u>

				Left Rudder Right trim tab: L R
39	Tailplane/Elevator Assembly			Elevator Up Down Elevator trim tab: Up Down
40	Tail Skid/Wheel			
41	Mainplane Structure (port)			
42	Aileron/Hinge (port)			
43	Air Brake/Spoiler Assembly (port)			
44	Flaps (port and starboard)			
45	Mainplane Structure (starboard)			
46	Aileron/Hinge (starboard)			
47	Air Brake/Spoiler Assembly (stbd)			
48	Range of Controls – Checked			
49	Drag Shute(s)			
50	Bonding/Vents/Drains			
51	Lubrication			
52	Cleanliness/Loose Articles			
53	Mandatory Mod's/Inspections			
54	Colour Coding of Controls			
55	Log Book Entries			
56	Placarding			
57	Min. Cockpit Load Placard	Kg		
58	Max. Cockpit Load Placard	Kg		
59	Registration Letters - Correctness			
60	Wing Bending Freq. (cycles/min)			
61	Compass			
62	Fuel Tank(s)			
63	Fuel Flow Check:			Left: Right: All: Off:
64	Record cylinder blow-by for the			/80 /80 /80 /80

4. Airframe, engine(s) and propeller(s) logbooks:
 - (a) Record all Airworthiness Directives complied with during this inspection.
 - (b) Record all recurring Airworthiness Directives complied with during this inspection.
 - (c) Record all Service Bulletins complied with during this inspection.
 - (d) Record of Service Letters embodied during this inspection.
 - (e) Record of modifications embodied during this inspection.
 - (f) Record of other service instructions embodied during this inspection,
 - (g) Record of all service instructions, considered mandatory by the manufacturer but, in terms of Section A, subparagraphs 3(5)(c), not embodied at the instruction of the owner.

I hereby certify that in carrying out the foregoing specified maintenance, all the requirements prescribed in the Civil Aviation Regulations, that are applicable thereto have been complied with.

Date Signature

LICENCE OR OTHER APPROVAL NO.:

AMO Name Licence No.
 AME Name Licence No.

SECTION F: MAINTENANCE SCHEDULE FOR MANNED BALLOONS (MINIMUM REQUIREMENTS)

Provided the Maintenance Schedule has been drawn up in accordance with this Technical Standard it serves as the Approved Aircraft Maintenance Schedule for the particular aircraft without the need to forward it to the Director for his or her approval. However, any deviation from the provisions of this Technical Standard shall require the prior approval of the Director.

SAMPLE LAYOUT OF CHECK-LIST, CONTAINING MINIMUM REQUIREMENTS

1. General:

Balloon type	Registration Z	S/N
Total Flying Hours		
Total Ascents		

2. Hours or cycles of operation:

Envelope total time	Hrs. Hrs. Ascents
---------------------	-------------------

3. Mass and balance:

Date last established:

4. Component overhauls due:

(List:)

5. Aircraft documentation:

C of A No.	Currency date:	Available and current
C of R No.	Radio station licence No.	Currency date:

6. Record of avionics equipment installed (name, type and serial nos.):

VHS	ADF	RADAR
HF	DME	GPS
TXPDR	STORMSCOPE	OTHER

Notes:

- 1. The minimum requirements for the annual inspection are the manufacturer's requirement, integrated with the requirements addressed in the Minimum Check-list.***
- 2. The serviceability of an item is to be indicated by initialling the block against the item, to be countersigned on the job card by the person who inspected the work.***
- 3. A list of the names of all technical and certifying personnel, their signatures and initials shall be attached to the check-list for identification purposes.***
- 4. During any maintenance it will be the responsibility of the person or organisation carrying out the maintenance to verify whether Class I and Class II products correspond with the aircraft documentation and to determine whether the correct data are affixed to these products, as applicable. If data plates are omitted, the Director must be notified prior to releasing the balloon to service, stating what measures have been taken to ensure that the component is not a non-certificated part.***

MPI MINIMUM CHECK-LIST

(Inspect as applicable)

1. ENVELOPE FABRIC AND LOAD TAPE

- (a) Check that the temperature link is still in place.**

- (b) Check temperature label. If overheating is indicated (above 120°C), install a new label alongside, and note temperature indication in logbook. See paragraph 8 of this appendix for procedures.
- (c) Inspect for holes, tears and abrasions. Holes or tears smaller than 25 mm (1") are acceptable, but all other damage must be repaired using prescribed methods.
- (d) Check fabric porosity by attempting to blow through it. If substantial porosity is suspected, perform a flight test.
- (e) Check envelope fabric strength by a 1" grab test. Minimum strength is 14 kg (30 lbs.). Perform the test three times; the lowest value is disqualifying. Perform test on the top section of the envelope, and make sure original fabric is tested. Also, look for discoloration as sign of overheating or exposure.
- (f) Check both vertical and horizontal tapes for security or stitching. Check especially the stitching of the crown ring, and the joints between overlying tapes and top rim tape.
- (g) Check the flying wire loops for friction and burn damage. Check that the pockets are in place.

1.2 Parachute deflation systems

- (a) Check control lines for wear and burn damage.
- (b) Check that knots are secure.
- (c) Check that pulleys are in good condition and not jammed with loose thread or other foreign material.
- (d) Check stitching of control line tie-off loops and pulley fixings.
- (e) Check that retaining cords and release cords are in good condition. Stiffness indicates overheating.
- (f) Check knots and stitching of loops to both parachute and balloon. If there are doubts about the sealing of the parachute, the balloon should be inflated. The parachute overlap should be equal all the way round with no daylight showing and no excessive stress in the retaining lines. Excessive stress is indicated by stress wrinkles in the edge of the parachute.

1.3 Combination tops

- (a) Check parachute as above.
- (b) Check Velcro control line as above.
- (c) Check that capewells operate correctly.
- (d) Check fixing of capewells. The fixing of the female half to the Velcro panel is particularly important.
- (e) Check condition of Velcro.
- (f) Check fit of Velcro. The Velcro panel edge must not be shorter at all, or significantly longer than the Velcro on the balloon. On Velcro balloons, the overlying tapes are gated to a top rim tape. The length of free tape below this rim tape should be 2,5% - 5% shorter than the corresponding seam length on the Velcro panel. Any errors here should be reported to the manufacturer so that the correct repair can be specified.

1.4 Triangular velcro rip

This is only used on certain special shapes. With one person stretching each corner of the triangular aperture, the fitted Velcro panel should be loose below the mesh of overlying tapes. Check rigging and capewell as for parachute/Velcro balloons. Check the condition of the side vent. Check the attachment of release and closing lines as above for parachutes. Check that the elastic closing lines are in good condition.

1.5 Load-bearing attachments

- (a) Flying wires must be of stainless steel or kevlar. There should be no exposed stands in the wire and no severe kinks. Slight discoloration is permissible.
- (b) Check thimbles and copper ferrules. Damage to the colour-coded plastic sleeving at the carabiner end of the cable is not important.
- (c) Carabiners should be free of distortion with fully operational screw gates. There should be no serious corrosion.
- (d) Basket wires: Check for abrasion damage. Check thimbles and copper ferrules.
- (e) Burner frame: Check for condition of welds, particularly if the frame shows signs of distortion.
- (f) Nylon rods are not critical for flight safety. Replace if cracked.

2. BURNER AND FUEL SYSTEM

2.1 Burner

- (a) Check for external signs of damage.
- (b) Check tightness of main jets.
- (c) Check blast valves for signs of wear or leakage.
- (d) Check that all joints and connections are leak proof.
 - (e) Carry out a burner test, using each cylinder. Observe function of pressure gauge, blast valves and cylinder valves. Cylinders should be vertical for this test.
 - (f) Pilot light: Check by sound and appearance of flame.
 - (g) If blockage is suspected, check hoses and jet by removing them and cleaning as necessary. Reassemble with PTEE tape.
- (h) Check operation of pilot valves on burner (if fitted).
- (i) Hoses: Should be of the wire-braided type. Check for wear, cuts or excessive bends. Liquid hoses should be pinpricked on the outer cover. Hose inspection should include fuel manifolds, if these are fitted.

2.2 Fuel cylinders

- (a) Check for external damage.
 - (b) Check self-seal on couplings by opening the valves with no hoses connected. No leakage should occur. After closing the liquid valve, release the pressure in the coupling by depressing the central pin.

- (c) Check operation of contents gauge.
- (d) Fuel tanks should be treated with a mixture of 4 oz. (113,4 gram) methanol/10 gallon (45,46 lt.) propane.

3. BASKETS

- (a) Check for wear or excessive distortion in weave.
- (b) Check the floor where (and if) the cane passes through it.
- (c) Check integrity of wooden floor.
- (d) Check rod sockets condition.
- (e) Check integrity of tank straps. No more than 30% cross sectional damage is acceptable.

4. INFLATION OR FLIGHT TEST

An inflation test is recommended, as this makes detailed fabric inspection much simpler and allows control lines to be checked. If fabric porosity or leaking parachute is suspected, a carefully monitored test flight should be made to assess fuel consumption.

High fuel consumption itself is not dangerous, but if the leakage is such that exceptional skill is required to fly the balloon, then the balloon is not airworthy.

5. INSTRUMENTS

Check instruments for proper operation, security and that they have been calibrated annually.

6. FIRE EXTINGUISHER

- (a) Check by weighing.
- (b) Check for condition.
- (c) Check mounting brackets and release mechanism.

7. 250-HOUR TEST AND SUBSEQUENT 100-HOUR TEST

Perform grab test in accordance with balloon operating handbook.

8. PROCEDURE AFTER OVERHEATING

If the temperature flag descends (i.e. the fusible link melts) the maximum allowable temperature has been exceeded. The flag will separate at approximately 127°C; maximum allowable temperature is 120°C. Inspect the two temperature indicating tags, if stitched onto the inside surface of the parachute. These tags, in turn, have ten temperature-incremental temperature windows. When a specific temperature is reached, the applicable window will turn black. These tags register service temperature (i.e. direct fabric temperature), which always will be somewhat less than inside air temperature.

If after flag separation the temperature tags show:

- (a) Up to 120°C: No further action needed. Replace flag link.
- (b) 120°C to 127°C: Carefully inspect top of envelope for signs of overheating, especially parachute and its retaining lines. Look for discolouration and undue stiffness in materials. If any discoloration or stiffness is visible, perform fabric test as per 250-hour inspection. If no signs of overheating are apparent, replace the temperature tags and flag, but always enter into the log/maintenance manual that an overheating has occurred, and what temperatures the tags registered.
- (c) 127°C or higher reading: Perform fabric test and enter result of same and temperature reading into flight log.

Do not try to re-solder the temperature flag link - always replace with a new item.

SECTION G: MAINTENANCE SCHEDULE FOR AIRSHIPS (MINIMUM REQUIREMENTS)

Provided the Maintenance Schedule has been drawn up in accordance with this Technical Standard it serves as the Approved Aircraft Maintenance Schedule for the particular aircraft without the need to forward it to the Director for his or her approval. However, any deviation from the provisions of this Technical Standard shall require the prior approval of the Director.

SAMPLE LAYOUT OF CHECK-LIST, CONTAINING MINIMUM REQUIREMENTS

1. General:

Airship Type	Registration Z	S/N
Total Flying Hours	Total Ascents	

2. Hours or cycles of operation:

Envelope total time	Hrs. Ascents
---------------------	--------------

3. Mass and balance:

Date last established:

4. Component overhauls due:

(List:)

5. Aircraft documentation:

C of A No.	Currency date:	Available and current
C of R No.	Radio station licence No.	Currency date:

6. Record of avionics equipment installed (name, type and serial nos.):

VHF	ADF	RADAR
-----	-----	-------

HF
TXPDR

DME
STORMSCOPE

GPS
OTHER

Notes:

- 1. *The minimum requirements for the annual inspection are the manufacturer's requirement, integrated with the requirements addressed in the Minimum Check-list.***
- 2. *The serviceability of an item is to be indicated by initialling the block against the item, to be countersigned on the job card by the person who inspected the work.***
- 3. *A list of the names of all technical and certifying personnel, their signatures and initials shall be attached to the check-list for identification purposes.***
- 4. *During any maintenance it will be the responsibility of the person or organisation carrying out the maintenance to verify whether Class I and Class II products correspond with the aircraft documentation and to determine whether the correct data are affixed to these products, as applicable. If data plates are omitted, the Director must be notified prior to releasing the airship to service, stating what measures have been taken to ensure that the component is not a non-certificated part.***

MPI MINIMUM CHECK-LIST

(Inspect as applicable)

[Under development]

Instructions:

1. All flexible hoses shall be renewed as prescribed by the manufacturer. In cases where the manufacturer does not specify the replacement of hoses, all fluid and pneumatic carrying flexible hoses shall be renewed every eight years. Record part numbers of any hoses replaced in the appropriate logbook(s).
2. Ensure that the aircraft empty mass has been established and revised up to date in accordance with the requirements of CAR 43.02.7, and that the established mass has been recorded in the flight manual or other approved document on the prescribed form as detailed in Technical Standard 43.02.7.
3. The aircraft may not be released for service unless the following documentation has been checked for availability, applicability and being up to date:

Certificate of registration No.

Certificate of airworthiness No. .

Currency date:

Radio Station licence:

Expiry date:

Certificate of release to service of the aircraft.

Approved flight manual:

P/No.:

Revision date/number:

Approved mass and balance data and equipment list.

Approved flight folio.

Approved minimum equipment list, if applicable.

Inspection reminder in the appropriate form

Record next inspection due hrs. and date

4. Airframe, engine(s) and propeller(s) logbooks:

- (a) Record all Airworthiness Directives complied with during this inspection.
- (b) Record all recurring Airworthiness Directives complied with during this inspection.
- (c) Record all Service Bulletins complied with during this inspection.
- (d) Record of Service Letters embodied during this inspection.
- (e) Record of modifications embodied during this inspection.
- (f) Record of other service instructions embodied during this inspection.
- (g) Record of all service instructions, considered mandatory by the manufacturer but, in terms of Section A, subparagraphs 3(5)(c), not embodied at the instruction of the owner.

I hereby certify that in carrying out the foregoing specified maintenance, all the requirements prescribed in the Civil Aviation Regulation, that are applicable thereto have been complied with.

Date

Signature

LICENCE OR OTHER APPROVAL NO.:

AMO Name

Licence No.

AME Name

Licence No.

43.02.9 AIRSPEED INDICATOR AND ALTIMETER SYSTEM TESTS AND INSPECTIONS

1. Tests and inspections

The tests and inspections referred to in CAR 43.02.9(a) are the following:

(1) The pitot static pressure system test to be performed annually

- (a) Ensure freedom from entrapped moisture and restrictions.
- (b) Ensure the leakage is within the following established tolerances:
 - (i) For unpressurised aeroplanes, evacuate the pitot static pressure system to a pressure differential of approximately 1 inch of mercury or to a reading, on the

altimeter, 1 000 feet above the aircraft elevation at the time of the test. Without additional application of pressure, the loss of indicated altitude must not exceed 100 feet on the altimeter over a period of 1 minute.

- (ii) for pressurised aeroplanes, evacuate the pitot static pressure system until a pressure differential equivalent of the maximum cabin differential for which the aeroplane is type certificated is achieved. Without additional application of pressure, the loss of indicated altitude must not exceed 2 per cent of the equivalent altitude of the maximum cabin differential pressure or 100 feet, whichever is the greater, over a period of 1 minute.
- (c) Determine that the pitot head/s and static ports heater/s, if installed, are operative.
- (d) Ensure that no alterations or deformations of the airframe surface have been made that would affect the relationship between air pressure in the pitot head/s, static pressure system and true ambient static air pressure for any flight condition.

(2) The airspeed indicator(s) and altimeter(s) tests to be performed annually

- (a) When tests are conducted with the temperature substantially different from an ambient temperature of approximately 25 degrees Celsius, allowance must be made for the variation from the specified condition.
- (b) Airspeed indicator/s and Altimeter/s tests must be carried out by an appropriately rated aircraft maintenance organisation, approved under Part 145, in accordance with the following:

(i) Airspeed indicators:

- (aa) For aircraft flown under IFR, pitot system tests for the airspeed indicator must be tested in accordance with the manufacturer's instructions.
- (bb) For aircraft flown under VFR only, pitot system tests for the airspeed indicator must be tested in accordance with the manufacturer's instructions, if available, or otherwise as follows:
 - (A) Apply sufficient pressure to an annually calibrated airspeed indicator test box at the pitot head to cause the airspeed indicator to indicate 150 knots, or up to the maximum air speed red line for aircraft that cannot reach 150 knots airspeed.

After one minute, the leakage should not exceed 10 knots, or 7% of the lower speed tested.

Should the aircraft's speed indicator not read the same airspeed as the airspeed indicator in the test box, the allowable tolerance to ensure that the aircraft's airspeed indicator is accurate is indicated in table 5 below.

Warning: Do not apply suction to the pitot head.

(ii) Altimeters:

(aa) Scale Error

The altimeter must, with the barometric pressure scale at 1013,25 millibars (1 Hecto Pascal = 1 millibar), be subjected successively to pressures corresponding to the altitude listed in Table 1 up to the maximum normally expected operating altitude of the aircraft in which the altimeter is to be installed.

The reduction in pressure must be made at a rate not exceeding 2 000 feet per minute to within approximately 200 feet of the test point.

The test point must be approached at a rate compatible with the test equipment.

The altimeter must be kept at the pressure corresponding to each test point for at least 1 minute, but not more than 10 minutes, before a reading is taken.

The error at all test points must not exceed the tolerances listed in Table 1.

(bb) Hysteresis

The hysteresis test must begin not more than 15 minutes after the altimeter's initial exposure to the pressure corresponding to the upper limit of the scale error tests prescribed in subparagraph (2)(a) and the hysteresis test must commence while the altimeter is at this pressure.

Pressure must be increased at a rate simulating a descent in altitude at the rate of 500 to 2 000 feet per minute until within 3 000 feet of the first test point (50 percent of maximum altitude).

The test point must then be approached at a rate of approximately 3 000 feet per minute.

The altimeter must be kept at this pressure for at least 5 minutes, but not more than 15 minutes, before the test reading is taken.

After the reading has been taken, the pressure must be increased further, in the same manner as before, until the pressure corresponding to the second test point (40 percent of maximum altitude) is reached.

The altimeter must be kept at this pressure for at least 1 minute, but not more than 10 minutes, before the test reading is taken.

After the reading has been taken, the pressure must be increased further, in the same manner as before, until atmospheric pressure is reached.

The reading of the altimeter at either of the two test points may not differ by more than the tolerance specified in Table 2 from the reading of the altimeter for the corresponding altitude recorded during the scale error test prescribed in subparagraph (b)(i).

(cc) After effect

Not more than 5 minutes after the completion of the hysteresis test prescribed in subparagraph (b)(ii), the reading of the altimeter, corrected for any change in atmospheric pressure, may not differ from the original atmospheric pressure reading by more than the tolerance specified in Table 2.

(dd) Friction

The altimeter must be subjected to a steady rate of decrease of pressure approximating 750 feet per minute. At each altitude listed in Table 3, the change in reading of the pointers after vibration may not exceed the corresponding tolerance listed in Table 3.

(ee) Case Leak

The leakage of the altimeter case, when the pressure within it corresponds to an altitude of 18 000 feet, may not change the altimeter reading by more than the tolerance shown in Table 2 during an interval of 1 minute.

(ff) Barometric Scale Error

At constant atmospheric pressure, the barometric pressure scale must be set at each of the pressures, falling within its range of adjustment that are listed in Table 4, and must cause the pointer to indicate the equivalent altitude shown in Table 4 with a tolerance of 25 feet.

(iii) Airspeed indicators and altimeters which are of the air data computer type with associated computing systems, or which incorporate air data correction internally, may be tested in a manner and to specifications developed by the manufacturer that are acceptable to the Director.

(3) The automatic pressure altitude reporting equipment and ATC transponder system integration test

- (a) Conduct each test in accordance with paragraph (b).
- (b) Measure the automatic pressure altitude at the output of the installed ATC transponder when interrogated on Mode C at a sufficient number of test points to ensure that the altitude reporting equipment altimeters and ATC transponders perform their intended functions as installed in the aircraft.
- (c) The difference between the automatic reporting output and the altitude displayed at the altimeter may not exceed 125 feet.
- (d) All mercury barometers used for the testing of altimeters are to be periodically checked/calibrated as often as deemed necessary by the manufacturer, or every 2 years by ICAO standards, whichever is shorter, or as required by the Director.

Table 1: Scale error

Altitude	Equivalent pressure (millibars)	Tolerance ± (feet)	Altitude	Equivalent Pressure (millibars)	Tolerance ± (feet)
-1 000	1050.36	20	14 000	595.21	100
0	1013.25	20	16 000	549.12	110
500	995.06	20	18 000	505.98	120
1 000	977.15	20	20 000	465.62	130
1 500	959.51	25	22 000	427.89	140
2 000	942.10	30	25 000	376.01	155
3 000	908.10	30	30 000	300.87	180
4 000	875.09	35	35 000	238.43	205
6 000	811.97	40	40 000	187.53	230
8 000	752.61	60	45 000	147.47	255
10 000	696.12	80	50 000	115.98	280
12 000	644.38	90			

Table 2: Test tolerances

Test	Tolerance ± (feet)
Case Leak Test	100
Hysteresis Test First test point (50% of maximum altitude)	75
Second test point (40% of maximum altitude)	75
After effect test	30

Table 3: Friction

Altitude ((feet)	Tolerance ±	Altitude (feet)	Tolerance
1 000	70	20 000	100
2 000	70	25 000	120
3 000	70	30 000	140
5 000	70	35 000	160
10 000	80	40 000	180
15 000	90	50 000	250

Table 4: Pressure altitude

Pressure in Millibars	Altitude (feet)
951.55	- 1 727
965.10	- 1 340
982.03	- 863
998.96	- 392
1013.25	0
1032.82	+ 531
1046.37	+ 893
1049.41	+ 974

Table 5: Airspeed indicator scale tolerance & friction

AIRSPED INDICATIONS KNOT / MILES PER HOUR	SCALE PERTOLERANCES (MPH)	ERROR (KTS / TOLERANCE (KTS / MPH)
40	± 2,5	± 3
60	± 2,5	± 3
80	± 2,5	± 3
100	± 2,5	± 3
120	± 2,5	± 3
140	± 2,5	± 3
160	+ 2,5 / - 3,5	± 3
180	+ 2,5 / - 3,5	± 3
200	+ 2,5 / - 3,5	± 3
220	+ 2,5 / - 3,5	± 3
250	+ 2,5 / - 3,5	± 3
270	+ 2,5 / - 3,5	± 3
300	+ 3 / - 4	± 3
320	+ 3 / - 4	± 3
350	+ 3 / - 4	± 3
370	+ 3 / - 4	± 3
400	+ 4 / - 5	± 3
430	+ 4 / - 5	± 3
450	+ 4 / - 5	± 3

43.02.10: ATC TRANSPONDER TESTS AND INSPECTIONS

1. Tests and inspections

(1) General

- (a) In this technical standard, ATCRBS means air traffic control radio beacon system.
- (b) The ATC transponder functional tests must be conducted annually using either a bench check or portable test equipment.
- (c) If portable test equipment with appropriate coupling to the aircraft antenna system is used, operate the test equipment for ATCRBS transponders at a nominal rate of 235 interrogations per second to avoid possible ATCRBS interference.
- (d) For Mode S, operate the test equipment at a nominal rate of 50 Mode S interrogations per second.
- (e) An additional 3 dB loss is allowed to compensate for antenna coupling errors during receiver sensitivity measurements conducted in accordance with paragraph (4) below when using portable test equipment.

(2) Radio reply frequency test

- (a) For all classes of ATCRBS transponders, interrogate the transponder and verify that the reply frequency is $1\ 090 \pm 3$ MHz.
- (b) For classes 1B, 2B and 3B Mode S transponders, interrogate the transponder and verify that the reply frequency is $1\ 090 \pm 3$ MHz.
- (c) For classes 1B, 2B and 3B Mode transponders that incorporate the optional $1\ 090 \pm 1$ MHz reply frequency, interrogate the transponder and verify that the reply frequency is correct.
- (d) For classes 1A, 2A, 3A and 4 Mode S transponders, interrogate the transponder and verify that the reply frequency is $1\ 090 \pm 1$ MHz.

(3) Suppression test

When Classes 1B, 2B ATCRBS transponders, or classes 1B, 2B and 3B Mode S transponders are interrogated at a rate between 230 and 1 000 Mode 3/A interrogations per second or when Classes 1A and 2A ATCRBS Transponders, or Classes 1, 2A, 3A and 4 Mode S transponders are interrogated at a rate between 230 and 1 200 Mode 3/A interrogations per second –

- (a) verify that the transponder does not respond to more than 1 percent of ATCRBS interrogations when the amplitude of P_2 pulse is equal to the P_1 pulse; and
- (b) verify that the transponder replies to at least 90 percent of ATCRBS interrogations when the amplitude of the P_2 pulse is 9 dB less than the P_1 pulse. If the test is conducted with a radiated test signal, the interrogation rate shall be 235 ± 5 interrogations per second unless a higher rate has been approved for the test equipment used at that location.

(4) Receiver sensitivity test

- (a) Verify that, for any class of ATCRBS Transponder, the minimum triggering level of the receiver for the system is -73 ± 4 dbm, or that for any class of Mode S transponder, the minimum triggering level of the receiver for Mode S format (P_6 type) interrogations is -74 ± 3 dbm by use of a test set –
 - (i) connected to the antenna end of the transmission line; or

- (ii) connected to the antenna terminal of the transponder with a correction for transmission line loss; or
 - (iii) utilising radiated signals.
- (b) Verify that the difference in Mode 3/A and Mode C receiver sensitivity does not exceed 1 db for either any class of ATCRBS transponder or any class of Mode S transponder.

(5) RF peak output power test

Verify that the transponder RF output power is within the following specifications for the class of transponder using the conditions prescribed in subsection (4)(a):

- (a) for class 1A and 2A ATCRBS transponders, the minimum RF peak output power is at least 21.0 dbw (125 watts);
- (b) for class 1B and 2B ATCRBS transponders, the minimum RF peak output power is at least 18.5 dbw (70 watts);
- (c) for class 1A, 2A, 3A and 4 and those Class 1B, 2B and 3B Mode S transponders that include the optional high RF peak output power, the minimum RF peak output power is at least 21.0 dbw (125 watts);
- (d) for class 1B, 2B and 3B Mode S transponders, the minimum RF peak output power is at least 18.5 dbw (70 watts);
- (e) for any class of ATCRBS or any class of Mode S transponders, the maximum RF peak output power does not exceed 27.0 dbw (500 watts).

(6) Mode S diversity transmission channel isolation test

For any class of Mode S transponder that incorporates diversity operation, verify that the RF peak output power transmitted from the selected antenna exceeds the power transmitted from the non-selected antenna by at least 20 db.

(7) Mode S address test

Interrogate the Mode S transponder using the correct address and at least two incorrect addresses and making the interrogations at a nominal rate of 50 interrogations per second and verify that it replies only to its assigned address.

(8) Mode S formats test

Interrogate the Mode S transponder with UF for which it is equipped and verify that the replies are made in the correct format using the surveillance formats UF=4 and 5. Verify that the altitude reported in the replies to UF=4 are the same as that reported in a valid ATCRBS Mode C reply. Verify that the identity reported in the replies to UF=5 are the same as that reported in a valid ATCRBS Mode 3/A reply, if the transponder is so equipped, using the communication formats UF=20, 21 and 24.

(9) Mode S all-call interrogations test

Interrogate the Mode S transponder with the Mode S-only all-call format UF=11, and the ATCRBS/Mode S all-call formats (1,6 microsecond P₄ pulse) and verify that the correct address and capability are reported in the replies (downlink format DF=11).

(10) ATCRBS-only all-call interrogation test

Interrogate the Mode S transponder with the ATCRBS-only all-call interrogation (0.8 microsecond P₄ pulse) and verify that no reply is generated.

(11) Squitter test

Verify that the Mode S transponder generates a correct squitter approximately once per second.

[Note: The tests in subsections (6) to (11) inclusive, apply only to Mode S transponders.]

43.02.11: EMERGENCY LOCATOR BEACON TESTS AND INSPECTIONS

1. Tests and inspections

The tests and inspections prescribed in CAR 43.02.11 are the following:

(1) Tests after installation

After installation, the emergency locator beacon must be tested in accordance with the manufacturer's instructions.

(2) Maintenance tests

- (a) Tests shall be conducted only within the first five minutes of the hour and then only for a maximum of three audio sweeps of the transmitter. Outside this time framework, tests must be co-ordinated with the nearest ATS unit and with the South African Search and Rescue mission control centre at telephone [27] (0)21 551-0700. A VHF receiver tuned to 121,5 MHz should be used to monitor the tests. The unit is tested by placing the ELT switch in the ON position. The emergency tone will be heard when the ELT is operating. Immediately after the test the ELT switch must be returned to the AUTO or OFF position, as required.
- (b) If fitted, the ELT remote control should be switched through each mode of operation to determine that the equipment is operating according to the manufacturer's instructions.
- (c) With the aircraft's engine/s off and the ELT transmitting, the aural monitor, if fitted, should be heard. If a visual monitor is provided, it should be visible from the pilot's normal seated position.
- (d) To ensure that the ELT is not susceptible to inadvertent activation by conducted or radiated interference, tests should be conducted with all avionics equipment powered by the aircraft electrical power-generating system operating. The tests should be carried out with the ELT armed and monitored on 121,5 MHz and include the following steps:
 - (i) individually operate each item of electrical equipment and each system, except VHF/UHF communication transmitters, and evaluate all reasonable combinations of control settings and operating modes;
 - (ii) individually operate installed VHF/UHF transmitters on various frequencies over their frequency range;
 - (iii) repeat the step under (ii) with all electronic equipment operating collectively, evaluating reasonable combinations of control settings and operating modes.

(3) Maintenance requirements

- (a) Scheduled maintenance:

At intervals not exceeding twelve months, an installed ELT shall undergo an operational check, including the following items:

- (i) ELT and antenna installation security;
- (ii) antenna coaxial cable for corrosion, security and slack;

- (iii) remote-switch wiring for condition and security;
- (iv) battery corrosion;
- (v) operation of the controls; and
- (vi) placards for legibility.

- (b) Batteries are required to be changed, or charged if applicable –
 - (i) when the transmitter has been in use for more than one cumulative hour;
 - (ii) when 50% of their useful life, or for rechargeable batteries 50% of their useful life of charge, as established by the transmitter’s manufacturer under its approval, has expired: Provided that batteries (such as water-activated batteries), that are essentially unaffected during probable storing intervals, are exempted from this latter requirement; and
 - (iii) on or before their expiration date.
- (c) Manufacturers of ELTs are required to mark the expiration date of the battery on the outside of the transmitter. If a battery is replaced, the date stamped on the replacement battery serves as the new expiration date and must be marked on the outside of the ELT.
- (d) At two-yearly intervals, the ELT must be removed for bench testing in accordance with the manufacturer’s instructions. Such tests should include the impact switch operation and the transmitter output. Testing should only be conducted in a screened room, with the transmitter connected to a dummy load to limit radiation.

(4) Temporary removal of ELT

- (a) Regulation 91.04.23(3) provides for operating an aircraft with an inoperative ELT or without an ELT fitted.
- (b) In the case of a flight under the above conditions –
 - (i) the ELT and a suitable cockpit location are required to be placarded

ELT

NOT INSTALLED *

NOT CARRIED *

INOPERATIVE *

* as applicable; and

- (ii) the appropriate maintenance entries shall have been made in the aircraft logbook or approved alternate maintenance record, stating:
 - (aa) the ELT’s make, model and serial number;
 - (bb) the date on which the ELT was removed;
 - (cc) the reason for removing the ELT; and
 - (dd) that the aircraft has been placarded in accordance with the provisions of subparagraph (i).

(5) Post-flight check

The pilot-in-command of an aircraft, equipped with an ELT, is responsible for its proper operation. As inadvertent activation may have occurred after hard landings and as a result of acrobatic flight, prior to engine shut-down at the end of each flight as part of the post-flight checks the VHF receiver should be tuned to 121,5 MHz to listen for ELT activation. If the ELT has been activated, maintenance may be required before it is returned to service.

[Note: Item (5) is an operational requirement and will be transferred to Technical standard 91.04.23 in due course.]

43.02.13 NON-DESTRUCTIVE TESTING

1. Personnel Qualifications Standards

(1) NDT qualification levels 1, 2 and 3

(a) Level 1

Reference to NDT Level 1 staff means such staff should be able, using written instructions and guidance as necessary from NDT level 2 or 3 staff to –

- (i) set up and calibrate the equipment;
- (ii) perform the specific NDT;
- (iii) interpret and evaluate for acceptance or rejection only in the case where the written instructions contain interpretative criteria; and
- (iv) report on the results.

(b) Level 2

Reference to NDT Level 2 staff means such staff should be able to –

- (i) assume NDT technical responsibility for an NDT organisation or section within a Part 145 or Part 148 approved organisation;
- (ii) carry out the level 1 duties without the limitations of subsection (1)(a)(iii);
- (iii) understand the NDT standards and specifications and be able to translate them into practical NDT instructions, adapted to the actual working conditions;
- (iv) choose the technique for the NDT method to be used;
- (v) interpret and evaluate results according to applicable standards and specifications;
- (vi) prepare written instructions;
- (vii) supervise all level 1 duties;
- (viii) organise and report the results of NDT;
- (ix) compile and certify a Certificate Relating to Maintenance (CRM) after satisfactory testing has been carried out;

and furthermore –

- (x) be thoroughly familiar with the scope and limitation of the NDT method;
- (xi) have a basic knowledge of product technology.

Level 3

Reference to NDT Level 3 staff means such staff should be able to –

- (i) establish and organise methods, techniques, written instructions and procedures;
 - (ii) interpret standards, specifications and procedures;
 - (iii) assist in establishing NDT methods to be used, including acceptance and rejection criteria;
 - (iv) audit any Part 145 or Part 148 approved organisation to ensure it meets the required NDT standards;
 - (v) train and examine NDT Level 1 and 2 qualified staff;
and furthermore –
 - (vi) should have sufficient knowledge in all NDT methods associated with the overall NDT responsibility and recognise the appropriate use thereof.
- (d) *Standards*
- (i) NDT Level 1, 2 and 3 standards are detailed in specification NAS-410 or its equivalent.
 - (ii) Other acceptable standards include:
 - > EN 473
 - > ISO 9712
 - > ATA 105
 - > PCN/GEN/92
 - > any approved by the Director.
- (e) *Training Authorities*
- The training authorities that are qualified to train NDT *personnel* to NAS-410 Level 3 are –
- (i) the British Authority of NDT;
 - (ii) the American Society for NDT;
 - (iii) any other international organisation which holds equivalent standards to (i) and (ii) above.

[Note: “NAS” stands for ‘National Aerospace Standard’ as issued by the US Aerospace Industries Association.]

2. NDT testing standard practices

- (1) The non-destructive testing standard practices acceptable to the Director are:

- (a) Magnetic Particle Inspection: the manufacturer's instructions and specification ASTM-E-1444 or its equivalent;
- (b) Fluoresant Penetrant Inspection: the manufacturer's instructions and specification ASTM-E-1417 or its equivalent;
- (c) Radiographic Inspection: the manufacturer's instructions and specification ASTM-E-1742 or its equivalent;
- (d) Eddy Current Inspection: the manufacturer's instructions or ADs, SBs, SLs and SIs;
- (e) Ultra Sonic Inspection: the manufacturer's instructions or ADs, SBs, SLs and SIs.

43.02.16: TEST FLIGHTS

1. General

- (1) The flight testing prescribed by CAR 43.02.16 shall be carried out by the holder of the appropriate test pilot rating issued in terms of Part 61, provided that the Director may approve the carrying out of flight tests by a person whose experience is considered to be adequate for satisfactorily assessing the flight characteristics and performance of a particular aircraft. Furthermore, Part 24 prescribes who may carry out the proving flights for the issuing of an authority to fly for a non-type certificated aircraft.
- (2) An aircraft that has undergone a major structural repair or a modification that may substantially affect its flight characteristics shall be flight-tested before it is returned to service. The outcome of the flight test(s) shall be passed to the owner or operator.
- (3) For complex aircraft the manufacturer's test flight procedure(s) may be utilised.

2. Requirements

(1) Recording of flight test results

- (a) When an aircraft is flight-tested, the results are to be recorded on the following flight performance records:
 - (i) Form CA 21.19 for single-engine fixed wing aircraft;
 - (ii) Form CA 21.18 for multiple-engine fixed wing aircraft; and
 - (iii) Form CA 21.34 for helicopters.
- (b) The forms referred to in subparagraph (a) shall be forwarded to the Director within 48 hours after the completion of the flight test.

(2) Mass of aircraft

The mass of the aircraft at the time of flight-testing must be established from the approved flight manual.

(3) Climb performance

- (a) In order to check the climb performance of the aircraft, a controlled climb is to be made with the aircraft in the *en route* configuration.
- (b) Prior to take-off, the altimeter is to be set to 1 013,2 hPA (mbs).
- (c) Before commencing the climb the indicated airspeed should be allowed to stabilise to the appropriate climbing speed and the power then applied gradually and the aircraft eased into the climb, endeavouring to maintain the correct speed. Care must

be taken to ensure that the initial times and altitudes are recorded when the aircraft has settled down in the climb and the airspeed should then be kept to within ± 2 knots.

- (d) In the case of twin piston-engine aircraft, the climb is to be made with the critical engine inoperative and the propeller feathered. The power setting on the operative engine should be set as specified in the approved flight manual. For single-engine aircraft the engine is to be operated at maximum continuous or climb power for a maximum period of 5 (five) minutes.
- (e) The test climb should not be carried out in or near cloud or in turbulent air and a steady heading should be maintained throughout.

(4) Helicopters

- (a) Helicopters must perform an in-ground effect hover test in still air conditions at a helicopter mass as specified in the approved flight manual for prevailing atmospheric conditions.
- (b) For a helicopter powered by reciprocating engines the hover test results must also be plotted on hover performance graphs given in the approved flight manual. These results must be attached to Form CA 21.34.
- (c) Helicopters powered by turbine engines must undergo a power assurance check according to data given in the approved flight manual. The results must be plotted on the power assurance graphs given in the approved flight manual. These results must be attached to Form CA 21.34.

43.02.17: TEMPORARY AND PERMANENT REPAIRS AFTER ACCIDENTS OR INCIDENTS

1. Requirements

The following procedures must be followed whenever temporary or permanent repairs become necessary after an accident or incident, irrespective of the extent of the damage to a Class I product:

- (1) Once it has been established that the aircraft must be repaired after an accident, the owner or operator of the aircraft must supply the Director with the following:
 - (a) the aircraft's nationality and registration marks and its location;
 - (b) the extent of the reported damage;
 - (c) a copy of all proposed repairs obtained from the AMO, AME or approved repair facility concerned prior to commencing the repairs; and
 - (d) a detailed schedule of all the repairs to be performed by the AMO, AME or approved repair facility.
- (2) When all the repairs have been completed the owner or operator shall advise the Director accordingly and arrange for an inspection by an airworthiness inspector or an approved person.
- (3) The owner or operator of an aircraft may arrange for an AMO, AME or an approved repair facility to act on his or her behalf and recover and return the aircraft to service. In this case he or she shall ensure that the Director is advised of his or her arrangement with the AMO, AME or approved repair facility. The AMO, AME or approved repair facility shall comply with the contents of subsections (1) and (2) in addition to the requirements prescribed in subsection (4).
- (4) The aircraft maintenance organisation (AMO), approved repair facility, or aircraft maintenance engineer (AME) concerned must –

- (a) submit to the Director –
 - (i) the name(s) of valid type-rated AMEs who will be responsible for the carrying out of the repairs;
 - (ii) a detailed description of the manner in which the repairs are to be effected; and
 - (iii) a detailed specification of all the repairs to be made in order to fly the aircraft safely to a base where it can be permanently repaired;
 - (b) certify the temporary or permanent repairs in the appropriate logbook(s) or flight folio, and forward copies of such certification or Certificates Relating to Maintenance of an Aircraft to the Director;
 - (c) ensure that only an appropriately licensed and rated person, as prescribed in CAR 43.04.8, certifies the duplicate inspection on all controls when temporary repairs are made to an aircraft;
 - (d) supply the area airworthiness inspector with copies of the documentation, referred to in paragraph (a);
 - (e) after certifying the aircraft as safe for flight, obtain from the Director an authority to fly the aircraft (which authority is valid for flight within the borders of the Republic); and
 - (f) advise the Director in writing when the flight has been completed.
- (5) Those responsible for temporary repairs shall ensure that such repairs are carried out in accordance with standard aviation practices or in a reasonable manner.

43.02.18: AIRCRAFT COMPASS REQUIREMENTS

1. Compass swing requirements

- (1) All compasses fitted to South African registered aircraft must be swung as follows:
 - (a) On installation.
 - (b) At 12 monthly intervals thereafter: Provided that where other independent direction-indicating systems are in use, the interval may be extended to 24 months. In such a case, the compass(es) shall be checked during each flight against such directing-indicating system. Should deviation exceed 5°, the compass shall be swung.

[Note: Whilst under the most favourable conditions an annual check is sufficient, it is recommended that owners of aircraft carry out a check swing every six months.]

- (c) Before a newly registered aircraft is placed into service in the country.
- (d) Immediately after material or equipment that may effect the compass is installed, removed or replaced.
- (e) After an aircraft has been struck by lightning.
- (f) After each engine change, except where it has been established that non-compliance with this requirement will not affect the compass readings. The Director must be advised accordingly.
- (g) In the case of “cargo only” aircraft, whenever cargo which is likely to affect the compass reading is carried. In such cases a check must be made on the cardinal headings and headings to be flown and a temporary deviation card installed. The temporary card must be replaced when such cargo is unloaded.
- (h) In the case of any primary compass, the compass swing shall be carried out with all common electrical equipment “N”.

- (i) In the case of any stand-by compass, the compass swing shall be carried out with all electrical equipment “FF”.

2. Deviation cards

- (1) A deviation card must be installed on or in close proximity to each compass or, for remote-reading compasses, the main indicator or repeaters and must contain the following information:
 - (a) The readings at intervals not greater than 45 degrees.
 - (b) Whether the compass was swung with electrical equipment switched on or off as applicable. The space marked A as shown on the examples of the deviation cards referred to in paragraph (f) below, may be used for this purpose.

[Note: Under certain conditions radio contact must be maintained with one aeronautical station at all times and if the radio receiver affects the compass, it will be necessary to install a card which will indicate the readings with such receiver switched on.]

- (c) The signature and licence number of the person responsible for the swing and the date it was carried out.
- (d) After a magnetic compass has been compensated the reading must be such that the residual deviation in level flight does not exceed 5 degrees on any heading.
- (e) Remote-reading compasses must be adjusted to obtain minimum deviations, but where the construction of the compasses is such that all deviation can be adjusted for, no deviation card will be necessary.
- (f) The compass deviation card must be completed in a manner similar to the examples shown below:

Aircraft:				Electrical equipment ON/OFF *				
FOR	000	045	090	135	180	225	270	315
STEER	001	046	090	134	179	225	272	316

Aircraft:		Electrical equipment ON/OFF *	
FOR	STEER	FOR	STEER
000	001	180	179
045	046	225	225
090	090	270	272
135	134	315	316

* delete as applicable.

- (g) Deviation cards must be placed in holders provided for this purpose.

3. Logbook entries

The date on which the compass was swung must be entered in the airframe logbook and certified by an appropriately licensed and rated aircraft maintenance engineer, or the holder of a commercial pilot or airline transport pilot licence.

4. Compass swing areas and equipment

- (1) Before any compass is swung it must be established that the swinging area is free from unwanted magnetic effects and that the landing compass is serviceable.
- (2) Where the landing compass is replaced by a permanent base it must be borne in mind that the magnetic north on the base is not a fixed point but is a point which moves due to local magnetic variations. The magnetic bearings of the compass base must therefore be checked at periods not exceeding 4 years.

5. Qualifying experience for compensation of compasses

- (1) In terms of SA-CATS 66 TS 66.02.4(13) and (14), applicants for the issue or addition to a licence under Category "X" (Compasses) shall have had recent general practical experience satisfactory to the Director.
- (2) In the pursuance of this technical standard the minimum practical experience acceptable to the Director shall consist of the satisfactory carrying out of the compensation in aircraft, including the compilation of the final deviation cards, of a least three compasses of the type on which the applicant desires to be licensed. Such experience shall have been gained during the six months immediately preceding the application for the issue of or addition to a licence.
- (3) Compensation of compasses for the required practical experience is to be done under the supervision of the holders of appropriately rated aircraft maintenance engineers, commercial pilots or airline transport pilot licences.
- (4) Application for the issue of or addition to a licence under Category "X" for the compensation of compasses in aircraft must be accompanied by certificates from the persons supervising the compensations done for the required practical experience. Such certificates must indicate whether or not the compensations, including the compilation of the final deviation card, were satisfactorily carried out and also indicate the dates and aircraft registrations on which the compensations were made.

43.02.19: EXTENDED RANGE TWIN TURBINE-ENGINE OPERATIONS (ETOPS)

The additional maintenance requirements for extended-range twin turbine-engine operations prescribed by CAR 43.02.19 are the following:

1. General

- (1) The maintenance programme shall contain the standards, guidance and direction necessary to support the intended operation. Maintenance and personnel involved shall be made aware of the special nature of ETOPS and shall have the knowledge, skills and ability to accomplish the requirements of the programme.
- (2) An ETOPS service check shall be developed to verify that the status of the aeroplane and certain critical items are acceptable. A qualified and authorised person should accomplish this check prior to any ETOPS flight.

2. ETOPS Manual

The operator shall include the following information in existing manuals used by personnel involved in ETOPS:

(1) Oil Consumption Program

The oil consumption programme shall reflect the manufacturer's recommendations and be sensitive to oil consumption trends. It shall consider the amount of oil added at the departing ETOPS stations with reference to the running average consumption; i.e. the monitoring must be

continuous up to and including oil added at the ETOPS departure station. If oil analysis is meaningful to the make and model, it should be included in the programme. If the APU is required for ETOPS operation, it shall be added to the oil consumption programme.

(2) Engine Condition Monitoring

The engine condition monitoring programme shall describe the parameters to be monitored, the method of data collection and the corrective action process. The programme shall reflect the manufacturer's instructions and industry practice. This monitoring is used to detect deterioration at an early stage and to allow for corrective action before safe operation is affected. The programme should ensure that engine limit margins are maintained so that a prolonged single-engine diversion may be conducted without exceeding approved engine limits (i.e. rotor speeds, exhaust gas temperature) at all approved power levels and expected environmental conditions. Engine margins preserved through this programme should account for the effects of additional engine loading demands (e.g. anti-icing, electrical, etc.) which may be required during the single-engine flight phase associated with the diversion.

(3) Verification Programme after Maintenance

A verification programme or procedure shall be established to ensure corrective action following an engine shutdown, primary system failure or adverse trends for any prescribed events that require a verification flight or other action, and establish means to assure their accomplishment. A clear description of who must initiate verification actions and of the person responsible for the determination of actions must be described in the operator's ETOPS manual.

(4) Reliability Programme

- (a) A reliability programme shall be developed or the existing reliability programme supplemented. This programme should be designed with early identification and prevention of ETOPS related unsafe conditions as its primary goal. The programme should be event-orientated and incorporate reporting procedures for significant events detrimental to ETOPS flights. This information shall be readily available for use by the operator and the CAA to help establish that the reliability level is adequate, and to assess the operator's competence and ability to safely carry out ETOPS.
- (b) The Director shall be notified within 24 hours of events reportable through this programme. These reportable events include:
 - (i) in-flight shutdowns;
 - (ii) diversion or turn-back;
 - (iii) uncommanded power changes or surges;
 - (iv) inability to control the engine or obtain desired power; and
 - (v) problems with systems critical to ETOPS.
- (c) Each report shall identify the following;
 - (i) aircraft identification;
 - (ii) engine identification (make and serial number);
 - (iii) total time, cycles and time since last inspection;
 - (iv) for systems, time since overhaul or last inspection of the defective unit;
 - (v) phase of flight; and
 - (vii) corrective action.

3. Maintenance Training Programme

- (1) The maintenance training programme shall be included with normal maintenance training. The goal of this programme is to ensure that all personnel involved in ETOPS are provided with the necessary skill to properly accomplish the ETOPS maintenance tasks, emphasising the special nature of ETOPS maintenance requirements.
- (2) Qualified maintenance personnel are those that have completed the operator's extended-range training programme and have satisfactorily performed extended-range tasks under supervision within the framework of the operator's procedures for licensed or authorised personnel.

4. ETOPS Parts Control Programme

The operator, in conjunction with the responsible AMO and the support of the manufacturer, shall develop a parts control programme that ensures that the proper configuration is maintained for ETOPS. The objective of the programme is to ensure that parts fitted to ETOPS aircraft, either in terms of a parts borrowing or pooling arrangement or during repair or overhaul, maintain the necessary ETOPS configuration for that aircraft.

43.02.20: RVSM Operations

1. General

The integrity of the design features necessary to ensure that altimetry systems continue to meet RVSM approval criteria needs to be verified by scheduled tests and inspections in conjunction with an approved maintenance programme.

2. Maintenance facilities

Adequate maintenance facilities will need to be available to enable compliance with the RVSM maintenance procedures.

3. Maintenance requirements

- (1) Section 7 of Technical Standard 91.04.31 of Document SA-CATS 91 prescribes the requirements for continued airworthiness of the RVSM certification with regard to –
 - (a) maintenance programmes, including the Maintenance Control Manual;
 - (b) maintenance documents, including the approved Aircraft Maintenance Schedule and its MMEL;
 - (c) maintenance practices; and
 - (d) test equipment.
- (2) Subsection (6) of Section 6 of the aforementioned technical standard prescribes requirements for the amendment of the aircraft's Structural Repair Manual, for periodic inspections, and for in-flight defect reporting systems.
- (3) Appendix 3 to the aforementioned technical standard deals with the monitoring of static-source errors.

43.03.1: MAINTENANCE RECORDS

1. Flight folios

The requirement for a flight folio to be carried, the information to be contained therein, the manner in which it shall be maintained and the period for which a flight folio shall be retained has been prescribed in CAR 91.03.5.

2. Recording of maintenance

- (1) An owner or operator shall ensure that the following records are kept:
 - (a) the total time in service (hours, cycles and calendar time, as appropriate) of the aircraft and all life-limited components;
 - (b) the current status of compliance with all mandatory continuing airworthiness information;
 - (c) appropriate details of modifications and repairs to the aircraft and its major components;
 - (d) the time in service (hours, calendar time and cycles, as appropriate) since last overhaul of the aircraft or its components that are subject to a mandatory overhaul life;
 - (e) the current status of compliance with the maintenance programme; and
 - (f) the detailed maintenance records to show that all requirements for signing of a Certificate of Release to Service of an aircraft have been met.
- (2) The records referred to in subsection (1)(f) shall be kept for a minimum period of five years after the signing of the maintenance release.
- (3) The records referred to in subsection (1)(a) to (e) shall be kept for a minimum period of 90 days after the unit to which they refer has been permanently withdrawn from service.
- (4) In the event of a temporary change of operator, the records shall be made available to the new operator. In the event of any permanent change of owner or operator, the records shall be transferred to the new owner or operator.

43.03.3: RECORDING OF MAJOR REPAIRS AND MODIFICATIONS

1. Manner of recording overhaul

The manner in which overhauls, repairs, processes and modifications related to a major repair or overhaul of an aircraft part or component shall be recorded in the applicable aircraft, engine or propeller logbook or on a certificate of release to service.

2. Processing

Copies of the recorded entries, referred to in section 1 above, shall be forwarded to the Director within fourteen days from the completion date of the maintenance in question.

43.04.4: CERTIFYING AFTER INSPECTION

1. Statement

The statement to be entered in the appropriate logbook or other maintenance record approved by the Director, as prescribed in regulation 43.04.4, is the following:

(1) After a progressive inspection:

“I certify that Phase of the progressive inspection programme of aircraft (description) was performed in accordance with its progressive inspection programme and in accordance with the Civil Aviation Regulations, and is fit for release to service. A list of discrepancies and non-airworthy items dated (date) has been submitted to the aircraft owner or operator and the Civil Aviation Authority responsible for continuous airworthiness records.”

or

(2) After any other inspection:

“I certify that aircraft (description) has been inspected in accordance with a (identify inspection) inspection and in accordance with the Civil Aviation Regulations, and is fit for release to service.”

43.04.5: CERTIFYING AFTER MAINTENANCE

1. Statement

The statement to be entered in the appropriate logbook or other maintenance record approved by the Director, as prescribed in CAR 43.04.5, is the following:

“The work recorded above has been carried out in accordance with the Civil Aviation Regulations, and in respect of that work the aircraft is fit for release to service.

“Signature:

“Licence / authorisation number:

“Date of entry:

2. Form of certificate of release to service

The forms referred to in CAR 43.04.5, in which the release to certificate an aircraft or aircraft component is certified, are the forms contained in the SACAA website.

43.04.6: DISCREPANCIES

1. Statement

The statement to be entered in the appropriate logbook or flight folio, as prescribed in CAR 43.04.6, is the following:

(1) After a progressive inspection:

“I certify that Phase of the progressive inspection programme of aircraft (description) was performed in accordance with its progressive inspection programme and is not released to service. A list of discrepancies and non-airworthy items dated (date) has been submitted to the aircraft owner or operator and the Civil Aviation Authority responsible for continuous airworthiness records.”;

or

(2) After any other inspection:

SA-CATS 44

Maintenance rules – Non-Type Certificated aircraft

List of technical standards

44.01.2 LOGBOOKS

1. Format

44.01.3 LOSS OF LOGBOOKS

1. Procedure for opening new logbooks

44.01.4 PERSONS TO CARRY OUT MAINTENANCE

1. Pilots

44.01.6 ANNUAL INSPECTIONS

1. Items to be inspected
2. Annual inspection form

44.01.9 MASS AND BALANCE

1. Procedure to establish mass
2. Form

44.01.10 MODIFICATIONS

1. Form

44.01.11 TEST FLIGHTS

1. General
2. Requirements

44.01.12 AIRCRAFT COMPASS REQUIRMENTS

1. Compass swing requirements
2. Deviation cards
3. Logbook entries
4. Compass swing areas and equipment

44.01.13 RELEASE TO SERVICE

1. Form

44.01.14 RECORD KEEPING AND AUDITS

1. General

44.01.16 OVERHAUL, REPAIR AND SUBSTITUTION OF MAJOR COMPONENTS

1. Reissuing of an Authority to Fly or Proving Flight Authority
2. Overhauls: General
3. Engine overhauls
4. Propeller overhauls
5. Substitution of products, components and parts

44.01.17 TEMPORARY AND PERMANENT REPAIRS AFTER ACCIDENTS

1. General

44.02.1 ACCEPTED MAINTENANCE SCHEDULE

1. Introduction
2. Format

44.03.1 MAINTENANCE SCHEDULE

1. Introduction
2. Format

44.03.2 MAINTENANCE CONTROL MANUAL

1. Maintenance control manual
2. Maintenance programme

Annexures

Annex A: Minimum requirements for an annual inspection for amateur-built aircraft other than balloons mandatory 25-hour periodic inspection for microlight aeroplanes operated in terms of part 96

Annex B: Minimum requirements for an annual inspection for manned balloons

44.01.2 Logbooks

(1) The approved logbook makes provision for the recording of-

- (a) airframe, engine(s) and propeller(s) particulars;
- (b) major defects and damage;
- (c) compass or direction indicator maintenance;
- (d) class I product substitution;
- (e) compliance with airworthiness directives or safety directives, as applicable;
- (f) compliance with service bulletins, service letters and similar documents, as applicable;
- (g) engine components;
- (h) Class II product overhaul;
- (i) scheduled inspections; and
- (j) scheduled and non-scheduled maintenance and defect rectification on airframe, engines, propellers and accessories and any relevant matter.

44.01.3 Loss of logbooks

- (1) The person or organisation responsible for the opening of a new logbook-
 - (a) may consult relevant records at the premises of the Authority or at the premises of the organisation designated for the purpose in terms of Part 149, as the case may be, and, at the prescribed fee, obtain the relevant pages;
 - (b) shall obtain any further information required to open the substitute logbook(s) so that these comply with the relevant regulations and technical standards, copies of which shall be supplied to the Director or the organisation designated for the purpose in terms of Part 149, as the case may be.
 - (c) shall provide evidence of overhaul of all Class I and all installed Class II products;
 - (d) shall research and certify that all relevant Airworthiness Directives, Service Bulletins or Service Letters declared mandatory by the Director or the organisation designated for the purpose in terms of Part 149, as the case may be, have been complied with;
 - (e) shall certify that the aircraft, its engine(s) and, in particular, its tubular engine mountings (if applicable) have been inspected for corrosion; and
 - (f) shall in the substitute logbook(s) detail and certify the inspection(s) and test(s) carried out to ensure that the aircraft, engine or propeller and their components is indeed serviceable.
- (2) The total hours operated or the times since overhaul of the relevant aircraft, engine(s) or propeller(s) shall be mutually agreed upon between the owner, maintenance organisation(s) and the Director or the organisation designated for the purpose in terms of Part 149, as the case may be.

- (3) The substitute logbook(s) shall be inspected for acceptance by the Director or the organisation designated for the purpose in terms of Part 149, as the case may be.
- (4) In the event of all relevant documentation having been lost, all documents required for the issue of an Authority to fly must be prepared in accordance with this technical standard, and the aircraft and its substitute documents shall be inspected by a person appointed by the Director or the organisation designated for the purpose in terms of Part 149, as the case may be.

44.01.4 Persons to carry out maintenance

- (1) Line maintenance comprising of the following may be carried out by the owner of a non-type certificated aircraft provided that only approved materials, parts and components are used:
 - (a) changing of tyres and tubes and repairing of punctures;
 - (b) servicing landing gear shock struts with air;
 - (c) correcting defective locking wire and split pins;
 - (d) replenishing hydraulic fluid in the hydraulic fluid reservoir;
 - (e) small simple repairs to fairings, non-structural cover plates and cowlings by means of stop drilling cracks and fitting small patches or reinforcements which will not change contours or interfere with proper airflow;
 - (f) replacing side windows where such work does not interfere with the primary system;
 - (g) replacing safety belts;
 - (h) replacing seats or seat parts where such work does not involve any removal, dismantling or interference with a primary structure system;
 - (i) replacing pre-fabricated fuel and oil lines, provided that a fuel flow check is subsequently carried out;
 - (j) replacing any electrical bulb, reflector, lens or fuse of navigation and landing lights;
 - (k) replacing or cleaning spark plugs and setting spark plug gaps;
 - (l) cleaning fuel and oil strainers;
 - (m) replacing batteries and checking fluid level and specific gravity;
 - (n) replacing tail wheels and tail-wheel springs;
 - (o) changing engine oil;

44.01.6 Annual Inspections

1. Items to be inspected

- (a) The minimum requirements for an annual inspection of an amateur-built or production-built aircraft shall be as per Annex A.
- (b) The minimum requirements for an annual inspection of a manned free balloon shall be as per Annex B.
- (c) The annual inspections, referred to in paragraphs (a) and (b), shall be carried out not later than 12 months since the previous inspection.

44.01.9 Mass and Balance

(1) Procedure to establish mass and centre of gravity

- (a) Remove excessive dirt, grease and moisture from the aircraft.
- (b) Place the aircraft in a level-flight attitude, as prescribed by the builder or manufacturer.
- (c) Where practical, establish the mass inside a closed building to prevent errors induced by wind.
- (d) Use only mass meters as prescribed in sub-regulation 44.01.9.
- (e) Obtain the necessary publications (i.e. maintenance manual, flight manual, etc.) before commencing with the procedures.
- (f) Ensure that the aircraft conforms to the definition of its “empty mass”. Any extra items must be removed before computation. Empty mass of an aircraft shall be the mass of the aircraft and its power plant(s), including engine coolant, unusable fuel, total oil, total hydraulic fluid, any fixed ballast, and all items of fixed equipment.
- (g) In the case of a weight-shift controlled aircraft, the applicant must provide the centre of gravity and the height difference or angle between the front wheel and the main gear.

(2) Form

- (a) The mass and balance data as prescribed in regulation 44.01.9 shall be recorded on the appropriate form.
- (b) The mass and balance report shall include at least the following information:
 - (i) aircraft nationality and registration, make, model and serial/build number;
 - (ii) date on which the mass was determined and the centre of gravity computed;
 - (iii) datum point used;
 - (iv) the necessary calculations made. (A specimen mass and balance report is given in FAA Advisory Circular AC 43.13-1 B, Chapter 10);
 - (v) the reference numbers of any other applicable publications which were used;
 - (vi) the signature and licence or approval number of the appropriately rated approved AMO, AME or Approved Person, rated in accordance with Subpart 4 of Part 66, who was responsible for establishing the mass and computing of the centre of gravity;
 - (vii) a copy of the mass and balance report must be submitted to the Director or the organisation designated for the purpose in terms of Part 149, as the case may be.

44.01.10 Modifications

(1) Form

The appropriate sections in Form XYZ1, must be completed in their entirety before the application for modification is submitted to the Director, or the organisation designated for the purpose in terms of Part 149, as the case may be, with the applicable fee as described in Part 187 of these Regulations. All supporting documentation as required by the form must accompany the application.

44.01.11 Test flights

(1) General

- (a) The flight testing prescribed by regulation 44.01.11 shall be carried out by-
 - (i) an appropriately rated pilot when a minor modification was carried out;
 - (ii) an appropriately rated test pilot in terms of Part 61 of these Regulations, if a major modification was carried out
- (b) For complex aircraft the manufacturer's test flight procedure(s) may be utilised.

(2) Requirements

- (a) Recording of flight test results
 - (i) When an aircraft is flight tested, the results are to be recorded on the following flight performance records:
 - (aa) Form CA 21.19 for single engine fixed wing aircraft;
 - (bb) Form CA21.18 for multiple engine fixed wing aircraft; and
 - (cc) Form CA 21.34 for helicopters.
 - (ii) The forms referred to in subparagraph (i) shall be forwarded to the Director or, if applicable, the organisation designated for the purpose in terms of Part 149, as the case may be, within 48 hours after the completion of the flight test.
- (b) Climb performance
 - (i) In order to check the climb performance of the aircraft, a controlled climb is to be made with the aircraft in the en route configuration.
 - (ii) Prior to commencing the climb performance test, the altimeter is to be set to 1013.25 hPA.
 - (iii) Before commencing the climb the indicated airspeed should be allowed to stabilise to the appropriate climbing speed and the power then applied gradually and the aircraft eased into the climb, endeavouring to maintain the correct speed. Care must be taken to ensure that the initial times and altitudes are recorded when the aircraft has settled down in the climb and the airspeed should be kept to within ± 2 knots.

¹ This form is yet to be created.

- (iv) In the case of twin piston engine aircraft, the climb is to be made with the critical engine inoperative and the propeller feathered. The power setting on the operative engine should be set as specified in the approved flight manual. For single engine aircraft the engine is to be operated at maximum continuous or climb power for a maximum period of 5 minutes.
- (v) The test climb should not be carried out in or near cloud or in turbulent air and a steady heading should be maintained throughout.
- (vi) In the case of helicopters-
 - (aa) an in-ground effect hover test must be carried out in still air conditions at a helicopter mass as specified in the approved flight manual for prevailing atmospheric conditions.
 - (bb) powered by reciprocating engines, the hover test results must also be plotted on hover performance graphs given in the approved flight manual. These results must be attached to Form CA 21.34.
 - (cc) powered by turbine engines, a power assurance check must be carried out according to data given in the approved flight manual. The results must be plotted on the power assurance graphs given in the approved flight manual. These results must be attached to Form CA 21.34.

44.01.12 Aircraft compass requirements

(1) Compass swing requirements

All compasses fitted to South African registered non-type certificated aircraft must be swung-

- (a) on installation;
- (b) every 5 years thereafter
- (c) before a newly registered aircraft is placed into service in the country;
- (d) immediately after material or equipment that may affect the compass is installed, removed or replaced;
- (e) an aircraft has been struck by lightning
- (f) after each engine change, except where it has been established that non-compliance with this requirement will not affect the compass readings. The Director or, if applicable, the organisation designated for the purpose in terms of Part 149, as the case may be, must be advised accordingly;
- (g) in the case of any primary compass, the compass swing shall be carried out with all common electrical equipment "ON".

- (h) in the case of any standby compass, the compass swing shall be carried out with all electrical equipment “OFF”.

(2) Deviation cards

- (a) A deviation card must be installed on or in close proximity to each compass or, for remote reading compasses, the main indicator or repeaters and must contain the following information:
- (i) The readings at intervals not greater than 45 degrees.
 - (ii) Whether the compass was swung with electrical equipment switched “ON” or “OFF”, as applicable. The space marked A as shown on the examples of the deviation cards referred to in subparagraph (vi), below, may be used for this purpose.
 - (iii) The signature and licence number of the person responsible for the swing and the date it was carried out.
 - (iv) After a magnetic compass has been compensated the reading must be such the residual deviation in level flight does not exceed 5 degrees on any heading.
 - (v) Remote-reading compasses must be adjusted to obtain minimum deviations, but where the construction of the compasses is such that all deviation can be adjusted for, no deviation card will be necessary.
 - (vi) The compass deviation card must be completed in a manner similar to the examples shown below:

Aircraft:					Electrical equipment ON/OFF*			
FOR	000	045	090	135	180	225	270	315
STEER	001	046	090	134	179	225	272	316

Aircraft:		Electrical equipment ON/OFF*	
FOR	STEER	FOR	STEER
000	001	180	179
045	046	225	225
090	090	270	272
135	134	315	316

* delete as applicable

- (vii) Deviation cards must be placed in holders provided for this purpose

(3) Logbook entries

The date on which the compass was swung must be entered in the airframe logbook and certified by an appropriately licensed and rated AME, Approved Person, or the holder of a commercial pilot or airliner transport pilot licence.

(4) Compass swing areas and equipment

- (a) Before any compass is swung it must be established that the swinging area is free from unwanted magnetic effects and that the landing compass is serviceable.
- (b) Where the landing compass is replaced by a permanent base it must be borne in mind that the magnetic north on the base is not a fixed point but is a point which moves due to local magnetic variations. The magnetic bearings of the compass base must therefore be checked at periods not exceeding 4 years.

44.01.13 Release to Service

- (1) The release to service for a non-type certificated aircraft shall either;
 - (a) be an entry in the flight folio; or
 - (b) be a separate form contained in the aircraft document folder.
- (2) An entry to the following effect shall be made:

Aircraft Registration:.....
 Aircraft type:.....
 Serial No.:.....

“I hereby certify that I am satisfied that the above-mentioned aircraft and all its equipment are in every way serviceable for flight and that all maintenance has been carried out in accordance with the Civil Aviation Regulations of 2011, as amended, and the aircraft’s Accepted Maintenance Schedule. This certificate lapses at a total of _____ hours of flight time or on _____(date), whichever occurs first, unless the aircraft is involved in an accident or becomes unserviceable, in which case the certificate is invalid for the duration of the period”.

Signed:.....
 Licence No.:.....
 Date:.....

44.01.14 Record Keeping and Audits

- (1) An owner shall ensure that the following records are kept for the periods mentioned-
 - (a) The total time in service for the aircraft and all components.
 - (b) The current status of compliance with all service bulletins.
 - (c) Details of modifications and repairs to the aircraft and its major components.

- (d) The time in service (hours, calendar time and cycles, as appropriate) since last overhaul of the aircraft or its components.
 - (e) The current aircraft status of compliance with its maintenance schedule.
 - (f) The detailed maintenance records to show that all requirements for signing or a release to service have been met.
- (2) The records, referred to in subparagraphs (1)(a) to (e), shall be kept for a minimum period of 90 days after the aircraft or item to which they refer has been permanently withdrawn from service.
 - (3) The records, referred to in subparagraph (1)(f), shall be kept for a minimum period of one year after the signing of the release to service.
 - (4) In the event of a change of ownership of the aircraft, the above maintenance records shall be transferred to the new owner.

44.01.16 Overhaul, repair and substitution of major components

1. Reissuing of authority to fly or proving flight authority

To reinstate the validity of a certificate of airworthiness deemed suspended as a result of an aircraft having been involved in an accident or incident that rendered one or more Class I products unserviceable, the following applies:

- (a) Such maintenance as is necessary shall be carried out in accordance with approved manuals, structural repair manuals, or authorised repair schemes or other approved data.
- (b) A annual inspection shall be carried out if the primary structure, the engine(s) or the propeller(s) have been damaged.
- (c) A test flight shall be done by an appropriately rated test pilot and the performance recorded in accordance with regulation 44.01.11.
- (d) Copies of the certificates relating to maintenance in respect of all repairs affected shall be submitted to the Director or, if applicable, the organisation designated for the purpose in terms of Part 149, as the case may be, within 5 working days of the certificate of release to service having been completed.

2. Overhauls: General

- (a) Any overhaul must be carried out in accordance with the manufacturer's current overhaul manuals. Records of compliance or non-compliance with Service Bulletins, Service Letters and Service Instructions must be kept in the relevant logbook.
- (b) Overhauls shall be recorded and certified in the appropriate logbook(s) by the holder of an appropriately rated licence or approval.
- (c) The required record of fits and clearances shall be made in the sequence indicated in the respective manuals.
- (e) Engine mountings shall be inspected at the time of the engine overhaul, propeller strike or whenever an engine is changed for signs of external and internal corrosion, cracks and other damage. Magnaflux, dye penetrant or any other non-destructive testing inspection

procedure acceptable to the Director or, if applicable, the organisation designated for the purpose in terms of Part 149, as the case may be, may be used.

- (f) The overhaul and the procedure which was used shall be recorded in the relevant logbook and signed by the appropriately rated person.

3. Engine overhauls

- (a) Engines and engine components may be overhauled at the recommended times indicated in the latest revised issues of the maintenance manuals, Service Bulletins and Service Letters, as applicable, or as and when their condition shows that it is necessary to keep the aircraft serviceable. The overhauled engine must then be tested as a complete unit in accordance with the manufacturer's recommendations, as applicable.
- (b) The overhaul of turbine engines must be executed in accordance with the manufacturer's current instructions and recommendations.
- (c) The engine and its Class II products, notably the ignition system, the fuel system and (when fitted) the turbo charging or super charging system must be overhauled according to the requirements of their manufacturers as and when their condition shows that it is necessary to keep the aircraft serviceable.
- (d) An engine shall be completely overhauled together with all components the fuel system, the ignition system and (if applicable) the turbo charging or super charging system-
 - (i) where the engine has been subjected to significant external heat, e.g. fire;
 - (ii) where the engine has been submerged in water;
 - (iii) when the engine has suffered substantial damage;
- (e) In cases where the engine has been struck by lightning and there are witness marks on the propeller, the manufacturer's recommendations should be complied with.
- (f) A copy of the overhaul record shall be submitted to the Director or, if applicable, the organisation designated for the purpose in terms of Part 149, as the case may be, by an appropriately rated approved AMO, AME or Approved Person, in terms of Subpart 4 of Part 66, approving the installation of the engine in the aircraft within 5 working days.

4. Propeller overhauls

- (1) Propellers and propeller components may be overhauled at the recommended times indicated in the latest revised issues of the Maintenance Manuals, Service Bulletins and Service Letters, as applicable, or as and when their condition shows that it is necessary to keep the aircraft serviceable. The overhauled propeller must then be tested as a complete unit in accordance with the manufacturer's recommendations, as applicable.
- (2) When a propeller requires an overhaul, the overhaul may be carried out by an approved propeller overhaul facility.
- (3) Notwithstanding paragraph (2) above, overhauls on propellers may be conducted by an appropriately rated approved AMO, AME or Approved Person, in terms of Part 66.4 of these Regulations.
- (4) Propeller inspection and repair requirements for the different propeller types are as follows-

(a) Variable-pitch propellers

- (i) The inspection requirement is for the propeller to be dismantled, cleaned and inspected, paying particular attention to the following and taking the necessary remedial action:

- (aa) corrosion;
- (bb) worn, damaged, cracked or otherwise unserviceable parts: life-limited parts to be replaced as required;
- (cc) checking the blades for cracks (the removal of serviceable de-icing boots is not mandatory unless required in terms of the maintenance manual, or Service Bulletin);
- (dd) blade measurement: length, width, thickness and blade angles must be within the serviceable limits and actual measurements must be recorded;
- (ee) all seals and gaskets must be replaced by new ones;
- (ff) reassembly of the propeller and subsequent checking of balance.

(b) Fixed-pitch propellers (other than wooden propellers)

- (i) The requirements contained in fixed-pitch propeller manufacturer's service manuals and other data shall be adhered to.
- (ii) Propellers involved in propeller strikes must undergo a complete overhaul.
- (iii) The recommended overhaul requirements, apart from those set out in the overhaul manual or service publications are as follows:
 - (aa) Inspect the propeller thoroughly for damage and corrosion, and rectify-
 - diameter;
 - blade width;
 - blade thickness;
 - face alignment;
 - blade angles;
 - edge alignment;
 - balance; and
 - (bb) keep a record of the findings

(c) Fixed-pitch wooden propellers

- (i) Due to the nature of the wood itself, it is necessary that wooden propellers and blades be frequently inspected to assure continued airworthiness. Inspect for such defects as cracks, bruises, scars, warpage, evidence of glue failure and separated laminations, sections broken off and defects in the finish.
- (ii) Irrespective of make, propeller of wooden construction must be removed and carefully inspected every 1 000 hours of operation or 5 years in service, whichever is shorter, for conditions such as the following:
 - (aa) elongated bolt holes;
 - (bb) out of track condition;
 - (cc) cracks in the shaft hole, bolt holes or blades;
 - (dd) oversize shaft hole;
 - (ee) broken lag screws that attach the metal leading edge sleeve to the blade;
 - (ff) separated laminations;
 - (gg) cracked internal laminations;
 - (hh) split blades;
 - (ii) cracks or deep cuts across the grain of the wood;

- (jj) loose lag screws or rivets;
- (kk) appreciable warp of blades;
- (ll) appreciable portion of wood missing;
- (mm) damaged hub flanges caused by over-tightening
- (iii) The propellers must be re-varnished and the balance checked and corrected.
- (iv) Propeller tip drain holes must be opened.
- (v) Any repairs required must be carried out in accordance with the provisions of FAA document AC43-13-1B, or as the manufacturers prescribe.

5. Substitution of products, components and parts

- (a) The substitution of products, components and parts with new items, considered to be desirable or essential by the manufacturer of the product, component or part, or recommended after a specified time in service, must be effected at the times recommended by the manufacturer in its applicable manuals, Service Bulletins, Service Letters, Service Instructions or other similar technical information that refer thereto.
- (b) Products, components and parts of which the manufacturer has classified the substitution as essential or mandatory after a specified time in service must be substituted not later than the time prescribed. Where a manufacturer bases the life of an item on factors other than flight times, e.g. number of landings, cycles or calendar periods, such records must be kept in the logbook(s) or other approved recording system in respect of such items to ensure that their expiry dates are not exceeded.
- (c) Any substitution must be recorded, together with the item's serial and part number and its historical record, where applicable. Where the part is being substituted with a used part, the time or cycles in service since new or since overhaul must be recorded.

44.01.17 Temporary and permanent repairs after accidents

The following procedures must be followed whenever temporary or permanent repairs become necessary after an accident:

- (1) Once it has been established that the aircraft must be repaired after an accident, the owner or operator of the aircraft must repair the aircraft in accordance with either the approved manufacturer's specifications, standard practices or, if neither are available, consult an appropriately rated approved AMO, AME or Approved Person, rated in accordance with Subpart 4 of Part 66.
- (2) When all the repairs have been completed the owner or operator shall advise the Director or, if applicable, the organisation designated for the purpose in terms of Part 149, as the case may be, accordingly and arrange for an inspection for the reissuing of the authority to fly by an airworthiness inspector or an Approved Person.
- (3) The owner or operator of an aircraft may arrange for an appropriately rated approved AMO, AME or Approved Person, rated in accordance with Subpart 4 of Part 66 to act on his or her behalf and recover and return the aircraft to service. In this case he or she shall ensure that the Director or, if applicable, the organisation designated for the purpose in terms of Part 149, as the case may be, is advised of his or her arrangement with the AMO, AME or approved repair facility. The AMO, AME or approved repair facility shall comply with the contents of paragraph (1) and (2) in addition to the requirements prescribed in paragraph (4).
- (4) The appropriately rated approved AMO, AME or Approved Person, rated in accordance with Subpart 4 of Part 66, concerned, must-

- (a) submit to the Director or, if applicable, the organisation designated for the purpose in terms of Part 149, as the case may be-
 - (i) the name(s) of valid type-rated, approved, AMO, AME or Approved Person, rated in accordance with Subpart 4 of Part 66, who will be responsible for the carrying out of the repairs;
 - (ii) a detailed description of the manner in which the repairs are to be effected; and
 - (iii) a detailed specification of all the repairs to be made in order to fly the aircraft safely to a base where it can be permanently repaired;
 - (b) certify the temporary or permanent repairs in the appropriate logbook(s) or flight folio, and forward copies of such certification or certificates relating to maintenance of an aircraft to the Director or, if applicable, the organisation designated for the purpose in terms of Part 149, as the case may be;
 - (c) after certifying the aircraft as safe for flight, obtain from the Director or, if applicable, the organisation designated for the purpose in terms of Part 149, as the case may be, an authority to fly the aircraft (which authority is valid for flight within the borders of the Republic); and
- (5) Those responsible for temporary repairs shall ensure that such repairs are carried out in accordance with standard aviation practices or in a reasonable manner.

44.02.1 Accepted Maintenance Schedule

1. Introduction

The Accepted Maintenance Schedule (AMS), referred to in regulation 44.02.1 and which may be issued in separate parts, shall contain a description of the procedures to be followed, to the extent applicable, to ensure that-

- (a) the aircraft is maintained in an airworthy condition;
- (b) the operational and emergency equipment, required for intended flight, is serviceable;
- (c) the Authority to Fly or Special Flight Permit referred to in regulation 24.02.4, remains valid for each aircraft to which the AMS applies;

2. Format

The AMS shall contain or reference the following information:

- (a) maintenance tasks and the intervals at which these are to be performed, taking into account the anticipated utilisation of the aircraft.
- (b) when applicable, a continuing structural integrity program.
- (c) procedures for changing or deviating from paragraphs (a) and (b) above.

44.03.1 Maintenance Schedule

1. Introduction

The AMS, referred to in regulation 44.03.1 and which may be issued in separate parts, shall contain a description of the procedures to be followed, to the extent applicable, to ensure that-

- (a) the aircraft is maintained in an airworthy condition;
- (b) the operational and emergency equipment, required for intended flight, is serviceable;
- (c) the Authority to Fly or Special Flight Permit referred to in regulation 24.02.4, remains valid for each aircraft to which the AMS applies;
- (d) in the case where an aircraft is operated in terms of Part 96, a description of the administrative and contractual arrangements between the owner and the person or persons approved to carry out maintenance on the aircraft; and

2. Format

The AMS shall contain or reference the following information:

- (a) maintenance tasks and the intervals at which these are to be performed, taking into account the anticipated utilisation of the aircraft.
- (b) when applicable, a continuing structural integrity program.
- (c) procedures for changing or deviating from paragraphs (a) and (b) above.

44.03.2 Maintenance control manual

1. Maintenance control manual

The maintenance control manual (MCM) prescribed by regulation 44.03.2, which may be issued in separate parts, shall contain the following information, as applicable:

- (a) The description of the procedures required to ensure that-
 - (i) each aircraft, covered by the MCM, is maintained in an airworthy condition;
 - (ii) the operational and emergency equipment, necessary for an intended flight, is serviceable;
 - (iii) the Authority to Fly remains valid for each aircraft covered by the MCM.
- (b) the administrative arrangements between the operator and an appropriately rated approved AMO, AME or Approved Person, rated in accordance with Subpart 4 of Part 66;
- (c) the maintenance procedures and the procedures for completing and signing off maintenance that is based on a system other than that of an appropriately rated approved AMO, AME or Approved Person, rated in accordance with Subpart 4 of Part 66;
- (d) the ratings of the person or persons who are required by the MCM to ensure that all maintenance is carried out in accordance with the MCM with regard to an Accepted Maintenance Programme. The design and application of the operators Maintenance Programme shall observe Human Factors principles;
- (e) a description of the methods used for the completion and retention of the maintenance records;
- (f) a description of the procedure for monitoring, assessing and reporting maintenance required by the operator of an aircraft in terms of these Regulations;
- (g) a description of the procedures for complying with the service information reporting requirements to the aircraft manufacturer and to The Director for Civil Aviation or the organisation designated for the purpose in terms of The Act, as the case may be;
- (h) a description of the procedures for implementing action resulting from Mandatory Airworthiness Notification and procedures for assessing continuing airworthiness information, issued by the organisation responsible for the type design of the aircraft covered by the MCM;
- (i) a description of establishing and maintaining a system of analysis and continued monitoring of the performance and efficiency of the Maintenance Programme in order to correct any deficiency in that programme;

- (j) a description of procedures for controlling the removal and use of parts from other aircraft and the controlling of Time Between Overhaul records when this occurs;
- (k) a description of the procedure for advising the Director or the organisation designated for the purpose in terms of Part 149, as the case may be, of significant in-service occurrences;
- (l) a description of aircraft types and models to which the manual applies.

2. Maintenance programme

The Maintenance Program shall contain;

- (a) maintenance tasks and the intervals at which these are to be performed, taking into account the anticipated utilisation of the aircraft;
- (b) procedures for deviations from (a) above; and
- (c) component, plant and systems condition monitoring programs where applicable

Annex A

MINIMUM REQUIREMENTS FOR AN ANNUAL INSPECTION FOR AMATEUR-BUILT AIRCRAFT OTHER THAN BALLOONS MANDATORY 25-HOUR PERIODIC INSPECTION FOR MICROLIGHT AEROPLANES OPERATED IN TERMS OF PART 96

(Inspect as applicable)

1. AIRFRAME AND INSTALLED EQUIPMENT

1.1 Fuselage or Hull

1. Carefully inspect the fuselage or hull for general condition.
2. Check the fabric and dope, or other skin covering, for condition and security.
3. Check installed systems and components for proper installation, security, defects and satisfactory functioning.

1.2 Cabin or Cockpit

1. Inspect the cabin or cockpit for cleanliness and loose or displaced articles that might interfere with the operation of controls.
2. Check seats, seat rails, seat locking mechanisms, safety harness, flooring and tie-down fittings for security and condition.
3. Check windscreens and windows for security, condition and, where applicable, for satisfactory operation.
4. Check emergency exits for proper installation, condition, legibility of operating instructions and other markings and for satisfactory functioning.
5. Check flight, engine and propeller controls for correct installation, security of connections, condition, proper operation and, where applicable, legibility of markings.
6. Check all systems and their controls in the cockpit or cabin for proper installation, security, satisfactory operation and legibility of markings.
7. Ensure that all required placards and registration letters are correctly installed and positioned, are legible and in good condition.

1.3 Instruments and Instrument Systems

1. Check instruments for proper installation, security, obvious defects and legibility and correctness of markings.
2. Check instrument operating systems for proper installation, security and condition. Pay particular attention to pitot-static systems for freedom from obstructions and absence from leakage.
3. Check that filter elements of vacuum operated instruments are cleaned or replaced in accordance with the manufacturer's recommendations.
4. Check altimeters and airspeed indicators for accuracy.

1.4 Landing Gear

1. Check the landing gear for general condition and security of attachment of all components.
2. Inspect the shock absorbing devices for correct fluid levels and pressures.
3. Check linkages, trusses and other members for condition and security of attachments.
4. Check retracting and locking mechanisms for condition and satisfactory operation.

5. Check hydraulic lines and retraction jacks for condition and any leakage of fluid.
6. Check electrical items for condition, chafing of cables and satisfactory operation of motors, switches and indicators.
7. Check mechanical indicators for conditions and satisfactory operation.
8. Check steering mechanisms for condition and bearings for condition, lubrication and correct adjustment.
10. Check tyres for condition and creep. Check tyre pressures.
11. Check brakes for condition, correct adjustment and operation.
12. Check floats, skis or skids for additional security.

1.5 Wings and Centre Section

1. Check the entire assembly, including any external bracing, for general conditions.
2. Check fabric and dope, or other skin covering, for condition and security.
3. Check wing attachments and bracings for security, condition, correct assembly and, where applicable, correct torqueing of attaching bolts.
4. Check movable surfaces for condition, security, proper attachment, correct travel and operation and security of all control connections.
5. Check installed systems and components for proper installation, security, condition and satisfactory functioning.

1.6 Empennage

1. Check the entire assembly, including external bracing, for general condition.
2. Check fabric and dope, or other skin covering, for condition and security.
3. Check attachment of all components for security and correct assembly.
4. Check movable surfaces for condition, security, proper attachment, correct travel and operation and security of all control connections.
5. Check installed systems and components for proper installation, security, condition and satisfactory functioning.

1.7 Electrical and Radio Equipment Installations

1. Inspect batteries for condition, corrosion and venting and for correct installation, and check specific gravity and level of electrolyte.
2. Check electrical installations and components for condition, security of mounting, correct installation and functioning.
3. Check electrical wiring and conduits for condition and security of mounting.
4. Check bonding and shielding for correct installation, security and condition.
5. Check radio equipment for correct functioning and for correct installation and security of mountings.
6. Check radio antenna systems for condition, correct installation and security, and trailing aerials for satisfactory operation.
7. Check for unacceptable interference from electrical and ignition systems on applicable radio equipment.

1.8 Fuel Systems

1. Check fuel tanks and fuel systems for the presence of water or other foreign matter, condition, security, correct installation, freedom from leaks and satisfactory functioning of components.
2. Inspect ON, OFF, BOTH fuel selector (as applicable) for condition and proper operation.

1.9 Rotorcraft (Helicopters and Gyroplanes and Gyrogliders)

In addition to applicable items under paragraphs 1.1 to 1.8 above, the following items on rotorcraft shall be checked for condition, security, correct installation and, as applicable, alignment:

- (a) drive shaft assemblies or similar systems;
- (b) main rotor transmission gear box;
- (c) rotary wings (rotors) and centre section or equivalent area;
- (d) tail rotor assembly where applicable; and
- (e) tracking of main rotors.

1.10 Miscellaneous

Check any systems, assemblies and items not specifically mentioned under paragraphs 1.1 to 1.9 above, for connection, correct installation, security and satisfactory operation.

2. POWER PLANTS AND INSTRUMENTS RELATING THERETO

2.1 Engine and Engine Installations

1. Inspect each entire engine for evidence of fuel, oil and other fluid leaks and for the sources of any such leaks.
2. Check all studs, nuts and other fasteners for security, condition and correct torqueing.
3. Check the internal conditions of engines by means of cylinder compression or blow-by checks, and oil filters and sump drain plugs for evidence of metal particles or other foreign matters.
4. Check engine shock mounts for condition, security and correct installation.
5. Check engine controls for correct installation, operation, condition and security.
6. Check fluid-carrying lines for security, correct installation and condition.
7. Check systems of security and condition. Pay particular attention to exhaust manifold assemblies, heater muffers and heat exchangers.
8. Check engine-driven accessories for condition and security of mountings.
9. Check carburettor air intake filters for cleanliness, condition, security and correct installation.
10. Check engine mountings for condition and security of attachment to the main structure.
11. Check cooling baffles and seals for condition, security and correct installation.
12. Check engine cowling for condition, security and correct installation.
13. Check cooling gills or other cooling devices for condition, security, correct installation and operation.
14. Check ignition systems for condition and correct timing of magnetos. Pay particular attention to the condition and assembly at terminal points of ignition switch wiring and ensure that ignition switch(es) function satisfactorily.
15. Where practicable, ensure that fuel flow at the carburettor or equivalent component from all tanks meets at least the minimum prescribed flow requirements.

2.2 Propellers

1. Check metal and composite propeller blades for nicks and damage, and metal hubs and counterweights, where applicable, for condition.
2. Check wooden propellers for condition. Check that propeller hub bolts are correctly torqued and leading edge caps are properly secured.
3. Check security of attachment of propeller to the engine.

4. Check propeller, where applicable, for oil leaks and for satisfactory operation.
5. Check propeller control systems for condition and satisfactory operation.
6. Check that propeller track is within specified limits.
7. Check any anti-icing systems for condition, security and satisfactory operation.

2.3 Powerplant Instruments and Instrument Systems

1. Check instruments for proper installation, security, obvious defects and legibility and correctness of markings.
2. Where practicable, check powerplant instrument for satisfactory functioning before and during engine run.

2.4 Miscellaneous

Check any other power plant system, assemblies and items not specifically mentioned under paragraphs 2.1 to 2.3 above, for condition, correct installation, security and satisfactory operation.

2.5 Engine Operation

On completion of an annual inspection each engine shall be run in accordance with the manufacturer's recommendations to determine the following:

- (1) Piston Engines
 - (a) power output (static and idle rpm);
 - (b) engine rpm-drop on each magneto;
 - (c) fuel and oil pressures;
 - (d) cylinder and oil temperatures; and
 - (e) satisfactory operation of any engine-driven accessories or other items not specifically mentioned above.
- (2) Gas Turbine Engines
 - (a) satisfactory operation of the engine and engine-driven accessories;
 - (b) engine pressure ration (EPR), if applicable;
 - (c) exhaust gas temperature (EGT), if applicable;
 - (d) maximum power; and
 - (e) other parameters, as applicable.

Annex B

MINIMUM REQUIREMENTS FOR AN ANNUAL INSPECTION FOR MANNED BALLOONS

(Inspect as applicable)

1. ENVELOPE FABRIC AND LOAD TAPE

- (a) Check that the temperature link is still in place.
- (b) Check temperature label. If overheating is indicated (above 120°C), install a new label alongside, and note temperature indication in logbook. See paragraph 8 of this appendix for procedures.
- (c) Inspect for holes, tears and abrasions. Holes or tears smaller than 25 mm (1O) are acceptable, but all other damage must be repaired using prescribed methods.
- (d) Check fabric porosity by attempting to blow through it. If substantial porosity is suspected, perform a flight test.
- (e) Check envelope fabric strength by a 1O grab test. Minimum strength is 14 kg (30 lbs.). Perform the test three times; the lowest value is disqualifying. Perform test on the top section of the envelope, and make sure original fabric is tested. Also, look for discoloration as sign of overheating or exposure.
- (f) Check both vertical and horizontal tapes for security or stitching. Check especially the stitching of the crown ring, and the joints between overlying tapes and top rim tape.
- (g) Check the flying wire loops for friction and burn damage. Check that the pockets are in place.

1.2 Parachute Deflation Systems

- (a) Check control lines for wear and burn damage.
- (b) Check that knots are secure.
- (c) Check that pulleys are in good condition and not jammed with loose thread or other foreign material.
- (d) Check stitching of control line tie-off loops and pulley fixings.
- (e) Check that retaining cords and release cords are in good condition. Stiffness indicates overheating.
- (f) Check knots and stitching of loops to both parachute and balloon. If there are doubts about the sealing of the parachute, the balloon should be inflated. The parachute overlap should be equal all the way round with no daylight showing and no excessive stress in the retaining lines. Excessive stress is indicated by stress wrinkles in the edge of the parachute.

1.3 Combination Tops

- (a) Check parachute as above.
- (b) Check Velcro control line as above.
- (c) Check that cape wells operate correctly.
- (d) Check fixing of cape wells. The fixing of the female half to the Velcro panel is particularly important.
- (e) Check condition of Velcro.
- (f) Check fit of Velcro. The Velcro panel edge must not be shorter at all, or significantly longer than the Velcro on the balloon. On Velcro balloons, the overlying tapes are gated to a top rim tape. The length of free tape below this rim tape should be 2,5%- 5% shorter than the corresponding seam length on the Velcro panel. Any errors here should be reported to the manufacturer so that the correct repair can be specified.

1.4 Triangular Velcro Rip

This is only used on certain special shapes. With one person stretching each corner of the triangular aperture, the fitted Velcro panel should be loose below the mesh of overlying tapes. Check rigging and cape well as for parachute/Velcro balloons. Check the condition of the side vent. Check the attachment of release and closing lines as above for parachutes. Check that the elastic closing lines are in good condition.

1.5 Load-Bearing Attachments

- (a) Flying wires must be of stainless steel or kevlar. There should be no exposed stands in the wire and no severe kinks. Slight discoloration is permissible.
- (b) Check thimbles and copper ferrules. Damage to the colour-coded plastic sleeving at the carabiner end of the cable is not important.
- (c) Carabiners should be free of distortion with fully operational screw gates. There should be no serious corrosion.
- (d) Basket wires: Check for abrasion damage. Check thimbles and copper ferrules.
- (e) Burner frame: Check for condition of welds, particularly if the frame shows signs of distortion.
- (f) Nylon rods are not critical for flight safety. Replace if cracked.

2. BURNER AND FUEL SYSTEM

2.1 Burner

- (a) Check for external signs of damage.
- (b) Check tightness of main jets.
- (c) Check blast valves for signs of wear or leakage.
- (d) Check that all joints and connections are leak proof.
- (e) Carry out a burner test, using each cylinder. Observe function of pressure gauge, blast valves and cylinder valves. Cylinders should be vertical for this test.
- (f) Pilot light: Check by sound and appearance of flame.
- (g) If blockage is suspected, check hoses and jet by removing them and cleaning as necessary. Reassemble with PTEE tape.
- (h) Check operation of pilot valves on burner (if fitted).
- (i) Hoses: Should be of the wire-braided type. Check for wear, cuts or excessive bends. Liquid hoses should be pinpricked on the outer cover. Hose inspection should include fuel manifolds, if these are fitted.

2.2 Fuel Cylinders

- (a) Check for external damage.
- (b) Check self-seal on couplings by opening the valves with no hoses connected. No leakage should occur. After closing the liquid valve, release the pressure in the coupling by depressing the central pin.
- (c) Check operation of contents gauge.
- (d) Fuel tanks should be treated with a mixture of 4 oz. (113,4 gram) methanol/10 gallon (45,46 lt.) propane.

3. BASKETS

- (a) Check for wear or excessive distortion in weave.

- (b) Check the floor where (and if) the cane passes through it.
- (c) Check integrity of wooden floor.
- (d) Check rod sockets condition.
- (e) Check integrity of tank straps. No more than 30% cross sectional damage is acceptable.

4. INFLATION OR FLIGHT TEST

An inflation test is recommended, as this makes detailed fabric inspection much simpler and allows control lines to be checked. If fabric porosity or leaking parachute is suspected, a carefully monitored test flight should be made to assess fuel consumption.

High fuel consumption itself is not dangerous, but if the leakage is such that exceptional skill is required to fly the balloon, then the balloon is not airworthy.

5. INSTRUMENTS

Check instruments for proper operation, security and that they have been calibrated annually.

6. FIRE EXTINGUISHER

- (a) Check by weighing.
- (b) Check for condition.
- (c) Check mounting brackets and release mechanism.

7. 250-HOUR TEST AND SUBSEQUENT 100-HOUR TEST

Perform grab test in accordance with balloon operating handbook.

8. PROCEDURE AFTER OVERHEATING

If the temperature flag descends (i.e. the fusible link melts) the maximum allowable temperature has been exceeded. The flag will separate at approximately 127°C; maximum allowable temperature is 120°C. Inspect the two temperature indicating tags, if stitched onto the inside surface of the parachute. These tags, in turn, have ten temperature-incremental temperature windows. When a specific temperature is reached, the applicable window will turn black. These tags register service temperature (i.e. direct fabric temperature), which always will be somewhat less than inside air temperature.

If after flag separation the temperature tags show:

- (a) Up to 120°C: No further action needed. Replace flag link.
- (b) 120°C to 127°C: Carefully inspect top of envelope for signs of overheating, especially parachute and its retaining lines. Look for discoloration and undue stiffness in materials. If any discoloration or stiffness is visible, perform fabric test as per 250-hour inspection. If no signs of overheating are apparent, replace the temperature tags and flag, but always enter into the log/maintenance manual that an overheating has occurred, and what temperatures the tags registered.
- (c) 127°C or higher reading: Perform fabric test and enter result of same and temperature reading into flight log.

Do not try to re-solder the temperature flag link - always replace with a new item.

Annex C

CHECKLIST FOR AERODYNAMIC ANALYSIS

(Include as applicable)

1. AEROPLANES

1. Aeroplane type
2. Intended aeroplane application
3. Aeroplane configuration:
 - a. Wings
 - b. Fuselage
 - c. Empennage
 - d. Power plant range
4. Wing details:
 - a. Plan form
 - b. Wing span
 - c. Wing cord at root and at tip
 - d. Wing area
 - e. Wing aspect ratio
 - f. Wing thickness (%) at root and at tip
 - g. Wing location
 - h. Airfoil at root and at tip
 - i. Spar material
 - j. Wing rib material
 - k. Skin material
 - l. Lift augmentation devices
5. Undercarriage configuration and type
6. Aeroplane overall length
7. Aeroplane overall height
8. Seating:
 - a. Crew number
 - b. Passenger seats
 - c. Side-by-side or tandem
9. Luggage compartment(s)
10. Fuel:
 - a. System
 - b. Tank(s)
 - c. Type and grade
11. Aircraft mass:
 - a. Maximum all-up mass
 - b. Empty mass: Standard configuration
 - c. Total payload
 - d. Maximum take-off mass
 - e. Maximum landing mass
12. Centre of gravity range (% of cord)
13. Limit loads:
 - a. Design load
 - b. Wing loading
 - c. Power loading

14. Aircraft speeds:1

- a. Design manoeuvring speed (V_a)
 - b. Design speed for maximum gust intensity (V_b)
 - c. Design cruising speed (V_c)
 - d. Design diving speed (V_d/M_d)
 - e. Demonstrated flight diving speed (V_{df}/M_{df})
 - f. Speed at which the critical engine is assumed to fail during take-off (V_{ef})
 - g. Design flap speed (V_f)
 - h. Maximum speed for stability characteristics (V_{fc}/M_{fc})
 - i. Maximum flap extended speed (V_{fe})
 - j. Maximum speed in level flight with maximum continuous power ($V_{r/}$)
 - k. Maximum landing gear extension speed (V_{le})
 - l. Maximum landing gear operating speed (V_{lo})
 - m. Lift-off speed (V_{lof})
 - n. Minimum control speed with the critical engine inoperative (V_{mc})
 - o. Minimum control speed, take-off climb (V_{mca})
 - p. Minimum control speed, on or near the ground (V_{mcg})
 - q. Minimum control speed, approach and landing (V_{mcl})
 - r. Maximum operating limit speed (V_{mo}/M_{mo})
 - s. Minimum unstick speed (V_{mu})
 - t. Never-exceed speed (V_{ne})
 - u. Rotation speed (V_r)
 - v. Rough air speed (V_{ra})
 - w. Stall speed or the minimum steady flight speed at which the aeroplane is controllable (V_s)
 - x. Stall speed or the minimum steady flight speed in the landing configuration (V_{so})
 - y. Reference stall speed (V_{sr})
 - z. Reference speed in the landing configuration (V_{sro})
 - aa. Speed at which onset of natural or artificial stall warning occurs (V_{sw})
 - bb. V_{ne-g} stall speed at which the aeroplane can develop a lift force (normal to the flight path) equal to its mass
 - cc. Maximum aerotow speed (V_t)
 - dd. Threshold speed (V_t)
 - ee. Maximum threshold speed (V_{tmax})
 - ff. Maximum winch-launch speed (V_w)
 - gg. Speed for best rate-of-climb (V_y)
 - hh. Minimum speed in take-off, following a failure of the critical engine at V_{ef} , at which the pilot can continue the take-off and achieve the required height above the take-off surface within the take-off distance (V_1)
 - ii. Take-off safety speed (V_2)
 - jj. Minimum take-off safety speed (V_{2min})
 - kk. Steady initial climb speed with all engines operating.
15. Take-off distance to 50 ft obstacle clearance - no wind
16. Take-off ground run – level, no wind
17. Landing distance from 50 ft obstacle clearance height - no wind
18. Landing ground run - level, no wind
19. Maximum rate of climb
20. Range
21. Endurance

2. HELICOPTERS

[Under development]

3. GYROCOPTERS

[Under development]

“I certify that aircraft (description) has been inspected in accordance with a (identify inspection) inspection and is not released to service. A list of discrepancies and non-airworthy items dated (date) has been submitted to the aircraft owner or operator.”

APPENDIX 1

SCHEDULE OF TIMES BETWEEN OVERHAUL AND LIFE-LIMITED PARTS FOR AEROPLANES WITH A MAXIMUM CERTIFICATED MASS OF 5 700 KG OR LESS OR HELICOPTERS WITH A MAXIMUM CERTIFICATED MASS OF 3 175 KG OR LESS

[Note: See also Item 3 ‘Associated Documents’ in Section A of Technical Standard 43.02.8.]

1. AIRCRAFT

Components shall be replaced at the times indicated in the latest revised issues of the Maintenance Manuals, Airworthiness Directives (ADs), Service Bulletins (SBs) and Service Letters (SLs), as applicable.

2. ENGINES

Engines and engine components shall be overhauled at the recommended times indicated in the latest revised issues of the Maintenance Manuals, ADs, SBs and SLs, as applicable.

3. PROPELLERS

Propellers shall be overhauled at the recommended times indicated in the latest revised issues of the Maintenance Manuals, ADs, SBs and SLs, as applicable.

See Appendix 2 for propeller mid-life inspections and repair requirements.

4. EQUIPMENT

Installed equipment shall be overhauled or tested at the recommended times indicated in the latest revised issues of the Maintenance Manuals, ADs, SBs and SLs, as applicable.

APPENDIX 2

PROPELLER MID-LIFE INSPECTION AND REPAIR REQUIREMENTS

1. Flight-time and calendar limits

(1) Variable-pitch propellers (Hartzell and McCauley)

- (a) The latest issues of service information and overhaul manuals produced by the various propeller manufacturers specify the flight time and calendar limits applicable to the various propellers commonly used today.
- (b) This notwithstanding, calendar time limits may be extended as follows:
 - (i) on variable-pitch propellers fitted to aircraft engaged in normal operations, the time limit is ten (10) years, subject to a five (5) yearly (mid-life) inspection as prescribed in paragraph (d) read together with the conditions mentioned in paragraph (c);
 - (ii) for aircraft engaged in agricultural operations and acrobatics, the time limit is six (6) years, subject to a three-yearly (mid-life) inspection as prescribed in paragraph (d) read together with the conditions contained in paragraph (c);
 - (iii) other manufacturer's requirements remain unchanged.
- (c) At the time of the mid-life inspection the accumulated flight hours may not be more than half of the hours between overhaul as specified by the manufacturer. If the accumulated flight hours do exceed half of the manufacturer's time between overhauls a complete overhaul shall be carried out.
- (d) The mid-life inspection requirement is for the propeller to be dismantled, cleaned and inspected, paying particular attention to the following and taking the necessary remedial action:
 - (i) corrosion;
 - (ii) worn, damaged, cracked or otherwise unserviceable parts: life- limited parts to be replaced as required;
 - (iii) blades for cracks (the removal of serviceable de-icing boots is not mandatory unless required in terms of the maintenance manual, an AD or SB);
 - (iv) blade measurement: length, width, thickness and blade angles must be within the required serviceable limits and actual measurements must be recorded;
 - (v) applicable ADs and SBs must have been / be embodied;
 - (vi) all seals and gaskets must be replaced by new ones;
 - (vii) reassemble of the propeller and subsequent checking of balance.
- (e) All other conditions imposed by the various manufacturers remain in force.

(2) Fixed-pitch propellers (Sensenich and McCauley)

- (a) The requirements contained in fixed-pitch propeller manufacturer's service manuals and other data shall be adhered to.
- (b) Propellers involved in propeller strikes must undergo a complete overhaul, provided the blades are within the straightening limitations specified. The following shall apply:
 - (i) after the blades have been successfully straightened, metal removal during the blade reconditioning should be at least 0.01 mm (.004 inch) per surface over the entire blade. This will afford an important benefit shifting the 2nd order – 1st mode resonance peak downward in the RPM range, as well as restoring the fatigue cycle life endurance;
 - (ii) a propeller so repaired shall be marked "Rep" with 3,175 mm (1/8th inch) high characters on the flat area of the front face of hub boss. Indicated the second and subsequent repairs by a number stamped on back face of the hub boss beginning with "2";
 - (iii) all information issued by the manufacturer of a propeller, which relates to the maintenance being carried out;
 - (iv) any requirements, including those contained in Airworthiness Directives and other service information; and
 - (v) Civil Aviation Regulations.

- (c) The minimum overhaul requirements, apart from those set out in the overhaul manual or service publications are as follows:
 - (i) Inspect the propeller thoroughly for damage and corrosion, and rectify –
 - (aa) diameter;
 - (bb) blade width;
 - (cc) blade thickness;
 - (dd) face alignment;
 - (ee) blade angles;
 - (ff) edge alignment;
 - (gg) balance; and
 - (ii) keep record of findings.

[Note: All measurements must be within the maker's specifications.]

- (d) It is a requirement that a thin layer of the metal surface be removed which affords an important benefit shifting the 2nd order - 1st mode resonance peak downward in the RPM range, as well as restoring the fatigue cycle life endurance.
- (e) Propeller must be marked "RECONDITIONED" with 3,175 mm (1/8 inch) high characters on the flat area of the front face of the hub boss. Indicate the second and subsequent repairs by a number stamped on the back face of the hub boss beginning with "2".
- (f) All the other conditions imposed by the various manufacturers remain unchanged.

(3) Fixed-pitch wooden propellers

- (a) Due to the nature of the wood itself, it is necessary that wooden propellers and blades be frequently inspected to assure continued airworthiness. Inspect for such defects as cracks, bruises, scars, warpage, evidence of glue failure and separated laminations, sections broken off and defects in the finish.
- (b) Irrespective of make, propellers of wooden construction must be removed and carefully inspected every 1 000 hours of operation or 5 years in service, whichever is the shorter, for conditions such as the following:
 - (i) elongated bolt holes;
 - (ii) out of track condition;
 - (iii) cracks in the shaft hole, bot holes or blades;
 - (iv) oversize shaft hole;
 - (v) broken lag screws that attach the metal leading edge sleeve to the blade;
 - (vi) separated laminations;
 - (vii) cracked internal laminations;
 - (viii) split blades;
 - (ix) cracks or deep cuts across the grain of the wood;
 - (x) loose lag screws or rivets;
 - (xi) appreciable warp of blades;
 - (xii) appreciable portion of wood missing;
 - (xiii) damaged hub flanges caused by over-tightening (the recommended torque values usually range from 2,073 to 3,318 kg/m (15 to 24 foot-pounds).
- (c) The propellers must be re-varnished and the balance checked and corrected.
- (d) Propeller tip drain holes must be opened.
- (e) Any repairs required must be carried out in accordance with the provisions of FAA document AC43-13-1B, or as the manufacturers prescribe.
- (f) Refer doubtful cases to the manufacturer and report such cases to the Director.

Annex to Appendix 2

INSPECTION REMINDER

Aircraft registration mark:	
Next inspection due on:	(Date:) or (Hours:)

SA-CATS 47

Aircraft Registration and Marking

List of technical standards

47.00.3 REQUIREMENTS FOR AIRCRAFT MARKING

1. Definitions
2. Allocation of marks
3. Identification plate
4. Display of marks
5. Location of marks: Lighter-than-air aircraft
6. Location of marks: Heavier-than-air aircraft
7. Specification of marks
8. Measurement of marks
9. Break-in-area markings on aircraft

FIGURES

Figure 1: Break-in-area markings on aircraft

47.00.3 REQUIREMENT FOR AIRCRAFT MARKING

1. Definitions

Any word or expression to which a meaning has been assigned in the Act, and the Regulations, bears the same meaning unless the context indicates otherwise, and –

“**fireproof material**” means a material capable of withstanding heat as well as or better than steel when the dimensions in both cases are appropriate for the specific purpose;

“**heavier-than-air aircraft**” means any aircraft deriving its lift in flight mainly from aerodynamic forces;

“**lighter-than-air aircraft**” means any aircraft supported mainly by its buoyancy in the air.

2. Allocation of marks

South African nationality marks are the capital letters ZS, ZT and ZU and the registration mark is a group consisting of three letters appearing after and separated from the nationality marks by a hyphen, for example, ZS-AAA.

3. Identification plate

- (1) Every South African registered aircraft must have affixed to it an identification plate stamped or engraved with its nationality and registration marks.
- (2) The identification plate must be –
 - (a) made of fireproof metal or other fireproof material of suitable physical properties; and
 - (b) affixed to the aircraft in a prominent position near the main point of entrance to the aircraft.

4. Display of marks

- (1) The nationality and registration marks must be –
 - (a) painted on the aircraft or affixed by any other approved means ensuring a similar degree of permanence;
 - (b) legible;
 - (c) displayed to the best possible advantage having regard to the construction or features of the aircraft; and
 - (d) kept clean and visible at all times.
- (2) The letters and hyphen must be formed by solid lines and must be of a colour which contrasts clearly with the background on which they are painted.

5. Location of marks: Lighter-than-air aircraft

5.1 Airships

The marks on an airship must appear –

- (1) lengthwise on each side of the hull near the maximum cross section of the airship and on the upper surface on the line of symmetry; or
- (2) on the following stabilisers:
 - (a) the horizontal stabiliser on the right half of the upper surface and on the left half of the lower surface with the tops of the letters towards the leading edge;
 - (b) the vertical stabiliser on each side of the bottom half stabiliser, with the letters placed horizontally.

5.2 Spherical balloons

The marks on a spherical balloon must appear in two places diametrically opposite and be located near the maximum horizontal circumference of the balloon.

5.3 Non-spherical balloons

The marks on a non-spherical balloon must appear on each side of the balloon and must be located near the maximum cross-section of the balloon immediately above –

- (1) the rigging band; or
- (2) the point of attachment,

of the basket's suspension cables.

5.4 All lighter-than-air aircraft

The side marks on all lighter-than-air aircraft must be visible both from the sides and from the ground.

6. Location of marks: Heavier-than-air aircraft

- (1) The marks on aeroplanes and gliders must appear –
 - (a) except as provided in subparagraph (4), once, on the lower left surface of the wing structure; and

- (b) on both sides of the fuselage between the wings and tail surfaces, or on the upper halves of the vertical tail surfaces.
- (2) If the marks are confined to the outer half of the wing structure, they must be located on the left lower surface.
- (3) The tops of the letters must be towards the leading edge of the wing and as far as possible, be equidistant from the leading and trailing edges of the wing.
- (4) Marks on a single vertical tail surface must appear on both sides of the tail surface.
- (5) Marks on multi-vertical tail surfaces must appear on the outboard sides of the outer surfaces.
- (6) The marks on a rotorcraft (other than a rotorcraft which is a gyrocopter) must appear –
 - (a) on the bottom surface of the fuselage or cabin with the top of the marks towards the front side of the fuselage; and
 - (b) on both sides of the fuselage or cabin or tailboom in a prominent place not obstructed in normal use.
- (7) The marks on a rotorcraft which is a gyrocopter must appear on both sides of a vertical surface.
- (8) Marks on multi-vertical surfaces must appear on the outboard sides of the outer surfaces.
- (9) If a heavier-than-air aircraft does not possess parts corresponding to those mentioned in the appropriate subparagraph of this paragraph, the marks must appear in such a manner that the aircraft can be readily identified.

7. Specification of marks

- (1) The nationality and registration marks must consist of capital letters in Roman characters without ornamentation.
- (2) The width of each letter (except letter “I”) and the length of the hyphen must be two-thirds of the height of the letter.
- (3) Each letter must be separated from the letter which immediately precedes or follows it by a space equal to one-third the height of the individual letters, the hyphen being regarded as a letter for this purpose.
- (4) The lines forming the letters and hyphen must be solid and the thickness of those lines must be one-sixth of the height of the letter.

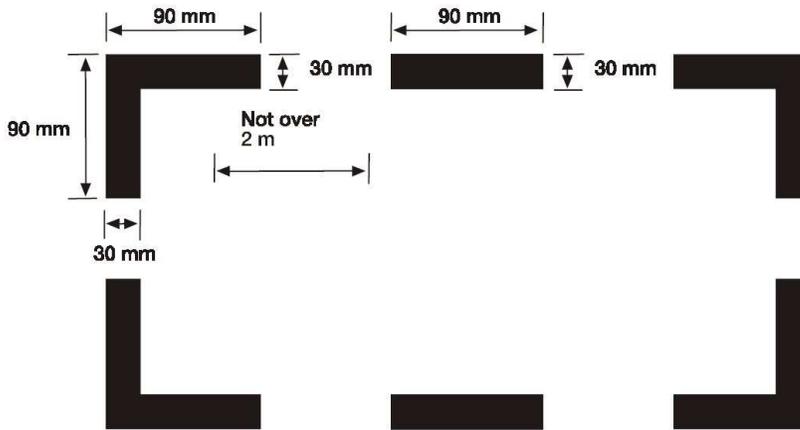
8. Measurement of marks

- (1) The nationality and registration marks must be formed of letters of equal height, and must be so situated as to leave a margin of at least 50 mm along each edge of any surface to which they are affixed.
- (2) The height of the marks on lighter-than-air aircraft must not be less than 500 mm.
- (3) The height of the marks on aeroplanes and gliders must be –
 - (a) on the wings, not less than 500 mm; and
 - (b) on the fuselage or equivalent structure and on the vertical surfaces, not less than 300 mm, except that where the surface is not large enough to accommodate full-size marks the Director may approve marks of a lesser measurement provided they are not less than 150 mm in height and can be readily identified.
- (4) The height of the marks on rotorcraft must be –
 - (a) on the bottom surface of the fuselage or cabin, not less than 500 mm high; and
 - (b) on the sides of the fuselage or cabin, not less than 250 mm high, except that where the surface is not large enough for full-size marks the Director may approve marks of a lesser measurement provided they are not less than 150 mm in height and can be readily identified.
- (5) If an aeroplane or glider does not possess parts corresponding to those mentioned in the appropriate subparagraph of this paragraph, the marks must appear in such a manner that the aircraft can be readily identified.

9. Break-in-area markings on aircraft

- (1) If areas of the fuselage suitable for break-in by rescue crews in an emergency are marked on an aircraft, such areas must be marked as per Figure 1.
- (2) The colour of the markings must be red or yellow, and, if necessary, they must be outlined in white to contrast with the background.
- (3) If the corner markings are more than 2 m apart, intermediate lines of 90 mm x 3 mm must be inserted so that there is not more than 2 m between adjacent marks.

Figure 1: Break-in-area markings on aircraft



**SA-CATS 48
Leasing of Aircraft**

List of technical standards

48.04.1 SUB-CHARTERS

- 1. Sub-charter with or without flight crew

48.06.5 TRANSFER OF RESPONSIBILITIES

- 1. Responsibilities transferable between States
- 2. Example of an agreement between States

48.04.1 SUB-CHARTERS

1. Sub-charter with or without flight crew

An operator may sub-charter an aircraft or flight crew or both an aircraft and flight crew in circumstances where such operator is faced with an immediate, urgent and unforeseen need for a replacement aircraft or flight crew or both.

48.06.5 TRANSFER OF RESPONSIBILITIES

1. Responsibilities transferable between States

The following are responsibilities that may be transferred between States:

RESPONSIBILITIES OF [STATE 1] AND [STATE 2] REGARDING AIRWORTHINESS

ICAO Doc	Subject	Responsibilities	Responsibilities
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		of the State of Registry ([State 1])	of the State of Operator ([State 2])
Annex 8, Part II, Chapter 4; Doc 9760, Volume II, Part B, Chapter 8	Mandatory continuing airworthiness information	Ensure that [State 2 – CAA] and the [operator] receive all the applicable mandatory continuing airworthiness information	Ensure that the [operator] complies with mandatory continuing airworthiness information transmitted by [State 1 – CAA]
Annex 6, Part I, 5.2.4	Operation of aircraft in compliance with its certificate of airworthiness (C of A)		Assume State of Registry's responsibility as defined in 5.2.4 of Annex 6, Part 1
Annex 6, Part I, 8.1.2	Operator's maintenance responsibilities	Approve maintenance organisations used by the [operator] except for line stations away from operator's main base	Approve line stations from the [operator's] main base
Annex 6, Part I, 8.2.1 to 8.2.4	Operator's maintenance control manual (MCM)		Ensure that guidance is contained in the MCM, approve the MCM and transmit a copy to [State 1 – CAA]
Annex 6, Part I, 8.4.1 to 8.4.3	Maintenance records	Inspect maintenance records and documents every six months	Ensure that records are kept in accordance with 8.4.1 to 8.4.3 of Annex 6, Part I, and inspect in accordance with the requirements of the AOC
Annex 6, Part I, 8.5.1 to 8.5.2	Continuing airworthiness	Ensure that the airworthiness	Ensure that the airworthiness

	information	requirements of [State 1] are known to both [State 2 – CAA] and [operator]	requirements of [State 1] and [State 2] are complied with and adequate procedures are incorporated in the MCM
Annex 6, Part I, 8.6; Doc 9760, Volume II, Part B, Chapter II, attachment to - A	Modifications and repairs	Ensure that they have been previously approved by the States of Design and of Manufacture	Ensure that the requirements are contained in the MCM and approve the MCM

2. Example of an agreement between States

The following is an example of an Article 83*bis* agreement:

MODEL AGREEMENT

Model Agreement between [State 1] and [State 2] on the implementation of Article 83*bis* of the Convention

WHEREAS the Protocol relating to Article 83*bis* of the Convention on International Civil Aviation (Chicago, 1944) (hereinafter referred to as "the Convention"), to which [State 1] and [State 2] are parties, entered into force on 20 June 1997;

WHEREAS Article 83*bis*, with a view to enhanced safety, provides for the possibility of transferring to the State of the Operator all or part of the State of Registry's functions and duties pertaining to Articles 12, 30, 31 and 32 a) of the Convention;

WHEREAS, in line with Doc 9760 (Airworthiness Manual), Volume II, Part B, Chapter 10, and in light of Doc 8335 (Manual of Procedures for Operations Inspection, Certification and Continued Surveillance), Chapter 10, it is necessary to establish precisely the international obligations and responsibilities of [State 1] (State of Registry) and [State 2] (State of the Operator) in accordance with the Convention;

WHEREAS, with reference to the relevant Annexes to the Convention, this Agreement organizes the transfer from [State 1] to [State 2] of responsibilities normally carried out by the State of Registry, as set out in Sections 3 and 4 below;

The Government of [State 1], represented by its [Civil Aviation Authority], and the Government of [State 2], represented by its [Civil Aviation Authority],

Hereinafter referred to as "the Parties", have agreed as follows on the basis of Articles 33 and 83*bis* of the Convention:

ARTICLE I – SCOPE

Section 1. [State 1] shall be relieved of responsibility in respect of the functions and duties transferred to [State 2], upon due publicity or notification of this Agreement as determined in paragraph b) of Article 83*bis*.

Section 2. The scope of this Agreement shall be limited to [types of aircraft] on the register of civil aircraft of [State 1] and operated under leasing arrangement by [operator], whose principal place of business is in [State 2]. The list of aircraft concerned, identified by type, registration number and serial number, is reproduced in Attachment I, which also indicates the term of each leasing arrangement.

ARTICLE II – TRANSFERRED RESPONSIBILITIES

Section 3. Under this Agreement, the Parties agree that [State 1] transfers to [State 2] the following functions and duties, including oversight and control of relevant items contained in the respective Annexes to the Convention:

Annex 1: Personnel Licensing, issuance and validation of licences.

Annex 2: Rules of the Air, enforcement of compliance with applicable rules and regulations relating to the flight and manoeuvre of aircraft.

Annex 6: Operation of Aircraft (Part1-International Commercial Air Transport Aeroplanes), all responsibilities which are normally incumbent on the State of Registry. Where responsibilities in Annex 6, Part 1, may conflict with responsibilities in Annex 8 -Airworthiness of Aircraft, allocation of specific responsibilities is defined in Attachment 2.

Section 4. Under this Agreement, while [State 1] will retain full responsibility under the Convention for the regulatory oversight and control of Annex 8-Airworthiness of Aircraft, the responsibility for the approval of line stations used by the [operator], which are located away from its main base, is transferred to [State 2]. The procedures related to the continuing airworthiness of aircraft to be followed by the [operator] will be contained in the operator's maintenance control manual (MCM). Attachment 2 hereunder describes the responsibilities of the Parties regarding the continuing airworthiness of aircraft.

ARTICLE III – NOTIFICATION

Section 5. Responsibility for notifying directly any States concerned of the existence and contents of this Agreement pursuant to Article 83*bis*) rests with [State 2] as the State of the Operator, as needed. This Agreement, as well as any amendments to it, shall also be registered with ICAO by [State 1] as the State of Registry or [State 2] as the State of the Operator, as required by Article 83 of the Convention and in accordance with the Rules for Registration with ICAO of Aeronautical Agreements and Arrangements (Doc 6685).

Section 6. A certified true copy [in each language] of this Agreement shall be placed on board each aircraft to which this Agreement applies.

Section 7. A certified true copy of the air operator certificate (AOC) issued to [operator] by [State 2], in which the aircraft concerned will be duly listed and properly identified, will also be carried on board each aircraft.

ARTICLE IV – COORDINATION

Section 8. Meetings between [State 1-CAA] and [State 2-CAA] will be held at [three-] month intervals to discuss both operations and airworthiness matters resulting from inspections that have been conducted by respective inspectors. For the sake of enhanced safety, these meetings will take place for the purpose of resolving any discrepancies found as a result of the inspections and in order to ensure that all parties are fully informed about the [operator's] operations. The following subjects will be among those reviewed during these meetings:

- Flight operations
- Continuing airworthiness and aircraft maintenance
- Operator's MCM procedures, if applicable
- Flight and cabin crew training and checking
- Any other significant matters arising from inspections

Section 9. Subject to reasonable notice, [State 1-CAA] will be permitted access to [State 2-CAA] documentation concerning [operator] in order to verify that [State 2] is fulfilling its safety oversight obligations as transferred from [State 1].

Section 10. During the implementation of this Agreement, and prior to any aircraft subject to it being made the object of a sub-lease, [State 2], remaining the State of the Operator, shall inform [State 1]. None of the duties and functions transferred from [State 1] to [State 2] may be carried out under the authority of a third State without the express written agreement of [State 1].

ARTICLE V – FINAL CLAUSES

Section 11. This Agreement will enter into force on its date of signature, and come to an end for aircraft listed in Attachment I at the completion of the respective leasing arrangements under which they are operated. Any modification to the Agreement shall be agreed by the parties thereto in writing.

Section 12. Any disagreement concerning the interpretation or application of this Agreement shall be resolved by consultation between the Parties.

Section 13. In witness thereof, the undersigned directors of civil aviation of [State 1] and [State 2] have signed this Agreement.

For the Government of [State 1]

For the Government of [State 2]

[Signature]

[Signature]

[Name, title, place and date]

[Name, title, place and date]

Attachments:

Attachment I: Aircraft Affected by this Agreement

Attachment 2: Responsibilities of [State 1] and [State 2] Regarding Airworthiness Attachment

1

AIRCRAFT AFFECTED BY THIS AGREEMENT

Aircraft type:

Registration number:

Serial number:

Leasing term:

Date:

Attachment

2

RESPONSIBILITIES OF [STATE 1] AND [STATE 2] REGARDING AIRWORTHINESS

ICAO Doc	Subject	Responsibilities of the State of Registry ([State 1])	Responsibilities of the State of Operator ([State 2])
Annex 8, Part II, Chapter 4; Doc 9760, Volume II, Part B, Chapter 8	Mandatory continuing airworthiness information	Ensure that [State 2 – CAA] and the [operator] receive all the applicable mandatory continuing airworthiness information	Ensure that the [operator] complies with mandatory continuing airworthiness information transmitted by [State 1 – CAA]
Annex 6, Part I, 5.2.4	Operation of aircraft in compliance with its certificate of airworthiness (C of A)		Assume State of Registry's responsibility as defined in 5.2.4 of Annex 6, Part 1
Annex 6, Part I, 8.1.2	Operator's maintenance responsibilities	Approve maintenance organisations used by the [operator] except for line	Approve line stations from the [operator's] main base

		stations away from operator's main base	
Annex 6, Part I, 8.2.1 to 8.2.4	Operator's maintenance control manual (MCM)		Ensure that guidance is contained in the MCM, approve the MCM and transmit a copy to [State 1 – CAA]
Annex 6, Part I, 8.4.1 to 8.4.3	Maintenance records	Inspect maintenance records and documents every six months	Ensure that records are kept in accordance with 8.4.1 to 8.4.3 of Annex 6, Part I, and inspect in accordance with the requirements of the AOC
Annex 6, Part I, 8.5.1 to 8.5.2	Continuing airworthiness information	Ensure that the airworthiness requirements of [State 1] are known to both [State 2 – CAA] and [operator]	Ensure that the airworthiness requirements of [State 1] and [State 2] are complied with and adequate procedures are incorporated in the MCM
Annex 6, Part I, 8.6; Doc 9760, Volume II, Part B, Chapter II, attachment to - A	Modifications and repairs	Ensure that they have been previously approved by the States of Design and of Manufacture	Ensure that the requirements are contained in the MCM and approve the MCM

Annex 6, Part 1, 8.7 and 8.8

Approved maintenance organization and maintenance release

Responsibilities of the State of Registry ([State 1])

Approval of the [operator's] base maintenance organization and procedures in accordance with 8.7 and 8.8 of Annex 6, Part I, and communication to [State 2-CAA] of related procedures to be included in the MCM.

Responsibilities of the State of the Operator ([State 2])

Approval of the [operator's] line maintenance arrangements away from base. Ensure that procedures are contained in the MCM and approve the MCM.

SA-CATS 61

Pilot Licensing

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- 61.01.5 MAINTENANCE OF COMPETENCY AND SKILLS TESTS**
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- 61.15.4 SKILLS TEST FOR A GRADE III HELICOPTER FLIGHT INSTRUCTOR RATING**
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The following appendices to Document SA-CATS 61 can be found on the SACAA website

APPENDICES

Note: All the appendices can be found on the SACAA website.

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61.01.5 MAINTENANCE OF COMPETENCY AND SKILLS TESTS

1. Revalidation Check

The contents of the revalidation check shall be as defined below and shall be conducted in an aircraft of the category, class or type for which the pilot requires the revalidation check or in a flight simulation training device (FSTD) approved for the purpose. In general terms, the elements listed below should be included in the revalidation check, however, it is accepted that there may be aircraft or operational requirements and limitations that prevents some of these elements from being covered. In such cases the DFE shall make appropriate comments on the revalidation check form. Where possible, in the interests of safety and for the purposes of conducting a realistic revalidation check, an FSTD should be used. The Director shall have final authority as to whether the items not covered constitute an acceptable revalidation check.

1.1 Normal Procedures

- (1) Mass and balance data
- (2) Take-off and landing distance or landing area requirements
- (3) Altitude capability/flight planning
- (4) Weather interpretation
- (5) Filing of flight plan
- (6) Pre-flight inspection
- (7) Pre-start checks
- (8) Starting and after start procedures
- (9) Taxiing/hover checks
- (10) Pre-take-off procedures and checks
- (11) Crew/pilot briefing
- (12) Departure and after departure procedures
- (13) Climb procedures including best rate/maximum angle and cruise climb techniques and engine monitoring procedures
- (14) Cruise techniques
- (15) Use of navigation systems
- (16) Use and monitoring of automation
- (17) Descent techniques
- (18) Approach preparation and briefing
- (19) Flying the published instrument approach and relevant procedures
- (20) Landing/hover techniques
- (21) After-landing procedures
- (22) Shutdown procedures
- (23) Paperwork requirements including technical logs

1.2 Non-normal Procedures

Non-normal procedures require that the pilot, whilst controlling the aircraft, identifies and assesses the problem, carries out the appropriate action to contain the problem or malfunction and then applies appropriate management techniques to minimise the danger to the crew and passengers. The use of the correct quick reference handbook (QRH) and/or other appropriate flight documentation is an essential element of successfully completing the proficiency or re-validation check.

Non-normal events and malfunctions include but are not limited to the following:

- (a) Operation on wet or contaminated runways
- (b) Operation in strong crosswinds
- (c) Wind-shear recovery procedures
- (d) CFIT recovery procedures
- (e) Aborted and alternate engine start procedures
- (f) Rejected take-off
- (g) Engine failure procedures
- (h) Autorotation
- (i) Vortex ring recovery
- (j) Mast bumping
- (k) System failure procedures
- (l) Instrument failure procedures
- (m) Avionic and auto-flight control failure procedures
- (n) Radio failure procedures

1.3. Crew Procedures

- (1) Crew procedures include but are not limited to the following:
 - (a) CRM
 - (b) Threat and error identification and management
 - (c) Multi-crew co-operation
 - (d) Communication including ATC communications
 - (e) General management of the flight
 - (f) Situational awareness
 - (g) Declaring an emergency
 - (h) Pilot incapacitation procedures in multi-crew aircraft
- (2) In the case where the applicant holds an instrument rating the revalidation check should be carried out under IFR and in IMC or simulated IMC as far as possible. The applicant should act as pilot flying unless the requirement for dealing with a non-normal procedure or the operator's procedures requires otherwise.

1.4. Revalidation Check Form

The revalidation check shall be conducted using the applicable form(s) as published on the SACAA website.

2. Summary

The summary shall:

- (1) Reflect: the number of hours flown recorded in each column of the logbook, per aircraft category, class or type in the preceding 12 months, as well as a grand total for the period; and
- (2) Be submitted together with annual currency fees and attached to the form required for the applicable revalidation or competency check.

61.01.7 LANGUAGE

1. Proficiency requirements

- (1) ICAO has specified English Language Proficiency Requirements, and mandated that these requirements shall be effective from 5 March 2008. There are six levels of proficiency in the requirement (refer to Appendix 1 of ICAO Annex 1 and the ICAO Language Proficiency Rating Scale attached to ICAO Annex 1).
- (2). In accordance with the requirements, Pilots and Air Traffic Service Personnel shall demonstrate a minimum proficiency of at least Operational Level '4' of both ICAO Standard Phraseology and plain language, to be issued with or to maintain their respective licences.
- (3). The requirements further indicate that Pilots and Air Traffic Services Personnel who have not been rated at Level 6 proficiency shall be tested for English language proficiency at regular intervals to ensure that they remain proficient at the required level. Pilots and Air Traffic Service Personnel who have been rated at Level 6 proficiency shall not require retesting.
- (4). The six language proficiency levels are:

PROFICIENCY LEVEL	PROFICIENCY TESTING INTERVAL
Level 6: Expert	Retesting not required
Level 5: Extended	Retesting required every six years
Level 4: Operational (Minimum level)	Retesting required every three years
Level 3: Pre-operational	Licence not issued/maintained
Level 2: Elementary	Licence not issued/maintained

- (5). Language Proficiency Requirement applies to speaking and listening proficiency only and does not address the ability to read or write, in the English Language.
- (6). Areas of language to be assessed: The following six dimensions as prescribed by ICAO Annex 1 are listed as:
- (a) Pronunciation: Ability to speak in a manner that is clear and easy to understand.
 - (b) Structure: Ability to compose concise, meaningful and unambiguous sentences or messages.
 - (c) Vocabulary: Ability to use correct words and phrases to match the setting.
 - (d) Fluency: Ability to respond, narrate events or describe situations naturally.
 - (e) Comprehension: Ability to understand and follow instructions without difficulty.
 - (f) Interaction: Ability to ask and answer questions, and engages in two-way dialogue without difficulty.
- (7). Licences affected by ICAO language requirements: The following licences are affected by this requirement:
- (a) Aeroplane and helicopter pilots.
 - (b) Glider and free balloons.
 - (c) Air Traffic Service Personnel.
 - (d) Aeronautical station operators.
 - (e) Exempted from the requirement:
 - (i) Aircraft maintenance engineers.
 - (ii) Flight dispatchers.
- (8). Compliance with language proficiency procedures:
- (a) In order to comply with this requirement all Flight crew and Air traffic Service Personnel shall be tested and rated accordingly.
 - (b) Approved Language Proficiency Interviewers/Raters will be registered with the CAA and shall comply with ICAO language proficiency requirements as set out in ICAO Document 9835, Ch 5 & 6. Language Proficiency Ratings shall comply with the critical characteristics of testing methodology as set out in ICAO Document 9835, Ch 6 (6.6.3) and make use of the ICAO Rating Scale, (See Appendix 1.5.1 to SA-CATS 61) and holistic descriptors provided.
 - (c) Approved Training Organizations shall apply to the CAA for accreditation, whereby individual instructors at these organizations are registered as Language Proficiency Interviewers/Raters in accordance with their respective professional and academic qualifications. (See ICAO document 9835, Ch 4 (4.3.1) and Appendix 1.5.2 to SA-CATS 61 for best practices.)
 - (d) Language Proficiency Interviewing/Rating is considered to be extremely “high stakes” testing as it impacts on aviation careers and the critical issue of aviation safety. To ensure validity of such assessments, it is imperative that the interviews and ratings shall only be conducted by professionals registered as CAA Language Proficiency Interviewers/Raters.
 - (e) Oral Proficiency Interviews (OPI's) must be conducted jointly by a CAA registered Subject Matter Expert (SME) and a Linguistic Expert. All OPI's shall be conducted using face-to-face interview procedures, and each OPI shall be recorded (preferably electronically) and stored for a minimum of 6 years in an archive system. These records shall be open for inspection and audits by the CAA.
 - (f) All CAA registered Language Proficiency Interviewers/Raters shall demonstrate full proficiency (Level 6 competency) in their language usage. They shall also be required to sign a Code of Conduct concerning language testing practices.

(g) Approved Test Centres and Language Proficiency Interviewers/Raters shall hold SAQA accreditation.

(9). The pre-interview process:

The pre-interview process comprises completion of a Bio-Data Questionnaire included under Part 1 on the CAA Language Proficiency Test Report for Radio Telephony Communications (Form CA 61-01-07).

(10). The interview process, certification and endorsement:

(a) The interview process shall consist of a thirty to forty minute interview with a Linguistic and a Subject Matter Expert (pilot or ATC). During this interview, the candidate shall be evaluated in the use of the plain language and aviation related language. Oral and listening skills shall be rated in accordance with the full set of ICAO descriptors.

(b) This process shall determine the candidate's actual proficiency level. The candidate shall then be issued with a Certificate of Language Proficiency from the Test Centre that will be submitted together with Form CA 61-01-11 for issuing of a rating into the candidate's licence. The applicable fee for the issuance of a rating as listed in CAR Part 187 is payable to the CAA.

(c) The Test Centre shall determine beforehand the test category that is most appropriate for the candidate, based on the candidate's profession. Separate tests shall be used for Pilots and Air Traffic Service Personnel who are considered *ab initio* or professional as per the following:

(i) The holder of a Commercial Pilot Licence shall be considered a professional pilot, whereas a pilot who flies in their private/personal capacity shall be considered to be *ab initio*.

(ii) Air Traffic Service personnel who hold a validated ATS rating shall be considered professional. All other Air Traffic Personnel shall be considered as *ab initio*.

(11) The certification process:

Approved Test Centres shall issue an English Language Proficiency Certificate that shall include the following minimum criteria:

(a) Name of the certificate, i.e. Certificate of Competency in ICAO English Language Proficiency.

(b) Name of the Test Centre.

(c) CAA approval number for the Test Centre.

(d) Identity Number of the applicant.

(e) Licence number of the applicant.

(f) Profession of the applicant.

(g) Full names of the applicant.

(h) Colour identity photograph of the applicant.

(i) The assessed rating result in all six skill dimensions reported under Part 2 Section 1 of Form CA 61-01-11, i.e.:

(i) Pronunciation.

(ii) Structure.

(iii) Vocabulary.

(iv) Fluency.

(v) Comprehension.

(vi) Interaction.

- (j) Overall ICAO Language Proficiency Rating, reported under Part 2 Section 1 of Form CA 61-01-7.
 - (k) Name, Signature and CAA approval number of the Linguistic Expert.
 - (l) Name, Signature and CAA approval number of the Subject Matter Expert.
- (12) Acceptance of Prior Learning or Foreign CAA language certification:
- (a) The SA CAA will accept foreign CAA language certification and issue the relevant rating into the applicant's licence.
 - (b) The process for alternative language certification is:
 - (i) The CAA will certify the holder of a South African Private Pilot Licence or Commercial Pilot Licence at Operational Level 4.
 - (ii) The CAA will certify the holder of an Instrument Rating for a South African Pilot licence at Extended Level 5.
 - (iii) An applicant who can provide evidence of Expert English Language Proficiency will be awarded Expert Level 6. This evidence is indicated, but not limited to the following options:
 - (aa). Certified copy of either a school leavers certificate or a statement of results indicating Matric, O or M Level, with a pass in English first language with a minimum symbol of D or its equivalent.
 - (bb) Certified copy of a SAQA recognised 2 year tertiary qualification with English either as a subject or English as the language of tuition and examination.
 - (cc) Proof of being a present or past native of a nation where English is the first language, e.g. UK, USA, Australia or New Zealand.
 - (iv) An applicant who can provide evidence of Operational English Language Proficiency will be awarded a Level 4. This evidence is indicated, but not limited to the following options either a school leaver's certificate or a statement of results indicating Matric, O or M Level, with a pass in English second language with a minimum symbol of C or its equivalent.
 - (c) Candidates applying for an English rating proficiency in terms of (b)(ii) or (b)(iii) above are required to submit a declaration that he or she does not suffer from a significant speech impediment or have a heavy accent that would make the spoken English language difficult to understand.
- (13) Candidates assessed to be below Level 4:
- (a) Candidates who do not meet the ICAO Level 4 requirement, will be required to undergo remedial language training, in order to address areas of difficulty identified in Part 3 of Form 61-01-7; – Language proficiency feedback.
 - (b) Applicants assessed below Level 4 as well as applicants assessed at Level 4 and level 5 who wish to gain a Level rating shall be required to wait for a period of 90 days after being assessed before applying for re-assessment.
 - (c) A moderation process should be established by the Test Centres should candidates wish to challenge their results.

14. The linguistic and subject matter expert requirements can be found in the applicable appendix to this Part.

61.01.8 LOGGING OF FLIGHT TIME

1. Pilot-in-command-under-supervision (PICUS) functions

- (1) The functions that the pilot-in-command-under-supervision are required to carry out, without intervention by the supervising designated pilot-in-command include, but are not limited to –
 - (a) Checking the accuracy of the proposed flight plan and the load sheet for the flight, including the computation of fuel;
 - (b) Ensuring that all checks are carried out in accordance with the check system established by the operator;
 - (c) Ensuring in any emergency that the procedures contained in the operations manual or other relevant documents have been complied with by each crew member;
 - (d) Carrying out all the duties and functions of a pilot-in-command;
 - (e) Taking all decisions relating to the use of any flight and ground systems required in the case of operations conducted by automatic means;
 - (f) Ensuring that all problems occasioned by meteorological conditions, communications and air traffic control procedures are resolved; and
 - (g) The operator shall have an approved scheme in terms of which the pilot-in-command under supervision training is conducted.
- (2) The supervising designated pilot-in-command shall certify an appropriate entry in the pilot-in-command under supervision's logbook.

2. Crediting of flight time for a flight examiner

A flight examiner may be credited for flight time as indicated in Document SA-CATS 61.36.

61.01.9 CREDITING OF FLIGHT TIME AND THEORETICAL KNOWLEDGE

1. Recognition of prior learning and experience by SAAF pilots and navigators

- (1) Credit at ATPL level is only applicable to Pilot Instructor, Navigator Instructors applicants or SA Air Force Graduate Test Pilots of one of the following Society of Experimental Test Pilots (SETP) recognised test pilot schools.
 - (a) Empire Test Pilot School. (UK)
 - (b) United States Air Force Test Pilot School. (USA)
 - (c) United States Navy Test Pilot School. (USA)
 - (d) EPNER. (France)
 - (e) National Test Pilot School. (USA)
 - (f) International Test Pilot School. (UK)
- (2) SA Air Force pilots and navigators may be exempted from all or some of the requirement to attend a ground school for the different licences or ratings as the case may be, issued under this Part, but are required to write the examinations reflected below except where credit is given for prior learning.
- (3) The exemption may be granted to applicants who hold, or have held within the 60 months preceding the date of application, an active South African Air Force Pilot or Navigator qualification
- (4) An exemption may also be granted in the case of an applicant who previously held a South African Air Force (SAAF) Pilot or Navigator qualification and obtained, and maintained competency of, a SACAA private pilot licence or higher issued under this part within 60 months of terminating active flying status in the Air Force provided that application is made no longer than 24 months after obtaining the SACAA licence.
- (5) The application for exemption shall be accompanied by –
 - (a) a Curriculum Vitae describing the applicant's SA Air Force Career and details of their flying experience;
 - (b) A letter from the Officer Commanding of the squadron or unit where the applicant has served or is serving, confirming current active flying status or, where applicable, the date of last active flying

status. This is necessary to confirm that the applicant complies with the 12 month requirement as stipulated above;

- (c) Confirmation of hours flown and types of aircraft flown in the SAAF (Certified copy of logbook must be signed out by Officer Commanding, CFI or responsible person);
- (d) Certified copy of the applicant's ID document;
- (e) Proof of instrument rating (if applicable);
- (f) Certified copy of any SA CAA licence held;
- (g) An explanation of the hours flown as summarised in the logbook:
 - (i) 140 hrs dual on PC7 (single-engine turbine (A));
 - (ii) 400 hrs PIC on PC7 (single-engine turbine (A));
 - (iii) 800 hrs Instruction;
 - (iv) 25 hrs dual on DC3 (multi-engine piston (A));
 - (v) 250 hrs Co-pilot on DC3 (multi-engine piston (A));
 - (vi) 1300 hrs PIC on DC3 (multi-engine piston (A));
- (6) Examinations
 - (a) A person who only has an aeroplane pilot qualification in the South African Air Force requiring to be issued with a Pilot Licence (Helicopter), shall write the technical examinations for Aircraft Technical and General (H) at PPL, CPL or ATPL level as applicable;
 - (b) A person who only has a helicopter pilot qualification in the South African Air Force requiring to be issued with a Pilot Licence (Aeroplane), shall write the technical examinations for Aircraft Technical and General (A) at PPL, CPL or ATPL level as applicable.
- (7) Exemption at PPL level
 - (a) A person who only has an aeroplane pilot qualification in the South African Air Force requiring to be issued with a Pilot Licence (Helicopter), shall write the technical examinations for Aircraft Technical and General (H) at PPL, CPL or ATPL level as applicable;
 - (b) A person who only has a helicopter pilot qualification in the South African Air Force requiring to be issued with a Pilot Licence (Aeroplane), shall write the technical examinations for Aircraft Technical and General (A) at PPL, CPL or ATPL level as applicable.
- (8) Exemption at CPL level.
 - (a) A person who has qualified as a pilot or navigator in the South African Air Force (Aeroplane) requiring to be issued with a Commercial Pilot Licence (Aeroplane) and had a minimum of 500 hours operational experience on SA Air Force multi-engine transport/marine type aeroplanes, or SA Air Force multi-engine helicopters, may be exempted from all technical examinations except Air Law or if an instrument rating is required as part of the licence, then Air Law and Procedures.
 - (b) A person who has qualified as a pilot or navigator in the South African Air Force (Aeroplane) requiring to be issued with a Commercial Pilot Licence (Aeroplane) and who does not have a minimum of operational experience on SA Air Force multi-engine transport/marine type aeroplanes, or SA Air Force multi-engine helicopters may be exempted from all technical examinations except Flight Performance and Planning and Air Law or if an instrument rating is required as part of the licence, then Air Law and Procedures;
 - (c) A person who has qualified as a pilot or navigator in the South African Air Force (Helicopter) requiring to be issued with a Commercial Pilot Licence (Helicopter) and had a minimum of 500 hours operational experience on SA Air Force multi-engine transport/marine type aeroplanes, or SA Air Force multi-engine helicopters, may be exempted from all technical examinations except Air Law or if an instrument rating is required as part of the licence, then Air Law and Procedures.
 - (d) A person who has qualified as a pilot or navigator in the South African Air Force (Helicopter) requiring to be issued with a Commercial Pilot Licence (Helicopter) and who does not have a minimum of 500 hours operational experience on SA Air Force multi-engine transport/marine type aeroplanes, or SA Air Force multi-engine helicopters may be exempted from all technical

examinations except Flight Performance and Planning and Air Law or if an instrument rating is required as part of the licence, then Air Law and Procedures.

- (9) Exemption at ATPL level
- (a) A person who has qualified as a pilot instructor or navigator instructor in the South African Air Force (Aeroplane) requiring to be issued with an Airline Transport Pilot Licence (Aeroplane) and had a minimum of 500 hours operational experience on SA Air Force multi-engine transport/ marine type aeroplanes, or SA Air Force multi-engine helicopters, may be exempted from all technical examinations except Air Law and Procedures.
- (b) A person who has qualified as a pilot instructor or navigator instructor in the South African Air Force (Aeroplane) requiring to be issued with an Airline Transport Pilot Licence (Aeroplane) and who does not have a minimum of 500 hours operational experience on SA Air Force multi-engine transport/marine type aeroplanes, or SA Air Force multi-engine helicopters may be exempted from all technical examinations except Flight Performance and Planning as well as Air Law and Procedures.
- (c) A person who has qualified as a pilot instructor or navigator instructor in the South African Air Force (Helicopter) requiring to be issued with an Airline Transport Pilot Licence (Helicopter) and had a minimum of 500 hours operational experience on SA Air Force multi-engine transport/ marine type aeroplanes, or SA Air Force multi-engine helicopters, may be exempted from all technical examinations except Air Law or if an instrument rating is required as part of the licence, then Air Law and Procedures.
- (d) A person who has qualified as a pilot instructor or navigator instructor in the South African Air Force (Helicopter) requiring to be issued with an Airline Transport Pilot Licence (Helicopter) and who does not have a minimum of 500 hours operational experience on SA Air Force multiengine transport/marine type aeroplanes, or SA Air Force multi-engine helicopters may be exempted from all technical examinations except Flight Performance and Planning and Air Law or if an instrument rating is required as part of the licence, then Air Law and Procedures.
- (10) Exemption for a Flight Instructor Rating
The holder of a valid South African Air Force flight instructor, navigator instructor or test pilot qualification on individual application and assessment:
- (a) Is exempted from all components of the written flight instructor examinations.
- (b) Is exempted from all or some of the requirement to attend a ground school.
- (c) Shall in the case of a South African Air Force flight instructor undergo the ground evaluation test and the skills test for the issue of a Grade III Flight Instructor Rating as required by CAR 61.12.1 (e), (f) and CAR 61.15.1 (e), (f).
- (d) Shall in the case of a South African Air Force flight instructor conduct at least 20 hours of flight instruction as a Grade III flight instructor before being eligible to upgrade to either a Grade II or I flight instructor.
- (e) Shall in the case of a South African Air Force navigator instructor or test pilot graduate conduct at least 20 hours of patter before being eligible to undergo the ground evaluation test and the skills test for the issue of a Grade III Flight Instructor Rating as required by CAR 61.13.1 (e), (f) and CAR 61.15.1 (e), (f).
- (f) Shall in the case of a South African Air Force flight instructor rating held in only one category of aircraft and an exemption from the flight instructor technical examinations is requested in a different category, then write the flight instructor examination for Principles of Flight in the new category.

61.01.10 THEORETICAL KNOWLEDGE EXAMINATIONS

1. Examination procedure: CPL, IF and ATPL candidates

- (1) General Information

- (a) An applicant for a pilot licence, or an instrument rating, shall demonstrate a level of knowledge appropriate to the privileges of the licence or rating for which application is made by passing theoretical knowledge examinations in accordance with the procedures set out in respective licence SA-CATS 61 Appendix 1.0 (PPL) or SA-CATS 61 Appendix 2.0 (IR/CPL/ATPL).
- (b) Questions appropriate to the syllabi will be held in a CAA Central Question Bank (CQB). The examinations will be provided in English, using abbreviations where applicable and compiled by a computer in multiple-choice format. A list of common abbreviations used in the examinations can be found in Part 1 of the Regulations.
- (c) Each multiple choice question shall generally have three or four alternative choices. Marks will not be deducted for incorrect selection.

(2) Theoretical Knowledge Examination Bookings

- (a) Candidates should apply by completing the appropriate application forms, available on the website www.caa.co.za or at an approved CAA examination centre. No bookings can be made by telephone, and all bookings are made on a first come, first served basis.
- (b) Candidates should indicate on the application form their first and second preference venue choices (written exams) and the date they wish to sit the examinations. The examinations section will contact applicants where dates requested cannot be met and in the case of a venue being fully booked an alternative will be offered. The Director reserves the right to change any venue to satisfy demand and does not guarantee a candidate a specific venue or examination date.
- (c) Examination fees are payable directly to the CAA accredited examination centres or in the case where examinations are undertaken at the offices of the CAA, fees must be submitted with the application form, where applicable. Consult the CAA website for details of payment methods. Bookings will not be confirmed unless all the requirements are met. Once a booking has been made, candidates will receive an examination booking confirmation.
- (d) The time between the closing date for applications and the examination sittings is two weeks. The Director will endeavour to send booking confirmations, venue details and examination timetables to reach candidates within 2 days of the booking and, in any case, at least 1 week prior to the sitting.
- (e) Details of the scheduled examination dates and venues can be found on the CAA website and in AIC 31.1.3.
- (f) Due to the restriction on the number of sittings allowed, the candidates on initial application, shall be allowed to book in advance for the entire series of examinations in a sitting or sittings. The candidate shall also have the privilege of booking for all rewrites in subsequent sittings.

(3) Booking/Cancellation/Venue Transfer Procedure

- (a) Examination bookings may not be changed in the week prior to the examination. Cancellations will only be accepted, if received in writing or on-line, at least five working days before the examination. For CAA purposes five working days means Monday to Friday (excluding public holidays). Only under exceptional circumstances and upon written application, will the Director consider refunding examination fees;
- (b) Under exceptional circumstances and upon written application, the Director may allow the candidate to transfer to an alternate venue.

(4) Attendance at the Examination

- (a) Candidates should be present at the examination centre at least 30 minutes before the scheduled time for the commencement of each examination paper, with the following documents –
- (i) An acceptable form of identification (Identity book, Driver's licence or Flight Crew Licence or Passport).
 - (ii) Confirmation of booking.
 - (iii) In the case of an initial writing of a subject, proof of having undergone the required knowledge instruction signed by the Chief Ground Instructor or his designee of a Part 141 approved training organisation.
 - (iv) Candidates may only enter the examination room during the 10 minutes preceding the start of the examinations to prepare examination material. They must not remain in the room after the finish of the examination period.
 - (v) On occasions when there is a possibility of disruption to transport services, for whatever reason, candidates are expected to make alternative arrangements for attendance or, if appropriate, to give formal notice of their inability to attend. Personal coats, bags, briefcases, etc. may be placed at the front/rear of the examination room, under the direction of the invigilating officer. Any bags etc. could be removed if left unattended outside the examination room.
 - (vi) Note: The Director accepts no responsibility for items of personal equipment a candidate brings into the examination hall and which he/she is not permitted to retain during the examination. Whilst every attempt is made to ensure reasonable comfort in examination halls, the Director cannot be held responsible for extraneous noise or for any breakdown or fluctuation in heating, lighting or ventilation facilities in examination halls which are operated on hire or lease arrangements and over which the Director, as a result, has no direct control. Candidates are also advised that, at all examination centres, a 'no smoking rule' must be observed.
 - (vii) Candidates must understand that failure to comply with these requirements will bar them from writing that particular examination.

(5) Materials for the Examination

- (a) When necessary the required reference books and tables will be supplied to each candidate but they must not be marked in any way or removed from the examination room.
- (b) Candidates are required to provide themselves with all the necessary drawing and calculating instruments, e.g. dividers, compasses, protractors, parallel rules, slide rules, navigational computers and a scientific, non-programmable, non-alphanumeric. Candidates may use their own pens, pencils, highlighters etc. on the rough working paper provided and/or on their own documents. Documents provided by the Exam Centre must not be marked in any way. No pencil boxes, containers or instrument cases are permitted on tables.
- (c) The use of slide rules or instruments containing printed information on critical point, point of no return, distance to the horizon, convergence, conversion angle, departure, dlat, dlong, conversion factors, etc. is not permitted.

(6) Examination Briefing

- (a) Before the start of the examinations, the invigilator will give a briefing regarding the examination.
- (b) Regulations which will be applied to the conduct of examinations:

- (i) Candidates are not allowed to use any loose paper other than that provided at the examination. All papers issued and documents provided by the Exam Centre are to be returned with the answer sheet to the invigilator on completion.
- (ii) Answer sheets must be completed in ink, where applicable. Candidates may use other writing implements on the rough working paper.
- (iii) Candidates must ensure that, where required, all answers have been transferred onto their answer sheet by the end of the examination. Candidates failing to do this will not be given any extra time.
- (iv) Silence is to be observed in the examination room at all times. Electronic alarms and key rings are not permitted. Mobile telephones, pagers etc. must be switched off and left in the candidates' personal belongings.
- (v) If a candidate wishes to speak to an Invigilating Officer, he/she should remain seated and raise his/her hand. It should be noted that the Invigilating Officer will consider only those questions from candidates that relate to the general conduct of the examinations and he/she will not enter into discussion on the interpretation of words or questions contained in the examination papers.
- (vi) A candidate may leave the room with the permission of the invigilating officer if he/she finishes an examination before time, except during the last 5 minutes before the end of any paper. Candidates are to stop work and put pencils or pens down when so directed and must remain seated and quiet until all answer material has been collected.
- (vii) Any candidate who attempts to remove unauthorised examination materials from the room will be liable to disqualification from those examinations that have been taken and may be subject to special arrangements for future examinations.
- (viii) Refer to AIC 31.1.3 for additional examination rules.

(7) Failure to comply with examination regulations

Any infringement of examination regulations may result in the candidate being disqualified in any subject that has been taken and may be barred from further participation in future examinations at the discretion of the Director.

(8) Results

- (a) Results will normally be available immediately at on-line Examination Centres or will be dispatched by mail within 10 working days following the end of the examination week concerned. Results will also be posted on the CAA website. Candidates should not telephone Examinations section to request examination results, as results will not be given over the telephone under any circumstances. In the event of non-receipt of a result notification, arrangements can be made for repeat notifications to be sent by post.
- (b) The Director cannot enter into discussion or correspondence with candidates on the subject of their examination results, but candidates may apply for any paper to be remarked in terms of the CAR on payment of the fee prescribed in Part 187.

(9) Re-mark after failure

- (a) A candidate, who fails an examination conducted by the Civil Aviation Authority, may, within 30 days from the date of notification of the examination results, apply in writing for a re-mark. Candidates who fail with a mark of 65% or above may request a remark.
- (b) The application shall be accompanied by the appropriate fee prescribed in Part 187.

(c) If the re-mark is successful, the fee will be refunded.

(10) Re-write after failure

- (a) A candidate, who fails an examination conducted by the Civil Aviation Authority, may apply in writing for a re-mark up to 30 days after the date of notification of the examination results.
- (b) Candidates cannot apply to re-write examinations, which they believe they may have failed, until they have received the official result notification. Furthermore, applicants who have applied for a re-write may not apply for the examination being remarked until they receive the official examination result notification.
- (c) Candidates for re-writes may not be allowed to re-write an examination, unless special circumstances prevail, within a period of 72 hours of an unsuccessful attempt.
- (d) Candidates for re-writes, who achieved a mark of less than 65%, will be required to produce proof that they have completed additional knowledge instruction from a Part 141 approved training provider, at the time of the re-write.

(11) Theoretical Knowledge Examination Pass Standards

- (a) A candidate must complete all required written CPL/ATPL/IR examination papers within 18 months of achieving a first credit for an examination. A credit for an examination is held for each successful attempt.
- (b) The papers can be attempted in any order. A Pass in an examination paper will be awarded to a candidate achieving at least 75% of the marks allocated to that paper.

(12) Failure to comply with Pass Standards

- (a) An applicant who does not pass all of the required PPL, CPL, Instrument Rating, ATPL or Flight Instructor theoretical knowledge examinations within a continuous period of 18 months will be required to re-write all theoretical knowledge examinations as though for an initial attempt.
- (b) In the event of an applicant who is the holder of student pilot licence or a private pilot licence on an integrated course, then the 18 month time limit for credits towards an ATPL is calculated from a first time pass in the subjects listed in section 1(3)(a) of TS 61.08.1.

(13) Theoretical Knowledge Examination Credits

- (a) Details of SA CAA Theoretical Examination Credits can be found in Table 2 of this Technical Standard.
- (b) Candidates who obtain credit or a pass for the ATPL subjects have 36 months to obtain an Instrument Flight Rating. The ATPL subjects will remain valid for a period of 60 months from the date of expiry of the last Instrument Flying Revalidation Check.
- (c) Candidates who obtained a pass at ATPL level under the provisions of the ANR's of 1976 and who have maintained an Instrument Flying Rating are afforded the same privilege as detailed in (b) above.

(14) Failure to obtain CPL/IR/Flight Instructor Rating within 36 month period

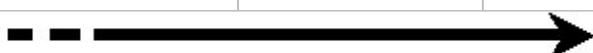
If a CPL and IR are not issued within the 36 month period from the date of passing the last CPL/IR or ATP examination as the case may be, then the CPL/IR and ATPL theory credit for

Air Law and Procedures will lapse. Candidates will be required to re-take the Air Law and Procedures CPL/IR knowledge examinations in order to regain CPL/IR or ATPL theory credits. Where a candidate has previously passed all ATPL theoretical knowledge examinations but was not issued with a CPL/IR within the 36 month period, the amount of credit to be given for the ATPL theoretical knowledge instruction for the Air Law and Procedures will be at the discretion of the Head of Training of the Part 141 approved training organisation. If the Flight Instructor Rating is not issued within 36 months of the date of the last Flight Instructor Rating examination, then the candidate will be required to re-take all the Flight Instructor Rating examinations.

(15) Credit of ATPL Examination

- (a) In some circumstances a candidate who has previously attempted some ATPL theoretical knowledge examinations may wish to consider attempting examinations at a lower level (i.e. CPL and/or IR). A candidate who has failed to obtain a pass in any subject at ATPL level will be required to enter for the CPL and/or IR examinations as though for an initial sitting.
- (b) A candidate who has previously completed an approved ATPL theoretical knowledge course may be credited with the CPL and/or IR theoretical knowledge course.
- (c) Candidates will be required to enter for these theoretical knowledge examinations via an approved Part 141 Aviation Training Organisation. A candidate who has passed at least one subject at ATPL level may be credited the equivalent subject at CPL and/or IR level as detailed below.
- (d) Candidates should note that where credit is given in accordance with Table 2, all sittings, attempts and time limits will be calculated from the initial attempt at the ATPL examinations.

Table 2: ATPL Examinations Credits in respect of CPL and IR

ATPL	CPL/IR	IR	CPL (VFR)	PPL
				
Aviation Meteorology	Aviation Meteorology	Aviation Meteorology	Aviation Meteorology	Aviation Meteorology
Flight Performance and Planning	Flight Performance and Planning	Flight Performance and Planning	Flight Performance and Planning	Flight Performance and Planning
Radio Aids and Communication	Radio Aids and Communication	Radio Aids and Communication	Radio Aids and Communication	
General Navigation	General Navigation	General Navigation	General Navigation	General Navigation
Navigation (Plotting)				
Instruments and Electronics	Instruments and Electronics	Instruments and Electronics	Instruments and Electronics	
Aircraft (A or H) Technical and	Aircraft (A or H) Technical and		Aircraft (A or H) Technical and	Aircraft (A or H) General

General	General		General	
				Principles of Flight (A or H)
				Human Performance and Limitations
				Air Law
*Air Law and Operational Procedures			*Air Law	Air Law

- *Note 1: A candidate who has decided to discontinue writing the ATPL examinations and who has passed a subject at ATPL level will be credited with the subject at CPL/IR, IR or CPL (VFR). Should the candidate wish to upgrade his/her licence then all subjects will have to be rewritten at the correct level with the exception of Human Performance and Limitations and Air Law and Operational Procedures.*
- *Note 2: A candidate who has decided to discontinue writing the ATPL examinations and who has passed Human Performance and Limitations examination papers at CPL (VFR) level will be credited with the Human Performance and Limitations examination required at CPL/IR, IR or ATPL.*
- *Note 3: A candidate who has passed Air Law and Operational Procedures examination papers at ATPL level will be credited with the Air Law and Operational Procedures examination required at CPL/IR or IR.*
- *Note 4: The IR exams under Part 61 are only offered at the level of ATPL or CPL. A PPL requiring an instrument rating shall write the examinations at CPL level. These examinations will act as a credit for the CPL (IR) examinations provided that the applicant successfully attains an instrument flying rating within 36 months of attaining a credit for the examinations. The credit for examinations remain valid for a period of 60 months from the date of the last successful IR revalidation check.*
- *Note 5: The credits for the CPL (IR) examinations with the exception of Air Law/Operational Procedure and Human Performance are not applicable to the ATPL examinations.*
- *Note 6: The credits obtained for ATPL examinations are valid for the CPL (IR), CPL (VFR) and the IR examinations.*

(16) Crediting of Theoretical Knowledge

- Where an applicant holds the theoretical knowledge credits for an aeroplane licence and wishes to obtain an equivalent helicopter licence and vice versa then the following rules apply to the transfer of the credits held.
- In order to satisfy the theoretical knowledge requirements for the ATPL (H), the holder of an ATPL (A), or CPL (A) with valid ATPL (A) theory credit, is required to complete approved bridge instruction for the subjects/topics detailed in Appendix 1 to SA-CATS 61.8. In addition, a pass in the following ATPL (H) examinations must be obtained –
 - Aircraft (H) Technical and General;
- In order to satisfy the theoretical knowledge requirements for the CPL (A), the holder of an ATPL (H) or CPL (H) is required to complete approved instruction for the subjects/topics detailed in Appendix 1 to SA-CATS 61.5. In addition, a pass in the following CPL (A) examinations must be obtained,
 - Aircraft (A) Technical and General;
- Division 5 - Examination arrangements shall apply.
The Director shall publish dates, times and venues for the examinations in an AIC.
- ATPL Papers
 - Aviation Meteorology;
 - Flight Performance and Planning;
 - Radio Aids and Communication;
 - General Navigation;

- (v) Navigation (Plotting)
 - (vi) Instruments and Electronics;
 - (vii) Aircraft (A or H) Technical and General;
 - (viii) Human Performance and Limitations;
 - (ix) Air Law and Operational Procedures.
- (f) CPL/IR Papers
- (i) Aviation Meteorology;
 - (ii) Flight Performance and Planning;
 - (iii) Radio Aids and Communication;
 - (iv) General Navigation;
 - (v) Instruments and Electronics;
 - (vi) Aircraft (A or H) Technical and General;
 - (vii) Human Performance and Limitations;
 - (viii) Air Law and Operational Procedures.
- (g) IR Papers
- (i) Aviation Meteorology;
 - (ii) Flight Performance and Planning;
 - (iii) Radio Aids and Communication;
 - (iv) General Navigation;
 - (v) Instruments and Electronics;
 - (vi) Human Performance and Limitations;
 - (vii) Air Law and Operational Procedures.
- (h) CPL (VFR) Papers
- (i) Aviation Meteorology;
 - (ii) Flight Performance and Planning;
 - (iii) Radio Aids and Communication;
 - (iv) General Navigation;
 - (v) Instruments and Electronics;
 - (vi) Aircraft (A or H) Technical and General;
 - (vii) Human Performance and Limitations;
 - (viii) Air Law.
- (i) PPL Papers
- (i) Aviation Meteorology;
 - (ii) Flight Performance and Planning;
 - (iii) General Navigation;
 - (iv) Aircraft (A or H) General;
 - (v) Principles of Flight;
 - (vi) Human Performance and Limitations;
 - (vii) Air Law.

61.01.13 RECOGNITION, VALIDATION AND CONVERSION OF A FOREIGN PILOT LICENCE AND RATING

1. Application for validation of foreign pilot licence and ratings

- (1) The PPL validation for VFR day operations may be issued by the CAA on confirmation of the validity of the licence. The PPL (VFR) validation will be endorsed with the following wording –
 For private day VFR operations only, provided that – “The holder of this validation may only exercise the privileges of the licence if in compliance with CAR 61.01.13(5)(a)”.

- (2) Prior to the privileges of the validation for the PPL (VFR) being exercised, ATO's are to ensure that the applicant first successfully completes;
 - (a) An appropriate South African Air Law examination at an approved ATO;
 - (b) A flight test at an approved ATO, with a Grade I or II flight instructor; and
 - (c) Completes a Density Altitude Tutorial conducted by at least a Grade III instructor;
 - (d) Has the above three items endorsed in his logbook by the testing instructors;
 - (e) Forwards proof to the CAA within 30 days of completion of the requirements in paragraphs (a), (b), (c) and (d) above.

61.01.15 TRAINING FOR ACQUIRING LICENSE , RATING OR VALIDATION

1. General

- (1) All flying training shall be conducted in accordance with the requirements laid down for a licence and rating as stipulated in the various Subparts.
- (2) The written approval by the Director to conduct flying training shall be kept by the person conducting the training and produced on demand to any authorised officer or inspector.

Flying instruction

- (3) Flight instruction and authorisation to a student for solo flying shall be such as to ensure that an aircraft piloted by a student does not constitute a hazard to air navigation or endanger the safety of life or property.

Flight instruction syllabus

- (4) Flying training shall be conducted in accordance with the flight instruction syllabus prescribed in the Subparts applicable to the licence or rating sought.

Local rules

- (5) A flying training organisation shall prepare and keep accessible to all students a copy of its local rules, which shall be submitted to the Director for approval.
- (6) In conjunction with the rules referred to in sub-paragraph (8) there shall be displayed a map clearly showing –
 - (a) the general flying area;
 - (b) the low-flying area;
 - (c) the simulated instrument flying area (if applicable); and
 - (d) the acrobatic and spinning area.

Experience requirement for the appointment of a chief flying instructor

- (7) A chief flying instructor must be the holder of at least a Grade II flight instructor rating and must satisfy the Director that he/she has –
 - (a) flown at least 1000 hours total flying time; and
 - (b) given not less than 500 hours of flight instruction of which at least 200 hours shall be ab initio training.

Responsibilities of chief flying instructors

- (8) A chief flying instructor shall be responsible for –
- (a) ensuring that each dual and solo training flight is authorised by the holder of an appropriate and valid flight instructor rating or a person appointed by the Chief Flying Instructor for the specific flight or sequence required by these regulations;
 - (b) ensuring that all authorisations are properly entered in the appropriate flight authorisation book;
 - (c) ensuring that the flight authorisation book is correctly completed before each dual and solo flight. Such authorisation book shall at least show the following entries –
 - (i) Date of the flight;
 - (ii) Aircraft type and registration;
 - (iii) Name and licence number of pilot in command;
 - (iv) Name and licence number of student pilot;
 - (v) Estimated elapse time;
 - (vi) Actual time of take-off;
 - (vii) Actual time of landing;
 - (viii) Actual flying time;
 - (viii) Description of exercise/route;
 - (viii) Name and full signature of the authorising person;
 - (ix) Full signature of the student before the flight (OUT); and
 - (x) Full signature of the student after the flight (IN).
 - (d) ensuring that each solo training flight is personally supervised by the holder of an appropriate and valid flight instructor rating or a person appointed by the Chief Flying Instructor;
 - (e) the maintenance of flying discipline;
 - (f) ensuring that student pilots receive the following dual flight instruction –
 - (i) a dual flight check prior to each solo flight during his first 3 hours of solo flight. Such dual flight check shall be conducted in accordance with subparagraph (9); and
 - (ii) subsequently a minimum of 1 hour dual instruction for every 5 hours' flight time until a private pilot's licence is obtained;
 - (g) ensuring that a dual competency check is conducted before the student pilot is permitted to undertake his first solo flight;
 - (h) ensuring that before a student pilot is authorised to conduct his first solo flight (exercise 14), the instructor who conducted the solo competency check flight has endorsed the student's logbook in accordance with SA-CATS 61;
 - (i) ensuring that before a student pilot is authorised to leave the circuit area on a solo flight to the general flying area or on a solo navigation flight, a flight instructor has endorsed the student's logbook in accordance with SA-CATS 61;
 - (j) the correct maintenance of pilot's logbooks by pupils and student pilots who are under training at the organisation;
 - (k) ensuring that the aircraft is equipped in accordance with CAR 91;
 - (l) ensuring that the standard of ground instruction given shall comply with the standards required for the licence to be obtained;
 - (m) ensuring that a training record of each student or pilot trained is properly maintained. This record is the property of the student and shall accompany him or her as a portfolio of evidence. The training organisation is required to make a copy of the training record and is to keep such record in a safe place for a minimum of 60 months. However, the full training file and logbook of a student or pilot trained shall be kept in a secure area on the premises of the training organisation during the entire training period. The training record shall include:
 - (i) the full details of the student or pilot trained;

- (ii) the name and licence number of the flight instructor concerned with the training;
- (iii) a training progress report for each individual training session which shall include:
 - (aa) the name of the student or trained pilot;
 - (bb) the name of the instructor conducting the training session;
 - (cc) the description of the exercise/route;
 - (dd) detailed de-brief comments related to each training session;
 - (ee) records of the dual flying hours;
 - (ff) records of the solo hours conducted in the circuit and general flying area;
 - (gg) record of the solo hours conducted during navigation flights; and
 - (hh) a summary of the hours flown solo and dual;
- (iv) a record of all the theoretical examinations;
 - (v) a record of all the briefings and courses attended pertaining to the licence sought;
 - (vi) certificates of competency;
 - (vii) all reports of passed and failed theoretical examinations;
 - (viii) an exercise checklist;
 - (ix) whether the training was successfully completed and the duration of the training period;
- (n) ensuring that no student pilot will conduct a flight below a height of less than 500 feet unless accompanied by a holder of an appropriate and valid flight instructor rating.
- (9) Dual progress check flights
 - (a) ensuring that a dual progress check flight is conducted at the latest after a student completed his/her first 15 hours dual flight instruction and after each completion of 10 hours flight time thereafter.
 - (b) the dual progress check flight must be conducted by the chief flying instructor or by an appointed Grade II or Grade I instructor.
 - (c) Each dual progress check flight must be endorsed by the checking instructor in the logbook of the student in accordance with SA-CATS 61.

61.01.17 APPROVAL OF FLIGHT SIMULATION TRAINING DEVICES

1. The approval process

The approval process shall be in accordance with Appendix C to Document SA-CATS 61.

61.02.1 REQUIREMENTS FOR STUDENT PILOT LICENCE

1. Theoretical knowledge course and examination

- (1) The theoretical knowledge course and pre-solo theoretical examination shall cover the following aspects:
 - (a) Air Law, as appropriate to student pilots; and
 - (b) Aircraft Knowledge, covering the aircraft make and model used for training.
- (2) The written theoretical knowledge examinations shall be conducted at an approved Aviation Training Organisation.
 - (a) The examination shall be conducted and corrected by the holder of an appropriately rated Grade I or Grade II flight instructor, Aeroplane or Helicopter, respectively;
 - (b) The flight instructor referred to in paragraph (a) may not be the flight instructor from whom the applicant received his or her theoretical training.
- (3) The Communications Syllabus can be found in Appendix 1.5 to Document SA-CATS 61.

61.02.5 PRIVILEGES AND LIMITATIONS OF STUDENT PILOT LICENCE

Note: Entry to training

Before being accepted for training an applicant should be informed that the appropriate medical certificate must be obtained before solo flying is permitted.

1. Requirements for, authorisation and supervision of solo training flights

- (1) A student cannot be released for the first solo flight unless he/she:
 - (a) has undergone a minimum of 10 hours of dual flight training;
 - (b) is holder of a student pilot licence;
 - (c) proves to possess adequate knowledge of the basic principles of flight;
 - (d) has undergone training in exercises 1 through 13;
 - (e) has shown proficiency in handling the aircraft in the event of an engine failure during initial climb-out and from downwind position;
 - (f) has shown proficiency in recovery from a balloon during landing and a bounced landing; and
 - (g) has shown proficiency in executing a go-around manoeuvre from a full flaps configuration.
- (2) Each solo training flight must be authorised by the Chief Flying Instructor (CFI) or by the holder of a valid flight instructor rating appointed by the CFI for the specific flight or sequence required by these regulations.
- (3) Each solo training flight authorisation must be properly entered in the appropriate flight authorisation book in compliance with the proper format represented in Part 141 of the Regulations.
- (4) Each solo training flight must be personally supervised by the holder of a valid flight instructor rating or a person appointed by the Chief Flying Instructor.

2. Dual competency check flight, dual check flight and dual progress check flight

- (1) A dual competency check flight must be conducted before the student pilot is permitted to undertake his first solo flight.
- (2) The dual competency first solo check flight shall be conducted by the Chief Flying Instructor (CFI) or a Grade II or Grade I instructor appointed by the CFI.
- (3) Before a student pilot is authorised to conduct his first solo flight (exercise 14), the instructor who conducted the dual competency check flight must endorse the student's logbook in accordance with SA-CATS 61.
- (4) The dual competency first solo check flight must include but is not limited to –
 - (a) at least 3 take-offs and landings
 - (b) one glide approach to a landing
 - (c) one simulated engine failure during initial climb out
 - (d) one go-around from a full flaps configuration.
- (5) A dual check flight shall be conducted by a suitably rated instructor prior to each solo flight during the first 3 hours of the student's solo flight time –
 - (a) subsequently a minimum of 1 hour dual instruction shall be conducted for every 5 hours solo flight time until a private pilot's licence is obtained.
- (6) Before a student pilot is authorised to leave the circuit area on a solo flight to the general flying area or on a solo navigation flight, a flight instructor shall endorse the student's logbook in accordance with SA-CATS 61.
- (7) A dual progress check flight must be conducted at the latest after a student completed his/her first 10 hours dual flight instruction and after each completion of 10 hours flight time thereafter.
 - (a) the dual progress check flight must be conducted by the Chief Flying Instructor (CFI) or by a Grade II or Grade I instructor appointed by the CFI.
- (b) each dual progress check flight must be endorsed by the checking instructor in the logbook of the student in accordance with SA-CATS 61.

3. Solo flights in the General Training Area and solo navigation flights

- (1) The student shall adhere to the authorised exercises while conducting solo flights in the general training area.
- (2) The student shall adhere to the authorised route while conducting his/her solo navigation flight.
- (3) The solo navigation flight must –
 - (a) include full-stop landings at two aerodromes away from base;
 - (b) have a total distance of not less than 150 nautical miles with a radius not exceeding 100 nautical miles from the base, along any sector of the flight.
- (4) Except for the purpose of conducting the exercise 17b (precautionary landing), no flight below 500 feet above ground level (AGL) shall be conducted unless an instructor is on board the aircraft.

61.03.1 REQUIREMENTS FOR PRIVATE PILOT LICENCE (AEROPLANE)

1. Training

- (1) Aim of training course
 - (a) The aim of the course is to train a candidate to the level of proficiency required for the issue of a private pilot licence (Aeroplane), and provide the training necessary to act, but not for remuneration, as pilot-in-command or as co-pilot of any aeroplane for which he or she holds a valid class or type rating, engaged in non-revenue flights under visual flight rules.
- (2) Contents and requirements of training course
 - (a) The applicant must complete a training course with an aviation training organisation approved by the Director in terms of Part 141. However, the theoretical knowledge course and the practical training course may be completed at different aviation training organisations.
 - (b) The course comprises –
 - (i) theoretical knowledge course; and
 - (ii) practical training course.
- (3) Theoretical knowledge course
- (4) Theoretical knowledge course syllabus
 - (a) The detailed theoretical knowledge syllabus is contained in Appendix 1.0 to Document SA-CATS 61.
 - (b) The practical training syllabus is contained in Appendix 1.1 to Document SA-CATS 61.
- (5) Radio Telephony
 - (a) To be eligible for the RTC a candidate must prove his knowledge of the ITU (International Telecommunications Union), and CAA requirements in both written and oral tests. The requirements are –
 - (i) ITU: Knowledge of radiotelephony operation and procedures, ability to transmit and receive messages by radio and knowledge of the radio communication regulations (e.g. use of different appropriate frequencies, interference, etc.) and especially those relating to the safety of human life.
 - (ii) ICASA: Proficiency in operating a radio installation including changing frequency, transmitting and receiving messages using the prescribed procedures, identification of Morse code beacons and clearing minor external faults.
 - (iii) The CAA: requirements are based on documents issued by the International Civil Aviation Organisation (ICAO) dealing with procedures, abbreviations and ing, the various aeronautical information circulars (AIC) in force, the S.A. Aeronautical Information Publication (AIP), Civil Aviation Regulations (CAR)

and Civil Aviation Technical Standards (CATS) and also other relevant regulations or rules in force.

- (iv) Applicants for a Restricted Radio Certificate shall pass a theoretical Restricted Radio Examination at an approved CAA examination centre. The training syllabus for a Restricted Radio Certificate is contained in Appendix 1.5 to Document SA-CATS 61.
- (b) Applicants for a Restricted Radio Certificate shall in addition to the theoretical knowledge examination pass a practical communication test including the identification of radio beacons using morse code conducted by a Designated Radio Examiner. The practical test shall include the full completion of an ATC Flight Plan and examine at minimum the following aspects:
 - (i) Use of Radio on the Ground.
 - (aa) Obtaining and complying with taxi instructions.
 - (bb) Knowing what to expect from the Air Traffic Control (ATC).
 - (cc) The importance of reading back all “hold short of instructions”.
 - (dd) The avoidance of runway incursions.
 - (ee) Meaning of “give way to other aircraft”.
 - (ff) Obtaining and complying with take-off instructions.
 - (gg) Importance of understanding “line up behind”.
 - (hh) Importance of reading back the take-off clearance.
 - (ii) Importance of reading back any other required instructions.
 - (jj) Radio procedures at unmanned/uncontrolled aerodromes.
 - (ii) Departure procedures.
 - (aa) Knowing what to expect in respect of departure procedures.
 - (bb) Required calls to be made on leaving the aerodrome circuit area.
 - (iii) En route procedures.
 - (aa) Knowing what call should be made to which station and when according to the airspace requirements.
 - (bb) Knowing the required in-flight broadcast procedure applicable to uncontrolled airspace.
 - (cc) Making a position report.
 - (dd) Obtaining relevant weather information, use of ATIS.
 - (ee) Making appropriate weather reports (PIREPS).
 - (ff) Knowing the difference between positively controlled airspace as opposed to a Flight Information Service (FIS).
 - (gg) Transponder use.
 - (hh) Procedure to obtain bearings, headings and position from air traffic control/FIS Altimeter setting procedures.
 - (ii) Relaying messages for other stations.
 - (iv) Arrival and traffic pattern procedures.
 - (aa) Knowing what to expect.
 - (bb) Arrival clearance/instructions.
 - (cc) Calls and ATC instructions whilst joining the traffic pattern.
 - (dd) Calls to be made in the circuit.
 - (ee) Calls to be made on vacating the runway.

(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
Total Flight Time			59.0	Hours							

61.03.4 SKILLS TEST FOR PRIVATE PILOT LICENCE (AEROPLANE)

1. Procedures and manoeuvres

- (1) The Skills Test shall be conducted in accordance with Appendix 1.2 to SA-CATS 61. Guidance to Designated Flight Examiner is provided on page 2 of the skills test form, Form CA 61-03.4, in respect of retesting. The skills test Form CA 61-03.4, completed by the Designated Flight Examiner, shall accompany the application form.
- (2) The navigation element of the skills test administered for the issuing of a private pilot licence may be conducted as a separate flight within a maximum period of 14 days.
- (3) The cross-country navigation flight of the skills test shall not be less than 200 nautical miles total distance and must include take-offs and landings at two aerodromes away from base. At least one of the aerodromes from which the aircraft takes off for this flight shall be an aerodrome at which an Air Traffic Services Unit (ATSU) is in operation.

61.04.1 REQUIREMENTS FOR PRIVATE PILOT LICENCE (HELICOPTER)

1. Training

- (1). Aim of training course
 - (a) The aim of the course is to train a candidate to the level of proficiency required for the issue of a private pilot licence (Helicopter), and provide the training necessary to act, but not for remuneration, as pilot-in-command or as co-pilot of any helicopter for which he or she holds a valid class or type rating, engaged in non-revenue flights under visual flight rules.
- (2) Contents and requirements of training course
 - (a) The applicant must complete a training course with an aviation training organisation approved by the Director in terms of Part 141. However, the theoretical knowledge course and the practical training course may be completed at different aviation training organisations.
 - (b) The course comprises –
 - (i) theoretical knowledge course; and
 - (ii) practical training course.
- (3) Theoretical knowledge course
- (4) Theoretical knowledge course syllabus

The detailed theoretical knowledge syllabus is contained in Appendix 1.0 to Document SA-CATS 61.

(5) Radio Telephony

- (a) To be eligible for the RTC a candidate must prove his knowledge of the ITU (International Telecommunications Union), and CAA requirements in both written and oral tests. The requirements are:
- (i) ITU: Knowledge of radiotelephony operation and procedures, ability to transmit and receive messages by radio and knowledge of the radio communication regulations (e.g. use of different appropriate frequencies, interference, etc. and especially those relating to the safety of human life.
 - (ii) ICASA: Proficiency in operating a radio installation including changing frequency, transmitting and receiving messages using the prescribed procedures, identification of Morse code beacons and clearing minor external faults.
 - (iii) The CAA: requirements are based on documents issued by the International Civil Aviation Organisation (ICAO) dealing with procedures, abbreviations and flight planning, the various aeronautical information circulars (AIC) in force, the S.A. Aeronautical Information Publication (AIP), Civil Aviation Regulations (CAR) and Civil Aviation Technical Standards (CATS) and also other relevant regulations or rules in force.
 - (iv) Applicants for a Restricted Radio Certificate shall pass a theoretical Restricted Radio Examination at an approved CAA examination centre. The training syllabus for a Restricted Radio Certificate is contained in Appendix 1.5 to Document SA-CATS 61.
- (b) Applicants for a Restricted Radio Certificate shall in addition to the theoretical knowledge examination pass a practical communication test including the identification of radio beacons using morse code conducted by a Designated Radio Examiner. The practical test shall include the full completion of an ATC Flight Plan and examine at minimum the following aspects:
- (i) Use of Radio on the Ground.
 - (aa) Obtaining and complying with taxi instructions.
 - (bb) Knowing what to expect from the Air Traffic Control (ATC).
 - (cc) The importance of reading back all "hold short of instructions".
 - (dd) The avoidance of runway incursions.
 - (ee) Meaning of "give way to other aircraft".
 - (ff) Obtaining and complying with take-off instructions.
 - (gg) Importance of understanding "line up behind".
 - (hh) Importance of reading back the take-off clearance.
 - (ii) Importance of reading back any other required instructions.
 - (jj) Radio procedures at unmanned/uncontrolled aerodromes.
 - (ii) Departure procedures.
 - (aa) Knowing what to expect in respect of departure procedures.
 - (bb) Required calls to be made on leaving the aerodrome circuit area.
 - (iii) En route procedures.
 - (aa) Knowing what call should be made to which station and when according to the airspace requirements.
 - (bb) Knowing the required in-flight broadcast procedure applicable to uncontrolled airspace.

- (cc) Making a position report.
- (dd) Obtaining relevant weather information, use of ATIS.
- (ee) Making appropriate weather reports (PIREPS).
 - (ff) Knowing the difference between positively controlled airspace as opposed to a Flight Information Service (FIS).
- (gg) Transponder use.
 - (hh) Procedure to obtain bearings, headings and position from air traffic control/FIS Altimeter setting procedures.
- (ii) Relaying messages for other stations.
- (iv) Arrival and traffic pattern procedures.
 - (aa) Knowing what to expect.
 - (bb) Arrival clearance/instructions.
 - (cc) Calls and ATC instructions whilst joining the traffic pattern.
 - (dd) Calls to be made in the circuit.
 - (ee) Calls to be made on vacating the runway.
- (c) Applicants for a Restricted Radio Certificate shall attach a certificate of competency (Form CA 61.03.2a) signed by a Designated Radio Examiner when applying for a private pilot licence.

2. Theoretical Knowledge Examination

The knowledge acquired must be sufficient for the candidate to pass examinations in the following theoretical knowledge subjects –

- (a) Aviation Meteorology (duration: 60 min);
- (b) Flight Performance and Planning (duration: 90 min);
- (c) General Navigation (duration: 90 min);
- (d) Aircraft General (duration: 45 min);
- (e) Principles of Flight (duration: 45 min);
- (f) Human Performance and Limitations (duration: 45 min);
- (g) Air Law (duration: 60min).

3. Practical Flight Test Standard

The Practical Flight Test Standard is found in Appendix 1.2 to Document SA-CATS 61.

61.04.2 APPLICATION FOR AND ISSUE OF PRIVATE PILOT LICENCE (HELICOPTER)

1. Format of logbook

- (1) The logbook summary shall be completed in the format indicated in Table 1 and submitted together with the application form.

Table 1

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
A/C Class or Type	Instrument		Instructor			FSTD	Single Engine Day			
	Actual Time	FSTD Time	SE	ME	FSTD		Dual	PIC	PICUS	Co-Pilot
R22							4.3	4.3		
R44	3.0						15.2	12.9		
FNPT 1		3.8					18.0	4.3		

The aim of the course is to train a candidate to the level of proficiency required for the issue of a Commercial Pilot licence (Aeroplane), and provide the training necessary to act, but not for remuneration, as pilot-in-command or as co-pilot of any aeroplane for which he or she holds a valid class or type rating, engaged in non-revenue flights under visual flight rules.

- (2) Contents and requirements of training course
 - (a) The applicant must complete a training course with an aviation training organisation approved by the Director in terms of Part 141. However, the theoretical knowledge course and the practical training course may be completed at different aviation training organisations.
 - (b) The course comprises –
 - (i) theoretical knowledge course; and
 - (ii) practical training course. The syllabus for the practical training is contained in Appendix 2.1 to Document SA-CATS 61.

2. Theoretical Knowledge Examination

The knowledge acquired must be sufficient for the candidate to pass examinations in the following theoretical knowledge subjects:

- (1) In the case of CPL VFR only:
 - (a) Aviation Meteorology;
 - (b) Flight Performance and Planning;
 - (c) Radio Aids and Communication;
 - (d) General Navigation;
 - (e) Instruments and Electronics;
 - (f) Aircraft Technical and General;
 - (g) Human Performance and Limitations;
 - (h) Air Law.
- (2) In the case of CPL with IFR:
 - (a) Aviation Meteorology;
 - (b) Flight Performance and Planning;
 - (c) Radio Aids and Communication;
 - (d) General Navigation;
 - (e) Instruments and Electronics;
 - (f) Aircraft Technical and General;
 - (g) Human Performance and Limitations;
 - (h) Air Law and Operational Procedures.

3. Theoretical knowledge course syllabus

The detailed theoretical knowledge syllabus is contained in Appendix 2.0A to Document SA-CATS 61.

4. Radio Telephony

- (1) To be eligible for the RTC a candidate must prove his knowledge of the ITU (International Telecommunications Union), and CAA requirements in both written and oral tests. The requirements are:
 - (a) ITU: Knowledge of radiotelephony operation and procedures, ability to transmit and receive messages by radio and knowledge of the radio communication regulations (e.g. use of different appropriate frequencies, interference, etc.) and especially those relating to the safety of human life.
 - (b) ICASA: Proficiency in operating a radio installation including changing frequency, transmitting and receiving messages using the prescribed procedures, identification of Morse code beacons and clearing minor external faults.
 - (c) The CAA: requirements are based on documents issued by the International Civil Aviation Organisation (ICAO) dealing with procedures, abbreviations and flight

planning, the various aeronautical information circulars (AIC) in force, the S.A. Aeronautical Information Publication (AIP), Civil Aviation Regulations (CAR) and Civil Aviation Technical Standards (CATS) and also other relevant regulations or rules in force.

- (d) Applicants for a General Radio Certificate shall pass a theoretical General Radio Examination at an approved CAA examination centre. The training syllabus for a General Radio Certificate is contained in Appendix 1.5a to Document SA-CATS 61.
- (2) Applicants for a General Radio Certificate shall in addition to the theoretical knowledge examination pass a practical communication test including the identification of radio beacons using morse code conducted by a Designated Radio Examiner (General). The practical test shall include the full completion of an ATC IFR Flight Plan and examine, at minimum, the following aspects for an IFR flight departing on a standard or non-standard departure from a controlled aerodrome, into a CTR/TMA, flying in both controlled and uncontrolled airspace en route to a controlled airfield as destination, complying with a standard arrival (STAR) and the completion of an instrument approach procedure (precision or non-precision):
 - (a) Use of Radio on the Ground –
 - (i) Obtaining start clearance
 - (ii) Obtaining taxi clearance
 - (iii) Acceptance and read back of ATC departure clearance (Standard/non-standard)
 - (b) Departure procedure –
 - (i) Take-off clearance
 - (ii) Use of SID chart/compliance with non-standard departure procedure
 - (iii) Selection of departure frequency and contact with relevant ATSU
 - (iv) Use of area chart if applicable
 - (c) En route procedures –
 - (i) Use of radio navigation chart
 - (ii) Selection of frequencies appropriate to the route
 - (iii) Passing and revising estimates
 - (iv) Complying with onward clearance time (OCT)
 - (d) Arrival procedures –
 - (i) Use of area chart if applicable
 - (ii) Acceptance and review of STAR and instrument approach charts
 - (iii) Radar vectors to ILS localiser or Holding beacon for non-precision approach including expected approach time (EAT)
 - (iv) Establishing weather minima at landing aerodrome and compliance with Approach Ban
 - (v) Completion of instrument approach procedure using IAC and correct radio procedures
 - (e) Radio communication failure –
Emphasis shall be placed on correct use of aviation words and phrases as well as the avoidance of slang terms.

61.05.2 APPLICATION FOR AND ISSUE OF COMMERCIAL PILOT LICENCE (AEROPLANE)

1. Format of logbooks

- (1) The logbook summary shall be completed in the format indicated in Table 1 and submitted together with the application form.

61.05.4 SKILLS TEST FOR COMMERCIAL PILOT LICENCE (AEROPLANE)

1. Procedures and manoeuvres

The practical test standard shall be conducted in accordance with Appendix 2.1 to SA-CATS 61.

61.06.1 REQUIREMENTS FOR COMMERCIAL PILOT LICENCE (HELICOPTER)

1. Training

(1) Aim of training course

The aim of the course is to train a candidate to the level of proficiency required for the issue of a Commercial Pilot licence (Helicopter), and provide the training necessary to act as pilot-in-command or as co-pilot of any helicopter for which he or she holds a valid class or type rating engaged in flights under visual flight rules.

(2) Contents and requirements of training course

(a) The applicant must complete a training course with an aviation training organisation approved by the Director in terms of Part 141. However, the theoretical knowledge course and the practical training course may be completed at different aviation training organisations.

(b) The course comprises –

(i) theoretical knowledge course; and

(ii) practical training course. The syllabus for the practical training is contained in Appendix 2.1 to Document SA-CATS 61.

(3) Theoretical Knowledge Examination

The knowledge acquired must be sufficient for the candidate to pass examinations in the following theoretical knowledge subjects:

(a) In the case of CPL VFR only:

(a) Aviation Meteorology;

(b) Flight Performance and Planning;

(c) Radio Aids and Communication;

(d) General Navigation;

(e) Instruments and Electronics;

(f) Aircraft Technical and General;

(g) Human Performance and Limitations;

(h) Air Law.

(b) In the case of CPL with IFR:

(i) Aviation Meteorology;

(ii) Flight Performance and Planning;

(iii) Radio Aids and Communication;

(iv) General Navigation;

(v) Instruments and Electronics;

(vi) Aircraft Technical and General;

(vii) Human Performance and Limitations;

(viii) Air Law and Operational Procedures.

(4) Theoretical knowledge course syllabus

The detailed theoretical knowledge syllabus is contained in Appendix 2.0A to Document SA-CATS 61.

(5) Radio Telephony

(a) To be eligible for the RTC a candidate must prove his knowledge of the ITU (International Telecommunications Union), and CAA requirements in both written and oral tests. The requirements are:

(i) ITU: Knowledge of radiotelephony operation and procedures, ability to transmit and receive messages by radio and knowledge of the radio

- communication regulations (e.g. use of different appropriate frequencies, interference, etc.) and especially those relating to the safety of human life.
- (ii) ICASA: Proficiency in operating a radio installation including changing frequency, transmitting and receiving messages using the prescribed procedures, identification of Morse code beacons and clearing minor external faults.
 - (iii) The CAA: requirements are based on documents issued by the International Civil Aviation Organisation (ICAO) dealing with procedures, abbreviations and flight planning, the various aeronautical information circulars (AIC) in force, the S.A. Aeronautical Information Publication (AIP), Civil Aviation Regulations (CAR) and Civil Aviation Technical Standards (CATS) and also other relevant regulations or rules in force.
 - (iv) Applicants for a General Radio Certificate shall pass a theoretical General Radio Examination at an approved CAA examination centre. The training syllabus for a General Radio Certificate is contained in Appendix 1.5a to Document SA-CATS 61.
- (b) Applicants for a General Radio Certificate shall in addition to the theoretical knowledge examination pass a practical communication test including the identification of radio beacons using morse code conducted by a Designated Radio Examiner (General). The practical test shall include the full completion of an ATC IFR Flight Plan and examine, at minimum, the following aspects for an IFR flight departing on a standard or non-standard departure from a controlled aerodrome, into a CTR/TMA, flying in both controlled and uncontrolled airspace en route to a controlled airfield as destination, complying with a standard arrival (STAR) and the completion of an instrument approach procedure (precision or non-precision):
- (i) Use of Radio on the Ground
 - (aa) Obtaining start clearance
 - (bb) Obtaining taxi clearance
 - (cc) Acceptance and read back of ATC departure clearance (Standard/non-standard)
 - (ii) Departure procedure
 - (aa) Take-off clearance
 - (bb) Use of SID chart/compliance with non-standard departure procedure
 - (cc) Selection of departure frequency and contact with relevant ATSU
 - (dd) Use of area chart if applicable
 - (iii) En route procedures
 - (aa) Use of radio navigation chart
 - (bb) Selection of frequencies appropriate to the route
 - (cc) Passing and revising estimates
 - (dd) Complying with onward clearance time (OCT)
 - (iv) Arrival procedures
 - (aa) Use of area chart if applicable
 - (bb) Acceptance and review of STAR and instrument approach charts
 - (cc) Radar vectors to ILS localiser or Holding beacon for non-precision approach including expected approach time (EAT)
 - (dd) Establishing weather minima at landing aerodrome and compliance with Approach Ban

13.0	7.5			9.1				2.0	1.0		
(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
Total Flight Time			217.8		Hours						

61.06.4 SKILLS TEST FOR COMMERCIAL PILOT LICENCE (HELICOPTER)

1. Procedures and manoeuvres

The practical test standard shall be conducted in accordance with Appendix 2.2 to SA-CATS 61.

61.07.1 REQUIREMENTS FOR AIRLINE TRANSPORT PILOT LICENCE (AEROPLANE)

1. Training

(1) Aim of training course

The aim of the course is to train a candidate to the level of proficiency required for the issue of an Airline Transport Pilot licence (Aeroplane), and provide the training necessary to act, but not for remuneration, as pilot-in-command or as co-pilot of any aeroplane for which he or she holds a valid class or type rating, engaged in non-revenue flights under visual flight rules.

(2) Contents and requirements of training course

(a) The applicant must complete a training course with an aviation training organisation approved by the Director in terms of Part 141. However, the theoretical knowledge course and the practical training course may be completed at different aviation training organisations.

(b) The course comprises –

(i) Theoretical knowledge course; and

(ii) Practical training course is only applicable to the Integrated Training Course. The syllabus for the practical training is contained in Appendix 3.0 to Document SA-CATS 61.

(3) Theoretical Knowledge Examination

(a) The knowledge acquired must be sufficient for the candidate to pass examinations in the following theoretical knowledge subjects:

- (i) Aviation Meteorology;
- (ii) Flight Performance and Planning;
- (iii) Radio Aids and Communication;
- (iv) General Navigation;
- (v) Instruments and Electronics;
- (vii) Aircraft Technical and General;

(b) In the case of a student pilot following an integrated course or a private pilot, the following two exams will also have to be written:

- (i) Human Performance and Limitations;
- (ii) Air Law and Operational Procedures;
- (iii) Navigation (at the CPL(IF) level).

(4) Theoretical knowledge course syllabus

14.0	58.2	20.2	138.4	32.1	359.0	410.0	1944.0	17.0	15.1	20.9	219.6
(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
Total Flight Time			3809.1	Hours							

61.07.4 SKILLS TEST FOR AIRLINE TRANSPORT PILOT LICENCE (AEROPLANE)

1. Procedures and manoeuvres

The practical test standard shall be conducted in accordance with Appendix 9.0 to SA-CATS 61.

61.08.1 REQUIREMENTS FOR AIRLINE TRANSPORT PILOT LICENCE (HELICOPTER)

1. Training

(1) Aim of training course

The aim of the course is to train a candidate to the level of proficiency required for the issue of an Airline Transport Pilot licence (Helicopter), and provide the training necessary to act, but not for remuneration, as pilot-in-command or as co-pilot of any helicopter for which he or she holds a valid class or type rating, engaged in non-revenue flights under visual flight rules.

(2) Contents and requirements of training course

(a) The applicant must complete a training course with an aviation training organisation approved by the Director in terms of Part 141. However, the theoretical knowledge course and the practical training course may be completed at different aviation training organisations.

(b) The course comprises –

(i) theoretical knowledge course; and

(ii) practical training course is only applicable to the Integrated Training Course. The syllabus for the practical training is contained in Appendix 3.0 to Document SA-CATS 61.

(3) Theoretical Knowledge Examination

(a) The knowledge acquired must be sufficient for the candidate to pass examinations in the following theoretical knowledge subjects:

- (i) Aviation Meteorology;
- (ii) Flight Performance and Planning;
- (iii) Radio Aids and Communication;
- (iv) General Navigation;
- (v) Instruments and Electronics;
- (vi) Aircraft Technical and General.

(b) In the case of a student pilot following an integrated course or a private pilot, the following two exams will also have to be written:

- (i) Human Performance and Limitations;
- (ii) Air Law and Operational Procedures
- (iii) Navigation (at the CPL (IF) level).

(4) Theoretical knowledge course syllabus

The detailed theoretical knowledge syllabus is contained in Appendix 2.0B to Document SA-CATS 61.

14.0	58.2	20.2	138.4	32.1	359.0	410.0	1944.0	17.0	15.1	20.9	219.6
(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
Total Flight Time			3809.1		Hours						

61.08.4 SKILLS TEST FOR AIRLINE TRANSPORT PILOT LICENCE (HELICOPTER)

1. Procedures and manoeuvres

The practical test standard shall be conducted in accordance with Appendix 9.0 to SA-CATS 61.

61.09.1 REQUIREMENTS FOR ISSUE OF CLASS AND TYPE RATINGS

1. Licence endorsements

The list of class and type ratings for endorsement are set out in Table 1 in TS 61.09.8.

2. Class and Type Rating Training

- (1) Theoretical knowledge instruction requirements for class/type ratings
 - (a) The theoretical knowledge instruction shall be conducted by competent persons having appropriate experience in aviation and knowledge of the aircraft concerned, eg. flight instructor, flight engineer, maintenance engineer.
 - (b) The theoretical knowledge instruction shall cover the syllabus in Appendix 8.0 to SA-CATS 61, as appropriate to the aeroplane class/type concerned. Depending on the equipment and systems installed, the instruction shall include but is not limited to the following content
 - (i) Aeroplane structure and equipment, normal operation of systems and malfunctions
 - (aa) Dimensions;
 - (bb) Engine including auxiliary power unit;
 - (cc) Fuel system;
 - (dd) Pressurisation and air-conditioning;
 - (ee) Ice protection, windshield wipers and rain repellent;
 - (ff) Hydraulic systems;
 - (gg) Landing gear;
 - (hh) Flight controls, lift devices;
 - (ii) Electrical power supply;
 - (jj) Flight instruments, communication, radar and navigation equipment;
 - (kk) Cockpit, cabin and cargo compartment;
 - (ll) Emergency equipment.
 - (ii) Limitations
 - (aa) General limitations;
 - (bb) Engine limitations;
 - (cc) System limitations;
 - (dd) Minimum equipment list.
 - (iii) Performance, flight planning and monitoring
 - (aa) Performance;
 - (bb) Flight planning;
 - (cc) Flight monitoring.
 - (iv) Load, balance and servicing
 - (aa) Load and balance;
 - (bb) Servicing on ground.
- (v) Emergency procedures

- (vi) Special requirements for extension of a type rating for instrument approaches down to a decision height of less than 200 ft (60 m)
 - (aa) Airborne equipment, procedures and limitations.
- (vii) Special requirements for “glass cockpit” aeroplanes
 - (aa) Electronic flight instrument systems (eg. EFIS, EICAS).
- (viii) Flight Management systems (FMS)
- (2) High Performance Aeroplane (HPA) Training Course of additional theoretical knowledge training for a class or type rating for high performance single-pilot aeroplane and warbird type endorsements.
 - (a) A number of aeroplanes certificated for single-pilot operation have similar performances, systems and navigation capabilities to those more usually associated with multi-pilot types of aeroplanes, and regularly operate within the same airspace. The level of knowledge required to operate safely in this environment is not part of, or not included to the necessary depth of knowledge in the training syllabi for the PPL (A), CPL (A) or IR (A) but these licence holders may fly as pilot-in-command of such aeroplanes.
 - (b) The aim of the theoretical knowledge course is to provide the applicant with sufficient knowledge of those aspects of the operation of aeroplanes capable of operating at high speeds and altitudes, and the aircraft systems necessary for such operation.
 - (c) The holder of an ATPL (A) issued by a Contracting State or with a pass in the theoretical knowledge examinations at ATPL (A) level is credited with meeting the requirement of CAR 61.09.4(3).
 - (d) A pass in any theoretical knowledge subjects as part of the HPA course will not be credited against meeting future theoretical examination requirements for issue of a CPL (A), IR (A) or ATPL (A).
- (3) HPA Course Providers

Theoretical knowledge instruction for the HPA may be provided by a Part 141 approved aviation training organisation accredited to conduct theoretical knowledge training for the ATPL (A). Course providers will be required to certify completion of the training and demonstration of knowledge by the applicant as a pre-requisite for training for an initial type or class rating for aeroplanes designated as high performance.
- (4) HPA Course Syllabus

There is no mandatory minimum or maximum duration of the theoretical knowledge instruction required for the HPA syllabus. The course material may be conducted by distance learning. The subjects to be covered in the course and written examination are given in Document SA-CATS .
- (5) Multi-crew Co-operation Course
 - (a) The aim of the course is to become proficient in multi-crew co-operation (MCC) in order to operate safely multi-pilot multi-engine aircraft under IFR and, for that purpose, to ensure that–
 - (i) The pilot-in-command fulfils his managing and decision-making functions irrespective whether he is pilot flying (PF) or pilot not flying (PNF);
 - (ii) The tasks of PF and PNF are clearly specified and distributed in such a manner that the PF can direct his full attention to the handling and control of the aircraft;
 - (iii) Co-operation is effected in an orderly manner appropriate to the normal, abnormal or emergency situations encountered; and
 - (iv) Mutual supervision, information and support are ensured at all times.
- (6) Instructors

Instructors for MCC training shall be approved as instructors for MCC training. They should be current with the latest developments in human factors training and CRM techniques.
- (7) Theoretical Knowledge

The theoretical knowledge syllabus is set out in Appendix 20.0 to Document SA-CATS 61. An approved MCC theoretical knowledge course shall comprise not less than 25 hours.

- (8) Flying Training
The flying training syllabus is set out in Appendix 20.0 to Document SA-CATS 61.
- (9) Certificate of Completion
On completion of the MCC training course or upon completion of an initial multi-pilot aircraft type endorsement, the applicant shall be issued with a certificate of satisfactory course completion as set out in the appropriate form.
- (10) Cross-Crediting
A holder of a certificate of completion of MCC training on aeroplanes or helicopters shall be exempted from the requirement to complete the theoretical knowledge syllabus, as set out in Appendix 20.0 to Document SA-CATS 61, in the event that applicant seeks multi-crew authorisation on an alternative category of aircraft.
- (11) HPA Examination
 - (a) Demonstration of acquisition of the HPA knowledge will be undertaken by passing an examination set by the training provider and acceptable to the Director. Successfully passing this examination will result in the issue of a certificate indicating that the course and examination have been completed. The syllabus content for theoretical training for High Performance Aircraft is set out in Appendix 8.2 to the SA-CATS 61.
 - (b) The certificate will represent a 'once only' qualification and will satisfy the requirement for the addition of all future high performance aeroplanes to the holder's licence. The certificate will be valid indefinitely and must be submitted with the application of the first HPA type or class rating.
 - (c) The written examination shall consist of not less than 60 multi-choice questions, and may be split into individual subject papers at the discretion of the Part 141 approved aviation training organisation. The pass mark for the examination will be 75%.
- (12) Class and Type Rating Examinations
 - (a) Demonstration of acquisition of the class or type rating knowledge will be undertaken by passing an examination(s) set by the Part 141 training provider or an equivalent organisation acceptable to the Director. Successfully passing this examination will result in the issue of a certificate indicating that the course and examination have been completed.
 - (b) For the initial issue of type ratings for multi-pilot aeroplanes the written or computer based examination shall at least comprise one hundred questions distributed appropriately across the main subjects of the syllabus. The pass mark shall be 75% in each of the main subjects of the syllabus.
 - (c) For the initial issue of type and class ratings for single-pilot aeroplanes the number of questions in the written or computer based examination shall depend on the complexity of the aeroplane. The pass mark shall be 75%.
 - (d) After the examination, the candidate shall review the questions answered incorrectly, with the instructor who provided the theoretical knowledge training, to correct the knowledge deficiency.

61.09.2 TRAINING

1. Training and prior qualifications

The training and prior qualification requirements for the issuing of class and type ratings (including high performance aeroplanes) are set out in Table A.

Table A

61.09.2 TRAINING

1. Training and prior qualifications

	SE Class	ME Class	ME SP Type	Multi-pilot	Warbird	Helicopter SE	Helicopter ME

Applicable Tables *	1, 2	1	3, 4, 5	6	8	7	7
Instrument rating (ME)	N/A	N/A	N/A	Required	N/A	N/A	N/A
MCC training	N/A	N/A	N/A	Required	N/A	N/A	N/A
ATPL theory credit	N/A	N/A	N/A	Required	N/A	N/A	N/A
Theoretical knowledge	App 8.0	App 8.3	App 8.3				
Flight training	App 10.0	App 10.2	App 10.2	App 10.3	App 10.4	App 10.5	App 10.6

* The tables are contained in SA-CATS 61.09.8

2. General

- (1) The type rating course, including theoretical knowledge, shall be completed within the 3 months preceding the skills test.
- (2) Where the type is new to the aircraft register or a manufacturer requires specific type training, then the training done through that manufacturer or TRTO shall be acceptable as part of the type training requirements as referred to above.
- (3) Where the type is new to the aircraft register and the pilot is able to present a FAA/JAR skills test carried out by a pre-approved examiner and where that skills test includes the oral exam pertaining to that regulatory authority, then that skills test will be deemed as being compliant with the Civil Aviations Regulations as specified below for the initial rating only.

61.09.3 SKILLS TESTS

Skills tests, the details of which can be found in Appendix 9.0, 'Guidance for the Conducting of Skills and Proficiency Tests' together with Appendices 9.1, 9.2 and 9.3 to Document SA-CATS 61, shall comprise the relevant elements from the following areas of operation

1. Normal Procedures

- (1) Mass and balance data;
- (2) Take-off and landing distance requirements;
- (3) Altitude capability/flight planning;
- (4) Weather interpretation;
- (5) Filing of flight plan;
- (6) Pre-flight inspection;
- (7) Pre-start checks;
- (8) Starting procedures after start procedures;
- (9) Taxiing checks;
- (10) Pre- take-off procedures and checks;
- (11) Crew/pilot briefing;
- (12) Departure procedures;
- (13) Climb procedures including best rate/maximum angle and cruise climb techniques and engine monitoring procedures;
- (14) Cruise techniques;
- (15) Use of navigation systems;
- (16) Use of automation;

- (17) Descent techniques;
- (18) Approach preparation and briefings;
- (19) Flying the approach and relevant procedures;
- (20) Landing techniques;
- (21) After-landing procedures;
- (22) Shutdown procedures; and
- (23) Paperwork requirements.

2. Non-normal Procedures

- (1) Operation on wet or contaminated runways;
- (2) Operation in strong crosswinds;
- (3) Operation in icing conditions;
- (4) Windshear recovery techniques;
- (5) Aborted and alternate engine start procedures;
- (6) Rejected take-off;
- (7) Engine failure procedures;
- (8) System failure procedures;
- (9) Instrument failure procedures;
- (10) Avionic failure procedures;
- (11) Radio failure procedures; and
- (12) Declaring an emergency.

3. Crew Procedures

- (1) CRM;
- (2) Threat and error identification and management;
- (3) Multi-crew co-operation;
- (4) Communication including ATC communications;
- (5) General management of the flight;
- (6) Situational awareness.

4. Theoretical knowledge instruction and checking requirements

An applicant for a class or type rating for single- or multi-engine aeroplanes shall have completed the required theoretical knowledge instruction and demonstrated the level of knowledge required for the safe operation of the applicable aeroplane type.

5. Flight instruction

- (1) An applicant for a class/type rating for single-engine and multi-engine single-pilot aeroplanes shall have completed a course of theory and flight instruction related to the class/type rating skills test.
- (2) An applicant for a type rating for multi-pilot aeroplanes shall have completed a course of theory and flight instruction related to the type rating skills test.

6. Conduct of training courses

- (1) Training courses shall be conducted by an Aviation Training organisation approved by the Director in terms of Part 141.
- (2) Such courses shall be approved by the Director.

7. Multi-crew co-operation training

- (1) The course shall provide multi-crew co-operation training for –
 - (a) students attending an integrated course for an airline transport pilot licence in accordance with CAR 61.01.16 (2); or
 - (b) the holders of a private pilot licence with instrument rating or commercial pilot licence with instrument rating, who have not graduated from an airline transport pilot integrated course but who wish to obtain an initial type rating on multi-pilot aeroplanes.

- (2) The multi-crew co-operation course shall comprise at least 25 hours of theoretical knowledge instruction and exercises and 20 hours of multi-crew co-operation training. Students attending an airline transport pilot integrated course may have the practical training reduced by 5 hours. Wherever possible, the multi-crew co-operation training should be combined with the initial type rating course on multi-pilot aeroplanes or helicopters.
- (3) The multi-crew co-operation training shall be conducted by an aviation training organisation approved by the Director in terms of Part 141. When multi-crew co-operation training is combined with the initial type rating training for a multi-pilot aeroplane, the practical multi-crew co-operation training may be reduced to not less than 10 hours provided the same FSTD is used for both the multi-crew co-operation and type rating training.

8. Additional training requirements for type or class ratings on High Performance Single-pilot Aeroplanes

The additional training requirements for an applicant for a class or type rating on a high performance single-pilot aeroplane and who is not the holder of an Airline Transport Pilot's Licence or holds credit for the ATP theoretical knowledge examinations shall be as set out in Appendix 8.2 to SA-CATS 61.

9. Warbird Qualification and Experience

The following qualifications and aeronautical experiences apply to warbird types of aeroplane fitted with dual controls –

- (1) The appropriate aeroplane class rating;
- (2) Any applicable design feature endorsements;
- (3) For gas turbine engine powered warbird types of aeroplane not capable of exceeding Mach 1 in level flight, aeronautical experience of at least –
 - (a) 300 hours of flight time as pilot-in-command in aeroplanes; or
 - (b) 30 hours of flight time as pilot-in-command in gas turbine engine powered aeroplanes.
- (4) For gas turbine engine powered warbird types of aeroplane capable of exceeding Mach 1 in level flight, aeronautical experience of at least 30 hours of flight time as pilot-in-command in turbojet or turbofan powered aeroplanes with a MMO of at least Mach 0.8;
- (5) In addition, for a warbird type not fitted with dual controls:
 - (a) for piston engine powered type, at least 30 hours of flight time as pilot-in-command in aircraft having engine power in excess of 450 hp;
 - (b) for a gas turbine powered type not capable of exceeding Mach 1, at least 30 hours of flight time as pilot-in-command in gas turbine powered aeroplanes;
 - (c) for a gas turbine powered warbird type capable of exceeding Mach 1 in level flight, a minimum of 50 hours of flight time in gas turbine powered aeroplanes capable of exceeding Mach 1 in level flight;
 - (d) for a warbird with a delta wing, at least 15 hours of flight time as pilot-in-command in aeroplanes fitted with a delta wing;
- (6) For multi-engine warbird aeroplane types, the aeronautical experience (except that mentioned in subparagraph (e) (iv) above) must be in multi-engine aeroplanes.
- (7) Multi-pilot Skills Test. An applicant for a type rating for a multi-pilot aeroplane shall have demonstrated to a Designated Flight Examiner the skills required for the safe operation of the applicable type of aeroplane in a multi-crew environment as a pilot-in-command or a co-pilot as applicable, as set out in Appendices 9.0 and 9.1 to Document SA-CATS 61.
- (8) Multi-engine Class Rating. An applicant for the issuing of a multi-engine class rating shall have demonstrated to a Designated Flight Examiner the competence to perform as pilot-in-command of the aircraft concerned the procedures and manoeuvres as described in Appendix 9.2 to Document SA-CATS 61.
- (9) Single-engine Class or Type Rating. An applicant for the issuing of a single-engine class, type rating or touring motor glider class rating shall have demonstrated to a Designated

Flight Examiner or an appropriately rated flight instructor the competence to perform as pilot-in-command of the aircraft concerned the procedures and manoeuvres as described in Appendix 9.2 to Document SA-CATS 61.

- (10) Warbird Type Rating. An applicant for the issuing of a warbird type rating shall have demonstrated to a Designated Flight Examiner or an appropriately rated flight instructor the competence to perform as pilot-in-command of the aircraft concerned the procedures and manoeuvres as described in Appendix 9.3 to Document SA-CATS 61.
- (11) Multi-crew Co-operation. On completion of the MCC training the applicant shall either demonstrate the ability to perform the duties of a pilot on multi-pilot aeroplanes by passing the type rating skills test on multi-pilot aeroplanes as set out in Appendices 9.0 and 9.1 to SA-CATS 61, or shall be given a certificate of completion of MCC and have the successful completion of the course endorsed in the logbook.
- (12) The skills test shall have been completed within 6 months of the date of completion of the training course.

61.09.7 TYPE AND CLASS RATING – PRIVILEGES AND VARIANTS

1. Difference training

The differences training required is indicated in Tables 1 – 10 in Technical Standard 61.09.8. In the case of a required change to another type or variant of the aeroplane within one class rating, the following will apply:

- (a) Although an applicant will have an endorsement in his licence for a class rating in his/her licence, differences training will have to be conducted as defined below, endorsed into the pilot logbook and the form forwarded to the Director within 30 days of completion of the training:
- (b) Theoretical and Flying Training
 - (i) A pilot undergoing differences training shall have completed a course of theory instruction relevant to the aircraft.
 - (ii) A pilot undergoing differences training shall have completed flight instruction related to the aircraft and shall include but is not limited to:
 - (aa) A minimum of five take-offs and landings;
 - (bb) Upper air work appropriate to the handling characteristics and different, or more complex systems pertaining to the aircraft.
 - (iii) Differences training shall be conducted by an aviation training organisation approved by the Director in terms of Part 141.

61.09.8 TYPE AND CLASS RATINGS

1. Issuing of class and type ratings

Class and Type ratings shall be issued as an endorsement in the pilot's logbook and licence on submission of the appropriate form, which shall be forwarded to the Director within 30 days of completion of the training. The endorsement in the logbook shall contain the following particulars:

- (a) an indication of the type or class of aircraft in respect of which the endorsement is made;
- (b) the type (and variant if applicable) and registration marks of the aircraft in which the skills test referred to in CAR 61.09.5, was performed;
- (c) the name, licence number, designation and signature of the person making the endorsement;
- (d) the date.

2. Establishment of Type Ratings

Criteria: For the establishment of type ratings for aeroplanes other than those included in Tables 4 – 8, all of the following shall be considered –

- (a) airworthiness type certificate;
 - (i) handling characteristics;

- (ii) certificated minimum flight crew complements; and
 - (iii) level of technology.
- (b) High performance single-pilot aeroplanes.
 Criteria: For the establishment of a class or type rating of a single-pilot aeroplane designated as high performance, all the following shall be considered –
- (i) type of power plant;
 - (ii) provision and capabilities of airframe systems;
 - (iii) cabin pressurisation;
 - (iv) capabilities of navigation systems;
 - (v) performance both airfield and en route;
 - (vi) handling characteristics.

3. List of Classes and Types of aeroplanes

(1) Class of Aeroplane

Explanation of how to use Tables 1, 2 and 3:

- (a) the symbol (D) in column 3 indicates that differences training is required when moving between variants or other types of aeroplane which are separated by the use of a line in column 2;
- (b) Although the licence endorsement (column 4) contains all aeroplanes listed in column 2, the required familiarisation or differences training has still to be completed and endorsed in the pilot's logbook by the instructor or SACAA authorised person;
- (c) The symbol HPA (High Performance Aeroplane) in column 3 indicates that additional knowledge instruction is required for this type of aeroplane if the applicant for the type rating is not the holder of an ATPL (A) or has no theoretical knowledge credit at ATPL (A) level.

Note: Aeroplanes not listed may be entered into a SA CAR 61 licence, but the rating privileges are restricted to aeroplanes on the SA register. At the time of publication of these Technical Standards every attempt was made to ensure that the information in respect of types was correct. Corrections and new entries will be made available on the SA CAA website www.caa.co.za. The tables will be updated from time to time.

Table 1

Single/multi-engine piston aeroplanes land/sea – Single-pilot (SP) (A)

1 Manufacturer	2 Aeroplanes	3	4 Licence Endorsement
All Manufacturers	Single-engine piston (land)	(D)	SEP (land)
	Single-engine piston (land) with variable pitch propellers (VP)		
	Single-engine piston (land) with Retractable undercarriage (RU)		
	Single-engine piston (land) with Turbo/super charged engines (T)		
	Single-engine piston (land) with cabin pressurisation (P)		
	Single-engine piston (land) with Tail wheel (TW)		
	Single-engine piston (sea)		

1 Manufacturer	2 Aeroplanes	3	4 Licence Endorsement
	Single-engine piston (sea) variable pitch propellers (VP)		SEP (sea)
	Single-engine piston (sea) with Turbo/super charged engines (T)	(D)	
	Single-engine piston (sea) with cabin pressurisation (P)		
	Multi-engine piston (land)	(D)	MEP (land)
	Multi-engine piston (sea)	(D)	MEP (sea)

Table 2
Single-engine turboprop (land) – Single-pilot

1 Manufacturer	2 Aeroplanes	3	4 Licence Endorsement
Aerospatiale (Socata)	TBM 700	(HPA)	Aerospatial SET
Snow/Rockwell/ Ayres	S2R turbo thrush		Snow/Ayres SET
Cessna	206 A/T Soloy 207 A/T Soloy 208	(D)	Cessna SET
De Havilland (Air Tech Canada)	DHC-3 Turbo-Otter		DHC3
(Bombadier)	DHC-2 Turbo-Beaver		DNC2
Gulfstream	AM.G-164D		Gulfstream SET
Pilatus	PC06 Series PC6 82H2 PC-7	(D)	Pilatus SET
Rhein Flugzeugbau	FT 600		Rhein Flugzeugbau SET

Table 3
Single-engine piston touring motor gliders (land) – Single-pilot

1 Manufacturer	2 Aeroplanes	3	4 Licence Endorsement
All Manufacturers	All touring Motor Gilders having integrally mounted non-retractable engine and a non-retractable propeller		TMG

- (2) List of aeroplane types – Tables 4 to 8
These tables include aeroplanes type certificated under FAR/JAR 25, FAR/JAR 23, FAR/JAR 23 Commuter Category, FAR/JAR 25, BCAR or AIR 2051, and aeroplanes type certificated by another competent authority acceptable to the Director, but does not include –
- (a) aeroplanes not type certificated in accordance with FAR/JAR 23, FAR/JAR 23 Commuter Category, FAR/JAR 25, BCAR or AIR 2051;

- (b) aeroplanes type certificated in South Africa under special registration such as military, ex-military, experimental (NTCA) or vintage aeroplanes.
- (c) Aeroplanes not listed in the tables may be entered into a South African licence subject to any specific requirements that may be laid down by the Director from time-to-time.
- (d) Explanation of tables:
 - (i) the symbol (D) in column 3 indicates that differences training is required when moving between variants or to other types of aeroplane which are separated by the use of a line in column 2.
 - (ii) although the licence endorsement (column 4) contains all aeroplanes listed in column 2, the required familiarisation or differences training has still to be completed.
 - (iii) the specific variant on which the skills test for the type of rating has been completed will be recorded according to TS 61.09.10.
 - (iv) the symbol HPA (High Performance Aeroplane) in column 3 indicates that additional knowledge instruction is required for this type of aeroplane if the applicant for the type rating is not the holder of an ATPL (A) or has no theoretical knowledge credit at ATPL (A) level.

A: Single-pilot aeroplanes

Table 4

Multi-engine turboprop aeroplane (land) – single-pilot (SP) (A)

1 Manufacturer	2 Aeroplanes	3	Licence Endorsement
Asla GAF	Nomad - 22B 24A		AslaMET
Beechcraft	90 series	(HPA)	BE90.99.100/200
	99 series		
	100 series	(D)	
	200 series		
	300 series	(HPA)	
	1900 series	(D)	BE300/1900
Cessna-Rheims Aviation	F406	(HPA)	C406/425
	425		
	441		C441
De Havilland Canada (Bombardier)	DHC6 Series		DHC6
Dornier	DO-128-6		D128
	DO 228 series		D228
Embraeer	Bandeirante EMB 110		EMB110
Grumman	Tracker S2FT		S2FT
Mitsubishi	MU2B series	(HPA)	MU2B
Piaggio	P165		Piaggio 165
	P180	(HPA)	Piaggio 180
Pilatus Britten	BN2T Turbine Islander	(D)	BN2T
	BN2T-4R MSSA		
	BN2T-4S Defender		
Piper	PA31 series Cheyenne	(HPA)	PA31/42

1 Manufacturer	2 Aeroplanes	3	Licence Endorsement
	PA42 series Cheyenne	(D)	
Rockwell	AC680 T AC690 series AC900 series	(HPA)	PA31/42
Short (Bombardier)	SC7Skyvan		SC7Skyvan
Swearingen/ Fairchild	226 T	HPA (D)	SA226/227
	226 T (B)		
	226AC		
	226TC		
	227TF		
	227AC 227AT 227BC		

Table 5
Single-engine – single-pilot

1 Manufacturer	2 Aeroplanes	3	Licence Endorsement
Pilatus	PC-7MkII	(HPA)	FC9/PC7MkII
	PC-9P C-9(M)		
	PC12 series	(HPA)	
Piper	PA-46 Malibu PA-46 Malibu Turbine	HPA (D)	PA-15
Weider Extra	Extra 400	(HPA)	Extra 400

Table 6
Multi-engine turbo-prop (sea) – single-pilot

1 Manufacturer	2 Aeroplanes	3	Licence Endorsement
Canadair (Bombardier)	CL215T		CL215T

Table 7
Multi-engine turbo-jet (land) – single-pilot (SP)

1 Manufacturer	2 Aeroplanes	3	Licence Endorsement
Aerospatiale	MS 760 Paris	(HPA)	S760
Cessna	C501/500SP	(HPA) (D)	C501/551
	C651/500SP*		
	C525	(HPA)	C525

B: Multi-pilot aeroplanes
Table 8

1 Manufacturer	2 Aeroplanes	3	Licence Endorsement
	SN601 Corvette		SN601
Aerospatiale/Sud Aviation	SE210III IIIR VIN	(D)	SE210/10B3/11/12
	SE 10B3		
	SE 11		
	SE 12		
Aerospatiale/BAC	Concorde		Concorde
Aerospatiale/Nord Aviation	Nordiatlas 2501		ND25
	C160 P Transall		ND16
	260A Nord 262A-B-C Nord		ND 26
Aero-Spaceline	377 SGTF Super Guppy		Super Guppy
Airbus	A300-B1 B2 series 4 series C4-200 series F4-200 series		A300
	A300-FFCC		A300FFCC
	A310-100 series 300 series A300-B4 600 series C4 600 series F4 600 series		A310/300-600
	A318 A319-100 series A320-100 series 200 series A321-100 series 200 series		A320
	A330-300 series 200 series		A330
	A340-200 series 300 series 500 series 600 series		A340
	A300 – 600 series ST/Beluga		A300-600ST
ATR	ATR42 200/30/400		
	ATR42 500 72 Series	(D)	ATR42.72
Mitsubshi/ Beech/Raytheon	Beechjet 400 series MU300		Beech400/MU300
	B707-100 series 200 series	(D)	B707/720
	B720		
	B717 series		B717

Boeing	B727-100 series 200 series		B727
	B737-100 series 200 series		B737 100-200
	B737-300 series 400 series 500 series	(D)	B737 300-900
	600 series 700 series 800 series 900 series		
	B747-100 series 200 series 300 series		
	B747SP		
	B747-400 series		B747-400
	B757-200 series 300 series	(D)	B757/767
	767-200 series 300 series		
	B767-400ER*		
	B777-200 series 300 series		B777

* The differences training course is valid from the B757/767 'classic' to the B767-400ER for crew members previously qualified on the B757/767 'classic variants'. The 767-400ER to B757/767 'classic' differences training shall be evaluated or the full type rating training shall be accomplished.

Bombardier	Global Express 1-A-10 1-A-11		BD700
British Aerospace Avro	ATP Jetstream 61		BAe/ATP/Jetstream 61
	AVROTO RJ series 146-100 series 200 series 300 series		AVROTORJ/Bae46
British Aerospace Avro	BAC1-11-200 series 400 series 500 series		BAC1-11
Hawker Siddeley/ BAe/ Raytheon	HS125	(D)	HS125
	Bae 125-800 series 1000 series		
Hawker Siddeley/BAe	Jetstream 3100 series 3200 series		Jetstream31/32
BAe/Avro	Jetstream 41		Jetstream41
Canadair (Bombardier)	CL145		CL145
	(Challenger Series) CL 600 CL 601-1A CL 601-3A		CL600/501

	(Challenger) CL604		CL604
	(Regional Jet series) CRJ 100 200	(D)	CRJ100
	700 900		
Casa	C212 series CN-235		C212 CN235
Cessna	C 500	(D)	C500/550/560
	C 550		
	CS 550		
	CS 550 Bravo		
	C 560 Encore		C560XL
	C 560XL		C560XL
Consolidated Vultee Aircraft	C650 Citation III Citation VI Citation VII		C650
	C750 Citation X		C750
	CV 240-4	(D)	CV240/340/440
	CV 340 CV 440		
CV 580		CV580	
Dassault	Falcon 10		Falcon 10/100
	Falcon 100		
	Falcon 20 series	(D)	Falcon 20/200
	Falcon 200		
	Falcon 50		
	Falcon 900	(D)	Falcon 50/900
	Falcon 900 EX		
	Falcon 2000	(D)	Falcon 2000/2000 EX
	Falcon 2000 EX (2) Falcon 2000 EX EASy		Falcon 2000EX EASy

- (3) The differences training course is valid from the Falcon 2000 to the Falcon 2000EX for crew members previously qualified on the Falcon 2000. The Falcon 2000EX to the Falcon 2000 differences training shall be evaluated or the full type rating training shall be accomplished.

1 Manufacturer	2 Aeroplanes	3	Licence Endorsement
Havilland (Bombardier)	Canada		DHC7
	DHC8-100 series 200 series 300 series	(D)	DHC8
	DHC8 400 series		
	Dornier	DO 328-100 DO328-200	
	Douglas A-26B Douglas -3A-51C3G		DCA26 DC3

McDonnell-Douglas	DC4		DC4
	DC6 series		DC6
	DC7C		DC7
McDonnell-Douglas/Boeing	DC8-33 50,60,70 series		DC8
	DC9 10-50 series		DC9 10-50
	DC9 60 series		
	MD 58 series	(D)	DC9 50/MD58/MD90
	MD 90 series		
	DC10 series		DC10
	MD11		MD11
Embraer	EMB120 Brasillia		EMB120
	EMB 145 135 145 series		EMB 135/145
	EMB 170-100		EMB170
Fokker/Fairchild	FH227 F27/A/F/J F27 series		F27
	F28 series		F28
	F50		F50
	F70 F100		F70/100
Grumman Gulfstream	Grumman G-159		Gulfstream I
	Grumman G1159	(D)	Gulfstream II/III
	Grumman G1159A		
	Gulfstream 1159C/GIV		Gulfstream IV
	Gulfstream V	(D)	G-V
	G550/G500/G V-SP		
Handley Page	Herald series		Herald
Israel Aircraft Industry	IAI-1121 Jetcommander 1123 Commander Jet 1124 Westwind		IAI1121/23/24
	IAI 1124 Astra		IAI1125
Junkers	Junkers 52		JU52
Lockheed	L188 Electra series A	(D)	L188 Electra
	L185 Electra series C		
	L382 G(C 130)		Hercules
	L1011 series L1329		L1011 Jetstar
Learjet (Bombardier)	Learjet-20 series	(D)	Learjet20/30
	30 series		
	Learjet-45 series		Learjet45
	Learjet-55 series Learjet-60 series		Learjet55 Lerajet60
Leteckee	L410UVP		LetL410
MBB	HFB320		HFB320
	VFW 614		VFW-614
PI Industry	IPTN CN 235-110		IPTNCN235

Rockwell International	NA-265 series		NA265
Saab	SAAB SF340 series		SAAB340
	SAAB 2000		SAAB2000
Short Brothers (Bombardier)	SD3-30	(D)	SD3-30/60
	60		
	Belfast		Belfast
Vickers-Armstrong	Vanguard		Vanguard
	Viscount		Viscount

(4) List of class/type of helicopters – Table 9

This table includes helicopters type certificated under FAR/JAR 27, BCAR and helicopters type certificated by another competent authority acceptable to the Director, but does not include:

- (a) helicopters not type certificated in accordance with FAR/JAR 27, BCAR; or
- (b) helicopters type certificated in South Africa under special registration such as military, ex-military, experimental (NTCA) or vintage helicopters;
- (c) Helicopters not listed in the table may be entered into a South African licence subject to any specific requirements that may be laid down by the Director from time-to-time.
- (d) Explanation of the Table:
 - (i) If a dividing line exists in column 2, this indicates a variant.
 - (ii) The symbol (D) between variants of types of helicopter used in column 3 indicates that differences training is required.
 - (iii) Although the licence endorsement (column 4) contains all helicopters listed in column 2, the required familiarisation or differences training has still to be completed (details of differences training can be found in SA-CATS 61.09);
 - (iv) The specific variant on which the skills test for the type rating has been completed will be recorded according to SA-CATS 61.09.

Table 9

1 Manufacturer	2 Aeroplanes	3	4 Licence Endorsement
Augusta			
SE Turbine	A 119 Koala		A119
ME Turbine	A 109A	(D)	A109/109K/109E
	A 109A II		
	A 109C		
	A 109K		
	A 109E		
Augusta-Bell			
SE Piston	Augusta Bell 47G-2		Bell 47
	Augusta Bell 47G-2A-1		
	Augusta Bell 47G-3B.1		
	Augusta Bell 47G-4		
	Augusta Bell 47G-4A		
	Augusta Bell 47J		
	Augusta Bell 47J-2		
	Augusta Bell 47J-3		
	Augusta Bell 206A Augusta Bell 206B	(D)	Bell206/206L

1 Manufacturer	2 Aeroplanes	3	4 Licence Endorsement
SE Turbine	Augusta Bell 206L	(D)	Bell204/205/UH-1D
	Augusta Bell 204		
	Augusta Bell 205		
ME Turbine	Augusta Bell 212		Bell212/412
	Augusta Bell 412		
	Augusta Bell 412 SP		
Augusta Sikorsky			
ME Turbine	Augusta S-61N1		SK-61
Bell Helicopters			
SE Piston	Bell 47D		Bell47
	Bell 47G		
	Bell 47G-1		
	Bell 47G-2		
	Bell 47G-3B-1		
	Bell 47G-4		
	Bell 47G-4A		
	Bell 47G-5		
	Bell 47H-1		
	Bell 47J		
Bell 47J-2			
Bell 47J-2A			
SE Turbine	Bell 47T		Bell47T
	Bell 47TA		
	Bell 204		Bell204/205/UH-1D
	UH-1D		
	Bell 206 A		Bell206/206L
	Bell 206 B		
	Bell 206 B 2		
	Bell 206 B 3		
	Bell 206 L		
	Bell 206 L-1		
	Bell 206 L-3		
	Bell 206 L-4		
	Bell 214 B		Bell214
	Bell 214 B 1		
	Bell 407		Bell407
ME Turbine	Bell 206 LT Twinranger		Bell 206LT
	Bell 212		Bell212/412
	Bell 412 SP	(D)	
	Bell 412 HP		
	Bell 412 EP		
	Bell 214 ST		Bell214ST
	Bell 222	(D)	Bell222/230/430
	Bell 222 A		
	Bell 222 B		
	Bell 222 UT		
	Bell 222 SP		

1 Manufacturer	2 Aeroplanes	3	4 Licence Endorsement
	Bell 230		
	Bell 430		
	Bell 427		Bell427
Boeing-Vertol			
ME Turbine	Boeing 234 LR		BV234
Bristol Aircraft			
SE Piston	B-171-B		Bristol 171B
Brantly			
SE Piston	B-2 B-2 B		Brantly B2
Breda Nardi			
SE Piston	Breda Nardi 269		HU269
SE Turbine	Breda Nardi 369		HU369
EH Industries			
ME Turbine	EH101		EH101
Enstrom			
SE Piston	F28 A-D F28 C 2 F280C F280F F280FX F280D		EN28
SE Turbine	F480		ENF480
Eurocopter			
SE Turbine	AS350B AS350B 1 AS350B 2 AS350D AS350B A AS350B B	(D)	AS350/350B3
	AS350B 3		
	EC130B 4		EC130B4
	EC120		EC120
	SA341 G SA342 J		SA341/342
	SA3180 SA318 B SA318 C SE3130 SE313 B		SA318/SE313
	SE3160 SE316 B SE316 C	(D)	SA316/319/315
	SA319 B		
	SA315 B		
	SA360		SA360

1 Manufacturer	2 Aeroplanes	3	4 Licence Endorsement
	SO1221		SO1221
ME Turbine	AS332 C AS332 C 1 AS332 L AS332 L 1 AS332 L 2	(D)	AS332/332L2
	EC 225 L P		EC 225LP
	AS355 E AS355 F AS355 F 1 AS355 F 2 AS355 N	(D)	AS355/355N
	BO105 A BO105 C BO105 D BO105 LS A-1 BO105 LS A-3 BO105 S BO105 CBS		BO105/105LS/105CBS
	EC135 T1 CDS EC135 P1 CDS	(D)	EC135
	EC135 T1 CPDS EC135 P1 CPDS EC135 T2 CPDS EC135 P2 CPDS		
	MBB-BK 117 A-1 MBB-BK 117 A-3 MBB-BK 117 A-4 MBB-BK 117 B-1 MBB-BK 117 B-2 MBB-BK 117 C-1 MBB-BK 117 C-2	(D)	BK117
	SA330 F SA330 G SA330 J		SA330
	SA365 SA365 C 1 SA365 C 2 SA365 C 3	(D)	SA365/365N
	SA365 N SA365 N 1 SA365 N 2		
	EC155		EC155
Hiller			
SE Piston	UH12 A UH12 B UH12 E		UH12

1 Manufacturer	2 Aeroplanes	3	4 Licence Endorsement
Hughes/Schweitzer			
SE Piston	269 A 269 B 269 C 300 C 300 CB		HU269
SE Turbine	330SP		SC330
Kaman			
SE Turbine	Kaman K 1200		K1200
McDonnell Douglas Helicopters			
SE Turbine	Hughes 369 D Hughes 369 E Hughes 369 HE Hughes 369HS MD500 N (NOTAR) MD520 N MD600	(D)	HU369/MD500N/ 600
ME Turbine	MD900 MD902	(D)	MD900/902
Robinson			
SE Piston	R22 R22 A R22 B R44		R22 R44
Silvercraft			
SE Piston	SV 4		SV4
Sikorsky			
SE Piston	S55 S58		SK55 SK58
ME Piston	S58T		SK58T
	S76 A S76 A+ S76 A++ S76 B S76 C S76 C+	(D)	SK76/76B/76C/76C+
	SN-61 N SN-61 S		SK61
Westland			
SE Piston	Westland Bell 47 G3 B-1		Bell 47
Westland Helicopters			
SE Piston	Westland S55 Series 1	(D)	WHS55
SE Turbine	Westland S55 Series 3		
Ministry of Aviation Industry of Russia			
ME Piston	Kamov KA26 D		KA26D
ME Turbine	KA32 A		KA32

1 Manufacturer	2 Aeroplanes	3	4 Licence Endorsement
	MIL Mi-8 MIL Mi 17 MIL Mi 171 MIL Mi 172		Mi8
P.Z.L Swidnik, Poland			
ME Turbine	MIL Mi-2		Mi-2
	PZL Kania		KANIA
	PZL W-3	(D)	W-3SOKOL
	PZL W-34		

Table 10 – Warbird Type Rating Standards

Standards for the issue of a Warbird Type Rating for the following aircraft are detailed below –

1 Manufacturer	2 Aeroplanes	3	4 Licence Endorsement
Boomerang			
	CAC CA-12 (all models)		
	CAC CA-13 (all models)		
	CAC CA-19 (all models)		
	A 109E		
Canberra			
	Handley Page Canberra TT18		
	English Electric Canberra (all models)		
Cessna			
	Cessna A37 Dragonfly (all models)		Cessna A37
L-39			
	Aero Vodochnyody L-39 Albatross (all models)		
L-29			
	Aero Vodochnyody L-29 Delphin (all models)		
Firefly			
	Fairey Firefly (all models)		
Fiat G59			
	Fiat G59 (all models)		
Fury			
	Hawker Sea Fury (all models) Hawker Fury (all models)		
Hunter			
	Hawker Hunter (all models)		
Iskra			
	PZL TS-11 Iskra		

1 Manufacturer	2 Aeroplanes	3	4 Licence Endorsement
Kittyhawk			
	Curtis P-40 (all models)		
Hudson			
	Lockheed 414 Hudson (all models)		
Ventura			
	Lockheed PV-1 (all models)		
ME109			
	Messerschmit BF 109 (all models)		
Meteor			
	Gloster Meteor (all models)		
MIG 15			
	Mikoyan MIG-15 (all models)		
MIG 17			
	Mikoyan MIG-17 (all models)		
MIG 21			
	Mikoyan MIG-21 (all models)		
Mustang			
	CAC CA-17 (all models) CAC CA-18 (all models) North American P-51 (all models)		
Sabre			
	CAC CA-27 (all models)		
North American			
	F-86 (all models)		
Spitfire			
	Supermarine Spitfire (all models) Supermarine Seafire (all models)		
Strikemaster			
	BAC-167 (all models) BAC Jet Provost (all models)		
Trojan			
	North American T28 (all models)		
Avenger			
	Grumman TBM Avenger (all models)		
Beaufort			
	Bristol Beaufort (all models)		
Vampire			
	De Havilland DH-115 Vampire (all models)		

1	2	3	4
Manufacturer	Aeroplanes		Licence Endorsement
YAK 3			
	Yakovlev YAK 3 (all models)		
All ex-military aircraft			

61.10.1 REQUIREMENTS FOR A NIGHT RATING

1. Theoretical Knowledge Instruction

(1) Night rating: General

The aim of the night rating theoretical knowledge instruction syllabus referred to in CAR 61.10.1(2)(a) is to ensure that the applicant has a thorough understanding of the theoretical aspects surrounding the night rating. Night flying takes place in a potentially hostile environment and applicants must understand each element of the environment in which they are operating.

(a) Air Law –

- (i) The definition of night flying;
- (ii) The privileges and limitations associated with the night rating;
- (iii) The pilot-in-command's responsibilities;
- (iv) The equipment to be carried on board for night flying;
- (v) Aircraft lighting including navigation lights;
- (vi) VFR differences from day flying;
- (vii) Aerodrome requirements for night flying.

(b) Meteorology –

- (i) The formation of fog;
- (ii) Various types of fog;
- (iii) Katabatic winds;
- (iv) Mixing, veering and backing of winds at night;
- (v) Formation of ice and frost;
- (vi) Nocturnal Thunderstorms.

(c) Human performance –

- (i) Factors affecting night vision; the preservation of night vision;
- (ii) Visual illusions;
- (iii) Hypoxia;
- (iv) Vertigo;
- (v) Autokinesis.

(d) Lighting systems –

- (i) External aircraft lighting;
- (ii) Internal cockpit lighting;
- (iii) Taxiway lighting;
- (iv) Runway lighting;
- (v) Approach lighting systems;
- (vi) Obstruction lighting;
- (vii) Aerodrome identification beacons;
- (viii) Where to find information on lighting systems;
- (ix) Pilot-operated lighting.

2. Training

(1) Contents and requirements of training course

The applicant must complete a training course with an aviation training organisation approved by the Director in terms of Part 141. However, the theoretical knowledge course

and the practical training course may be completed at different aviation training organisations.

3. Practical Instruction

For the detailed practical training syllabus, refer to Appendix 11.0 to Document SA-CATS 61.

(1) Helicopter

In the case of an applicant for a night rating for a helicopter the practical instruction must include –

- (a) Pre-flight Operations;
- (b) Take-off Procedures;
- (c) In-flight Manoeuvres;
- (d) Approach and Landing; and
- (e) Non-normal Emergency Operations

(2) Aeroplane

In the case of an applicant for a night rating for an aeroplane the practical instruction must include –

- (a) Pre-flight Operations;
- (b) Take-off Procedures;
- (c) In-flight Manoeuvres;
- (d) Approach and Landing; and
- (e) Non-normal Emergency Operations.

61.11.1 REQUIREMENTS FOR AN INSTRUMENT RATING

1. Training

(1) Aim of the Instrument Rating training course

The aim of the Instrument Rating training course is to train a candidate to the level of proficiency required for the issue of an instrument rating.

(2) Contents and requirements of training course

(a) The applicant must complete a training course with an aviation training organisation approved by the Director in terms of Part 141. However, the theoretical knowledge course and the practical training course may be completed at different aviation training organisations.

- (b) The course is comprised of –
- (i) theoretical knowledge course; and
 - (ii) practical training course.

(3) Theoretical knowledge course

(a) An instrument rating theoretical knowledge course shall cover the subjects listed below –

- (b) IF theoretical knowledge –
- (i) Aviation Meteorology;
 - (ii) Flight Planning and Performance;
 - (iii) Radio Aids and Communication;
 - (iv) General Navigation;
 - (v) Air Law and Operational Procedures;
 - (vi) Instruments and Electronics;
 - (vii) Human Performance;

(c) Theoretical knowledge course syllabus

The detailed theoretical knowledge syllabus is contained in Appendix 2.0A to Document SA-CATS 61.

(4) Practical Flight Training course

The detailed practical flight training syllabus is contained in Appendix 12.0.

- (5) Radio Telephony
- (a) To be eligible for the RTC a candidate must prove his knowledge of the ITU (International Telecommunications Union), and CAA requirements in both written and oral tests. The requirements are:
- (i) ITU: Knowledge of radiotelephony operation and procedures, ability to transmit and receive messages by radio and knowledge of the radio communication regulations (e.g. use of different appropriate frequencies, interference, etc.) and especially those relating to the safety of human life.
 - (ii) ICASA: Proficiency in operating a radio installation including changing frequency, transmitting and receiving messages using the prescribed procedures, identification of Morse code beacons and clearing minor external faults.
 - (iii) The CAA: requirements are based on documents issued by the International Civil Aviation Organisation (ICAO) dealing with procedures, abbreviations and flight planning, the various aeronautical information circulars (AIC) in force, the S.A. Aeronautical Information Publication (AIP), Civil Aviation Regulations (CAR) and Civil Aviation Technical Standards (CATS) and also other relevant regulations or rules in force.
 - (iv) Applicants for a General Radio Certificate shall pass a theoretical General Radio Examination at an approved CAA examination centre. The training syllabus for a General Radio Certificate is contained in Appendix 1.5a to Document SA-CATS 61.
- (b) Applicants for a General Radio Certificate shall in addition to the theoretical knowledge examination pass a practical communication test including the identification of radio beacons using morse code conducted by a Designated Radio Examiner (General). The practical test shall include the full completion of an ATC IFR Flight Plan and examine, at minimum, the following aspects for an IFR flight departing on a standard or non-standard departure from a controlled aerodrome, into a CTR/TMA, flying in both controlled and uncontrolled airspace en route to a controlled airfield as destination, complying with a standard arrival (STAR) and the completion of an instrument approach procedure (precision or non-precision):
- (i) Use of Radio on the Ground –
 - (aa) Obtaining start clearance
 - (bb) Obtaining taxi clearance
 - (cc) Acceptance and read back of ATC departure clearance
(Standard/non-standard)
 - (ii) Departure procedure –
 - (aa) Take-off clearance
 - (bb) Use of SID chart/compliance with non-standard departure procedure
 - (cc) Selection of departure frequency and contact with relevant ATSU
 - (dd) Use of area chart if applicable
 - (iii) En route procedures –
 - (aa) Use of radio navigation chart
 - (bb) Selection of frequencies appropriate to the route
 - (cc) Passing and revising estimates
 - (dd) Complying with onward clearance time (OCT)
 - (iv) Arrival procedures –
 - (aa) Use of area chart if applicable
 - (bb) Acceptance and review of STAR and instrument approach charts

- (cc) Radar vectors to ILS localiser or Holding beacon for non-precision approach including expected approach time (EAT)
- (dd) Establishing weather minima at landing aerodrome and compliance with Approach Ban
- (ee) Completion of instrument approach procedure using IAC and correct radio procedures
- (v) Radio communication failure –
Emphasis shall be placed on correct use of aviation words and phrases as well as the avoidance of slang terms.

61.11.3 THEORETICAL KNOWLEDGE EXAMINATION

1. Written examination

- (1) The applicant for an instrument rating shall pass the written theoretical knowledge examinations in the subjects prescribed in TS 61.11.1(3)(b).
- (2) The written theoretical knowledge examination shall be conducted by the SACAA.

61.11.4 SKILLS TEST FOR AN INSTRUMENT RATING

1. Procedures and manoeuvres

The Skills Test shall be conducted in accordance with the Practical Test Standard contained in Appendix 2.5 to Document SA-CATS 61, as appropriate, using the skills test form.

61.11.7 REVALIDATION OF AN INSTRUMENT RATING

1. Revalidation check

The revalidation check shall be conducted in accordance with the Practical Test Standard contained in Appendix 2.5 to Document SA-CATS 61, as appropriate, using the skills test form.

2. Theoretical knowledge examination

The theoretical knowledge examinations shall be the examinations indicated in TS 61.11.3.

3. Application for revalidation

The application for an instrument rating shall be made on the appropriate form.

4. Endorsement of logbook

The endorsement in the logbook of the applicant shall contain the following –

- (a) the stamp of the Designated Flight Examiner, which shall indicate the name, licence number and designation of the Designated Flight Examiner;
- (b) the date of the proficiency test;
- (c) the description of the proficiency test;
- (d) the result of the test as reflected on the test form; and
- (e) the signature of the Designated Flight Examiner.

61.12.1 REQUIREMENTS FOR GRADE III AEROPLANE FLIGHT INSTRUCTOR RATING

1. Training

- (1) Aim
The aim of the Grade III Flight Instructor (A) rating course is to train a candidate to the level of proficiency required for the issue of a Grade III flight instructor rating.
- (2) Contents and requirements of training course
 - (a) The applicant must complete a training course with an aviation training organisation approved by the Director in terms of Part 141. However, the theoretical knowledge course and the practical training course may be completed at different aviation training organisations.
 - (b) A SA Air Force pilot or navigator instructor may be exempted from attending the theoretical knowledge course. The Air Force pilot instructor is furthermore exempted from the requirement to conduct 20 hours of patten.
- (3) Theoretical knowledge course
Theoretical knowledge syllabus is contained in Appendix 13.0 to Document SA-CATS 61.
- (4) Practical Instruction course

The detailed syllabus is contained in Appendix 13.1 to Document SA-CATS 61.

(5) Ground evaluation

The ground evaluation shall comprise the following:

- (a) a class teaching evaluation test conducted by a Designated Flight Examiner and the instructor responsible for the training of the candidate;
- (b) the DFE conducting such test shall be specifically nominated for FIC by the Director;
- (c) the candidate shall present a full briefing on a subject that was given in advance to him or her by the Designated Flight Examiner;
- (d) the candidate shall be assessed on their basic instrument training aspects.

61.12.3 THEORETICAL KNOWLEDGE EXAMINATIONS FOR GRADE III AEROPLANE FLIGHT INSTRUCTOR RATING

1. Syllabus

The applicant for a Grade III flight instructor (A) rating shall pass prior to the commencement of practical class and flight training the written theoretical knowledge examinations in the subjects listed below –

- (a) Applied Meteorology and Navigation;
- (b) Principles of Flight and Legislation.

61.12.4 SKILLS TEST FOR GRADE III (AEROPLANE) FLIGHT INSTRUCTOR RATING

1. Procedures and manoeuvres

The skills test shall be conducted by the nominated Designated Flight Examiner in accordance with the Practical Test Standard contained in skills test form.

61.12.6 PERIOD OF VALIDITY AND REISSUE OF A GRADE III AEROPLANE FLIGHT INSTRUCTOR RATING

1. Flight Instructor refresher seminar

- (1) Flight Instructor refresher seminars should be arranged by ATOs as part of their training programme. Attendance by a flight instructor of the bi-annual instructor seminar conducted regionally by the Authority will substitute this requirement.
- (2) The seminars should run for between one and two days, and if credit is required in terms of this Part, attendance from participants will be required for the whole duration of the seminar including breakout groups or workshops.
- (3) The Director will make use of the services of experienced flight instructors and Designated Flight Examiners who are well versed in various levels of flying training to participate in, or to provide lectures and group discussions at the seminars.
- (4) The attendance form shall be completed and signed by the organiser of the Seminar and shall accompany the revalidation application.
- (5) The content of the Flight Instructor refresher seminar will generally be selected from the following topics –
 - (a) new and/or current rules/regulations, with emphasis on knowledge of SA CAR as applicable to the job of the flight instructor;
 - (b) teaching and learning;
 - (c) instructional techniques;
 - (d) the role of the instructor;
 - (e) human factors;
 - (f) topical and recent accidents and their probable cause;
 - (g) flight safety, incident and accident prevention;
 - (h) airmanship;
 - (i) legal aspects and enforcement procedures;
 - (j) navigational skills including new/current radio navigation aids;
 - (k) teaching instrument flying;

- (l) weather related topics including methods of distribution of aeronautical information; and
 - (m) feedback on knowledge and skills deficiencies revealed in the prescribed theoretical and practical examinations and tests, for improvement in instruction.
- (6) The seminar will consist of formal sessions, which will typically allow for a presentation time of 45 minutes and 15 minutes for questions. Group breakouts and discussions will be facilitated and summarised at the end of the day's proceedings.

61.12.7 REVALIDATION OF A GRADE III AEROPLANE FLIGHT INSTRUCTOR RATING

1. Flight instructor refresher seminar

- (a) The Flight Instructor refresher seminar is described in TS 61.12.6.

2. Revalidation skills test

- (a) The revalidation skills test shall be conducted by the nominated Designated Flight Examiner in accordance with the Practical Test Standard contained in skills test form.

61.13.1 REQUIREMENTS FOR GRADE II AEROPLANE FLIGHT INSTRUCTOR RATING

1. Training

The aim of the Grade II Flight Instructor (A) rating course is to train a candidate to the level of proficiency required for the issue of a Grade II flight instructor rating.

2. Contents and requirements of training course

- (1) The applicant must complete a training course with an aviation training organisation approved by the Director in terms of Part 141. However, the theoretical knowledge course and the practical training course may be completed at different aviation training organisations.
- (2) A SA Air Force pilot or navigator instructor may be exempted from attending the theoretical knowledge course. The Air Force pilot instructor is furthermore exempted from the requirement to conduct 20 hours of patten.

3. Theoretical knowledge course

Theoretical knowledge syllabus is contained in Appendix 13.0 to Document SA-CATS 61.

4. Practical instruction course

The detailed syllabus is contained in Appendix 13.1 to Document SA-CATS 61.

5. Ground evaluation

The ground evaluation shall comprise the following:

- (a) a class teaching evaluation test conducted by a Designated Flight Examiner and the instructor responsible for the training of the candidate;
- (b) the DFE conducting such test shall be nominated by the Director;
- (c) the candidate shall present a full briefing on a subject given to him or her in advance by the nominated Designated Flight Examiner.

61.13.4 SKILLS TEST FOR GRADE II AEROPLANE FLIGHT INSTRUCTOR RATING

1. Procedures and manoeuvres

The Skills Test shall be conducted by the nominated Designated Flight Examiner in accordance with the Practical Test Standard contained in skills test form.

61.13.5 PRIVILEGES AND LIMITATIONS OF A GRADE II AEROPLANE FLIGHT INSTRUCTOR RATING

1. Endorsement

The flight instructor wishing to conduct training for the ratings listed in CAR 61.13.5(1)(g) shall have the applicable endorsement entered into his or her pilot logbook.

61.13.6 PERIOD OF VALIDITY AND REISSUE OF A GRADE II AEROPLANE FLIGHT INSTRUCTOR RATING

1. Flight Instructor refresher seminar

- (1) Flight Instructor refresher seminars will be co-ordinated and arranged by the SA CAA at various centres, taking due regard of the distribution of instructors in South Africa.
- (2) The seminars will run for between one and two days, and if credit is required in terms of this Part, attendance from participants will be required for the whole duration of the seminar including breakout groups/workshops.
- (3) The Director will make use of the services of experienced flight instructors and Designated Flight Examiners who are well versed in various levels of flying training to participate in, or to provide lectures and group discussions at the seminars.
- (4) The attendance form shall be completed and signed by the organiser of the Seminar and shall accompany the revalidation application.
- (5) The content of the Flight Instructor refresher seminar will generally be selected from the following topics –
 - (a) new and/or current rules/regulations, with emphasis on knowledge of SA CAR as applicable to the job of the flight instructor.
 - (b) teaching and learning;
 - (c) instructional techniques;
 - (d) the role of the instructor;
 - (e) human factors;
 - (f) topical and recent accidents and their probable cause;
 - (g) flight safety, incident and accident prevention;
 - (h) airmanship;
 - (i) legal aspects and enforcement procedures;
 - (j) navigational skills including new/current radio navigation aids;
 - (k) teaching instrument flying;
 - (l) weather related topics including methods of distribution of aeronautical information; and
 - (m) feedback on knowledge and skills deficiencies revealed in the prescribed theoretical and practical examinations and tests, for improvement in instruction.
- (6) The seminar will consist of formal sessions, which will typically allow for a presentation time of 45 minutes and 15 minutes for questions. Group breakouts and discussions will be facilitated and summarised at the end of the day's proceedings.

61.13.7 REVALIDATION OF A GRADE II AEROPLANE FLIGHT INSTRUCTOR RATING

1. Flight instructor refresher seminar

- (1) The Flight Instructor refresher seminar is described in TS 61.13.6.

2. Revalidation skills test

- (1) The revalidation skills test shall be conducted by the nominated Designated Flight Examiner in accordance with the Practical Test Standard contained in skills test form.

61.14.1 REQUIREMENTS FOR GRADE I AEROPLANE FLIGHT INSTRUCTOR RATING

1. Training course

- (1) The applicant must complete a training course with a training organisation approved by the Director. The detailed syllabus is contained in Appendix 18.0 to Document SA-CATS 61.
- (2) The applicant must pass an oral examination on the subjects contained in Appendix 18.0 to Document SA-CATS 61.

61.14.4 SKILLS TEST FOR GRADE I AEROPLANE FLIGHT INSTRUCTOR RATING

1. Procedures and manoeuvres

The skills test shall be conducted in accordance with the Practical Test Standard contained in the skills test form.

61.14.7 REVALIDATION OF GRADE I AEROPLANE FLIGHT INSTRUCTOR RATING

1. **Flight instructor refresher seminar**

- (1) The skills test shall be conducted in accordance with the Practical Test Standard contained in the skills test form. This form, completed by the Designated Flight Examiner, shall accompany the application form.
- (2) When required by CAR 61.18.6, the applicant for a revalidation of a Grade III flight instructor (A) rating shall complete the flight instructor refresher seminar as detailed below –
 - (a) Flight Instructor refresher seminar
 - (i) Flight Instructor refresher seminars will be co-ordinated and arranged by the SA CAA at various centres, taking due regard of the distribution of instructors in South Africa.
 - (ii) The seminars will run for between one and two days, and if credit is required in terms of this Part, attendance from participants will be required for the whole duration of the seminar including breakout groups/workshops.
 - (iii) The Director will make use of the services of experienced flight instructors and Designated Flight Examiners who are well versed in various levels of flying training to participate in, or to provide lectures and group discussions at the seminars.
 - (iv) The attendance form shall be completed and signed by the organiser of the Seminar and shall accompany the revalidation application.
 - (v) The content of the Flight Instructor refresher seminar will generally be selected from the following topics –
 - (aa) new and/or current rules/regulations, with emphasis on knowledge of SA CAR's as applicable to the job of the flight instructor;
 - (bb) teaching and learning;
 - (cc) instructional techniques;
 - (dd) the role of the instructor;
 - (ee) human factors;
 - (ff) topical and recent accidents and their probable cause;
 - (gg) flight safety, incident and accident prevention;
 - (hh) airmanship;
 - (ii) legal aspects and enforcement procedures;
 - (jj) navigational skills including new/current radio navigation aids;
 - (kk) teaching instrument flying;
 - (ll) weather related topics including methods of distribution of aeronautical information; and
 - (mm) feedback on knowledge and skills deficiencies revealed in the prescribed theoretical and practical examinations and tests, for improvement in instruction.
 - (vi) The seminar will consist of formal sessions, which will typically allow for a presentation time of 45 minutes and 15 minutes for questions. Group breakouts and discussions will be facilitated and summarised at the end of the day's proceedings.
- (3) The Skills Test report referred to is the skills test form.
 - (4) The result of the skills test shall be endorsed in the pilot logbook as per CAR 61.01.19(2) and Appendix A to this Document.

61.15.1 **REQUIREMENTS FOR GRADE III HELICOPTER FLIGHT INSTRUCTOR RATING**

1. **Training**

The aim of the Grade III Flight Instructor (H) rating course is to train a candidate to the level of proficiency required for the issue of a Grade III flight instructor rating.

2. **Contents and requirements of training course**

- (1) The applicant must complete a training course with an aviation training organisation approved by the Director in terms of Part 141. However, the theoretical knowledge course

and the practical training course may be completed at different aviation training organisations.

- (2) A SA Air Force pilot or navigator instructor is exempted from attending the theoretical knowledge course. The Air Force pilot instructor is furthermore exempted from the requirement to conduct 20 hours of pattern.

3. Theoretical knowledge course

Theoretical knowledge syllabus is contained in Appendix 13.0 to Document SA-CATS 61.

4. Practical instruction course

The detailed syllabus is contained in Appendix 13.1 to Document SA-CATS 61.

5. Theoretical knowledge examinations

The applicant for a Grade III flight instructor (H) rating shall pass prior to the commencement of training the written theoretical knowledge examinations in the subjects listed below –

- (a) Applied Meteorology and Navigation;
- (b) Principles of Flight and Legislation.

61.15.3 THEORETICAL KNOWLEDGE EXAMINATIONS FOR GRADE III HELICOPTER FLIGHT INSTRUCTOR RATING

1. Syllabus

The applicant for a Grade III flight instructor (H) rating shall pass prior to the commencement of practical class and flight training the written theoretical knowledge examinations in the subjects listed below –

- (a) Applied Meteorology and Navigation;
- (b) Principles of Flight and Legislation.

61.15.4 SKILLS TEST FOR A GRADE III HELICOPTER FLIGHT INSTRUCTOR RATING

1. Procedures and manoeuvres

- (1) The DFE conducting the skills test shall be nominated by the Director.
- (2) The skills test shall be conducted by the nominated Designated Flight Examiner in accordance with the Practical Test Standard contained in skills test Form.
- (3) The skills test shall comprise a class teaching evaluation test conducted by a Designated Flight Examiner and the instructor responsible for the training of the candidate.
- (4) The candidate shall present a full briefing on a subject given to him or her in advance by the nominated Designated Flight Examiner.

61.15.6 PERIOD OF VALIDITY AND REISSUE OF A GRADE III HELICOPTER FLIGHT INSTRUCTOR RATING

1. Flight Instructor refresher seminar

The flight instructor refresher seminar shall be in the format as prescribed in TS 61.15.7.

61.15.7 REVALIDATION OF A GRADE III HELICOPTER FLIGHT INSTRUCTOR RATING

1. Flight Instructor refresher seminar

- (1) Flight Instructor refresher seminars will be co-ordinated and arranged by the SA CAA at various centres, taking due regard of the distribution of instructors in South Africa.
- (2) The seminars will run for between one and two days, and if credit is required in terms of this Part, attendance from participants will be required for the whole duration of the seminar including breakout groups/workshops.
- (3) The Director will make use of the services of experienced flight instructors and Designated Flight Examiners who are well versed in various levels of flying training to participate in, or to provide lectures and group discussions at the seminars.
- (4) The attendance form shall be completed and signed by the organiser of the Seminar and shall accompany the revalidation application.
- (5) The content of the Flight Instructor refresher seminar will generally be selected from the following topics –

- (a) new and/or current rules/regulations, with emphasis on knowledge of SA CAR as applicable to the job of the flight instructor;
 - (b) teaching and learning;
 - (c) instructional techniques;
 - (d) the role of the instructor;
 - (e) human factors;
 - (f) topical and recent accidents and their probable cause;
 - (g) flight safety, incident and accident prevention;
 - (h) airmanship;
 - (i) legal aspects and enforcement procedures;
 - (j) navigational skills including new/current radio navigation aids;
 - (k) teaching instrument flying;
 - (l) weather related topics including methods of distribution of aeronautical information; and
 - (m) feedback on knowledge and skills deficiencies revealed in the prescribed theoretical and practical examinations and tests, for improvement in instruction.
- (6) The seminar will consist of formal sessions, which will typically allow for a presentation time of 45 minutes and 15 minutes for questions. Group breakouts and discussions will be facilitated and summarised at the end of the day's proceedings.

2. Revalidation skills test

- (2) The skills test shall be conducted in accordance with the Practical Test Standard contained in skills test form CA 61.16.3.
- (3) The Grade III instructor rating revalidation shall be endorsed in the applicant's logbook as prescribed in Appendix A to Document SA-CATS 61.
- (4) The failure of the Grade III instructor rating revalidation shall be endorsed in the applicant's logbook as prescribed in Appendix A to Document SA-CATS 61.

61.16.1 REQUIREMENTS FOR GRADE II HELICOPTER FLIGHT INSTRUCTOR RATING

1. Training

The aim of the Grade II Flight Instructor (H) rating course is to train a candidate to the level of proficiency required for the issue of a Grade II helicopter flight instructor rating.

2. Contents and requirements of training course

- (1) The applicant must complete a training course with an aviation training organisation approved by the Director in terms of Part 141. However, the theoretical knowledge course and the practical training course may be completed at different aviation training organisations.
- (2) A SA Air Force pilot or navigator instructor may be exempted from attending the theoretical knowledge course. The Air Force pilot instructor is furthermore exempted from the requirement to conduct 20 hours of patten.

3. Theoretical knowledge course

Theoretical knowledge syllabus is contained in Appendix 13.0 to Document SA-CATS 61.

4. Practical instruction course

The detailed syllabus is contained in Appendix 13.1 to Document SA-CATS 61.

5. Ground evaluation

- (1) The ground evaluation shall comprise a class teaching evaluation test conducted by a Designated Flight Examiner and the instructor responsible for the training of the candidate.
- (2) The DFE conducting the test shall be nominated by the Director.
- (3) The candidate shall present a full briefing on a subject given to him or her in advance by the nominated Designated Flight Examiner.

61.16.4 SKILLS TEST FOR GRADE II HELICOPTER FLIGHT INSTRUCTOR RATING

1. Procedures and manoeuvres

The Skills Test shall be conducted by the nominated Designated Flight Examiner in accordance with the Practical Test Standard contained in skills test Form CA 61-16-3.

61.16.5 PRIVILEGES AND LIMITATIONS OF A GRADE II HELICOPTER FLIGHT INSTRUCTOR RATING

1. Endorsement

The flight instructor wishing to conduct training for the ratings listed in subparagraph (1)(h) of regulation 61.16.5 shall have the applicable endorsement entered into his or her pilot logbook.

61.16.6 PERIOD OF VALIDITY AND REISSUE OF A GRADE II HELICOPTER FLIGHT INSTRUCTOR RATING

1. Flight Instructor refresher seminar

- (1) Flight Instructor refresher seminars will be co-ordinated and arranged by the SA CAA at various centres, taking due regard of the distribution of instructors in South Africa.
- (2) The seminars will run for between one and two days, and if credit is required in terms of this Part, attendance from participants will be required for the whole duration of the seminar including breakout groups/workshops.
- (3) The Director will make use of the services of experienced flight instructors and Designated Flight Examiners who are well versed in various levels of flying training to participate in, or to provide lectures and group discussions at the seminars.
- (4) The attendance form shall be completed and signed by the organiser of the Seminar and shall accompany the revalidation application.
- (5) The content of the Flight Instructor refresher seminar will generally be selected from the following topics –
 - (a) new and/or current rules/regulations, with emphasis on knowledge of SA CAR as applicable to the job of the flight instructor;
 - (b) teaching and learning;
 - (c) instructional techniques;
 - (d) the role of the instructor;
 - (e) human factors;
 - (f) topical and recent accidents and their probable cause;
 - (g) flight safety, incident and accident prevention;
 - (h) airmanship;
 - (i) legal aspects and enforcement procedures;
 - (j) navigational skills including new/current radio navigation aids;
 - (k) teaching instrument flying;
 - (l) weather related topics including methods of distribution of aeronautical information; and
 - (m) feedback on knowledge and skills deficiencies revealed in the prescribed theoretical and practical examinations and tests, for improvement in instruction.
- (6) The seminar will consist of formal sessions, which will typically allow for a presentation time of 45 minutes and 15 minutes for questions. Group breakouts and discussions will be facilitated and summarised at the end of the day's proceedings.

61.16.7 REVALIDATION OF A GRADE II HELICOPTER FLIGHT INSTRUCTOR RATING

1. Flight instructor refresher seminar

- (1) The Flight Instructor refresher seminar is described in TS 61.16.6.

2. Revalidation skills test

- (1) The revalidation skills test shall be conducted by the nominated Designated Flight Examiner in accordance with the Practical Test Standard contained in skills test form CA 61.16.3.

61.17.1 REQUIREMENTS FOR GRADE I HELICOPTER FLIGHT INSTRUCTOR RATING

1. Training course

- (1) The applicant must complete a training course with a training organisation approved by the Director. The detailed syllabus is contained in Appendix 18.0 to Document SA-CATS 61.
- (2) The applicant must pass an oral examination on the subjects contained in Appendix 18.0 to Document SA-CATS 61.

61.17.4 SKILLS TEST FOR GRADE I HELICOPTER FLIGHT INSTRUCTOR RATING

1. Procedures and manoeuvres

The Skills Test shall be conducted in accordance with the Practical Test Standard contained in the skills test form CA 61-16-3.

61.17.7 REVALIDATION OF GRADE I HELICOPTER FLIGHT INSTRUCTOR RATING

1. General

- (1) The skills test shall be conducted in accordance with the Practical Test Standard contained in the skills test Form CA 61-16-3. This form, completed by the Designated Flight Examiner, shall accompany the application form.
- (2) When required by sub-regulation 61.17.6 (3), the applicant for a revalidation of a Grade III flight instructor (H) rating shall complete the flight instructor refresher seminar as detailed below.

2. Flight Instructor refresher seminar

- (1) Flight Instructor refresher seminars will be co-ordinated and arranged by the SA CAA at various centres, taking due regard of the distribution of instructors in South Africa.
- (2) The seminars will run for between one and two days, and if credit is required in terms of this Part, attendance from participants will be required for the whole duration of the seminar including breakout groups/workshops.
- (3) The Director will make use of the services of experienced flight instructors and Designated Flight Examiners who are well versed in various levels of flying training to participate in, or to provide lectures and group discussions at the seminars.
- (4) The attendance form shall be completed and signed by the organiser of the Seminar and shall accompany the revalidation application.
- (5) The content of the Flight Instructor refresher seminar will generally be selected from the following topics –
 - (a) new and/or current rules/regulations, with emphasis on knowledge of SA CAR's as applicable to the job of the flight instructor;
 - (b) teaching and learning;
 - (c) instructional techniques;
 - (d) the role of the instructor;
 - (e) human factors;
 - (f) topical and recent accidents and their probable cause;
 - (g) flight safety, incident and accident prevention;
 - (h) airmanship;
 - (i) legal aspects and enforcement procedures;
 - (j) navigational skills including new/current radio navigation aids;
 - (k) teaching instrument flying;
 - (l) weather related topics including methods of distribution of aeronautical information; and
 - (m) feedback on knowledge and skills deficiencies revealed in the prescribed theoretical and practical examinations and tests, for improvement in instruction.
- (6) The seminar will consist of formal sessions, which will typically allow for a presentation time of 45 minutes and 15 minutes for questions. Group breakouts and discussions will be facilitated and summarised at the end of the day's proceedings.

3. Skills test

- (1) The skills test report referred to is the skills test Form CA 61-16-3.
- (2) The result of the skills test shall be endorsed in the pilot logbook as per subregulation 61.1.19.(2) and Appendix A to SA-CATS-FCL 61.

61.22.1 REQUIREMENTS FOR HELICOPTER SLING LOAD RATING

1. Training

- (1) Aim of training course
The aim of the training course is to train a candidate to the level of proficiency required for the issue of a helicopter sling load rating, and to provide the training necessary to act as pilot-in-command of a helicopter engaged in sling load operations.
- (2). Contents and requirements of training course
 - (a) The candidate must have completed not less than 250 hours of flight time as pilot-in-command of a helicopter. The course must be conducted by the holder of an aviation training organisation approval, issued by the Director in terms of Part 141.
 - (b) The course comprises –
 - (i) a theoretical knowledge course; and
 - (ii) a practical training course.
- (3) Theoretical knowledge course
The theoretical knowledge course must comprise instruction on the following –
 - (a) the significance of operations within and outside ground effect, and the correct use of the relevant performance charts;
 - (b) the possible fore and aft C of G changes when picking up and releasing sling loads;
 - (c) the pre-flight checking and correct operation of the helicopter cargo hook equipment, including the emergency release;
 - (d) the importance of a full and correct briefing for all flight and ground crew members participating in the operation as regards to –
 - (i) pick-up and drop-off points;
 - (ii) load preparation and flight characteristics of different loads;
 - (ii) oscillation characteristics and their control;
 - (e) the care, selection, preparation and correct use of lifting equipment, including strops of various lengths, swivels, shackles, nets, and safety harnesses for cabin crew, as applicable;
 - (f) responsibilities and duties of cabin crew;
 - (g) aircraft-generated static, use of the static discharge pole and the correct procedure in this regard;
 - (h) marshalling signals;
 - (i) correct radio procedures and terminology for intercom communications between the pilot and cabin crew;
 - (j) pick-up and release procedures;
 - (k) safety and other equipment, including hand-held transceivers, hard hats, safety goggles, durable gloves, overalls and whistles;
 - (l) emergency procedures, including engine failure in the hover, strops getting fouled either with the helicopter or with other items, loads becoming difficult or impossible to control in flight, and jettisoning of loads; the effects of buildings and obstruction on prevailing winds, escape routes in the event of downdrafts, turbulence and engine failure;
 - (m) the pre-flight briefing which is given just before each flight, and which consists of a brief summary of the principal parts of the theoretical knowledge course, together with any particular points of airmanship, air traffic control, and meteorology pertaining to the flight; and

- (n) the relevant air law aspects.
- (4) Practical training course
 - (a) In-flight instruction

A full briefing must be given during flight, covering the following:

 - (i) Airmanship –
 - (aa) The suitability of pick-up and drop areas in respect of size, shape, surface, slope, approach and take-off paths and obstructions;
 - (bb) Helicopter operation with due regard to such matters as power in the hover, power limitations, hovering into the wind, position of ground crew, and obstructions;
 - (cc) The limits for the relevant conditions;
 - (dd) Good lookout at all times;
 - (ee) Built-up areas and gatherings of people must be avoided when a load is suspended below the helicopter, provided that where the operation is to be conducted within be a built-up area, safe flight routes must be established and approved by the Director and local municipality;
 - (ff) Cabin crew, if used, must be safely secured to the helicopter at all times by means of a safety harness or seat belt.
 - (ii) Hook-up and transition –
 - (aa) Demonstrate the positioning of the helicopter accurately above the load using the techniques of marshalling either by radio, visual signals, mirror or cabin crew intercom;

Note: When a cabin crew member is used for marshalling, the pilot must strictly obey his or her instructions at all times, except if the helicopter and its occupants would be placed in jeopardy by doing so;

 - (bb) Demonstrate the pick-up and the transition to forward flight when at a safe height;
 - (cc) The appropriate cruise speed should take into account the load's flight characteristics, the environment, level of turbulence and engine power available;
 - (dd) Demonstrate control of the load during flight and procedure to be followed if the load becomes difficult or impossible to control. For example, if the load starts oscillating, the pilot should reduce power and enter a gentle turn left or right, or bring the helicopter to a stationary hover; this generally will alleviate the condition. The load should only be jettisoned in extreme cases when the helicopter or its occupants are at risk and then only over uninhabited areas.
 - (iii) Approach and drop-off –
 - (aa) The approach should be cautious and fairly shallow, taking into account the distance the load is beneath the aircraft and above the surface;
 - (bb) The transition to the hover should be made high, to ensure adequate clearance between the load and the surface or ground obstacles;
 - (cc) Directional information should be provided by the radio, visual signals or cabin crew during the final stages of the approach;
 - (dd) Demonstrate positioning the load over the drop-off point and lowering it to the surface or its position, using the techniques of marshalling either by radio, visual signals, mirror or cabin crew intercom;
 - (ee) Demonstrate releasing the load, using the normal release method and the emergency release method.
 - (iv) Common faults –

- (aa) Lack of precision when hovering inside ground effect or outside ground effect;
 - (bb) Lack of appreciation for ground clearance with an underslung load;
 - (cc) Vertical drift when lifting and lowering the load;
 - (dd) Horizontal drift when lifting and lowering the load;
 - (ee) Jerky pick-up and drop-off;
 - (ff) Pilot-induced oscillations due to over-controlling on the cyclic;
 - (gg) The effects of trying to counter oscillations in flight using cyclic instead of power and speed.
- (b) Air exercises
- Exercise 1: Hook-up procedure
- (i) Approach the hook-up area using –
 - (aa) ground marshaller;
 - (bb) radio;
 - (cc) cabin crew intercom; and
 - (dd) helicopter mirror.
 - (ii) Establish a steady hover using –
 - (aa) short strop;
 - (bb) long strop.
 - (iii) Once the load has been hooked up, take up the slack while monitoring the power required to hover before lifting the helicopter vertically until the load is well clear of the surface or obstacles, as communicated/established by each of the methods listed under paragraph (a) above.
 - (iv) Once the load is clear, transit to forward flight.
- Exercise 2: In-flight
- (v) Observe V_{ne} as established from the flight manual or dictated by the load, while handling the controls as smoothly as possible;
 - (vi) Reduce power and enter a gentle turn to either left or right, or bring the helicopter to a stationary hover, to demonstrate the technique for bringing an oscillating load under control;
 - (vii) Avoid any built-up or inhabited areas during flight with a sling load.
- Exercise 3: Drop-off procedure
- (viii) Approach the drop-off area at a shallow angle using –
 - (aa) ground marshaller;
 - (bb) radio;
 - (cc) cabin crew intercom; and
 - (dd) helicopter mirror;
 - (ix) Terminate the approach in a high hover with the load well clear of the surface or ground obstacles as communicated/established by each of the methods listed under paragraph (a) above;
 - (x) Maintain a steady inside ground effect hover or outside ground effect hover while monitoring the power required to hover;
 - (xi) Position the load over the drop-off point;
 - (xii) Once in position, lower the load vertically until it contacts the surface and then jettison it using –
 - (aa) the normal release system; or
 - (bb) the emergency release system.
- Note: Both normal and emergency release methods are to be practised.*
- (c) Post-flight discussion

The post-flight discussion reviews the exercise and can be used to amplify or clarify any particular point or difficulty, thus consolidating the exercise as a whole.

- (5) Skills test
The applicant shall demonstrate competency in the aspects of subparagraph (b) using appropriate form.

61.23.1 REQUIREMENTS FOR HELICOPTER WINCHING RATING

1. Training

- (1) Aim of training course
The aim of the training course is to train a candidate to the level of proficiency required for the issue of a helicopter winching rating, and to provide the training necessary to act as pilot-in-command of a helicopter engaged in winching operations.
- (2) Contents and requirements of training course
- (a) The candidate must have completed not less than 250 hours of flight time as pilot-in-command of a helicopter. The course must be conducted by the holder of an aviation training organisation approval, issued by the Director in terms of Part 141.
- (b) The course comprises –
- (i) a theoretical knowledge course; and
 - (ii) a practical training course.
- (3) Theoretical knowledge course
- (a) The theoretical knowledge course must comprise instruction on the following –
- (i) The significance of operations inside ground effect and outside ground effect and the correct use of the relevant performance charts;
 - (ii) the preflight checking and correct operation of the helicopter winching equipment, including the emergency cable cutter;
 - (iii) the marked lateral C of G shift that takes place when winching;
 - (iv) the importance of a full and correct briefing for all flight and ground crew members participating in the operation as regards to –
 - (aa) pick-up and drop-off points;
 - (bb) the care, selection, preparation and correct use of winching equipment, including inspection of cables, nets, strops, and safety harness for winch operator, as applicable;
 - (v) responsibilities and duties of cabin crew;
 - (vi) marshalling signals;
 - (vii) load preparation and flight characteristics of different loads;
 - (viii) aircraft-generated static, use of the static discharge pole and the correct procedures in this regard;
 - (ix) correct radio procedures and terminology for intercom communication between the pilot and the winch operator;
 - (x) pick-up and release procedures;
 - (xi) emergency procedures, including engine failure in the hover, cables getting fouled either with the helicopter or with other items, loads becoming difficult or impossible to control in flight and cable cutting; the effects of buildings and obstruction on prevailing winds, escape routes in the event of downdrafts, turbulence and engine failure;
 - (xii) safety and other equipment including hand held transceivers, hard hats, safety goggles, durable gloves, overalls and whistles;
 - (xiii) the relevant air law aspects;
 - (xiv) the pre-flight briefing which is given just before each flight, and which consists of a brief summary of the principal parts of the theoretical knowledge

course, together with any particular points of airmanship, air traffic control, and meteorology pertaining to the flight.

(4) Practical training course

(a) In-flight instruction

A full briefing must be given during flight, covering the following:

(i) Airmanship –

(aa) The suitability of pick-up and drop areas in respect of size and shape, surface, slope, approach and take-off paths, and obstructions;

(bb) Helicopter to be operated within its Vne for winching operations at all times. Transition into forward flight should only be undertaken once the winch cable has been safely stowed;

(cc) The limits for the relevant conditions;

(dd) Good lookout at all times;

(ee) Built up areas and gatherings of people must be avoided when a load is suspended below the helicopter, provided that where the operation is to be conducted within a built up area, safe flight routes must be established and approved by Director and the local municipality;

(ff) Personnel must only be raised or lowered by means of the winch from a stationary hover in relation to the surface and never while the helicopter has any apparent forward, sideward or rearward speed unless deemed necessary in the interests of safety;

(gg) The winch operator must be safely secured to the helicopter by a safety harness, particularly when the doors are open during, or have been removed for the operation, and while manoeuvring people into or out of the helicopter cabin;

(hh) The helicopter should never transit to forward flight with people suspended on the winch cable unless deemed necessary in the interests of safety;

(ii) The helicopter must be operated with due regard for such matters as power limitations, hover power, hovering into the wind, and position of obstructions;

(jj) While in the hover during hoisting operations, the pilot must strictly obey the hoist operator's instructions at all times, except if the helicopter and its occupants would be placed in jeopardy by doing so.

(ii) Hook-up and transition

(aa) Demonstrate the approach and accurate positioning of the helicopter over the pick-up point, guided via the intercom by a flight crew member acting as winch operator;

(bb) Demonstrate the pick-up and the pronounced lateral C of G shift when the winch takes up the weight;

(cc) Demonstrate the transition to forward flight only when the winching operation has been completed. The winching operation is completed when the winched persons or cargo are safely aboard, the winch cable is safely stowed and, where applicable, the cabin doors have been closed.

(iii) Approach and drop-off

- (aa) The approach should be normal;
- (bb) Control should be handed over to the winch operator when still some distance short of the drop-off point;
- (cc) Demonstrate positioning the helicopter, following the instructions given by the winch operator over the intercom;
- (dd) Demonstrate the drop-off and the pronounced C of G shift when the load is removed from the winch cable.
- (iv) Common faults
 - (aa) Lack of precision when hovering inside ground effect or outside ground effect;
 - (bb) Vertical drift when lifting and lowering the load;
 - (cc) Horizontal drift when lifting and lowering the load;
 - (dd) Pilot-induced oscillations due to lateral C of G shift and over-controlling on the cyclic when hovering during the pick-up and drop-off.
- (b) Air exercises
 - (i) Exercise 1: Pick-up procedure
 - (aa) Approach the pick-up area guided by instructions received over the intercom from the winch operator;
 - (bb) Establish a steady inside ground effect hover or outside ground effect hover over the pick-up point following the winch operator's instructions while he or she lowers the winch cable;
 - (cc) Indicate the pronounced C of G shift experienced when picking up the load;
 - (dd) Once the load has been picked up, monitor the power required to hover until the load is safely stowed inside the helicopter, the winch cable is secure and, if applicable, the cabin doors have been closed, before transitioning to forward flight.
 - (ii) Exercise 2: In-flight
Observe Vne as established from the flight manual.
 - (iii) Exercise 3: Drop-off procedure
 - (aa) Approach the drop-off area normally, following instructions by the winch operator given over the intercom;
 - (bb) Terminate the approach in a high hover and follow the winch operator's instructions for the positioning of the helicopter while he or she is lowering the winch cable;
 - (cc) Indicate the pronounced C of G shift when the load is released;
 - (dd) Once the load has been released, maintain the hover until the winch is safely stowed and, if applicable, the cabin doors have been closed;
 - (ee) Only then transit to forward flight.
 - (c) Post-flight discussion
The post-flight discussion reviews the exercise and can be used to amplify or clarify any particular point or difficulty, thus consolidating the exercise as a whole.
- (5) Skills test
The applicant shall demonstrate competency in the aspects of subparagraph 4.2 using appropriate form.

61.24.1 REQUIREMENTS FOR HELICOPTER GAME OR LIVESTOCK CULL RATING

1. Training

- (1) Aim of training course

The aim of the training course is to train a candidate to the level of proficiency required for the issue of an helicopter game or livestock cull rating, and to provide the training necessary to act as pilot-in-command of a helicopter engaged in game or livestock cull operations.

- (2) Contents and requirements of training course
 - (a) The candidate must have completed not less than 250 hours of flight time as pilot-in-command of a helicopter. The course must be conducted by the holder of an aviation training organisation approval, issued by the Director in terms of Part 141.
 - (b) The course comprises –
 - (i) theoretical knowledge course; and
 - (ii) practical training course.
- (3) Theoretical knowledge course
 - (a) The theoretical knowledge course must comprise instruction on the following:
[Under development]
- (4) Practical training course
 - (a) In-flight instruction
[Under development]
- (5) Skills test
The applicant shall demonstrate competency in the aspects of paragraph 4 using Appropriate form.

61.25.2 SKILLS TEST FOR AGRICULTURAL PILOT RATING

1. Conducting the Skills Test

The person conducting the skills test shall test an applicant for the issuing of an agricultural pilot rating on his or her ability to perform as pilot-in-command of an aeroplane, helicopter or microlight aeroplane, as the case may be, in the following procedures and manoeuvres with a degree of competency appropriate to the privileges granted to the holder of an agricultural pilot rating:

- (1) The skills test shall be conducted in accordance with the skills test appropriate form and shall include the following –
 - (a) Assessment of area to be sprayed
 - (b) Load sheet
 - (c) Weather report
- (2) In the case of aeroplanes –
 - (a) Short-field take-off and landings
 - (b) Cross-wind and down-wind take-offs and landings;
 - (c) Flight manoeuvres at minimum air speed;
 - (d) Accelerated stalls;
 - (e) Maximum-rate turns;
 - (i) Incipient spin recoveries entered into inside of and from outside of turns;
 - (ii) Precision landings, normal, down-wind and cross-wind;
 - (iii) Exit from application area, turn around and re-entry to application area under various wind conditions;
 - (iv) Simulated application runs at appropriate heights;
 - (v) Entry to and exit from applications over obstructions;
 - (aa) Avoidance of obstructions;
 - (bb) Emergency procedures.
 - (vi) Low-level forced landing technique
 - (vii) Dump load
- (3) In the case of helicopters –
 - (a) Take-offs and landings at maximum certificated mass for aerial applications;
 - (b) Cross-wind and down-wind take-offs and landings;

- (c) Flight manoeuvres at minimum air speed;
- (d) Maximum-rate turns;
 - (i) recoveries entered into inside of and from outside of turns;
 - (ii) Precision landings, normal, down-wind and cross-wind;
 - (iii) Exit from application area, turn around and re-entry to application area under various wind conditions;
 - (iv) Simulated application runs at appropriate heights;
 - (v) Entry to and exit from applications over obstructions;
 - (aa) Avoidance of obstructions;
 - (bb) Emergency procedures;
 - (vi) Low-level autorotation technique;
 - (vii) Dump load.

2. Skills Test Standard

The skills test shall be conducted in accordance with the standard contained in the skills test appropriate form.

61.25.3 APPLICATION FOR AGRICULTURAL PILOT RATING

1. Skills test report

- (1) The skills test form, completed by the Designated Flight Examiner, shall accompany the application form.
- (2) The Agricultural Pilot Rating shall be endorsed in the pilot licence.

61.26.2 GENERAL REQUIREMENTS FOR DESIGNATED FLIGHT EXAMINERS

1. Assessment course

A Designated Flight Examiner is required to successfully complete the flight examiner assessment course, the contents of which are stated below.

- (1) Flight examiner assessment course
 - (a) An applicant for his or her first designation as a flight examiner (DFE) or for approval as a person to act as flight examiner (APFE) shall have completed an approved flight examiner assessment course within the 12 months immediately preceding such application;
 - (b) The assessment course, referred to in paragraph (a), shall be conducted by the CAA or by the holder of an aviation training organisation approval issued in terms of Part 141, and shall include – as appropriate to the role of the examiner – at least the following subjects –
 - (i) the regulatory requirements relevant to the examination duties;
 - (ii) fundamentals of human performance and limitations relevant to flight examination;
 - (iii) fundamentals of evaluation relevant to examiner's performance;
 - (iv) CAR Part 61, related technical standards, AIP, published flight guides, and AICs;
 - (v) quality system as related to CAR Part 61;
 - (vi) multi-crew co-operation, and human performances and limitations, if applicable;
 - (vii) constructing and conducting a skills test or proficiency check; and
 - (viii) performance assessment.

61.26.10 CONDUCTING OF SKILLS TEST AND PROFICIENCY CHECK BY DESIGNATED FLIGHT EXAMINERS

1. Guidelines

The guidelines for the conducting of a Skills Test or Proficiency Check are contained in Appendix 9.0 to SA-CATS 61.

SA-CATS 62
NATIONAL PILOT LICENSING

List of technical standard

62.01.9 COMPETENCY

1. Revalidation check
2. Annual logbook summary

62.01.10 MEDICAL FITNESS

1. Format for personal medical fitness certificate
2. Medical conditions to watch for

62.01.11 LANGUAGE

1. Ability requirements
2. Ability demonstration

62.01.12 LOGGING OF FLIGHT TIME

1. Format of logbook
2. Information to be contained in logbooks
3. Recording of flight time
4. Manner in which logbooks are to be maintained

62.01.14 RECOGNITION AND VALIDATION OF PILOT LICENCES AND RATINGS ISSUED BY AN APPROPRIATE AUTHORITY OF A CONTRACTING STATE

1. Contracting States

62.01.15 APPLICATION FOR AND ISSUING OF A VALIDATION OF A FOREIGN PILOT LICENCE AND RATINGS

1. Application form
2. Requirements and conditions
3. Certificate of validation
4. Documents to accompany application

62.01.20 RADIO TELEPHONY CERTIFICATES

1. General
2. Restricted certificate
3. Validation of foreign certificate
4. Concessions for holders of national pilot learners certificate
5. Application and examination

62.02.2 TRAINING

1. Required outcomes of training course
2. Practical training
3. Subjects to be covered in theoretical training phase

62.02.3 THEORETICAL KNOWLEDGE EXAMINATIONS

1. Theoretical knowledge examinations
2. Invigilating

62.02.4 CERTIFICATE OF COMPETENCY

1. Basic training and knowledge requirements

62.04.3 TRAINING

62.04.4 THEORETICAL KNOWLEDGE EXAMINATIONS

62.04.5 SKILL TEST

1. Practical test of knowledge of procedures and flying skills
2. Skill test report

62.04.7 APPLICATION

62.05.3 TRAINING

1. Practical training

62.05.4 THEORETICAL KNOWLEDGE EXAMINATIONS

62.05.5 SKILL TEST

1. Practical test of knowledge of procedures and flying skills
2. Skill test report

62.05.7 APPLICATION

62.06.3 TRAINING

1. Practical training

62.06.4 THEORETICAL KNOWLEDGE EXAMINATIONS

62.06.5 SKILL TEST

1. Practical test of knowledge of procedures and flying skills

2. Skill test report

62.07.1 GENERAL

62.07.2 EXPERIENCE

62.07.3 TRAINING

62.07.5 SKILL TEST

62.07.6 APPLICATION

1. Forms
2. Medical fitness certificate
3. Training proficiency card

62.07.11 TYPE RATINGS

62.08.2 EXPERIENCE

62.08.3 TRAINING

62.08.4 THEORETICAL KNOWLEDGE EXAMINATIONS

62.08.5 SKILLS TEST

62.08.6 APPLICATION FOR PARAGLIDER CLASS OR ADD-ON RATING

1. Forms
2. Medical fitness certificate
3. Training proficiency form

62.09.1 GENERAL

62.09.2 EXPERIENCE

62.09.3 TRAINING

1. Required outcomes of training course
2. Main aspects of training course
3. Theoretical tuition
4. Practical tuition

62.09.4 THEORETICAL KNOWLEDGE EXAMINATIONS

62.09.5 SKILL TEST

1. Practical test of knowledge of procedures, instructional technique and flying skills
2. Skill and pattern test report

62.09.9 RENEWAL

1. Flight instructor referresher seminars
2. Open book

62.11.4 THEORETICAL KNOWLEDGE EXAMINATIONS

62.11.5 SKILL TEST

62.13.3 THEORETICAL KNOWLEDGE EXAMINATIONS

62.14.4 TRAINING

1. Required outcomes of training course
2. Contents of training course
3. Theoretical tuition
4. Practical tuition

62.14.5 THEORETICAL KNOWLEDGE EXAMINATIONS

1. Content
2. Invigilation of theoretical knowledge examinations
3. Marking and adjudicating the theoretical knowledge examinations

62.14.6 SKILL TEST

1. Practical test of knowledge of procedures and flying skills
2. Skill test report

62.15.4 ISSUING OF DESIGNATION

62.16.3 TRAINING

1. Practical training

62.16.4 THEORETICAL KNOWLEDGE EXAMINATIONS

62.16.5 SKILL TEST

1. Practical test of knowledge of procedures and flying skills
2. Skill test report

62.16.7 ADDITIONAL TYPE RATINGS BY NAME FOR LIGHT SPORT AEROPLANES

62.17.3 TRAINING

1. Practical training

62.17.4 THEORETICAL KNOWLEDGE EXAMINATIONS

62.17.5 SKILL TEST

1. Practical test of knowledge of procedures and flying skills
2. Skill test report

62.17.7 ADDITIONAL TYPE RATINGS BY NAME FOR TOURING MOTOR GLIDERS

62.17.9 ISSUING

APPENDICES

Note: All the appendices are available on the RAASA website

R62.01	PRACTICAL (CONVENTIONAL)	
R62.02	THEORY (CONVENTIONAL)	
R62.03	SKILLS TEST (CONVENTIONAL)	
R62.04	PRACTICAL (WEIGHT SHIFT)	
R62.05	THEORY (WEIGHT SHIFT)	
R62.06	SKILLS TEST (WEIGHT SHIFT)	
R62.07	PRACTICAL (GYROPLANES)	
R62.08	THEORY (GYROPLANES)	
R62.09	SKILLS TEST (GYROPLANES)	
R62.10	INSTRUCTOR RATING - THEORY	
R62.11	INSTRUCTOR RATING - PRACTICAL	
R62.14	INSTRUCTOR RATING - PRACTICAL	
R62.15	Part 96 AUTHORIZATION - SKILLS TEST	
R62.16	PRACTICAL (LIGHT SPORT)	
R62.17	THEORY (LIGHT SPORT)	
R62.18	SKILLS TEST (LIGHT SPORT)	
R62.19	INSTRUCTORS RATING - SKILLS TEST	
R62.20	Part 96 AUTHORIZATION - PRACTICAL	
R62.21	LOGBOOK SUMMARY FORMAT	

R62.22	MEDICAL FITNESS CERTIFICATE	
R62.23	MEDICAL FITNESS CERTIFICATE FORMAT - MEDICAL PRACTITION	
R62.24	LOGBOOK FORMAT	
R62.25	LOGBOOK FORMAT HANG- AND PARAGLIDING	
R62.26	SAHPA MANUAL OF PROCEDURES	
	SAHPA MOP - ADENDUM DOCUMENTS	
R62.27	THEORETICAL SUBJECT REQUIREMENTS HANG GLIDING	
R62.28	SKILLS TEST REQUIREMENTS HANG GLIDING	
R62.29	TRAINING PROFECIENCY CARD FOR HANG GLIDING	
R62.30	INSTRUCTOR RATING - PRACTICAL HANG- AND PARAGLIDING	
R62.31	INSTRUCTOR RATING - THEORY HANG- AND PARAGLIDING	
R62.32	INSTRUCTOR RATING - SKILL TEST HANG- AND PARAGLIDING	
R62.33	CATEGORY RATING EXPERIENCE HANG GLIDING	
R62.34	CATEGORY RATING PRACTICAL TRAINING AND EXPERIENCE HANG GLIDING	
R62.35	EXPERIENCE REQUIREMENTS PARAGLIDERS AND POWERED PARAGLIDING	
R62.36	CATEGORY RATING PRACTICAL TRAINING AND EXPERIENCE PARAGLIDING	
R62.37	THEORETICAL SUBJECT REQUIREMENTS PARAGLIDING	
R62.38	SKILLS TEST REQUIREMENTS PARAGLIDING	
R62.39	INSTRUCTOR RATING -EXPERIENCE REQUIREMENTS HANG AND PARAGLIDING	
R62.40	SAHPA LICENSE	

62.01.9 COMPETENCY

1. Revalidation check

- (1) The contents of the revalidation check shall be as defined in the form CA62.05 and shall be conducted in an aircraft of the category, class or type for which the pilot requires the revalidation check. In general terms, the elements listed below should be included in the revalidation check, however, it is accepted that there may be aircraft or operational requirements and limitations that prevents some of these elements from being covered. In such cases the instructor shall make appropriate comments on the revalidation check form.
- (a) An applicant for the renewal of a national pilot licence must demonstrate his skill to an appropriately qualified Grade B or Grade A National Flight Instructor:

- (b) Procedures and actions to be tested according to APPENDIX R62.03, APPENDIX R62.06, APPENDIX R62.09, and/or APPENDIX R62.18 depending on the licence to be renewed.
- (c) The flight instructor conducting the revalidation check must complete the assessment report on form CA62-05 with reference to the standard of assessment on a scale of 1 to 5 as indicated in paragraph (h) below.
- (d) If an Assessment category score of 1 was obtained in more than one assessment, the complete test has to be repeated after more training in all aspects that was assessed as below Assessment Category 4.
- (e) If an Assessment category score of 2 was obtained in more than two assessments, the test has to be repeated in respect all aspects that were assessed as below Assessment Category 4, after more training in all these aspects.
- (f) If an Assessment category score of 3 was obtained in more than four assessments, the application for the license may only be presented after more training in these aspects were conducted and a report to the satisfactory completion thereof, including copies of logbook entries of such training, accompanies the application.
- (g) Testing officials are encouraged not to fall into the well-known easy habit of simply awarding “average” assessments. It is important to not be afraid to award either the highest or the lowest mark, and be certain to discuss these with the applicant, his instructor as well as the flight school management.
- (h) Format of assessment report:

<u>Mark obtained</u>	<u>Assessment</u>
1	Failed, unacceptable, requires considerably more training in the particular aspect.
2	Failed, requires further training in the particular aspect.
3	Average, some flight instructor input required with a report before the license may be issued.
4	High average, good standard with no ingrained faults.
5	Above average

2. Annual logbook summary

The annual logbook summary shall:

- (a) be in the format prescribed in APPENDIX R62.21
- (b) reflect the number of hours flown recorded in each column of the logbook, per aircraft category, class or type in the preceding 12 months, a grand total of hours flown in each aircraft category for the period and a grand total of hours flown which has been recorded in each column of the logbook; and
- (c) be submitted together with the annual currency fees and attached to form CA62.02.

62.01.10 MEDICAL FITNESS

1. Format for personal medical fitness certificate

(1) Personal declaration

A medical fitness certificate to be submitted by the applicant for or the holder of a national pilot licence in terms of CAR 62.01.10(2) shall be on form APPENDIX R62.22.

(2) Medical practitioner's declaration

Where a person feels unable to sign the Pilot's declaration, referred to in paragraph 1, or where an aviation training organisation or an authorised Licensing and Safety Officer of an aviation recreation organisation is reluctant to accept the declaration, a Medical Practitioner's Declaration must be submitted.

(3) Requirement for hang- or para-glider ratings

A Medical Practitioner's Declaration is required in respect of the holder of a national pilot license with a hang- or para-glider endorsement, in addition to the Pilot's Declaration (if any) per format prescribed in APPENDIX R62.23.

2. Medical conditions to watch for

The following conditions may cause severe safety risks when flying. Any person suffering, or having suffered, from any of these conditions, must seek medical opinion before any further:

- (1) Chronic bronchitis, severe asthma, chronic sinus disease, chronic ear disease, eye trouble (e.g. inability to read a car number plate at 25 meters – corrective glasses may be used), regular severe migraine.
- (2) Diabetes in any form, rheumatic fever, kidney stones, psychiatric disorders, severe motion or travel sickness, any condition requiring the regular use of drugs or other medication.
- (3) Injuries that were previously sustained and that may inhibit control of an aircraft.

62.01.11 LANGUAGE

1. Ability requirements

The applicant for a pilot licence, to be issued in terms of Part 62 shall have sufficient ability in reading, speaking and understanding the English language in the following circumstances:

(1) Examination:

To undergo and pass oral and written examinations conducted in English, required for the issue of the particular license / ratings applied for;

(2) Ground actions:

All information written in English relevant to the accomplishment of a flight, such as:

- (a) All laws, regulations, rules and other statutory requirements, including all technical manuals;
- (b) all pre-flight administrative and flight planning procedures;
- (c) use of all aeronautical *en route*, departure and approach charts and associated documents;

- (3) Communication:

Be able to clearly and coherently communicate with ATC and other crew members in English during all phases of flight, and particularly during any emergency situation.

2. Ability demonstration

The ability, referred to in section 1 shall be demonstrated by complying with one of the following alternative requirements:

- (1) Having graduated from a pilot licensing course conducted in English; or
- (2) Having passed a specific examination given by or on behalf of the Civil Aviation Authority after having undertaken a course of training enabling the applicant to meet all the objectives listed in section 1 (a) to (c) above; or
- (3) Having passed a specific examination given by or on behalf of the Civil Aviation Authority, if considered necessary by the Director, where an applicant claims English as his or her mother tongue or second language.

62.01.12 LOGGING OF FLIGHT TIME

1. Format of logbook

- (1) Logbooks must be maintained with at least the format as per APPENDIX R62.24.
- (2) The format of logbooks to be maintained by hang-gliding pilots and paragliding pilots will be dependant upon their vario instrument software or as per APPENDIX R62.25.

2. Information to be contained in logbooks

The following information must be recorded in logbooks as applicable:

- (1) General:
 - (a) full name and address of owner;
 - (b) summary of previous flying experience, if any;
 - (c) licence(s) held, with number.
- (2) Particulars of each actual or simulated flight:
 - (a) date;
 - (b) the registration marks and type or ICAO designator of the aircraft, or the make and model and size of hang-glider or para-glider, in which the flight was made or the registration and type of the simulator in which the simulated flight was made;
 - (c) name of pilot-in-command (PIC) or 'SELF';
 - (d) operating capacity of the holder if not PIC;
 - (e) name of safety pilot, if applicable;
 - (f) place of departure and of arrival in respect of an actual flight;
 - (g) nature of flight.
- (3) Specification of pilot flight time experience acquired in any of the following categories:

- (a) authorised flight training received from an appropriately rated flight instructor;
- (b) national pilot learner flying solo;
- (c) pilot-in-command (PIC);
- (d) co-pilot;
- (e) flight instructor.

3. Recording of flight time

- (1) Flight time shall be recorded as prescribed in regulation 62.01.12.
- (2) Flight times may be recorded in hours and minutes, or in hours and decimals of hours.
- (3) When recording flight times, a clear distinction must be made between flight time acquired on different categories of aircraft; e.g. microlight aeroplane, gyrocopter, light sport aeroplane, etc.

4. Manner in which logbooks are to be maintained

- (1) In order to facilitate the issuing of licences, or the issuing and renewal of ratings, a pilot shall summarize his or her logbook for the twelve months immediately preceding the date of application for the issue of a licence, or the issue or renewal of a rating, as applicable, provided that in the case of hang- and paragliding pilots, a summary of the logbook entries during the previous year shall be submitted on the necessary renewal form as per form CA 62-16, unless a new rating or license is to be issued, in which case a copy of the logbook pages pertaining to the rating or license will be submitted.
- (2) Summaries must be signed by the pilot and, where applicable, by the flight instructor. In the latter case, the flight instructor shall print clearly his or her name, and record his or her license number.
- (3) On each page, totals must be brought and carried forward, and grand totals recorded. Grand totals must be recorded in the left-hand corner at the bottom of each page in the space provided therefore.
- (4) The 'details of flight and remarks' column must be completed, showing-
 - (a) the exercises of the applicable practical flight instruction syllabus; or
 - (b) in the case of navigation: the route flown; or
 - (c) in the case of a aviation flight the type of flight;
 - (d) whether the pilot-in-command acted as flight instructor;
 - (e) any other information of importance related to the flight.
- (5) Where a flight is conducted for the purpose of meeting a maintenance of competency requirement, this must be recorded on the line of the particular flight; e.g. '*Reg. 62.04.7(a)(ii) complied with*'. Where currency was restored by means of a skill test, the entry '*Reg. xxx complied with*' shall be countersigned by the national instructor. The same applies even if the required purpose is achieved over a number of flights.

62.01.14 RECOGNITION AND VALIDATION OF PILOT LICENCES AND RATINGS ISSUED BY AN APPROPRIATE AUTHORITY OF A CONTRACTING STATE

1. Contracting States

- (1) A list of Contracting States of which the licences and ratings issued by or on behalf of the appropriate authority are deemed to be of a standard equal to, or higher than, those issued by or on behalf of the South African Civil Aviation Authority may be obtained from the Director or the organisation designated for the purpose in terms of Part 149, as the case may be.
- (2) In the case of Hang gliding or Paragliding only those countries recognised by the FAI and able to produce an IPPI card (International Pilots Proficiency Identification card) will be deemed of similar standards however they while have to comply as per form CA 62-17.

62.01.15 APPLICATION FOR, AND ISSUING OF A VALIDATION OF A FOREIGN PILOT LICENCE AND RATINGS

1. Application form

- (1) The application for the Validation for a foreign pilot licence or rating shall be made on the form CA 62-01 to the Director or the organisation designated for the purpose in terms of Part 149, as the case may be.
- (2) In the case of hang gliders and Paragliders this will be done on form CA62-18.

2. Requirements and conditions

- (1) Language ability requirements

The applicant for a pilot licence, to be issued in terms of Part 62 shall have sufficient ability in reading, speaking and understanding the English language in the following circumstances:

- (a) Examination:

To undergo and pass oral and written examinations conducted in English, required for the issue of the particular license / ratings applied for;

- (b) Ground actions:

All information written in English relevant to the accomplishment of a flight, such as:

- (i) All laws, regulations, rules and other statutory requirements, including all technical manuals;
- (ii) all pre-flight administrative and flight planning procedures;
- (iii) use of all aeronautical *en route*, departure and approach charts and associated documents;

- (c) Verbal communication: Be able to clearly and coherently communicate with ATC and other crew members in English during all phases of flight, and particularly during any emergency situation.
- (2) Language ability demonstration

The ability, referred to in section 1 shall be demonstrated by complying with one of the following alternative requirements:

- (a) Having graduated from a pilot licensing course conducted in English; or
 - (b) Having passed a specific examination given by or on behalf of the Civil Aviation Authority after having undertaken a course of training enabling the applicant to meet all the objectives listed in section 1 (a) to (c) above; or
- (3) Requirements for the issue of a validation for the purpose of flying

An applicant who wishes to validate his or her foreign licence for the purpose of exercising the privileges of a national pilot in a South African registered aircraft shall –

- (a) Pass a skill test with an appropriately rated flight instructor, who is also required to assess the applicant's cross-country, navigational proficiency. If necessary, according to experience, the applicant shall undergo a navigation flight test with the instructor, similar to the cross-country flight requirement as prescribed by these regulations for the issue of a national pilot licence; and
 - (b) Pass an examination in air law as applicable for a national pilot licence at an aviation training organisation, approved in terms of Part 141.
- (4) Validation of flight instructor rating

- (a) To qualify for the validation of a national flight instructor rating, the applicant shall –
 - (i) be in the possession of a valid, equivalent or higher grade flight instructor rating, issued by the appropriate authority of a Contracting State;
 - (ii) qualify for the issue of, or be in the possession of a valid validation of his or her pilot licence;
 - (iii) pass a skill test with an appropriately qualified flight instructor who shall also assess the applicant's teaching proficiency and conduct a cross-country flight test with the applicant: Provided that in the case of hang-gliders and paragliders only the applicant's teaching proficiency needs to be assessed; and
 - (iv) pass a written or oral examination, conducted by the CAA or the designated organisation, in any other relevant subject as may be directed by the Director or the said organisation in the light of the applicant's flight instructor rating applied for.
- (b) The Civil Aviation Authority retains the right to nominate a specific testing officer for the conduct of any of the tests, referred to in the sub-paragraph (i).

- (5) Validation of other ratings

An applicant for the issuing of a Certificate of validation of any foreign rating, other than a national flight instructor rating, shall –

- (a) have been issued with the relevant pilot licence validation;
- (b) meet the eligibility requirements laid down in this Part for the particular rating; and

- (c) pass the relevant skill test prescribed for the particular rating with the holder of an appropriately qualified flight instructor's rating.

3. Certificate of validation

A foreign national pilot licence and or rating Certificate of validation shall be issued on the form CA 62-01 unless a hang gliding or paragliding pilot which shall be issued as per form CA 62-16.

4. Documents to accompany application

An application for a Certificate of validation for a foreign pilot licence or rating shall be accompanied by –

- (a) the fees and documents prescribed in CAR 62.01.15 (5);
- (b) where a skill test is required, a copy of the relevant skill test report;
- (c) where a theoretical knowledge examination is required, proof of having passed such examination; and
- (d) any other document that the Director or the organisation designated for the purpose in terms of Part 149, as the case may be, may require in respect of a particular applicant, required to assess the applicant's fitness to hold a South African Validation for his or her foreign pilot licence or rating.

62.01.20 RADIO TELEPHONY CERTIFICATES

1. General

- (1) The issuing authority for radiotelephony certificates is the Independent Communications Authority of South Africa (ICASA). The CAA has been authorised by ICASA to issue certificates on behalf of ICASA.
- (2) ICASA issues two types of certificates, namely a restricted and a general certificate of proficiency (aeronautical), and may recognise similar certificates issued by a foreign state for validation purposes.

2. Restricted certificate

The holder of a national pilot licences must be the holder of at least a restricted certificate whenever he or she operates an aircraft that is required to be fitted with radio apparatus capable of operating within the aeronautical frequency band.

3. Validation of foreign certificate

The holder of a foreign certificate of proficiency (aeronautical) or similar certificate must obtain a validation from the CAA before operating the radio apparatus in a South African registered aircraft.

4. Concessions for holders of national pilot learner's certificate

ICASA has given permission for the holder of a national pilot learner's certificate to operate the radio apparatus on board an aircraft under the supervision of a certificated operator for a period not exceeding the validity of the learner's certificate. The conditions for the issue of a national pilot learner's certificate and a certificate of competency to operate radio apparatus are prescribed in Subpart 2 of Part 62 of the Regulations.

5. Application and examination

The procedures to be followed in applying for a certificate of proficiency (aeronautical), and the conditions applying to the relevant examinations, are published from time to time in Aeronautical Information Circular AIC 30-9.

62.02.2 TRAINING

1. Required outcomes of training course

The aim of the training course is to train prospective national learner pilots to the level of knowledge required to obtain a national pilot learner's certificate.

2. Practical training

Prior to applying for a national pilot learner's certificate, the applicant shall have undergone basic training:

- (1) pre-flight inspections
- (2) an air experience flight

3. Subjects to be covered in theoretical training phase

The theoretical training phase must cover the following subjects:

- (1) Aircraft technical general on the type of training aircraft being used.
- (2) Basic Air Law as appropriate to learner national pilots.
- (3) Local Rules appropriate to the airfield in use as well as the surrounding areas.
- (4) In the case of paragliders excluding the above they will have to comply as per APPENDIX R62.26

62.02.3 THEORETICAL KNOWLEDGE EXAMINATION

1. Theoretical knowledge examination

The theoretical knowledge examination is to be based on the subjects prescribed in TS 62.02.2.

2. Invigilating

The written theoretical knowledge examinations must be invigilated by-

- (a) in the case of a microlight or light sport aeroplane, the holder of a Grade C, Grade B or Grade A national flight instructor with the appropriate rating; or
- (b) in the case of a gyroplane, the holder of a national flight instructor (gyroplane) rating or national chief flight instructor (gyroplane) rating.

62.02.4 CERTIFICATE OF COMPETENCY

1. Basic training and knowledge requirements

The communication basic training and knowledge syllabus requirements are:

- (a) Practical operation of the radio and intercom
- (b) Basic explanation of airspaces
- (c) Basic practical radio communication

62.04.3 TRAINING

The practical training must be done according to APPENDIX R62.01.

62.04.4 THEORETICAL KNOWLEDGE EXAMINATION

- (1) The contents of the written theoretical knowledge examination must be based on the theoretical training described in APPENDIX R 62.02.
- (2) The written theoretical knowledge examination shall be invigilated by the holder of an appropriately qualified Grade C, Grade B or Grade A microlight aeroplane flight instructor.

62.04.5 SKILLS TEST

1. Practical test of knowledge of procedures and flying skills

- (1) An applicant for a national pilot licence to be issued with a type rating or class rating for conventional microlight aeroplanes must demonstrate his skill in the following procedures to an appropriately qualified Grade B or Grade A National Flight Instructor (conventional microlight aeroplane) who had not been involved in more than 3 hours of instruction with the applicant:
- (2) Procedures and actions to be tested according to APPENDIX 62.03.

2. Skill test report

- (1) The flight instructor conducting the skill test must complete the assessment report on form CA 62-05 with reference to the standard of assessment on a scale of 1 to 5 as indicated in paragraph (f) below.
- (2) If an Assessment category score of 1 was obtained in more than one assessment, the complete test has to be repeated after more training in all aspects that was assessed as below Assessment Category 4.
- (3) If an Assessment category score of 2 was obtained in more than two assessments, the test has to be repeated in respect all aspects that were assessed as below Assessment Category 4, after more training in all these aspects.
- (4) If an Assessment category score of 3 was obtained in more than four assessments, the application for the license may only be presented after more training in these aspects were conducted and a report to the satisfactory completion thereof, including copies of logbook entries of such training, accompanies the application.
- (5) Testing officials are encouraged not to fall into the well-known easy habit of simply awarding “average” assessments. It is important to not be afraid to award either the highest

or the lowest mark, and be certain to discuss these with the applicant, his instructor as well as the flight school management.

(6) Format of assessment report:

<u>Mark obtained</u>	<u>Assessment</u>
1	Failed, unacceptable, requires considerably more training in the particular aspect.
2	Failed, requires further training in the particular aspect.
3	Average, some flight instructor input required with a report before the license may be issued.
4	High average, good standard with no ingrained faults.
5	Above average

62.04.7 APPLICATION

An applicant for the issue of an additional type rating by name for conventional microlight aeroplanes shall pass the technical exams on the aeroplane for which the type rating is sought and which will include:

- (a) All technical aspects and specifications of the aeroplane
- (b) All flight parameters of the aeroplane
- (c) Any special safety considerations for that particular aeroplane type

62.05.3 TRAINING

1. Practical training

The practical training must be done according to APPENDIX R62.04.

62.05.4 THEORETICAL KNOWLEDGE EXAMINATION

- (1) The contents of the written theoretical knowledge examination must be based on the theoretical training described in APPENDIX R 62.05.
- (2) The written theoretical knowledge examination shall be invigilated by the holder of an appropriately qualified Grade C, Grade B or Grade A microlight aeroplane flight instructor.

62.05.5 SKILLS TEST

1. Practical test of knowledge of procedures and flying skills

- (1) An applicant for a national pilot licence to be issued with a type rating or class rating for weight-shift controlled microlight aeroplanes must demonstrate his skill in the following procedures to an appropriately qualified Grade B or Grade A National Flight Instructor

(weight-shift controlled microlight aeroplane) who had not been involved in more than 3 hours of instruction with the applicant:

- (2) Procedures and actions to be tested according to APPENDIX R62.06.

2. Skill test report

- (1) The flight instructor conducting the skill test must complete the assessment report on form CA 62-05 with reference to the standard of assessment on a scale of 1 to 5 as indicated in paragraph (f) below.
- (2) If an Assessment category score of 1 was obtained in more than one assessment, the complete test has to be repeated after more training in all aspects that was assessed as below Assessment Category 4.
- (3) If an Assessment category score of 2 was obtained in more than two assessments, the test has to be repeated in respect all aspects that were assessed as below Assessment Category 4, after more training in all these aspects.
- (4) If an Assessment category score of 3 was obtained in more than four assessments, the application for the license may only be presented after more training in these aspects were conducted and a report to the satisfactory completion thereof, including copies of logbook entries of such training, accompanies the application.
- (5) Testing officials are encouraged not to fall into the well-known easy habit of simply awarding “average” assessments. It is important to not be afraid to award either the highest or the lowest mark, and be certain to discuss these with the applicant, his instructor as well as the flight school management.
- (6) Format of assessment report

<u>Mark obtained</u>	<u>Assessment</u>
1	Failed, unacceptable, requires considerably more training in the particular aspect.
2	Failed, requires further training in the particular aspect.
3	Average, some flight instructor input required with a report before the license may be issued.
4	High average, good standard with no ingrained faults.
5	Above average

62.05.7 APPLICATION

An applicant for the issue of an additional type rating by name for weight-shift controlled microlight aeroplanes shall pass the technical exams on the aeroplane for which the type rating is sought and which will include:

- (1) All technical aspects and specifications of the aeroplane
- (2) All flight parameters of the aeroplane
- (3) Any special safety considerations for that particular aeroplane type

62.06.3 TRAINING

1. Practical training

The practical training must be done according to APPENDIX R62.07.

62.06.4 THEORETICAL KNOWLEDGE EXAMINATION

- (1) The contents of the written theoretical knowledge examination must be based on the theoretical training described in APPENDIX R 62.08.
- (2) The written theoretical knowledge examination shall be invigilated by the holder of an appropriately qualified Grade A or Grade B gyroplane flight instructor.

62.06.5 SKILLS TEST

1. Practical test of knowledge of procedures and flying skills

- (a) An applicant for a national pilot licence to be issued with a type rating or class rating for gyroplanes must demonstrate his skill in the following procedures to an appropriately qualified National Flight Instructor (gyroplanes) who had not been involved in more than 3 hours of instruction with the applicant;
- (b) Procedures and actions to be tested according to APPENDIX R 62.09.

2. Skill test report

- (1) The flight instructor conducting the skill test must complete the assessment report on form (to be determined by SACAA) with reference to the standard of assessment on a scale of 1 to 5 as indicated in paragraph (f) below.
- (2) If more than one assessment in the Assessment Category 1 was obtained the complete test has to be repeated after more training in all aspects that was assessed as below Assessment Category 4.
- (3) If more than two assessments in the Assessment Category 2 were obtained the test has to be repeated in respect all aspects that were assessed as below Assessment Category 4, after more training in all these aspects.
- (4) If more than four assessments in the Assessment Category 3 were obtained, the application for the license may only be presented after more training in these aspects were conducted and a report to the satisfactory completion thereof, including copies of logbook entries of such training, accompanies the application.
- (5) Testing officials are encouraged not fall into the well-known easy habit of simply awarding “average” assessments. Be not afraid to award either the highest or the lowest mark, and be certain to discuss these with the applicant, his instructor as well as the flight school management.
- (6) Format of assessment report

<u>Mark obtained</u>	<u>Assessment</u>
1	Failed, unacceptable, requires considerably more training in the particular aspect.
2	Failed, requires further training in the particular aspect.
3	Average, some flight instructor input required with a report before the license may be issued.
4	High average, good standard with no ingrained faults.
5	Above average

62.07.1 GENERAL

1. Format

A type rating for hang gliding shall be issued on the SAHPA license.

(1) The following ratings and endorsements are applicable to hang gliding:

(a) Class ratings:

- (i) Learner Rating
- (ii) Novice Rating
- (iii) A Rating
- (iv) B Rating
- (v) C Rating

(b) Ratings and endorsements

- (i) Assistant Instructors Rating
- (ii) Instructors Rating (Grade A, B or C)
- (iii) Powered Hang Gliding Endorsement – prone, supine and suprone endorsed
- (iv) Tandem Rating – Foot launch, winch launch and aero tow endorsed.
- (v) Winch tow endorsement.
- (vi) Hang gliding aero tow endorsement.
- (vii) Hill launch endorsement

Notes:

Training by Tandem flying

Learners who are trained on a tandem hang glider, should complete at least 15 flights of a minimum of 2 minutes each as P2 with the instructor before flying solo.

The student will complete a minimum of 10 solo flights of at least 2 minutes duration each and 100m ground clearance.

Recommended Operating Limitations for Novice Licence Pilots

The Novice Pilot should exceed these limitations only after thoroughly mastering all required tasks, and after acquiring a full understanding of the potential problems and dangers involved in exceeding these limitations. It is highly recommended that all flights (after obtaining the rating) be made under the direct supervision of a SAHPA rated Instructor or senior pilot unless flights take place on a student registered training site

Should fly only in smooth winds of 28 kph or less, and gusty winds of no more than 20 kph.

Should launch only on slopes of 2:1 to 7:1, where wind is no more than 25 degrees of being straight up the slope.

Novice licences will also carry a hill or tow endorsement. This is to facilitate training by means of towing without having to make use of any hill launching. This endorsement is only applicable to Novice Licences. All Novice Pilots need to be fully endorsed for hill launching when applying for the A-Licence.

Operating limitations for Assistant Instructors

Assistant instructors may only do training of students under direct supervision of an instructor, i.e. a rated instructor must be at the same site at the same time, on the ground, not flying. The instructor will take responsibility for the actions of assistant instructors during training. Assistant instructors may give theory lectures unsupervised after having been supervised for at least 2 lectures.

Powered Hang Gliding

Powered hang gliding is defined as the use or aid of any motor device attached to a hang gliding wing with the primary goal of achieving soaring flight. Training for the powered hang gliding rating can be for one of the following three categories. Prone type – flying head first above the bar: Suprone type – flying feet first above the bar: Supine type – fly feet first below the bar. Each type entails criteria that are specific to the category. Where this is the case the differences must be clearly pointed out by the instructor. Where required the use of wheels are not excluded for practical and safety reasons; however each of these types may use only certified hang gliding wings for PHG application.

62.07.2 EXPERIENCE

The holder of, or an applicant for, a national pilot license who wishes to be issued with any of the class ratings or add-on endorsements, referred to in CAR 62.07.1(1) in the category hang-glider shall have the appropriate experience as per APPENDIX R62.33.

62.07.3 TRAINING

The holder of, or an applicant for, a national pilot license who wishes to be issued with any of the class ratings or add-on ratings, referred to in sub-regulation 62.07.1(1) in the category hang-glider shall have successfully completed the appropriate training and experience as per APPENDIX R62.34.

62.07.5 SKILLS TEST

1. The holder of, or an applicant for, a national pilot license who wishes to be issued with any of the class ratings, add-on ratings or endorsements, referred to in regulation 62.07.1(1) in the category hang-glider shall have successfully passed the applicable skill test, as prescribed in this technical standard and as per APPENDIX R62.26.
2. The applicable skill tests for the relevant ratings are per APPENDIX R62.28.

62.07.6 APPLICATION FOR HANG-GLIDER CLASS OR ADD-ON RATING

1. Forms

An application for the issuing of a category rating and endorsement for hang-gliders shall be made on the form CA62.16 and CA62.33.

Endorsements for hang gliding shall be entered into the pilot's logbook by the endorsing Instructor. Supporting documents must be posted to the applicable Authority for safe keeping within 7 days of the date of the endorsement.

2. Medical fitness certificate

The medical fitness certificate to be completed, signed and submitted shall be made using APPENDIX R62.22.

3. Training proficiency card

The training proficiency card to be submitted is for the issue of a Novice Class rating only and shall be in the format as prescribed in APPENDIX R62.29.

62.07.11 TYPE RATINGS

- (1) The listing in CAR 62.01.7(2) prescribes the various types of hang -gliders in use that may be flown by the holder of any of the class ratings, referred to in CAR 62.07.1(1).
- (2) These are not endorsed in the pilot's licence. However, before attempting to fly a new type, the pilot must undergo the familiarisation training prescribed in APPENDIXC R62.26. The details of such familiarisation training must be endorsed in the pilot's logbook by the instructor who had conducted the training with the pilot.

62.08.2 EXPERIENCE

The holder of, or an applicant for, a national pilot licence who wishes to be issued with any of the class ratings or add-on endorsements, referred to in CAR 62.08.1(1) in the category paraglider or powered paraglider shall have the appropriate experience as per APPENDIX R62.35.

62.08.3 TRAINING

The holder of, or an applicant for, a national pilot license who wishes to be issued with any of the class ratings or add-on ratings, referred to in CAR 62.08.1(1) in the category paraglider or powered paraglider shall have successfully completed the appropriate training and experience as per APPENDIX R62.36.

62.08.4 THEORETICAL KNOWLEDGE EXAMINATION

- (1) The holder of, or an applicant for, a national pilot license who wishes to be issued with any of the class ratings or add-on ratings, referred to in CAR 62.08.1(1) in the category paraglider or powered paraglider shall have successfully passed the appropriate technical knowledge examination in the prescribed subjects.
- (2) The prescribed subjects for the relevant ratings as per APPENDIX 62.37.
- (3) The written theoretical knowledge exams will only be marked by Grade A or Grade B flight instructor (PG, PPG or PPC) holding this rating

62.08.5 SKILLS TEST

- (1) An applicant for the Basic licence must have completed the tasks as per APPENDIX 62.38, checked and signed off on the practical requirements card by a level A or B instructor.

62.08.6 APPLICATION FOR PARAGLIDER CLASS OR ADD-ON RATING

1. Forms

An application for the issuing of a category rating and endorsement for paragliders and powered paragliders shall be made on form and CA62.16 and CA62.33.

Endorsements for paragliding or powered gliding shall be entered into the pilot's logbook by the endorsing Instructor. Supporting documents must be submitted to the applicable Authority for safe keeping within 7 days of the date of the endorsement.

2. Medical fitness certificate

The medical fitness certificate to be completed, signed and submitted shall be as per APPENDIX R62.22.

3. Training proficiency form

The training proficiency form to be submitted is for the issue of a basic license only and shall be in the format as per CA62.29 and APPENDIX R62.26.

62.09.1 GENERAL

- (1) National Flight Instructor Ratings (Paraglider, Hang glider, Powered Paraglider and Power Hang Gliders or powered parachutes) may be issued in four classes:
 - (a) National Assistant Flight Instructor
 - (b) National Flight Instructor Grade C
 - (c) National Flight Instructor Grade B
 - (d) National Flight Instructor Grade A
- (2) Hold a valid medical certificate as detailed in addendum C as per APPENDIX R62.26.

62.09.2 EXPERIENCE

Experience requirements for National Flight Instructor Ratings Paraglider, Hangglider, Powered Paraglider and Power Hang Gliders or powered parachutes) are as per APPENDIX R62.39.

62.09.3 TRAINING

1. Required outcomes of training course

The aim of the course must be to train a candidate national flight instructor to obtain the high level of theoretical knowledge, practical flying skills proficiency, safety, airmanship, and the ability to convey and teach these to a learner pilot as required by SACAA and the Aero Club of South Africa standards and as indicated in this document. This requires that the candidate should be able to safely and professionally act as flight instructor of any national aircraft for which he or she holds a valid class or type rating, and knowledgeably and confidently stand in front of a class of learner pilots as lecturer on the required theoretical subjects.

2. Main aspects of training course

The course must be comprised of the following aspects running in parallel-

- (a) Theoretical tuition; and
- (b) Practical flying tuition.

3. Theoretical tuition

The dedicated aspects of theoretical tuition shall be applicable for national flight instructor rating (conventional and weight-controlled microlight and light sport aeroplanes) and for a national assistant flight instructor rating (gyroplane) as indicated. The theoretical phase must cover tuition to teach the candidate instructor to confidently lecture on the subjects as outlined in APPENDIX R 62.10

4. Practical tuition

- (1) Candidate instructors must be taught ground briefings and patten in the air according to APPENDIX R62.11
- (2) Except in the case of paragliders, powered paragliders, powered parachutes, hang gliders and powered hang gliders where they shall complete the training detailed in APPENDIX R62.30.
- (3) Candidate instructors must be taught according to APPENDIX R62.30.

62.09.4 THEORETICAL KNOWLEDGE EXAMINATION

Content of theoretical knowledge examinations are to be based on the theoretical subjects as mentioned in APPENDIX R62.10 and APPENDIX R62.31 in the case of Hang Gliding, Paragliding, Powered Paragliding and Powered Parachutes.

62.09.5 SKILL TEST

1. Practical test of knowledge of procedures, instructional technique and flying skill

- (1) The applicant must show a consistent above average level of flying skill in demonstrating the air exercises below.
- (2) Before conducting this test the applicant must be given by the appointed “A”- grade instructor conducting the test, a particular air exercise as the main aspect of training to be briefed and pattered upon, as a new, first time simulated exercise.
- (3) Furthermore, during the test the testing instructor must at random select four further aspects which he must fly as a learner pilot who already had received some instruction, and for which the applicant must do corrective patter and demonstration of flight technique to alleviate any shortcomings or mistakes.

2. Skill and patter test report

- (1) The flight instructor conducting the skill and patter test must complete the assessment report on form CA 62-07 with reference to the standard of assessment on a scale of 1 to 5 as indicated below.
- (2) If more than one assessment in the Assessment Category 1 was obtained the complete test has to be repeated after more training in all aspects that was assessed as below Assessment Category 4.
- (3) If more than two assessments in the Assessment Category 2 were obtained the complete test has to be repeated after more training in all aspects that was assessed as below Assessment Category 4.
- (4) If more than four assessments in the Assessment Category 3 were obtained, the test has to be repeated regarding only these aspects, and after more training has been done in these aspects.
- (5) Testing instructors are encouraged not fall into the well-known easy habit of simply awarding “average” assessments. Be not afraid to award either the highest or the lowest mark, and be certain to discuss these with the candidate, his tutor as well as the flight school management.
- (6) Format of assessment report

<u>Mark obtained</u>	<u>Assessment</u>
1	Failed, unacceptable, requires considerably more training in the particular aspect. Complete retest required
2	Failed, requires further training in the particular aspect. Complete retest required.
3	Average, retest required in these aspects.
4	High average, good standard with no ingrained faults.
5	Above average

Except in the case of paragliders, powered paragliders, powered parachutes, hang-gliders and powered hang gliders where they shall complete the skill tests detailed in APPENDIX R62.32.

62.09.9 RENEWAL

1. Flight instructor refresher seminars

All gyrocopter, hang glider and paraglider national flight instructor's must attend a refresher seminar at least once every two years if held. These seminars, set up under the auspices of the Recreation Aviation Administration of South Africa, will be conducted every 2 years at selected venues. These must include, but not be limited to the following aspects of discussion:

- (a) Advancement in instructional techniques.
- (b) Statutory changes in aviation.
- (c) Applicable aspects of existing statutes.
- (d) Analyses of root causes and trends of occurrences.
- (e) Open book quiz on various aspects of commercial aviation, flight and ground instruction, and aviation in general.

2. Open book quiz

The results of the open book quiz is not a norm in the renewal process, but is mainly for self evaluation, and is to be kept in hard copy format on the instructor's file at the flight training school where he is employed. Paragliding and hang gliding are excluded from this requirement.

62.11.4 THEORETICAL KNOWLEDGE EXAMINATION

An applicant for a microlight or light sport aeroplane tug or tow rating shall have passed the appropriate written examination based on the theoretical knowledge course as prescribed in Appendix R 62.12

62.11.5 SKILL TEST

An applicant for a microlight or light sport aeroplane tug or tow rating shall within the 30 days immediately preceding the date of application have demonstrated to an appropriately rated flight instructor the ability to satisfactorily execute the skills as prescribed in Appendix R 62.13.

62.13.3 THEORETICAL KNOWLEDGE EXAMINATION

- (1) The holder of, or an applicant for, a national pilot license who wishes to be issued with any of the class ratings or add-on ratings, referred to in CAR 62.07.1(1) in the category hang-glider shall have successfully passed the appropriate technical knowledge examination in the prescribed subjects.
- (2) The prescribed subjects for the relevant ratings as per APPENDIX 62.27.

62.14.4 TRAINING

1. Required outcomes of training course

The aim of the Part 96 authorisation training course is to train the holder of a national or private pilot license to the level necessary for the issue of a Part 96 authorisation, and to the standards as required by SACAA and the Recreation Aviation Administration of South Africa as indicated in this document. This requires that the candidate should be able to safely and professionally operate any microlight aircraft (including gyroplanes, tandem paragliders, powered tandem paragliders, tandem hang gliders or powered tandem hang gliders up to a maximum all up mass of 2,000kg) for which he or she holds a valid class or type rating in commercial air operations.

2. Contents of training course

The course must be comprised of the following aspects running in parallel –

- (a) Theoretical tuition; and
- (b) Practical flying tuition.

3. Theoretical tuition

The theoretical phase must cover tuition to prepare the applicant to obtain a level of theoretical knowledge as detailed in APPENDIX R62.14.

4. Practical tuition

Practical ground and air work must cover tuition of the applicant to be able to act professionally and safely as pilot in command of a commercial operation –

- (a) the administration process.
- (b) pre- and post-flight process.

62.14.5 THEORETICAL KNOWLEDGE EXAMINATION

1. Content

An applicant for Part 96 Authorisation shall have passed the appropriate written examination based on the theoretical tuition detailed in APPENDIX R62.14.

2. Invigilation of theoretical knowledge examination

The written theoretical knowledge examination shall be invigilated by the holder of an appropriately qualified Grade A national flight instructor.

3. Marking and adjudicating the theoretical knowledge examination

The theoretical knowledge examinations written by applicants for a Part 96 authorisation shall be marked by a holder of a Grade A flight instructor approved for the purpose by the Director or the organisation approved for the purpose in terms of Part 149.

62.14.6 SKILL TEST

1. Practical test of knowledge of procedures and flying skill

The applicant must show a consistent above average level of flying skill in demonstrating the air exercises below.

(a) Aim:

An applicant for a Part 96 authorisation must demonstrate to an appropriately qualified and approved National Flight Instructor:

- (i) His knowledge of, and ability to accurately convey his knowledge of the procedures and processes mentioned below, and
- (ii) His above average flying skill and ability to control the aircraft during demonstration of these exercises.

(b) Procedures and actions to be tested:

The procedures and actions to be tested must be in accordance with APPENDIX R62.15.

2. Skill test report

- (1) The flight instructor conducting the skill and patten test must complete the assessment report on form CA 62-10 with reference to the standard of assessment on a scale of 1 to 5 as indicated in paragraph (f) below.
- (2) If more than one assessment in the Assessment Category 1 was obtained the complete test has to be repeated after more training in all aspects that was assessed as below Assessment Category 4.
- (3) If more than two assessments in the Assessment Category 2 were obtained the complete test has to be repeated after more training in all aspects that was assessed as below Assessment Category 4.
- (4) If more than four assessments in the Assessment Category 3 were obtained, the test has to be repeated regarding only these aspects, and after more training has been done in these aspects.
- (5) Testing officials are encouraged not fall into the well-known easy habit of simply awarding “average” assessments. Be not afraid to award either the highest or the lowest mark, and be certain to discuss these with the candidate, his tutor as well as the flight school management.

(6) Format of assessment report

Mark obtained

Assessment

1

Failed, unacceptable, requires considerably more training in the particular aspect. Complete retest required

2	Failed, requires further training in the particular aspect. Complete retest required.
3	Average, retest required in these aspects.
4	High average, good standard with no ingrained faults.
5	Above average

62.15.4 ISSUING OF DESIGNATION

- (1) A code of conduct for Designated Examiners will be the same as the code of conduct for Designated Examiners in Part 61.
- (2) The Designated Examiner status will be written up and included in the National Pilots Licence book.

62.16.3 TRAINING

1. Practical training

The practical training must be done according to APPENDIX R62.16.

62.16.4 THEORETICAL KNOWLEDGE EXAMINATION

- (1) The contents of the written theoretical knowledge examination must be based on the theoretical training described in APPENDIX R 62.17.
- (2) The written theoretical knowledge examination shall be invigilated by the holder of an appropriately qualified Grade C, Grade B or Grade A light sport aeroplane flight instructor.

62.16.5 SKILL TEST

1. Practical test of knowledge of procedures and flying skills

- (1) An applicant for a national pilot licence to be issued with a type rating for light sport aeroplanes must demonstrate his skill in the following procedures to an appropriately qualified Grade B or Grade A National Flight Instructor (light sport aeroplane) who had not been involved in more than 3 hours of instruction with the applicant:
- (2) Procedures and actions to be tested according to APPENDIX 62.18.

2. Skill test report

- (1) The flight instructor conducting the skill test must complete the assessment report on form CA 62-05 with reference to the standard of assessment on a scale of 1 to 5 as indicated in paragraph (f) below.

- (2) If an Assessment category score of 1 was obtained in more than one assessment, the complete test has to be repeated after more training in all aspects that was assessed as below Assessment Category 4.
- (3) If an Assessment category score of 2 was obtained in more than two assessments, the test has to be repeated in respect all aspects that were assessed as below Assessment Category 4, after more training in all these aspects.
- (4) If an Assessment category score of 3 was obtained in more than four assessments, the application for the license may only be presented after more training in these aspects were conducted and a report to the satisfactory completion thereof, including copies of logbook entries of such training, accompanies the application.
- (5) Testing officials are encouraged not to fall into the well-known easy habit of simply awarding “average” assessments. It is important to not be afraid to award either the highest or the lowest mark, and be certain to discuss these with the applicant, his instructor as well as the flight school management.
- (6) Format of assessment report

<u>Mark obtained</u>	<u>Assessment</u>
1	Failed, unacceptable, requires considerably more training in the particular aspect.
2	Failed, requires further training in the particular aspect.
3	Average, some flight instructor input required with a report before the license may be issued.
4	High average, good standard with no ingrained faults.
5	Above average

62.16.7 ADDITIONAL TYPE RATINGS BY NAME FOR LIGHT SPORT AEROPLANES

An applicant for the issue of an additional type rating by name for light sport aeroplanes shall pass the technical exams on the aeroplane for which the type rating is sought and which shall include:

- (a) All technical aspects and specifications of the aeroplane
- (b) All flight parameters of the aeroplane
- (c) Any special safety considerations for that particular aeroplane type

62.17.3 TRAINING

1. Practical training

The practical training must be done according to APPENDIX R62.20.

62.17.4 THEORETICAL KNOWLEDGE EXAMINATION

- (1) The contents of the written theoretical knowledge examination must be based on the theoretical training described in APPENDIX R 62.21
- (2) The written theoretical knowledge examination shall be invigilated by the holder of an appropriately qualified Grade C, Grade B or Grade A touring motor glider flight instructor.

62.17.5 SKILLS TEST

1. Practical test of knowledge of procedures and flying skills

- (1) An applicant for a pilot licence to be issued with a type rating for touring motor gliders must demonstrate his skill in the following procedures to an appropriately qualified Grade B or Grade A Flight Instructor (touring motor gliders) who had not been involved in more than 3 hours of instruction with the applicant:
- (2) Procedures and actions to be tested according to APPENDIX 62.18.

2. Skill test report

- (1) The flight instructor conducting the skill test must complete the assessment report on form CA 62-05 with reference to the standard of assessment on a scale of 1 to 5 as indicated in paragraph (f) below.
- (2) If an Assessment category score of 1 was obtained in more than one assessment, the complete test has to be repeated after more training in all aspects that was assessed as below Assessment Category 4.
- (3) If an Assessment category score of 2 was obtained in more than two assessments, the test has to be repeated in respect all aspects that were assessed as below Assessment Category 4, after more training in all these aspects.
- (4) If an Assessment category score of 3 was obtained in more than four assessments, the application for the license may only be presented after more training in these aspects were conducted and a report to the satisfactory completion thereof, including copies of logbook entries of such training, accompanies the application.
- (5) Testing officials are encouraged not to fall into the well-known easy habit of simply awarding “average” assessments. It is important to not be afraid to award either the highest or the lowest mark, and be certain to discuss these with the applicant, his instructor as well as the flight school management.
- (6) Format of assessment report

<u>Mark obtained</u>	<u>Assessment</u>
1	Failed, unacceptable, requires considerably more training in the particular aspect.
2	Failed requires further training in the particular aspect.
3	Average, some flight instructor input is required with a corrective report before the license may be issued.

- | | |
|---|--|
| 4 | High average, good standard with no inherent faults. |
| 5 | Above average |

62.17.7 ADDITIONAL TYPE RATINGS BY NAME FOR TOURING MOTOR GLIDERS

An applicant for the issue of an additional type rating by name for Touring Motor gliders shall pass the technical exams of the motor glider for which the type rating is sought and which will include:

- (a) All technical aspects and specifications of the aircraft
- (b) All flight parameters of the aircraft
- (c) Any special safety considerations for that particular aircraft type.

62.17.9 ISSUING

A type rating by name for touring motor gliders shall be issued in the format of entries into the National Pilots Licence book.

**SA-CATS 63
Flight Engineer Licensing**

List of technical standards

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- 3. Issuing of a validation
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- 2. Information to be contained in logbooks
- 3. Manner in which logbooks are to be maintained

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- 1. Retesting after failure

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- 2. Procedures
- 3. Designation reference number
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 1. Training course
- 63.03.3 THEORETICAL KNOWLEDGE EXAMINATION**
 1. Theoretical examination on type
- 63.03.4 SKILL TEST**
 1. Procedures and manoeuvres
- 63.03.6 APPLICATION FOR TYPE RATING**
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 2. Certificate of competency
- 63.03.11 RE-ISSUE**
 1. Skill test report
- 63.04.3 TRAINING**
 1. Training course
- 63.04.4 THEORETICAL KNOWLEDGE EXAMINATION**
 1. Examination
- 63.04.5 SKILL TEST**
 1. Procedures
- 63.04.6 APPLICATION FOR GRADE I FLIGHT ENGINEER INSTRUCTOR RATING**
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 2. Skill test report
- 63.04.10 RENEWAL**
 1. Flight engineer instructor refresher seminar
 2. Skill test report
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- 63.05.3 TRAINING**
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- 63.05.4 THEORETICAL KNOWLEDGE EXAMINATION**
 1. Examination
- 63.05.5 SKILL TEST**
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- 63.05.6 APPLICATION FOR GRADE II FLIGHT ENGINEER INSTRUCTOR RATING**
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1. Flight engineer instructor refresher seminar
2. Skill test report

63.05.11 REISSUE

1. Flight engineer instructor refresher seminar

63.01.3 VALIDATION OF LICENCE ISSUED BY APPROPRIATE AUTHORITY

1. Application for validation of licence issued by an appropriate authority

The application form for the issuing of a flight engineer licence is as prescribed by the Director.

2. Requirements and conditions for the issue of a validation

Any valid foreign flight engineer licence and rating may be validated by the Director subject to the following conditions:

- (a) The applicant must pass an examination in air law conducted by the holder of an aviation training organization approval, issued in terms of Part 141;
- (b) the applicant must pass a practical skill test with a Grade I flight engineer instructor;
- (c) the applicant must have flown a minimum of 500 hours as a flight engineer in the country of issue of the foreign flight engineer licence or in an environment at least equal or similar to that of the Republic; and
- (d) no additions can be made to a flight engineer licence regarding the types of aircraft which may be flown.

3. Issuing of a validation

A validation of a flight engineer licence must be issued by the Director in the appropriate form.

4. Renewal of a validation issued by the Director

The Director may renew the validation of a flight engineer licence provided that the holder of such validation has, for the duration of the validation –

- (a) exercised the privileges of the flight engineer licence to which the validation refers, in accordance with the provisions of the Act, the Regulations and this Document; and
- (b) operated safely and professionally, with a degree of competency appropriate to the privileges granted to the holder of a similar licence.

5. Compliance

The reference to Document SA-CATS 63 in CAR 63.01.3(7) means the appropriate standards, rules, requirements, methods, specifications, characteristics and procedures contained in the Act, the Regulations and this Document.

63.01.6 LOGBOOKS

1. Form of logbooks

Logbooks must be maintained in the appropriate form prescribed by the Director.

2. Information to be contained in logbooks

The following information must be recorded in logbooks –

- (a) full name and address of owner;
- (b) summary of previous flying experience, if any; and
- (c) particulars of flights –
 - (i) date;
 - (ii) type and registration of the aircraft in which the flight occurs;
 - (iii) operating capacity of holder;
 - (iv) flight time; and
 - (v) nature of flight.

3. Manner in which logbooks are to be maintained

In order to facilitate the issue of licences, a flight engineer must –

- (a) clearly indicate night and instructional flight times; and
- (b) summarise his or her logbook.

63.01.13 RETESTING AFTER FAILURE

1. Retesting after failure

- (1) The pass mark for any written examination referred to in CAR 63.02.4, 63.03.3, 63.04.4 or 63.05.5 is 75%.
- (2) A candidate who fails with a mark of between 71% and 74%, may apply in writing for a re-mark within 30 days from the date of receiving the examination results, on payment of the appropriate fee.
If the re-mark is successful, the fee will be refunded.
- (3) A candidate who fails with a mark for above 68%, may apply to be entered for the following examination sitting.
- (4) A candidate who fails with a mark of between 60% and 68%, has to wait for six months before applying to enter again.
- (5) A candidate who fails with a mark of less than 60%, will have to wait for 12 months before applying to enter again.

63.01.14 DESIGNATION OF EXAMINER

1. Requirements

The Director may designate the holder of a Grade I flight engineer instructor rating as an examiner.

2. Procedures

- (1) Any person who desires to be designated as an examiner, must apply in writing to the Director.
- (2) An application for the designation as an examiner must be accompanied by proof that the applicant complies with the conditions, requirements and standards prescribed in this technical standard.
- (3) The Director may, after due consideration of the application, designate the applicant as an examiner.
- (4) The Director may designate the applicant as an examiner for the period determined by the Director, which period may not exceed one year, calculated from the date of designation.
- (5) The Director may withdraw a designation if –
 - (a) it becomes evident that the designated examiner does not comply with the provisions of this technical standard; or
 - (b) the withdrawal is necessary in the interests of aviation safety.
- (6) The designated examiner must, upon the withdrawal of the designation by the Director, forthwith surrender the document referred to in CAR 63.01.14(3) to the Director.

3. Designation reference number

- (1) A designation number will be allocated to an examiner. This number together with other relevant information as indicated on the document referred to in CAR 63.01.14(3) must be reflected on all the relevant documents signed by the examiner.
- (2) The letter (c) will be inserted after designation reference number to indicate that the examiner is restricted to certain tests within a particular company, if applicable.

4. Submission of reports and forms

- (1) An examiner must submit a report to the Director quarterly, on all skill tests conducted by the examiner. These reports must be submitted regardless of the results of the skill tests or even if no skill tests were conducted by the examiner.
- (2) Competency forms where the test resulted in failure must be forwarded by the examiner to the Director for record keeping.

- (3) In the event of a failure, the test form must indicate notes on the debriefing done and the candidate must initial at such notes.
- (4) Any competency form not duly completed by an examiner may be rejected by the Director.

5. Stamp

An examiner, must upon receiving the document referred to in CAR 63.01.14(3), have a stamp made that reflects the following information –

<ul style="list-style-type: none"> (a) Name of examiner (b) Licence number (c) Class and category (d) Designation number (e) Expiry date 	<p>Example</p> <table border="1" style="border-collapse: collapse;"> <tr><td>J A Fox</td></tr> <tr><td>Xxxxxxxx</td></tr> <tr><td>Designation #</td></tr> <tr><td>099 or 099(C)</td></tr> <tr><td>12/97</td></tr> </table>	J A Fox	Xxxxxxxx	Designation #	099 or 099(C)	12/97
J A Fox						
Xxxxxxxx						
Designation #						
099 or 099(C)						
12/97						

6. Responsibility

- (1) It is the responsibility of the examiner to ensure that the candidate has passed the relevant theoretical knowledge examinations with the CAA before commencing the skill test.
- (2) It is also the responsibility of the examiner to ensure that the candidate is in possession of a valid flight engineer licence and that his or her flying hours comply with the requirements for that particular licence as is required by the Civil Aviation Regulations.

7. Monitoring of the system

The Director may at any time require an examiner to subject himself or herself for a ground or skill test, should it become evident that such examiner is not maintaining the required standard of testing.

63.02.3 TRAINING

1. Aim of training course

The aim of the training course is to train the candidate to the level necessary for the issuing of a flight engineer licence and to operate aeroplanes in commercial air transportation.

The candidate must complete the approved training course with the holder of an aviation training organisation approval issued in terms of Part 141. The course of theoretical knowledge must be completed within 18 months and the skill test within 6 months of passing the theoretical examination

The course comprises a theoretical knowledge course to flight engineer know-ledge level.

2. Contents and duration of training course

The theoretical knowledge course must comprise of at least 350 hours (200 hours instruction and 150 hours of monitored self study) of instruction including formal classroom work, computer-based training, slide/tape presentation, interactive video and learning carrels where appropriate.

The 350 hours of instruction should preferably be divided as follows –

Subject	Hours
Air Law and ATC procedures	30
Aircraft general knowledge	40
Flight performance planning	55
Human performance and limitations	10
Meteorology	50
Navigation	50
Operational procedures	10
Principles of flight	25
Communications	20

3. Training course syllabus

- 3.1 Air Law and ATC procedures
 - 3.1.1 Civil Aviation Regulations

- (1) Structure of Civil Aviation Regulations
- (2) Contents of the following Parts –
 - (a) Part 21 – Certification procedures for products and parts
 - (b) Part 47 – Registration and marking
 - (c) Part 63 – Flight engineer licensing
 - (d) Part 67 – Medical requirements
 - (e) Part 91 – General operating and flight rules
 - (f) Part 121 – Air transport operations: Carriage on aeroplanes of more than 19 passengers or cargo
 - (g) Part 172 – Airspace and air traffic service

3.1.2 International Aviation Law

- (1) The Chicago Convention
 - (a) General principles and application –
 - sovereignty; and
 - territory.
 - (b) Flight over territory of Contracting States
 - right of non-scheduled flight;
 - scheduled air services;
 - cabotage;
 - landing at customs airports;
 - applicability of air regulations;
 - rules of the air; and
 - search of aircraft.
 - (c) Measures to facilitate air navigation –
 - customs duty;
 - conditions to be fulfilled with respect to aircraft, such as certificates of airworthiness, licences of personnel, recognition of certificates and licences;
 - cargo restrictions;
 - photographic apparatus; and
 - documents to be carried in aircraft.
 - (d) International standards and recommended practices –
 - adoption of international standards and procedures;
 - endorsement of certificates and licences;
 - validity of endorsed certificates and licences; and
 - departure from international standards and procedures (notification of differences).
- (2) The Air Services Transit Agreement
- (a) The five freedoms.
- (3) The Convention of Tokyo
 - (a) Jurisdiction; and
 - (b) Authority of the pilot-in-command of the aircraft.

Subject	Hours
Air Law and ATC procedures	30
Aircraft general knowledge	40
Flight performance planning	55
Human performance and limitations	10
Meteorology	50
Navigation	50
Operational procedures	10
Principles of flight	25
Communications	20

3. Training course syllabus

3.1 Air Law and ATC procedures

3.1.1 Civil Aviation Regulations

- (1) Structure of Civil Aviation Regulations
- (2) Contents of the following Parts –
 - (a) Part 21 – Certification procedures for products and parts
 - (b) Part 47 – Registration and marking
 - (c) Part 63 – Flight engineer licensing
 - (d) Part 67 – Medical requirements
 - (e) Part 91 – General operating and flight rules
 - (f) Part 121 – Air transport operations: Carriage on aeroplanes of more than 19 passengers or cargo
 - (g) Part 172 – Airspace and air traffic service

3.1.2 International Aviation Law

- (1) The Chicago Convention
 - (a) General principles and application –
 - sovereignty; and
 - territory.
 - (b) Flight over territory of Contracting States
 - right of non-scheduled flight;
 - scheduled air services;
 - cabotage;
 - landing at customs airports;
 - applicability of air regulations;
 - rules of the air; and
 - search of aircraft.
 - (c) Measures to facilitate air navigation –
 - customs duty;
 - conditions to be fulfilled with respect to aircraft, such as certificates of airworthiness, licences of personnel, recognition of certificates and licences;
 - cargo restrictions;
 - photographic apparatus; and
 - documents to be carried in aircraft.
 - (d) International standards and recommended practices –
 - adoption of international standards and procedures;
 - endorsement of certificates and licences;
 - validity of endorsed certificates and licences; and
 - departure from international standards and procedures (notification of differences).
- (2) The Air Services Transit Agreement
 - (a) The five freedoms.
- (3) The Convention of Tokyo
 - (a) Jurisdiction; and
 - (b) Authority of the pilot-in-command of the aircraft.
- (4) The International Civil Aviation Organisation
 - (a) Annex 8 – Airworthiness of aircraft
 - Applicability.
 - (b) Annex 7 – Aircraft nationality and registration marks
 - Applicability.
 - (c) Annex 1 – Personnel Licencing
 - Applicability.

- (d) Annex 2 – Rules of the Air
 - Essential definitions;
 - Applicability of the rules of the air general rules (except water operations);
 - Visual flight rules;
 - Instruments flight rules;
 - Signals;
 - Interception of civil aircraft; and
 - Table of cruising levels.
- (e) Procedures for air navigation – Aircraft Operations Doc. 8168 – OPS/ 611, Volume 1
 - Altimeter setting procedures (ICAO Doc. 7030 – regional supplementary procedures) – Basic requirements (except tables), procedures applicable to operators and pilots (except tables).
Secondary surveillance radar transponder operating procedures (ICAO Doc. 7030 – regional supplementary procedures) –
 - Operation of transponders; and
 - Phraseology.
- (f) Annex 11 – Air traffic services
 - (i) Air traffic services
 - Definitions (see general statements).
 - (ii) General
 - Objectives of ATS, division of ATS, designation of the portions of the airspace and controlled aerodromes where ATS will be provided, establishment and designation of the units providing ATS, specifications (for flight information regions, control areas and control zones), minimum flight altitudes, priority in the event of an aircraft in emergency, in-flight contingencies time in ATS.
 - (iii) Air traffic control
 - Application; and
 - Provision of air traffic control service, operation of air traffic control service, separation minima, contents of clearances, co-ordination of clearances, control of persons and vehicles at aerodromes.
 - (iv) Flight information service
 - For VFR flights: application and scope of flight information service; and
 - Operational flight information service broadcasts.
 - (v) Alerting service
 - Application, notification of rescue co-ordination centres (only INCERFA, ALERFA, DETRESFA), information to aircraft operating in the vicinity of an aircraft in a state of emergency.
 - (vi) Principles governing the identification of ATS routes other than standard departure and arrival routes.
 - (vii) Rules of the air and air traffic services (ICAO Doc. 4444 – RAC/501/11 and ICAO Doc. 7030 – Regional supplementary procedures)
 - Definitions (see general statements).
 - (viii) General provisions
 - General air traffic services operating practices –
 - Submission of a flight plan;
 - change from IFR to VFR flight;
 - clearances and information;
 - control of air traffic flow;
 - altimeter setting procedures;
 - indication of heavy wake turbulence category; and

- position reporting Appendix.
 - AIREP form of air report AIREP form (Model AR), recording and reporting instructions (first 7 items).
- (ix) Area control service
 - Vertical separation –
 - Vertical separation application;
 - vertical separation minimum;
 - minimum cruising level;
 - assignment of cruising level; and
- vertical separations during ascent or descent.
 - Horizontal separation –
 - Lateral separation application;
 - geographical separation;
 - track separation between aircraft using the same VOR;
 - longitudinal separation application (except between super-sonic aircraft).
 - Reduction separation minimum;
 - Air traffic control clearances –
 - Contents;
 - description of air traffic control clearances;
 - clearance to fly maintaining own separations while in VMC;
 - essential traffic information;
 - clearance of a requested change in flight plan; and
 - Emergency and communication failure –
 - Emergency procedures (only general priority);
 - emergency descent;
 - action by pilot-in-command;
 - air-ground communication failure (only concerning the actions by pilot-in-command);
 - interception of civil aircraft.
- (x) Approach control service
 - Departing aircraft –
 - General procedures for departing aircraft;
 - clearances to climb maintaining own separation whilst in VMC;
 - information for departing aircraft; and
 - Arriving aircraft –
 - General procedures for arriving aircraft;
 - clearance to descent maintaining own separation in VMC;
 - visual approach;
 - instrument approach;
 - holding;
 - approach sequence;
 - expected approach time;
 - information for arriving aircraft.
- (xi) Aerodrome control service
 - Functions of aerodrome control towers –
 - General;
 - alerting service provided by aerodrome control towers;
 - suspension of VFR operations by aerodrome control towers;
 - Traffic and taxi circuits –
 - Selection of runway-in-use;
 - Information to aircraft by aerodrome control towers –

- information related to the operation of the aircraft;
- Information on aerodrome conditions control of aerodrome traffic –
- Order of priority for arriving and departing aircraft;
- control of departing and arriving aircraft.
- (xii) Flight information services and alerting service
 - Air traffic advisory service;
 - alerting service; and
 - AFIS.
- (g) Annex 15 – Aeronautical information service
 - Definitions (see general statements); and
 - Applicability.
- (h) Annex 14 – Aerodromes
- (i) Aerodrome data –
 - Conditions of the movement area and related facilities.
- (ii) Visual aids for navigation –
 - Indicators and signaling devices;
 - markings;
 - lights;
 - signs; and
 - markers.
- (iii) Visual aids for denoting obstacles –
 - Marking of objects; and
 - lighting of objects.
- (iv) Visual aids for denoting restricted use of areas
- (v) Emergency and other services –
 - Fire and rescue service;
 - apron management service; and
 - ground servicing of aircraft.
- (i) Annex 9 – Facilitation
- (i) Entry and departure of aircraft –
 - Description, purpose and use of aircraft documents – general declaration.
- (ii) Entry and departure of persons and their baggage –
 - Entry requirement and procedures for flight crew and other operator’s personnel.
- (j) Annex 12 – Search and rescue
- (i) Organisation –
 - Establishment and provision of SAR service;
 - establishment of SAR regions; and
 - establishment and designation of SAR services units.
- (ii) Cooperation –
 - Cooperation between States; and
 - cooperation with other services.
- (iii) Operating procedures –
 - Procedures for pilots-in-command intercepting a distress trans-mission; and
 - search and rescue signals.
- (iv) Search and rescue signals –
 - Signals with surface craft;
 - ground/air visual signal code; and
 - air/ground signals.
- (k) Annex 17 – Security
- (i) General –

- Aims and objectives.
- (ii) Organisation –
 - Cooperation and coordination.
- (iii) Operators –
 - Operators security programme.
- (l) Annex 13 – Aircraft accident investigation
 - Applicability.
 - (1) Airframe and system, electrics, powerplant, emergency equipment – Aero-planes
- (a) Airframe and systems
 - (i) Fuselage –
 - Types of construction; and
 - structural components and materials.
 - (ii) Cockpit and cabin windows –
 - Construction (laminated glass); and
 - structural limitations.
 - (iii) Aerofoil –
 - Types of construction; and
 - structural components and materials.
 - (iv) Control surfaces –
 - Vertical, horizontal and V-tail surfaces; and
 - construction materials.
 - (v) Landing gear –
 - Types;
 - construction;
 - locking devices and emergency extension systems;
 - accidental retraction prevention devices;
 - position, movement lights and indicators;
 - nose wheel steering;
 - wheels and tyres (construction, limitations); and
 - braking systems –
 - Construction;
 - parking brake;
 - mode of operation of antiskid system;
 - mode of operations of auto brake system; and
 - operation, indications and warning systems.
 - (vi) Flight controls (construction and operation)
 - Primary controls –
 - Elevator, aileron and rudder;
 - trim;
 - mode of actuation; and
 - operation, indicators, warning devices and controls.
 - secondary controls lift augmentation and wing flaps –
 - Lift dumping and speed brakes;
 - variable elevator;
 - mode of actuation (mechanical, hydraulic, fly-by-wire);
 - operation, indicators, warning devices; and
 - danger situations and potential failures.
 - (vii) Hydraulics
 - Basic principles of hydromechanics –
 - Hydraulic fluids; and

- schematic construction and functioning of hydraulic systems.
- (viii) Hydraulic systems
 - Main, standby and emergency systems;
 - operation, indicators, warning systems; and
 - ancillary systems.
- (ix) Air driven systems (piston engines only)
- (x) Pneumatic systems
 - Power sources; and
 - schematic construction and functioning of pneumatic systems.
- (xi) Air conditioning system
 - Heating and cooling; and
 - construction, functioning and controls.
- (xii) Pressurisation
 - Cabin altitude, maximum cabin altitude, differential pressure;
 - pressurised zones in the aircraft;
 - operations and indicators;
 - safety devices and warning systems;
 - rapid decompression, cabin altitude warning; and
 - emergency procedures.
- (xiii) De-ice systems
 - Pneumatic leading edge de-icing of wings and control surfaces;
 - schematic construction;
 - operational limitations; and
 - initiation/timing of de-icing system usage.
- (xiv) Air driven systems
 - Pneumatic system –
 - Power sources;
 - schematic construction;
 - potential failures, warning devices;
 - operation, indicators, warning systems; and
 - pneumatic operated systems.
 - Air conditioning system –
 - Construction, functioning, operation, indicators and warn-ing devices;
 - heating and cooling;
 - temperature regulation;
 - automatic and manual; and
 - ram air ventilation.
 - Anti-ice systems –
 - Aerofoil and control surfaces, power giant, air intakes, windshield;
- schematic construction, operating limitations and initiation, timing of de-icing system usage; and
- ice warning system.
- Non-pneumatic operated de-ice and anti-ice systems.
- (xv) Schematic construction functioning and operation of –
 - Air intake;
 - propeller;
 - pitot, static pressure sensor and stall warning devices;
 - windshield;
 - weeping wing system; and
 - rain repellent system.

- (xvi) Fuel system
 - Fuel tanks –
 - Structural components and types;
 - location of tanks on single and multi-engine aircraft;
 - sequence and types of refueling; and
 - unusable fuel.
 - Fuel feed –
 - Gravity and pressure feed;
 - crossfeed; and
 - schematic construction.
 - Fuel dumping system.
 - Fuel system monitoring –
 - Operation, indicators and warning systems;
 - fuel management (sequencing of fuel tank switching); and
 - dip stick.
- (b) Electrics
 - (i) Direct current (DC)
 - General –
 - Electric circuits;
 - voltage, current, resistance;
 - Ohm's law;
 - resistive circuits;
 - resistance as a function of temperature;
 - electrical power, electrical work;
 - fuses (function, type and operation);
 - the electrical field; and
 - the capacitor (function).
 - Batteries –
 - Types and characteristics;
 - capacity;
 - uses; and
 - hazards.
 - Magnetism –
 - Permanent magnetism;
 - electromagnetism – relay, circuit breaker, solenoid valve (principle, function and applications);
 - electromagnetic power; and
 - electromagnetic induction.
 - Generators –
 - Alternator – principle, function and applications, monitoring devices, regulation, control and protection and modes of excitation;
 - starter generator.
 - Distribution –
 - Current distribution (buses);
 - monitoring of the ammeter, voltmeter and annunciator;
 - electrical consumers;
 - DC power distribution –
 - * construction, operation and system monitoring; and
 - * elementary switching circuits.
 - Inverter (applications).

- The aircraft structure as an electrical conductor.
- (ii) Alternating current (AC)
 - General –
 - Single and multi-phase AC;
 - frequency;
 - phase shift; and
 - AC components.
 - Generators –
 - 3-phase generator;
 - brushless generator (construction and operation);
 - generator drive –
 - * constant speed drive; and
 - * integrated drive.
 - AC power distribution –
 - Construction, operation and monitoring; and
 - protection circuits, paralleling of AC-generators.
 - Transformers –
 - Function; and
 - types and applications.
 - Synchronous and asynchronous motors –
 - Operations; and
 - application.
 - Transformer/rectifier units.
 - Semiconductors –
 - Principles of semiconductors;
 - semiconductor resistors (properties and application);
 - rectifier (function and application);
 - transistor (function and applications); and
 - diode (function and applications).
 - Basic knowledge of computers.
 - Logic circuits.
 - Logical symbols.
 - Switching circuits and logical symbols.
 - Basic radio propagation theory; basic principles –
 - Electromagnetic waves;
 - wave length, amplitude, phase angle, frequency;
 - frequency bands, side band, single sideband;
 - pulse characteristics;
 - carrier, modulation, de-modulation;
 - kinds of modulation (amplitude, frequency, pulse, multiplex); and
 - oscillation circuits.
 - Antennas –
 - Characteristics;
 - polarisation; and
 - types of antennas.
 - Wave propagation –
 - Ground waves;
 - space waves;
 - propagation with the frequency bands;
 - frequency prognosis (MUF);

- fading; and
 - factors affecting propagation (reflection, absorption, inter-ference, twilight, shoreline, mountain, static).
- (c) Powerplant
 - (i) Piston engine
 - General –
 - Design types;
 - principles of the 4-stroke internal combustion engine; and
 - mechanical components.
 - Lubrication system –
 - Function;
 - schematic construction;
 - monitoring instruments and indicators; and
 - lubricants.
 - Air cooling –
 - System monitoring;
 - cylinder head temperature; and
 - cowl flaps.
 - Ignition –
 - Schematic construction and function;
 - types of ignition; and
 - magneto check.
 - Engine fuel supply –
 - Carburetor (construction and mode of operation, carburetor icing);
 - fuel injection (construction and mode of operation); and
 - alternate air.
 - Engine performance –
 - Pressure/density altitude; and
 - performance as a function of pressure and temperature.
 - Power augmentation devices –
 - Turbocharger, supercharger construction and effect on engine performance).
 - Fuel –
 - Types, grades;
 - detonation characteristics, octane rating;
 - colour coding;
 - additives;
 - water content, ice formation;
 - fuel density; and
 - alternate fuels, differences in specifications, limitations.
 - Mixture –
 - Rich and lean mixture; and
 - maximum power and fuel economy mixture setting.
 - Rotor –
 - Principles and operation of rotors;
 - rotor check; and
 - rotor efficiency as a function of airspeed.
 - Engine handling and manipulation –
 - Power setting, power range;
 - mixture setting; and
 - operational limitations.

- Operational criteria –
 - Maximum and minimum RPM;
 - (induced) engine vibration and critical RPM; and
 - remedial action by abnormal engine start, run-up and in-flight.
- Turbine engine.
- Principles of operation.
- Types of construction –
 - Centrifugal; and
 - axial flow.
- Engine construction.
- Air inlet –
 - Function.
- Compressor –
 - Function;
 - construction and mode of operation;
 - effects of damage;
 - compressor stall and surge (cause and avoidance); and
 - compressor characteristics.
- Diffusor –
 - Function.
- Combustion chamber –
 - Function, types and working principles;
 - mixing ratios;
 - fuel injectors; and
 - thermal load.
- Turbine –
 - Underspeed and overspeed governors;
 - function, construction and working principles;
 - thermal and mechanical stress;
 - effects of damage; and
 - monitoring of exhaust gas temperature.
- Jet pipe –
 - Function;
 - different types; and
 - noise silencing devices.
- Pressure, temperature and airflow in a turbine engine
- Reverse thrust –
 - Function, types and principles of operation;
 - degree of efficiency; and
 - use and monitoring.
- Performance and thrust augmentation –
 - Water injection, principles of operation; and
 - use and system of monitoring.
- Bleed air –
 - Effect of use of bleed air on thrust, exhaust temperature, RPM and pressure ratio.
- Auxiliary gearbox –
 - Function.
- Engine systems.
- Ignition –
 - Function, types, components, operation and safety aspects.

- Starter –
 - Function, type, construction and mode of operation;
 - control and monitoring; and
 - self sustaining and idle speeds.
- Engine start malfunctions –
 - Cause and avoidance.
- Fuel system –
 - Construction, components;
 - operation and monitoring; and
 - malfunctions.
- Lubrication –
 - Construction, components;
 - operation and monitoring; and
 - malfunctions.
- Fuel –
 - Effects of temperature;
 - impurities; and
 - additives.
- Thrust –
 - Thrust formula;
 - flat rated engine; and
 - thrust as a function of airspeed, air density, pressure, temperature and RPM.
- Powerplant operation and monitoring.
- (ii) Auxiliary power unit (APU)
 - General –
 - Function and types;
 - location; and
 - operation and monitoring.
 - Ram air turbine –
 - Function.
- (d) Emergency equipment
 - (i) Doors and emergency exits –
 - Accessibility;
 - normal and emergency operation;
 - markings;
 - floor exit markings;
 - crew emergency exits;
 - passenger emergency exits; and
 - evacuation slides, general usage or as life rafts or flotation.
 - (ii) Smoke detection –
 - Location, indicators, function test;
 - fire detection; and
 - location, warning mode, function test.
 - (iii) Fire fighting equipment –
 - Location, operation, contents, gauge, function test.
 - (iv) Aircraft oxygen equipment –
 - Principles of operation;
 - protection and surveillance devices;
 - drill, use of equipment in case of rapid decompression;
 - comparison of constant flow and demand outlet masks;

- oxygen generators; and
- dangers of oxygen use, safety measures.
- (v) Emergency equipment –
 - Portable, hand-held fire extinguisher;
 - smoke mask, smoke protection hood;
 - portable oxygen system;
 - emergency locator beacon, transmitter;
 - life jacket, life raft;
 - pocket lamp, emergency lighting;
 - megaphone;
 - crash axe; and
 - fireproof gloves.
- (2) Instrumentation – Aeroplanes
 - (a) Flight Instruments
 - (i) Air data instruments
 - (ii) Pitot and static system –
 - Pitot tube, construction and principles of operation;
 - static source;
 - malfunction;
 - heating; and
 - alternate static source.
 - (iii) Altimeter –
 - Construction and principles of operation;
 - display and setting;
 - errors;
 - correction tables; and
 - tolerances.
 - (iv) Airspeed indicator –
 - Construction and principles of operation;
 - speed indications (IAS);
 - meaning of coloured arcs;
 - maximum speed indicator, barber pole; and
 - errors.
 - (v) Mach meter
 - (vi) Vertical Speed Indicator (VSI) –
 - Aneroid and instantaneous VSI (IVSI);
 - construction and principles of operation; and
 - display.
 - (vii) Gyroscopic instruments.
- (iii) Gyro fundamentals –
 - Theory of gyroscopic forces (stability, precession);
 - types, construction and principles of operation –
 - Vertical gyro;
 - directional gyro;
 - rate gyro;
 - rate integrating gyro;
 - single degree-of-freedom gyro; and
 - ring laser gyro.
 - apparent drift;
 - random drift;

- mountings; and
- drive types, monitoring.
- (ix) Directional gyro –
 - Construction and principles of operation.
- (x) Slaved gyro compass –
 - Construction and principles of operation;
 - components;
 - mounting and modes of operation;
 - turn and acceleration errors; and
 - application, uses of output data.
- (xi) Attitude indicator (vertical gyro) –
 - Construction and principles of operation;
 - display types;
 - turn and acceleration errors;
 - application, uses of output data;
 - turn and bank indicator (rate gyro);
 - construction and principles of operation;
 - display types;
 - application errors;
 - application, uses of output data; and
 - turn coordinator.
- (xii) Magnetic compass –
 - Construction and principles of operation; and
 - errors (deviation, effect of inclination).
- (xiii) Radio Altimeter –
 - Components;
 - frequency band;
 - principle of operation;
 - display; and
 - errors.
- (xiv) Electronic Flight Instrument System (EFIS)–
 - Information display types;
 - data input;
 - control panel, display unit; and
 - example of a typical aircraft installation.
- (b) Flight control system
 - (i) Flight Director –
 - Function and application;
 - block diagram, components;
 - mode of operation;
 - operation set-up for various flight phases;
 - command modes (bars);
 - mode indicator;
 - system monitoring; and
 - limitations, operational restrictions.
 - (ii) Autopilot –
 - Function and application;
 - types (different axes);
 - block diagram, components;
 - lateral modes;

- longitudinal modes;
- common modes;
- autoland, sequence of operation;
 - system concepts for autoland, go around, take-off fail passive, fail operational (redundant) control modes;
- signal interfacing to control surfaces;
- operation and programming for various flight phases;
- system monitoring; and
- limitations, operational restrictions.
- (iii) Yaw damper –
 - Function;
 - block diagram, components; and
 - signal interfacing to vertical stabilizer.
- (c) Warning and recording equipment
 - (i) Warning general –
 - Classification of warning; and
 - display, indicator system.
 - (ii) Stall warning –
 - Function;
 - constituent components of a simplified system;
 - block diagram, components of a system with angle-of-attack indicator; and
 - operation.
- (d) Power plant and system monitoring instruments
 - (i) Pressure gauge –
 - Sensors;
 - Pressure indicators; and
 - Meaning of coloured arcs.
 - (ii) Temperature gauge –
 - Sensors;
 - ram rise, recovery factor;
 - temperature indicators; and
 - meaning of coloured arcs.
 - (iii) RPM indicator –
 - Interfacing of signal pick-up to RPM gauge;
 - RPM indicators, piston and turbine engines; and
 - meaning of coloured arcs.
 - (iv) Consumption gauge –
 - Fuel flowmeter (function, indicators); and
 - high pressure line fuel flowmeter (function, indications, failure warnings).
 - (v) Fuel gauge –
 - Measurement of volume/mass, units;
 - measuring sensors;
 - content, quantity indicators; and
 - reasons for incorrect indications.
 - (vi) Torque meter –
 - Indicators, units; and
 - meaning of coloured arcs.
 - (vii) Flight hour meter –
 - Drive source; and
 - indicators.

- (viii) Vibration monitoring –
 - Indicators units;
 - interfacing to bypass turbofan engines; and
 - warning system.
- (ix) Remote (signal) transmission system –
 - Mechanical; and
 - electrical.

3.3 Flight performance and planning

- (1) Performance of multi-engine aeroplanes not certified under Part 21 (JAR/FAR 25 (light twin))
 - Definitions of terms and speeds.
 - Any new terms used for multiengine aeroplane performance.
 - Importance of performance calculations.
 - Determination of performance under normal conditions i.e. all engines operating.
 - Consideration of effects of density altitude, wind, aeroplane mass, run-way slope and runway conditions.
 - Elements of performance.
 - Take-off and landing distances.
 - Rate of climb and descent.
 - Effects of selected power settings, speeds and aircraft configuration.
 - Cruise altitudes and altitude ceiling.
 - Payload/range trade-offs.
 - Speed/economy trade-offs.
 - Use of performance graphs and tabulated data.
 - Performance section of flight manual.
- (2) Flight planning and flight monitoring
 - (a) Flight plans for cross-country flights
 - (i) Fuel plan –
 - Computation of planned fuel usage for each leg and total fuel usage for the flight –
 - Flight manual figures for fuel flow during climb, en-route and during descent; and
 - navigation plan for times en-route.
 - Fuel for holding or diversion to alternate airfield.
 - Reserves.
 - Total fuel requirements for flight.
 - Completion of pre-flight portion of fuel log.
 - Flight monitoring and in-flight replanning.
 - In-flight fuel computations –
 - Recording of fuel quantities remaining at navigational checkpoints.
 - Calculation of actual consumption rate –
 - Comparison of actual and planned fuel consumption and fuel state.
 - Revision of fuel reserve estimates.
 - In-flight replanning in case of problems –
 - Selection of cruise altitude and power settings for new destination;
 - time to new destination; and
 - fuel state, fuel requirements, fuel reserves.
 - Radio communication and navigation aids.
 - Communication frequencies and call signs for appropriate control agencies and in-flight service facilities such as weather stations.
 - Radio navigation and approach aids, if appropriate –
 - Type;

- frequencies; and
 - identification.
 - (b) Air traffic service flight plan
 - (i) Types of flight plan –
 - ICAO flight plan;
 - Format;
 - information included in completed plan; and
 - repetitive flight plan.
 - Completing the flight plan.
 - Information for flight plan obtained from –
 - navigation flight plan;
 - fuel plan;
 - operator’s records for basic aircraft information; and
 - mass and balance records.
 - Filing the flight plan.
 - Procedures for filing.
 - Agency responsible for processing the flight plan.
 - Requirements of the State concerning when a flight plan must be filed.
 - Closing the flight plan.
 - Responsibilities and procedures.
 - Processing agency.
 - Checking slot time.
 - Adherence to flight plan.
 - (ii) Tolerances allowed by the State for various types of flight plans
 - In-flight amendment of flight plan –
 - Conditions under which a flight plan must be amended;
 - pilot’s responsibilities and procedures for filing an amendment; and
 - agency to which amendments are submitted.
 - (c) Practical flight planning
 - (i) Simple fuel plans.
 - (ii) Preparation of fuel logs showing planned values for –
 - fuel used on each leg;
 - fuel remaining at end of each leg; and
 - endurance, based on fuel remaining and planned consumption rate, at end of each leg.
 - (iii) Completion of fuel plan –
 - Time and fuel to top-of-climb;
 - cruise sector times and fuel used;
 - total time and fuel required to destination;
 - fuel required for missed approach, climb, en-route altitude and cruise alternate; and
 - reserve fuel.
 - (iv) Practical completion of an air traffic service flight plan.
- 3.4 Human performance and limitations
- (1) Human factors: basic concepts
 - (a) Human factors in aviation
 - (i) Competence and limitations.
 - (ii) Becoming a competent flight engineer –
 - The traditional approach towards “professionalism”.
 - (iii) Accident statistics
 - (iv) Flight safety concepts.

- (b) Basic aviation physiology and health maintenance
 - (i) Basics of flight physiology –
 - The atmosphere –
 - Composition;
 - gas laws; and
 - oxygen requirement of tissues.
 - respiratory and circulatory systems –
 - Functional anatomy;
 - hypobaric environment;
 - pressurisation, decompression;
 - rapid decompression-
 - entrapped gases, barotraumas;
 - counter measures;
 - hypoxia;
 - symptoms; and
 - time of useful consciousness;
 - hyperventilation; and
 - accelerations.
 - (ii) Man and environment: the sensory system –
 - Central and peripheral nervous system –
 - Sensory threshold, sensitivity, adaptation;
 - habituation; and
 - reflexes and biological control systems.
 - Vision –
 - Functional anatomy;
 - visual field, foveal and peripheral vision;
 - binocular and monocular vision;
 - monocular vision cues; and
 - night vision.
 - Hearing –
 - Functional anatomy; and
 - flight related hazards to hearing.
 - Equilibrium –
 - functional anatomy;
 - motion, acceleration, verticality; and
 - motion sickness.
 - Integration of sensory inputs –
 - Spatial disorientation;
 - illusions –
 - * Physical origin;
 - * physiological origin; and
 - approach and landing problems.
 - (iii) Health and hygiene –
 - Personal hygiene.
 - Common minor ailments –
 - Cold;
 - influenza; and
 - gastro-intestinal upset.
 - Problem areas for flight engineers –
 - Hearing loss;

- defective vision;
- hypotension, hypertension, coronaric disease;
- obesity;
- nutrition hygiene;
- tropical climates; and
- epidemic diseases.
- Intoxication –
 - Tobacco;
 - alcohol;
 - drugs and self-medication; and
 - various toxic materials.
- (2) Basic aviation psychology
 - (a) Human information processing
 - (i) Attention and vigilance –
 - Selectivity of attention; and
 - divided attention.
 - (ii) Perception –
 - Perceptual illusions;
 - Subjectivity of perception; and
 - “bottom-up”/“top-down” processing.
 - (iii) Memory –
 - Sensory memory;
 - working memory;
 - long term memory; and
 - motor memory (skills).
 - (iv) Response selection –
 - Learning principles and techniques;
 - drives; and
 - motivation and performance.
 - (b) Human error and reliability
 - (i) Reliability of human behaviour.
 - (ii) Hypotheses on reality –
 - Similarity, frequency; and
 - completion casuality.
 - (iii) Theory and model of human error.
 - (iv) Error generation –
 - Internal factors (cognitive styles);
 - external factors –
 - Ergonomics;
 - economics; and
 - social environment (group, organisation).
 - (v) Decision making –
 - Decision making concepts –
 - Structure (phases);
 - limits;
 - risk assessment; and
 - practical application.
 - Avoiding and managing errors: cockpit management.
 - Safety awareness –
 - Risk area awareness;

- identification of error proneness (oneself);
- identification of error sources (others); and
- situational awareness.
- (vi) Personality –
 - Personality and attitudes –
 - Development; and
 - environmental influences.
 - Individual differences in personality –
 - Self concepts (e.g. action vs. state-orientation).
 - Identification of hazardous attitudes (error proneness).
 - Human overload and underload.
 - Arousal.
 - Stress –
 - Definition(s), concept(s), mode(s);
 - anxiety and stress; and
 - effects of stress.
 - Fatigue –
 - Types, causes, symptoms; and
 - effects of fatigue.
 - Body rhythm and sleep –
 - Rhythm disturbances; and
 - symptoms, effects, management.
 - Fatigue and stress management –
 - Coping strategies;
 - management techniques;
 - health and fitness programmes;
 - relaxation techniques;
 - religious practices; and
 - counselling techniques.
 - Advanced cockpit automation.
 - Advantages and disadvantages (criticalities).
 - Automation complacency.
 - Working concepts.

63.02.4 THEORETICAL KNOWLEDGE EXAMINATION

1. Contents

An applicant for a flight engineer licence must pass a written theoretical knowledge examination on –

- (1) (a) flight-time limitations;
- (b) the following as set out in the AIP, AIP SUP, NOTAMs and AICs currently in force –
 - (i) the organisation and operation of the various air traffic service units;
 - (ii) holding, approach and departure procedures;
 - (iii) entry and departure requirements;
 - (iv) search and rescue;
 - (v) incident reporting procedures;
- (2) navigation;
- (3) elementary meteorology;
- (4) the technical subjects prescribed in paragraphs 2 and 3.

2. General

- (1) Elementary principles of theory of flight, definition of terms, e.g. airflow, forces on an aircraft, straight and level flight, relation between speed and angle of attack, angle of incidence, lift/drag ratio, stability, centre of pressure, flaps and slots.
- (2) Properties of air, density, pressure, relationship between pressure, density and temperature, and their effect on aircraft and engine performance, isothermal atmosphere, international standard atmosphere.
- (3) The action is to be taken in the event of a serious defect or a heavy landing.
 - (4) The principles of operation of engines and their component parts and accessories.
- (5) Definition of the terms associated with propellers, function of constant speed, fully feathering and braking propellers.
- (6) Direction of movement of controls, principles of operation and function of trimming, servo or balance tabs and alternative devices.
- (7) Elementary knowledge of electricity and magnetism: definition of terms, e.g. volts, amperes, ohms, watts, alternating and direct current, aircraft batteries, charging and functioning.

3. Theoretical examination on type of aeroplane to which application relates

The examination in the following subjects must be confined to the type of aircraft in respect of which application is made –

- (a) Operational limitations of the aircraft, including its engines;
- (b) definitions of the datum point and position of centre of gravity limits;
 - (c) aircraft loading and centre of gravity computation prior to and for duration of flight;
- (d) information contained in a certificate of airworthiness and associated documents;
- (e) aircraft performance with respect to speed limitations;
 - (f) the procedure to be followed in the case of an emergency, particularly in the event of power plant failure and fire whilst airborne;
- (g) knowledge of the operations manual or flight manual and maintenance inspection cycles;
- (h) operation of flying controls, trimming, servo or balance tabs and alternative devices;
- (i) normal and emergency systems for operating the landing gear and flaps, including a working knowledge of the systems;
- (j) the pneumatic pressure and vacuum system, location and functioning of the pumps and important units. Ground tests for correct functioning;
- (k) the pressurisation, heating and ventilating system, including a working knowledge of the principle components, the regulation of pressure, temperature and humidity;
- (l) the operation and functioning of the de-icing system, including the main units and duration of the supply;
- (m) the wheel brake system, pressures and defects liable to reduce the operating efficiency. Knowledge of the landing gear shock-absorbing system;
- (n) a knowledge of the fuel system, including the location and function of all important units incorporated in the system;
- (o) the location and capacity of the fuel tanks, including supplementary schemes, where applicable, the means of ascertaining fuel consumption en route;
- (p) a knowledge of the oil system, including capacity of the tanks, the location and function of all important units incorporated in the system;
- (q) the coolant system, where applicable, and the recommended range of temperature to be maintained under various circumstances.
- (r) a general knowledge of the electrical system, voltage and amperage in particular circuits, position and current-carrying capacity of fuses, circuit breakers and main units in the installation; importance of using and method of replacing correct fuses and resetting of circuit breakers;

- (s) the functioning of electrical engine starters and generators; location and checking of security and condition of batteries, action to be taken in the case of failure of any unit in the electrical system;
- (t) flight planning based on loading and performance charts, fuel consumption and engine power curves. Control of power outputs and the computations involved;
- (u) the operation and elementary principles of the automatic pilot, including the method of engagement and disengagement, emergency release and power source, as applicable;
- (v) a working knowledge of the principles of operation of the engine instruments;
- (w) characteristics of particular engines and their component parts and accessories and methods of control used therefore;
- (x) types of fuel and oil used and refueling procedures;
- (y) operation and control of propellers fitted to the particular power plants;
- (z) operation and control of jet engines; and
- (za) all normal procedures, alternate procedures as contained in the aeroplane flight manual.

63.02.5 SKILLS TEST

1. Procedures and manoeuvres

The procedures and manoeuvres referred to in CAR 63.02.5 are the exercises of the practical training course referred to in TS 63.02.3, including –

- (a) the ability to perform normal, alternate and emergency manoeuvres, appropriate to the category and class of aeroplane types for which a licence is applied, with a degree of competency appropriate to that of a flight engineer;
- (b) tracking from or to VOR and NDB stations and utilising navigation aids as applicable; and
- (c) flight planning and mass and balance problems appropriate to the type of aeroplane a licence is applied for.

63.03.3 THEORETICAL KNOWLEDGE EXAMINATION

1. Theoretical examination on type

The examination in the following subjects is confined to the type of aircraft in respect of which application is made –

- (a) Operational limitations of the aircraft, including its engines;
- (b) definitions of the datum point and position of centre of gravity limits;
- (c) aircraft loading and centre of gravity computation prior to and for duration of flight;
- (d) information contained in a certificate of airworthiness and associated documents;
- (e) aircraft performance with respect to speed limitations;
- (f) the procedure to be followed in the case of an emergency, particularly in the event of power plant failure and fire whilst airborne;
- (g) knowledge of the operations manual or flight manual and maintenance inspection cycles;
- (h) operation of flying controls, trimming, servo or balance tabs and alternative devices;
- (i) normal and emergency systems for operating the landing gear and flaps, including a working knowledge of the systems;
- (j) the pneumatic pressure and vacuum system, location and functioning of the pumps and important units. Ground tests for correct functioning;
- (k) the pressurisation, heating and ventilating system, including a working knowledge of the principle components, the regulation of pressure, temperature and humidity;
- (l) the operation and functioning of the de-icing system, including the main units, and duration of the supply;
- (m) the wheel brake system, pressures and defects liable to reduce the operating efficiency. Knowledge of the landing gear shock-absorbing system;

- (n) a knowledge of the fuel system, including the location and function of all important units incorporated in the system;
- (o) the location and capacity of the fuel tanks, including supplementary schemes, where applicable, the means of ascertaining fuel consumption en route;
- (p) a knowledge of the oil system, including capacity of the tanks, the location and function of all important units incorporated in the system;
- (q) the coolant system, where applicable, and the recommended range of temperature to be maintained under various circumstances;
- (r) the functioning of electrical engine starters and generators; location and checking of security and condition of batteries, action to be taken in the case of failure of any unit in the electrical system;
- (s) the functioning of electrical engine starters and generators; location and checking of security and condition of batteries, action to be taken in the case of failure of any unit in the electrical system;
- (t) flight planning based on loading and performance charts, fuel consumption and engine power curves. Control of power output and the computations involved;
- (u) the operation and elementary principles of the automatic pilot, including the method of engagement and disengagement; emergency release and power source, as applicable;
- (v) a working knowledge of the principles of operation of the engine instruments;
- (w) characteristics of particular engines and their component parts and accessories and methods of control used thereof;
- (x) types of fuel and oil used and refueling procedures;
- (y) operation and control of propellers fitted to the particular power plants;
- (z) operation and control of jet engines; and
- (za) all normal procedures, alternate procedures and emergency procedures as contained in the aeroplane flight manual.

63.03.4 SKILL TEST

1. Procedures and manoeuvres

The procedures and manoeuvres referred to in CAR 63.03.4 are the exercises of the practical training course referred to in TS 63.03.2, including –

- (a) the ability to perform normal, alternate and emergency manoeuvres, appropriate to the category and class of aeroplane type for which a licence is applied, with a degree of competency appropriate to that of a flight engineer;
- (b) tracking from o to VOR and NDB stations and utilising navigation aids as applicable; and
- (c) flight planning and mass and balance problems appropriate to the type of aeroplane a licence is applied for.

63.03.10 RENEWAL

1. Proficiency check

The proficiency check required for the renewal of a type rating is the skill test referred to in TS 63.03.4.

63.04.3 TRAINING

1. Training course

The training referred to in TS 63.05.3 constitutes the training requirements for this technical standard.

63.04.4 THEORETICAL KNOWLEDGE EXAMINATION

1. Examination

The examination referred to in TS 63.05.4 constitutes the examination for this technical standard.

63.04.5 SKILLS TEST

1. Procedures

The procedures referred to in CAR 63.04.5 are the exercises contained in TS 63.02.5.

63.05.3 TRAINING

1. Aim of training course

- (1) The training course should be designed for the applicant to be given adequate training in ground and flying instructional techniques based upon established teaching methods.
- (2) On successful completion of the training course and final test, the applicant will be issued with a Grade II flight engineer instructor rating permitting the holder to give ground and flight training appropriate to the issue or a flight engineer licence or type rating.
- (3) The training course should stress the role of the individual in relation to the importance of human factors in the man-machine environment. Special attention should be paid to the applicant's maturity and judgement, including an understanding of adults, their behavioural attitudes and variable levels of education.
- (4) With the exception of paragraph 2, all the subject detail contained in the ground and flight training syllabus is complementary to the training course prescribed in TS 63.02.3. The purpose of the course is to –
 - (a) refresh and bring up to date the technical knowledge of the student instructor;
 - (b) train the student instructor to teach the ground subjects and air exercises;
 - (c) ensure that the student instructor's flying is of a sufficiently high standard; and
 - (d) teach the student instructor the principles of basic instruction and to apply them at the flight engineer level.
- (5) During the training course, the student instructor should be made aware of his or her attitude to the importance of flight safety. The flight engineer instructor is the critical link in the flight training process and his or her attitude to flight safety has a major impact upon student flight engineers. Improving safety awareness is therefore a fundamental objective throughout the training course. It will be of major importance for the training course to aim at giving the student instructor knowledge, skills and attitudes relevant to a flight engineer instructor's task and to achieve this the training course syllabus should comprise at least –
 - (a) teaching and learning; and
 - (b) flight training.

2. Teaching and learning

- (1) The learning process
 - (a) Motivation;
 - (b) perception and understanding;
 - (c) memory and its application;
 - (d) habits and transfer;
 - (e) obstacles to learning;
 - (f) incentives to learning;
 - (g) learning methods; and
 - (h) rates of learning.
- (2) The teaching process
 - (a) Elements of effective teaching;
 - (b) planning of instructional activity;
 - (c) teaching methods;
 - (d) teaching from the "known" to the "unknown"; and
 - (e) use of "lesson plans".
- (3) Training philosophies
 - (a) Value of a structured training course;
 - (b) importance of a planned syllabus; and

- (c) integration of ground and flight training.
- (4) Techniques of applied instruction
 - (a) Classroom instruction techniques –
 - (i) Use of training aids;
 - (ii) group lectures;
 - (iii) individual briefings; and
 - (iv) student participation/discussion.
 - (b) Airborne instruction techniques –
 - (i) The fight/cockpit environment;
 - (ii) as the 2nd or 3rd crew member;
 - (iii) techniques of applied instruction; and
 - (iv) post flight and in-flight judgement and decision making.
- (5) Student evaluation and testing
 - (a) Assessment of student performance –
 - (i) The function of progress tests;
 - (ii) recall of knowledge;
 - (iii) translation of knowledge into understanding;
 - (iv) development of understanding into actions; and
 - (v) the need to evaluate rate of progress.
 - (b) Analysis of student errors –
 - (i) Establish the reason for errors;
 - (ii) tackle major faults first, minor faults second;
 - (iii) avoidance of over criticism; and
 - (iv) the need for clear concise communication.
- (6) Training programme development
 - (a) Lesson planning;
 - (b) preparation;
 - (c) explanation and demonstration;
 - (d) student participation and practice; and
 - (e) evaluation.
- (7) Human performance and limitations relevant to flight instruction
 - (a) Physiological factors;
 - (b) psychological factors;
 - (c) human information procession;
 - (d) behavioural attitudes; and
 - (e) development of judgement and decision making.
- (8) Hazards involved in simulating systems failures and malfunctions in the aeroplane during flight
 - (a) Selection of a safe altitude;
 - (b) importance of “touch drills”;
 - (c) situational awareness; and
 - (d) adherence to correct procedures.
- (9) Training administration
 - (a) Flight/ground training records;
 - (b) flight engineers personal flying log book;
 - (c) the flight/ground curriculum;
 - (d) study material;
 - (e) official forms;
 - (f) aircraft flight/owner’s manuals/flight crew operating handbooks;
 - (g) flight authorisation papers;

- (h) aircraft documents; and
 - (i) the regulations applicable to a flight engineer licence, type rating and a Grade I and Grade II flight engineer instructor rating.
- (10) Ground training

The ground training consists of all instruction given on the ground for the purpose of the training course by a competent person, and includes classroom lectures, tutorials, long briefings and directed private study, but excludes pre-flight briefings and postflight discussions which form part of the flight training.
- (11) Flight training

The student instructor must occupy the seat normally occupied by the flight engineer instructor, in both aeroplane and simulator, except when acting as a flight engineer on mutual flights.
- (12) Air exercises
 - (a) The air exercises are similar to those used for the training of flight engineers but with additional items designed to cover the needs of a flight engineer instructor.
 - (b) The numbering of exercises should be used primarily as an exercise reference list and as a broad instructional sequence guide. The demonstrations and practices need not necessarily be given in the order listed. The actual order and content will depend upon the following inter-related factors –
 - (i) The applicant's progress and ability;
 - (ii) the weather conditions affecting the flight;
 - (iii) the flight time available;
 - (iv) instructional technique considerations;
 - (v) the local operating environment; and
 - (vi) the exercises being carried out by the other crew members under instruction.
 - (c) A student instructor will eventually be faced with similar interrelated factors and they should be shown and taught how to construct flight lesson plans, taking these factors into account, so as to make the best use of each flight lesson, combining parts of the set exercises as necessary. There must be liaison with the pilot instructor as to the best use of available time and crew coordination for all the exercises.
- (13) General
 - (a) The briefing normally includes a statement of the aim and a brief allusion to principles of flight only if relevant. An explanation must be made of exactly what air exercises are to be taught by the student instructor and practiced by the student instructor during the flight. It should include how the flight will be conducted with regard to who is to fly the aeroplane and what airmanship, weather and flight safety aspects currently apply. The nature of the lesson will govern the order in which the constituent parts are to be taught.
 - (b) The four basic components of the briefing will be –
 - (i) The aim;
 - (ii) principles of flight (briefest reference only);
 - (iii) the air exercise(s) (what, and how and by whom); and
 - (iv) airmanship (weather, flight safety, etc.).
- (14) Planning of flight lessons

The preparation of lesson plans is an essential prerequisite of good instruction and the student instructor must be given supervised practice in the planning and practical application of flight lesson plans.
- (15) General considerations
 - (a) The student instructor should complete flight training to practice the principles of basic instruction at the flight engineer level.

- (b) During this training, except when acting as a flight engineer for mutual flights, the student instructor must occupy the seat normally occupied by the flight engineer instructor. The flight engineer instructor giving or monitoring to the student instructor may occupy the flight engineer seat, although it is more desirable that the student instructor gives instruction to a line flight engineer and the flight engineer instructor occupies an extra seat in the cockpit or simulator.

3. Suggested approximate breakdown of hours for the ground training part of the training course. (The item numbers shown below relate to the item numbers of paragraph 2 "Teaching and learning" above.)

Item No.	Tuition hours	Practice hours in class	Comment	Progress tests
	2.00	–	Allow for questions and short discussion periods	0.30
2	4.00	–	The tuition time should allow for questions and short discussion periods	1.00
3	2.00	–	The training syllabus prescribed in TS 63.02.3 should get used as reference material	0.30
4(a)	5.00	34	The time spent in practice under this item will involve the student instructor refreshing his or her technical knowledge, and developing his or her classroom instruction techniques. It will also include discussion between student instructors and advice on teaching from the supervising instructor should include all systems as contained in the operations manual of the aeroplane	
4(b)	4.00	34	The time spent in practice will be mainly directed to the giving of pre-flight briefings. It will allow the student instructor to develop his or her ability to give a practical and short briefing (10 – 15 minutes) to another student instructor. The briefing will outline in a logical sequence the flight lesson to be undertaken	
5(a)	2.00	–	Emphasis should be placed on the validity of questions used in progress tests	1.00
5(b)	2.00	–	Emphasis should be placed on the need to give encouragement to the student	1.00
6	5.00	15	The time spent in practice will be directed towards the planning of classroom lesson periods and the development of the ability of the student instructor to construct lesson plans	
7	5.00	–	Scenarios relevant to good judgement and decision making should be set and analysed	1.00
8	2.00	–	Examples of hazards should cover a broad	1.00

			range of light aircraft and types of operation and not to be confined to the aeroplane used on the course	
9	2.00	–	General revision of relevant documents	
TOTAL	35.00	83.00		7.00
COURSE TOTAL = 125 HOURS				

Note: Technical ground classroom could be longer for large aircraft.

4. Flight training

4.1 Contents

- (1) Briefing before and after exercises.
- (2) Airworthiness certificate limitation and manufacturers recommend limitation for all exercises to be adhered to.
- (3) Operation restriction and procedures as called for in the minimum equipment and configuration deviation lists for all exercises to be adhered to.
- (4) Pre-flight –
 - (a) Cockpit safety inspection;
 - (b) external safety inspection;
 - (c) cockpit preparation;
 - (d) external inspection; and
 - (e) before start check list.
- (5) Normal procedure and check lists for –
 - (a) engine start;
 - (b) taxi out;
 - (c) take-off;
 - (d) rejected take-off;
 - (e) engine failure after V1;
 - (f) climb;
 - (g) cruise;
 - (h) descent;
 - (i) approach;
 - (j) go-around;
 - (k) landing;
 - (l) landing roll;
 - (m) taxi in;
 - (n) parking;
 - (o) shut down;
 - (p) cold weather operation;
 - (q) hot weather operation;
 - (r) wet or slippery runways;
 - (s) severe turbulence; and
 - (t) wind shear.
- (6) Alternate operational procedure and check lists.
- (7) Abnormal procedure and check lists.
- (8) Emergency procedures and check lists.

4.2 General

All exercises to have an assessment rating or grade scale 1 – 5 for the following aspects –

- (a) Technical knowledge 1, 2, 3, 4, 5;
- (b) standard and normal procedures;
- (c) general flying;

- (d) monitoring and crew coordination;
- (e) crew coordination;
- (f) abnormal and emergency procedures; and
- (g) instructional skill.

4.3 Numerical scale for assessment

5	High standard
4	Good standard with no ingrained faults
3	Satisfactory some instructor input
2	Requires further training
1	Requires considerable further training

Note: See skill test report in Annexure D.

63.05.4 THEORETICAL KNOWLEDGE EXAMINATION

1. Examination

An applicant for a Grade I flight engineer instructor rating must pass a written theoretical knowledge examination on –

- (a) theory of flight;
- (b) principles of flying instruction;
- (c) navigation and meteorology;
- (d) the regulations made under the Act relating to the licensing requirements applicable to flight engineers licences and ratings;
- (e) theory of high-altitude flight;
- (f) the application of aero-medicine to high-altitude flying; and
- (g) human factor performance and limits relevant to instruction.

63.05.5 SKILL TEST

1. Procedures

The procedures referred to in CAR 63.05.5 are the exercises contained in TS 63.02.5.

**SA-CATS 64
Cabin crew licensing**

List of technical standards

64.01.5 LOGBOOKS

1. Information to be contained in logbooks
2. Manner in which logbooks are to be maintained

64.01.9 DESIGNATION OF EXAMINER

1. Requirements
2. Procedures
3. Designation reference number
4. Submission of reports and forms
5. Stamp
6. Responsibility
7. Monitoring of the system

64.01.10 DESIGNATION OF INSTRUCTORS

1. Cabin crew instructor requirements
2. Application procedures
3. Responsibility
4. Maintaining currency
5. Monitoring of the system

64.01.11 DESIGNATION OF FIRST AID EXAMINER

1. Procedure for designation
2. Qualification criteria for designation as First Aid Examiners
3. Conditions for designated First Aid Examiners
4. Training aids and equipment required
5. Oversight of First Aid Examiners

64.01.12 DESIGNATION OF FIRST AID INSTRUCTOR

1. Procedure for designation of First Aid Instructor
2. Qualification criteria for designation as First Aid Instructor
3. Conditions for First Aid Cabin Crew Designated Instructors
4. Oversight of First Aid Instructor

64.02.2 TRAINING

1. Aim of training course
2. Theoretical knowledge course
3. Practical training course
4. Aviation security
5. First aid

64.02.3 THEORETICAL KNOWLEDGE EXAMINATION

1. Examination
2. Retesting after failure

64.02.4 SKILL TEST

1. Procedures

64.02.5 APPLICATION FOR CABIN CREW MEMBER LICENCE

1. Skill test report

64.01.5 LOGBOOKS

1. Information to be contained in logbooks

The following information must be recorded in logbooks:

- (a) full name and address of owner;
- (b) summary of previous flying experience, if any; and
- (c) particulars of flights –
 - (i) date;
 - (ii) type and registration of the aircraft in which the flight occurs;
 - (iii) operating capacity of holder;
 - (iv) flight time; and
 - (v) nature of flight.

2. Manner in which logbooks are to be maintained

In order to facilitate the issue of licences, a cabin crew member must –

- (a) clearly indicate instructional flight times; and
- (b) summarise his or her logbook.

64.01.8 LANGUAGE

1. Language proficiency

- (1) There are six levels of proficiency in the requirement (refer to Appendix 1 of ICAO Annex 1 and the ICAO Language Proficiency Rating Scale attached to ICAO Annex 1).
- (2) A cabin crew member shall demonstrate a minimum proficiency of at least Operational Level '4' of both ICAO Standard Phraseology and plain language, to be issued with their respective licenses or validations. However, cabin crew member will be required to be tested once only or when the Director considers it necessary.
- (3) The six language proficiency levels are as follows:

PROFICIENCY LEVEL	PROFICIENCY INTERVAL	TESTING
Level 6: Expert	Retesting not required	
Level 5: Extended	Retesting not required	
Level 4: Operational (Minimum level)	Retesting not required	
Level 3: Pre-operational	Licence not issued/maintained	
Level 2: Elementary	Licence not issued/maintained	
Level 1: Pre-elementary	Licence not issued/maintained	

- (4) Language Proficiency Requirement applies to speaking and listening proficiency only and does not address the ability to read or write, in the English Language.

- (5) Areas of language to be assessed: The following six dimensions as prescribed by ICAO Annex 1 are listed as:
- (a) Pronunciation: Ability to speak in a manner that is clear and easy to understand.
 - (b) Structure: Ability to compose concise, meaningful and unambiguous sentences or messages.
 - (c) Vocabulary: Ability to use correct words and phrases to match the setting.
 - (d) Fluency: Ability to respond, narrate events or describe situations naturally.
 - (e) Comprehension: Ability to understand and follow instructions without difficulty.
 - (f) Interaction: Ability to ask and answer questions, and engages in two-way dialogue without difficulty.

2. Compliance with language proficiency procedures

- (1) In order to comply with this requirement all cabin crew members shall be tested in accordance with this technical standard.
- (2) Approved Language Proficiency Interviewers/Raters shall be registered by the Director and shall comply with ICAO language proficiency requirements as set out in ICAO Document 9835, Chapter 5 & 6.
- (3) Language Proficiency Ratings shall comply with the critical characteristics of testing methodology as set out in ICAO Document 9835, Ch 6 (6.6.3) and make use of the ICAO Rating Scale and holistic descriptors provided. It is imperative that the interviews and ratings shall only be conducted by professionals registered by the Director as Language Proficiency Interviewers/Raters.
- (4) An approved aviation training organization shall apply to the Director for accreditation to conduct language proficiency testing. The testing at these organizations shall be conducted by registered Language Proficiency Interviewers/Raters in accordance with their respective professional and academic qualifications. (See ICAO document 9835, Chapter 4 (4.3.1) and Appendix 1.5.2 for best practices.)
- (5) Oral Proficiency Interviews (OPI's) shall be conducted jointly by a subject matter expert and a linguistic expert registered by the Director. All OPI's shall be conducted using face-to-face interview procedures, and each OPI shall be recorded (preferably electronically) and stored for a minimum of 6 years in an archive system. These records shall be open for inspection and audits by the CAA.

- (6) All registered Language Proficiency Interviewers/Raters shall demonstrate full proficiency (Level 6 competency) in their language usage. They shall also be required to sign a Code of Conduct concerning language testing practices.

3. The pre-interview process

The pre-interview process comprises completion of a Bio-Data Questionnaire included under Part 1 on the CAA Language Proficiency Test Report [for Cabin Crew Communication (Form CA 64-15)].

3.1 The interview process, certification and endorsement:

- (1) The interview process shall consist of a thirty to forty minute interview with a [CAA registered Language Proficiency Interviewer/Rater]. During this interview, the candidate shall be evaluated in the use of the plain language and aviation related language. Oral and listening skills shall be rated in accordance with the full set of ICAO descriptors.
- (2) This process shall determine the candidate's actual proficiency level. The candidate shall then be issued with a Certificate of Language Proficiency from the [Training Organization] that will be submitted together with the [Skills Test Form CA 64-07] for issuing of a rating into the candidate's licence. The applicable fee for the issuance of a rating as listed in CAR Part 187 is payable to the CAA.

3.2 The certification process:

An approved training organization shall issue an English Language Proficiency Certificate that shall include the following minimum criteria:

- (a) Name of the certificate, i.e. Certificate of Competency in ICAO English Language Proficiency.
- (b) Name of the [Accredited Training Organization].
- (c) CAA approval number for the [abovementioned Training Organization].
- (d) Identity Number of the applicant.
- (e) Licence number of the applicant.
- (f) Profession of the applicant.
- (g) Full names of the applicant.
- (h) Colour identity photograph of the applicant.
- (i) The assessed rating result reported under Part 2 Section 1 of Form CA 61-01-11, i.e.:
 - (i) Pronunciation.
 - (ii) Structure.
 - (iii) Vocabulary.
 - (iv) Fluency.
 - (v) Comprehension.
 - (vi) Interaction.

- (j) ICAO Language Proficiency Rating, reported under Part 2 Section 1 of Form CA 64-15.
- (k) Name, Signature and CAA approval number of the Tester or Rater.
- (l) Name, Signature and CAA approval number of the Subject Matter Expert.

3.3 Acceptance of Prior Learning or Foreign CAA language certification:

- (1) The SA CAA will accept foreign CAA language certification and issue the relevant rating into the applicant's license.
- (2) The process for alternative language certification is:
 - (a) The CAA will certify the holder of a South African Cabin Crew Member License at Operational Level 4 if obtained prior to 31st July 2010.
 - (b) An applicant who can provide evidence of [Operational] English Language Proficiency will be awarded [Operational Level 4]. This evidence is indicated, but not limited to the following options:
 - (i) Certified Copy of School leavers certificate – Matric, O or M Level, with a pass in English first language with a minimum symbol of D or its equivalent.
 - (ii) Certified copy of a SAQA recognised 2 year tertiary qualification with English either as a subject or English as the language of tuition and examination.
 - (iii) Proof of being a present or past native of a nation where English is the first language, e.g. UK, USA, Australia or New Zealand.
 - (iv) An applicant who can provide evidence of Operational English Language Proficiency will be awarded a Level 4. This evidence is indicated, but not limited to the following options to a school leaver's certificate – Matric, O or M Level, with a pass in English second language with a minimum symbol of C or its equivalent.
- (4) No fees for adding or changing of an English language proficiency certificate will be charged.

3.4. Candidates assessed to be below Level 4:

- (1) Candidates who do not meet the ICAO Level 4 requirement, will be required to undergo remedial language training, in order to address areas of difficulty identified in Part 3 of [Form 64-15;] – Language proficiency feedback.
- (2) Applicants assessed below Level 4 who wish to gain a Level rating shall be required to wait for a period of 90 days after being assessed before applying for re-assessment.

- (3) A moderation process should be established by the [Training Organizations] should candidates wish to challenge their results, [also as verification that the process is fair].

3.5 Transfer

- (1) If for any reason a transfer is required, Form CA 64-16 shall be completed.
- (2) The candidate shall obtain a copy of his/her testing material from the previous Training Organization for submission to the transfer Training Organization.
- (3) The costs for the above named copy in (b) shall be for the candidate's expense.
- (4) The transfer Training Organization shall acknowledge receipt and verify contents thereof.

64.01.9 DESIGNATION OF EXAMINER

1. Requirements

The Director may designate the holder of a Grade I cabin crew instructor rating as an examiner.

2. Procedures

- (1) Any person who desires to be designated as an examiner, must apply in writing to the Director.
- (2) An application for the designation as an examiner must be accompanied by proof that the applicant complies with the conditions, requirements and standards prescribed in this technical standard.
- (3) The Director may, after due consideration of the application, designate the applicant as an examiner.
- (4) The Director may designate the applicant as an examiner for the period determined by the Director, which period may not exceed one year, calculated from the date of designation.
- (5) The Director may withdraw a designation if –
 - (a) it becomes evident that the designated examiner does not comply with the provisions of this technical standard; or
 - (b) the withdrawal is necessary in the interests of aviation safety.
- (6) The designated examiner must, upon the withdrawal of the designation by the Director, forthwith surrender the document referred to in CAR 64.01.9(3) to the Director.

3. Designation reference number

- (1) A designation number will be allocated to an examiner. This number together with other relevant information as indicated on the document referred to in CAR 64.01.9(3) must be reflected on all the relevant documents signed by the examiner.
- (2) The letter (c) will be inserted after a designation number to indicate that the examiner is restricted to certain tests within a particular organisation, if applicable.

4. Submission of reports and forms

- (1) An examiner must submit a report to the Director quarterly, on all skill tests conducted by the examiner. These reports must be submitted regardless of the results of the skill tests or even if no skill tests were conducted.
- (2) Competency forms where the test resulted in a failure must be forwarded by the examiner to the Director for record keeping.

- (3) In the event of a failure, the test form must indicate notes on the debriefing done and the candidate must initial at such notes.
- (4) Any competency form not duly completed by an examiner may be rejected by the Director.

5. Stamp

An examiner must, upon receiving the document referred to in CAR 64.01.9(3), have a stamp made that reflects the following information –

- (a) Name of examiner
- (b) Licence number
- (c) Class and category
- (d) Designation number
- (e) Expiry date

Example

J A Fox Xxxxxxxx Designation # 099 or 099(C) 12/97
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6. Responsibility

- (1) It is the responsibility of the examiner to ensure that the candidate has passed the relevant theoretical knowledge examination with the CAA before commencing the relevant test.
- (2) It is also the responsibility of the examiner to ensure that the candidate is in possession of a valid cabin crew licence as is required by the Civil Aviation Regulations.

7. Monitoring of the system

The Director may at any time require an examiner to subject himself or herself for a ground or skill test, should it become evident that such examiner is not maintaining the required standard of testing.

64.01.10 DESIGNATION OF INSTRUCTORS

1. Cabin Crew Instructor requirements

- (1) The training for cabin crew referred to in CAR 64.01.10 shall be conducted by an instructor designated in terms of that Regulation.
- (2) The instructor shall be in possession of the following qualifications:
 - (a) A valid South African cabin crew member licence.
 - (b) Current on aircraft types that the instructor will provide training on.
 - (c) A valid class II medical certificate.
 - (d) Original or certified proof of having undergone an approved train the trainer course.
 - (e) Original or certified proof of having undergone an approved assessor course.
 - (f) A minimum of two (2) years and at least one thousand (1000) flying hours as an active cabin crew member (certified copy of summarised logbook).
 - (g) Proof of internal instructor assessments conducted by the ATO's Designated Examiner
 - (h) Other relevant aviation or training experience or qualification in terms of criteria determined by the Director.
- (3) The instructor shall have sufficient ability in reading, speaking an understanding the English language to enable such instructor to duly exercise the privileges of a cabin crew instructor.

2. Application procedures

- (1) Any person, who desires to be designated as a cabin crew instructor, must apply in writing to the Director.
- (2) An application for designation as an instructor shall be accompanied by proof that the applicant complies with the requirements as set out in paragraph 1.
- (3) A practical assessment of the applicant's ability to conduct aviation Safety and Emergency Procedures training shall be conducted by an authorised officer.

- (4) The designated examiner's assessment report and recommendation must be forwarded to the Director.
- (5) The Director may, after consideration of the application, designate the applicant as an instructor, provided that the requirements prescribed in this Technical Standard have been complied with.
- (6) The designation of cabin crew instructor is valid for an indefinite period, provided that the privileges of the designation shall not be exercised unless the instructor:
 - (a) undergoes recurrent training as prescribed in Part 121; and
 - (b) is the holder of a valid Class II medical certificate.
- (7) A designated instructor shall be affiliated to an Aviation Training Organisation approved in terms of Part 141.
- (8) The Director may withdraw a cabin crew instructor's rating if –
 - (a) it becomes evident that the instructor does not comply with the provisions of this Technical Standard; or
 - (b) the withdrawal is necessary in the interest of aviation safety.

3. Responsibility

- (1) It is the responsibility of the instructor to ensure that the candidate being trained has acquired all necessary theoretical and practical knowledge as per the provision of SA-CATS 64.

4. Maintaining currency

- (1) The number of aircraft types that the instructor is qualified on in terms of training is unlimited, provided the instructor:
 - (a) conducts theoretical and practical training on aircraft type at least once in a six month period; or
 - (b) attends refresher training in a six month period if no training was conducted.

5. Monitoring of the system

- (1) A designated examiner shall conduct at least two assessments on the activities of the instructor per aviation training organisation.
- (2) Annual and ad hoc inspections for the maintenance of standards shall be conducted.
- (3) The Director may at any time require the instructor to subject himself or herself to a ground or skills test, should it become evident that such an instructor is not maintaining the required standard of training.
- (4) The inspections prescribed in paragraphs (1) to (3) above shall be conducted on each Instructor within a twelve (12) month period.

64.01.11 DESIGNATION OF FIRST AID EXAMINER

1. Procedure for designation

- (1) Any person, who desires to be designated as a First Aid Examiner, must apply in writing to the Director.
- (2) An application for the designation as a First Aid Examiner must be accompanied by proof that the applicant complies with the conditions, requirements and standards prescribed in these technical standards.
- (3) The Director may, after due consideration of the application, designate the applicant as a First Aid Examiner.
- (4) The Director may designate the applicant as a First Aid Examiner for the period determined by the Director, which period may not exceed one year, calculated from the date of the designation.
- (5) Any person who desires to renew their designated examiner status must submit the following to the Director at 60 days preceding the date of expiry –
 - (a) a appropriate application form;
 - (b) the appropriate fee as prescribed in Part 187.

2. Qualification criteria for designation as First Aid Examiners

The qualifications for designation shall be –

- (a) proof of current registration as –
 - (i) medical doctor registered with the Health Professional Council of South Africa;
 - (ii) professional nurse registered with the Nursing Council of South Africa;
 - (iii) intermediate life support paramedic emergency care practitioner (level 6) registered with the Health Professions Council of South Africa; or
 - (iv) advanced life support paramedic registered with the Health Professions Council of South Africa;
- (b) attendance of an Assessor and Moderator Course approved by the South African Qualification Authority;
- (c) attendance of Primary Aviation Health or Flight Medical Attendant Course/Aviation Health Care Provider Course;
- (d) attendance of recognized Facilitator Course or Instructor Course or Train the Trainer Course or Educational Courses as part of either Under or Post Graduate Professional Bachelors Degree or equivalent course registered with an accredited authority;
- (e) attendance of Basic Life Support Instructors Certificate approved by the relevant Authority; and
- (f) affiliation to an Aviation Training Organization.

3. Conditions for designated First Aid Examiners

- (1) The First Aid Examiners must ensure that the original or certified copy for each test conducted, are retained by the ATO for a minimum period of 5 years, such documentation will be assessed during all inspection.
- (2) The First Aid Examiners must ensure that they have access to the current Civil Aviation Regulations, Technical Standards, AICs and any other relevant documentation.
- (3) The First Aid Examiner is to sign appropriate sections of the applicant's certificate where and when required indicating the date and nature of the test.
- (4) The First Aid Examiner is responsible for moderating 30% of training provided by First Aid Instructors, they authorized to provide and sign off training.
- (5) The First Aid Examiner will be required to produce documented proof of currency with relevant professional authority.
- (6) An examiner must submit a report to the Director quarterly, on all theory and practical tests conducted by the examiner.
- (7) The Director may require other supporting documentation such as training schedule, lesson plans and training manuals.
- (8) In the event of a failure, the test forms must indicate notes on the de-briefing done and the candidate must initial at such notes.
- (9) An examiner must, upon receiving the document referred to in CAR 64.01.11(3), have a stamp made that reflects the name and designation number of the examiner.

4. Training aids and equipment required

The following training aids and equipments are required during training:

- (a) A CPR adult, child and infant manikins are to be available for all courses presented at a ratio of three learners per manikin minimum.
- (b) Each learner must be issued with a pair of medical examination gloves and resusci-aid way valve mouth-to mouth device or a pocket mask.
- (c) A maximum of 12 learners per 1x First Aid Instructor/DE is allowed for all practical training sessions.
- (d) A medical or patient oxygen cylinder device will be required for training.

5. Oversight of First Aid Examiners

- (1) The following types of inspections must be conducted on each examiner within a twelve (12) month period:
 - (a) An inspection for annual renewal of an examiner status, which inspection shall entail –
 - (i) an assessment of training compliance to Part 64; and
 - (ii) an assessment of compliance to conditions of designation and training equipments.
 - (b) Ad hoc inspections for the maintenance of standards.
- (2) The Director may at any time require an examiner to subject himself or herself to a theoretical and practical assessment, should it become evident that such an examiner is not maintaining the required standard of testing.

64.01.12 DESIGNATION OF FIRST AID INSTRUCTOR

1. Procedure for designation of First Aid Instructor

- (1) Any person, who desires to be designated as a First Aid Instructor, must apply in writing to the Director.
- (2) An application for the designation as a First Aid Instructor must be accompanied by proof that the applicant complies with the conditions, requirements and standards prescribed in this technical standard.
- (3) The Director may, after due consideration of the application, designate the applicant as a First Aid Instructor.
- (4) The Director may designate the applicant as a First Aid Instructor for the period determined by the Director, which period may not exceed one year, calculated from the date of the designation.
- (5) The Director may withdraw a designation if it becomes evident that the designated instructor does not comply with the provision of the technical standards.
- (6) The withdrawal will be necessary in the interest of aviation safety.
- (7) The designated instructor must upon the withdrawal of the designation by the Director, forthwith surrender all documents issued by the Director.

2. Qualification criteria for designation as First Aid Instructor

The qualifications for designation shall be –

- (a) proof of current registration as –
 - (i) medical doctor registered with the Health Professions Council of South Africa;
 - (ii) auxiliary nurse registered with the South African Nursing Council;
 - (iii) Advanced Life Support Paramedic (Level 7 and 8), registered with the Health Professions Council of South Africa;
 - (iv) Intermediate Life Support Emergency Care Practitioner (Level 6);
 - (v) Basic Life Support Emergency Care Practitioner (BAA–Level 4-5), registered with the Health Professions Council of South Africa;
 - (vi) proof of continued professional development with the institutions mentioned in subparagraphs (i) to (v) above;
- (b) Instructor / Train to Trainer / Facilitator - accredited by the relevant authority;
- (c) Primary Aviation Health / Flight Medical Attendant Course / Aviation Health Care Provider Course;
- (d) Basic Life Support Instructor Certificate - approved by the relevant authority;
- (e) Assessor Course - SAQA approved;
- (f) Documented proof of experience in the aviation environment;
- (g) Affiliation with an ATO.

3. Conditions for First Aid Cabin Crew Designated Instructors

- (1) The First Aid Instructor must ensure that they have access to the current Civil Aviation Regulations, Technical Standards, AICs and any other relevant documentation.
- (2) The First Aid Instructor is to sign appropriate sections of the applicant's certificate where and when required indicating the date and nature of the test.
- (3) The First Aid Instructor shall be moderated by First Aid Examiner.
- (4) An instructor must submit a report to the Director quarterly, on all practical and theoretical test conducted by the instructor.
- (5) In the event of a failure, the test forms must indicate notes on the de-briefing done and the candidate must initial at such notes.
- (6) The First Aid Examiner will be required to produce documented proof of currency with relevant professional authority.
- (7) An instructor must submit a report to the Director quarterly, on all theory and practical tests conducted by the examiner.
- (8) The Director may require other supporting documentation such as training schedule, lesson plans and training manuals.
- (9) In the event of a failure, the test forms must indicate notes on the de-briefing done and the candidate must initial at such notes.
- (10) An instructor must, upon receiving the document referred to in CAR 64.01.12 (3), have a stamp made that reflects the name and designation number of the examiner.

4. Oversight of First Aid Instructor

- (1) The following types of Inspections must be conducted on each instructor within a twelve (12) month period:
 - (a) An inspection for an annual renewal of an instructor status, which inspection shall entail –
 - (i) assessment of training compliance to Part 64;
 - (ii) assessment of compliance to conditions of designation and training equipments.
 - (b) Ad hoc inspections for the maintenance of standards.
- (2) The Director may at any time require an instructor to subject himself or herself to a theoretical and practical assessment, should it become evident that such an instructor is not maintaining the required standard of testing.

64.02.2 TRAINING

1. Aim of training course

- (1) The aim of the cabin crew member training course is to train aspiring cabin crew members to the level of proficiency required for the issue of a cabin crew member licence.
- (2) The duration of the course is to be determined.
- (3) The course must be conducted by an aviation training organisation licenced in terms of Part 141 of the Regulations.
- (4) The course must comprise –
 - (a) a theoretical knowledge course;
 - (b) a practical training course;
 - (c) an aviation security course; and
 - (d) a first aid course.

2. Theoretical knowledge course

2.1 Training syllabus

- (1) The theoretical knowledge course must consist of the following subjects –
 - (a) Aviation – general
 - (i) regulatory overview
 - (ii) aviation terminology
 - (iii) theory of flight
 - (iv) physiology of flight
 - (v) flight deck observation flight

- (b) Responsibilities
 - (i) operator
 - (ii) cabin crew member
 - (iii) civil aviation inspector
- (c) Safety procedures
 - (i) crew coordination
 - (ii) communication
 - (iii) surface contamination
 - (iv) briefings
 - (v) pre-flight and safety checks
 - (vi) passenger handling
 - (vii) passenger and flight crew seats/restraints
 - (viii) cabin baggage
 - (ix) electronic devices
 - (x) service to passengers on the ground
 - (xi) fuelling with passengers on board
 - (xii) pre-take-off and pre-landing
 - (xiii) propeller abnormalities
 - (xiv) apron/ramp safety
 - (xv) turbulence
 - (xvi) crew member incapacitation
 - (xvii) flight deck protocol
 - (xviii) fuel dumping
 - (xix) post flight duties
 - (xx) oxygen administration
- (d) Emergency procedures
 - (i) fire fighting
 - (ii) smoke/fumes in the cabin
 - (iii) rapid decompression and decompression problems
 - (iv) evacuations
- (e) Emergency equipment
 - (i) equipment overview
- (f) Aircraft specific subjects
 - (i) physical description
 - (ii) galleys
 - (iii) communication systems
 - (iv) lighting system
 - (v) water and waste systems
 - (vi) heating and ventilation systems
 - (vii) oxygen systems
 - (viii) exits
 - (ix) unique features

2.2 Contents of training syllabus

2.2.1 Aviation – General

2.2.1.1 Regulatory overview

- (1) Training objective

The cabin crew member will be able to identify the international and national aviation regulatory bodies and describe the legislation relating to cabin crew members.
- (2) Regulatory agencies

- (a) Identify international and national aviation regulatory agencies and describe their role especially as it relates to cabin crew members. Describe how cabin crew members are required to comply with international regulations and penalties for breach of these regulations e.g. organisation and individual liabilities.
 - (b) Identify other regulatory agencies cabin crew members may be in contact with, and describe their role in aviation, i.e. Customs, Police, Immigration, Health, Narcotics and Agriculture.
 - (c) Describe the regulatory system in the Republic and how it functions to draft regulations and standards, ensure compliance and investigate accidents and incidents.
- (3) Civil aviation legislation
- (a) Identify and describe the legislation governing flight crew in the Republic.
 - (b) Identify the trends in the industry i.e. open skies, mergers and harmonisation.
 - (c) Identify historic legislation in cabin safety and describe its effect on aviation safety i.e. fire protection and minimum crew.
 - (d) Identify other sources of regulatory guidance i.e. technical directives, policy letters and compliance requirements.
 - (e) Identify and describe the specific regulations applicable to cabin crew members and cabin safety including –
 - (i) seatbelts and related restraints systems;
 - (ii) life-saving equipment, e.g. life rafts, life vests and survival kits;
 - (iii) oxygen equipment;
 - (iv) first aid kits;
 - (v) minimum equipment lists;
 - (vi) floor proximity lighting;
 - (vii) cabin fire protection;
 - (viii) crew stations;
 - (ix) infant (i.e. definition of);
 - (x) minimum flight crew requirements;
 - (xi) passenger safety briefings;
 - (xii) emergency duties;
 - (xiii) passenger safety briefing cards;
 - (xiv) surface contamination training;
 - (xv) carry-on baggage;
 - (xvi) aircraft journey log/cabin log book (equivalent);
 - (xvii) liquor and drugs;
 - (xviii) refuelling (including fuelling with one engine running);
 - (xix) emergency equipment;
 - (xx) survival equipment;
 - (xxi) duty time limitations – flight crew/cabin crew;
 - (xxii) crew rest – flight crew/cabin crew;
 - (xxiii) designated crew rest areas/policies;
 - (xxiv) cabin crew manual as part of operations manual;
 - (xxv) non-smokers legislation; and
 - (xxvi) take-off and landing stations.

Note: Paragraphs (3)(b), (c) and (d) are recommended subjects.

2.2.1.2 Aviation terminology

- (1) Training objective

The cabin crew member will be able to define common industry terms of reference and be able to use them in an appropriate context.
- (2) Terminology

- (a) Identify and define common operator terminology including terms relating to airports, ground operations and flight operations.
- (b) Describe the importance to flight safety of using correct terminology.
- (3) Terms of reference
 - (a) Identify and describe the 24 hour clock and its application in aviation.
 - (b) Describe what is meant by time zones and outline how to calculate elapsed time when crossing time zones.
 - (c) Define what is meant by the international date line and describe its application in aviation.
 - (d) Define what is meant by UTC and its application in aviation.
 - (e) List and identify the airport location identifiers used by the operator and describe how and why they are used.
 - (f) Define and describe the phonetic alphabet and describe its importance in aviation-related communication.
 - (g) Identify the way that airspeed is measured and describe the conversion from knots to kilometres/hour.

Note: Paragraphs (3)(b), (c), (d) and (g) are recommended subjects.

2.2.1.3 Theory of flight

- (1) Training objective

The cabin crew member will be able to identify and describe the basic components of theory of flight relating to the aircraft environment in which they will be operating.

- (2) General aircraft description
 - (a) Identify the main components of an aircraft and describe their function including but not limited to –
 - (i) Wing – leading edge, trailing edge, wing tip, wing root and winglet;
 - (ii) control systems – ailerons, flaps, rudder and elevator;
 - (iii) tail – fixed vertical stabiliser, rudder and elevators; and
 - (iv) miscellaneous – fuselage, spoilers, speed brakes, undercarriage, main gear, nose wheel, chocks or blocks and pins.
 - (b) Define what is meant by aircraft operating abnormalities which do not constitute an emergency, e.g. flap, landing gear, visible fluid leaks, etc.
- (3) Aerodynamics of flight
 - (a) Identify and describe the four forces acting on an aircraft in flight.
 - (b) Identify and describe the three axes of an aircraft and describe the aircraft movement around each.
 - (c) Define what is meant by aircraft attitude.
 - (d) Describe how lift is achieved and factors which adversely affect lift.
 - (e) Describe how a piston engine, turbine engine and a jet engine function (as applicable to the operator's operation).
 - (f) Describe how and when an aircraft is pressurised and how pressurisation is maintained (as applicable to the operator's operation).
 - (g) Describe the aerodynamic forces at work when aircraft engines fail in flight with specific reference to the operator's aircraft.
 - (h) Identify the importance of crew members to be alert for abnormal aircraft functioning and how to recognise and report it to flight deck crew members.
 - (i) Define what is meant by weight and balance (centre of gravity), its effect on aircraft controllability and factors which affect weight and balance.

Note: Paragraph (3)(e) is a recommended subject.

- (4) Meteorology

- (a) Describe types of common cloud formations and their effect on weather, i.e. frontal systems and thunderstorms.
- (b) Describe the types of wind phenomena and their effect on aircraft in flight, i.e. jet stream and wind shear.
- (c) Identify the hazards to flight associated with volcanic ash/dust. Describe how to recognise it, i.e. smoke or dust in the cabin, acrid odour and a bright orange glow in the engine intakes.

Note: Paragraph (4) is a recommended subject.

- (5) Air traffic control
 - (a) Define what is meant by VFR and IFR and identify the most common restrictions for an aircraft flying under VFR and IFR flight plans.
 - (b) Identify what is meant by air traffic control and who is responsible for ensuring aircraft separation under VFR and under VFR conditions.
 - (c) Describe how aircraft are controlled on the ground and in the air with specific reference to the operator's operation.

Note: Paragraph (5) is a recommended subject.

2.2.1.4 Physiology of flight

- (1) Training objective

The cabin crew member will be able to identify and describe the most common physiological effects of flight in pressurised and non-pressurised aircraft including likely causes, recognition and ways to minimise these effects.
- (2) General
 - (a) Describe the physiology of respiration and circulation.
 - (b) Identify the body's requirement for oxygen and the potential for crew member incapacitation due to lack of oxygen.
 - (c) Describe the most common physiological effects of altitude and the pressurised cabin, including but not limited to varicose veins, dehydration, effects of trapped gasses and water retention.
 - (d) Describe the circumstances under which carbon monoxide poisoning may occur, the signs and symptoms, ways to detect it and minimise its effects. Include the potential for CO poisoning from ground heating/air conditioning units and ground power units.
- (3) Effect of altitude
 - (a) Define what is meant by decompression sickness and describe the physiological effects of pressure changes on gases in the body. Define "safe" times between scuba-diving and flight.
 - (b) Define what is meant by hypoxia, the hazards associated with it, signs and symptoms, ways to detect it and minimise its effects.
 - (c) Define time of useful consciousness and factors affecting it.
 - (d) Identify persons most susceptible to the effects of hypoxia.
 - (e) Describe the effects of altitude on night vision and the impact this has on flight safety and personal safety.

Note: Paragraph (3)(e) is a recommended subject.

2.2.1.5 Flight deck observation flight

- (1) Training objective

The cabin crew member will be able to recognise the duties and expectations of flight deck crew members as they apply to different aircraft on which the cabin crew member will be operating.
- (2) General
 - (a) Flight crew communication and flight crew coordination depend on each cabin crew member having an understanding of each other's crew duties, responsibilities, workloads and expectations for all phases of flight. While this knowledge can be taught in a classroom, a more appropriate forum would be in an actual operating environment. At least one flight deck

observation flight will be completed prior to a cabin crew member becoming qualified (thereafter on an annual basis). The following conditions will apply.

- (b) Cabin crew members will be in uniform; however, they will be in addition to the minimum cabin crew and will not be assigned any normal safety or cabin service duties.
- (c) Each flight deck observation flight will begin at the regular check-in time for the flight deck crew. Cabin crew members will observe the normal pre-flight pilot duties, i.e. flight planning, weather briefing, flight deck crew briefing, pre-flight walkaround –
 - (i) Flight deck workloads and safety duties;
 - (ii) flight crew communication procedures;
 - (iii) flight crew coordination procedures;
 - (iv) flight deck layout;
 - (v) location of emergency equipment;
 - (vi) location and operation of flight deck windows;
 - (vii) location and operation of flight deck escape hatches;
 - (viii) location of controls and operation of pilot and observer seats;
 - (ix) location and operation of flight deck oxygen; and
 - (x) location of emergency checklists.
- (d) Each cabin crew member will participate in a post-flight debriefing on the flight deck observation flight.

2.2.2 Responsibilities

2.2.2.1 Operator

- (1) Training objective
 - The cabin crew member will be able to describe the roles and responsibilities of the operator which have been legislated in the interests of aviation safety.
- (2) Operating requirements
 - (a) Describe the operator's operating policy as it relates to safety and requirement to maintain this safety emphasis.
 - (b) Describe the relationship between regulatory requirements and the operator's policy and procedures.
 - (c) Describe the operator's responsibility to conduct operations according to approved procedures and to ensure that any companies contracted by the operator also comply with these procedures.
 - (d) Identify the requirement to have an organisational chart with clearly defined reporting responsibilities. Clearly outline the organisational links between pilots (flight operations) and cabin crew members.
 - (e) Identify the requirement for the operator to provide appropriate training ensuring cabin crew member competency in safety and emergency duties relating to the carriage of passengers.
 - (f) Identify the operator's policy and procedures for the reporting of accidents and incidents. Include information regarding investigations and follow-up that may occur.
- (3) Operations manual
 - (a) Define "operations manual" and describe the operator's responsibility to develop and maintain an operations manual and for ensuring cabin crew members are familiar with the portions relating to their duties.
 - (b) Identify the cabin crew manual as part of the operations manual and describe contents and the requirement to have a manual readily available to each cabin crew member during flight.
 - (c) Describe the means used by the operator to update, revise and amend the cabin crew manual, and the requirement of the cabin crew member to maintain an up to date manual at all times.
 - (d) State the responsibility of the operator to ensure that whenever more than one cabin crew member is carried, one cabin crew member is designated as in charge.

- (e) Describe the responsibility of the operator to ensure that the minimum flight crew is carried and the exceptions to the minimum crew requirement.
- (f) Identify the circumstances when the operator may delegate flight crew duties to persons who are not flight crew members. (Authority issued by an operations specification).

2.2.2.2 Crew members

(1) Training objective

The cabin crew member will be able to describe their legislated roles and responsibilities relating to their duties and in the interest of aviation safety.

(2) General

- (a) Describe the responsibility of cabin crew members to maintain knowledge of all safety and emergency procedures relating to their duties.
- (b) Identify the requirement for cabin crew members to perform their duties in accordance with approved procedures.
- (c) Outline cabin crew member responsibilities to ensure all flight documentation, publications and manuals are up to date and readily available on board and that cabin crew members are familiar with their contents. Cabin crew members are required to ensure that –
 - (i) competency documents signed by the authorised organisation personnel, as designated in the organisation operations manual, date of expiry, specific aircraft types and series on which the cabin crew member is qualified to operate;
 - (ii) a record of revisions is in the FAM, tracking the amendments received and when they were inserted into the FAM;
 - (iii) all amendments are inserted in the appropriate section of the FAM and not in their issued format, i.e. stapled or cello-wrapped.

Note: Paragraph (iii) is a recommended subject.

- (iv) operations manual and revisions are up to date.
- (d) Identify the responsibility of cabin crew members to report any on board safety concerns to the pilot-in-command.
- (e) Identify the requirement to keep all documentation relative to flight duties up to date at all times, e.g. passport and security pass.
- (f) Outline cabin crew member responsibilities to ensure that all equipment is available and in good working order, and properly secured when not in use.
- (g) Identify the responsibility of cabin crew members to report unserviceable equipment following established organisation procedures.
- (h) Identify the responsibility for cabin crew members to successfully complete required training and qualifications.
- (i) Define the chain-of-command and describe the authority of the pilot-in-command and describe their importance relating to flight safety.
- (j) Describe the requirement to be aware of the duties and responsibilities of other cabin crew members and be prepared to assume those duties, if necessary.
- (k) Define the procedure regarding attending and participating in flight crew briefings.
- (l) Define what is meant by “person carried for the completion of non- safety related duties” who are not qualified cabin crew members. Describe the function they perform when assigned on a flight, activities they may/may not be assigned, and identification to differentiate them from other cabin crew members. Include as per operator’s operations manual –
 - (i) cabin crew members on familiarisation or line orientation lights; and
 - (ii) public relations assignments, e.g. crew from “partner” operators or translators, etc.
- (m) Identify the importance of cabin crew members to be constantly alert and therefore prepared to handle any abnormal/ emergency situation as it may occur.

- (n) Identify the responsibility of the cabin crew member to comply with and enforce regulatory requirements.

2.2.2.3 Civil aviation inspectors

(1) Training objective

The cabin crew member will be able to describe the roles and responsibilities of the Civil Aviation Authority and its inspectors.

(2) General

- (a) Identify the types of regulatory control CAA exercises in areas of aviation safety.
- (b) Outline the authority of CAA inspectors to inspect the operations of operators. Describe the actions they may take if non-conformances are identified.
- (c) Describe the types of inspectors that cabin crew may come into contact with, e.g. flight deck, cabin safety, dangerous goods or airworthiness.
- (d) Describe the types of inspections that may be carried out by CAA inspectors.
- (e) Describe the procedure for the senior cabin crew member to advise the pilot-in-command whenever an inspector has identified himself or herself as being on board, and conducting an inspection.
- (f) Define the requirements for a CAA inspector to provide official identification. Describe the forms of identification that may be presented on the aircraft whenever a pre-flight or in-flight inspection is conducted.
- (g) Identify the circumstances under which a CAA inspector should occupy a flight deck observer seat.
- (h) CAA regulatory aspects: every person on board must have a valid ticket except operating air crew.

Note: Paragraph (2)(g) is a recommended subject.

2.2.3 Safety procedures

2.2.3.1 Flight crew coordination

(1) Training objective

The cabin crew member will identify the components of flight crew coordination and its importance in operational safety achieved.

(2) General

- (a) Describe the importance of common terminology and a common conceptual framework in maintaining flight safety.
- (b) Describe the importance of cabin crew members being aware of other cabin crew members duties, responsibilities, workloads and expectations.
- (c) Outline the importance of preflight briefings to share relevant flight and safety information, outline expectations and develop communication channels.

(3) Flight crew coordination

- (a) Describe the importance of flight crew coordination when applying approved procedures.
- (b) List the positive effects of flight crew coordination in enhancing flight safety.
- (c) Outline the benefits of flight crew coordination on working environment and morale and the effects this has on flight safety.
- (d) Define the one crew concept and list ways this may be achieved.
- (e) Identify the importance of flight crew coordination especially in abnormal and emergency situations.
- (f) Identify how poor flight crew coordination has contributed to aircraft accidents and incidents and outline strategies to improve crew coordination.

2.2.3.2 Communication

(1) Training objective

The cabin crew member will be able to describe and demonstrate the importance and the procedures for effective communication in normal, abnormal/non-routine and emergency situations.

- (2) General
 - (a) Define communication and list differences between normal, abnormal and emergency communications, and describe ways of communicating effectively in either situation, i.e. speed, volume, choice of words, enunciation, etc.
 - (b) Describe the procedures for normal, abnormal/non-routine and emergency communication.
 - (c) Describe the importance of effective communication especially when dealing with abnormal and emergency situations.
 - (d) Describe the responsibility of cabin crew members to provide command to assist in decision-making.
- (3) Communication
 - (a) Identify the difference between verbal and non-verbal communication and describe the effects of communicating different messages. Describe the potential hazards to flight safety if communication is not effective.
 - (b) Identify how poor communication has contributed to aviation accidents and incidents and discuss ways to minimise these communication deficiencies.
- (4) Passenger
 - (a) List the systems on board for passenger announcements, e.g. PA, pre-recorded announcements, etc.
 - (b) Describe recommended passenger address techniques, i.e. how to hold the handset, volume, feedback in systems, etc.
 - (c) Describe when, and by whom cabin announcements must be made, and the minimum content of each announcement, i.e. cabin baggage, pre-departure safety, after take-off, etc.
 - (d) Define the operator's policy on route language announcements.
 - (e) Identify the importance of listening to all announcements in the event that the announcement may contain emergency signals or information.
 - (f) Describe the procedures for translating all air crew announcements.

Note: Paragraphs (4)(d) and (f) are recommended subjects.

2.2.3.3 Surface contamination

- (1) Training objective

The cabin crew member will be able to define what is meant by surface contamination, describe their responsibilities and identify the procedures for reporting suspected surface contamination to the pilot-in-command.
- (2) General
 - (a) Define surface contamination and hazards to flight associated with surface contamination.
 - (b) Define aircraft critical surfaces for each of the aircraft types in the operator's fleet.
 - (c) Identify an awareness of the conditions most likely to produce surface contamination.
 - (d) Give examples of a clean wing and visible signs of surface contamination, e.g. frost, ice, snow, including rain and clear, etc.

Note: Paragraphs (2)(b), (c) and (d) are recommended subjects.

- (3) Cabin crew responsibilities
 - (a) Define the responsibilities of cabin crew members to report suspected surface contamination, prior to take-off roll, to the pilot-in-command as soon as it is discovered.
 - (b) State the requirement for the pilot-in-command to investigate reports of suspected surface contamination or to designate such duty to another flight crew member.
 - (c) Describe the advice to passengers whenever aircraft de-icing is taking place and who is responsible for this announcement.

Note: Paragraphs (3)(b) and (c) are recommended subjects.

- (4) De-icing
- (a) Describe when the cabin crew member in charge will be advised in adverse weather conditions whether or not de-icing will occur.
 - (b) Describe the different types of equipment used to accomplish de-icing, for example, cherry-picker, car wash, rope, etc.

Note: Use of video of photographic material is recommended.

- (c) Identify that icing conditions can recur on critical surfaces of the aircraft if the take-off is prolonged for any period of time after de-icing has occurred.
- (d) Describe the possible hazards wherever de-icing is taking place, i.e. inhaling de-icing fluid, de-icing fluid entering cabin through open doorways and the presence of glycol fumes in the cabin. Identify the procedures to deal with these situations.

Note: Paragraph (4) is a recommended subject.

2.2.3.4 Briefings

- (1) Training objective
- The cabin crew member will be able to identify the different types of briefings which are required by the operations manual and the information which must be included in each.
- (2) Cabin crew briefing
- (a) Identify the importance of cabin crew briefings including enhancing cabin crew communication and coordination, establishing expectations and clarifying procedures. (Where operationally practicable, the pilots and cabin crew members should be encouraged to combine their briefings.)
 - (b) Outline when cabin crew briefings are required including normal, abnormal and emergency situations.
 - (c) Identify the types of cabin crew briefings, i.e. between pilot-in-command cabin crew member and senior cabin crew member or other cabin crew members.
 - (d) Describe the topics to be covered in the cabin crew briefing(s).
 - (e) Identify the cabin crew member responsibility to ask questions if all the required information has not been given in a briefing or if the information is unclear.
 - (f) Identify who is required to attend each type of briefing and their expected level of preparedness and participation.
- (3) Passenger briefing
- (a) Identify the requirement for passenger safety briefings prior to departure.
 - (b) Identify the content of the mandatory announcements and when they must be performed.
 - (i) Carry-on baggage;
 - (ii) pre-flight safety announcement/demonstration;
 - (iii) after take-off;
 - (iv) en route turbulence;
 - (v) pre-landing;
 - (vi) after landing; and
 - (vii) special attention passengers – individual preflight briefing.
 - (c) Identify the requirement to relay safety related messages to passengers, i.e. whenever flight conditions change or abnormal or emergency situations.
 - (d) Identify the equipment used in a passenger safety briefing. Describe and demonstrate how the safety demonstration will be performed.
 - (e) Describe the cabin crew member responsibility for passenger briefings, i.e. who performs the briefing, where each crew member is positioned for the demonstration, as appropriate to aircraft configuration.
 - (f) Identify means for gaining and maintaining passenger attention when delivering safety briefings, including eye contact, enthusiasm, clear words, synchronised actions with announcement and with other cabin crew members.

- (g) Describe the operator's procedures for delivering the passenger safety briefing and the equipment available to accomplish this. Where briefings are given using pre-recorded tape or audio-visual equipment describe the procedures established in case of equipment failure.
- (h) Identify and describe the briefing requirements for passengers requiring special handling, including who briefs them, when the briefing occurs and the different briefing points for each type of special handling passenger.
- (i) Describe the organisation procedure and minimum content of short taxi announcements.

2.2.3.5 Pre-flight and safety checks

(1) Training objective

The cabin crew member will be able to identify the responsibility for pre-flight checks, the types of checks to be carried out and will define what is meant by the aircraft minimum equipment list.

(2) General

- (a) Define the cabin crew responsibilities for conducting pre-flight checks including items which must be checked, how they are checked, who checks them and when the pre-flight checks must be completed
(If an operator uses a pre-flight checklist have a copy available and demonstrate how to complete it correctly.)
- (b) Identify the importance of pre-flight checks and the impact on flight safety.
- (c) Identify the logbooks which are required on aircraft and unserviceable tags. Identify the procedures for recording information in them, who is responsible for making logbook entries and when these entries must be made. Identify the types of items which would not be logged.
(Have copies of the aircraft cabin log unserviceable tag and demonstrate how to make entries correctly).
- (d) Define what is meant by the minimum equipment list and identify the cabin items which are included.
- (e) Identify types of conditions which may have airworthiness implications and which should be brought to the immediate attention of the pilot-in-command, i.e. cracked windows, damaged door seals, excessive water spills or leaks, obvious structural damage.
- (f) Identify the procedures for reporting, removing and repairing all unserviceable items.

2.2.3.6 Passenger handling

(1) Training objective

The cabin crew member will be able to identify the types of passenger which may be carried and the general handling considerations which relate to safety.

(2) General

- (a) Identify the requirement for passengers to comply with instructions of cabin crew members.
- (b) Describe the types of passengers which may be carried including passengers who require special handling.
- (c) Describe the procedures for acceptance and carriage of the following and include special handling considerations, seating and securing the persons and the equipment for all phases of the flight –
 - (i) Incubators;
 - (ii) stretchers;
 - (iii) disabled persons;
 - (iv) persons travelling with medical oxygen;
 - (v) child restraint system; and
 - (vi) guide and service animals.

Note: Paragraphs (i) and (ii) are recommended items.

- (d) Identify the operator's policy for accepting or denying boarding to passengers and who is responsible for making this decision.

- (e) Identify the procedures for handling special passengers including safety briefings and seating restrictions on different aircraft types.
 - (f) Outline the regulatory requirements regarding passengers who appear to be impaired due to alcohol or drugs, and the operator's policies and procedures regarding alcohol service to passengers. Include cabin crew responsibilities in serving passengers who appear to be impaired.
- (3) Passenger boarding
- (a) Define cabin crew member responsibilities for passenger supervision while the aircraft is on the ground, including boarding, disembarking and station stops. Include the number of cabin crew members that must be present on the aircraft for the above.
 - (b) Identify the importance of safety duties over service duties during passenger boarding.

2.2.3.7 Passenger and cabin crew seats/restraints

- (1) Training objective
- The cabin crew member will be able to identify the requirements and established procedures relating to on board seating for passengers and cabin crew members.
- (2) Passenger seating
- (a) Outline the requirement for each person to have a seat with an individual safety belt.
 - (b) Define exit row and describe the operator's policy and procedures regarding exit row seating, and who may not occupy seats in these rows.
 - (c) Describe the procedures associated with the relocation of passengers in compliance with exit row seating policies.
 - (d) Describe where special attention passengers may be seated, taking into consideration proximity to exits, availability of supplemental oxygen, ease of evacuation etc.
 - (e) Identify the passenger seating restriction on aircraft equipped with upper deck/lower deck passenger seating where applicable.
 - (f) Outline the seating restrictions regarding arm held infants.
 - (g) Describe the procedures for the use of on board skycots, stating when these devices may be used, and restrictions regarding the occupant of the skycot.
 - (h) Describe the requirement for passengers to be seated in their assigned seats for take-off, landing and whenever advised by a cabin crew member. Describe the required positioning of seats for take-off and landing.
 - (i) Describe the different types of seat belts/harnesses found on passenger seats on aircraft in the fleet, and the correct method of operation for each including description of extensions and importance of verifying compatibility.
 - (j) Identify any placards of signage associated with passenger seating and describe appropriate usage, for example, "Seat Unserviceable" or "For Crew Use Only".

Note: Paragraph (2)(g) is a recommended subject.

- (3) Flight crew seating
- (a) Identify the persons authorised to occupy any of the flight crew seats on board and who has the authority to make this decision.
 - (b) Identify the persons authorised to occupy any of the observer seats in the flight deck.
 - (c) Describe the importance of ensuring serviceability of cabin crew member seats, who is responsible to ensure this and when to check serviceability.
 - (d) Identify the components of a pre-flight serviceability check for a cabin crew member seat, e.g. "sit and fit" to enable quick access.
 - (e) Describe the procedures to follow and approved alternate seating in case of an unserviceable cabin crew member seat.
 - (f) Describe the requirements for cabin crew members to be seated with restraint system fastened for taxi (except for safety related duties), take-off, landing and turbulence whenever directed to do so by the pilot-in-command.

- (g) Identify the correct way to sit in a cabin crew member seat including the preferred position of hands, feet, legs and head to ensure maximum protection.
- (h) Identify rationale behind wearing the seat belt and shoulder harness and the hazards of improper use.
- (i) Identify any placards or signage associated with crew seating and describe appropriate usage, for example “Seat Unserviceable” and “For Crew Use Only”.
- (j) Identify the signals/verbal command for cabin crew members to take their assigned seats and to secure themselves. State who is responsible for these signals.

2.2.3.8 Carry-on baggage

- (1) Training objective

The cabin crew member will be able to define what is meant by carry-on-baggage and will describe the procedures for accepting and stowing carry-on baggage and any applicable restrictions.
- (2) Passenger carry-on baggage.
 - (a) Define carry-on baggage.
 - (b) Describe carry-on baggage regulations and organisation procedures.
 - (c) Identify the safety implications of improperly stowed carry-on baggage.
 - (d) Identify the approved stowage locations for carry-on baggage, any specific areas of the cabin where carry-on baggage may not be stowed, e.g. lavatory compartment. Identify the requirement for placarding overhead bins, closets and drawers and the types of placarding used in the operator’s fleet.
 - (e) Describe the procedures for stowing awkward types of carry-on baggage, such as –
 - (i) strollers;
 - (ii) musical instruments;
 - (iii) canes, crutches, walking sticks; and
 - (iv) diplomatic mail.
 - (f) Describe the procedures for accepting carry-on baggage and procedures for non-acceptance.
 - (g) Describe announcement to passengers regarding carry-on baggage, when it is made, who is responsible for making it and how often it is made.
 - (h) Identify the cabin crew responsibilities for ensuring that all carry-on baggage is correctly stowed when required.
 - (i) Outline the operator’s procedures for dealing with carry-on baggage that cannot be correctly stowed.
 - (j) Identify the importance of cabin crew consistency in applying these requirements.
 - (k) Outline the operator’s policies and procedures for the carriage of live animals in the passenger cabin.
 - (l) Describe the cabin crew responsibility for monitoring carry-on baggage.
 - (m) Identify the effects of carry-on baggage on weight and balance (as applicable to the operator’s fleet).
 - (n) Describe the approved procedures for accepting and restraining seat-loaded baggage and cargo in the passenger cabin, and approved devices/equipment for accomplishing this.
 - (o) Describe the requirement to keep the exit areas clear and free from obstructions, such as carry-on baggage.
 - (p) Describe the requirement to maintain clear access to emergency equipment.
 - (q) Describe safety precautions for cabin crew members when opening overhead bins, and when handling items of carry-on baggage in order to prevent personal injury.
- (3) Flight crew carry-on baggage
 - (a) Describe the policies and procedures for stowing flight crew carry-on baggage in the passenger cabin including accepting baggage from dead-heading crew.

- (b) Identify the cabin crew carry-on baggage stowage locations for each aircraft type.

2.2.3.9 Electronic devices

(1) Training objective

The cabin crew member will be able to define what is meant by electronic devices, and describe policies and procedures for their acceptance and use on board aircraft.

(2) General

- (a) Define “electronic devices”.
- (b) Identify the electronic devices most likely to be carried on board aircraft.
- (c) List the potential hazards to flight safety associated with these electronic devices.
- (d) Describe the organisation policy/procedures relating to electronic devices and list exceptions to these regulations.
- (e) Describe the conditions under which on board phones provided by the operator are approved for use.
- (f) Identify the safety concerns associated with the use of “walkman” type headsets during critical phases of flight, abnormal operations, boarding and disembarking across an open ramp.
- (g) Outline the notification to passengers regarding the use of electronic devices on board aircraft and who is responsible for advising passengers.
- (h) Describe cabin crew responsibilities for monitoring passengers to ensure that only acceptable electronic devices are accepted on board and that passengers comply with conditions of use.

2.2.3.10 Service to passengers on the ground

(1) Training objective

The cabin crew member will be able to identify what is meant by service to passengers on the ground, the conditions under which this can be accomplished and the procedures to do so.

(2) General

- (a) Describe service to passengers on the ground and the types of service which may be provided in normal situations and also in abnormal situations (delays).
- (b) Identify when this service is to be offered and who is responsible for making this decision.
- (c) Describe the procedures/restrictions for providing food and beverage service to passengers on the ground.

(3) Cabin crew responsibilities

- (a) Identify the need for flight crew communication and coordination whenever passenger service is being offered on the ground, i.e. cabin crew to let pilot know service is taking place and pilot to let cabin crew know how much time before taxiing.
- (b) State the requirement for the pilot-in-command to give cabin crew adequate notice prior to taxi so that equipment and supplies may be stowed and pre-take-off duties can be completed.

2.2.3.11 Fuelling with passengers on board

(1) Training objective

The cabin crew member will be able to identify the regulatory requirements regarding fuelling with passengers on board and the procedures established for this situation.

(2) General

- (a) Describe fuelling and how fuelling may or may not occur, i.e. overwing refuelling and refuelling with an engine running.
- (b) List the potential hazards associated with fuelling aircraft to occupants and the aircraft.
- (c) Identify the types of fuelling procedures which require that passengers and flight crew be off-loaded and why the potential hazard is greater.
- (d) Describe the procedures and precautions for fuelling with passengers on board.

- (e) Define what is meant by designated evacuation exits during fuelling and associated procedures.
- (3) Cabin crew responsibilities
 - (a) Identify cabin crew responsibilities and communication when fuelling with passengers on board.
 - (b) Describe the fuel leak or spill procedures and identify the communication and coordination procedures contained in the operations manual that cabin crew members are responsible for.
 - (c) Describe the procedures whenever fumes are detected in the cabin including flight crew communication and the decision to disembark passengers.

2.2.3.12 Pre-take off and pre-landing

- (1) Training objective

The cabin crew member will be able to identify safety procedures associated with take-off and landing and be able to implement them.
- (2) Cabin preparation
 - (a) List the preparations which must be completed to secure the cabin prior to taxi, take-off and landing and identify cabin crew responsibilities to do so.
 - (b) Describe flight crew communication procedures prior to aircraft movement advising the pilot-in-command that all passengers are seated.
 - (c) Describe the procedures in place to ensure that the cabin of the aircraft is secure prior to the commencement of taxi, take-off or landing.
 - (d) Describe the requirements and procedures for stowing equipment and securing galleys.
- (3) Cabin crew responsibilities
 - (a) Define “critical phases of flight”, when this is in effect and procedures associated with it.
 - (b) Define “sterile flight deck”, and associated procedures.
 - (c) Identify the potential hazards to flight safety of violating the sterile flight deck rule with non-safety related issues.
 - (d) Identify when cabin crew members are required to violate the sterile flight deck rule. Describe safety related information that should be conveyed and the requirement to be clear, concise, specific and timely.
 - (e) Define “silent-review” and identify the components, when it must be done and who is required to complete it.
 - (f) Describe take-off or landing stations and when they are required to be occupied.
 - (g) Identify when cabin crew members must have their seat belt and shoulder harnesses fastened at their station/seat.
 - (h) Describe the signals used by the flight deck to advise cabin crew members that take-off or landing is imminent.
- (4) Abnormal situations
 - (a) Define “rejected take-off”, and describe the associated procedures.
 - (b) Define “missed approach” and describe the associated procedures.
 - (c) Define abnormal landing situations, e.g. no landing gear/partial landing gear, burst tyres/deflated tyres.

2.2.3.13 Propeller abnormalities

- (1) Training objective

The cabin crew member will be able to identify the characteristics of an over speeding and a runaway propeller and be aware of the procedures associated with these situations.
- (2) General
 - (a) Define what is meant by over-speeding propeller/runaway propeller, and emergencies that may occur as a result.

- (b) Describe how to recognise these propeller malfunctions and their effect on flight characteristics.
- (c) Identify the flight crew communication procedures associated with these propeller abnormalities.
- (d) Outline the procedures for relocating passengers;
- (e) Identify propeller abnormalities (propeller functions), e.g. turning or not turning when it should.

2.2.3.14 Apron/ramp safety

- (1) Training objective

The cabin crew member will be able to identify the components of ramp safety, the responsibilities for passenger movement on airport ramps and the procedures established to accomplish such safety.
- (2) Hazards on ramps
 - (a) Identify the hazards associated with airport ramps, for example: aircraft/ground service traffic, noise and weather and foreign objects.
 - (b) Describe the hazards associated with traffic on the ramp including aircraft movement, propellers, jet blast/exhaustion vehicles.
- (3) Cabin crew responsibilities
 - (a) Identify the established procedures and requirements for escorting passengers across airport ramps.
 - (b) Describe the coordination required between cabin crew members and ground staff to ensure passenger safety, i.e. stairs in place, propellers are secured and ways to achieve it.
- (4) Helicopter operations
 - (a) List the ramp safety hazards associated with helicopter operations.
 - (b) Describe the correct ways to approach a helicopter with and without the rotor engaged.
 - (c) Identify communication and coordination procedures between crew and ground staff to ensure passengers are escorted to and from the helicopter.
 - (d) Describe when it is safe to board/disembark passengers and who is responsible for this decision, and how this information is conveyed to crew members.
 - (e) Describe operational regulations differing from fixed wing operations.

2.2.3.15 Turbulence

- (1) Training objective

The cabin crew member will be able to identify the hazards associated with turbulence and the procedures for ensuring passenger and cabin crew safety during periods of in-flight turbulence.
- (2) General
 - (a) Describe turbulence and the classifications of turbulence, i.e. light, moderate or severe.
 - (b) List the potential hazards to aircraft, cabin crew and passengers in turbulence.
- (3) Cabin crew responsibilities
 - (a) Identify the importance of flight crew communication and flight crew coordination in conditions of turbulence and describe communication and coordination procedures.
 - (b) Describe safety advice to passengers during turbulence.
 - (c) Outline the cabin crew responsibilities to ensure that passengers comply with requirements and procedures.

2.2.3.16 Crew member incapacitation

- (1) Training objective

The cabin crew member will be able to identify the procedures for dealing with an incapacitated flight crew member.
- (2) General
 - (a) Define what is meant by incapacitated flight crew member and identify possible causes, i.e. illness, injury, death, physical and mental incapacitation, food poisoning.

- (b) Identify the impact on flight safety of an incapacitated pilot or cabin crew member on different aircraft types in the fleet.
 - (c) Identify the preferred locations for relocating incapacitated flight crew members on different aircraft in the operator's fleet.
 - (d) Identify how and where to secure an incapacitated flight crew member for landing or during periods of in-flight turbulence.
 - (e) Identify the flight crew communication procedures to advise of flight crew member incapacitation including flight deck/cabin, in-charge/ cabin crew members.
- (3) Pilot incapacitation
- (a) Identify the assistance cabin crew members will be required to provide in the flight deck.
 - (b) Describe the procedures for assisting an incapacitated pilot.
(See paragraph 3.2.2.5 for pilot incapacitation drill).
 - (c) Describe and demonstrate the procedures for administering first aid oxygen to an incapacitated pilot.
(See paragraph 3.2.2.5 for pilot incapacitation drill).
 - (d) Describe the procedures for removing an incapacitated pilot from the flight deck.
(See paragraph 3.2.2.5 for pilot incapacitation drill).
- (4) Cabin crew member's incapacitation
- (a) Identify the flight crew coordination procedure to ensure that the safety and emergency duties of the incapacitated cabin crew member are assumed and identify the person responsible for this decision.
 - (b) Outline the procedures associated with incapacitated cabin crew members (including procedures for dealing with more than one incapacitated cabin crew member).

2.2.3.17 Flight deck protocol

- (1) Training objective
The cabin crew member will be able to identify the procedures associated with entry to the flight deck and service to the flight deck crew.
- (2) General
- (a) Identify the credentials/organisation policy for flight deck entry and describe the authority of the pilot-in-command to give permission for access to the flight deck.
 - (b) Describe the policies and procedures for locking/unlocking the flight deck door.
 - (c) Describe the components of flight deck protocol, such as –
 - (i) coordinating passenger visits with pilot-in-command and available oxygen mask;
 - (ii) supervising passengers in-flight on flight deck;
 - (iii) awareness of pilot(s) monitoring radio calls;
 - (iv) briefing passengers on appropriate behaviour in the flight deck;
 - (v) meal service to pilots: different meals, ovens and times;
 - (vi) beverages to be passed from the outboard side;
 - (vii) use of tray to pass beverages;
 - (viii) insulate hot drinks; and
 - (ix) no alcohol to be served to pilots or flight deck visitors.
 - (d) Identify flight crew communication and flight crew coordination procedures associated with flight deck visits.

2.2.3.18 Fuel dumping

- (1) Training objective
The cabin crew member will be able to recognise the characteristics associated with fuel dumping and be able to follow established procedures.
- (2) General
- (a) Define fuel dumping.
 - (b) Describe the conditions under which fuel dumping may occur.

- (c) Identify the need for flight crew communication during fuel dumping and the responsibility of cabin crew members to report any unusual conditions to the pilot-in-command.
- (d) Describe the advice to passengers regarding fuel dumping and the person responsible for this advice.

2.2.3.19 Post flight duties

- (1) Training objective
The cabin crew member will be able to identify their post-flight safety related duties.
- (2) Documentation
Describe the safety related documentation which must be completed after each flight and who is responsible for its completion.
(Experience in completing appropriate documentation correctly is recommended for each trainee).
- (3) Communication
In instances of a cabin crew change, identify the responsibility of the cabin crew to brief the new cabin crew regarding any unserviceabilities, special passengers, any other safety related matters pertinent to their flight.

2.2.3.20 Oxygen administration

- (1) Training objective
The cabin crew member will be able to identify the importance of oxygen, when it may be necessary to administer oxygen, and identify the procedures for oxygen administration using the different oxygen sources on the operator's aircraft.
- (2) General
 - (a) Identify the physiological importance of oxygen.
 - (b) List the circumstances when additional oxygen may be required, i.e. decompressions or medical emergencies.
 - (c) Identify when oxygen must be available for passengers and flight crew, and the requirement to brief passengers on the availability of oxygen.
 - (d) Describe in general terms the types of oxygen available on the operator's aircraft including fixed and portable systems.
- (3) Procedures
 - (a) Describe procedures for use of the fixed cabin oxygen system.
 - (b) Describe procedures for use of the portable oxygen system.
 - (c) Describe procedures associated with using the flight deck oxygen system.
 - (d) List the precautions whenever oxygen is being administered, i.e. no open flame and monitor supply.
 - (e) Describe the flight crew communication procedures in each circumstance when oxygen is being used.
 - (f) Describe procedures for oxygen provided by passengers or operator for continuous use during flight.
 - (g) Describe advice to passengers and the person responsible for briefing the passengers.

2.2.4 Emergency procedures

2.2.4.1 Fire fighting

- (1) Training objective
The cabin crew member will be able to identify the types of fire, fire detection and fire fighting systems and the established fire-fighting procedures.
- (2) General
 - (a) Identify the threat to safety from in-flight fires.
 - (b) Identify hazards associated with on board fires including toxicity of fumes, flammability of cabin materials, variety of materials to burn.

- (c) Identify the impediments to fire fighting on board aircraft including limited visibility due to smoke/fumes, fire fighting in confined space, difficulty in locating the source of the fire, limited resources to fight the fire and distance to suitable airport for landing.
- (d) Describe experiences with fire accidents/incidents. Identify the safety lessons learned as a result.
- (e) Describe the legislated requirements to fire safety, e.g. on board smoke detectors, fire resistant seat cushions, floor fighting, etc.
- (f) Define fire chemistry, including the elements which must be present for fire to occur (fuel, heat, oxygen, chemical reaction).
- (g) List the classes of fire which may occur on aircraft Class A – combustible material fires, Class B – grease/spill fires, Class C – electrical and Class D – fire involving metals and the possible sources for these fires.
- (h) Describe the importance of early detection and correct recognition.
- (i) Identify the characteristics and behaviour of fire (e.g. what you will see, how the fire will behave) in different cabin environments, fire propagation.
- (j) Describe the means of fire smoke detection, e.g. smell, auditory, visual, touch and tactile.
- (k) Describe the chemical properties of each type of fire extinguisher, including hazards to occupants and aircraft systems and how it extinguishes fire.
- (l) Describe each piece of fire fighting equipment on board (including protective breathing equipment, protective clothing) and include the following in the description –
 - (i) purpose;
 - (ii) stowage, location, access, retrieval;
 - (iii) serviceability;
 - (iv) operation;
 - (v) duration;
 - (vi) limitations;
 - (vii) conditions of use; and
 - (viii) care after use.

Note: This information may be included in the aircraft type specific.

(3) Cabin crew responsibilities

- (a) Identify the responsibility for to maintain situational awareness and investigate immediately whenever on board fire situation is suspected and when an on board fire detection system is activated.
- (b) Identify the importance and responsibility to be prepared to implement appropriate fire fighting procedures.
- (c) Define the specific cabin crew responsibilities for fire fighting on board –
 - (i) Fighting fire;
 - (ii) back-up equipment/second firefighter;
 - (iii) communication; and
 - (iv) passenger control.
- (d) List fire prevention measures and cabin crew responsibilities for fire prevention including but not limited to –
 - (i) practicing and maintaining safe work habits;
 - (ii) enforcing smoking regulations;
 - (iii) monitoring cabin, lavatories and cargo compartments.
 - (iv) maintaining good housekeeping practices; awareness of popped circuit breaker procedures; and
 - (v) prompt investigation of fire detection alarms, unusual odours, heat build-up, deformation of aircraft components, etc.

- (e) Describe the importance of flight crew coordination in fire fighting and identify ways that this may be achieved.
 - (f) Describe the importance of flight crew communication in fire fighting and providing pilot-in-command with accurate information on fire source, location, extent/severity of fire/smoke and fire fighting actions.
- (4) Procedures cabin
- (a) Describe the fire fighting procedures for specific types of fires, e.g. gallery, oven, lavatory, electrical, upholstery, etc.
 - (b) Describe the technique and procedures for fighting these fires including finding the source of the fire, type of extinguisher to use, additional fire fighting equipment needed, technique for using extinguisher, complications to fighting these types of fire, limitations to fighting this type of fire, post-fire procedures, flight crew communication and flight crew coordination procedures, passenger handling.
 - (c) Identify ways to maintain breathing comfort for cabin occupants.
 - (d) Define “smoke removal”, and smoke control, and describe the associated procedures on the different types of aircraft including flight crew coordination and advice to passengers.

Note: *May be in the aircraft type specific.*

- (e) Define flash over and flash-fire. Describe the cause of each and conditions under which each is likely to occur.
- (5) Procedures external
- (a) Identify the types of external fires which could affect flight safety, including, but not limited to –
 - (i) engine fires;
 - (ii) APU and engine torching;
 - (iii) fuel spill/ramp fires;
 - (iv) fires on loading bridges; and
 - (v) service vehicle fires.
 - (b) Describe established procedures for dealing with these fire situations including recognition, flight crew communication and flight crew coordination.
 - (c) Identify the communication and coordination required with ground personnel and describe the fire fighting assistance ground personnel can offer, and the assistance cabin crew members can provide to ground personnel.

2.2.4.2 Smoke/fumes in the cabin

- (1) Training objective
- The cabin crew member will be able to identify the hazards associated with fumes and/or smoke in the cabin, potential sources and the established procedures if fumes and/or smoke are detected in the cabin in flight or on the ground.
- (2) General
- (a) Identify the possible sources of fumes and smoke in the cabin.
 - (b) Describe the potential hazards to the aircraft and the occupants from smoke/fumes in the cabin.
- (3) Cabin crew responsibilities
- (a) Describe the requirement of crew to be alert for smoke and fumes in the cabin, i.e. during fuelling or de-icing.
 - (b) List the flight crew communication procedures associated with smoke/ fumes in the cabin, including how to notify the pilot-in-command of the situation and what information is required.
 - (c) Describe the procedures for dealing with smoke/fumes in the cabin including locating the source, notifying the pilot-in-command, flight crew coordination, ensuring passengers’ breathing comfort, preparation for rapid disembarkation or evacuation.

- (d) Describe the authority of the pilot-in-command to relocate passengers if smoke/fumes are present in the cabin and when this decision may be made.
- (e) Describe how to recognise “condensation” in the cabin, its similarity to smoke and describe causes and the phases of flight when it may be visible.
- (f) Identify the advice to passengers in case of condensation in the cabin, the person who gives this advice, when it is given and the importance of communicating with passengers to minimise panic.
- (g) Define “smoke removal”, and smoke control, and describe the associated procedures on the air carrier’s aircraft types, as applicable and in accordance with the manufacturer’s specifications, including flight crew communication, flight crew coordination and advice to passengers.

2.2.4.3 Rapid decompression and decompression problems

(1) Training objective

The cabin crew member will be able to recognise a rapid decompression and cabin pressurisation problems, associated cabin crew responsibilities and the established procedures for dealing with each condition.

(2) General

- (a) Define rapid decompression and cabin pressurisation problems.
- (b) Identify the potential threat to flight safety caused by a rapid decompression.
- (c) Identify the potential causes of a rapid decompression (e.g. fuselage failure, air pack failure) and cabin pressurisation problems (e.g. door seal leak, cracked window, system malfunction, etc.)
- (d) Describe the mechanical indications and physiological effects associated with each condition.
- (e) Describe the effects of oxygen deficiency on human performance and identify the importance in recognising these signs and symptoms in other crew members.
- (f) Identify the importance of blowout panels and where these may be located on each aircraft type in the air carrier’s fleet.
- (g) List the cabin crew member procedures associated with rapid decompression and cabin pressurisation problems.
- (h) Describe the effects of a rapid decompression on any unsecured objects, or persons in the immediate area.
- (i) Describe the likely aircraft attitude associated with an emergency or rapid descent following a rapid decompression, and what is meant by safe altitude and the importance of reaching a safe altitude quickly.
- (j) Identify the likely cabin conditions in a rapid decompression and the ways cabin crew members can ensure safety for themselves and passengers.

(3) Crew member responsibilities

- (a) Describe means and procedures for cabin crew to passenger communication during a rapid decompression and cabin pressurisation problems.
- (b) Identify the immediate actions cabin crew members must take in the event of a rapid decompression.
- (c) Describe the flight crew communication procedures (e.g. signal for beginning a post-decompression walk-around, who is responsible for giving this signal and when it will be given, etc.).
- (d) List the cabin crew member duties in a post-decompression walk-around and safety priorities.
- (e) Identify the importance of flight crew coordination and methods of achieving this coordination.

2.2.4.4 Evacuations

- (1) Training objective

The cabin crew member will be able to identify the types of evacuations, cabin crew responsibilities and procedures relating to the different types of evacuation situations.
- (2) General
 - (a) Define evacuation and rapid disembarkation.
 - (b) Identify the types of emergencies which may require evacuation or rapid disembarkation, who is responsible for this decision and the factors to be considered when making this decision.
 - (c) Describe the experiences with accidents/incidents involving rapid disembarkation and evacuation.
 - (d) Outline factors affecting survivability in evacuation such as fuselage break-up, smoke, fire etc.
 - (e) Define the types of evacuations, i.e. prepared and unprepared.
 - (f) Define “ditching” and “unprepared water landing”. Describe the conditions which may be associated/expected with each type of emergency.
 - (g) Describe the flotation characteristics of aircraft in the operator’s fleet identify the factors which could adversely affect aircraft flotation in water landing, i.e. structural damage, weight, centre of gravity, outside conditions.
 - (h) Describe the need to be prepared during critical phases of flight due to increased risk of accidents.
 - (i) Describe the different attitudes possible as a result of accidents/ incidents, i.e. gear collapse, off-runway, shift in centre of gravity. Include the effect of different aircraft attitudes on exit usability.
 - (j) Describe the effect of environmental conditions in evacuations, i.e. strong winds, terrain or snow/ice.
 - (k) Identify the importance of time in evacuations and how time affects survivability in different accident situations.
 - (l) Describe the type of assistance which may be available at the various airports in the operator’s route system. Include ways flight crew members can manage the evacuation to coordinate their actions with the ground rescue personnel.

Note: Paragraph (2)(f) is a recommended subject.

- (3) Cabin crew responsibilities
 - (a) Define situational awareness and the responsibility of cabin crew members to be situationally aware, e.g. unwarranted evacuations.
 - (b) Identify the requirement of cabin crew members to be aware of their duties and the duties of other cabin crew members and what this means in an evacuation.
 - (c) Identify the responsibility of cabin crew members to assist passengers and fellow flight crew members in an evacuation and any limitation to this responsibility. Outline the conditions when cabin crew members should evacuate themselves.
 - (d) Describe ways to assist incapacitated passengers and fellow cabin crew members in evacuations.
 - (e) Describe the importance of silent review in preparing for a possible evacuation.
 - (f) Describe the importance of flight crew communication in an evacuation and the established communication signals for evacuations. Identify the person responsible for activating evacuation signals.
 - (g) Identify when cabin crew members have the authority and the responsibility to initiate an evacuation.
 - (h) Identify the briefings required between flight deck/cabin crew and in an emergency situation which may require an evacuation. Include the following information in the description.
 - (i) The person responsible to conduct briefing;

- (ii) when and where to conduct the briefing;
 - (iii) the information that is required; and
 - (iv) the manner in which to conduct the briefing, including time management.
 - (i) Outline the responsibility of cabin crew members to prepare passengers and the cabin in a planned emergency situation, including the effect of time constraints.
 - (j) Describe the different types of passenger behaviour (passive, aggressive and hysteric) and identify effective ways of managing passenger behaviour in evacuations.
 - (k) Identify the responsibility of cabin crew members to provide leadership in an evacuation and list ways this may be achieved.
 - (l) Define an Able-Bodied-Person (ABP). Describe the types of persons a cabin crew member would choose for an ABP, the assistance they could provide and the special briefing instructions.
 - (m) Identify the responsibility of cabin crew members to assess conditions prior to opening any exit.
- (4) Evacuation procedures
- (a) Describe the established evacuation procedures for each of the following types of evacuation –
 - (i) Land evacuation – planned and unplanned;
 - (ii) tidal flat;
 - (iii) ditching evacuation – planned and unplanned;
 - (iv) inadvertent water landing;
 - (v) evacuation with PTV mated to aircraft; and
 - (vi) evacuation at an airport gate/ramp jetway.
 - (b) Outline the operator's procedures for planned evacuations. Include the following –
 - (i) Flight crew communication procedures, i.e. signals, briefings, etc.
 - (ii) flight crew coordination procedures, i.e. with the pilot-in-command and with other flight crew members; and
 - (iii) preparation priorities.
 - (c) Define brace position. Describe the effect of seat pitch on preferred brace positions. Identify the brace positions for cabin crew members in forward or aft-facing seats, passengers (seat orientation as appropriate), including pregnant passengers, handicapped passengers and children and infants. Describe the effectiveness of each brace position and the importance of assuming the preferred brace position to minimise injury.
 - (d) Identify the signal for assuming the brace position in different evacuation situations, when it is given, who is responsible for giving it and the crew responsibilities when the brace signal has been given. Identify when cabin crew members should assume the brace position if no signal has been given.
 - (e) Identify the shouted commands for each type of evacuation and describe the rationale behind each of the commands. Describe ways to increase the effectiveness of commands, i.e. voice tone, pace, volume, diction, body language and phraseology (commands in unison).
 - (f) Identify the evacuation procedures for each type of exit, i.e. doors, windows, hatches, ventral exits and tailcones.
 - (g) Describe the procedures for using evacuation aids, i.e. slides, ramps, ropes or any other evacuation aid that is provided on the operator's aircraft. Include instructions on operation, use and instructions to passengers for using these.
 - (h) Identify the inflation times for the different evacuation aids, i.e. slides, ramps, slide/rafts. Describe how to recognise if an evacuation device is fully inflated.
 - (i) Describe alternate procedures if initial inflation fails and if the inflation fails during the course of the evacuation.

- (j) Describe the preferred techniques for special attention passengers using evacuation slides, i.e. elderly, handicapped, passengers with guide animals.
 - (k) Identify how cabin crew members can manage evacuations in adverse conditions, e.g. heavy smoke, darkness.
 - (l) Identify the importance of checking the cabin, flight deck and lavatories, after all passengers have been evacuated and describe how and under what conditions this should be accomplished.
 - (m) Identify the cabin crew responsibilities for removal of equipment when they evacuate the aircraft and under what conditions this should be accomplished.
- (5) Post-evacuation
- (a) Describe the responsibilities of cabin crew members after an evacuation, e.g. grouping passengers, assisting with first aid, etc.
 - (b) List the types of survival situations cabin crew members may encounter as a result of an evacuation including wilderness, arctic conditions, sea, deserts, jungle and survival as appropriate to operator's operation.
 - (c) Identify the importance of post-crash procedures to increase survivability in each of the survival situations. Include the following –
 - (i) First aid;
 - (ii) survival priorities;
 - (iii) hazards inherent in different environments;
 - (iv) survival skills for different environments;
 - (v) survival equipment; and
 - (vi) signalling and recovery techniques.
 - (d) Describe the search-and-rescue systems, their scope of operation and how they are able to locate downed aircraft.
 - (e) Identify the on board equipment and supplies which cabin crew members could remove from an aircraft after an evacuation that would enhance survivability.
 - (f) Describe the different groups, e.g. media, legal and accident investigators which will attempt to solicit information from cabin crew members after an evacuation and outline the procedures for dealing with these groups.
 - (g) Describe the process of accident investigation and describe the official groups tasked with accident investigation, internationally and nationally. Identify their mandate and their role in aviation safety.

Note: Paragraph (5)(g) is a recommended subject.

- (6) Accident/incident review
 - (a) Describe the operator's accidents/ incidents, and accidents/incidents of other operators.
 - (b) List the factors which had positive and a negative effect on survivability.

2.2.5 Emergency equipment

2.2.5.1 Equipment overview

- (1) Training objective

The cabin crew member will be able to identify each piece of safety emergency equipment on board the operator's aircraft, describe its uses and procedures associated with its operation.
- (2) General
 - (a) Define safety and emergency equipment.
 - (b) Describe each piece of safety and emergency equipment the operator has available on board each aircraft based on the following points –
 - (i) General description;
 - (ii) uses;
 - (iii) location;
 - (iv) pre-flight serviceability check;

- (v) removal from stowage;
- (vi) how to operate;
- (vii) conditions for operation;
- (viii) operational limitations;
- (ix) operation under adverse conditions, precautions for use; and
- (x) care after use.

2.2.6 Aircraft specific

2.2.6.1 Physical description

(1) Training objective

The cabin crew member will be able to recognise the aircraft's main characteristics and be able to describe the interior and exterior features.

(2) General

- (a) Identify the manufacturer.
- (b) Identify the model and series number of the aircraft, (years in service), aircraft family.
- (c) Describe the aircraft type, e.g. wide body, commuter, STOL.
- (d) Describe the performance features of the aircraft, e.g. range, cruising altitudes, cruising speeds.
- (e) Identify the physical dimensions of the aircraft including height, length and wingspan.
- (f) Identify the number of aircraft the operator has in his or her fleet, where the aircraft are based and the age of such aircraft and routes.

Note: Paragraphs (2)(d), (e) and (f) are recommended subjects.

(3) Exterior description

- (a) Identify how many engines the aircraft has, where they are located and the accepted way to refer to them. Include the APU in this description.
- (b) Identify all the exits on the aircraft, the operator's way to refer to them and their principle uses (e.g. LI; main boarding door).
- (c) List and describe any distinguishing features, e.g. upper deck and winglets.
- (d) Identify exterior markings and their significance including the aircraft registration.

(4) Interior description

- (a) Describe the cockpit configuration including seats and special features.
- (b) Describe the cabin features of this aircraft, including safety and emergency equipment locations and blow-out panels, e.g. flight crew and passenger seating, galleys, lavatories, cabin stowage areas, partitions, special features, e.g. crew rest areas. Include the following –
 - (i) Number, locations and access;
 - (ii) special features of each;
 - (iii) operation including description of controls;
 - (iv) precautions, conditions and limitations of use;
 - (v) serviceability checks; and
 - (vi) procedures for malfunctions.
- (c) Describe the operation of each of the flight crew seats, cabin and flight deck, when it is occupied. Include the correct operation of the restraint system for each seat and the correct method for securing it to minimise injury, and the assigned crew member take off/landing stations.
- (d) List the types of fire-detection systems on board the operator's aircraft including those in the passenger cabin and in main deck cargo compartments.
- (e) Describe the fire detection systems on board the operator's aircraft including the following in the description –
 - (i) Location;

- (ii) serviceability;
 - (iii) limitations;
 - (iv) activation;
 - (v) signals when activated;
 - (vi) shut off/re-set; and
 - (vii) care after activation.
- (f) Describe cabin crew member cabin positions, in all configurations, for both pre-flight passenger safety demonstrations and emergency landing briefings.
 - (g) Describe the aircraft's flotation characteristics as well as the different aircraft attitudes possible as a result of accidents/incidents on landing and water and any effect on exit usability.

2.2.6.2 Galleys

(1) Training objective

The cabin crew member will be able to identify the components of the galley and describe the operation and procedures relating to their use.

(2) General

- (a) Identify the components of the galley, e.g. ovens trolleys, 2 electrical panels.
- (b) Describe the operation of each of these components.
- (c) Identify the safety procedures associated with each of the galley components.
- (d) Identify the safety implications of "safe work" practices in the galleys and ways to achieve this.
- (e) Identify the potential hazards of spills and leaks in galleys and describe the procedures for dealing with them.
- (f) Describe what is meant by "water shut-off valves" in the galley and identify the responsibility of cabin crew members regarding these.
- (g) Identify the function of circuit breakers in electrical panels and describe the procedures for tripped circuit breakers including reset and crew communication procedures. Describe the potential hazards to flight safety if circuit breaker procedures are not followed.
- (h) Identify the flight crew procedures for dealing with any electrical malfunctions in the galley.
- (i) Describe the procedures for reporting unserviceabilities in the galleys and who is responsible for reporting them. Include the importance of communicating this information to the new cabin crew in case of a crew change.
- (j) Identify the types of restraint devices in galleys (and in the cabin for gallery equipment). Identify the restraint devices for portable equipment, i.e. trolleys/carts etc. Include descriptions on how to use them, when they are to be used and the person responsible for securing galley equipment. Describe the procedures and precautions for securing trolleys and galley equipment in case of in-flight turbulence.
- (k) Identify the procedures for securing galley curtains and the position they must be secured in for take-off and landing and at station stops with passengers on board.
- (l) Identify the approved stowage for excess galley equipment and supplies, especially during takeoff and landing, and the approved location for garbage. Include the importance of keeping exit areas and emergency equipment stowage clear of obstruction and accessible.
- (m) Where galleys are located on the lower deck include the following –
 - (i) Policies and procedures relating to lower deck galleys;
 - (ii) maximum number of persons allowed in the lower deck galley;
 - (iii) communication procedures with lower galley crew member; and
 - (iv) escape routes from the lower deck galley.
- (n) Identify the procedures relating to lifts, e.g. cart-lifts/dumb-waiter how and when they are to be operated, safety features and alternate procedures if lift becomes unserviceable.

- (o) Describe circumstances when galley power may be disrupted, e.g. during engine shutdown or taxi.
- (p) Outline crew member responsibilities to ensure that all equipment is available and in good working order, and properly secured when not in use.

2.2.6.3 Communication system

- (1) Training objective

The cabin crew member will be able to describe the communication system on board and be able to use it effectively in any on board situation.
- (2) General
 - (a) Describe the components of the communication systems for flight crew communication and communication to the passengers.
 - (b) Describe the procedures for using each of these components in normal and emergency situations and inoperative/unserviceable procedures.
- (3) Interphone
 - (a) Describe the following points related to the cabin interphone –
 - (i) Location of the handsets and controls;
 - (ii) when would it be used/not used;
 - (iii) what is the established call priority, describe the priority of system operation (override calling priority).
 - (iv) identify the response to flight deck calls;
 - (v) identify interphone protocol;
 - (vi) describe and demonstrate use of the interphone;
 - (vii) identify accompanying chimes, lights and other signals;
 - (viii) describe the reset procedures after use;
 - (ix) describe the interphone procedures; normal, emergency; and
 - (x) describe alternate procedures in case of system failure.
- (4) Public address system
 - (a) Describe the following points relating to the public address system –
(See paragraph 3.2.1.1 for public address system and interphone system drill.)
 - (i) Location of the PA microphones and controls;
 - (ii) what is the established PA priority;
 - (iii) describe and demonstrate use of the PA;
 - (iv) identify accompanying chimes, lights and other signals;
 - (v) describe the reset procedures after use;
 - (vi) describe the normal and emergency PA procedures; and
 - (vii) describe alternate procedures in case of system failure.
- (5) Passenger call system
 - (a) Describe the components location, operation and procedures associated with passenger call system.
 - (b) Identify the cabin crew responsibilities relating to passenger call system.
- (6) Entertainment system
 - (a) Describe the components, location, operation and procedures of the on board entertainment system.
 - (b) If the entertainment system is being used for passenger safety briefings, identify alternate procedures if the system fails.
 - (c) List the safety procedures associated with the entertainment system, e.g. stowing of screens for take-off and landing.
- (7) Automatic announcement system
 - (a) Describe the automatic announcement system.
 - (b) Identify the information it is programmed for.

- (c) Describe when it is used and what it is used for.
- (d) Describe how the system is programmed and activated and who is responsible for this.
- (e) Describe the procedures for using the automatic announcement system and alternate procedures in case of system failure.

2.2.6.4 Lighting system

(1) Training objective

The cabin crew member will be able to identify the different components of the interior and exterior lighting systems and be able to use them effectively in any situation.

(2) General

- (a) Describe the components of the interior and exterior lighting systems on board including fixed and portable components.
- (b) Describe the function of each of the components of the lighting system.
- (c) Describe the controls for the different components of the lighting system, including location and operation. Identify the person responsible for controlling each of them.
- (d) Describe the features of each component when used in normal and emergency situations.
- (e) Describe the procedures for use of each of the components of the lighting system in normal and emergency situations.
- (f) Describe the alternate procedures for use in case of system failure.
- (g) Describe the duration of components of the emergency lighting system.
- (h) Identify the responsibilities for activating components of the lighting system in normal and emergency situations.

2.2.6.5 Water and waste systems

(1) Training objective

The cabin crew member will be able to identify the components of water and waste system and be able to implement the correct procedures relating to these systems.

(2) General

- (a) Identify the components of the water and waste system on board.
- (b) Describe the location of the different components of the water and waste system including any cabin controls or gauges.
- (c) Identify the potential threat to flight safety in case of large leaks of either the water or the waste system.
- (d) Describe the cabin crew responsibilities for the operation/malfunctions of the water and waste system.
- (e) Describe the shut-off valves, importance, location, operation and identification.

2.2.6.6 Heating and ventilation systems

(1) Training objective

The cabin crew member will be able to identify the components of the heating and ventilation systems and be able to implement correct procedures relating to these systems.

(2) General

- (a) Describe the components and operation of the heating and ventilation system.
- (b) Identify the location of the heating and exhaust vents which cabin crew members need to be aware of.
- (c) Describe the location of the controls and control panels for the heating and ventilation system, the procedures for use and the person responsible for monitoring.
- (d) Describe the cabin crew responsibilities for the oxygen system.
- (e) Identify how the system is activated, duration of oxygen flow and flow rates. Include how to activate flow to each individual mask and ways to verify that oxygen is flowing to an individual mask.

2.2.6.7 Oxygen systems

(1) Training objective

The cabin crew member will be able to recognise the components of the fixed oxygen systems and be able to use the systems effectively in any on board situation.

(2) General

- (a) Describe the components of the oxygen systems on board the aircraft, including flight deck, cabin sources, toilets and galleys.
- (b) Describe when each of the oxygen system components is used. Include description of use for first aid, decompression and supplemental purposes.
- (c) Identify the location of the components of the oxygen system including the location of O₂ masks and spares.
- (d) Describe the cabin crew responsibilities for the oxygen system.
- (e) Identify how the system is activated, duration of oxygen flow and flow rates. Include how to activate flow to each individual mask and ways to verify that oxygen is flowing to an individual mask.
- (f) Identify alternate procedures to access oxygen mask when the system fails.
- (g) Describe the flight crew communication procedures required to activate the oxygen system.

2.2.6.8 Exits

(1) Training objective

The cabin crew member will be able to identify the features of different types of exits, and be able to effectively use them in any on board situation.

(2) General

- (a) Identify each of the different types of cabin and flight deck exits on board the aircraft.
- (b) Identify and describe the features of each of the exits.
- (c) Identify what the normal function of the exit, i.e. boarding, service, emergency use only.
- (d) Identify safety precautions associated with exit operation. Include potential hazards, e.g. inadvertent slide deployment, injury to flight crew and ground personnel, etc.
- (e) Identify the MEL relief given to operators when a door or slide is in-operative. Outline the conditions for this relief to be granted and the procedures which must be followed

(3) Normal operations

- (a) Describe the procedures for operating the exit in normal mode including arming/disarming and opening/closing.
- (b) Identify the precautions associated with using this exit in normal mode/ situations.
- (c) Identify who is responsible for operating the exit in normal situations.
- (d) Describe the flight crew communication and coordination procedures, including any established signals associated with exit operation in normal situations. Identify the person responsible for ensuring that this communication occurs and the importance of this communication for flight safety.

(4) Non-routine

- (a) Identify what is meant by abnormal/non-routine operation of the operation exit.
- (b) Describe the features of the exit associated with abnormal/non-routine operation.
- (c) Describe the procedures for abnormal/non-routine operation exits, including who is responsible for the exit operation, flight crew communication and flight crew coordination procedures.
- (d) Identify any precautions for abnormal/non-routine operation of this exit.
- (e) Describe the door reset procedures.

(5) Emergency operation

- (a) Identify what is meant by emergency operation of the exit.
- (b) Describe the features of the exit associated with emergency operation.
- (c) Describe the procedures for operating the exit in emergency mode.
- (d) Identify the precautions for using this exit in emergency situations.
- (e) Describe any alternate procedures for use of this exit if it becomes unserviceable.

- (f) Identify who is responsible for operating the exit in emergency situations.
- (6) Airstairs
 - (a) Define what is meant by airstairs and identify their location.
 - (b) Describe the features of the airstairs relating to normal, abnormal/non-routine and emergency use.
 - (c) Describe the procedures for operating the airstairs in normal, abnormal/non-routine and emergency situations. Identify the cabin crew member responsibility for airstair operation.
 - (d) Identify the precautions relating to use of the airstairs.
 - (e) Describe the flight crew communication and the coordination procedures whenever the airstairs are being used.

2.2.6.9 Unique features

- (1) Training objective

The cabin crew member will be able to recognise the unique features of this aircraft type or differences within the type as a result of interior configuration or manufacturer series differences.
- (2) General
 - (a) Identify any features, procedures and/or equipment unique or different to each aircraft in the operator's detection systems or interior doors/ latches.
 - (b) Describe each of the differences, their impact on the operator's standard operating procedures and the importance to flight safety of cabin crew members being familiar with them.
 - (c) Describe the cabin crew member's responsibility to maintain proficiency with all aircraft safety and emergency equipment and systems.
 - (d) Identify the function of circuit breakers in electrical panels and describe the procedures for tripped circuit breakers including reset and flight crew communication procedures. Describe the potential hazards to flight safety if circuit breaker procedures are not followed.

3. Practical training course

3.1 Practical training syllabus

The practical training course must consist of the following drills and checks –

- (1) Public address system and interphone system drill;
- (2) passenger briefing drill;
- (3) aircraft exit operation drill;
- (4) evacuation drill;
- (5) life raft drill;
- (6) aircraft slide drill;
- (7) fire fighting drill;
- (8) oxygen equipment drill;
- (9) pre-flight check;
- (10) pre-take-off check;
- (11) pre-landing check;
- (12) post landing check; and
- (13) pilot incapacitation drill.

3.2 Contents of training syllabus

3.2.1 Drills

3.2.1.1 Public address system and interphone system drill

- (1) General
 - (a) Relaying information to fellow flight crew members and to passengers is an important safety component of the cabin crew member's duties.
 - (b) The PA system and interphone system are tools for relaying safety information, thus using the systems correctly and effectively increases the probability of the message being received and understood.

- (2) Equipment criteria
At least one public address system and one interphone system representative of the systems installed in the operator's aircraft must be used for the drill.
- (3) Performance criteria
Each cabin crew member will demonstrate communications techniques on a public address system and an interphone system and perform the following –
 - (a) Remove the PA microphone/hand-set from its stowage;
 - (b) activate the PA system and (if applicable) verify that it is activated;
 - (c) deliver at least one published safety or emergency announcement;
 - (d) de-activate/reset the system after use;
 - (e) re-stow the handset/microphone after use;
 - (f) remove the interphone handset from its stowage;
 - (g) activate, select station;
 - (h) communicate with receiving station;
 - (i) de-activate/reset system after use; and
 - (j) re-stow the handset/microphone after use.
- (4) Evaluation criteria
Cabin crew member performance will be observed, rated and debriefed according to –
 - (a) correct operation of the systems;
 - (b) message clarity (i.e. well-paced, modulated, good volume, confidence, authority and sincerity);
 - (c) appropriate usage of announcement (i.e. terminology, pronunciation); and
 - (d) follows operator's procedures (i.e. identifies station/name etc.).

3.2.1.2 Passenger briefing drill

- (1) Equipment criteria
Demonstrate equipment representative of all of the equipment used on the aircraft in the operator's fleet.
- (2) Performance criteria
Each cabin crew member will perform each of the following –
 - (a) Pre-flight safety briefing to a special attention passenger (i.e. blind, physically disabled or an unaccompanied minor);
 - (b) individual briefing to an ABP (i.e. exit operation, crowd control, assisting a special attention passenger, assistance on the ground, life raft removal and launching); and
 - (c) perform a full passenger pre-flight safety demonstration (i.e. signs, seat belts, exits, oxygen, life jacket, floor level lighting, safety features card etc.).
- (3) Evaluation criteria
Cabin crew member performance will be observed, rated and debriefed according to –
 - (a) completeness of briefing content (i.e. all relevant points included);
 - (b) effective usage of communication techniques (i.e. clarity, comprehension, absence of jargon for special attention and ABP briefing);
 - (c) correctly modified in accordance with requirements of the individual to whom briefing is being delivered;
 - (d) proper usage of eye contact and body language;
 - (e) correct usage and simulation of the operation of each piece of demonstration equipment;
 - (f) synchronises demonstrations with announcement;
 - (g) displays confidence and leadership;
 - (h) displays openness and ability to answer questions; and
 - (i) verifies that briefing points were understood.

3.2.1.3 Aircraft exit operational drill on each aircraft type

- (1) Equipment criteria

- (a) Each drill will be performed using the appropriate aircraft or an approved training device.
 - (b) Individual aircraft exits may be substituted by an approved equivalent. Exits equipped with slides must include an equivalent slide or a mock-up or training device where the drag of the simulated slide is the same as the original equipment.
- (2) Normal door operation performance criteria
- Each cabin crew member will operate each floor level exit for each aircraft in the normal mode and perform the following –
- (a) Identify the signal and the conditions under which that exit may be opened/closed;
 - (b) assess the exterior and interior conditions for obstacles or hazards to persons or the exit during opening/closing (e.g. loading bridge, stairs, barrier straps/cords, equipment);
 - (c) identify the signal for arming and disarming sequence for the exit;
 - (d) perform the arming and disarming sequence for the exit;
 - (e) verify the exit mode as armed and disarmed by completing appropriate checks (i.e. visual checks, physical checks, crosschecks, response to interphone call);
 - (f) open and close the exit (in the normal (disarmed) mode);
 - (g) engage and release exit locking mechanisms and verify functioning of locking mechanisms (i.e. gust lock);
 - (h) install and remove the barrier strap for that exit; and
 - (i) perform the opening/closing follow-up checks for that exit (i.e. alignment of markings, closed/locked indicators etc.).
- (3) Emergency door operation performance criteria
- Each cabin crew member will operate each floor level exit type, for each aircraft type, in the emergency mode and perform the following –
- (a) Recognise the signal for or the conditions under which the exit is to be opened in the emergency mode;
 - (b) verify the exit is in the correct mode;
 - (c) assess conditions outside the exit to determine exit usability (i.e. clear of obstruction, fire, aircraft attitude);
 - (d) position escape device (if applicable);
 - (e) open the exit in the armed mode and secure the exit in the fully open position;
 - (f) pull the manual inflation handle(s) and verify deployment, inflation (i.e. ramp, slide);
 - (g) assume and maintain appropriate protective body and hand positions; and
 - (h) physically identify release handle(s) (i.e. slide disconnect, ventral stairs, etc.)
- (4) Cabin window exit performance criteria
- Each cabin crew member will operate each cabin window or hatch exit type, for each aircraft type and perform the following –
- (a) Recognise the signal for or the conditions under which the exit is to be opened;
 - (b) assess conditions outside the exit to determine exit usability (i.e. clear of obstruction, fire, aircraft attitude);
 - (c) open and correctly stow the exit;
 - (d) verbally describe correct exit placement following removal, if the training procedures differ from the operational procedures;
 - (e) pull the manual inflation handle(s) and verify deployment, inflation (i.e. ramp, slide);
 - (f) assume and maintain appropriate protective body and hand positions;
 - (g) access escape tapes or escape ropes; and
 - (h) access release handle(s) (i.e. slide disconnect, tailcone jettison, etc.)
- (5) Evaluation criteria
- Cabin crew member performance will be observed, rated and debriefed according to the following –
- (a) Acknowledgement and timely response to signals;

- (b) assesses conditions outside the exit to determine exit usability (i.e. clear of obstruction, fire, aircraft attitude);
 - (c) correct usage of exit operating mechanisms including hand and body position;
 - (d) usage of proper terminologies and procedures;
 - (e) correctly positions escape device;
 - (f) secures exit in the fully opened position or ensures correct stowage position of exit door, window or hatch;
 - (g) pulls manual inflation handle(s) and verifies deployment, inflation of (i.e. ramp, slide);
 - (h) assumes and maintains appropriate protective hand and body positions;
 - (i) correctly access escape tapes or ropes;
 - (j) correctly access release handle(s) (e.g. slide disconnect, tailcone jettison, ventral stairs); and
 - (k) correctly applies procedures (i.e. positioning of arm-rests and tray tables.)
- (6) Airstair operation performance criteria
- (a) For each aircraft type equipped with airstairs not integral to the exit and not used for evacuation, each crew member will perform the following –
 - (i) apply the correct procedures to ensure that the exit with the airstairs is in the appropriate mode, e.g. locked or unlocked;
 - (ii) select the appropriate airstair controls and deploy/retract the airstairs; and
 - (iii) verify that the airstairs are fully extended/retracted and lock them into position.
 - (b) Demonstrate the correct extension/retraction of handrails, assist handles (if applicable).
 - (c) Demonstrate any additional features that are associated with the airstairs, e.g. treat lights.

Note: Paragraph (6) is a recommended subject.

3.2.1.4 Evacuation drill

- (1) General
 - (a) Evacuations are emergency situations which cabin crew members must effectively manage using their knowledge of procedures and the resources available to them. Skills are developed through practice.
 - (b) It is recognised that on aircraft with more than one cabin crew member, an evacuation will likely involve multiple exits and cabin crew members. Therefore, where a drill is performed on an aircraft with more than one cabin crew member, the drill scenario will involve a “typical” number of cabin crew members. Where a cabin simulator is used to conduct the drills, the number of cabin crew members who could participate at anytime will be appropriate to the cabin simulator configuration.
 - (c) Each cabin crew member will assume an actual crew position and will perform the designated evacuation responsibilities for that position. Where a double cabin crew member seat is available and would normally be occupied by two crew members the drill will be conducted to reflect this reality;
 - (d) A cabin crew member who is to qualify on aircraft operating with more than one cabin crew member must perform at least one drill with additional trainees.
 - (e) It is recommended that a demonstration be completed by an instructor prior to cabin crew member conduct of evacuation drills. This will allow the crew member to see theory put to practice.
- (2) Simulation scenarios
 - (a) An evacuation drill is a training and evaluation scenario which must portray an operational flight and include abnormal and emergency occurrences and interactions amongst cabin crew members (if applicable), flight crew members and passengers.
 - (b) A drill scenario should not incorporate excessive or multiple related variables that would overload a flight crew member, but not limited so that there is reduced value to the exercise.

The variables should differ in sequence from one drill to the next and can include but are not limited the following –

- (i) Unserviceable exits;
- (ii) inflation devices that fail or only partially inflate;
- (iii) aircraft attitude which necessitates a decision to use the exit or redirect passengers;
- (iv) poor visibility (i.e. darkness or smoke);
- (v) incapacitated flight crew members;
- (vi) exits which become unusable during the evacuation;
- (vii) special needs passengers (i.e. elderly, handicapped etc.);
- (viii) passengers in panic (i.e. positive, negative, false leadership);
- (ix) failure of aircraft emergency systems (i.e. lighting, evacuation signal, communication etc.);
- (x) decompression; and
- (xi) exits which require the use of non-standard “commands” (i.e. ramp with slide, tailcone, ventral stairs etc.)

(3) Unprepared land and unprepared water evacuation drill performance criteria

Each cabin crew member will perform at least one land and one unprepared water evacuation drill that incorporates the procedures pertinent to a specific exit and perform the following –

- (a) Secure themselves in a cabin crew member seat;
- (b) recognise that an emergency situation is developing and react appropriately to the drill scenario;
- (c) apply all applicable commands;
- (d) recognise when and how to initiate the evacuation (i.e. commands, evacuation horn etc.);
- (e) activate emergency lights and evacuation horn;
- (f) assess conditions inside and outside the exit to determine exit usability throughout the evacuation;
- (g) locate and don life jacket and command passengers as appropriate;
- (h) prepare and open exit;
- (i) secure exit in fully open position or ensure correct stowage;
- (j) pull inflation handle(s) and ensure deployment, inflation of ramp, slide;
- (k) assume appropriate protective position;
- (l) initiate passenger evacuation;
- (m) final cabin and flight deck checks and remove required emergency equipment;
- (n) exit aircraft/trainer correctly;
- (o) access location of escape tapes or escape ropes; and
- (p) access release handle(s) (i.e. slide disconnect, ventral stairs, tailcone jettison etc.)

(4) Evaluation criteria

Cabin crew member performance will be observed, rated and debriefed according to –

- (a) correct usage seat mechanism, restraint system and brace position as appropriate for seat direction, location and drill scenario;
- (b) correct and timely reaction to emergency situations;
- (c) consistent usage of appropriate terminologies (i.e. commands, ABP briefings) with clear, positive, authoritative communication techniques, appropriate for drill scenario;
- (d) activates emergency lights, evacuation horn;
- (e) selects appropriate exit for the evacuation scenario and the aircraft type;
- (f) assesses conditions inside and outside the exit to determine exit usability throughout evacuation (i.e. clear of obstruction, fire, aircraft attitude, flow rate, slide conditions, etc.);
- (g) preparation and correct operation of exit;
- (h) secures exit in the fully open position or ensures correct stowage;
- (i) pulls inflation handle(s) and verifies deployment, inflation of ramp, slide;

- (j) correctly accesses escape tapes or escape ropes;
 - (k) assumes and maintains appropriate protective body and hand positions;
 - (l) effective usage of able-bodied persons for special needs passengers (i.e. assisting outside aircraft and directing people away from the aircraft or onto flotation devices, crowd control etc);
 - (m) adequacy of cabin checks, removal of equipment and additional supplies as scenario and operator procedures dictate;
 - (n) correctly accesses release handle(s) (i.e. slide disconnect, ventral stairs, tailcone jettison, etc);
 - (o) correctly applies procedures as related to scenario; and
 - (p) consequences of errors.
- (5) Crew prepared land and ditching evacuation drill performance criteria
Each cabin crew member must participate in at least one prepared land evacuation drill and at least one ditching drill and perform the following –
- (a) Recognise the in-flight emergency signal from the flight deck and react according to procedures;
 - (b) prepare passengers, cabin and self according to procedures and scenario;
 - (c) select and brief able-bodied passengers to assist as required: opening non-crewed exits, removal, launching life rafts, crowd control, buddy-up with special needs passengers, assisting outside aircraft and directing people away from the aircraft or onto rafts;
 - (d) recognise the emergency brace and evacuation signals and react accordingly;
 - (e) prepare and operate exits;
 - (f) evacuate passengers;
 - (g) final cabin and flight deck checks, remove required emergency equipment;
 - (h) evacuate aircraft/trainer; and
 - (i) demonstrate post evacuation procedures.
- (6) Evaluation criteria
Cabin crew member will be observed, rated and debriefed according to the contents of paragraph (5) and the following –
- (a) Correct application of emergency landing preparation procedures;
 - (b) awareness of and appropriate response to passenger behaviour, exit/slide condition, passenger flow rates, interior and exterior condition changes;
 - (c) communication acknowledgement;
 - (d) problem identification and alternate solutions;
 - (e) accuracy in briefing of ABPS;
 - (f) adequacy of cabin checks, removal of equipment and additional supplies as scenario and operator procedures dictate; and
 - (g) drill participants will demonstrate duties/responsibilities that must be completed following the evacuation scenario, (i.e. equipment responsibilities, life-raft/dinghy duties, head count, flotation responsibilities, protection from the elements, location (i.e. movement of passengers to a safe area), first aid etc. according to operator's procedures;
 - (h) consequences of error.

3.2.1.5 Life raft drill

- (1) Equipment criteria
 - (a) Life raft drill must be conducted using life saving equipment that is similar to or presentative of that installed in the aircraft with respect to weight, dimensions, appearance, features and operations.
 - (b) Rafts may be substituted where they are much the same with respect to weight, dimensions, appearance, features and operations and differences training has been provided.
- (2) Performance criteria

- (a) Each cabin crew member will perform the following –
 - (i) Access the raft compartment and experience the difficulty associated with moving the weight of a packaged life raft within a space representative of the aircraft aisle;
 - (ii) examine all features of a fully inflated raft;
 - (iii) board raft(s); assist persons into raft;
 - (iv) access the inflation lanyard (dinghy);
 - (v) access the slide raft quick release mechanism while verbally describing the procedure to release the life raft from the aircraft; and
 - (vi) examine the life raft survival kit and components, review operation of all components.
- (b) Each cabin crew member will participate in the following –
 - (i) Launching, inflating and disconnecting raft(s) either actual or by video;
 - (ii) righting overturned rafts (if applicable);
 - (iii) effective raft management (i.e. distribution of passengers, deploying sea anchor, etc.);
 - (iv) erecting the raft canopy;
 - (v) raft maintenance;
 - (vi) distribution of duties to passengers; and
 - (vii) discuss the hazards associated with moving a packaged life raft (inadvertent inflation, passenger movement and panic.)

3.2.1.6 Life jacket drill

(1) Equipment criteria

Life jackets used for this drill must be representative of type carried on the operator's fleet.

(2) Performance criteria

Each cabin crew member will perform the following –

- (a) Remove life jacket from closed pouch;
- (b) don life jacket and inflate using automatic inflation of at least one chamber;
- (c) partially inflate second chamber of life vest orally;
- (d) practice deflation technique;
- (e) locate and review light activation;
- (f) locate whistle; and
- (g) fit life jacket.

3.2.1.7 Aircraft slide drill

(1) Equipment criteria

The evacuation slide must be representative of the type installed in the aircraft with respect to the following categories –

- (a) Inflatable, double lane slides;
- (b) inflatable slide and ramp combinations;
- (c) inflatable, single lane slides; and
- (d) non-inflatable slide.

(2) Performance criteria

- (a) View a video with slide inflation sound which depicts the slide, slide ramp activation and inflation both externally from a side angle and a slide base angle and internally from the cabin crew member protected position.
- (b) Each cabin crew member will perform an aircraft slide drill according to the following –
 - (i) Slide down an inflatable slide from each of the categories and physically inspect all features; or
 - (ii) slide down an inflatable slide from one of the categories and physically inspect features, and for each other category, locate and touch the manual inflation handle and a slide release from a position at the door sill area.
- (c) Each cabin crew member will perform an aircraft non-inflatable slide drill according to the following –

- (i) Access and retrieve the evacuation slide, if not door mounted;
- (ii) attach the evacuation slide clips to the appropriate “D” rings on the door frame(s);
- (iii) position the slide at exit(s); and
- (iv) slide down the slide.

3.2.1.8 Fire fighting drill

(1) General

- (a) Drill scenarios will provide each cabin crew member with the opportunity to merge procedural knowledge with practical skills. Their ability to successfully react to different fire situations will enhance their level of confidence and their ability to deal with fire in flight.
- (b) Cabin fire fighting drills may include class A, B, C fires in the following locations –
 - (i) Cabin area (i.e. under seat, overhead bin, closet);
 - (ii) galley area (i.e. garbage bin, upper electrical panel, oven);
 - (iii) confined area (i.e. waste bin, lavatory); and
 - (iv) hidden (i.e. behind panels.)

(2) Equipment criteria

- (a) Fire fighting drills will be conducted using furnishings representative of those found on the operator’s aircraft, such as seats, galley units, panels, waste bins etc.
- (b) Fire fighting equipment and the brackets used for restraint must be representative of those installed in the aircraft with respect to weight, dimensions, controls, types and operations. Fire extinguishers used for live fire fighting must be charged with an environmentally friendly agent. Protective Breathing Equipment (P.B.E.) consisting of a portable oxygen bottle and full face mask must be fully operational and charged with oxygen. Self contained P.B.E. may be substituted with a training smoke hood which is not operational.

(3) Equipment practice

Each cabin crew member will practice the following –

- (a) Remove from stowage, don and activate protective breathing equipment and practice communications;
- (b) remove from stowage and operate each type of fire extinguisher and associated attachments (i.e. extinguisher fitted with hose attachment, extension/wand, etc.);
- (c) don each piece of protective clothing; and
- (d) initiate fire fighting procedures including intervention involving one or more flight crew members, or a passenger.

(4) Live fire fighting

Each cabin crew member must demonstrate the effectiveness of a fire extinguisher correctly applied to an actual fire while wearing P.B.E.

(5) Fire fighting/cabin performance criteria

Each cabin crew member will demonstrate the ability to carry out fire fighting procedures in a cabin environment as a primary firefighter and perform the following –

- (a) Recognise that there is a potential fire situation (e.g. smoke-detector signal or unusual fumes, odours);
- (b) locate the source of fire;
- (c) apply communication/coordination procedures;
- (d) select and remove the nearest appropriate fire extinguisher and (if applicable) other fire fighting equipment.
- (e) inform, assist and control passengers;
- (f) operate the extinguisher; and
- (g) monitor for re-ignition, and apply post-fire follow-up procedures.

(6) Evaluation criteria

Cabin crew member performance will be observed, rated and debriefed according to –

- (a) Recognition or identification of the problem;

- (b) correctly locates the source of the fire (i.e. tactile search, use of crash axe, etc);
 - (c) effective communication/coordination procedures throughout the drill (i.e. notifying fellow flight crew members of the situation, establish and maintain communication with the flight deck, providing clear, concise information to the pilot-in-command, advice assistance to passengers, etc);
 - (d) responds in a timely manner;
 - (e) correct usage of fire fighting equipment consistent with the type of fire, location of the fire and maximum effective position of the fire extinguisher;
 - (f) undertake further action as required; and
 - (g) undertake further action as required; and
- (7) Class B main deck (combi configuration) fire fighting drill performance criteria (Reserved.)

3.2.1.9 Oxygen equipment drill

- (1) Equipment drill
- (a) The equipment must be identical to that installed in the aircraft with respect to dimensions, appearance, features, controls, charge duration, operation and brackets used for restraint.
 - (b) The following drill does not need to be completed using each type of portable oxygen bottle installed in the aircraft provided the procedures, brackets, oxygen mask tubing, fittings and the means to activate the oxygen flow are the same from one bottle to the other. Where types differ, the drill must be repeated with the appropriate equipment.
- (2) Portable oxygen bottle performance criteria
- Each cabin crew member will use each portable oxygen bottle type and perform, according to the operator's procedures, the following –
- (a) Remove bottle from the bracket stowage;
 - (b) retrieve oxygen mask and hose, attach it to the high and low outlet, if applicable;
 - (c) use the carrying strap;
 - (d) prepare the “passenger” for receiving oxygen;
 - (e) prepare the cabin for oxygen administration (i.e. no smoking area);
 - (f) turn on the oxygen and test for flow, position and secure the mask to the passenger's face;
 - (g) secure the oxygen bottle and position it to monitor the supply; and
 - (h) recognise when oxygen is no longer required and apply procedures for shutting off the supply and restowing the oxygen mask and bottle.
- (3) Fixed first aid oxygen performance criteria
- Each cabin crew member will perform the following –
- (a) Coordinate and communicate with crew members as appropriate;
 - (b) activate the oxygen system;
 - (c) retrieve the mask and hose and attach to the system outlet and adjust for desired flow rate;
 - (d) reset the oxygen system; and
 - (e) prepare the cabin for oxygen administration (i.e. no smoking in area).

3.2.2 Checks

3.2.2.1 Pre-flight check

- (1) Training objective
- The cabin crew member will perform a pre-flight check.
- (2) Equipment criteria
- Demonstration equipment representative of the equipment used on the aircraft.
- (3) Performance criteria
- (a) Each cabin crew member will perform the following safety equipment checks to ensure that all equipment is available, serviceable and correctly secured according to the cabin plan –

- (i) Correct amount of equipment on board;
 - (ii) the equipment is properly secured;
 - (iii) the equipment is properly sealed, where sealing is required; and
 - (iv) the equipment is operable.
- (b) Each cabin crew member will perform the following exit checks –
- (i) The emergency escape slide pressures are correct; and
 - (ii) the door power assist gauge pressure is correct.
- (c) Each cabin crew member will perform the following cabin readiness checks –
- (i) Cabin interphone and PA are functioning correctly;
 - (ii) cabin and emergency lighting is satisfactory;
 - (iii) security of the cabin, e.g. storage of all articles;
 - (iv) toilets and galleys for safety, security and operability.

(4) Evaluation criteria

Cabin crew member performance will be observed, rated and de-briefed accordingly.

3.2.2.2 Pre-take off check

(1) Training objective

The cabin crew member will perform a cabin check before take-off.

(2) Equipment criteria

Demonstration equipment representative of the equipment used on the aircraft.

(3) Performance criteria

Each cabin crew member will perform the following pre-take-off checks –

- (a) Seat belts fastened;
- (b) seat backs in upright position;
- (c) tray tables stowed;
- (d) arm rests set;
- (e) cabin baggage correctly stowed (overhead bins closed and exits clear);
- (f) mothers with babies correctly seated;
- (g) electronic devices identified and passengers briefed accordingly;
- (h) foot rests correctly stowed;
- (i) ABPs overwing exits briefed;
- (j) cutlery and crockery removed from cabin;
- (k) cabin lighting set;
- (l) music system switched off;
- (m) galley equipment secured;
- (n) toilets clear, functioning and locked;
- (o) window shades retracted;
- (p) main exit doors (armed and cross-checked);
- (q) flight deck communication made (cabin sterile);
- (r) head count; and
- (s) no smoking announcement made.

Note: Paragraph (r) is a recommended item.

(4) Evaluation criteria

Cabin crew member performance will be observed, rated and de-briefed accordingly.

3.2.2.3 Pre-landing check

(1) Training objective

The cabin crew member will perform a cabin check prior to landing.

(2) Equipment criteria

Demonstration equipment representative of the equipment used on the aircraft.

(3) Performance criteria

Each cabin crew member will perform the following pre-landing checks –

- (a) Passengers to return to original seats announcement;
- (b) seat belts fastened;
- (c) seat backs in the upright position;
- (d) tray tables stowed;
- (e) arm rests set;
- (f) carry-on baggage correctly stowed (overhead bins closed and exits clear);
- (g) passengers briefed on the use of electronic equipment;
- (h) footrests correctly stowed;
- (i) ABPs at emergency exits briefed;
- (j) cutlery and crockery removed from cabin;
- (k) cabin lighting set;
- (l) galley equipment secured;
- (m) toilets clear and locked;
- (n) window shades retracted;
- (o) main exit doors (armed and cross-checked);
- (p) flight deck communication made (cabin sterile); and
- (q) no smoking announcement made.

(4) Evaluation criteria

Cabin crew member performance will be observed, rated and de-briefed accordingly.

3.2.2.4 Post landing check

(1) Training objective

The cabin crew member will perform a cabin check after landing.

(2) Equipment criteria

Demonstration equipment representative of the equipment used on the aircraft.

(3) Performance criteria

Each cabin crew member will perform the following post-landing checks –

- (a) Passengers remain seated announcement made;
- (b) flight crew remain seated announcement made (unless attending to safety related activity);
- (c) disarm main exit doors when announcement is made and cross-checked; and
- (d) check that stairs/airbridge is in position.

(4) Evaluation criteria

Cabin crew member performance will be observed, rated and de-briefed accordingly.

3.2.2.5 Pilot incapacitation drill

(1) Training objective

The cabin crew member will apply the procedures relating to incapacitated pilot.

(2) General

For each aircraft where the operation of the pilot seats is significantly different, each cabin crew member will –

- (a) pull the pilot away from the flight controls and correctly fasten and lock the restraint system; and
- (b) position the pilot seat using the controls, i.e. horizontal, vertical, recline.

(3) Performance criteria

- (a) Apply flight crew coordination and flight crew communication procedures to assist the remaining flight deck crew.
- (b) Administer first aid as necessary.

Note: Paragraph 3.2.2.5 is a recommended subject.

4. Aviation security

4.1 Introduction to operator security

(1) Training objective

The cabin crew member will be aware of the minimum aviation security standards prescribed by the CAA and organisation policies/procedures as they relate to the flight crew of an aircraft.

(2) General

- (a) Requirement for cabin crew members to comply with minimum aviation security standards prescribed by the CAA and organisation security policies/procedures
- (b) An overview of passenger screening, carry-on baggage screening, checked baggage security, mail/cargo security as it relates to cabin crew members.
- (c) Responsibilities of holders of airport restricted areas passes including the requirement to challenge persons in restricted areas who are not wearing passes.
- (d) Protection of cabin crew members' personal belongings.
- (e) Flight crew baggage – identification/procedures.
- (f) Protection of organisation property – manuals, procedures, uniforms, passes, videos, identification and inadvertent communication of information.
- (g) An overview of the regulations pertaining to operator security and the minimum aviation security standards and other aeronautical legislation pertaining to security issues, prescribed by the CAA.

4.2 Passenger security

(1) Training objective

The cabin crew member will be familiar with the handling of unruly or violent passengers and the carriage of persons in custody.

(2) General

- (a) Pilot-in-command's authority.
- (b) Restraint of passengers.
- (c) Crew procedures for passenger restraint.
- (d) Procedures on the ground.
- (e) Assault by passengers on cabin crew members.
- (f) Passenger restraining equipment.
- (g) Disruptive/intoxicated passengers.
- (h) Carriage of persons in custody/deportees.
- (i) Measures relating to VIP passengers.

4.3 Security of the aircraft

(1) Training objectives

The cabin crew member will be able to identify key elements relating to the security of the aircraft.

(2) General

- (a) Communication between cabin crew members of possible threats to security.
- (b) Pre-flight checks/inspection of an aircraft prior to departure (cabin).
- (c) Admittance to the flight deck-operating crew, passengers and CAA inspectors.
- (d) Measures to prevent unauthorised access to aircraft not in service.
- (e) Security measures relating to catering.
- (f) Post-flight checks/inspections of an aircraft after landing (cabin).

4.4 Management of security incidents

(1) Training objective

Cabin crew members will have an understanding of the roles and responsibilities of airport operators, police and other agencies in the management of security incidents.

(2) General

- (a) An understanding of the role and responsibilities of aerodrome operators, police and other agencies in the management of a security incident.
- (b) Requirement to report incidents and procedures.
- (c) Information required at time of reporting a security related incident.

4.5 Definitions

- (1) Training objective
The cabin crew member will be knowledgeable in the terms used in aviation security.
- (2) General
Knowledge of the following terms –
 - (a) Bomb threat;
 - (b) disembarking/evacuation;
 - (c) explosives disposal expert;
 - (d) firearms;
 - (e) hijacking;
 - (f) peace officer;
 - (g) restricted area;
 - (h) sabotage;
 - (i) sterile area; and
 - (j) weapon.

4.6 Bomb threats – aircraft on the ground

- (1) Training objective
The cabin crew member will be aware of the procedures to be followed in the event of a bomb threat to an aircraft while it is still on the ground.
- (2) General
 - (a) Crew advisory/briefing.
 - (b) Disembarkation/evacuation.
 - (c) Search of the aircraft after disembarkation/evacuation.
 - (d) Re-entering the aircraft.
 - (e) Communication with passengers.
 - (f) Communication with authorities and organisation.

4.7 Bomb threat – aircraft in flight

- (1) Training objective
The cabin crew member will be aware of the procedures to be followed in the event of a bomb threat to an aircraft while in flight.
- (2) General
 - (a) Pilot-in-command responsibilities.
 - (b) Crew advisory/briefing.
 - (c) Communication with passengers.
 - (d) Search of the aircraft while in flight.
 - (e) Awareness of components of an explosive device.
 - (f) Locating a suspect device.
 - (g) Protecting a suspect device.
 - (h) Awareness of procedure employed when moving a suspect device.
 - (i) Areas of lowest risk for relocating of suspect device.
 - (j) Disposal of suspect device overboard.
 - (k) Disembarkation/evacuation upon landing.
 - (l) Re-entering the aircraft.
 - (m) Communication with authorities and organisation.

4.8 Hi-jacking

- (1) Training objective
The cabin crew member is familiar with tactics and policies to be implemented in the event of a hi-jack.
- (2) General
 - (a) Crew-advisory/briefing.

- (b) Company policies.
 - (c) General tactics.
 - (d) Tactics specific to on-flight.
 - (e) Tactics specific to on-ground.
 - (f) Coded signals.
 - (g) Conclusion of hi-jack incident.
 - (h) Communication with authorities and organisation.
- (3) Application for cabin crew member licence
- (a) Application form for cabin crew member licence
Application form for cabin crew member licence referred to in CAR 64.02.5, is contained in the SACAA website.
 - (b) Skill test
The skill test report referred to in CAR 64.02.5 is contained in the SACAA website.
- (4) Issuing of cabin crew member licence
The form for a cabin crew member licence referred to in CAR 64.02.6 is contained in the SACAA website.

5. First aid

5.1 Principles of first aid

5.1.1 Training objective

The cabin crew member will be able to define/demonstrate the principles of first aid required to effectively handle an in-flight medical emergency situation.

5.1.2 Syllabus

Responsibility of cabin crew member and equipment and materials.

5.1.2.1 Objectives of first aid

- (1) State three objectives of first aid –
 - (a) To preserve life;
 - (b) to prevent the condition from worsening; and
 - (c) to promote recovery –
 - (i) Airway;
 - (ii) breathing;
 - (iii) circulation –
 - Heart
 - Bleeding

5.1.2.2 Responsibility of cabin crew member

- (1) Hazards – are there any to you or passenger/s.
- (2) Decide as far as possible what the problem or cause is.
- (3) Give appropriate first aid care.
- (4) Communicate with the pilot-in-command, giving all information gained, with an update at regular intervals.

5.1.3 First aid equipment and materials

- (1) Describe how, when and why to use –
 - (a) surgical gloves;
 - (b) supplemental oxygen cylinder and face mask; and
 - (c) first aid materials.
- (2) State the disposal procedures for –
 - (a) body fluids, bagged and labelled; and
 - (b) contaminated first aid material.
- (3) Describe the on board sources of first aid materials and conditions for use –
 - (a) first aid kit;

- (b) medical kit; and
- (c) improvised materials carried on the aircraft.

5.2 In-flight medical emergency scene management

5.2.1 Training objective

The cabin crew member will be able to define/demonstrate the in-flight medical emergency scheme management required to effectively handle in-flight emergency situation.

5.2.2 Syllabus

Emergency scene management

5.2.2.1 Emergency scene

- (1) Describe "Priority Action Approach".
 - (a) H - Hazards.
 - (b) H - Hello.
 - (c) H - Help.
 - (d) A - Airway.
 - (e) B - Breathing.
 - (f) C - Circulation
 - (i) Heart
 - (ii) Bleeding
- (2) Describe the three possible sources of help in an in-flight emergency situation –
 - (a) Medical personnel on board;
 - (b) crew members; and
 - (c) passengers.
- (3) State the authorities that must be notified of an in-flight emergency.
 - (a) Senior cabin crew member; and
 - (b) pilot-in-command: ground advanced life-support system.
- (4) State the administrative procedures to be completed following an in-flight emergency –
 - (a) Report forms –
 - (i) medical kit;
 - (ii) first aid kit; and
 - (iii) name and address of doctor in attendance or anyone providing assistance.
- (5) Describe the effect of the aircraft environment on an in-flight emergency situation –
 - (a) cabin configuration of aircraft;
 - (b) number of cabin crew members on board;
 - (c) turbulence;
 - (d) distance to ground life-support system; and
 - (e) cabin altitude.
- (6) Demonstrate with a simulated casualty the management on an in-flight emergency situation.
 - (a) Priority Action Approach (HHH ABC) –
 - (i) conscious casualty; and
 - (ii) unconscious casualty.

5.3 Casualty assessment and movement/positioning

5.3.1 Training objective

The cabin crew member will be able to define/demonstrate the casualty assessment and movement/positioning required to effectively handle an in-flight medical emergency situation.

5.3.2 Syllabus

5.3.2.1 Examine and assess a casualty

- (1) Define history, signs and symptoms and describe their use.
- (2) Name the vital signs and describe their use –
 - (a) Respiration;
 - (b) pulse;

- (c) level of consciousness;
 - (d) skin colour and temperature;
 - (e) pupils;
 - (f) movement;
 - (g) sensation; and
 - (h) pain.
- (3) State how a medical alert device can assist in assessing a casualty's conditions.
- (4) Describe how to examine and assess a casualty –
- (a) Primary examination; and
 - (b) secondary examination –
 - (i) conscious casualty; and
 - (ii) unconscious casualty

5.3.2.2 Move and positioning a casualty

- (1) State the preferred location for first aid administration in each aircraft interior configuration.
- (2) Demonstrate with a simulated casualty and blankets the moving and positioning for first aid.
- (3) State the specific conditions when a casualty should not be moved –
 - (a) Head and spinal injuries;
 - (b) space limitations in the aircraft; and
 - (c) apparent death.

Note: Refer to individual organisation policies

5.4 Artificial respiration – adult

5.4.1 Training objective

The cabin crew member will be able to define/demonstrate the artificial respiration (adult) required to effectively handle an in-flight medical emergency situation.

5.4.2 Syllabus

5.4.2.1 Respiratory emergencies

- (1) State causes of respiratory emergencies –
 - (a) Airway obstruction;
 - (b) lack of oxygen;
 - (c) dysfunction of lungs and heart; and
 - (d) allergic reaction – define signs and symptoms.
- (2) State the time when brain damage may result from lack of oxygen.

5.4.2.2 Mouth-to-mouth direct method of artificial respiration

- (1) State when mouth-to-mouth artificial respiration (adult) should be initiated.
- (2) State when the carotid pulse is taken and rechecked during mouth-to-mouth artificial respiration for an adult.
- (3) Describe the characteristics of the resting pulse of a health adult –
 - (a) Average pulse rate;
 - (b) normal range of pulse rates; and
 - (c) quality of the pulse.
- (4) State the rate of normal respiration for an adult.
- (5) Demonstrate, on a mannequin (adult) or on a simulated casualty (adult) mouth-to-mouth artificial respiration for a minimum of one minute or 12 to 15 consecutive ventilations; using the head tilt-chin method to open the airway and a face mask with an oxygen port and a one-way valve and oxygen.
- (6) Demonstrate, on a mannequin (adult) or on a simulated casualty (adult), with the assistance of passengers, the technique for ventilations prior to moving a casualty and every 15 seconds thereafter until the casualty is positioned.
- (7) Describe how to administer oxygen to an adult.
- (8) State the procedures required to deal with the following complications of artificial respiration –

- (a) Gastric distension; and
- (b) vomiting during artificial respiration.

5.4.2.3 Mouth-to-mouth direct method of artificial respiration – casualty with a suspected neck injury.

- (1) State when the jaw thrust without head tilt method should be used to open the airway.
- (2) Describe how to perform the jaw thrust without head tilt method and the technique to seal the nose for ventilations.
- (3) Describe how to take a radial pulse.
- (4) State why and when the application of a cervical collar is required.
- (5) Describe the application of a commercial cervical collar if applicable on aircraft and the preparation and application of immobilisation.

5.4.2.4 Follow-up care – restored breathing

- (1) State when and why the recovery position is used.
- (2) State location(s) in the aircraft for the recovery position.
- (3) Demonstrate the recovery position on a simulated, conscious or unconscious, breathing casualty without suspected neck injury who is lying on their back.

5.5 Artificial respiration – child and infant

5.5.1 Training objective

The cabin crew member will be able to define/demonstrate artificial respiration (child and infant) required to effectively handle an in-flight medical emergency situation.

5.5.2 Syllabus

5.5.2.1 Artificial respiration – child

- (1) Define the term “child” as it applies to first aid.
- (2) State the differences in the rate and force of ventilations between an adult and a child.
- (3) State the resting pulse range for a healthy child.
- (4) Demonstrate on a mannequin (child or adult) or on a simulated casualty the techniques of mouth-to-mouth artificial respiration for a minimum of one minute or 15 consecutive cycles.
- (5) Describe how to administer oxygen to a child.

5.5.2.2 Mouth-to-mouth and nose method of artificial respiration – infant

- (1) Define the term “infant” as it applies to first aid.
- (2) State when and where the brachial pulse is taken and rechecked during mouth-to-mouth-and-nose artificial respiration.
- (3) State the resting pulse range for a healthy infant.
- (4) State the rate and the force of ventilations for an infant.
- (5) Demonstrate, on an infant mannequin if available, the mouth-to-mouth-and-nose method of artificial respiration for a minimum of one minute or 20 consecutive ventilations, using the head tilt-chin lift method to open the airway.
- (6) Describe how to administer oxygen to an infant.

5.6 Choking – Adult, child and infant

5.6.1 Training objective

The cabin crew member will be able to define/demonstrate the choking procedure for adult, child and infant required to effectively handle an in-flight emergency situation.

5.6.2 Syllabus

5.6.2.1 Causes of choking

- (1) State causes of choking in an adult, child and infant –
 - (a) Food;
 - (b) foreign objects;
 - (c) excessive consumption of alcoholic beverages; and

(d) fluid.

5.6.2.2 Recognise choking

- (1) Describe the signs of choking for an adult, child and infant –
 - (a) Partial airway obstruction; and
 - (b) complete airway obstruction.

5.6.2.3 Choking adult and child

- (1) State the first aid for choking for an adult and child casualty with partial airway obstruction –
 - (a) Good air exchange; and
 - (b) poor air exchange.

5.6.2.4 Describe the methods by which a conscious choking adult and child can assist themselves.

5.6.2.5 Demonstrate the first aid for a complete airway obstruction on a simulated, choking adult and child casualty when the adult or child is –

- (1) conscious;
- (2) conscious who becomes unconscious; and
- (3) found unconscious.

5.6.2.6 State two instances when chest thrusts should be used on an adult casualty –

- (1) Advanced pregnancy; and
- (2) markedly obese.

5.6.2.7 State how to perform chest thrusts on a woman casualty in the advanced stages of pregnancy or a markedly obese casualty –

- (1) Conscious; and
- (2) unconscious.

5.6.2.8 Choking infant

Demonstrate, on an infant mannequin if available, the first aid for an airway obstruction when an infant is –

- (a) conscious;
- (b) conscious who becomes unconscious; and
- (c) found unconscious.

5.6.2.9 Follow-up care – complete airway obstruction

Describe the follow-up care for a complete airway obstruction when first aid has been administered to –

- (a) an adult;
- (b) a child; and
- (c) an infant.

5.6.2.10 Allergic reaction

- (1) Define allergic reaction.
- (2) Describe the signs and symptoms –
 - (a) Facial swelling;
 - (b) colour, cyanosed;
 - (c) tongue protruding;
 - (d) noisy obstructed breathing;
 - (e) shock;
 - (f) breathing stops.

5.6.2.11 Describe the treatment –

- (1) Call for on board medical assistance, if any;
- (2) give oxygen;
- (3) ensure and maintain airway;
- (4) leave in sitting position;
- (5) loosen tight clothing; and

- (6) monitor.

5.6.2.12 Respiratory emergencies

State the signs and symptoms of the following respiratory emergencies –

- (1) Breath shortage (dyspnea);
- (2) asthma; and
- (3) emphysema.

5.6.2.13 First aid – Respiratory emergencies

State the first aid for a casualty who is suffering from breath shortage, asthma and emphysema –

- (1) Give oxygen;
- (2) assist in taking prescribed medication; and
- (3) call for medical assistance.

5.7 Shock, unconsciousness, fainting, stroke and seizures

5.7.1 Training objective

The cabin crew member will be able to define/demonstrate the procedures for shock, unconsciousness, fainting and seizures required to effectively handle an in-flight emergency situation.

5.7.2 Syllabus

- (1) Shock.
- (2) Shock positions.
- (3) Levels of consciousness.
- (4) Unconscious casualty.
- (5) Fainting.
- (6) First aid–fainting.
- (7) Recognise a stroke.
- (8) First aid–stroke.
- (9) Epileptic seizure.
- (10) First aid–epileptic seizure.
- (11) Convulsions–children and adults.
- (12) First aid–convulsions–children and adults.

5.7.2.1 Shock

- (1) Define shock.
- (2) State causes of shock.
- (3) List the signs and symptoms of shock.
- (4) Treatment.

5.7.2.2 Shock positions

Name the position of choice to lessen the severity of shock for a conscious casualty with each of the following conditions –

- (1) Nausea and vomiting;
- (2) chest injuries;
- (3) heart attack; and
- (4) pelvic injury.

5.7.2.3 Levels of consciousness

- (1) State the three responses used for assessing the levels of consciousness –
 - (a) Response to voice;
 - (b) response to touch; and
 - (c) response to pain.
- (2) State the conditions that may cause a loss of consciousness –
 - (a) Stroke;
 - (b) heart attack;
 - (c) head injuries;
 - (d) epilepsy;

- (e) convulsions;
- (f) diabetes;
- (g) fainting; and
- (h) shock.

(3) State the importance of monitoring the changes in the casualty's level of consciousness.

5.7.2.4 Unconscious casualty

- (1) Describe the first aid for an unconscious casualty –
 - (a) Breathing;
 - (b) not breathing; and
 - (c) deep state of unconsciousness (coma).
- (2) State the first aid for an unconscious, breathing casualty in shock.

5.7.2.5 Fainting

- (1) Define fainting.
- (2) State the cause of fainting.
- (3) Describe the signs and symptoms of an impending faint.

5.7.2.6 First aid–fainting

Describe the first aid for person who –

- (1) feels faint; or
- (2) has fainted.

5.7.2.7 Recognise a stroke

- (1) Define a stroke.
- (2) List the signs and symptoms of a stroke.

5.7.2.8 First aid–stroke

State the first aid for a stroke –

- (1) Place casualty into the most comfortable position;
- (2) give oxygen;
- (3) protect paralysed parts of the body;
- (4) call for medical assistance; and
- (5) monitor.

5.7.2.9 Epileptic seizure

- (1) Define epilepsy.
- (2) List the signs and symptoms of an epileptic seizure.

5.7.2.10 First aid–epileptic seizures

State the first aid for an epileptic seizure.

5.7.2.11 Convulsions – children and adults

- (1) State a common cause of convulsions in children.
- (2) List the signs and symptoms of convulsions in children and adults.

5.8 Heart attack

5.8.1 Training objective

The cabin crew member will be able to define/demonstrate the procedures for heart attack required to effectively handle an in-flight emergency situation.

5.8.2 Syllabus

5.8.2.1 Heart attack

- (1) Describe briefly the anatomy and physiology of the heart.
- (2) Define a heart attack.
- (3) List the signs and symptoms of a heart attack.

5.8.2.2 First aid–heart attack

State the first aid for a heart attack

- (1) Leave patient in semi-sitting position;
- (2) reassure;

- (3) give oxygen;
- (4) loosen tight clothing;
- (5) do not allow casualty to walk around;
- (6) give shock treatment;
- (7) monitor; and
- (8) if cardiac arrest occurs, perform CPR.

5.9 Wounds and bleeding

5.9.1 Training objective

The cabin crew member will be able to define/demonstrate the procedures for wounds and bleeding to effectively handle an in-flight emergency situation.

5.9.2 Syllabus

5.9.2.1 External and internal bleeding

- (1) Define a wound
 - (a) Describe 6 types of wounds.
 - (b) List 2 dangers of wounds.
- (2) Define external and internal bleeding.
- (3) List the signs and symptoms of internal bleeding.
- (4) Define the three types of bleeding and the signs of each –
 - (a) Arterial;
 - (b) venous; and
 - (c) capillary.

5.9.2.2 Contamination and infection of wounds

- (1) Name measures to prevent further contamination and infection of wounds.
- (2) State how to clean a minor wound –
 - (a) Demonstrate the use of roller bandages; and
 - (b) demonstrate the use of slings.

5.9.2.3 Control external bleeding from wounds

- (1) Describe the first aid for a wound with –
 - (a) slight bleeding; and
 - (b) severe bleeding (give oxygen if showing signs of shock).
- (2) Describe the signs of inadequate distal (away from) circulation to the extremities –
 - (a) Skin temperature;
 - (b) colour; and
 - (c) pulse.
- (3) Demonstrate, on a simulated casualty, the techniques to control severe bleeding from a wound on the inside of the forearm using dressing and two triangular bandages.
- (4) Demonstrate how to improve impaired distal circulation when a limb is bandaged.

5.9.2.4 External bleeding from a wound – embedded object

- (1) Describe the first aid for a wound with an embedded object when the protrusion is –
 - (a) short; and
 - (b) long.
- (2) Describe the techniques for the control of bleeding from a wound with a short embedded foreign object in the lower leg using dressings, a ring pad and a triangular bandage.

5.9.2.5 First aid – internal bleeding

Describe the first aid for internal bleeding –

- (1) Give oxygen;
- (2) place casualty into the shock position if injuries and aircraft configuration permit;
- (3) prevent shock from worsening; and
- (4) call for medical assistance.

5.9.2.6 First aid–nose bleed

Describe the first aid for bleeding from the nose.

5.9.2.7 First aid–protruding intestines

Describe the procedure for handling protruding intestines –

- (1) Don't touch protruding intestines;
- (2) don't push back into body;
- (3) cover with wet sterile dressings; and
- (4) don't move casualty unnecessarily.

5.9.2.8 Tourniquets

- (1) State the dangers.
- (2) State the responsibilities of the first aider if tourniquet is used.
- (3) Advise against use.

5.10 Fractures, dislocations and sprains

5.10.1 Training objective

The cabin crew member will be able to define/demonstrate the procedures for fractures, dislocations and sprains to effectively handle an in-flight emergency situation.

5.10.2 Syllabus

5.10.2.1 Fractures

- (1) List the causes of fractures.
- (2) Define classifications of fractures –
 - (a) Closed fracture;
 - (b) open fracture; and
 - (c) complicated.
- (3) List the signs and symptoms of a fracture.

5.10.2.2 Rules of first aid–fractures

State the general rules of first aid for fractures –

- (1) Support; and
- (2) immobilise.

5.10.2.3 Immobilise a fracture of the forearm

Demonstrate, on a simulated casualty, the immobilisation of a closed fracture of the forearm using three triangular bandages and short, padded splint or an improvised, padded splint.

5.10.2.4 Immobilise a fracture of the lower leg

Describe the immobilisation of a closed fracture of the lower leg using six triangular bandages and either two padded, wooden splints or the good leg as a splint.

5.10.2.5 Immobilise a fracture of the femur

- (1) List the factors that increase the seriousness of a fracture of the femur/hip.
- (2) Describe the immobilisation of a closed fracture of the femur/hip using a long, padded splint, padding and seven triangular bandages.

5.10.2.6 Immobilise a fracture of the clavicle

Describe the immobilisation of a fracture of the clavicle using two triangular bandages.

5.10.2.7 Joint injuries

- (1) Define two types of joint injuries –
 - (a) Dislocation; and
 - (b) sprain.
- (2) List the signs and symptoms of a –
 - (a) dislocation; and
 - (b) sprain.

5.10.2.8 First aid – joint injuries

State the principles of first aid for a –

- (1) dislocation; and

- (2) sprain.

5.10.2.9 Immobilise joint injuries

- (1) Describe the techniques for support and immobilisation of a dislocated shoulder using padding and three triangular bandages and the application of cold packs/ice packs.
- (2) Demonstrate, on a simulated casualty, the techniques for support and immobilisation of a sprained ankle using a blanket/cushion and two triangular bandages and the application of cold packs/ice packs.

5.11 Burns

5.11.1 Training objective

The cabin crew member will be able to define/demonstrate the procedures for burns to effectively handle an in-flight emergency situation.

5.11.2 Syllabus

5.11.2.1 Burns

- (1) List the types of burns –
 - (a) Dry burns: heat, fire, hot metal, friction;
 - (b) scalds: steam, hot water, hot oil/fat;
 - (c) cold burns: liquid nitrogen/oxygen;
 - (d) chemical burns: acids, alkalis;
 - (e) electrical burns; and
 - (f) radiation burns.
- (2) State the classification of burns –
 - (a) Superficial–reddening of skin;
 - (b) partial–blistering; no loss of skin; and
 - (c) full thickness–loss of skin and possibly underlying tissue and muscle.

5.11.2.2 First aid – burns

- (1) Describe the first aid for burns –
 - (a) Electrical burns; and
 - (b) other types.
- (2) List critical burn areas –
 - (a) Face (lung involvement);
 - (b) hands and feet;
 - (c) genitals; and
 - (d) circumferential burns.
- (3) State dangers of burns –
 - (a) Shock; and
 - (b) infection.

5.12 Miscellaneous conditions I

5.12.1 Training objective

The cabin crew member will be able to define/demonstrate the procedures to effectively handle miscellaneous conditions in an in-flight emergency situation.

5.12.2 Syllabus

5.12.2.1 Head injury

- (1) Define three types of head injuries –
 - (a) Concussion;
 - (b) compression; and
 - (c) skull fracture.
- (2) Describe how to recognise the three types of head injuries by –
 - (a) history;
 - (b) signs; and
 - (c) symptoms.

- (3) Name the injury that is most commonly associated with a head injury (neck, spinal).

5.12.2.2 First aid – head injury

- (1) Describe the first aid for a scalp wound with an underlying fracture of the skull, using large dressing and a triangular bandage.
- (2) Describe the best position for conscious/unconscious casualty with head injury.

5.12.2.3 Spinal injury

Describe how to recognise a spinal injury by –

- (1) history;
- (2) signs; and
- (3) symptoms.

5.12.2.4 Unconscious casualty – suspected spinal injury

- (1) State the principal of first aid for a spinal injury.
- (2) State under what conditions a casualty with a suspected spinal injury should be moved.
- (3) Describe the necessary when moving a casualty with a suspected spinal injury within the limitations of an aircraft configuration.

5.12.2.5 Acute abdominal distress (acute abdomen)

- (1) Define acute abdominal distress (acute abdomen).
- (2) Describe the signs and symptoms of an acute abdomen.
- (3) Describe the phenomenon of the referred pain.
- (4) State two causes of an acute abdomen –
 - (a) Acute appendicitis; and
 - (b) ectopic pregnancy.

5.12.2.6 Acute abdominal distress

Describe the first aid for an acute abdominal distress –

- (1) Call for medical assistance;
- (2) give nothing by mouth –
 - (a) food and drink; or
 - (b) medication for pain or sedative.
- (3) place casualty in the position of most comfort;
- (4) prevent shock from worsening; and
- (5) give oxygen.

5.12.2.7 Poison emergencies

- (1) List the four ways that poison can gain entry into the body.
- (2) List the signs and symptoms of poisoning by ingestion.

5.12.2.8 First aid – poison by ingestion

State the first aid for a conscious casualty when a poison has been ingested –

- (1) Vomiting included;
- (2) vomiting not included;
- (3) give oxygen; and
- (4) call for medical assistance.

5.12.2.9 Diabetic emergencies

- (1) Define diabetic emergency.
- (2) State how the history of an incident helps to identify a diabetic emergency –
 - (a) Conscious casualty; and
 - (b) unconscious casualty (check medic alert disc).
- (3) List the signs and symptoms of a diabetic emergency.

5.12.2.10 First aid – diabetic emergencies

State the first aid for a diabetic emergency.

5.13 Miscellaneous conditions II

5.13.1 Training objective

The cabin crew member will be able to define/demonstrate the procedures to effectively handle miscellaneous conditions in an in-flight emergency situation.

5.13.2 Syllabus

5.13.2.1 Earache (Barotrauma)

State the signs and symptoms of earache –

- (1) Pain, increasing during descent of aircraft;
- (2) dizziness;
- (3) loss of hearing; and
- (4) possible rupture of eardrum.

5.13.2.2 Sinusitis

State the signs and symptoms of sinusitis –

- (a) Headache;
- (b) pain increasing during descent of aircraft;
- (c) possible nosebleed; and
- (d) dizziness.

5.13.2.3 First aid – earache and sinusitis

- (1) Describe the first aid for an earache –
 - (a) Assist in taking prescribed medication if necessary; and
 - (b) valsalva manoeuvre, chewing, swallowing, yawning.
- (2) Describe the first aid for sinusitis –
 - (a) assist in taking prescribed medication.

5.13.2.4 Hyperventilation

- (1) Define hyperventilation.
- (2) State the signs and symptoms of hyperventilation –
 - (a) Marked anxiety;
 - (b) short of breath;
 - (c) dizziness and light headedness; inability to concentrate;
 - (d) feeling of unreality;
 - (e) tingling, pins and needles in extremities;
 - (f) an awareness of heart beating very fast; and
 - (g) yawning, sighing.

5.13.2.5 First aid – hyperventilation

Describe the first aid for hyperventilation –

- (1) Try to talk the passenger into slowing his respiration rate;
- (2) have the passenger breath into an oxygen mask that is not receiving oxygen flow, or into a vomit bag; and
- (3) do not give oxygen.

5.13.2.6 Air sickness

- (1) State the causes of air sickness –
 - (a) Turbulence;
 - (b) poor ventilation;
 - (c) digestive disorders; and
 - (d) unpleasant odours.
- (2) List the signs and symptoms of air sickness –
 - (a) Nausea and vomiting;
 - (b) dizziness;
 - (c) pale, clammy skin; and
 - (d) fainting

5.13.2.7 First aid – air sickness

Describe the first aid for air sickness –

- (1) Assist in taking medication;
- (2) provide fresh air;
- (3) recline the passengers seat;
- (4) place a cool, damp cloth over the passenger's eyes;
- (5) dispose of any vomitus in an appropriate manner; and
- (6) clean and deodorise area as required.

5.14 Aviation medicine (physiology of flight)

5.14.1 Training objective

The cabin crew member will be able to identify and describe the most common physiological effects of flight in pressurised and non-pressurised aircraft including likely causes, recognition and ways to minimise these effects.

5.14.2 Syllabus

5.14.2.1 General

- (1) Describe the physiology of respiration and circulation.
- (2) Identify the body's requirement for oxygen and the potential for flight crew member incapacitation due to lack of oxygen.
- (3) Describe the most common physiological effects of altitude and the pressurised cabin, including but not limited to dehydration, effects of trapped gases and water retention.

5.14.2.2 Effect of altitude

- (1) Define what is meant by decompression sickness and describe the physiological effects of pressure changes on gases in the body. Define "safe" times between scuba-diving and flight.
- (2) Define what is meant by hypoxia, the hazards associated with it, signs and symptoms, ways to detect it and minimise its effects.
- (3) Define "Time of Useful Consciousness" and factors affecting it.
- (4) Identify persons most susceptible to the effects of hypoxia.
- (5) Describe the effects of altitude on night vision and the impact this has on flight safety and personal safety.

5.15 CPR – Adult, child and infant

5.15.1 Training objective

The cabin crew member will be able to define/demonstrate the procedures required to effectively handle cardiopulmonary resuscitation on adult, child and infant in an in-flight medical emergency.

5.15.2 Syllabus

5.15.2.1 Cardiac arrest

- (1) List 3 common causes of cardiac arrest –
 - (a) Heart attack;
 - (b) electric shock; and
 - (c) asphyxia.
- (2) State the signs and symptoms of cardiac arrest.

5.15.2.2 One-rescuer CPR adult, child and infant

- (1) State when CPR is required for cardiac arrest.
- (2) Define the terms "child" and "infant" as they apply to CPR.
- (3) Describe one-rescuer CPR for adult, child and infant casualties –
 - (a) When to start/when to stop;
 - (b) techniques;
 - (c) sequencing; and
 - (d) timings
- (4) Demonstrate on a mannequin (adult) one-rescuer CPR for a minimum of one minute or four cycles of 15 compressions and 2 ventilations to Resuscitation Council standards which are in accordance with the standards of the Heart Foundation.

- (5) Demonstrate, on mannequin (child or adult), one-rescuer CPR or a child for a minimum of one minute of 10 continuous cycles of 5 compression's and 1 ventilation as above which are in accordance with the standards of the Heart Foundation.
- (6) Demonstrate, on an infant mannequin if available, one-rescuer CPR for a minimum of one minute or 10 continuous cycles of 5 compression's and 1 ventilation which are as above in accordance with the standards of the Heart Foundation.
- (7) State the minimum time for pulse assessment when giving CPR to a casualty in hypothermia.

5.16 Emergency childbirth

5.16.1 Training objective

The cabin crew member will be able to define/demonstrate the procedures required to effectively handle emergency childbirth in an in-flight medical emergency situation.

5.16.2 Syllabus

5.16.2.1 Childbirth – imminent

- (1) List three signs that indicate the beginning of labour.
- (2) State four things of imminent delivery.

5.16.2.2 Preparations – emergency delivery

- (1) List the materials that will assist a First Aider in an emergency delivery.
- (2) State how to prepare the expectant mother for an emergency delivery.

5.16.2.3 First aid – emergency delivery

- (1) Describe the role of the person administering first aid in an emergency delivery –
 - (a) Normal delivery;
 - (b) delivery with complications –
 - (i) umbilical cord;
 - (ii) placenta; and
 - (iii) haemorrhage.
- (2) State how to care for the new-born baby.
- (3) State how to care for the placenta and umbilical cord following delivery.
- (4) Describe how to care for the mother following delivery until medical aid is obtained.

Note: *Should the decision be made to cut the umbilical cord, sterile equipment must be used.*

5.17 Death on board

5.17.1 Training objective

The cabin crew member will be knowledgeable about and in a position to effectively handle death on board.

5.17.2 Syllabus

5.17.2.1 Death on board

- (1) Describe the procedures for notifying authorities.
- (2) Describe the procedure for the deceased's valuables and documentation.
- (3) Handling of the body according to organisation directives.

5.18 Self medication

5.18.1 Training objective

The cabin crew member will understand the dangers of self medication and their side effects.

5.18.2 Syllabus

Background knowledge

- (1) Normal physiological and neurophysiological functions of aircrew is mandatory if flight safety is to be achieved.
- (2) Taking medication alters or changes physiological and neuro-physiological reaction and functioning.
- (3) Disease and/or medication is usually incompatible with flight safety.
- (4) A flight crew member using any medication (prescription or over the counter) that alters flight skills should not be allowed to perform flight duties.

- (5) Regarding flight safety, consider the effects of the –
 - (a) disease/ailment;
 - (b) main pharmacological action of the medication used; and
 - (c) pharmacological side effect.
- (6) Never underestimate the medico-legal implications of all medication in aircraft accidents and incidents.
- (7) During every flight there is the possibility that at any moment with no prior warning the aircrew might have to use their –
 - (a) concentration abilities;
 - (b) best attention allocation properties;
 - (c) critical judgement capabilities;
 - (d) decision taking abilities;
 - (e) clear sensory and motor functioning.

5.19 Frostbite, hypothermia

5.19.1 Training objectives

The cabin crew member will be able to define/demonstrate the procedures required to effectively handle frostbite and hypothermia in an in-flight medical emergency situation.

5.19.2 Syllabus

5.19.2.1 Cold injuries

- (1) Name the signs and symptoms of –
 - (a) superficial frostbite; and
 - (b) deep frostbite.
- (2) List signs and symptoms of the progressive stages of hypothermia.

5.19.2.2 First aid – cold injuries

- (1) State the first aid for –
 - (a) superficial frostbite;
 - (b) deep frostbite; and
 - (c) hypothermia.
- (2) State the minimum time for pulse assessment in a casualty with severe hypothermia.

5.20 Hypothermia

5.20.1 Training objective

The cabin crew member will be able to define/demonstrate the procedures required to effectively handle hypothermia in an in-flight medical emergency situation.

5.20.2 Syllabus

5.20.2.1 Heat illnesses

- (1) State four conditions that cause heat illnesses.
- (2) List four safety measures to prevent heat illnesses.
- (3) List the signs and symptoms of –
 - (a) heat cramps;
 - (b) heat exhaustion; and
 - (c) heat-stroke –
 - (i) classic heat-stroke; and
 - (ii) exertional heat-stroke.

5.20.2.2 First aid – heat illnesses

State the first aid for –

- (1) heat cramps;
- (2) heat exhaustion; and
- (3) heat-stroke.

5.21 Toothache

5.21.1 Training objective

The cabin crew member will be able to define/demonstrate the procedures required to effectively handle toothache in an in-flight medical emergency situation.

5.21.2 Syllabus

5.21.2.1 Toothache

List the signs and symptoms of a toothache –

- (1) pain;
- (2) swelling; and
- (3) localised heat.

Note: Often associated with sinusitis—referred pain.

5.21.2.2 First aid – toothache

- (1) Describe the first aid for a toothache –
 - (a) Call for medical assistance; and
 - (b) prevent shock from worsening.
- (2) Describe the care for a knocked-out tooth –
 - (a) Do not handle the tooth by the root;
 - (b) gently replace the tooth into the socket if the casualty refuses to have the tooth replaced –
 - (i) place the tooth in a moistened gauze or a cup of water;
 - (ii) seek medical aid as soon as possible.

5.21.2.3 Environment – passengers with respiratory problems

Describe the precautions to be taken when the interior of aircraft has been sprayed with disinfectants or insecticides.

5.22 Most commonly used medication

5.22.1 Training objective

The cabin crew member will understand the 6 most commonly used medication available.

5.22.2 Syllabus

5.22.2.1 Analgesics (painkillers, antihistamines, anti-allergic, anti congestants, blocked nasal passages).

- (1) Drowsiness.
- (2) Euphoria.
- (3) Visual disturbances.
- (4) Impaired judgement.

5.22.2.2 Appetite suppressants

- (1) Alteration of higher cognitive skills.
- (2) Depression.

5.22.2.3 Anti-acids

- (1) Difficulty in eye focussing.
- (2) Various nervous system effects.

5.22.2.4 Anti nausea drugs

- (1) Sedation and drowsiness.
- (2) Tremors.
- (3) Low blood pressure.
- (4) Heart rhythm disturbance.
- (5) Dizziness.

5.22.2.5 Anti diarrhoea

- (1) Brain function suppression.
- (2) Visual disturbances.

5.22.2.6 Anti hypertensive drugs (for high blood pressure)

- (1) Heart rate disturbances.

- (2) Dizziness.
- (3) Possible loss of consciousness.

5.22.2.7 Flight environment changes

- (1) Pressure changes
- (2) Temperature changes.
- (3) Hypoxic changes.
- (4) Vestibular function changes (normal turn and bank and G-forces effects on the balance organs).
- (5) Vibration.

5.22.2.8 Social chemical substances

- (1) Nicotine.
- (2) Alcohol.
- (3) Caffeine.

5.22.2.9 Recommendations

- (1) Don't use over the counter medication on flight duty unless you have cleared it with your designated aviation medical examiner.
- (2) Avoid taking different types of medications simultaneously.
- (3) If taking "allowable" medication while on flight duty, monitor your performance and skills continuously and ask colleagues to co-monitor your performance.
- (4) If temporarily on medication which makes grounding mandatory, remember that the body should be clear of all that medicine. This may take several days after the last dosage has been taken.

Notes –

1. EQUIPMENT AND PROCEDURES CRITERIA

Training programme content and delivery must be consistent with the amount and type of equipment carried on the operator's aircraft and the operator's procedures that have been published. This should be as practical as possible.

2. REGULATORY APPROVAL PROCESS

Any organisation conducting cabin crew member training must be approved by the Director in terms of Part 141.

5.23 Definitions

Any word or expression to which a meaning has been assigned in the Act and the Civil Aviation Regulations, bears, when used in the publication, the same meaning unless the context indicates otherwise, and –

- “**anatomy**” means what the body consists of;
- “**barotraumas**” means trauma involving changes in air pressure;
- “**brachial**” means artery on upper inner arm or brachial pressure point;
- “**cardiac arrest**” means a heart that has stopped;
- “**CPR**” means cardio pulmonary resuscitation;
- “**carotid**” means artery in the neck on either side of airway;
- “**cervical**” means neck;
- “**distal**” means a point on an extremity further away from the trunk;
- “**fracture**” means break in the bone;
- “**femoral**” means artery in the groin or femoral pressure point;
- “**gastric**” means stomach;
- “**history**” means what happened before, or to cause the problem;
- “**physiology**” means how the body works;
- “**radial pulse**” means wrist pulse;
- “**respiration**” means breathing;
- “**signs**” means what you see on the person; and
- “**symptoms**” means what the person feels and describes.

64.02.3 THEORETICAL KNOWLEDGE EXAMINATION

1. Examination

An applicant for a cabin crew member licence must pass a written theoretical knowledge examination on –

- (a) safety and emergency procedures –
 - (i) standard safety procedures;
 - (ii) standard emergency procedures; and
 - (iii) cabin crew manual; and
- (b) particulars of aircraft type –
 - (i) aircraft systems;
 - (ii) aircraft exits;
 - (iii) safety and emergency equipment; and
 - (iv) normal, abnormal, alternate and emergency operating limitations relating to safety and emergency equipment.

2. Retesting after failure

- (1) The pass mark for any written examination referred to in CAR 64.02.3 is 75%.
- (2) A candidate who fails with a mark of between 71% and 74%, may apply in writing for a re-mark within 30 days from the date of receiving the examination results, on payment of the appropriate fee. If the re-mark is successful, the fee will be refunded.
- (3) A candidate who fails with a mark of above 68%, may apply to be entered for the following examination sitting.
- (4) A candidate who fails with a mark of between 60% and 68%, has to wait for six months before applying to enter again.
- (5) A candidate who fails with a mark of less than 60%, will have to wait for 12 months before applying to enter again.

64.02.4 SKILL TEST

1. Procedures

The procedures referred to in CAR 64.02.4 are the drills and checks contained in SA-CATS 64.

64.02.5 APPLICATION FOR CABIN CREW MEMBER LICENCE

1. Skills test report

The skill test report that must accompany an application for the issuing of a cabin crew member licence is contained in the appropriate form in the SACAA website.

SA-CATS 65 Air Traffic Service Personnel Licensing

List of Technical Standards

65.01.5 MAXIMUM HOURS OF DUTY

- 1. Maximum hours of duty

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65.09.8 PRIVILEGES OF APPROACH CONTROL RATING

1. Requirements and standards

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1. Entry level requirements
2. Course aim
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5. Theoretical training
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65.10.8 PRIVILEGES OF AREA CONTROL RATING

1. Requirements and standards

65.11.2 TRAINING

1. Entry level requirements
2. Course aim
3. Course outcome
4. Licensing
5. Theoretical training
6. Practical simulator training
7. Examination and pass requirements
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9. Syllabus

65.11.8 PRIVILEGES OF APPROACH CONTROL (RADAR) RATING

1. Requirements and standards

65.12.2 TRAINING

1. Entry level requirements
2. Course aim
3. Course outcome
4. Licensing
5. Theoretical training
6. Practical simulator training
7. Examination and pass requirements
8. Validation training
9. Syllabus

65.12.8 PRIVILEGES OF AREA CONTROL (RADAR) RATING

1. Requirements and standards

65.01.5 MAXIMUM HOURS OF DUTY

1. Maximum hours of duty

- (1) The maximum hours of duty of air traffic service personnel are governed by the Basic Conditions of Employment Act, 1983 (Act No. 3 of 1983): Provided that in the case of an air traffic controller –

- (a) a shift on operational duty may not exceed eight hours including meal intervals;
 - (b) the aggregate periods of operational duty, including such duty in overtime, may not exceed 180 hours in any shift cycle;
 - (c) the duty time referred to in subparagraph (1)(a) may be extended by a maximum of three hours of overtime to a maximum of 10 hours overtime per week.
- (2) Subject to subparagraph (6), the number of shifts to be worked by an air traffic controller or an air traffic service assistant in any shift cycle may not exceed 22 shifts.
 - (3) An air traffic controller or an air traffic service assistant must have been free of any duty for at least 10 hours before the commencement of any period of operational duty.
 - (4) Upon the conclusion of a period of night duty, an air traffic controller or an air traffic service assistant is entitled to an interval of at least 24 hours before the commencement of the next period of operational duty.
 - (5) An air traffic controller or an air traffic service assistant may not be required to work more than seven successive shifts of operational duty without an interval of at least 24 hours before the commencement of the next period of operational duty.
 - (6) The number of shifts in any shift cycle referred to in subparagraph (2), may be extended by two additional shifts to 24 shifts if unforeseen circumstances require such extension: Provided that –
 - (a) the extension must be reported in writing to the Director by the air traffic controller or the air traffic service assistant concerned and his or her employer within 30 days from the date on which the extension occurred, stating the reason for such extension; and
 - (b) the duration of such additional shifts may not be extended beyond eight hours per shift through overtime.
 - (7) If the Director is of the opinion that the extension of the number of shifts referred to in subparagraph (6) may jeopardise aviation safety, the Director may take the appropriate steps which he or she deems necessary to prevent the recurrence of such extension.
 - (8) The form in which the reporting referred to in subparagraph (6)(a) must be done, is form CA172-18.

65.01.9 DESIGNATION OF VALIDATION EXAMINERS AND RATING ASSESSMENT EXAMINERS

- 1. **Conditions, rules, requirements, procedures or standards for designation of validation examiner (operational)**
 - (a) The appointee must hold a South African ATS licence with the appropriate valid rating(s).
 - (b) Such an appointee must have validated the rating(s) referred to in paragraph (a) at a South African ATSU, and have exercised the privileges of such rating(s) for a period of not less than two years per rating.
 - (c) Such an appointee should preferably be the standards officer of the relevant service provider as referred to in regulation 172.03.3(1)(b).
The appointee must be found suitable, and be appointed by the Director in accordance with regulation 65.01.9(1)(a).
- 2. **Conditions, rules, requirements, procedures or standards for designation of rating assessment examiner (training organisation)**
 - (a) The appointee must hold or have held a South African ATS licence with the rating(s).
 - (b) Such an appointee must have validated the rating (s) referred to in (a) at a South African ATSU, and have exercised the privileges of such rating(s) for a period of not less than two years per rating.
 - (c) Such an appointee should preferably be the standards officer of the relevant service provider as referred to in regulation 172.03.3(1)(b).
The appointee must be found suitable, and be appointed by the Director in accordance with regulation 65.01.9(1)(b).

65.02.2 TRAINING

1. Applicability

The following training standards apply to the issuing of –

- (a) an air traffic service licence;
- (b) an air traffic service assistant rating;
- (c) an air traffic service assistant (coordinator) rating;
- (d) an air traffic service assistant (clearance delivery) rating;
- (e) an air traffic service assistant (flight information service) rating; and
- (f) an air traffic service assistant (aerodrome flight information service) rating.

2. Entry level requirements

- (1) Age: minimum 17 years on commencing training.
- (2) Educational qualifications –
 - (a) Matriculation/senior Certificate with exemption or equivalent qualification.
 - (b) Mathematics, English, Science and Geography recommended.
- (3) Language
The candidate must have sufficient ability in reading, speaking and understanding the English language.

3. Course aim

The aim of ab initio training for air traffic controllers is to provide the candidate with the necessary knowledge, skills and attitudes to enable him/her to undertake AIS clerical duties in support of AIS officers and technical officers and/or to obtain an ATS licence with one, more than one or all the following ratings –

- (a) Air traffic service assistant
- (b) Air traffic service assistant (coordinator)
- (c) Air traffic service assistant (clearance delivery)
- (d) Air traffic service assistant (flight information service)
- (e) Air traffic service assistant (aerodrome flight information service)

4. Course outcome

On completion of the ab initio training for air traffic controllers, the candidate will have the necessary knowledge and skills to commence operational and clerical AIS duties in support of AIS officers and technical officers and/or validation training in one, more than one or all of the following ratings –

- (a) Air traffic service assistant
- (b) Air traffic service assistant (coordinator)
- (c) Air traffic service assistant (clearance delivery)
- (d) Air traffic service assistant (flight information service)
- (e) Air traffic service assistant (aerodrome flight information service)

5. Licensing

On successful completion of all training pertaining to a specific rating, the Director will issue an ATS licence with the appropriate rating. Endorsement of the validation pertaining to the specific rating will only be done on successful completion of such validation training.

6. Theoretical training

The ab initio training course for air traffic controllers will consist of the following theoretical modules –

- (a) Aerodynamics
On completion of this module, the candidate will have a basic knowledge of aerodynamics to enable him/her to understand the operations and performance of aircraft and those factors influencing such performance and operations.
- (b) Aircraft instruments, navigation and approach aids
On completion of this module the candidate will have the necessary knowledge of the principles that are applicable to the functioning of aircraft instruments, navigation and approach aids.
- (c) Air law

- On completion of this module the candidate will have the necessary knowledge of national air law and its application relating to personnel licensing, aerodromes and aircraft operations.
- (d) AIS general
On completion of this module the candidate will have the necessary knowledge of the specific documentation pertaining to AIS in order to effectively assist in the provision of AIS.
 - (e) AIS theory and procedures
On completion of this module the candidate will have an extensive knowledge of all the theoretical aspects and procedures pertaining to the provision of AIS in order to apply them in the execution of the operational and clerical duties of AIS.
 - (f) ATC theory and procedures
On completion of this module the candidate will be able to display the necessary knowledge on all aspects relating to the practices and procedures in the provision of air traffic services.
 - (g) International Civil Aviation Organisation (ICAO) procedures and documents
On completion of this module the candidate will have a basic knowledge of the ICAO and selected operating mechanisms.
 - (h) Meteorology
On completion of this module the candidate will have sound knowledge of various aspects of meteorology affecting aircraft operations and will be able to observe weather, interpret, assess and relay information provided by meteorological offices or other authorised sources.
 - (i) Navigation and maps
On completion of this module the candidate will have the necessary knowledge in order to –
 - (aa) explain the use of maps and charts in the provision of flight navigation assistance; and
 - (bb) explain and apply variation of selected positions on an aeronautical chart.
 - (j) Radio technical
On completion of this module the candidate will have the necessary knowledge of the operation, limitations and uses of radio and other electronic aids in the provision of air traffic services.
 - (k) Search and rescue
On completion of this module the candidate will have extensive knowledge of the search and rescue practices and procedures and alerting services in order to apply them efficiently while undertaking operational training; and when assisting in the provision of search and rescue and alerting services.
 - (l) Separation standards
On completion of this module the candidate will be able to understand the separation standards applied by ATC, to the extent of solving simple separation problems.
 - (m) Human factors
On completion of this module the candidate will have a basic knowledge of and understanding of the importance of human factors in the ATS workplace.
 - (n) RVSM
On completion of this subject the student will be equipped with the knowledge, skills and attitudes required to provide air traffic services within the designated RVSM and transition airspaces in the AFI region, in accordance with ICAO regional agreements.
 - (o) GNSS
On completion of this subject the student will have knowledge of the current and future satellite navigation components and basic understanding of RNAV GNSS approach segments, associated fixes/waypoints, protected airspace and fix/waypoint naming.

6. Practical simulator training

In order to develop the practical operational skills of the candidate to the required standard, he/she will be required to apply the following procedures and principles in a simulated operational environment as appropriate for the rating being sought –

- (a) Radio telephony procedures
- (b) Co-ordination Service Procedures for ratings issued under regulation 65.04.4
- (c) Clearance Delivery Service Procedures for ratings issued under regulation 65.05.4
- (d) Flight information service procedures for ratings issued under regulation 65.06.4
- (e) Aerodrome flight information service procedures for ratings issued under regulation 65.07.4
- (f) Administrative procedures
- (g) RVSM
- (h) GNSS

7. Examination and pass requirements

- (1) In order to pass the course the candidate must successfully undertake the following examinations to the prescribed standards.

EXAMINATION	REQUIRED PASS MARK
Aerodynamics	70%
Aircraft instruments, navigation and approach aids	70%
Air law	70%
AIS general	70%
AIS theory and procedures	70%
ATC theory and procedures	70%
ICAO, procedures and documents	70%
Meteorology	70%
Navigation and maps	70%
Radio technical	70%
Search and rescue	70%
Separation standards	70%
Human factors	70%
RVSM	70%
GNSS	70%
Simulated operational assessments	70%

- (2) A once-off re-write in any two of the subjects may be permitted, provided that the candidate does not attain less than 20% below the required pass mark on the first attempt. A failure to achieve this will mean immediate failure of the course.
- (3) Re-writes must be undertaken within 14 days of the first failed attempt.
- (4) An average of 70% or more must be attained during the simulated practical assessments. A once-off re-evaluation in any two practical assessments may be allowed and must be undertaken within 14 days of the first failed attempt.

- (5) Recognition of prior learning (RPL) may be accredited to a candidate who has successfully completed the examination requirement for any of the above modules as referred to in TS 65.02.2(5) within the preceding 24 months. Such Candidate may be exempted by a Designated Examiner (DE) from the examination requirement for that specific subject provided the candidate can demonstrate to the DE satisfactory knowledge and skills associated with the subject or credit is given for prior learning as per an ATO's approved training syllabus.

The conditions for an ATO to accredit RPL and the acceptable means for a candidate to demonstrate having satisfactory knowledge and skills to meet the requirements for exemption from the examination/assessment shall be documented in the ATO's Training and Procedures Manual.

8. Validation training

- (1) In order to validate the ATSA ratings the candidate must successfully undertake the following evaluations –
- (a) Progressive practical standards evaluations
 - (b) Final practical standards evaluation
 - (c) Written examinations on all aspects as specified in Station Standing Instructions
 - (d) Satisfy the Director as to his/her competency in the specific rating to be validated.
- (2) In order to pass the validation training the candidate has to be successful in all evaluations.
- (3) In order to successfully validate any of the ATSA ratings, the candidate has to comply with the following –
- (a) Provide the appropriate service, under supervision of an air traffic service instructor (operational), at an ATSU as follows –
 - (i) Air traffic service assistant: at least 50 hours;
 - (ii) ATSA (coordinator): at least 50 hours;
 - (iii) ATSA (clearance delivery): at least 50 hours;
 - (iv) ATSA (flight information service): at least 50 hours;
 - (v) ATSA (aerodrome flight information service): at least 50 hours.
 - (b) Obtain and maintain a sound knowledge of local practices and procedures as specified in Station Standing Instructions.
 - (c) Obtain and maintain a sound knowledge of the function and operation of local instruments and technical aids.

9. Syllabus

The ab initio ATC training course will consist of the following modules:

- (1) Aerodynamics
- (a) Principles of flight
 - (b) Newton's law of motion
 - (c) Lift, drag, weight, thrust (forces)
 - (d) Factors affecting lift
 - (e) Wing shapes
 - (f) Causes of drag
 - (g) Angle of attack, chordline, relative airflow
 - (h) Stalling
- (i) Aileron, elevator, rudder
- (j) Stability, dihedral, sweepback
 - (k) Flap systems, trim, airbrake
 - (l) Aircraft types and identification
 - (m) Aircraft performances
- (2) Aircraft instruments, navigation and approach aids
- (a) The atmosphere

- (b) Pressure instruments
- (c) Gyro/mechanical instruments
- (d) Non-directional beacons
- (e) VHF Omni-directional radio range
- (f) Distance measuring equipment
- (g) Instrument landing system
- (h) Decca navigation system
- (i) Doppler
- (j) Direction finding
- (k) Global positioning system
- (3) Air law
 - (a) Explanation of legal documents
 - (b) Non-application of CAR
 - (c) Duties, powers and functions of Director
 - (d) Designation of authorised officers, inspectors and authorised persons
 - (e) Authority of authorised officers, inspectors and authorised persons
 - (f) Issue of licences, certificates and ratings
 - (g) Flights by night
 - (h) Meteorological reports
 - (i) Public transport category – rules
 - (j) Flying balloons
 - (k) Offences
 - (l) Categories of employment of aircraft
 - (m) Compliance with rules of the air
 - (n) Flight rules
 - (o) Authority of pilot-in-command
 - (p) Pre-flight action
 - (q) Airspace restrictions
 - (r) Negligent or reckless flying
 - (s) Use of liquor, narcotics or drugs
 - (t) Operation on and in the vicinity of aerodrome
 - (u) Helicopter operations
 - (v) Proximity and formation flying
 - (w) Right-of-way rules
 - (x) Minimum safe heights
 - (y) Flight over assemblies of persons
 - (z) Semi-circular rule
 - (aa) Aircraft speeds
 - (bb) Towing, dropping, spraying, etc.
 - (cc) Parachute descents
 - (dd) Simulated instrument flying
 - (ee) Flight instruction
 - (ff) Aerobatics flight
 - (gg) Flight plans
 - (hh) Mandatory radio – controlled/advisory airspace
 - (ii) Reporting positions
 - (jj) Fuel/oil reserves
 - (kk) VFR/VMC
 - (ll) IFR
 - (mm) Light to be displayed by aircraft

- (nn) Search and rescue
 - (oo) Taxi rules
 - (pp) Light endangering aircraft
 - (qq) AFTN services
 - (rr) Accidents investigation
 - (ss) Overflight regulations
- (4) AIS general
- (a) General
 - (b) Scope of information handled by AIS
 - (c) Establishment of a sound organisational base
 - (d) Organisation of structures and resources
 - (e) Publication of aeronautical information
 - (f) Aeronautical fixed services
 - (g) Aeronautical broadcasting services
 - (h) ATS Messages
 - (i) Distress and urgency communication procedures
 - (j) Aerodrome and other landing surfaces
 - (k) Flight documents
- (5) AIS theory and procedures
- (a) Pre and post flight information
 - (b) Airspaces
 - (c) Types of flight
 - (d) Altimeter setting procedures
 - (e) Semi-circular rule
 - (f) Flight plans
 - (g) Flight progress strips
 - (h) Radio telephony procedures, codes and abbreviations
- (6) ATC theory and procedures
- (a) ATC general
 - (b) Altimeter setting procedures (including basic altimetry)
 - (c) ATC clearances and position reports
 - (d) Composition of ATS broadcasts
 - (e) Emergencies: General
 - (f) Aerodrome Control
 - (g) AFIS/CLD/FIS (as appropriate for the rating being sought)
 - (h) ATC responsibilities re radio failure
 - (i) Responsibilities and scope of FIS
 - (j) Administration and documentation
- (7) ICAO, procedures and documents
- (a) Introduction
 - (b) The Five Freedoms of the Air; International Air Services Transit Agreement and International Air Transport Agreement
 - (c) Membership of ICAO
 - (d) Aims and objectives of ICAO
 - (e) Representative bodies of ICAO
 - (f) ICAO publications
 - (g) ICAO publications relevant to AIS
- (8) Meteorology
- (a) Authority, organisation and responsibility for the provision of meteorological services
 - (b) Types of services provided and information for pre-flight briefings

- (c) Meteorological codes and terminology
- (d) Composition of the atmosphere
- (e) Types of cloud
- (f) Fronts
- (g) Wind
- (h) Thunderstorms
- (i) Meteorological instruments
- (j) The atmosphere
- (k) Pressure
- (l) Insulation
- (m) Sublimation
- (n) Visibility
- (o) Winds
- (p) Clouds
- (q) Precipitation
- (9) Navigation and maps
 - (a) Frequencies
 - (b) Navigation aids
 - (c) General
 - (d) Computer
- (10) Radio technical
 - (a) Characteristics
 - (b) Frequencies
 - (c) Antennae and microphones
- (11) Search and rescue
Practices and procedures
- (12) Separation standards
 - (a) Provision of standard separation
 - (b) Longitudinal separation
 - (c) Holding aircraft vertical crossing
- (13) Human factors
 - (a) Introduction to human factors and resource management
 - (b) Sensory and Perceptual mechanisms
 - (c) Errors
 - (d) Human factors and team resource management within the organisational quality/safety management system
 - (e) Stress Management
- (14) Simulated operational assessments
 - (a) Practical application of knowledge and skills.
- (15) RVSM
 - (a) RVSM in the AFI region
 - (b) RVSM Approval process
 - (c) Aircraft requirements and approval
 - (d) Safety monitoring
 - (e) Flight planning
 - (f) Operational procedures
 - (g) R/T Phraseology.
- (16) GNSS
 - (a) Satellite Navigation System
 - (b) GNSS receiver and augmentation

- (c) GNSS equipment operational requirement and approval
- (d) GNSS Approach
- (e) ATC separation based on GNSS
- (f) Other GNSS Procedures
- (g) R/T Phraseology.

65.02.3 THEORETICAL KNOWLEDGE EXAMINATION

1. Written examination

The written examination referred to in CAR 65.02.3, is the written examination contained in paragraph 7 of TS 65.02.2.

65.02.7 PRIVILEGES

1. Requirements and standards

The requirements and standards referred to in CAR 65.02.7(a), are the Standards and Procedures for the Procedures for the Provision of Service referred to in TS 172.03.12 in Document SA-CATS 172.

65.03.2 TRAINING

1. Training standards

The training standards for the issuing of an air traffic service assistant rating referred to in CAR 65.03.2, are the training standards contained in TS 65.02.2.

65.03.8 PRIVILEGES OF AIR TRAFFIC SERVICE ASSISTANT RATING

1. Requirements and standards

The requirements and standards referred to in CAR 65.03.8(a), are the procedures for the provision of service contained in Document SA-CATS 172.

65.04.2 TRAINING

1. Training standards

The training standards for the issuing of an air traffic service assistant (coordinator) rating referred to in CAR 65.04.2, are the training standards contained in TS 65.02.2.

65.04.8 PRIVILEGES OF AIR TRAFFIC SERVICE ASSISTANT (COORDINATOR) RATING

1. Requirements and standards

The requirements and standards referred to in CAR 65.04.8(a), are the requirements and standards contained Document SA-CATS 172.

65.05.2 TRAINING

1. Training standards

The training standards for the issuing of an air traffic service assistant (clearance delivery) rating referred to in CAR 65.05.2, are the training standards contained in TS 65.02.2.

65.05.8 PRIVILEGES OF AIR TRAFFIC SERVICE ASSISTANT (CLEARANCE DELIVERY) RATING

1. Requirements and standards

The requirements and standards referred to in CAR 65.05.8(a), are the procedures for the provision of service contained Document SA-CATS 172.

65.06.2 TRAINING

1. Training standards

The training standards for the issuing of an air traffic service assistant (flight information service) rating referred to in CAR 65.06.2, are the training standards contained in TS 65.02.2.

65.06.8 PRIVILEGES OF AIR TRAFFIC SERVICE ASSISTANT (FLIGHT INFORMATION SERVICE) RATING

1. Requirements and standards

The requirements and standards referred to in CAR 65.06.8(a), are the procedures for the provision of service contained in Document SA-CATS 172.

65.07.2 TRAINING

1. Training standards

The training standards for the issuing of an air traffic service assistant (aerodrome flight information service) rating referred to in CAR 65.07.2, are the training standards contained in TS 65.02.2.

65.07.8 PRIVILEGES OF AIR TRAFFIC SERVICE ASSISTANT (AERODROME FLIGHT INFORMATION SERVICE) RATING

1. Requirements and standards

The requirements and standards referred to in CAR 65.07.8(a), are the procedures for the provision of service contained Document SA-CATS 172.

65.08.2 TRAINING

The following training standards apply to an aerodrome control rating:

1. Entry level requirements

- (1) Age: minimum 19 years
- (2) The candidate must hold a valid air traffic service licence.

2. Course aim

The aim of the Aerodrome Control Course is to provide the candidate with the necessary knowledge, skills and attitudes to enable him/her to obtain an aerodrome control rating.

3. Course outcome

On completion of the Aerodrome Control Course the candidate will have the necessary knowledge and skills to commence validation training for aerodrome control.

4. Licensing

On completion of the Aerodrome Control Course, the Director will issue an aerodrome control rating. Endorsement of the aerodrome control validation will only be done on successful completion of aerodrome control validation training.

5. Theoretical training

The Aerodrome Control Course consists of the following theoretical modules –

- (1) Aerodrome control procedures
On completion of this module, the candidate will have the necessary knowledge with respect to aerodrome control practices and procedures, in order to apply them efficiently during the practical simulator training.
- (2) Air law
On completion of this module, the candidate will be able to display the necessary knowledge of national air law relating to personnel licensing, aerodromes and aircraft operations in order to provide an aerodrome control service to the required standard.
- (3) Theory and procedures
On completion of this module, the candidate will be able to display the necessary knowledge on all aspects relating to the practices and procedures in the provision of air traffic services.
- (4) Navigation
On completion of this module, the candidate will have the necessary knowledge in order to –
 - (a) effectively utilise maps and charts to provide flight navigation assistance;
 - (b) use advanced plotting methods to plot aircraft positions; and
 - (c) interpret flight plans.
- (5) Meteorology
On completion of this module, the candidate will have a sound knowledge of various aspects of meteorology affecting aircraft operations in the vicinity of an aerodrome and will be able to observe weather, interpret, assess and relay information provided by meteorological offices or other authorised sources.
- (6) Technical and navigation aids

On completion of this module, the candidate will have the necessary knowledge of the principles that are applicable to the operation and functioning of technical instruments, radios and electronic navigation aids used in the provision of an aerodrome control service.

(7) Search and rescue

On completion of this module, the candidate will have the necessary knowledge of the search and rescue practices and procedures and alerting services in order to apply them efficiently in the provision of an aerodrome control service and when assisting as a search mission coordinator.

6. Practical simulator training

In order to develop the practical controlling skills of the candidate to the required standard, he/she will be required to apply the following procedures and principles in a simulated operational environment –

- (a) Radio telephony procedures
- (b) Aerodrome control procedures
- (c) Separation standards
- (d) Emergency procedures
- (e) Flight progress strip marking

7. Examination and pass requirements

(1) In order to pass the course the candidate must successfully undertake the following examinations to the prescribed standards –

EXAMINATION	REQUIRED PASS MARK
Aerodrome control	70%
Air law	70%
ATC theory and procedures	70%
Navigation	70%
Meteorology	60%
Technical and navigation aids	60%
Search and rescue	70%
Simulated aerodrome control assessments	70%

(2) A once-off re-write in any two of the subjects may be permitted, provided that the candidate does not attain less than 20% below the required pass mark on the first attempt.

(3) Re-writes must be undertaken within 14 days of the first failed attempt.

(4) An average of 70% or more must be attained during the simulated practical assessments. A once-off re-evaluation in any two practical assessments may be allowed and must be undertaken within 14 days of the first failed attempt.

(5) Recognition of prior learning (RPL) may be accredited to a candidate who has successfully completed the examination requirement for any of the above modules as referred to in 65.08.2(5) within the preceding 48 months and who has held a valid Air Traffic Service License within the preceding 24 months. Such Candidate may be exempted by a Designated Examiner (DE) from the examination requirement for that specific subject provided the candidate can demonstrate to the DE satisfactory knowledge and skills associated with the subject or credit is given for prior learning as per an ATO's approved training syllabus.

The conditions for an ATO to accredit RPL and the acceptable means for a candidate to demonstrate having satisfactory knowledge and skills to meet the requirements for exemption from the examination/assessment shall be documented in the ATO's Training and Procedures Manual.

8. Validation training

- (1) In order to validate the aerodrome control rating, the candidate must successfully undertake the following evaluations –
 - (a) Progressive practical standards evaluations
 - (b) Final practical standards evaluation
 - (c) Written examinations on all aspects as specified in Station Standing Instructions
 - (d) Satisfy the Director as to his/her competency in the specific rating to be validated.
- (2) In order to pass the validation training, the candidate has to be successful in all evaluations.
- (3) In order to successfully validate the aerodrome control rating, the candidate has to comply with the following –
 - (a) Provide an aerodrome control service, under supervision of an air traffic service instructor (operational), at an ATSU for at least 100 hours but not more than 200 hours, 50 percent of which may be done on an accredited simulator.
 - (b) Obtain and maintain a sound knowledge of local practices and procedures as specified in Station Standing Instructions.
 - (c) Obtain and maintain a sound knowledge of the function and operation of local instruments and technical aids.

9. Syllabus

The aerodrome control course will consist of the following modules:

- (1) ATC theory and procedures
 - (a) Communications
 - (b) Responsibilities in respect of military aircraft
 - (c) Approach control
 - (d) Approach control procedures
 - (e) Separation standards used by approach
 - (f) Delaying actions
 - (g) Emergencies
 - (h) Liaison
 - (i) Instrument and approach procedures
- (2) Aerodrome control
 - (a) General
 - (b) Extent of responsibility
 - (c) Loss of communication
 - (d) Runways and circuits
 - (e) Control of aerodrome traffic, vehicles and persons
 - (f) Aerodrome traffic separation
 - (g) Rules applicable to pilots
 - (h) Aerodrome and lighting serviceabilities
 - (i) Aerodrome physical
 - (j) Runway markings
 - (k) Taxiway markings
 - (l) Lighting aids
 - (m) Runway lighting
 - (n) Obstruction restriction, removal and marking
- (3) Air law
 - (a) Rules of the air
 - (b) Authority of pilot-in-command of an aircraft
 - (c) Pre-flight action
 - (d) Airspace restrictions
 - (e) Prohibited areas
 - (f) Restricted areas

- (g) Negligent and reckless flying
- (h) Consumption of alcohol or drugs
- (i) Operation on and in the vicinity of an aerodrome
- (j) Helicopter operations
- (k) Proximity
- (l) Right-of-way
- (m) Minimum safe heights
- (n) Flights over open-air assemblies of persons
- (o) Aircraft speed
- (p) Towing objects
- (q) Dropping objects, spraying or dusting
- (r) Picking up objects
- (s) Parachute descents
- (t) Simulated instrument flights
- (u) Flight instruction
- (v) Acrobatic flight (including spinning)
- (w) Lights to be displayed by aircraft
- (x) Visual distress and urgency signals
- (y) Ground and light signals for control of aerodrome traffic
- (z) Taxi rules
- (aa) Lights which endanger
- (4) Navigation
- (a) Direction
 - (b) Variation and deviation
 - (c) Units of measurement
 - (d) Latitude and longitude
 - (e) Georef system
 - (f) Time
 - (g) Speed and velocity
 - (h) Triangle and velocity
 - (i) Air pilot
 - (j) One-in-sixty rule
 - (k) Scale
 - (l) Map construction
 - (m) Plotting charts
 - (n) Special purpose maps and charts
 - (o) Relief
 - (p) Computer
 - (q) Elementary plotting
 - (r) Vector triangles
 - (s) Advanced plotting (practical)
 - (t) GNSS
- (5) Meteorology
 - (a) Introduction
 - (b) Wind
 - (c) Clouds
 - (d) Thunderstorms
 - (e) Visibility
 - (f) Ocean currents
 - (g) Climate of south Africa

- (6) Search and rescue (SAR)
 - (a) The search and rescue organisation
 - (b) Types of SAR and flights to which they pertain
 - (c) Declaration of phases when emergency is known
 - (d) General Administration
- (7) Technical and navigation aids
 - (a) Workings, advantages and disadvantages of VOR, ILS, NDB, DME, VDF, TACAN, VORTAC, GPS
 - (b) VDF procedure
- (8) Aerodrome control practical simulator training
Practical application of knowledge and skills.

65.08.8 PRIVILEGES OF AERODROME CONTROL RATING

1. Requirements and standards

The requirements and standards referred to in CAR 65.08.8(a), are the procedures for the provision of service contained Document SA-CATS 172.

65.09.2 TRAINING

The following training standards apply to an approach control rating:

1. Entry level requirements

- (1) Age: minimum 21 years
- (2) The candidate must hold a valid air traffic service licence.

2. Course aim

The aim of the Approach Control Course is to provide the candidate with the necessary knowledge, skills and attitudes to enable him/her to obtain an approach control rating.

3. Course outcome

On completion of the Approach Control Course, the candidate will have the necessary knowledge and skills to commence validation training for approach control.

4. Licensing

On completion of the Approach Control Course, the Director will issue an approach control rating. Endorsement of the Approach Control validation will only be done on successful completion of approach control validation training.

5. Theoretical training

The approach control course consists of the following theoretical modules –

- (1) General ATC procedures
On completion of this module, the candidate will be able to display the necessary knowledge of ATS relevant to approach control to enable him/her to efficiently provide the ATS required of an approach controller.
- (2) Approach control
On completion of this module, the candidate will have the necessary knowledge with respect to approach control practices and procedures, in order to apply them efficiently during the practical simulator training.
- (3) Separation standards
On completion of this module, the candidate will have an extensive knowledge of separation standards as applied in the provision of an approach control service, enabling him/her to provide an approach control service applying the correct separation standards.
- (4) Meteorology
On completion of this module, the candidate will have a sound knowledge of various aspects of meteorology pertinent to approach control and affecting aircraft operations under the jurisdiction of approach control.

6. Practical simulator training

In order to develop the practical controlling skills of the candidate to the required standard, he/she will be required to apply the following procedures and principles in a simulated operational environment –

- (a) Radio telephony procedures
- (b) Approach control procedures
- (c) Separation standards
- (d) Emergency procedures
- (e) Emergency progress strip marking

7. Examination and pass requirements

- (1) In order to pass the course, the candidate must successfully undertake the following examinations to the prescribed standards –

EXAMINATION	REQUIRED PASS MARK
General ATC procedures	70%
Approach control	70%
Separation standards	70%
Meteorology	70%
Simulated procedural approach assessments	70%

- (2) A once-off re-write in any two of the subjects may be permitted, provided that the candidate does not attain less than 20% below the required pass mark on the first attempt.
- (3) Re-writes must be undertaken within 14 days of the first failed attempt.
- (4) An average of 70% or more must be attained during the simulated practical assessments. A once-off re- evaluation in any two practical assessments may be allowed and must be undertaken within 14 days of the first failed attempt.
- (5) Recognition of prior learning (RPL) may be accredited to a candidate who has successfully completed the examination requirement for any of the above modules as referred to in 65.09.2(5) within the preceding 48 months and who has held a valid Air Traffic Service License with in the preceding 24 months. Such Candidate may be exempted by a Designated Examiner (DE) from the examination requirement for that specific subject provided the candidate can demonstrate to the DE satisfactory knowledge and skills associated with the subject or credit is given for prior learning as per an ATO’s approved training syllabus.

The conditions for an ATO to accredit RPL and the acceptable means for a candidate to demonstrate having satisfactory knowledge and skills to meet the requirements for exemption from the examination/assessment shall be documented in the ATO’s Training and Procedures Manual.

8. Validation training

- (1) In order to validate the aerodrome control rating, the candidate must successfully undertake the following evaluations –
 - (a) Progressive practical standards evaluations
 - (b) Final practical standards evaluation
 - (c) Written examinations of all aspects as specified in Station Standing Instructions
- (2) In order to pass the validation training, the candidate has to be successful in all evaluations.
- (3) In order to successfully validate any of the approach control ratings, the candidate has to comply with the following –
 - (a) Provide an approach control service, under supervision of an air traffic service instructor (operational), at an ATSU for at least 200 hours but not more than 400 hours, 50 percent of which may be done on an accredited simulator.
 - (b) Obtain and maintain a sound knowledge of local practices and procedures as specified in Station Standing Instructions.
 - (c) Obtain and maintain a sound knowledge of the function and operation of local instruments and technical aids.

9. Syllabus

The approach control course will consist of the following modules –

- (1) General ATC procedures
 - (a) Standard R/T procedures and inter unit phraseologies
 - (b) Communication failure procedures
 - (c) Radio failure in respect of VFR flights
 - (d) Interception of civilian aircraft
 - (e) Descents by supersonic aircraft due to solar cosmic radiation
 - (f) Division and classification of airspace
 - (g) ATC clearances
 - (h) Emergencies
 - (i) Diversion procedures
 - (j) Flight progress strips
 - (k) SAR procedures associated with approach and aerodrome control
- (2) Approach control
 - (a) Provision of approach control services
 - (b) Responsibilities of approach control
 - (c) Coordination with other units
 - (d) Expected approach time
 - (e) Onward clearance time
 - (f) Control and communications
 - (g) Procedures for arriving aircraft
 - (h) Types of approach
 - (i) Suspension and resumption of VFR operations
- (3) Separation standards
 - (a) Introduction and application
 - (b) Vertical separation
 - (c) Horizontal separation
 - (d) Lateral separation
 - (e) Longitudinal separation based on time
 - (f) Arrival/departure separation
 - (g) Sector separation
- (4) Meteorology
 - (a) General circulation
 - (b) Winds
 - (c) Synoptic meteorology
 - (d) Cloud and weather
 - (e) Meteorological flying hazards
 - (f) Observations and conclusions
 - (g) Meteorological codes
- (5) Approach control practical simulator training
Practical application of knowledge and skills.

65.09.8 PRIVILEGES OF APPROACH CONTROL RATING

1. Requirements and standards

The requirements and standards referred to in CAR 65.09.8(a), are the procedures for the provision of service contained Document SA-CATS 172.

65.10.2 TRAINING

The following training standards apply to an area control rating:

1. Entry level requirements

- (1) Age: minimum 21 years
- (2) The candidate must hold a valid air traffic service licence.

2. Course aim

The aim of the Area Control Course is to provide the candidate with the necessary knowledge, skills and attitudes to enable him/her to obtain an area control rating.

3. Course outcome

On completion of the Area Control Course, the candidate will have the necessary knowledge and skills to commence validation training for area control.

4. Licensing

On completion of the Area Control Course, the Director will issue an area control rating. Endorsement of the area control validation will only be done on successful completion of area control validation training.

5. Theoretical training

The area control course consists of the following theoretical modules –

- (1) General ATC procedures
On completion of this module, the candidate will be able to display the necessary knowledge of ATS relevant to area control to enable him/her to efficiently provide the ATS required of an area controller.
- (2) Area control
On completion of this module, the candidate will have the necessary knowledge with respect to area control practices and procedures, in order to apply them efficiently during the practical simulator training.
- (3) Separation standards
On completion of this module, the candidate will have an extensive knowledge of separation as applied in the provision of an area control service, enabling him/her to provide an area control service applying the correct separation standards.
- (4) Meteorology
On completion of this module, the candidate will have a sound knowledge of various aspects of meteorology pertinent to area control and affecting aircraft operations under the jurisdiction of area control.

6. Practical simulator training

In order to develop the practical controlling skills of the candidate to the required standard, he/she will be required to apply the following procedures and principles in a simulated operational environment –

- (a) Radio telephony procedures
- (b) Area control procedures
- (c) Separation standards
- (d) Emergency procedures
- (e) Flight progress strip marking

7. Examination and pass requirements

- (1) In order to pass the course, the candidate must successfully undertake the following examinations to the prescribed standards –

EXAMINATION	REQUIRED PASS MARK
General ATC procedures	70%
Area control	70%
Separation standards	70%
Meteorology	60%
Simulated operational assessments	70%

- (2) A once-off re-write in any two of the subjects may be permitted, provided that the candidate does not attain less than 20% below the required pass mark on the first attempt.

- (3) Re-writes must be undertaken within 14 days of the first failed attempt.
- (4) An average of 70% or more must be attained during the simulated practical assessments. A once-off re- evaluation in any two practical assessments may be allowed and must be undertaken within 14 days of the first failed attempt.
- (5) Recognition of prior learning (RPL) may be accredited to a candidate who has successfully completed the examination requirement for any of the above modules as referred to in 65.10.2 (5) within the preceding 48 months and who has held a valid Air Traffic Service License within the preceding 24 months. Such Candidate may be exempted by a Designated Examiner (DE) from the examination requirement for that specific subject provided the candidate can demonstrate to the DE satisfactory knowledge and skills associated with the subject or credit is given for prior learning as per an ATO's approved training syllabus.
The conditions for an ATO to accredit RPL and the acceptable means for a candidate to demonstrate having satisfactory knowledge and skills to meet the requirements for exemption from the examination/assessment shall be documented in the ATO's Training and Procedures Manual.

8. Validation training

- (1) In order to validate the area control rating, the candidate must successfully undertake the following evaluations –
 - (a) Progressive practical standards evaluations
 - (b) Final practical standards evaluation
 - (c) Written examinations on all aspects as specified in Station Standing Instructions
- (2) In order to pass the validation training, the candidate has to be successful in all evaluations.
- (3) In order to successfully validate the area control rating, the candidate has to comply with the following –
 - (a) Provide an area control service, under supervision of an air traffic service instructor (operational), at an ATSU for at least 200 hours but not more than 300 hours, 50 percent of which may be done on an accredited simulator.
 - (b) Obtain and maintain a sound knowledge of local practices and procedures as specified in Station Standing Instructions.
 - (c) Obtain and maintain a sound knowledge of the function and operation of local instruments and technical aids.

9. Syllabus

The area control course will consist of the following modules –

- (1) General ATC procedures
 - (a) Standard R/T procedures and inter unit phraseologies
 - (b) Communication failure procedures
 - (c) Radio failure in respect of VFR flights
 - (d) Interception of civilian aircraft
 - (e) Descents by supersonic aircraft due to solar cosmic radiation
 - (f) Division and classification of airspace
 - (g) ATC clearances
 - (h) Emergencies
 - (i) Diversion procedures
 - (j) Flight progress strips
 - (k) SAR procedures associated with approach and aerodrome control
- (2) Area control
 - (a) Introduction
 - (b) Coordination
 - (c) Coordination between area control and approach
 - (d) Release and transfer of control and communication

- (e) Procedures for overflying flights, flying through remote TMAs and CTRs (IFR and VFR)
- (f) Information to be given to aircraft on first contact
- (g) Air traffic advisory service
- (3) Separation standards
 - (a) Introduction and application
 - (b) Vertical separation
 - (c) Horizontal separation
 - (d) Lateral separation
 - (e) Longitudinal separation based on time
- (4) Meteorology
 - (a) General circulation
 - (b) Winds
 - (c) Synoptic meteorology
 - (d) Cloud and weather
 - (e) Meteorological flying hazards
 - (f) Observations and conclusions
 - (g) Meteorological codes
- (5) Area control practical simulator training
Practical application of knowledge and skills.

65.10.8 PRIVILEGES OF AREA CONTROL RATING

1. Requirements and standards

The requirements and standards referred to in CAR 65.10.8(a), are the procedures for the provision of services contained in Document SA-CATS 172.

65.11.2 TRAINING

The following training standards apply to an approach control (surveillance) rating:

1. Entry level requirements

- (1) Age: minimum 21 years
- (2) The candidate must hold a valid air traffic service licence.

2. Course aim

The aim of the Approach Control (Surveillance) Course is to provide the candidate with the necessary knowledge, skills and attitudes to enable him/her to obtain an approach control (radar) rating.

3. Course outcome

On completion of the Approach Control (Surveillance) Course, the candidate will have the necessary knowledge and skills to commence validation training for approach control (radar).

4. Licensing

On completion of the Approach Control (Surveillance) Course, the Director will issue an Approach Control (Surveillance) Rating. Endorsement of the Approach Control (Surveillance) validation will only be done on successful completion of approach control (surveillance) validation training.

5. Theoretical training

The approach control (surveillance) course consists of the following theoretical modules –

- (1) General ATC procedures
On completion of this module, the candidate will be able to display the necessary knowledge of ATS relevant to approach control to enable him/her to efficiently provide the ATS required of an approach controller.
- (2) Approach control

On completion of this module, the candidate will have the necessary knowledge with respect to approach control practices and procedures, in order to apply them efficiently during the practical simulator training.

(3) Surveillance theory and procedures

On completion of this module, the candidate will have an extensive knowledge of procedures and practices applied in the provision of an approach control (radar) service, enabling him/her to provide an approach control (surveillance) service applying the correct procedures and practices.

(4) Surveillance technical

On completion of this module, the candidate will have a sound knowledge of the operations and limitations of surveillance equipment and its application to air traffic control, including SSR.

(5) Meteorology

On completion of this module, the candidate will have a sound knowledge of various aspects of meteorology pertinent to approach control and affecting aircraft operations under the jurisdiction of approach control.

6. Practical simulator training

In order to develop the practical controlling skills of the candidate to the required standard, he/she will be required to apply the following procedure and principles in a simulated operational environment –

- (a) Radio telephony procedures
- (b) Approach control (surveillance) procedures
- (c) Separation standards
- (d) Emergency procedures
- (e) Flight progress strip marking

7. Examination and pass requirements

(1) In order to pass the course, the candidate must successfully undertake the following examinations to the prescribed standards –

EXAMINATION	REQUIRED MARK	PASS
General ATC procedures	70%	
Approach control	70%	
Surveillance theory and procedures	70%	
Surveillance technical	60%	
Meteorology	60%	
Simulated approach assessments	70%	

(2) A once-off re-write in any two of the subjects may be permitted, provided that the candidate does not attain less than 20% below the required pass mark on the first attempt.

(3) Re-writes must be undertaken within 14 days of the first failed attempt.

(4) An average of 70% or more must be attained during the simulated practical assessments. A once-off re- evaluation in any two practical assessments may be allowed and must be undertaken within 14 days of the first failed attempt.

(5) Recognition of prior learning (RPL) may be accredited to a candidate who has successfully completed the examination requirement for any of the above modules as referred to in 65.11.2(5) within the preceding 48 months and who has held a valid Air Traffic Service License within the preceding 24 months. Such Candidate may be exempted by a Designated Examiner (DE) from the examination requirement for that specific subject provided the candidate can demonstrate to the DE satisfactory knowledge and skills associated with the subject or credit is given for prior learning as per an ATO's approved training syllabus.

The conditions for an ATO to accredit RPL and the acceptable means for a candidate to demonstrate having satisfactory knowledge and skills to meet the requirements for exemption from the examination/assessment shall be documented in the ATO's Training and Procedures Manual.

8. Validation training

- (1) In order to validate the approach control (surveillance) rating, the candidate must successfully undertake the following evaluations –
 - (a) Progressive practical standards evaluations
 - (b) Final practical standards evaluation
 - (c) Written examinations on all aspects as specified in Station Standing Instructions
- (2) In order to pass the validation training, the candidate has to be successful in all evaluations.
- (3) In order to successfully validate the approach control (surveillance) rating, the candidate has to comply with the following –
 - (a) Provide an approach control (surveillance) service, under supervision of an air traffic service instructor (operational), at an ATSU for at least 50 hours but not more than 150 hours, 50percent of which may be done on an accredited simulator.
 - (b) Obtain and maintain a sound knowledge of local practices and procedures as specified in Station Standing Instructions.
 - (c) Obtain and maintain a sound knowledge of the function and operation of local instruments and technical aids.

9. Syllabus

The approach control (surveillance) course will consist of the following modules –

- (1) General ATC procedures
 - (a) Standard R/T procedures and inter unit phraseologies
 - (b) Communication failure procedures
 - (c) Radio failure in respect of VFR flights
 - (d) Interception of civilian aircraft
 - (e) Descents by supersonic aircraft due to solar cosmic radiation
 - (f) Division and classification of airspace
 - (g) ATC clearances
 - (h) Emergencies
 - (i) Diversion procedures
 - (j) Flight progress strips
 - (k) SAR procedures associated with approach and aerodrome control
- (2) Approach control
 - (a) Provision of approach control services
 - (b) Responsibilities of approach control
 - (c) Coordination with other units
 - (d) Expected approach time
 - (e) Onward clearance time
 - (f) Control and communications
 - (g) Procedures for arriving aircraft
 - (h) Types of approach
 - (i) Suspension and resumption of VFR operations
- (3) Surveillance theory and procedures
 - (a) Use of surveillance in the air traffic control service
 - (b) Surveillance separation minima
 - (c) SSR operations
 - (d) Identification, vectoring and transfer of aircraft
 - (e) Terrain clearance and emergencies

- (f) Failure of airborne equipment
 - (g) Combined surveillance -procedural
 - (h) Use of surveillance in the approach control service
 - (i) General surveillance approach procedures
 - (j) Final approach procedures
 - (k) Surveillance phraseologies
- (4) Meteorology
- (a) General circulation
 - (b) Winds
 - (c) Synoptic meteorology
 - (d) Cloud and weather
 - (e) Meteorological flying hazards
 - (f) Observations and conclusions
 - (g) Meteorological codes
- (5) Surveillance technical
- (a) Surveillance – How does it work?
 - (b) Prefix summary
 - (c) Frequency bands
 - (d) Radiated power in free space
 - (e) Primary surveillance system
 - (f) SSR development
 - (g) Circular polarisation
 - (h) MTI-Radar
 - (i) Doppler effect
 - (j) Tangential fade
- (6) Approach control (surveillance) practical simulator training
Practical application of knowledge and skills.

65.11.8 PRIVILEGES OF APPROACH CONTROL (SURVEILLANCE) RATING

1. Requirements and standards

The requirements and standards referred to in CAR 65.11.8(a), are the procedures for the provision of service contained Document SA-CATS 172.

65.12.2 TRAINING

The following training standards apply to an area control (surveillance) rating:

1. Entry level requirements

- (1) Age: minimum 21 years
- (2) The candidate must hold a valid air traffic service licence

2. Course aim

The aim of the Area Control (Surveillance) Course is to provide the candidate with the necessary knowledge, skills and attitudes to enable him/her to obtain an Area control (radar) Rating.

3. Course outcome

On completion of the Area Control (Surveillance) Course, the candidate will have the necessary knowledge and skills to commence validation training for Area Control (Surveillance).

4. Licensing

On completion of the Area Control (Surveillance) Course, the Director will issue an Area Control (Surveillance) Rating. Endorsement of the Area Control (Surveillance) validation will only be done on successful completion of area control (Surveillance) validation training

5. Theoretical training

The area control (surveillance) course consists of the following theoretical modules –

- (1) General AT procedures

On completion of this module, the candidate will be able to display the necessary knowledge of ATS relevant to area control to enable him/her to efficiently provide the ATS required of an area controller.

(2) Area control

On completion of this module, the candidate will have the necessary knowledge with respect to approach control practices and procedures, in order to apply them efficiently during the practical simulator training.

(3) Surveillance theory and procedures

On completion of this module, the candidate will have an extensive knowledge of procedures and practices applied in the provision of an area control (surveillance) service, enabling him/her to provide an area control (surveillance) service applying the correct procedures and practices.

(4) Radar technical

On completion of this module, the candidate will have a sound knowledge of the operations and limitations of surveillance equipment and its application to air traffic control, including SSR.

(5) Meteorology

On completion of this module, the candidate will have a sound knowledge of various aspects of meteorology pertinent to area control and affecting aircraft operations under the jurisdiction of area control.

6. Practical simulator training

In order to develop the practical controlling skills of the candidate to the required standard, he/she will be required to apply the following procedures and principles in a simulated operational environment –

- (a) Radio telephony procedures
- (b) Area control (surveillance) procedures
- (c) Separation standards
- (d) Emergency procedures
- (e) Flight progress

7. Examination and pass requirements

(1) In order to pass the course, the candidate must successfully undertake the following examinations to the prescribed standards –

EXAMINATION	REQUIRED PASS MARK
General ATC procedures	70%
Area control	70%
Surveillance theory and procedures	70%
Surveillance technical	60%
Meteorology	70%
Simulated surveillance area assessments	70%

(2) A once-off re-write in any two of the subjects may be permitted, provided that the candidate does not attain less than 20% below the required pass mark on the first attempt.

(3) Re-writes must be undertaken within 14 days of the first failed attempt.

(4) An average of 70% or more must be attained during the simulated practical assessments. A once-off re- evaluation in any two practical assessments may be allowed and must be undertaken within 14 days of the first failed attempt.

(5) Recognition of prior learning (RPL) may be accredited to a candidate who has successfully completed the examination requirement for any of the above modules as referred to in 65.12.2(5) within the preceding 48 months and who has held a valid Air Traffic Service License within the preceding 24 months. Such Candidate may be exempted by a Designated Examiner (DE) from the

examination requirement for that specific subject provided the candidate can demonstrate to the DE satisfactory knowledge and skills associated with the subject or credit is given for prior learning as per an ATO's approved training syllabus.

The conditions for an ATO to accredit RPL and the acceptable means for a candidate to demonstrate having satisfactory knowledge and skills to meet the requirements for exemption from the examination/assessment shall be documented in the ATO's Training and Procedures Manual.

8. Validation training

- (1) In order to validate the area control (surveillance) rating, the candidate must successfully undertake the following evaluations –
 - (a) Progressive practical standards evaluations
 - (b) Final practical standards evaluation
 - (c) Written examinations on all aspects as specified in Station Standing Instructions
- (2) In order to pass the validation training, the candidate has to be successful in all evaluations.
- (3) In order to successfully validate the area control (surveillance) rating, the candidate has to comply with the following –
 - (a) Provide an area control (surveillance) service, under supervision of an air traffic service instructor (operational), at an ATSU for at least 50 hours but not more than 150 hours, 50 percent of which may be done on an accredited simulator.
 - (b) Obtain and maintain a sound knowledge of local practices and procedures as specified in Station Standing Instructions.
 - (c) Obtain and maintain a sound knowledge of the function and operation of local instruments and technical aids.

9. Syllabus

The area control (surveillance) course will consist of the following modules:

- (1) General ATC procedures
 - (a) Standard R/T procedures and inter unit phraseologies
 - (b) Communication failure procedures
 - (c) Radio failure in respect of VFR flights
 - (d) Interception of civilian aircraft
 - (e) Descents by supersonic aircraft due to solar cosmic radiation
 - (f) Division and classification of airspace
 - (g) ATC clearances
 - (h) Emergencies
 - (i) Diversion procedures
 - (j) Flight progress strips
 - (k) SAR procedures associated with approach and aerodrome control
- (2) Area control
 - (a) Introduction
 - (b) Coordination
 - (c) Coordination between area control and approach
 - (d) Release and transfer of control and communication
 - (e) Procedures for overflying flights, flying through remote TMAs and CTRs (IFR and VFR)
 - (f) Information to be given to aircraft on first contact
 - (g) Air traffic advisory service
- (3) Surveillance theory and procedures
 - (a) Use of surveillance in the air traffic control service
 - (b) Surveillance separation minima
 - (c) SSR operations

- (d) Identification, vectoring and transfer of aircraft
 - (e) Terrain clearance and emergencies
 - (f) Failure of airborne equipment
 - (g) Combined radar-procedural
 - (h) Use of surveillance in the approach control service
 - (i) General surveillance approach procedures
 - (j) Final approach procedures
 - (k) Surveillance phraseologies
- (4) Meteorology
- (a) General circulation
 - (b) Winds
 - (c) Synoptic meteorology
 - (d) Cloud and weather
 - (e) Meteorological flying hazards
 - (f) Observations and conclusions
 - (g) Meteorological codes
- (5) Surveillance technical
- (a) Surveillance – How does it work?
 - (b) Prefix summary
 - (c) Frequency bands
 - (d) Radiated power in free space
 - (e) Primary surveillance system
 - (f) SSR development
 - (g) Circular polarisation
 - (h) MTI-Radar
 - (i) Doppler effect
 - (j) Tangential fade
- (6) Area control (surveillance) practical simulator training
Practical application of knowledge and skills.

65.12.8 PRIVILEGES OF AREA CONTROL (RADAR) RATING

1. Requirements and standards

The requirements and standards referred to in CAR 65.12.8(a), are the procedures for the provision of services contained Document SA-CATS 172.

SA-CATS 66 Aircraft Maintenance Engineer Licensing

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66.01.9 VALIDATION OF LICENCE ISSUED BY APPROPRIATE AUTHORITY

1. Requirements and conditions

The period of effectiveness of the validation shall not extend beyond the date of expiry of the appropriate authority licence or for a period of 12 months, whichever comes first.

2. Renewal of validation

The circumstances and conditions, referred to in CAR 66.01.9(5), for the renewal of a validation are the following:

- (a) The applicant shall satisfy the Director that he or she is in possession of a permanent residence permit and holds a work permit. The revalidation shall not extend beyond the date of expiry of the appropriate authority licence or for a period of 12 months, whichever comes first.
- (b) A validation is normally renewed only once. A second revalidation period shall not be granted without prior authority of the Director.
- (c) Should the holder of a revalidated validation wishes to continue with exercising the privileges of his or her foreign licence in South Africa, he or she should apply for the issue of a South African aircraft maintenance engineer licence before the expiry date of the validation.

3. Requirement and conditions

The requirements and conditions, referred to in CAR 66.01.9(6), are that the holder of the validation at all times shall comply with the privileges and limitations of the validation granted by the Director as prescribed in regulation 66.02.10 for the applicable categories and ratings.

66.01.11 DESIGNATION OF EXAMINERS

1. Conditions, rules, requirements, procedures or standards for designation of examiners

1.1. Purpose

This technical standard deals with the selection and designation of Designated Examiners (DE) and identifies the specific functions which, authorized by the Director, may be performed by DE's.

1.2 Qualification criteria

- (a) General qualifications
To qualify for a designation as a DE, the applicant must possess the general qualifications listed hereunder, in addition to having the specialised experience appropriate to the particular function for which designation is sought –
 - (i) current and thorough knowledge of the Civil Aviation Regulations and relevant Aeronautical Information Circulars, and Civil Aviation Technical Standards, etc.;
 - (ii) current technical knowledge and experience commensurate with that required for the particular function;
 - (iii) unquestionable integrity, co-operative attitude, and ability to exercise sound judgment;
 - (iv) the ability to maintain the highest degree of objectivity while performing authorized functions on behalf of the Director in compliance with the CAR and safety goals, notwithstanding any coercion by any person to the contrary;
 - (v) at least five years of satisfactory experience in the field of work covered by the designation.
- (b) Specialised experience
In addition to the general qualifications, specified in sub-paragraph (a), an applicant for designation as examiner shall have the following specialised experience, and demonstrated ability in respect of each particular function for which DE designation is sought –
 - (i) At least five years experience as a Grade I instructor at an approved aviation training organisation (ATO) or an aircraft manufacturer's training school that has been involved with either –
 - (a) the issuing of course
 - (b) the management of programs, leading to the issuing of course certificates, in either case for aircraft, engines, propellers, avionics, instruments, electrical and component parts of similar type and complexity to those for which DE designation is sought.
 - (ii) Must hold a current valid instructor's certification with an appropriate rating and must demonstrate the ability to carry out instruction and examination to determine the status of

aircraft, engines, propellers, avionics, instruments, electrical and component parts of a similar type and complexity for which DE designation is sought.

1.3. Application procedure

- (a) Any suitably qualified person may apply for designation as a DE. Applications for designation must be initiated by an application in the form found on SACAA website under forms.
- (b) Applications submitted by individual applicants must be accompanied by –
 - (i) a letter from the applicant's employer, attesting to the applicant's integrity and qualifications to perform instruction and examination on products of similar type and complexity, to those for which designation is sought;
 - (ii) supporting documents, to substantiate that he or she meets all the relevant qualifications specified in paragraph 2; and
 - (iii) the appropriate fee as prescribed in Part 187.

1.4. Procedure followed with regard to selection and appointment

- (a) Receipt of an application is acknowledged by the Director.
- (b) The Director evaluates the applicant's qualifications and peruses the personal references submitted.
- (c) On determination that the applicant meets all the relevant requirements, the Director issues a document that identifies him or her as a Designated Examiner in the particular category.

66.01.13 LOGBOOKS

1. Completion of logbooks

1.1 Category A/B &C/D

All Logbooks must be properly filled in and the designation of all aircraft types and engine types to be filled in properly. Experience to be filled in hours, days or weeks. Logbooks should be signed and stamped in the appropriate place by a Supervising Inspector, a Quality Manager or Accountable Manager. Logbooks to be updated and signed on a monthly basis.

Below is an example of how the experience should be indicated in the logbook:

Period		Employer	Type of aircraft, engine or equipment	Inspection or any other work carried out	Aircraft category	Engine category				Supervising inspectors signature and stamp
From	To				IN DAYS	IN DAYS				
					A	B	C	D		
01/01/01	20/01/01	Com Air	Boeing 737-800 CMF 56-5	MPI and Snags ext MPI	5		5	5	Signature & Stamp	
01/02/01	28/02/01	Com Air	Cessna 208 PT6A-114	MPI and Snags ext MPI	14		14			
01/03/01	30/03/01	Com Air	Boeing 737-800 CMF 56-5	MPI and Snags ext MPI	20		10			
01/04/01	30/04/01	Com Air	Cessna 208 PT6A-114	MPI and Snags ext MPI	15		15			
01/05/01	30/05/01	Com Air	Boeing 737-800 CMF 56-5	MPI and Snags ext MPI	5	10	5	10		
01/06/01	30/06/01	Com Air	Cessna 208 PT6A-114	MPI and Snags ext MPI	10	10	10			
01/07/01	30/07/01	Com Air	Boeing 737-800 CMF 56-5	MPI and Snags ext MPI	10	5	10	5		
01/08/01	30/08/01	Com Air	Cessna 208 PT6A-114	MPI and Snags ext MPI	20		10			
01/09/01	30/09/01	Com Air	Boeing 737-800 CMF 56-5	MPI and Snags ext MPI	5		25			
01/10/01	30/10/01	Com Air	Cessna 208 PT6A-114	MPI and Snags ext MPI	15		15			
01/11/01	30/11/01	Com Air	Boeing 737-800 CMF 56-5	MPI and Snags ext MPI	20		10			
01/12/01	30/12/01	Com Air	Cessna 208 PT6A-114	MPI and Snags ext MPI	25		5			
SUMMARY OF EXPERIENCE FROM 1 JAN 2001 TO 31 DEC 2001										
			BOEING 737-800	65 DAYS						
			CFM 56-7	65 DAYS						
			CESSNA 208	99 DAYS						
			PTA-114	69 DAYS						
ACCOUNTABLE MANAGER SIGN & STAMP										
LICENCE NR										

1.2 Category X and W

All Logbooks must be properly filled in and the designation of all aircraft component types and engine component types to be filled in properly. Experience must be filled in hours, days or weeks. Logbooks should be signed and stamped in the appropriate place by a Supervising Inspector, a Quality Manager or Accountable Manager. Logbooks to be updated and signed on a monthly basis.

Below is an example of how the experience should be indicated in the logbook:

Period		Employer	Type of aircraft,- engine or equipment	Inspection or any other work carried out	Electrical category	Aut om atic	Co mp ass es	Instrument s Category	Supervising inspectors signature and stamp	
From	To									
01/01/01	20/01/01	Com Air	Boeing 737-800 CMF 56-5	MPI and Snags ext MPI	5		5 5	5	Signature & Stamp	
01/02/01	28/02/01	Com Air	Cessna 208 PT6A-114	MPI and Snags ext MPI	14		14			
01/03/01	30/03/01	Com Air	Boeing 737-800 CMF 56-5	MPI and Snags ext MPI	20		10			
01/04/01	30/04/01	Com Air	Cessna 208 PT6A-114	MPI and Snags ext MPI	15		15			
01/05/01	30/05/01	Com Air	Boeing 737-800 CMF 56-5	MPI and Snags ext MPI	5	10	5	10		
01/06/01	30/06/01	Com Air	Cessna 208 PT6A-114	MPI and Snags ext MPI	10	10		10		
01/07/01	30/07/01	Com Air	Boeing 737-800 CMF 56-5	MPI and Snags ext MPI	10	5		10 5		
01/08/01	30/08/01	Com Air	Cessna 208 PT6A-114	MPI and Snags ext MPI	20			10		
01/09/01	30/09/01	Com Air	Boeing 737-800 CMF 56-5	MPI and Snags ext MPI	5			25		
01/10/01	30/10/01	Com Air	Cessna 208 PT6A-114	MPI and Snags ext MPI	15			15		
01/11/01	30/11/01	Com Air	Boeing 737-800 CMF 56-5	MPI and Snags ext MPI	20			10		
01/12/01	30/12/01	Com Air	Cessna 208 PT6A-114	MPI and Snags ext MPI	25			5		
SUMMARY OF EXPERIENCE FROM 1 JAN 2001 TO 31 DEC 2001										
			BOEING 737-800	65 DAYS						
			CFM 56-7	65 DAYS						
			CESSNA 208	99 DAYS						
			PTA-114	69 DAYS						
ACCOUNTABLE MANAGER SIGN & STAMP										
LICENCE NR										

66.02.2 TRAINING

1. Basic training syllabus for the trade: Aircraft Mechanic Category A, B, C, D, X (X on fixed and variable-pitch propeller)

1.1 Introduction

- (1) Competency Based Modular Training (CBMT)

1.2 Safety

- (1) Occupational Health and Safety Act
- (2) Acceptable first-aid course (Approved by appropriate body)
- (3) Acceptable fire-fighting course (Approved by appropriate body)
- (4) Incident reporting

1.3 Engineering practices

- (1) Identify, care and use of hand tools
- (2) Use of torque wrenches and deadweight testing (Acro torque)
- (3) Standard torque's and charts
- (4) Ferrous and non-ferrous metals
- (5) Heat treatment of materials (hardening, case hardening, tempering, normalising, hardness test)
- (6) Identification and control of corrosion
- (7) Reading of engineering drawings and performing layout

- (8) Reading and use of measuring instruments (verniers, micrometers, vernier height gauges, dial test indicators and combination sets)
- (9) Use of calipers and dividers
- (10) Use of precision gauges (cylinder bore-, radius- hole-, telescopic-, drill point-, snap-, ring-, slip-, sine- and weighting scale)
- (11) Reading and use of steel rule and tape
- (12) Care and use of hand files
- (13) Care and use of hacksaws
- (14) Care and use of band saws
- (15) Identification and safe use of a pedestal drill
- (16) Identification and safe use of a bench grinder
- (17) Replacing and dressing a grinding wheel
- (18) Grinding of drill bits, punches and chisels
- (19) Drilling, tapping and reaming of holes
- (20) External and internal threading
- (21) Identification of screw threads
- (22) Repair of heli-coils
- (23) Stud removal
- (24) Manufacturing of projects

1.4 Standard practices

- (1) Selection and use of information-, procedures-, overhaul-, maintenance-, illustrated parts catalogue manuals, Air Transport Association (ATA) chapters, and Civil Aviation Regulations
- (2) Aircraft hardware and locking procedures
- (3) Jacking and leveling of aircraft
- (4) Determining the mass of an aircraft
- (5) Marshalling signals
- (6) Aircraft towing
- (7) Aircraft refueling
- (8) Aircraft labels
- (9) Aircraft fluids (contamination, fuels, hydraulic fluids, oils, greases and inhibiting)
- (10) Cleaning solvents and compounds
- (11) Performing liquid penetrate and fluorescent dye inspection
- (12) Identifying solid and flexible tubing
- (13) Flaring, bending and cutting of solid tubing
- (14) Solid and flexible end fittings
- (15) Testing of tubing
- (16) Maintenance of plain-, shell-, ball-, roller- and taper bearings
- (17) Common bearing faults

1.4.1 Piston engines

- (1) Identifying different types of engines
- (2) Principles of operation
- (3) Identifying major sections
- (4) Disassembling and assembling of engines
- (5) Changing components
- (6) Cleaning methods
- (7) Performing visual and dimensional inspections (cylinder, piston accessories, nips, crankshaft, reduction gear assembly, alignment checks and final inspections)
- (8) Carburetors, fuel injection systems, pumps and systems

- (9) Magneto stripping, replacement of points, condensers, distributors, internal timing, engine timing
 - (10) Valve timing
 - (11) Grinding of valves and valve seats
 - (12) Replacement of valve guides and testing of valve springs
 - (13) Repair or replacement of valve rocker assemblies, testing of hydraulic tappet assemblies, repair and adjustment of push rod assemblies
 - (14) Inspection, repair and replacement of exhaust systems, exhaust shrouds for carburetor and cabin heating systems
 - (15) Inspection, repair and replacement of turbochargers and related component parts; setting and adjusting turbocharger systems
 - (16) Supercharger and related components, induction system; setting and adjusting supercharger
 - (17) Radiators, oil coolers, governors, constant speed units, oil pumps, oil filters and related oil systems
 - (18) Engine cooling systems, radiators, baffles, cowl flaps and related systems
 - (19) Engine mounts, shock mounts, bonding, protection and related parts
 - (20) Reduction gears, drive belts, pulleys gearboxes and related components and parts
 - (21) Sparkplug cleaning and testing
 - (22) High tension ignition harness system repair, replacement and testing
 - (23) Compression and blow-by check
 - (24) Engine overhaul
 - (25) Engine inhibiting
 - (26) Engine and related system testing
- 1.4.2 Propellers
- (1) Construction, description and operation
 - (2) Replacement
 - (3) Overhaul
 - (4) Half-life inspection
 - (5) Blade repair and straightening
 - (6) Blade dimensional measuring
 - (7) Hub and actuation mechanism repairs
 - (8) Anodising
 - (9) Plating
 - (10) De-icer boot replacement
 - (11) Static balancing
 - (12) Dynamic balancing
- 1.4.3 Gas turbines
- (1) Identify different types and major sections identified as modules
 - (2) Construction, description and operation
 - (3) Airflow and pressure probes
 - (4) Gas flow, temperature probes and tail cone
 - (5) Fuel flow nozzles and fuel manifold system
 - (6) Fuel control units, pumps and related component parts
 - (7) Combustion chambers and vanes
 - (8) Fan and by-pass system
 - (9) Low pressure compressor and turbine assembly
 - (10) High pressure compressor and turbine assembly
 - (11) Gearbox and related component parts
 - (12) Thrust reverse system

- (13) Lubrication system
- (14) Construction diagram of a basic module system
- (15) Engine overhaul
- (16) Replacement of engine modules
- (17) Overhaul and repair of engine modules
- (18) Rebuild an engine to a QEC (Quick Engine Change) status
- (19) Engine servicing
- (20) System servicing
- (21) Change components
- (22) Overhaul components
- (23) Test components
- (24) Overhaul procedures (visual, dimensional and cleaning)
- (25) Hot section inspection
- (26) Boroscope inspection
- (27) Remove, inspect, repair and replace compressor and turbine blades
- (28) Dynamic and static balancing
- (29) Engine testing and inhibiting

1.4.4 Pneumatics

- (1) Identifying different types and major sections
 - (2) Construction, description and operation of units and components that deliver large volumes of compressed air from a power source to connecting points for such other systems as air- conditioning, pressurisation, de-icing, and other systems
- (3) Identifying components such as; ducts, valves, actuators, heat exchangers, controls, temperature and pressure indicators
- (4) Maintenance of and removal of components and parts for inspection, repair, overhaul and testing.

1.4.5 Vacuum

- (1) Identifying different types and major sections
 - (2) Units and components used to generate, deliver and regulate negative air pressure to using systems.
- (3) Identifying components such as lines, pumps, regulators, temperature- and vacuum- indicating systems
- (4) Maintenance of and removal of components and parts for inspection, repair, overhaul and testing.

1.4.6 Hydraulics

- (1) Identify components, such as –
 - (a) hydraulic fluid to use in the system
 - (b) tanks
 - (c) accumulators
 - (d) valves
 - (e) pumps
 - (f) actuators
 - (g) jacks
 - (h) selectors
 - (i) connectors
 - (j) gauges
- (2) Hydraulic operation principles
- (3) Hydraulic fluid identification
- (4) Hydraulic pipe and hose identification
- (5) Operational check

- (6) Principles of operation of an aircraft's secondary systems.
 - (7) Maintain components
 - (8) Overhaul and repair components
 - (9) Bench test components
- 1.4.7 Flight controls
- (1) Mechanics of flight (low and high speed)
 - (2) Terms and definitions
 - (3) Axis of an aircraft
 - (4) Flight controls (low and high speed)
 - (5) Basic components
 - (6) Terms and definitions
 - (7) Major stresses
 - (8) Major components
 - (9) Wing forms and components
 - (10) Fuselage types and components
 - (11) Control rigging
 - (12) Primary and secondary systems
 - (13) Types of tensionometers
 - (14) Temperature and tension charts
 - (15) Setting cable tension
 - (16) Control surface travels, utilising inclinometers
 - (17) Setting surface travel
 - (18) Carryout rigging checks
- (19) Balancing of flight controls
- (20) Dual inspection of flight controls
- 1.4.8 Fuel systems
- (1) Identify components such as –
 - (a) fuel tanks, metal, bladder, tip, slung, integral, reserve and other
 - (b) fuel pumps engine-driven, electrical, boost and other
 - (c) fuel-dumping components
 - (d) valves and shuttles
 - (e) selectors and cocks
 - (f) gauges, indicators, transmitters and sender units
 - (g) fuel caps
 - (h) pressure-fueling systems
 - (i) drain cocks and de-fueling
 - (j) fuel transfer
 - (2) Fuel system operating principles
 - (3) Fuel identification and placarding
 - (4) Fuel pipe and hose identification
 - (5) Fuel flow checks
 - (6) Fueling and de-fueling precautions
 - (7) Overhaul and repair components
 - (8) Bench test components
- 1.4.9 Safety equipment
- (1) Those items of equipment required for use in emergency procedure, to be removed during periodic inspections for condition, repair, replenishment or TBO –
 - (a) portable fire extinguishers
 - (b) cockpit smoke/oxygen masks, extinguishers, harnesses gloves and axe
 - (c) first-aid kits

- (d) loud hailer, torches
- (e) lavatory smoke warning, automatic fire extinguishers and fire proof bins
- (f) life jackets, rafts and floatation cushions
- (g) life rafts
- (h) indicator lights and lighted signs
- (i) slides or inflatable slides/slide rafts
- (j) incubators
- (k) portable oxygen bottles
- (l) passenger service units
- (m) medical stretchers
- (n) signal strips
- (o) signal flares
- (p) evacuation signs and pamphlets

1.4.10 Landing gear and brakes

- (1) Identify components such as –
 - (a) steering system on ground or on water
 - (b) main gear assemble
 - (c) nose gear assembly
 - (d) tail gear assembly
 - (e) wheel assembly
 - (f) bearings
 - (g) de-boosters
 - (h) swivel glands
 - (i) brake assembly
 - (j) anti-skid devices
 - (l) skids
 - (m) floats
 - (n) doors
 - (o) shock struts
 - (p) tyres
 - (q) valves
 - (r) linkages
 - (s) actuators
 - (t) locks
 - (u) latches
 - (v) position indicating
 - (w) warning systems
- (2) Landing gear servicing
- (3) Landing gear indicator lights, warning system and emergency systems
- (4) Landing gear components and parts overhaul and NDT
- (5) Landing gear rigging and alignment
- (6) Service, inspect, repair a wheel assembly
- (7) Replace and balance tyres
- (8) Service, inspect, repair and overhaul an oleo leg
- (9) Service, inspect, repair and overhaul a brake assembly
- (10) Service, inspect, repair and overhaul a brake system
 - (11) Overhaul procedures hydraulic components and parts (visual dimensional and cleaning)
- (12) Inspect, repair and replace components
- (13) Measure tyre creep

- (14) Retraction tests
- (15) Wheel balancing
- 1.4.11 Inspections
 - (1) Inspection techniques
 - (2) Pre-flight inspections
 - (3) Between flight inspections
 - (4) After flight inspections
 - (5) Weekly inspections
 - (6) Periodic Inspections
 - (7) Special inspections after an occurrence, incident or accident per SA-CATS 43
- 1.4.12 Rotorcraft
 - (1) Rotorcraft theory
 - (2) Major transmission components
 - (3) Inspect, remove, repair and replace components
 - (4) Strip, inspect repair, overhaul and assemble main rotor head
 - (5) Strip, inspect, repair, overhaul and assemble tail rotor head
 - (6) Strip, inspect, repair, overhaul and assemble tail and main rotor gearbox
 - (7) Strip, inspect, repair, overhaul and assemble incline shaft, brake, clutch unit, free-wheel unit and drive belts
 - (8) Rotorcraft mass and balance
 - (9) Static balancing of rotor assemblies
 - (10) Dynamic balancing of rotor assemblies
 - (11) Rotor blade inspection, maintenance, repair and replacement
 - (12) Undercarriage, skids, wheels and brakes
 - (13) Undercarriage retraction system
 - (14) Ground engine running and precautions
 - (15) Ground handling and precautions
- 1.4.13 Structures, composites, fabrics and plastics
 - (1) Theory of structures, composites, fabrics and plastics
 - (2) Aging aircraft and corrosion prevention control programs
 - (3) Methods of carrying out repair to steel, aluminum, composites, fabrics and plastics
 - (4) Edge dimensions, spacing and installing aircraft rivets and fasteners
 - (5) Mark-off projects
 - (6) Cut out projects
 - (7) Drill materials
 - (8) Bend materials
 - (9) Roll and form materials
 - (10) Heat treatment of materials
 - (11) Assemble materials
 - (12) Inspection of fabric covered materials
 - (13) Repair of and replacement fabric covered materials
 - (14) Inspection and repair of composites and plastics
- 1.4.14 Batteries
 - (1) Theory lead-acid batteries
 - (2) Theory Nickel cadmium ni-cad batteries
 - (3) Servicing and charging of batteries
 - (4) Inspection, repair and overhaul of batteries
 - (5) Corrosion prevention and control
 - (6) Venting procedures
 - (7) Storage procedures

1.4.15 Avionic mechanical

- (1) Electron theory
- (2) Properties of conductors and insulators
- (3) Theory of electric charges
- (4) Current flow and potential
- (5) Methods of generating electricity
- (6) Fundamentals of magnetism
- (7) Operation of an electromagnet
- (8) Measure volts, amperes and resistance
- (9) Amp meter and voltmeter range conversions
- (10) Amp meters and voltmeters connected in circuits
- (11) Factors controlling resistance
- (12) Resistance value and power rating
- (13) Identify components in a simple circuit
- (14) Theory and operation of a step up, step down and auto transformers
- (15) Design and construct a step up and step down transformer
- (16) Aircraft instrumentation principles
- (17) Navigation radio communication principles
- (18) Calculate resistance of a series resistive network
- (19) Calculate resistance of a parallel resistive network
- (20) Kirchhoff's voltage and current laws
- (21) Construct series and parallel circuits
- (22) Theory of alternating current
- (23) Various alternating current meters
- (24) Ohm's law to determine amps, volts, resistance and power consumed in a pure resistive alternating current circuit
- (25) Characteristics of inductance in alternating and direct current circuits
- (26) Calculate inductances in series and parallel, inductive time constant and inductive circuits
- (27) Apparent power and true power in an alternating current circuit
- (28) Theory of capacitance
- (29) Construction of different capacitors
- (30) Characteristics of capacitance in direct and alternating currents
- (31) Calculate capacitive time constant and reactance

2. Basic training syllabus for the trade: Aircraft Structures Worker Category B

2.1 Introduction

- (1) Competency Based Modular Training (CBMT)

2.2 Safety

- (1) Occupational Health and Safety Act
- (2) Acceptable first-aid course (Approved by appropriate body)
- (3) Acceptable fire-fighting course (Approved by appropriate body)
- (4) Incident reporting

2.3 Engineering practices

- (1) Apply sealants
- (2) Bend and roll material (bending allowances)
- (3) Correct use of pneumatic hand drills
- (4) Countersinking of holes
- (5) Deburr of holes
- (6) Identification, care and use of hand tools

- (7) Identification, safe use of bench grinders, pedestal drill (replace and dress of grinding wheels)
- (8) Identify sealants and joints
- (9) Identify corrosion and treatments
- (10) Install temporary fasteners
- (11) Identification of rivets and defects (countersink and universal)
- (12) Installation of various types of fasteners
- (13) Identify profiles, abbreviations, extrusions, joints and radii
- (14) Identify various aircraft materials
- (15) Interpretation of manufacturers manuals
- (16) Installation of universal and countersink rivets and obtaining the correct bucktails
- (17) Manufacturing of various projects
- (18) Manufacturing and repairing of various aircraft components (stress skin repairs, etc.)
- (19) Manufacturing and repairing aircraft flex and solid tubing
- (20) Oxygen acetylene gas welding – heat treatment
- (21) Polishing of aircraft materials
- (22) Protective coatings
- (23) Read and use of measuring instruments (verniers, micrometers, rulers [metric and imperial] height gauges)
- (24) Removing of rivets and fasteners
- (25) Reaming of holes for various fasteners
- (26) Read and identify more complex aircraft drawings
- (27) Stretch, crimp and form aircraft materials
- (28) Safety precautions and use of guillotine
- (29) Workout of bending allowances

3. Basic training syllabus for the trade: Aircraft Instrument Mechanic Category X

3.1 Introduction

- (1) Competency Based Modular Training (CBMT)

3.2 Safety

- (1) Occupational Health and Safety Act
- (2) Acceptable first-aid course (Approved by appropriate body)
- (3) Acceptable fire-fighting course (Approved by appropriate body)
- (4) Incident reporting

3.3 Engineering practices

3.3.1 Soldering

- (1) Soldering and soldering process
- (2) Soldering to turret terminals
- (3) Soldering to cup terminals
- (4) Soldering to bifurcated terminals
- (5) Soldering hook, pierced and lug terminals
- (6) Axial lead components
- (7) Soldering IC
- (8) TO-5 type IC package and other multi lead devices

3.3.2 Electricity

- (1) AC/DC voltage with AVO meter
- (2) AC/DC current with AVO meter
- (3) Resistance with AVO meter
- (4) AC/DC voltages with digital multimeter
- (5) AC/DC current with digital multimeter
- (6) Resistance with digital multimeter

- (7) Values and tolerances of resistors
- (8) Values and tolerances of potentiometers
- (9) Resistance of series/parallel combination of resistors
- (10) Kirchhoff's voltage and current laws
- (11) OHM's law determine current, voltage and resistance in basic circuit
- (12) Power in DC load and maximum power transfer
- (13) Trouble shoot series and/or parallel circuits
- (14) Block diagram of power supply
- (15) Power supply with voltage and current specifications
- (16) AC voltages, current and measuring peak RMS values
- (17) AC/DC voltages with oscilloscope
- (18) Block diagram of function generator
- (19) Generates sine waves with function generator
- (20) Generate square waves with function generator
- (21) Time duration with oscilloscope
- (22) Frequency and phase difference with oscilloscope
- (23) Testing of inductors
- (24) Measure inductance, reactance and resistance of coil
- (25) Frequency and phase relationships of coil
- (26) Effect on DC on inductance of iron core choke
- (27) Impedance of RL circuit
- (28) Relationship that exists in RL circuit
- (29) Identify values of capacitors
- (30) Capacitance of capacitors in series and parallel
- (31) Capacitive reactance of capacitor
- (32) Voltage across capacitors and capacitor voltage dividers
- (33) Charging and discharging of capacitor
- (34) Phase angle between voltage, current in capacitive circuit.

3.3.3 Electronics

- (1) Atomic and semiconductor theory
- (2) Diode applications
- (3) Construct a transformer fed full and half wave rectifier circuit
- (4) Testing of zener diodes
- (5) Values of OPTO electronic devices
- (6) Operation of active filters
- (7) Testing of bridge rectifiers
- (8) Test a transistor
- (9) Construct a common base amplifier
- (10) Construct a common emitter amplifier
- (11) Construct a common collector amplifier
- (12) Field effect transistors
- (13) Metal oxide field effect transistors
- (14) Test a uni-junction transistor
- (15) Test a thyristor
- (16) Construction and operation of switches
- (17) Voltage multipliers
- (18) Voltage regulation
- (19) Construct a monostable circuit
- (20) Construct a astable circuit
- (21) Construct a bistable circuit

- (22) Introduction to operational amplifiers
- (23) Operational amplifiers in DC circuit
- (24) Operational amplifiers in AC circuit
- (25) Typical applications
- (26) Block diagram and operation of an oscilloscope

3.3.4 Digitals

- (1) Digital techniques in electronics
- (2) Binary number system
- (3) Binary coded octal system
- (4) Binary coded hexa-decimal system
- (5) Decimal to binary, vice versa
- (6) Binary to octal, vice versa
- (7) Binary to hexa-decimal, vice versa
- (8) Basic logic functions
- (9) Truth tables for: AND, OR, NOR, NAND
- (10) Re-design circuit by using NAND or OR gates
- (11) Boolean equations for logic functions
- (12) Simplify by Boolean algebra and karnaugh maps
- (13) Propagation delay
- (14) Power dissipation
- (15) Noise shielding
- (16) Fan out/in
- (17) Logic levels
- (18) TTL logic
- (19) MOS logic
- (20) Scottky TTL
- (21) Three-state devices
- (22) Data busses
- (23) Identify different packages
- (24) Flip-flops
- (25) Counters
- (26) Arithmetic CCT
- (27) Combine logic CCT
- (28) Processor language
- (29) Introduction to microprocessors
- (30) Internal organization of microprocessors
- (31) Computer memory

3.3.5 Theory of flight

- (1) Terms and definitions
- (2) Aircraft controls
- (3) Facts of aircraft stability
- (4) Lift and drag ratios
- (5) Power-to-weight ratios

3.3.6 Hand tools and hand skills

- (1) Hand tools
- (2) Linear measuring tools
- (3) Use steel rule and tape
- (4) Set caliper and divider using rule
- (5) Vernier inside, outside and depth
- (6) Vernier height gauge

- (7) Use of micrometers
 - (8) Use of a hacksaw
 - (9) Manufacture a work piece
 - (10) Layout using scribe, vernier height gauge, steel ruler or tape
 - (11) Bench grinder
 - (12) Grinding wheels
 - (13) Grind drill bit
 - (14) Drill press
 - (15) File to layout
 - (16) Drill and ream holes
 - (17) Internal thread by using hand taps
 - (18) External thread by using hand dies
 - (19) Locking devices
 - (20) Use of screwdrivers and spanners
- 3.3.7 Pitot and static units
- (1) Basic principles of pitot static
 - (2) Vacuum chamber
 - (3) Barometer
 - (4) Altimeters
 - (5) Mach indicator
 - (6) Outflow valve and pressure switches
 - (7) VSI
 - (8) Airspeed indicator
 - (9) Capsule principles
- 3.3.8 Mechanical watches
- (1) Watches
- 3.3.9 Pressure switches and transmitters
- (1) Principles of pressure switches
 - (2) Altitude switch
 - (3) Oil pressure switch
 - (4) Bourden Tubes
 - (5) Pressure TX
- 3.3.10 Basic compass
- (1) Aircraft magnetism
 - (2) Magnetic properties
 - (3) Identify components
 - (4) Direction of magnetic field
 - (5) Standby compass
- 3.3.11 Oxygen
- (1) Properties of Oxygen
 - (2) General life support
 - (3) Testing
 - (4) Precautions
- 3.3.12 Moving coil meters
- (1) Moving coils
- 3.3.13 Fuel quantity and flow systems
- (1) Indicator and TX
 - (2) Resistive type fuel system
 - (3) Capacitive type fuel system
- 3.3.14 Methods of temperature

- (1) Temperature measurement
- (2) Thermocouples
- (3) Resistive probes
- 3.3.15 Engine instruments
 - (1) RPM test bench
 - (2) RPM indicators
 - (3) Tacho generators
 - (4) Oil pressure theory
 - (5) Oil pressure indicators
 - (6) RPM system
 - (7) Vibration system
 - (8) Fuel pressure
 - (9) Temperature indicators
 - (a) JTP
 - (b) EGT
 - (c) TIT
 - (d) CHT
- 3.3.16 Display equipment
 - (1) Construction of CRT
 - (2) CRT deflection
 - (3) Colour CRT
- 3.3.17 Synchro system
 - (1) Synchro theory
 - (2) Control synchro theory
 - (3) Differential synchro theory
 - (4) Dessyn system
 - (5) Synchro TX theory
 - (6) Synchro indicator theory
- 3.3.18 Gyroscopic instrument
 - (1) Principles of operation
 - (2) Artificial horizon
 - (3) Turn-and-bank indicator
 - (4) Directional indicator
- 3.3.19 Navigation systems
 - (1) Navigation indicators
 - (a) RMI
 - (b) HIS
 - (c) ADI
- 3.3.20 Autopilots and Recorders
 - (1) Theory
 - (2) Flight recorders
 - (3) Voice recorders
- 4. Basic training syllabus for the trade: Aircraft Radiotrician Category X**
- 4.1 Introduction**
 - (1) Competency Based Modular Training (CBMT)
- 4.2 Safety**
 - (1) Occupational Health and Safety Act
 - (2) Acceptable first-aid course (Approved by appropriate body)
 - (3) Acceptable fire-fighting course (Approved by appropriate body)
 - (4) Incident reporting

4.3 Engineering practices

4.3.1 Soldering

- (1) Soldering and soldering process
- (2) Soldering to turret terminals
- (3) Soldering to cup terminals
- (4) Soldering to bifurcated terminals
- (5) Soldering hook, pierced and lug terminals
- (6) Axial lead components
- (7) Soldering IC
- (8) TO-5 type IC package and other multi lead devices
- (9) The flat pack
- (10) De-soldering

4.3.2 Electricity

- (1) Principles of electrostatics
- (2) Principles of conductors and insulators
- (3) Which active components operates with magnetism
- (4) Relays
- (5) Magnetic field about wire carrying current
- (6) Voltage will be induced in coil when moving through magnetic field
- (7) Magnetic field about bar and horse shoe magnets
- (8) Block diagram and operation of a VOM
- (9) Use of ECG manual
- (10) Block diagram and operation of digital multimeter
- (11) AC/DC voltages with AVO meter
- (12) AC/DC current with AVO meter
- (13) Resistance with AVO meter
- (14) AC/DC voltages with digital multimeter
- (15) AC/DC current with digital multimeter
- (16) Resistance with digital multimeter
- (17) Values and tolerances of resistors
- (18) Values and tolerances of potentiometers
- (19) Resistance of series/parallel combination of resistors
- (20) Kirchoff's voltage and current laws
- (21) OHM's law determine current, voltage and resistance in basic circuit
- (22) Power in DC load and maximum power transfer
- (23) Trouble shoot series and/or parallel circuits
- (24) Block diagram of power supply
- (25) Power supply with voltage and current specifications
- (26) AC voltages, current and measuring peak RMS values
- (27) AC/DC voltages with oscilloscope
- (28) Block diagram of function generator
- (29) Generates sine waves with function generator
- (30) Generate square waves with function generator
- (31) Time duration with oscilloscope
- (32) Frequency and phase difference with oscilloscope
- (33) Testing of inductors
- (34) Measure inductance, reactance and resistance of coil
- (35) Frequency and phase relationships of coil
- (36) DC effect on inductance of iron core choke
- (37) Impedance of RL circuit

- (38) Relationship that exists in RL circuit
- (39) Identify values of capacitors
- (40) Capacitors in series and parallel
- (41) Capacitive reactance of capacitor
- (42) Voltage across capacitors and capacitor voltage dividers
- (43) Charging and discharging of capacitor
- (44) Phase angle between voltage and current in pure capacitive circuit
- (45) Frequency change and connection in RL and RC circuits
- (46) Impedance of RC circuit
- (47) Relationship that exists in RC circuit
- (48) Effect of frequency on impedance on RLC circuit
- (49) Apparent power, true power and power factor in AC circuit
- (50) Resonant frequency of series LC circuit
- (51) Impedance of parallel RC and RLC circuit
- (52) Impedance in RLC circuit
- (53) Turns ratio and primary load current of insulation transformers
- (54) Parallel resonance
- (55) Types of batteries
- (56) Battery maintenance and storage
- (57) Battery internal resistance
- (58) Identify, test, apply fuses
- (59) Bandwidth of series resonance
- (60) Battery voltages in series and parallel
- (61) Series RC phase shift

4.3.3 Electronics

- (1) Atomic theory for semiconductors
- (2) Diodes and test
- (3) Transistor and test
- (4) Zener diode and test
- (5) Transformer full and half wave rectifier
- (6) Function generator
- (7) Sine waves
- (8) Common base amplifier
- (9) Common emitter amplifier
- (10) Common collector
- (11) Class A amplifier
- (12) Class B amplifier
- (13) Cascading (transformer)
- (14) Cascading (RC)
- (15) Cascading (direct)
- (16) Amplifier principle
- (17) Fault Finding 2 stage amplifier
- (18) Active filters
- (19) Differential amplifier
- (20) Complementary symmetry amplifier
- (21) Clipping and clamping
- (22) Fault find push pull amplifier
- (23) Operational amplifier
- (24) Regulated PSU
- (25) Voltage doubling and tripling

- (26) Audio amplifier construction
- (27) Test, trace and repair amplifier
- (28) FET
- (29) UJT
- (30) Plugs and sockets
- (31) Class C amplifier
- (32) RF amplifier cascading
- (33) RF amplifier test, trace and repair
- (34) Astable multivibrator
- (35) Bistable multivibrator
- (36) Schmidt trigger
- (37) Diagnostic testing on TV
- (38) TRIACS
- (39) SCR's
- (40) Bandwidth of common emitter amplifier
- (41) Bridge rectification
- (42) OPTO electronics
- (43) DIACS
- (44) AM signals with function generator
- (45) FM signals with function generator
- (46) RF generator
- (47) RF generator and AM modulation
- (48) RF generator and FM modulation
- (49) Carrier signals
- (50) Hartley oscillator
- (51) Colpitts oscillator
- (52) Phase shift oscillator
- (53) Crystal oscillator
- (54) Phase lock loop

4.3.4 Digitals

- (1) Basic logic function
- (2) TTL and MOS voltage levels
- (3) IC packaging
- (4) Practical reasons and uses
- (5) Binary number system
- (6) Positive and negative logic
- (7) Series/parallel data
- (8) RTL logic characteristics
- (9) TTL logic characteristics
- (10) DTL logic characteristics
- (11) Identify and explain logic levels
- (12) Identify and explain TTL logic levels
- (13) Introduction to microprocessors
- (14) Internal organization of microprocessors
- (15) Computer memory
- (16) Processor language

4.3.5 Theory of flight

- (1) Terms and definitions
- (2) Aircraft controls
- (3) Facts of aircraft stability

- (4) Lift and Drag ratios
- (5) Power to Weight ratios
- 4.3.6 Hand tools and hand skills
 - (1) Hand tools
 - (2) Linear measuring tools
 - (3) Set caliper and divider using rule
 - (4) Use a vernier
 - (5) Vernier height gauge
 - (6) Use steel rule and tape
 - (7) Use of micrometer
 - (8) Hacksaw cut to layout
 - (9) Manufacture a work piece
 - (10) Layout using scribe, vernier height gauge, steel ruler or tape
 - (11) Bench grinder
 - (12) Grinding wheel
 - (13) Grind drill bit
 - (14) Drill press
 - (15) File to layout
 - (16) Drill and ream holes
 - (17) Internal thread by using hand taps
 - (18) External thread by using hand dies
 - (19) Use steel rule and tape
 - (20) Use of screwdrivers and spanners
- 4.3.7 Synchro's and servo
 - (1) Synchro and servo
 - (2) Dessyu systems
- 4.3.8 Basic communication and antennas
 - (1) Telephony
 - (2) Volume and radio signals
 - (3) Propagation and paths
 - (4) Transmission lines
 - (5) Antenna principles
 - (6) Dipoles and vertical antenna's
 - (7) UHF and antenna arrays
 - (8) Practical demonstrator
 - (9) Practical construction and SWR
 - (10) Magnetic recording
 - (11) Practical applications
 - (12) Introduction to radar
 - (13) TX block diagram-AM
 - (14) RX block diagram-AM
 - (15) RX block diagram-SSB
 - (16) TX block diagram-SSB
 - (17) TX block diagram-FM
 - (18) RX block diagram-FM
- 4.3.9 Basic TX
 - (1) Operator power amplifier – AM output
 - (2) Master oscillator – A
 - (3) Phase Lock loop – AM
 - (4) Balanced modulator SSB

- (5) FM TX construction
- (6) Preliminary TX fault finding
- (7) TX fault finding (symptoms)
- (8) TX fault finding (visual inspection)
- (9) TX fault finding (main DC checks)
- (10) TX fault finding (signal tracing)
- (11) TX fault finding (stage identification)
- (12) TX fault finding (stage DC checks)
- (13) TX fault finding (component identification)
- (14) TX fault finding resistance confirm
- (15) Practical TX fault finding
- (16) SSB TX fault diagnostics

4.3.10 Basic RX

- (1) Mixers, oscillators and detectors
- (2) RX auxiliary CCT
- (3) RX practical AM detector
- (4) RX fault finding preliminary check
- (5) RX fault finding symptoms checks
- (6) RX fault finding visual inspect
- (7) RX fault finding main DC checks
- (8) RF probe and oscillator
- (9) RX fault finding signal injection
- (10) RX fault finding stage identification
- (11) RX fault finding stage DC checks
- (12) RX fault finding component identification
- (13) RX fault finding resistance confirmation
- (14) Practical RX fault finding
- (15) SSB RX fault diagnostics

4.3.11 Display equipment

- (1) Radar displays
- (2) Glass Cockpit and Display
- (3) Diagnostic testing
- (4) Display equipment

4.3.12 Navigation systems

- (1) ADF
- (2) VOR
- (3) ILS
- (4) DME
- (5) Radio altimeters
- (6) ATC transponder
- (7) Weather radar
- (8) Aircraft controls, locations and safety
- (9) GPS
- (10) ACAS

4.3.13 Aircraft communication

- (1) Aircraft intercom system
- (2) Principle of operation, HF, UHF, VHF

5. Basic training syllabus for the trade: Aircraft Electrician Category X

5.1 Introduction

- (1) Competency Based Modular Training (CBMT)

5.2 Safety

- (1) Occupational Health and Safety Act
- (2) Acceptable first-aid course (Approved by appropriate body)
- (3) Acceptable fire-fighting course (Approved by appropriate body)
- (4) Incident reporting

5.3 Engineering Practices

5.3.1 Soldering

- (1) Soldering and soldering process
- (2) Soldering to turret terminals
- (3) Soldering to cup terminals
- (4) Soldering bifurcated terminals
- (5) Soldering hook, pierced and lug terminals
- (6) Axial lead components
- (7) Soldering Integrated Circuit
- (8) TO-5 type Integrated Circuit package and other multi lead devices
- (9) The flat pack
- (10) De-soldering

5.3.2 Electricity

- (1) Principles of electrostatics
- (2) Principles of conductors and insulators
- (3) Principles of magnetism
- (4) Which active components operates with magnetism
- (5) Magnetic field about wire carrying current
- (6) Voltage will be induced in coil when moving through magnetic field
- (7) Magnetic field about bar and horse shoe magnets
- (8) Block diagram and operation of a VOM
- (9) Use of ECG manual
- (10) Block diagram and operation of digital multimeter
- (11) AC/DC voltages with AVO meter
- (12) AC/DC current with AVO meter
- (13) Resistance with AVO meter
- (14) AC/DC voltages with digital multimeter
- (15) AC/DC current with digital multimeter
- (16) Resistance with digital multimeter
- (17) Values and tolerances of resistors
- (18) Values and tolerances of potentiometers
- (19) Resistance of series/parallel combination of resistors
- (20) Kirchoff's voltage and current laws
- (21) OHM's law determine current, voltage and resistance in basic circuit
- (22) Power in DC load and maximum power transfer
- (23) Measure inductance, reactance and resistance of coil
- (24) Frequency and phase relationships of coil
- (25) DC effect on inductance of iron core choke
- (26) Impedance of RL circuit
- (27) Relationship that exists in RL circuit
- (28) Identify values of capacitors
- (29) Capacitors in series and parallel
- (30) Capacitive reactance of capacitor
- (31) Voltage across capacitors and capacitor voltage dividers
- (32) Charging and discharging of capacitor

(33) Phase angle between voltage and current in pure capacitive circuit

5.3.3 Electronics

- (1) Construction and operation of switches
- (2) Test a thyristor
- (3) Voltage multipliers
- (4) Voltage regulation
- (5) Construct mono-stable
- (6) Construct a a-stable circuit
- (7) Construct bi-stable
- (8) Introduction to operational amplifiers
- (9) Operational amplifiers in DC circuit
- (10) Operational amplifiers in AC circuit
- (11) Typical applications
- (12) Block diagram and operation of an oscilloscope

5.3.4 Digitals

- (1) Digital techniques in electronics
- (2) Binary of system
- (3) Binary coded octal system
- (4) Binary coded hexa-decimal system
- (5) Decimal to binary vice versa
- (6) Binary to octal vice versa
- (7) Binary to hexa-decimal vice versa
- (8) Basic logic functions
- (9) Truth tables for: AND, OR, NAND and NOR gates
- (10) Re-design circuit by using NAND or OR gates
- (11) Boolean equations for logic functions
- (12) Simplify by boolean algebra and karnaugh maps
- (13) Propagation delay
- (14) Power dissipation
- (15) Noise shielding
- (16) Fan out/in
- (17) Logic levels
- (18) TTI logic
- (19) MOS logic
- (20) Scottky TTL
- (21) Three-stage devices
- (22) Data busses
- (23) Identify different packages
- (24) Flip-flops
- (25) Counters
- (26) Arithmetic circuit
- (27) Combine logic circuit
- (28) Processor language
- (29) Introduction to microprocessors
- (30) Internal organization of microprocessors
- (31) Computer memory

5.3.5 Theory of flight

- (1) Terms and definitions
- (2) Aircraft controls
- (3) Facts of aircraft stability

- (4) Lift and drag ratios
- (5) Power to weight ratios
- 5.3.6 Hand tools and hand skills
 - (1) Hand tools
 - (2) Linear measuring tools
 - (3) Use steel rule and tape
 - (4) Set caliper and divider using rule
 - (5) Vernier, inside, outside and depth
 - (6) Vernier height gauge layout for inspection
 - (7) Use of micrometer
 - (8) Hacksaw cut to layout
 - (9) Manufacture a work piece
 - (10) Layout using scribe, vernier height gauge, steel ruler or tape
 - (11) Bench grinder
 - (12) Dress a grinding wheel
 - (13) Grind drill bit
 - (14) Drill press
 - (15) File to layout
 - (16) Drill and ream holes
 - (17) Internal thread by using hand taps
 - (18) External thread by using hand dies
 - (19) Locking devices
 - (20) Use of screwdrivers and spanners
- 5.3.7 Servicing of aircraft wiring
 - (1) Wire marking
 - (2) Cable loom
 - (3) Fault find and test of cable loom
 - (4) Wire stripper and crimping tool
 - (5) Plugs and sockets
 - (6) Crimping of various terminals
 - (7) Continuity tester
 - (8) Meggar
 - (9) Crimping of various splices
 - (10) Electronic symbols, CCT diagrams
 - (11) Busbars
 - (12) CCT diagrams of AC/DC electrical systems
- 5.3.8 Operation, maintenance and servicing of DC machines
 - (1) DC machines
 - (2) Armature and commutator servicing
 - (3) Field coil and measure its resistance
 - (4) Brushes used in DC machines
 - (5) Install brushes
 - (6) Lubricants
 - (7) Types of bearings
 - (8) Lubrication and installation of bearings
 - (9) Gears, clutches, brakes and switches
 - (10) Inspection of gears, clutches, brakes and switches
 - (11) O-rings and seals
 - (12) Inspection of O-rings and seals
 - (13) Lapping of steel and carbon seals

- (14) Fault finding on DC machines
- (15) Repair, service, overhaul and testing of DC generators
- (16) Repair, service, overhaul and testing of DC motors
- (17) Synchro and servos
- 5.3.9 Operation of aircraft batteries
 - (1) Batteries
 - (2) Voltage of battery in series and parallel
 - (3) Internal resistance of dry cell
 - (4) Safety precautions secondary cells
 - (5) Use of hydrometer
 - (6) Gravity readings of cells
 - (7) Inspection of aircraft batteries
 - (8) Test of aircraft batteries
 - (9) Maintenance of aircraft batteries
 - (10) Applications of voltage regulator
- (11) Fuses
 - (12) Circuit breakers
 - (13) Testing of DC control equipment
 - (14) Testing of relays
 - (15) Testing of DC control equipment
- 5.3.10 Operation, servicing and maintenance of AC machines
 - (1) Operation of AC machines
 - (2) Repair and testing of AC machines
 - (3) Operation of an AC induction motor
 - (4) Overhaul and test induction motor
 - (5) Operation of split phase induction motor
 - (6) Overhaul and test capacitor start induction motor
 - (7) Operation of a capacitor start induction motor
 - (8) Operation of a capacitor start capacitor run motor
 - (9) Shaded pole motor
 - (10) Universal motor
 - (11) Overhaul and test of universal motor
 - (12) Synchronous motors
 - (13) Contactors
 - (14) Cut-out protection single-phase motors
 - (15) Start and switch single-phase motors
- 5.3.11 Electromechanical devices
 - (1) Rotary actuators
 - (2) Linear actuators
- 5.3.12 Operation, servicing and maintenance of aircraft control equipment
 - (1) Voltage regulation
 - (2) Magnetic amplifiers
 - (3) Brake control equipment
 - (4) Environmental control
- 5.3.13 Operation, servicing and maintenance of APU and TRU
 - (1) Auxiliary Power unit (APU)
 - (2) Applications of transformer rectifier Units
 - (3) Applications of inverters
 - (4) AC ignition exciter
 - (5) DC ignition exciter

- (6) Ignitor plug
- (7) Magnetos
- 5.3.14 Operation, servicing and maintenance of aircraft lighting
 - (1) Application of aircraft lighting equipment
 - (2) Fault find of aircraft lighting equipment
 - (3) Fault find of aircraft lighting panel
 - (4) Explain aircraft lighting system
- 5.3.15 Operation of fire protection pneumatic and air conditioning systems
 - (1) Fire protection
 - (2) Pneumatics and air conditioning system

6. Basic training syllabus for the trade: Aircraft Welding Category X

6.1 Introduction

- (1) Competency Based Modular Training (CBMT)

6.2 Safety

- (1) Occupational Health and Safety Act
- (2) Acceptable first-aid course (Approved by appropriate body)
- (3) Acceptable fire-fighting course (Approved by appropriate body)
- (4) Incident reporting

6.3 Engineering Practices

- (1) Identify, care and use of hand tools
- (2) Identification, safe use of bench grinders, pedestal drill (replace and dress of grinding wheels)
- (3) Ferrous and non-ferrous metals
- (4) Heat treatment of materials (hardening, case hardening, tempering, normalising, hardness, etc.)
- (5) Manufacturing of various projects
- (6) Read engineering drawings and perform layout
- (7) Read and use measuring instruments (verniers, micrometers, vernier height gauges, dial test indicators and combination sets)
- (8) Use of calipers and dividers – identify various aircraft materials
- (9) Manufacturing and preparing of various aircraft components (Stress skin repairs)
- (10) Read and use of steel rule and tape
- (11) Care and use of hand files
- (12) Care and use of hacksaws
- (13) Care and use of band saws
- (14) Identification and safe use of a pedestal drill
- (15) Identification and safe use of a bench grinder
- (16) Replace and dress a grinding wheel
- (17) Grinding of drill bits, punches and chisels
- (18) Drilling, tapping and reaming of holes
- (19) External and internal threading
- (20) Identification of screw threads
- (21) Interpretation of manufacturer's manuals
- (22) Safety precautions and use of guillotine
- (23) Workout of bending allowances

6.4 Experience in the following welding processing

- (1) Oxy-acetylene welding (basic)
- (2) Oxy-acetylene welding (advance)
- (3) Oxy-acetylene brazing

- (4) Oxy-acetylene silver brazing
- (5) Welding inspection
- (6) Oxy-acetylene aluminum welding
- (7) Oxy-acetylene cutting (free hand)
- (8) Shielded metal arc welding (basic)
- (9) Gas metal arc welding (basic)
- (10) Gas metal arc welding (advance)
- (11) Gas tungsten arc welding (basic)
- (12) Gas tungsten arc welding (advance)
- (13) Plasma arc welding

6.5 Resistance Welding

- (1) Oxy-acetylene welding experience
- (2) Shield metal arc welding experience
- (3) Gas metal arc welding experience

6.6 Gas Tungsten Arc Welding

6.7 Knowledge of the following

- (1) Welding inspection
- (2) Heat treatment
- (3) Sheet metal
- (4) Metal spray

66.02.3 THEORETICAL KNOWLEDGE EXAMINATION

1. Entry requirements and procedures for theoretical knowledge examinations for Aircraft Maintenance Engineer licence (Categories A, C, W, B, D and X)

1.1 General

- (1) Candidates who intend to sit for a theoretical knowledge examination must complete the application form timeously and pay the fee to be considered for the examination concerned.
- (2) All CAA applications must reach the AME licensing section of the CAA at least 5 working days prior to the date of examination.
- (3) All outstation applications must reach the AME licensing of the CAA, before the closing date as specified on the website.
- (4) All fees must be paid before the closing date as specified on the CAA website. Failure to pay such fees timeously will disqualify the candidate from being entered for the examination concerned.
- (5) Applications or fees, which are received after the respective closing dates, will not be accepted, regardless of the date on which such applications were completed.
- (6) A candidate accepted for a theoretical knowledge examination will be required to answer in a written examination, questions to demonstrate his or her knowledge of the appropriate topics, which are prescribed in section 2 below.

(7) CAA and outstation area:

Cancellation of examinations must take place more than 5 working days prior to exam/s or will forfeit fee.

Postponements of examinations a written confirmation must be forwarded to the CAA, more than 5 working days prior to exam/s or will forfeit fee.

Cancellation of a confirmed booking will not be accepted after five working days before an examination. Candidates not attending a confirmed session will forfeit the fees paid for that session.

When accepted for an examination, candidates will receive a written confirmation of entry. This document must be presented at the examination office on each day an exam is undertaken.

(8) Postponement/Cancellations:

Any request for a postponement or cancellations should be done 5 working days prior to the examination date of such examination, or the examination fees will be forfeited, or a letter from a physician stating that you are unable to attend the exams.

1.2 Procedures for examinations

- (1) Written examination instructions to candidates will be attached to the letter of acceptance from the Director or aviation training organization concerned. The letter of acceptance will serve as admittance to the examination room. Candidates, unable to produce this letter of acceptance, AME licence or ID, will be denied access to the examination room.
- (2) Candidates must –
 - (a) report at the examination room at least 20 minutes before the scheduled time of commencement;
 - (b) provide an identity document in the form of either an identity book, AME licence with a photo or in the case of non-citizens, a passport;
 - (c) sign the attendance register;
 - (d) provide their own writing and ancillary equipment;
 - (e) check that their examination number and necessary information are correct on all the documents;
 - (f) remain silent during the course of the examination;
 - (g) stop writing at the instruction of the invigilator;
 - (h) hand in examination script when so instructed by the invigilator;
 - (i) hand in all question papers, scrap paper and related documents;
 - (j) if there is any lack of clarity regarding a question, write his/her complaints to the examiner on the scrap paper and hand this in with his/her answer paper; and
 - (k) comply with all examination instructions during the course of the examination.
- (3) Candidates may not –
 - (a) retain any notes of whatever nature during the examination;
 - (b) communicate with another candidate;
 - (c) pass any object to another candidate;
 - (d) look at the work of another candidate;
 - (e) enter the examination room if more than 30 minutes late;
 - (f) leave the examination room within the first hour of the examination;
 - (g) leave the examination room without the invigilators permission;
 - (h) write on the answer sheet of multiple choice examinations apart from the mark to indicate the answer selected;
- (i) make any notes or marks on the manuals and question papers;
 - (j) direct any question regarding the questionnaire to the invigilator;
 - (k) use or retain in their possession, while in the examination room, a programmable computer/calculator;
 - (l) smoke in the examination room;
 - (m) behave in an unsatisfactory manner; or
 - (n) disobey the instructions of the invigilator.
- (4) The following types of programmable computers have been identified as such and may not be taken into the examination room –
 - (a) any calculator with an alphanumerical keyboard;
 - (b) position organizer/Navmaster;
 - (c) any Hewlett Packards;

(d) if doubt exists whether a computer may be used or not, candidates may request the CAA or the aviation training organization concerned at least 30 days before the examination to approve such computer.

1.3 Examination Results

(1) The candidate is to be notified of his/her examination(s) results giving percentage(s) obtained.

No examination result will be given telephonically.

(2) A candidate for an examination success will be valid for twelve months from the date of the examination. A candidate who applies to use that credit after that period is to be re-examined.

1.4 Re-testing after failure

An applicant who fails the written examination referred to in sub-regulation (1), may apply for retesting after the appropriate period specified below:

(1) The pass mark for any written technical examination is 75%.

(2) A candidate who fails with a mark –

(a) of between 71% and 74%, both inclusive, may apply in writing for a re-mark within 30 days from the date of receiving the examination results, on payment of the appropriately fee. If the remark is successful, the fee will be refunded;

(b) of more than 68% may apply to be entered for the following exam sitting;

(c) of between 60% and 68%, both inclusive, has to wait 6 months before applying to enter again;

(d) of less than 60%, will have to wait for 12 months before applying to enter again.

(3) A candidate who is unsuccessful with his or her second attempt, and shows no improvement on previous attempts, will have to wait 18 months before he or she will be allowed to enter for the same examination.

1.6 Persons found guilty of misconduct

Persons found guilty of misconduct by CAA inspectors and have been requested to attend penalty examinations at CAA will follow the process as per technical standard 66.02.3, paragraph 1. Note that the first attempt will be at no cost but should the applicant fail his/her first attempt the second attempt will be charged as per Part 187.

2 Knowledge requirements

2.1 Aircraft Maintenance Engineer licence (Category A rating)

(1) Category A (aeroplanes)

(a) An applicant accepted for examination in Category A to cover aeroplanes will be required to answer, in a written examination, questions to demonstrate his or her knowledge of the following subjects, according to the construction of the type for which accepted:

(i) British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the FAA Advisory Circular 43.13-2B, so far as they affect an aircraft maintenance engineer licensed in Category A.

(ii) Practical arithmetical calculations, involving vulgar and decimal fractions, percentage mensuration.

(iii) The various terms used in aeroplane construction and aerodynamics, the functioning of each component of an aeroplane, and the elementary principles of theory of flight.

(iv) The preparation of a brief report, illustrated by sketches if necessary, describing the replacements required in the event of damage, defect or wear.

(v) The inspection and checks for alignment after assembly of aeroplane structural components.

(vi) The inspection during and after adjustment of flying controls.

(vii) The correction of faults experienced in flight, with particular reference to rigging and control settings.

- (viii) General maintenance of the airframe (including equipment but excluding the engine) and minor repairs.
- (ix) Defect and deterioration of metallic materials, treatments and methods used against corrosion.
- (x) Defects and deterioration of wooden structures, including treatments and methods used in this connection, where applicable.
- (xi) Defects and deterioration of materials – other than wood or metal – such as fabric, dopes, rubber, etc. Treatments and methods used in rectifying defects encountered, where applicable.
- (xii) The inspection of control mechanisms for defects and deterioration.
- (xiii) The inspection and scope of investigation following heavy landings.
 - (xiv) The methods of checking flying instruments for correct functioning, the inspection of instruments and instrument installations in aeroplanes and methods of making check calibrations.
- (xv) The inspection of electrical installations in aeroplanes and testing for correct functioning and condition.
- (xvi) The inspection of under-carriage shock-absorbing systems, brakes, wheels and tyres.
- (xvii) The principles of operation of retracting undercarriage and flap operating systems and inspection of these systems installed in aeroplanes, where applicable.
- (xviii) The method of determining the mass and the position of the center of gravity of an aeroplane and the preparation of a mass and balance schedule.
- (xix) Where applicable, general principles of operation of the particular type of automatic pilot installed in the aeroplane.
- (xx) Where applicable, methods of coupling the automatic pilot system to the aircraft flying controls. Tests to ensure that the automatic pilot can be immediately disengaged or over-controlled in any emergency.
- (xxi) Where applicable, the daily maintenance and periodical inspections necessary to ensure correct operation and functioning of automatic pilot installations. Such minor replacements and adjustments to the automatic pilot on the aeroplane as specified in the maintenance manual as being within the scope of an aircraft maintenance engineer licensed in Category A.
- (xxii) The regulations made under the Act in so far as they affect an aircraft maintenance engineer licensed in Category A.
- (xxiii) Detailed knowledge of the construction of the airframe and the principles of operation of the components.
- (b) Where, subsequent to the written examination, a supplementary examination is required by the Director, an applicant may be required to answer further questions in respect of the subjects prescribed in sub-paragraph (1). An applicant may also be required to demonstrate his or her practical knowledge of inspection, the use of measuring instruments and the interpretation of drawings.
- (2) Categories A (rotorcraft)
 - (a) An applicant accepted for examination in Categories A for the certification before flight of rotorcraft, excluding engines, will be required to answer, in a written examination, questions to demonstrate his or her knowledge of the following subjects, according to the construction of the type for which accepted:
 - (i) British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the FAA Advisory Circular 43.13-2B, so far as they affect an aircraft maintenance engineer licensed in Categories A.
 - (ii) Practical arithmetical calculations, involving vulgar and decimal fractions, percentages and mensuration.

- (iii) The maintenance, including minor repairs, of the rotorcraft, airframe, and its equipment.
- (iv) The various terms used in rotorcraft construction and aerodynamics and the functioning of each component of a rotorcraft.
- (v) The assembly of rotorcraft structures, with particular reference to the assembly and functioning of the rotors, including transmission.
- (vi) The adjustment of the rotors for the purpose of rectifying faults experienced in flight as a result of a defect or maladjustment.
- (vii) The inspection of electrical installations in rotorcraft and testing for correct functioning and condition.
- (viii) Defects and deterioration in covered surfaces, in timber and metal structures, as applicable and methods of rectification.
- (ix) The principles and functioning of shock-absorbing devices and retracting devices of landing gear, where applicable.
- (x) The methods of effecting minor repairs and replacements.
 - (xi) The methods of checking flying and engine instruments for correct functioning, methods of making check-calibrations, and inspection of instruments and installations in rotorcraft.
- (xii) The preparation of a brief report, illustrated by sketches if necessary, describing the replacements of repairs required in the case of damage.
- (xiii) Detailed knowledge of the construction of the rotorcraft.
 - (xv) The principles of operation of the transmission and the inspection and rectification of faults in the system.
- (xvi) The composition, properties, uses, defects and protection against corrosion and deterioration of the principal materials used in the construction of the rotorcraft.
- (xvii) The method of determining the mass and the center of gravity of a rotorcraft and the preparation of a mass and balance schedule.
- (xviii) The regulations made under the Act in so far as they affect an aircraft Maintenance Engineer licensed in Categories A.
- (b) Where, subsequent to the written examination, a supplementary examination is required by the Director, an applicant may be required to answer further questions in respect of the subjects prescribed in subparagraph (1). An applicant may also be required to demonstrate his or her practical knowledge of inspection, the use of measuring instruments and the interpretation of drawings.

2.2 Aircraft Maintenance Engineer licence (Category C rating)

- (1) Category C (engines: piston and gas turbine jet)
 - (a) An applicant accepted for examination in Category C to cover aircraft engines will be required to answer, in a written examination, questions to demonstrate his or her knowledge of the following subjects, according to the construction of the type for which accepted:
 - (i) British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the FAA Advisory Circular 43.13-1B, so far as they affect an aircraft maintenance engineer licensed in Category C.
 - (ii) Practical arithmetical calculations involving vulgar and decimal fractions, percentages and mensuration.
 - (iii) The principles of operation of the engine and its parts and accessories. The preparation of a brief report, illustrated by sketches if necessary. Describing the replacements required in the event of damage, defect or wear.
 - (iv) Methods of inspection for defects during rectification, clearances and allowances for wear and distortion.
 - (v) Methods of rectification of defects, inspection during and after re-assembly.

- (vi) Inspection and checks on complete installation and systems, as required during engine installation.
- (vii) The methods of checking engine instruments for correct functioning, the inspection of engine instruments and instrument installations in aeroplanes and methods of making check calibrations.
- (viii) Testing and tuning during ground running in accordance with the manufacturer's recommended procedure, including diagnosis of all types of running faults.
- (ix) Preparing engines for initial installation and inhibiting of engines.
 - (x) General maintenance of the engine and its installation, including minor repairs.
- (xi) Where applicable, the assembly of variable-pitch propellers dismantled for ease of transport, provided the propeller hub is not dismantled or split, assembly of propeller to engine, inspection of damage to propellers, permissible limits and methods of rectification.
- (xii) Where applicable, the principles of variable-pitch propellers and controlling devices, beta and reverse mode inspection of correct assembly and functioning, de-icing ground testing and rectification of defects.
- (xiii) Detailed knowledge of the construction of the type of engine for which accepted.
- (xiv) Dismantling of modules of turbo propeller and gas turbine jet engines for repairs for overhaul and testing.
- (xv) Constructional details of parts, the rectification of which may be certified by the holder of a licence in Category C.
- (xvi) Typical faults and defects calling for partial overhaul or other rectification that may be certified by the holder of a licence in Category C, provided the crankcase halves of a piston engine are not dismantled.
- (xvii) The inspection of the complete fuel, oil, pneumatic and, where applicable, coolant systems and tests for functioning and defects and methods of rectification.
- (xviii) Inspection of ignition systems and high tension harnesses for correct installation, condition, timing and functioning, and test for defects and methods of rectification.
- (xix) The principles of operation of carburetors and/or injectors, inspection of carburetors or injectors and induction systems, fuel control units, fuel manifolds, nozzles and combustion chambers, test for functioning and defects.
- (xx) Where applicable, the inspection of fixed-pitch propellers, fans, compressors, turbines, inspection, repairs and replacement of rotors and blades and checks during assembly to engine.
- (xxi) Where applicable, the principles of supercharging turbo charging and the operation of boost controls, inspection for correct assembly adjustment and functioning.
- (xxii) Where applicable the principles of gas turbine engines, air and gas flows, engine pressure ratios, rotor speeds, temperatures, torques, thrust and thrust reversing.
- (xxiii) The composition, properties, uses, defects and protection against corrosion and deterioration of the principal materials used in the construction of the engine, its parts, accessories and installation.
- (xxiv) The regulations made under the Act in so far as they affect an aircraft maintenance engineer licensed in Category C.
- (b) Where, subsequent to the written examination, a supplementary examination is required by the Director, an applicant may be required to answer further questions in respect of the subjects prescribed in subparagraph (1). An applicant may also be required to demonstrate his or her practical knowledge of inspection, the use of measuring instruments and the interpretation of drawings.

2.3 Aircraft Maintenance Engineer licence (Category W rating)

- (1) Category W: Avionic Equipment (Installations/Service)

(a) An applicant accepted for examination in Category W for the certification of the installation, modification, troubleshooting, rectification of defects, repair and system checks in aircraft of all types of Radio Communication Equipment, Radio Navigational Equipment (Pulse and Non-Pulse), and Electronically Operated Systems, i.e. amplifiers, computers, recorders, flight management and entertainment systems, will be required to answer, in written examinations, questions to demonstrate his knowledge of the following:

- (i) British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the American Advisory Circular 43.13-1A & B so far as they affect an aircraft maintenance engineer's licence in Category W.
 - (ii) Elementary electricity and magnetism, definitions of terms used and their application and the elementary mathematical calculations involved.
 - (iii) Basic theory pertaining to the applicable trade.
 - (iv) Basic semiconductor and digital devices.
 - (v) Operation and use of electronic test equipment.
 - (vi) The regulations made under the Act so far as they affect an aircraft maintenance engineer licensed in Category W.
 - (vii) Methods of inspecting and testing the whole system, including the bonding and earthing system.
 - (viii) Theory of operation, maintenance procedures and testing of the equipment.
 - (ix) The installation of such equipment in aircraft, the procedures to be followed and the precautions to be observed.
- (b) Where subsequent to the written examination, a supplementary examination is required by the Director, an applicant may be required to answer further questions in respect of the subjects prescribed in subparagraph (a), an applicant may also be required to demonstrate his or her practical knowledge of inspection, the use of measuring instruments and the interpretation of drawings.

(2) Category W: Electrical Equipment (Installations/Service)

(a) An applicant accepted for examination in Category W for the certification of the installations, modification, troubleshooting, rectification of defects, repair and system checks in aircraft of all types of electrical equipment, will be required to answer in written examinations, questions to demonstrate his knowledge of the following:

- (i) British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the American Advisory Circular 43.13-1A & B so far as they affect an aircraft maintenance engineer licensed in Category W.
 - (ii) Elementary electricity and magnetism, definitions of terms used and their application and the elementary mathematical calculations involved.
 - (iii) Basic theory pertaining to the applicable trade.
 - (iv) Basic semiconductor and digital devices.
 - (v) Operation and use of electronic test equipment.
 - (vi) The regulations made under the Act so far as they affect an aircraft maintenance engineer licensed in Category W.
 - (vii) Methods of inspecting and testing the whole system, including the bonding and earthing system.
 - (viii) Theory of operation, maintenance procedures and testing of the equipment.
 - (ix) The installation of such equipment in aircraft, the procedures to be followed and the precautions to be observed.
- (b) Where, subsequent to the written examination, a supplementary examination is required by the Director, an applicant may be required to answer further questions in respect of the subjects prescribed in subparagraph (a), an applicant may also be required to demonstrate

his or her practical knowledge of inspection, the use of measuring instruments and the interpretation of drawings.

(3) **Category W: Instrument Equipment Installations/Serviceing**

(a) An applicant accepted for examination in category W for the certification of the installation, modification, troubleshooting, rectification of defects, repair and system checks in aircraft of all types of instrument equipment, will be required to answer, in written examinations, questions to demonstrate his knowledge of the following:

- (i) British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the American Advisory Circular 43.13-1A & B so far as they affect an aircraft maintenance engineer licensed in Category W.
 - (ii) Elementary electricity and magnetism, definitions of terms used and their application and the elementary mathematical calculations involved.
 - (iii) Basic theory pertaining to the applicable trade.
 - (iv) Basic semiconductor and digital devices.
 - (v) Operation and use of electronic test equipment.
 - (vi) The regulations made under the Act so far as they affect an aircraft maintenance engineer licensed in Category W.
 - (vii) Methods of inspecting and testing the whole system, including the bonding and earthing system.
 - (viii) Theory of operation, maintenance procedures and testing of the equipment.
 - (ix) The installation of such equipment in aircraft, the procedures to be followed and the precautions to be observed.
- (b) Where, subsequent to the written examination, a supplementary examination is required by the Director, an applicant may be required to answer further questions in respect of the subjects prescribed in subparagraph (a), an applicant may also be required to demonstrate his or her practical knowledge of inspection, the use of measuring instruments and the interpretation of drawings.

2.4 Aircraft Maintenance Engineer licence (Category B rating)

(1) **Category B (aircraft)**

(a) An applicant accepted for examination in Category B for the certification of the repair and overhaul of aircraft, incorporating the use and replacement of approved parts and components only, will be required to answer, in a written examination, questions to demonstrate his or her knowledge of the following subjects, according to the construction of the type for which accepted:

- (i) British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the FAA Advisory Circular 43.13-1B, so far as they affect an aircraft maintenance engineer licensed in Category B.
- (ii) Practical arithmetical calculations, involving vulgar and decimal fractions, percentages and mensuration.
- (iii) The various terms used in aeroplane construction and aerodynamics, the functioning of each component of an aircraft and the elementary principles of theory of flight.
- (iv) The preparation of an inspection report on the condition of an aircraft that is about to be overhauled.
- (v) The method of systematically carrying out the required overhaul.
- (vi) The procedure for compiling an inspection report of work done in the overhaul of the components.
- (vii) The approved repair scheme applicable to the complete rectification and overhaul of the components, including fixed-pitch wooden propellers or rotors.
- (viii) The inspection of the repair, overhaul and assembly of components and the workshop processes involved, such as gluing, doping, welding, brazing and soldering, so far as they

affect the incorporation of previously approved replacement members and parts, including the appropriate protective and heat treatments, where applicable.

- (ix) The inspection and methods of checking for alignment and symmetry of components such as fuselages, hulls, floats, wings and fixed-pitch wooden propellers and rotors, where applicable.
 - (x) The inspection of the repair, overhaul and functional testing of tanks, radiators and coolers.
 - (xi) The inspection of the repair, overhaul and functional testing of shock-absorbing devices of landing gear.
 - (xii) The inspection of the engine installations, including controls and fuel, oil and coolant systems.
 - (xiii) The inspection of the complete aircraft, including controls and trimming devices, for correct assembly and functioning.
 - (xiv) The general principles of electricity and magnetism and, as far as it is practicable on the ground, the inspection of the installation and functioning of instruments, automatic pilots and electrical equipment. Methods of making check calibrations.
 - (xv) The method of determining the mass and the position of the center of gravity of an aircraft and the preparation of the mass and balance schedule.
 - (xvi) The preparation of a sketch from which a finished drawing can be made.
 - (xvii) The inspection of the assembly and functioning of retracting devices of landing gear, where applicable.
 - (xviii) The regulations made under the Act in so far as they affect an aircraft maintenance engineer licensed in Category B.
 - (xix) Detailed knowledge of the construction of the airframe and its components.
 - (xx) The composition, properties, uses, defects and protection against corrosion and deterioration of the principal materials used in the construction of the airframe and its components.
 - (xxi) The identification, selection, inspection and physical testing of the various timbers used in the construction of the aircraft, where applicable.
 - (xxii) The methods of examination and physical testing of all the non-metallic materials (other than timbers) used in the construction of the aircraft to ensure compliance with specification requirements.
 - (xxiii) The inspection during manufacture of non-metallic materials into aircraft parts and components, of the workshop processes involved in gluing, stitching, doping and protective measures against corrosion and deterioration, where applicable.
 - (xxiv) The methods of examination and physical testing of both ferrous and non-ferrous metallic materials used in the construction of the aircraft to ensure compliance with specification requirements.
 - (xxv) The inspection during manufacture of metallic materials into aircraft parts and components, and of the workshop processes involved. Heat treatment, including temperature control, welding, soldering, brazing, electro-plating and other protective treatments against corrosion and deterioration.
 - (xxvi) The inspection during construction of components such as fuselages, wings, fixed-pitch wooden propellers, rotors, tanks, radiators and coolers.
 - (b) Where, subsequent to the written examination, a supplementary examination is required by the Director, an applicant may be required to answer further questions in respect of the subjects prescribed in subparagraph (a). An applicant may also be required to demonstrate his or her practical knowledge of inspection, the use of measuring instruments and his or her interpretation of drawings.
- (2) Category B (Structure Worker)

- (a) An applicant accepted for the examination in Category X (aircraft structures) will be required to answer in a written examination, questions to demonstrate his or her knowledge of the subjects prescribed in items (iii) to (xii):
- (i) British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the FAA Advisory Circular 43.13-1B, in so far as these affect an aircraft maintenance engineer licensed in Category X (aircraft structures).
 - (ii) Standard Practices
 - (aa) Safety practices
 - (bb) Gas laws and fluid mechanics – Theory and application
 - (cc) Properties of the atmosphere – Pressure, humidity, density characteristics
 - (dd) Properties of solids and liquids – Theory and application
 - (ee) Velocity, acceleration, mass and force – Theory and calculation
 - (ff) Heat, temperature, heat transfer and measurement – Calculation
 - (gg) Work, energy and power – Theory and calculation
 - (hh) Aircraft electrical wiring – Types, characteristics, wire sizes
 - (ii) Aircraft grounding and bonding – Theory and calculation
 - (jj) Instrument panel layout and instrument mounting – Theory and application
 - (ll) Flight control systems – Theory and application
 - (mm) Propulsion systems – Theory and application
 - (nn) Hydraulic systems – Theory and application
 - (oo) Pneumatic systems – Theory and application
 - (pp) Landing gear systems – Theory and application
 - (qq) Environmental systems – Theory and application
 - (rr) Fire protection systems – Theory and application
 - (ss) Safety wiring (lockwiring) procedures
 - (tt) Welding techniques – Theory and application
 - (uu) ATA Specification 100 – Chapters relevant to maintenance aviation maintenance
 - (iii) Aerodynamics
 - (aa) Aircraft structures and theory of flight – Fixed wing aircraft
 - (bb) Aircraft structures and theory of flight – Rotary wing aircraft
 - (iv) Mathematics/Physics
 - (aa) Shop mathematics, graphs and charts – Theory and application
 - (bb) Measurement systems and conversion – Calculation and application
 - (cc) Chemical and physical nature of matter – Theory and application
 - (dd) Stress and strain – Theory and application
 - (v) Aircraft Hardware
 - (aa) Specifications and standards – Basic theory and application
 - (bb) Rivets – Identification and use
 - (cc) Threaded fasteners – Identification and use
 - (dd) Special fasteners – Theory and application
 - (ee) Control cables, terminals and turnbuckles – Identification and use
 - (ff) Rigid lines, flexible lines and fittings – characteristics, fabrication, material and size designation
 - (gg) Sealant – Theory and application

- (vi) Aircraft Drawing
 - (aa) Types of drawings – Application
 - (bb) Interpretation of drawings, diagrams and charts – Theory and application
 - (cc) Station diagrams – Theory and application
- (vii) Weight and Balance
 - (aa) C of G design limits and range – knowledge and application
 - (bb) Weighing procedures and calculations – knowledge and application
- (viii) Metallurgy and Corrosion Prevention
 - (aa) Types of corrosion – Identification
 - (bb) Inspection processes – Theory and application
 - (cc) Removal and treatment of corrosion – Theory and application
 - (dd) Heat treatment, annealing and temper designation – Theory and application
 - (ee) Ferrous and non ferrous metals – Types and properties
- (ix) Non-destructive Testing
 - (aa) Inspection techniques – Theory, types and application
- (x) General Handling and Servicing
 - (aa) Shop safety – Theory and application
 - (bb) Fire protection – Types, prevention and extinguishing
 - (cc) Safety on the flight line – FOD and hazardous areas
 - (dd) Ground servicing equipment – Theory and application
- (xi) Tools and Measuring Devices
 - (aa) Hand tools – Identification and use
 - (bb) Power tools – Identification and use
 - (cc) Measuring devices – Identification and use
 - (dd) Test equipment – Identification and application
- (xii) Aircraft Sheet Metal, Tubular, Wood and Composite Structures
 - (aa) Repairs and fabrication
 - (bb) Assessment methods, techniques and practices – Theory, application and inspection
 - (cc) Repair materials – identification and application
- (xiii) Thermoplastics
 - (aa) Material – Inspection and installation
 - (bb) Storage and surface protection – Theory and application
- (xiv) Maintenance Procedures
 - (aa) Inspection and maintenance requirements – Theory and application
 - (bb) Inspections (periodic, annual, progressive, approved maintenance schedules)
 - (cc) Jacking, hoisting and leveling – Theory and application
 - (dd) Basic welding – Theory and application
 - (ee) Rivet layout pattern designs and installation – Theory and application

2.5 Aircraft Maintenance Engineer licence (Category D rating)

(1) Category D (engines)

- (a) An applicant accepted for examination in Category D for the certification of the overhaul and repair of engines, incorporating the use and replacement of approved parts and components only, will be required to answer, in a written examination, questions to demonstrate his or her knowledge of the following subjects, according to the construction of the type for which accepted –

- (i) British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the FAA Advisory Circular 43.13-1B, so far as they affect an aircraft maintenance engineer licensed in Category D.
- (ii) Practical arithmetical calculations, involving vulgar and decimal fractions, percentages and mensuration.
- (iii) The principles of operation of the engine and its components and accessories.
- (iv) The preparation of an inspection report on the condition of an engine stripped down for complete overhaul for parts accessories and installation.
- (v) The method of systematically carrying out the complete overhaul and repair of the engine, its parts and accessories, not incorporating electric principles but including the replacement of the mechanical parts of a magneto.
- (vi) The procedure for completing the inspection report on work done in the overhaul of the parts.
- (vii) The methods of inspection during overhaul of the parts of an engine for wear, misalignment, distortion and damage. The defects likely to be encountered and their rectification, the permissible allowances for wear and distortion and the balancing of parts.
- (viii) The inspection during rectification of parts and the re-assembly of the engine and of the workshop processes involved, so far as they affect the incorporation and fitting of previously approved replacement parts, including the appropriate protective treatments applicable.
- (ix) The methods of inspection and checking the correct functioning of the ignition, fuel control, carburetion or injection, bonding and, where applicable, coolant systems.
- (x) The inspection of the complete engine, including controls for correct assembly and functioning.
- (xi) The principles, functioning, operation, adjustment and control of the equipment used for testing engines.
- (xii) The inspection, adjustment and testing of an engine and all its accessories after overhaul, including the measurement of the power developed and of the fuel and oil consumption.
- (xiii) The preparation of a sketch from which a finished drawing can be made.
- (xiv) The methods of inspecting and checking of the correct functioning of propeller control systems, where applicable.
- (xv) The principles of supercharging and the operation and testing of superchargers and boost control systems, where applicable.
- (xvi) Detailed knowledge of the construction of the engine, its parts and accessories.
- (xvii) The composition, properties, uses, defects and protection against corrosion and deterioration of the principal materials used in the construction of the engine, its parts, accessories and installation.
- (xviii) The regulations made under the Act in so as they affect an aircraft maintenance engineer licensed in Category D.
- (xix) The methods of examination and physical testing of both ferrous and non-ferrous metallic materials used in the construction of the engine to ensure compliance with specification requirements.
- (xx) The methods of examination and physical testing of metal forgings, castings and pressings used in the construction of the engine, for the detection of characteristic defects which may render them unsuitable and to ensure compliance with both specification and drawing requirements.
- (xxi) The inspection of metallic materials during the manufacture of metal forgings, castings and pressings into engine parts, the repair of parts and of the workshop processes involved, heat treatments, including temperature control of hardening, tempering, case hardening and normalising procedures, and of welding, white metalling, soldering, brazing, electroplating and other protective treatments against corrosion and deterioration.

- (xxii) The inspection and methods of checking the finished parts prior to and during assembly into the complete engine for correct alignment, mass and balance.
- (b) Where, subsequent to the written examination, a supplementary examination is required by the Director, an applicant may be required to answer further questions in respect of the subjects prescribed in subparagraph (a). An applicant may also be required to demonstrate his or her practical knowledge of inspection, the use of measuring instruments and the interpretation of drawings.

2.6 Aircraft Maintenance Engineer licence (Category X rating)

(1) Category X (automatic pilots)

An applicant accepted for examination in Category X for the certification of the repair and overhaul of automatic pilots will be required to answer, in a written examination, questions to demonstrate his or her knowledge of the subjects prescribed in items (a) to (d) and, in addition, according to the class of automatic pilot for which accepted, questions to demonstrate his or her knowledge of the subjects prescribed in sub-paragraphs (b) to (d) –

- (a) General
 - (i) British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the FAA Advisory Circular 43.13-1B, so far as they affect an aircraft maintenance engineer licensed in Category X.
 - (ii) Elementary physics and the elementary practical mathematical calculations involved.
 - (iii) The fundamental principles employed in the construction and operation and their application to the particular automatic pilot for which the application is accepted.
 - (iv) The regulations made under the Act in so far as they affect an aircraft maintenance engineer licensed in Category X (automatic pilots).
- (b) Automatic pilots employing hydraulic operation
 - (i) General principles of construction and operation of the control units, subassemblies, hydraulic and air systems.
 - (ii) The necessary inspection prior to installation in the aircraft of the automatic pilot and its subassemblies, including oil pumps, regulators and accessories.
 - (iii) The inspection, during and after installation in the aircraft, including procedure for bleeding the hydraulic system. Tests to be carried out to ensure that the automatic pilot can be disengaged quickly and/or manually over-controlled in emergency in flight and that it is correctly installed.
 - (iv) The types of faults, which may develop in operation and methods, adopted to trace the causes. The adjustment and rectification of minor defects and measures taken to prevent their recurrence.
 - (v) The inspection of parts of the control units and subassemblies during overhaul, repair or modification and the correction of physical and mechanical faults peculiar to such parts. The effect of variation and adjustment.
 - (vi) The methods and procedure for lapping, polishing, testing and inspecting ball-races, cones and pivots to the gyro systems, gimbal systems and attachments.
 - (vii) The conventional method of tuning, balancing, calibrating, adjusting and testing during and after overhaul, repair or modification of the subassemblies and the complete automatic pilot in the workshop so far as is permitted by the manufacturer's approved overhaul and repair manual.
The principles employed and methods adopted in construction, operation, calibration and testing of the substandard test apparatus normally used in automatic pilot repair workshops. The use for this purpose of reference standards.
- (c) Automatic pilots employing pneumatic operation
 - (i) The general principles of operation and construction of the control unit or units and subassemblies, including the monitoring system and air system.

- (ii) The necessary inspection prior to installation in the aircraft of the automatic pilot and its subassemblies including the compressors, separators and dryers.
- (iii) The inspection during and after installation in the aircraft. Tests to be carried out to ensure that the automatic pilot can be disengaged quickly and/or manually over-controlled in emergency in flight and that it is correctly installed.
- (iv) The type of faults, which may develop in operation, methods, adopted to trace the causes. The adjustment and rectification of minor defects and measures to be taken to prevent their recurrence.
- (v) The inspection of parts of the control units and subassemblies during overhaul, repair or modification and the correction of physical and mechanical faults peculiar to such parts. The effect of variation and adjustment.
- (vi) The methods and procedures for lapping, polishing, testing and inspecting ball-races, cups, cones and pivots of the gyro systems, gimbal systems and attachments.
- (vii) The conventional method of tuning, balancing, calibrating, adjusting and testing during and after overhaul, repair or modification of the subassemblies and the complete automatic pilot in the workshop so far as is permitted by the manufacturer's approved overhaul and repair manual.

The principles employed and the methods adopted in the construction, operation, calibration and testing of the substandard test apparatus normally used in automatic pilot repair workshops. The use for this purpose of reference standards.

- (d) Automatic pilots employing electrical operation (including those with electronic amplifiers)
 - (i) Electricity and magnetism, definitions of terms used and their application and the elementary practical mathematical calculations involved. Basic electronic principles, the operation of electronic components, electronic circuit analysis and basic calculations involved with such circuits.
 - (ii) General principles of operation and construction of the control unit or units and subassemblies, including the electrical, hydraulic and/or air systems and monitoring systems, where applicable.
 - (iii) The necessary inspection prior to installation in the aircraft of the automatic pilot and its subassemblies.
 - (iv) The inspection during and after installation in the aircraft of the automatic pilot and its subassemblies.
 - (v) The types of electrical and mechanical faults, which may develop in operation and the methods, adopted to trace the causes. The adjustments and rectification of minor defects and measures taken to prevent their recurrence.
 - (vi) The inspection of components of the control units and subassemblies during overhaul, repair or modification and the correction of physical, electrical and mechanical faults peculiar to such components. The effect of variation and adjustment.
 - (vii) The conventional method of calibrating, adjusting and testing during and after overhaul, repair or modification of the sub-assemblies and the complete automatic pilot in the workshop so far as is permitted by the manufacturer's approved overhaul and repair manual.
 - (viii) The principles employed and methods adopted in the construction, operation, calibration and testing of the substandard test apparatus normally used in automatic pilot repair workshops. The use for this purpose of reference standards.

- (e) Supplementary examination

Where, subsequent to the written examination, a supplementary examination is required by the Director, an applicant may be required to answer further questions in respect of the subjects prescribed in subparagraphs (a) to (d) according to the class of automatic pilot for which application is accepted. An applicant may also be required to demonstrate his or her

practical knowledge of inspection, the use of measuring instruments and the interpretation of drawings.

(2) Category X (Compasses)

(a) An applicant accepted for examination in Category X for the certification of the installation and compensation of direct-reading compasses will be required to answer, in a written examination, questions to demonstrate his or her knowledge of the subjects prescribed in items (i) to (x). An applicant for examination in remote-reading compasses will be required in addition to answer, in a written examination, questions to demonstrate his or her knowledge of the subjects prescribed in items (xi) to (xiii) according to the form of construction applicable to the type of remote-reading compass for which the application is accepted:

- (i) British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the FAA Advisory Circular 43.13-1B, so far as they affect an aircraft maintenance engineer licensed in Category X.
 - (ii) The general principles of magnetism, magnetic materials and permanent magnets, polarity and strength of bar magnets, the earth as a magnet, the magnetic meridian and its relationship to the geographic meridian.
 - (iii) The general principles of construction of typical aircraft compasses, including magnet systems, damping liquid, verge ring and markings, lubber line, grid wires, shock-absorbing suspension and corrector box, the inspection necessary for the detection of common defects that may arise in use.
 - (iv) Minor external repairs to the compass and de-aerating the compass liquid.
 - (v) The installation of compasses in aircraft, points to be observed and the procedure adopted before adjustments are made.
 - (vi) The precautions to be observed in the choice of a site for and the preparation of a "swinging base" and checking the base by means of a landing compass.
 - (vii) The compensation of compasses in aircraft, including the observation of deviations, the calculations and adjustments necessary for corrections of co-efficients A, B and C, the procedure to be followed after the corrections are made and the preparation of deviation cards and graphs.
 - (viii) The use of a landing compass for the checking of compasses in aircraft.
 - (ix) The compensation of the compass in a marine aircraft afloat by means of a bearing plate, on the aircraft, or by the use of a landing compass ashore.
 - (x) The regulations made under the Act in so far as they affect an aircraft maintenance engineer licensed in Category X (compasses).
 - (xi) The general principles of construction of remote-reading aircraft compasses, the principles of operation and functioning of the particular type for which the application is made and inspection of the parts necessary, prior to installation in the aircraft.
 - (xii) The installation and correct positioning of the remote-reading compass in the aircraft, including the components and accessories, points to be observed and the procedure adopted before adjustments are made.
 - (xiii) The methods and procedure adopted for the compensation of remote-reading compass in the aircraft, the adjustments to be made to the master compass, the master indicator and the repeater units in order to ensure correct functioning.
- (b) Supplementary examination
Where, subsequent to the written examination, a supplementary examination is required by the Director, an applicant may be required to answer further questions in respect of the subjects prescribed in subparagraph (a). An applicant may also be required to demonstrate his or her knowledge, in a practical form, of the subjects prescribed above.

(3) Category X (Electrical Equipment)

(a) An applicant accepted for examination in Category X for the certification of the overhaul, repair and modification of aircraft electrical equipment, including installations in aircraft with main power supply systems, the nominal tension of which does not exceed 30 volts, will be required to answer, in a written examination, questions to demonstrate his or her knowledge of the following subjects –

- (i) British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the FAA Advisory Circular 43.13-1B, so far as they affect an aircraft maintenance engineer licensed in Category X.
- (ii) Elementary electricity and magnetism, definitions of the terms used and their application, and the elementary practical mathematical calculations involved.
- (iii) The construction and functioning of all types of electro-magnetic induction machines used on aircraft.
- (iv) The method of carrying out overhauls and repairs to electro-magnetic induction machines used on aircraft, the inspection necessary to detect defects, mechanical, electrical and magnetic, as a result of wear and deterioration, and the permissible allowances in each case.
- (v) The inspection of parts of aircraft electrical generators, motors, automatic control and switch gear.
- (vi) The schedule of tests, the equipment required for such tests, and the methods employed in carrying out functional tests to prove the satisfactory condition of electrical generators and motors after overhaul and repair.
- (vii) The general principles of construction and functioning of all types of automatic control and switch gear, the method of carrying out overhauls, repairs and tests.
- (viii) The installation, functioning and testing of all types of electrical batteries.
- (ix) The selection and inspection of materials used in the construction, repair and overhaul of aircraft electrical equipment.
- (x) The types, sizes and capacities of cables, fuses and switch gear used in aircraft electrical installation.
- (xi) The specified light-angles of navigation lamps, the installation, inspection, overhaul and testing of navigation, signaling and landing-light equipment.
- (xii) Methods of inspecting and testing the whole of the electrical system installed in aircraft, including the bonding and earthing system.
- (xiii) The preparation of a circuit diagram illustrating the symbols used to denote the various items of equipment.
- (xiv) The regulations made under the Act in so far as they affect an aircraft maintenance engineer licensed in Category X (electrical equipment).

(b) Supplementary examination

Where, subsequent to the written examination, a supplementary examination is required by the Director, an applicant may be required to answer further questions in respect of the subjects prescribed in subparagraph (a). An applicant may also be required to demonstrate his or her practical knowledge of inspection, the use of measuring instruments and the interpretation of drawings.

(4) Category X (Ignition Equipment)

(a) An applicant accepted for examination in Category X for the certification of the repair and overhaul of aircraft engine ignition equipment will be required to answer, in a written examination, questions to demonstrate his or her knowledge of the following subjects –

- (i) British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the FAA Advisory Circular 43.13-1, so far as they affect an aircraft maintenance engineer licensed in Category X.

- (ii) Elementary electricity and magnetism, definitions of the terms used and their application and the elementary practical mathematical calculations involved.
 - (iii) The construction and functioning of all types of engine ignition apparatus, including screened types fitted to aircraft engines.
 - (iv) The method of carrying out overhauls and repairs, the inspection necessary to detect defects, mechanical, electrical and magnetic, as a result of wear and deterioration and the permissible allowances in each case.
 - (v) The inspection and testing of parts and assemblies, and the equipment required for such tests.
 - (vi) The schedule of tests, the equipment for such tests, and the methods employed in carrying out functional tests to prove the satisfactory condition of apparatus after overhaul and repair.
 - (vii) The construction and functioning of impulse starters, the method of carrying out overhauls, repairs and tests.
 - (viii) The construction and functioning of automatic timing devices, the method of carrying out overhauls, repairs and tests.
 - (ix) The construction, inspection and testing of ignition cables, screened harness and fittings, the defects and deterioration likely to be encountered, and the effect on engine ignition apparatus and spark plugs, of metal braiding on cables.
 - (x) The overhaul and testing of spark plugs.
 - (xi) The preparation of a wiring diagram from which a finished drawing could be made of the internal and external connections of a typical ignition system.
 - (xii) The regulations made under the Act in so far as they affect an aircraft maintenance engineer licensed in Category X (engine ignition equipment).
 - (b) Supplementary examination

Where, subsequent to the written examination, a supplementary examination is required by the Director, an applicant may be required to answer further questions in respect of the subjects prescribed in subparagraph (a). An applicant may also be required to demonstrate his or her practical knowledge of inspection, the use of measuring instruments and the interpretation of drawings.
- (5) Category X (Instruments)
- (a) An applicant accepted for examination in Category X for the certification of the overhaul, repair and modification of aircraft and engine instruments, excluding electrically operated instruments, will be required to answer, in a written examination, questions to demonstrate his or her knowledge of the subjects prescribed in items (i) to (x). An applicant accepted for examination in Category X for the certification of the overhaul, repair or modification of aircraft and engine instruments, including electrically operated instruments, will be required in addition to answer, in a written examination, questions to demonstrate his or her knowledge of the subjects prescribed in items (xi) and (xii) –
 - (i) British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the FAA Advisory Circular 43.13-1B, so far as they affect an aircraft maintenance engineer licensed in Category X.
 - (ii) Elementary physics and the elementary practical mathematical calculations involved.
 - (iii) The general principles of construction, operation, overhaul and repair of all types of mechanically operated aircraft and engine instruments.
 - (iv) The types of fault, which may develop in operation, methods, adopted to trace the causes and measures taken to prevent their recurrence, the effect of variation and adjustment on instrument mechanisms.
 - (v) The inspection of parts of the various instruments during overhaul and repair, the correction of mechanical faults peculiar to such instruments.

- (vi) The conventional methods of calibration, adjusting and testing aircraft and engine instruments, high and low pressure tests, temperature and vibration tests, and luminosity tests on luminous fluorescent dial markings.
 - (vii) The principles employed, and method adopted, in the construction and operation of the substandard test apparatus normally used in instrument repair shops for calibration purposes.
 - (viii) Methods of testing and checking the accuracy of the substandard test apparatus, and the use for this purpose of reference standards.
 - (ix) The preparation of a sketch from which a finished drawing could be made of a part of a typical instrument mechanism.
 - (x) The regulations made under the Act in so far as they affect an aircraft maintenance engineer licensed in Category X (instruments).
 - (xi) Elementary electricity and magnetism, definitions of the terms used and their application, and the elementary practical mathematical calculations involved.
 - (xii) The general principles of construction, operation, overhaul and repair of all electrically-operated instruments used in aircraft, methods of adjustment, detection and rectification of faults peculiar to specific instruments and equipment, and the tests necessary to prove correct functioning.
- (b) Supplementary examination
Where, subsequent to the written examination, a supplementary examination is required by the Director, an applicant may be required to answer further questions in respect of the subjects prescribed in subparagraph (a). An applicant may also be required to demonstrate his or her practical knowledge of inspection, the use of measuring instruments and the interpretation of drawings.
- (6) Category X (Variable-Pitch Propellers)
- (a) An applicant accepted for examination in Category X for the certification of the overhaul, repair or modification of variable-pitch propellers, will be required to answer, in a written examination, questions to demonstrate his or her knowledge of the subjects prescribed in items (i) to (x), according to the form of construction applicable to the type of propeller for which application is accepted. An applicant accepted for examination in Category X for the certification of the overhaul, repair or modification of oil and electrically operated variable-pitch propellers will be required in addition to answer, in a written examination, questions to demonstrate his or her knowledge of the subjects prescribed in item (xii) –
- (i) British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the FAA Advisory Circular 43.13-1B so far as they affect an aircraft maintenance engineer licensed in Category X.
 - (ii) Practical arithmetical calculations, involving vulgar and decimal fractions, percentages and mensuration.
 - (iii) The principles and functioning of the operating systems of current types of variable-pitch propellers.
 - (iv) The preparation of an inspection report on the condition of the propeller dismantled for complete overhaul.
 - (v) The method of systematically carrying out the required overhaul.
 - (vi) The procedure for completing the inspection record on work done in the overhaul of the parts.
 - (vii) The approved repair scheme applicable to the rectification and overhaul of the parts.
 - (viii) The methods of inspection during the overhaul of the parts of a propeller for wear, mal-alignment, distortion and damage. The defects likely to be encountered and their

rectification, the permissible clearances and allowances for wear and distortion, and the balancing of parts.

- (ix) The inspection during rectification of parts and components and the reassembly of the propeller, the workshop processes involved, so far as they affect the incorporation and fitness of previously approved replacement parts, including the appropriate protective treatments applicable.
 - (x) The inspection during rectification of spinners, fans and all parts normally attached to, and rotating with, propellers.
 - (xi) The construction and functioning of auxiliary oil pumps, motors, constant-speed governors, controlling means and de-icing equipment and the methods of carrying out overhauls, repairs and tests.
 - (xii) The inspection of a complete propeller for correct assembly, adjustment, mass and balance, methods employed for correcting balance and checking torque loading of blades.
 - (xiii) Assembly of a propeller to an engine, check testing and adjustment for performance and correction of faults.
 - (xiv) Static and dynamic balancing of the propeller.
 - (xv) The preparation of a sketch from which a finished drawing could be made of a part of the operating mechanism of a variable, controllable and fixed pitch propeller.
 - (xvi) The regulations made under the Act in so far as they affect an aircraft maintenance engineer licensed in Category X (variable, controllable and fixed pitch propellers).
 - (xvii) Elementary electricity and magnetism, definitions of the terms used and their application and the elementary practical mathematical calculations involved.
 - (b) Where, subsequent to the written examination, a supplementary examination is required by the Director, an applicant may be required to answer further questions in respect of the subjects, as applicable, prescribed in subparagraph (a). An applicant may also be required to demonstrate his or her practical knowledge of inspection, the use of measuring instruments and the interpretation of drawings.
- (7) Category X (Avionic Equipment)
- (a) An applicant accepted for examination in Category X for the certification of the overhaul, repair, modification and installation of avionic equipment in aircraft will be required to answer in a written examination, questions to demonstrate his or her knowledge of the subjects prescribed in items (i) to (vi), and in addition, according to the rating for which he has been accepted, questions to demonstrate his or her knowledge of the subjects prescribed in items (vii) to (x) or (xi) to (xx) –
 - (i) British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the FAA Advisory Circular 43.13-1B so far as they affect an aircraft maintenance engineer licensed in Category X.
 - (ii) Elementary electricity and magnetism, definitions of terms used and their application and the elementary mathematical calculations involved.
 - (iii) Basic theory pertaining to radio and electronic principles.
 - (iv) Basic semi-conductor and digital devices theory and its application.
 - (v) Operation and use of electronic test equipment and the limitations on the use of such equipment.
 - (vi) The regulations made under the Act in so far as they affect an aircraft maintenance engineer licensed in Category X (Avionic Equipment).
Avionic equipment excluding equipment employing pulse techniques
 - (vii) Methods of inspecting and testing the whole of the avionic system, excluding equipment employing pulse techniques, installed in aircraft, including the bonding and earthing system.
 - (viii) Theory of operation, maintenance procedures, alignment and testing of all types of avionic equipment excluding equipment employing pulse techniques.

- (ix) The installation of all such equipment in aircraft, the procedures to be followed and the precautions to be observed.
 - (x) Theory of operation, installation, inspection and testing of appropriate avionic equipment, antenna and transmission lines.
Avionic equipment employing pulse techniques
 - (xi) Base theory and principles of pulse techniques.
 - (xii) Methods of inspecting and testing the whole of the avionic system employing pulse techniques installed in aircraft, including the bonding and earthing system.
 - (xiii) Theory of operation, maintenance procedures, alignment and testing of all types of avionic equipment employing pulse techniques.
 - (xix) The installation of all such equipment in aircraft, the procedures to be followed and the precautions to be observed.
 - (xx) Theory of operation, installation, inspection and testing of appropriate avionic equipment antenna and transmission lines.
 - (b) Supplementary examination
Where, subsequent to the written examination, a supplementary examination is required by the Director, an applicant may be required to answer further questions in respect of the subjects, as applicable, prescribed in subparagraph (a). An applicant may also be required to demonstrate his or her practical knowledge of inspection, the use of measuring instruments and the interpretation of drawings.
- (8) Category X (aircraft welding)
- (a) An applicant accepted for the examination in Category X (aircraft welding) will be required to answer in a written examination, questions to demonstrate his or her knowledge of the subjects prescribed in items (i) to (vi) and, in addition, shall pass practical tests to demonstrate his or her knowledge of the subjects prescribed in item (vii) –
 - (i) British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the FAA Advisory Circular 43.13-1B, in so far as these affect an aircraft maintenance engineer licensed in Category X (aircraft welding).
 - (ii) Elementary welding procedures and their application, definitions and terms used, and the elementary mathematical calculations involved in aircraft welding.
 - (iii) Basic theory pertaining to welding principles.
 - (iv) Basic strength of material and heat treatment theory and its application.
 - (v) Operating and use of test equipment and the limitations on the use of such equipment.
 - (vi) The regulations made under the Act in so far as they affect an aircraft maintenance engineer licensed in Category X (aircraft welding).
 - (vii) The welding requirements as prescribed in Schedule 1 in this document.
 - (b) Supplementary examination
Where, subsequent to the written examination, a supplementary examination is required by the Director, an applicant may be required to answer further questions in respect of the subjects, as applicable, prescribed in subparagraph (a). An applicant may also be required to demonstrate his or her practical knowledge of inspection, the use of measuring instruments and the interpretation of drawings.

66.02.4 EXPERIENCE

1. Aircraft Maintenance Engineer licence (Category A)

1.1 Category A (Aeroplanes): Issue or addition of different types of Category 'A'

- (1) An applicant for the issuing of a licence in Category A, or for the addition of Category A to an existing licence, must have two years aeronautical engineering experience after

qualifying on relevant trade including 6 months experience to the type for which application is made, shown in the following table:

TABLE 1

1 Applications relating to airframe will be accepted for the following:	2 Total aeronautical engineering experience after passing the appropriate trade test or trade exam		3 Experience in column 2 must include periods of general practical maintenance and inspection solely of airframes prior to flight on the type to which the application is made
	Without training	With training	With approved training
All or any one of the types classified under group 1	3 years	2 years	6 months
All or any one of the types classified under group 2	3 years	2 years	6 months
All or any one of the types classified under group 3	3 years	2 years	6 months
All or any one of the types classified under group 4	3 years	2 years	6 months
All or any one of the types classified under group 5	3 years	2 years	6 months
All or any one of the types classified under group 6	3 years	2 years	6 months
One of the types classified under group 7	3 years	2 years	6 months
One of the types classified under group 8	3 years	2 years	6 months
One of the types classified under group 9	3 years	2 years	6 months
One of the types (Deleted) classified under group 10	3 years	2 years	6 months
One of the types (Deleted) classified under group 11	3 years	2 years	6 months
One of the types classified under group 12	3 years	2 years	6 months

NOTE

An “approved course” refers to a course approved for the purpose by the Director which includes practical training in the maintenance and inspection of Airframes or Engines or Electrical or Instruments or Avionics before flight as per CAR Part 141.

1.2. Category A (Aeroplanes): Extension of Category A (all types within same type data specification)

An applicant for the extension of Category A of his or her licence must have had a total amount of six months experience of practical maintenance and inspection of airframes on type or six months within the same type data specification of which a minimum of thirty days spent solely on the type for which the extension is desired.

1.3. Categories A (Rotorcraft): Issue or addition of Categories A

An applicant for the issuing of a licence in Categories A, or for the addition of Categories A to an existing licence, for the certification of rotorcraft with a maximum certificated mass of 3175kg or less, must have had two years' aeronautical engineering experience after passing trade test, including a minimum of one year of general practical experience of the maintenance and inspection solely of rotorcraft of which six months must have been on the practical maintenance and inspection of the type for which application is made including engines.

1.4. Categories A (rotorcraft): Extension of Categories A

An applicant for the extension of Categories A of a licence already valid for the certification before flight of rotorcraft, to include a further type or types of rotorcraft, must have had a total six months' experience on the practical maintenance and inspection of rotorcraft on type or six months within the same type data specification of which a minimum of thirty days spent solely on the type for which the extension is desired including engines.

2. Aircraft Maintenance Engineer licence (Category C)

2.1. Category C (engines): Issue or addition of different types of Category C

(1) An applicant for the issuing of a licence in Category C, or the addition of Category C to an existing licence, must have two years aeronautical engineering experience after qualifying on relevant trade including 6 months experience, appropriate to the type for which application is made, shown in the following table:

TABLE 3

1 Applications relating to engines will be accepted for the following	2 Total aeronautical engineering experience after passing the appropriate trade test or trade exam		3 Experience in column 2 must include periods of general practical maintenance and inspection solely of aircraft engines prior to flight, on the type to which the application is made
	Without training	With training	With approved training
All or any one of the types classified under group 01	3 years	2 years	6 months
All or any one of the types classified under group 02	3 years	2 years	6 months
All or any one of the types classified under group 03	3 years	2 years	6 months
All or any one of the types classified under group 04	3 years	2 years	6 months
All or any of the of the types classified under group 05	3 years	2 years	6 months
All or any of the of the types classified under group 06	3 years	2 years	6 months

- (2) Where a licence is already valid under Category D for an engine classified under groups 01, 02, 03, 04 and 05, the experience requirements for the addition of Category C to include the same engine will be half of those stated above in column 3.

2.2. Category C (engines): Extension of Category C (all types within same type data specification)

An applicant for the extension of Category C of his or her licence must have had a total of six months' experience on the practical maintenance and inspection of engines prior to flight on type or six months within the same type data specification of which a minimum of thirty days spent solely on the type for which the extension is desired.

3. Aircraft Maintenance Engineer licence (Category W)

3.1. Category W: Issue or addition of different types of Category W

- (1) Avionic equipment installations/servicing

(a) An applicant for the issuing of a licence in Category W, or for the addition of Category W to an existing licence, for the certification of the installation, modification, troubleshooting, rectification of defects, repair and system checks in aircraft of all types of Radio Communication Equipment, Radio Navigational equipment (Pulse and Non-pulse), and Electronically Operated Systems, i.e. amplifiers, computers, recorders, flight management and entertainment systems, must have two years' electronic engineering experience after qualifying on relevant trade, of which twelve months of recent (within three years) general practical experience in the installation, modification, troubleshooting, rectification of defects, repair and system checks in aircraft of all types of Radio Communication Equipment, Radio Navigational Equipment (Pulse and Non-pulse), and Electronically Operated Systems, i.e. amplifiers, computers, recorders, flight management and entertainment systems to which the application relates.

(b) For the addition of a "W" to a current licence 6 months recent experience is required.

- (2) Electrical equipment installations/servicing

(a) An applicant for the issuing of a licence in Category W, or for the addition of Category W to an existing licence, for the certification of the installation, modification, troubleshooting, rectification of defects, repair and system checks in aircraft of all types of electrical equipment, must have two years electronic engineering experience after qualifying on relevant trade, of which twelve months of recent (within three years) general practical experience in the installation, modification, troubleshooting, rectification of defects, repair and system checks in aircraft of all types of electrical equipment to which the application relates.

(b) For the addition of a "W" to a current licence 6 months recent experience is required.

- (3) Instrument equipment installations/servicing

(a) An applicant for the issuing of a licence in Category W, or for the addition of Category W to an existing licence, for the certification of the installation, modification, troubleshooting, rectification of defects, repair and system checks in aircraft of all types of instrument equipment, must have had at least two years electronic engineering experience after qualifying on relevant trade or has written a trade exam, of which twelve months of recent (within three years) general practical experience in the installation, modification, troubleshooting, rectification of defects, repair and system checks in aircraft of the types of instrument equipment to which the application relates.

(b) For the addition of a "W" to a current licence 6 months recent experience is required.

3.2. Category W: Extension of Category W

An applicant for the extension of Category W of a licence already valid for the certification of the installation, modification, troubleshooting, rectification of defects, repair and system checks in aircraft of all types of Radio Communication Equipment, Radio Navigational equipment (Pulse and Non-pulse), and Electronically Operated Systems, i.e. amplifiers, computers, recorders, flight management, entertainment systems, electrical equipment and instrument equipment, to include one further type to that for which the licence is already endorsed, must have had at least six months recent practical experience on the particular type related.

4. Aircraft Maintenance Engineer licence (Category B)

4.1. Category B: Issue or addition of different types of Category B

An applicant for the issuing of a licence in Category B, or the addition of Category B to an existing licence for the certification of the repair and overhaul of airframes, must have two years aeronautical engineering experience after qualifying on relevant trade including 6 months experience, appropriate to the type for which application is made, shown in the following table:

TABLE 2

1 Applications relating to the following airframes will be accepted for the following	2 Total aeronautical engineering experience after passing the appropriate trade test or trade exam		3 Experience in column 2 must include periods of the practical repair and overhaul of airframes on the type to which the application is made
	Without training	With training	With approved training
All or any one of the types classified under group 1	3 years	2 years	6 months
All or any one of the types classified under group 2	3 years	2 years	6 months
All or any one of the types classified under group 3	3 years	2 years	6 months
All or any one of the types classified under group 4	3 years	2 years	6 months
All or any one of the types classified under group 5	3 years	2 years	6 months
All or any one of the types classified under group 6	3 years	2 years	6 months
One of the types classified under group 7	3 years	2 years	6 months
One of the types classified under group 8	3 years	2 years	6 months
One of the types classified under group 9	3 years	2 years	6 months
One of the types (Delete) classified under group 10	3 years	2 years	6 months
One of the types (Delete) classified under group 11	3 years	2 years	6 months
One of the types classified under group 12	3 years	2 years	6 months

NOTE:

An approved course is a course approved for the purpose by the Director which includes practical training in the maintenance and inspection of Airframes or Engines or Electrical or Instruments or Avionics before flight.

4.2. Category B: Extension of Category B (all types within same type data specification)

An applicant for the extension of Category B of his or her licence must have had a total of six months' experience of the practical repair and overhaul of airframes types or six months within the same type data specification of which a minimum of thirty days spent solely on the type for which the extension is desired.

4.3. Category B (Aircraft Structure Worker): Issue of Category B (Aircraft Structure Worker)

An applicant for the issuing of a licence in Category B, for the certification of the repair and overhaul of airframes, must have two years aeronautical engineering experience after qualifying on relevant trade including 12 months experience, appropriate to the type of work for which application is made, shown in the following table:

TABLE 2

1 Applications relating to airframes will be accepted for the following	2 Total aeronautical engineering experience after passing the appropriate trade test or trade exam		3 Experience in column 2 must include periods of the practical repair and overhaul of airframes on the type to which the application is made.
	Without training	With training	
All or any one of the types classified under group 1	3 years	2 years	12 months
All or any one of the types classified under group 2	3 years	2 years	12 months
All or any one of the types classified under group 3	3 years	2 years	12 months
All or any one of the types classified under group 4	3 years	2 years	12 months
All or any one of the types classified under group 5	3 years	2 years	12 months
All or any one of the types classified under group 6	3 years	2 years	12 months
One of the types classified under group 7	3 years	2 years	12 months
One of the types classified under group 8	3 years	2 years	12 months
One of the types classified under group 9	3 years	2 years	12 months
One of the types classified under group 10 (Delete)	3 years	2 years	12 months
One of the types	3 years	2 years	12 months

(Delete) classified under group 11			
One of the types classified under group 12	3 years	2 years	12 months

NOTE

An approved course is a course approved for the purpose by the Director which includes practical training in the maintenance and inspection of Airframes or Engines or Electrical or Instruments or Avionics before flight.

5. Aircraft Maintenance Engineer licence (Category D)

5.1. Category D (Engines): Issue or addition of different types of Category D

An applicant for the issuing of a licence in Category D or for the addition of Category D to an existing licence, for the certification of the repair and overhaul of engines must have two years aeronautical engineering experience after qualifying on relevant trade including six months experience, appropriate to the type for which application is made, shown in the following table.

TABLE 4

1 Applications relating to engines will be accepted for the following	2 Total aeronautical engineering experience after passing the appropriate trade test or trade exam		3 Experience in column 2 must include periods of practical repair and overhaul of engines on the type to which the application is made.
	Without training	With training	With approved training
All or any one of the types classified under group 01	3 years	2 years	6 months
All or any one of the types classified under group 02	3 years	2 years	6 months
All or any one of the types classified under group 03	3 years	2 years	12 months
All or any one of the types classified under group 04	3 years	2 years	12 months
All or any one of the types classified under group 05	3 years	2 years	12 months
All or any one of the types classified under group 06	3 years	2 years	6 months

5.2. Category D (Engines): Extension of Category D (all types within same type data specification)

An applicant for the extension of Category D of his or her licence must have had a total of six months' experience in the practical repair and overhaul of engines type or six months within the same type data specification of which a minimum of thirty days spent solely on the type for which the extension is desired.

6. Aircraft Maintenance Engineer licence (Category X)

6.1. Category X (Automatic pilots): Issue or addition of Category X (Automatic pilots)

- (1) An applicant for the issuing of a licence in Category X for the certification of the overhaul, repair, modification, calibration and installation in aircraft of automatic pilots which do not operate on electronic principles, must have two years' instrument engineering experience after qualifying on relevant trade, of which a minimum of nine months on gyroscopic instruments, and three months general practical experience of the repair, modification, calibration, installation and testing of aircraft automatic pilots, must be recent (within three years) experience concentrated on the particular type of automatic pilot to which the application relates.
 - (2) An applicant for the issuing of a licence in Category X for the certification of the installation and in flight adjustment of electronic automatic pilots, must have two years' electronic experience after qualifying on relevant trade, of which twelve months' general practical experience of the repair, modification, calibration, installation and testing of electronic automatic pilots, must be recent (within three years) experience concentrated on the particular type of automatic pilot to which the application relates.
- 6.2. Category X (Automatic pilots): Extension of Category X (Automatic pilots)**
An applicant for the extension of Category X of a licence already valid for the certification of the repair and overhaul of automatic pilots, to include one further type of automatic pilot similar to that for which the licence is already endorsed, must have six months recent (within the last three years) practical experience of the particular type, and in addition, a satisfactory course, except that where the type of automatic pilot to which the application relates includes electronic principles, the applicant must have had at least nine months' practical experience of the particular types.
- 6.3. Category X (Compasses): Issue of Category X (Compasses)**
An applicant for the issuing of a licence in Category X for the certification of the installation and compensation of direct-reading or remote-reading magnetic compasses in aircraft must have two years aeronautical engineering experience after qualifying on relevant trade including the appropriate experience referred to in CAR 43.02.18, in the installation and compensation of direct-reading magnetic compasses in aircraft.
- 6.4. Category X (Compasses): Extension of Category X (Compasses)**
An applicant for the extension of a licence already valid for the certification of the installation and compensation of compasses to include direct-reading magnetic compasses or one further type of remote-reading compass, must have had the appropriate experience referred to in CAR 43.02.18, of the type for which the extension is required.
- 6.5. Category X (Electrical equipment): Issue or addition of Category X (Electrical equipment)**
An applicant for the issuing of a licence in Category X for the certification of the overhaul, repair or modification of aircraft electrical equipment, including installations in aircraft with main power supply systems, the nominal tension of which does not exceed 30 volts, must have two years' electrical engineering experience after qualifying on relevant trade, of which a minimum of twelve months of recent (within the last three years) general practical experience in the overhaul, repair and testing of aircraft electrical equipment, including recent experience of the inspection and testing of electrical installations in aircraft: Provided that three months' recent (within the last three years) general practical experience in the overhaul, repair or modification of aircraft electrical equipment for engines classified in groups 01, 02 and 03 will be acceptable for the issuing of a licence in Category X –
- (a) if the applicant is the holder of an existing licence in Category X (ignition equipment); or
 - (b) if the applicant is the holder of an existing licence in Category D for any or all of the engines classified in groups 01, 02 and 03: Provided that the privileges of any Category X licence issued or added to an existing licence in accordance herewith shall be restricted to the certification of the overhaul, repair or modification of electrical equipment fitted to the engine type ratings entered under Category D of the existing licence.
- 6.6. Category X (Ignition equipment): Issue or addition of Category X (Ignition equipment)**

An applicant for the issuing of a licence in Category X for the certification of the overhaul, repair or modification of aircraft engine ignition equipment, must have two years' electrical engineering experience after qualifying on relevant trade, of which a minimum of twelve months of recent (within the last three years) general practical experience in the overhaul, repair and testing of all types of aircraft engine ignition equipment: Provided that three months' recent (within the last three years) general practical experience in the overhaul, repair and modification and testing of ignition equipment for engines classified in groups 01, 02 and 03 will be acceptable for the issuing of a licence in Category X –

- (a) if the applicant is the holder of an existing licence in Category X (electrical equipment); or
- (b) if the applicant is the holder of an existing licence in Category D for any or all of the engines classified in groups 01, 02 and 03: Provided that the privileges of any Category X licence issued or added to an existing licence in accordance herewith will be restricted to the certification of the overhaul, repair, modification and testing of ignition equipment fitted to the engine type ratings entered under Category D of the existing licence.

6.7. Category X (Instruments): Issue or addition of Category X (Instruments)

- (1) An application for the issuing of a licence in Category X for the certification of the overhaul, repair or modification of aircraft and engine instruments, excluding electrically operated instruments, must have two years' instrument engineering experience after qualifying on relevant trade, of which a minimum of twelve months of recent (within the last three years) general practical experience in the overhaul, repair, calibration and installation in aircraft of all types of physically and mechanically operated aircraft and engine instruments.
- (2) An applicant for the issuing of a licence in Category X for the certification of the overhaul, repair or modification of aircraft and engine instruments, including electrically operated instruments, must have had two years instrument engineering experience after qualifying on relevant trade including twelve months of recent (within the last three years) general practical experience in the overhaul, repair or modification of electrically operated aircraft and engine instruments.

6.8. Category X (Variable-pitch propellers): Issue or addition of Category X (Variable-pitch propellers)

An applicant for the issuing of a licence in Category X, or for the addition of Category X to an existing licence, for the certification of the overhaul, repair or modification of variable-pitch propellers, must have had two years aeronautical engineering experience after qualifying on relevant trade, of which at least six months must have been spent on the overhaul or repair of the type of propeller to which the application relates: Provided that the Director may agree to lesser periods of experience on specified types of propellers of comparatively simple construction: Provided further that six months' experience in the overhaul and repair of the type of propeller to which the application relates will be acceptable if the applicant, being the holder of an existing aircraft maintenance engineers' licence in Category B or D, applies for the addition of Category X to such licence.

6.9. Category X (Avionic equipment): Issue or addition of Category X (Avionic equipment)

An applicant for the issuing of a licence in Category X for the certification of the overhaul, repair, modification and installation of avionic equipment or of avionic equipment employing pulse techniques, must have two years' electronic engineering experience after qualifying on relevant trade, of which a minimum of twelve months of recent (within the last three years) general practical experience in the overhaul, repair, calibration and installation in aircraft of all types of avionic equipment to which the application relates.

6.10. Category X: (Avionic Equipment): Extension of Category X (Avionic equipment)

An applicant for the extension of Category X of a licence already valid for the certification of the overhaul, repair modification and installation of avionic equipment or of avionic equipment employing pulse techniques to include the type of avionics equipment to which the application

relates, must in addition to the experience detailed in paragraph 9 above, have had at least one year of recent (within the last three years) general practical experience in the overhaul, repair or modification of avionic equipment of the type concerned.

6.11. Category X (Aircraft welding): Issue or addition of Category X (Aircraft welding)

(1) General

- (a) An applicant for the issuing of a licence in Category X for aircraft welding and certification of welding on aircraft must have two years experience after qualifying on relevant trade, of which a minimum of six months in the rating applied for namely –
 - (i) oxy-acetylene;
 - (ii) inert gas shielded arc;
 - (iii) plasma arc;
 - (iv) atomic hydrogen;
 - (v) metal arc; and
 - (vi) carbon welding processes, for the following groups or metallic materials:
 - (aa) Group 1 – Aluminum alloys
 - (bb) Group 2 – Magnesium alloys
 - (cc) Group 3 – Carbon steels
 - (dd) Group 4 – Corrosion and heat resisting steels
 - (ee) Group 5 – Nickel base and cobalt base alloys
 - (ff) Group 6 – Titanium alloys
 - (gg) Group 7 – Copper base alloys
- (b) Welding ratings will be limited to those types of materials or material groups and welding processes on which the applicant has demonstrated his or her welding ability by means of the tests referred to hereunder.
- (c) Where a welder is employed by an approved aircraft maintenance organization, the responsibility of maintaining a satisfactory standard of competency of the welder concerned will be entrusted to the organization which must use the procedure for establishing such competency as set out in this technical standard.

(2) Welding test for initial ratings

- (a) Each welder will be required to make test pieces and at his or her option, prepare test specimens appropriate to the ratings required. Such test pieces and test specimens must conform to the standards shown in Figures 1, 2, 3 and 4. For test pieces shown in Figures 2 and 3, a 25% variation in tube diameter will be permitted; tubular material wall thickness must be within 20% of the range specified.
- (b) Applicants must use for their tests piece materials of the same specifications or the nearest equivalent as those they will be welding on aircraft, but – if this provides undue difficulty – similar materials will be acceptable if two control specimens of the parent material conforming to the tensile test specimen of Figure 1 are submitted.
- (c) The test pieces required for the various groups of materials are as follows:
 - (i) For group 1 and 2 materials, the test pieces shown in Figures 1 and 4.
 - (ii) For group 3 and 4 materials, the test pieces shown in Figure 1, for plasma arc welding process, and Figures 2 and 3 for oxy-acetylene and inert gas shielded arc welding processes.
 - (iii) For group 5, 6 and 7 materials, the test piece shown in Figure 1.
 - (iv) Where the applicant desires a welding rating to be limited to certain types of work, e.g. tubular repairs only, such applicable test pieces as shown in Figures 1, 2, 3 or 4.
- (v) Figure 3 does not apply in respect of the plasma arc welding process.
 - (d) The welding of test pieces must be done by each welder in accordance with the requirements prescribed in paragraph (b) and under the supervision of a person approved for the purpose by the Director. If the welder elects to have the test specimens prepared

before these are submitted to the test laboratory for examination, such preparation must also be under the control of the supervisor.

- (e) The welds of test pieces and test specimens may not be hammered, dressed or sand blasted.
 - (f) The supply of welding equipment and test materials is the responsibility of the welder concerned.
 - (g) Only one set of test pieces and test specimens is permitted at a time for each rating for each welder.
 - (h) A welder may abandon any test at any stage if he or she is dissatisfied with the results. In such cases, and in the case of failure to pass the initial test, he or she will only be permitted to do further tests after a period of 30 days, during which period he or she must obtain additional welding experience. If a welder fails the second renewal test, all the prescribed tests for that group of metallic material will have to be satisfactorily completed after a further period of 30 days.
 - (i) A welder only becomes qualified for a material or material group using the appropriate welding process on the date that the approved examiner indicates in writing that the test concerned was satisfactory.
- (3) Welding tests for renewal
- (a) Each welder will annually be required to do a test piece for each rating for which renewal is required and, at his or her option, prepare the necessary test specimens in accordance with Figure 1. For such tests the provisions of paragraphs (2)(a) and (2)(e) to (i) inclusive apply.
 - (b) A welder may abandon any renewal test at any stage if he or she is dissatisfied with the results.
 - (c) In cases where the privileges of a rating have lapsed for more than six months, the complete test must be satisfactorily completed before the privileges of the rating concerned are again exercised.
- (4) Examination of test pieces and test specimens
- Examination of test pieces and test specimens must be done in accordance with the following requirements:
- (a) General
All welds must be examined for contour, width, reinforcement, penetration, bonding, and porosity, non-metallic inclusions and excessive carburisation cracks. Where excessive penetration occurs, the test piece or specimen will be rejected, but isolated excrescencies on the underside of a weld are acceptable provided the weld is free from cavities, oxide films and other defects.
 - (b) Tensile tests
 - (i) Tensile test specimens must be tested to destruction in direct tension. The ultimate tensile stress (calculated on the minimum area of cross section of the specimen) and the position of the break must be recorded.
 - (ii) A break through the weld of a sheet-to-sheet butt welded test specimen will be considered satisfactory only if the ultimate tensile stress at which the break occurs, is to the acceptable value for the type of material concerned.
 - (iii) Tensile tests on tube to tube specimens must produce end loads without bending. Suitable pins passing through the top and bottom cross tubes and shackles should be used on the tensile test machine for this purpose. Where the specimen fails by the weld metal peeling away from the surface of one of the component parts, the weld will not be considered satisfactory even though the required ultimate tensile stress may have been reached.
 - (c) Bend tests
 - (i) Bend test specimens must be bent so that the weld is along the axis of the bend with the base of the weld "V" on the inner side of the bend. To facilitate close contact of the

specimen to the bar about which it is bent, the side of the specimen remote from the weld face should be dressed by filing or grinding until any excrescencies are level with the parent metal. The edges of the specimen in the vicinity of the weld should be given a reasonable radius. A backing ingot or slab of lead may be used if desired in accomplishing bends of test specimens. Specimens will be considered satisfactory if they withstand the bend tests without showing cracks visible to the naked eye.

- (ii) The angles and radii of bends for the various materials involved must be as shown in the following table:

MATERIAL	ANGLE OF BEND	RADIUS OF BEND
Aluminum alloys	180 °	5 times nominal thickness of test piece
Magnesium alloys	180 °	10 times nominal thickness of test piece
Carbon and low alloy steels	180 °	2 times nominal thickness of test piece
Austenitic steels *	90 °	3 times nominal thickness of test piece
Boron containing steels	180 °	3 times nominal thickness of test piece
Titanium	180 °	5 times nominal thickness of test piece
All other materials	180 °	2 times nominal thickness of test piece

* Austenitic steel bend specimens in the “as welded” condition must be given the “weld decay” pickling test, prescribed by the specification for the parent metal, prior to bending. The formula for the weld decay solution is: 222 grams of copper sulfate, 106.5 ml of sulfuric acid and add water to make a total of two litres.

- (d) Microscopic examinations
- (i) Micro specimens must be examined microscopically in the unetched and etched conditions for satisfactory fusion and adequate penetration and for freedom from carburisation or decarburisation, cracks, excessive cavitation and harmful inclusions.
- (ii) Examination for intergranular oxide films must be done with the specimen in the unetched condition as the presence of such films is difficult to detect in the etched condition. If the area of intergranular oxide is only very slight and satisfactory results are obtained from mechanical testing of the related test specimens, further sections of the weld should be micro examined before a decision is reached.
- (iii) For fillet welds of 45 ° or greater, the maximum lack of fusion which will normally be accepted, is that revealed by a line of oxide extending from the root for a distance not greater than one third of the distance between the root and the toe of the weld provided that the amount of weld material used is adequate to give a throat thickness of not less than the thickness of the sheets or tubes used for test pieces.
- (iv) For fillet welds at acute angles e.g. 30 ° in Figure 3, complete penetration in the root of the weld may be difficult to achieve without excessive melting of the parent metal. The presence of a fairly large cavity or corresponding lack of fusion will be acceptable at the apex of such welds provided there is a bridge of weld material of a reasonable throat depth showing satisfactory fusion to the parent metal.
- (e) Assessment of welded pieces
- Final assessment of the weld must be based on consideration of the sample weld as a whole, including the results obtained by visual inspection, microscopical examination, and

where applicable, radiographic examination and mechanical testing. If any doubt exists regarding the quality of the weld, or any defect revealed is thought to be of a local character, further sections may be examined and final assessment must be based on all the specimens examined.

(5) Methods of preparation of welded test pieces and test specimens

The preparation of welded test pieces for the groups of materials must be as follows:

(a) Figure 1: Sheet to sheet butt weld

- (i) Edges of sheets to be welded must be chamfered when 16 I.S.W.G or thicker material is used except for aluminum and aluminum alloys, in which case edge preparation is not necessary for material thinner than 12 I.S.W.G.
- (ii) Welds must be performed by forward welding from one side only using correct flux and filler rod.

(b) Figure 2: Sheet to tube weld

- (i) The centre of each end plate must be drilled with a 12mm diameter hole prior to welding. The ends of the tube need not be chamfered for material thinner than 16 I.S.W.G.
- (ii) End plates may be positioned with tack welds and the first to be welded must be done with the end plate flat on the bench and the tube in the vertical position; this weld must be completed by working around the test piece. The second end plate must be welded to the tube with the tube in the horizontal position and not moved during the process of completing the weld; this weld must be completed by working under and over the test piece.
- (iii) The specimen for microscopic examination must be cut from one end of the test piece as indicated in Figure 2. The remainder of the test pieces must be preserved and submitted for any further examination, which may be considered necessary should the results of the macroscopic examination raise any doubt.

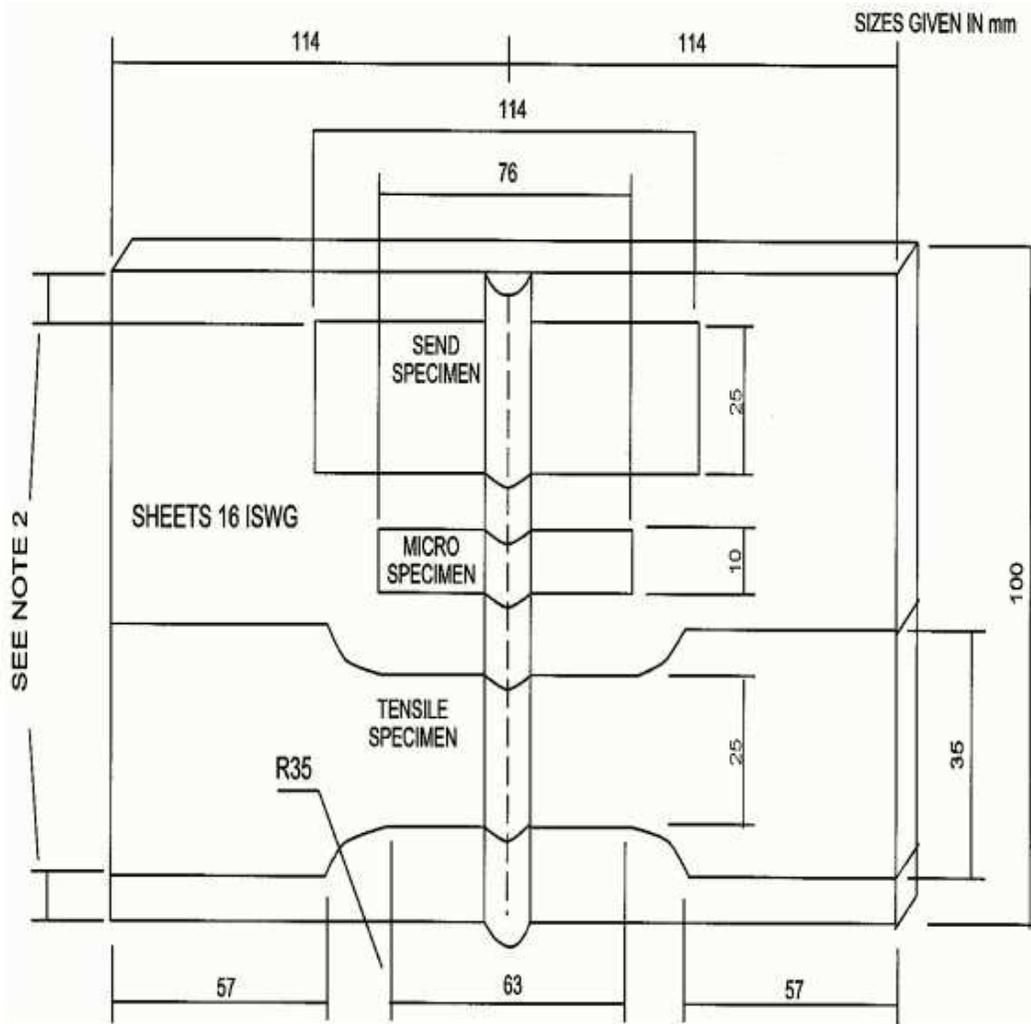
(c) Figure 3: Tube to tube weld

- (i) After preparation of the tubes for welding these must be assembled in a jig and tack welded.
- (ii) The assembly must then be removed from the jig and mounted in a vertical position with the longest tube (365mm) at the lowest point. The assembly may not be moved from this position during the process of completing the welds.
- (iii) The uppermost joint formed by the short horizontal, vertical and diagonal tubes must be welded by the "overhead" welding technique and the remaining joints completed by working around the test piece.

(d) Figure 4: Block build-up

Do a build-up operation of the U cutout on the machined block, by multiweld runs, to a level slightly above that of block surface.

**FIGURE 1
SHEET TO SHEET BUTT WELD**

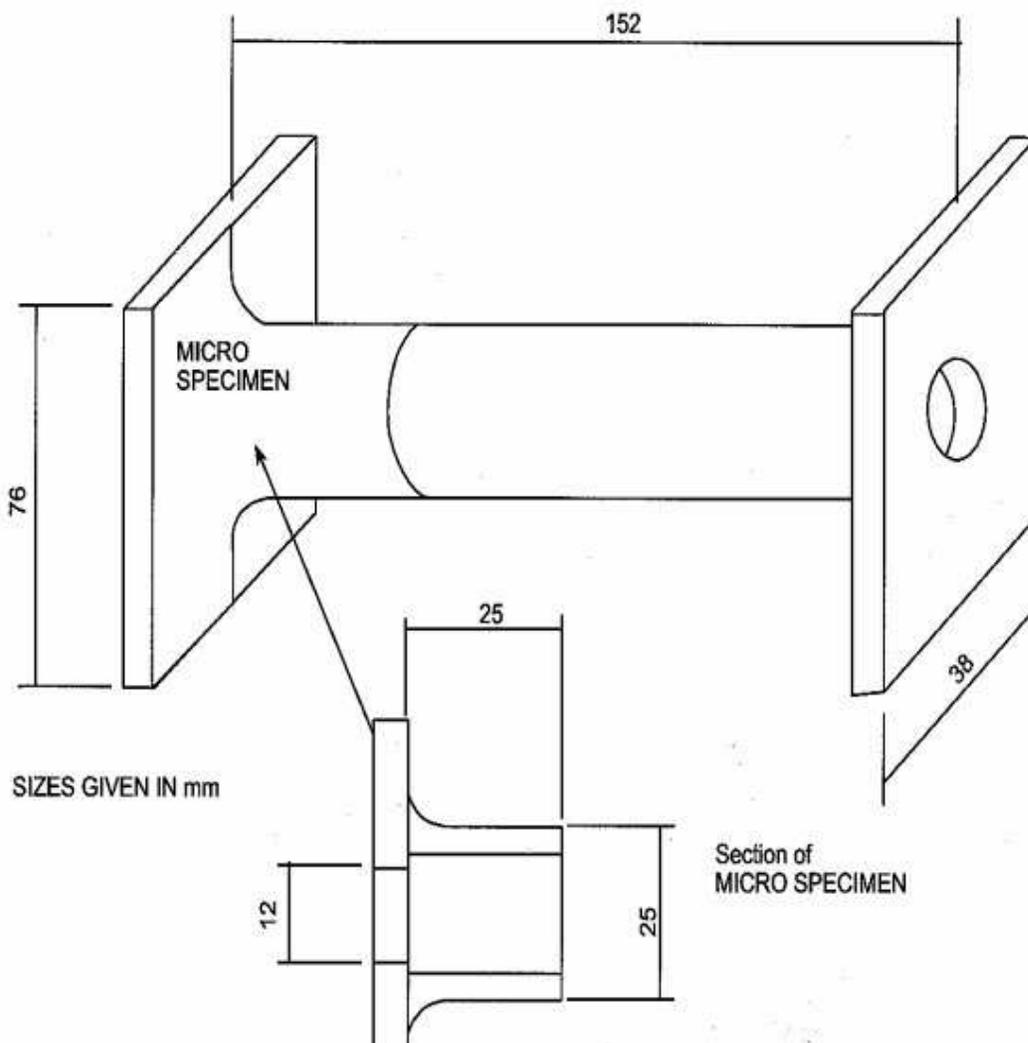


Notes:

ISWG = Imperial or British Standard wire gauge.

Enough discard so that the beginning and end of the run is not included in the test specimen.

**FIGURE 2
SHEET TO TUBE WELD**



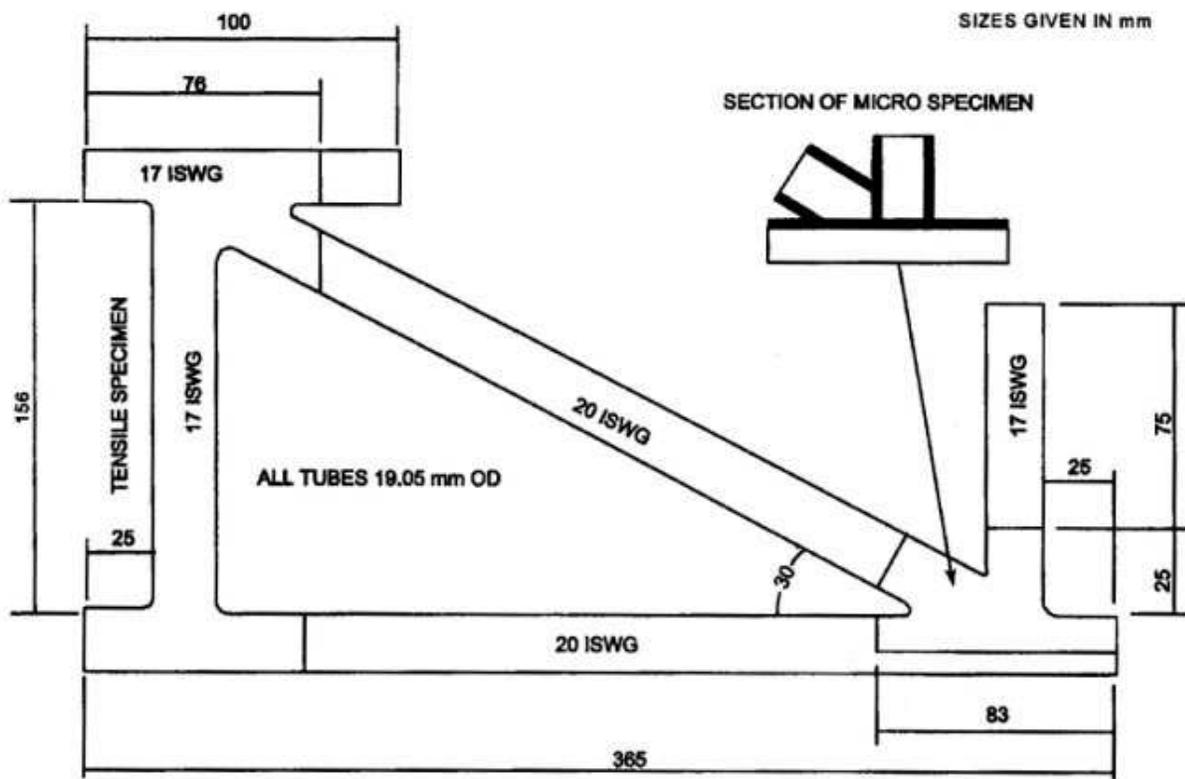
Notes:

A variation of up to 25% in tube diameter will be permitted for tubular material but wall thickness of tubes must be within the dimensions specified.

For Oxy-acetylene welding use tube 20 ISWG (0,889 – 1,016mm) and end plates 16 ISWG (1,626 – 1,676mm).

For ARC welding use tube 16 ISWG (1,626 – 1,676mm) and end plates 16 ISWG (1,626 – 1,676mm).

**FIGURE 3
TUBE TO TUBE WELD**

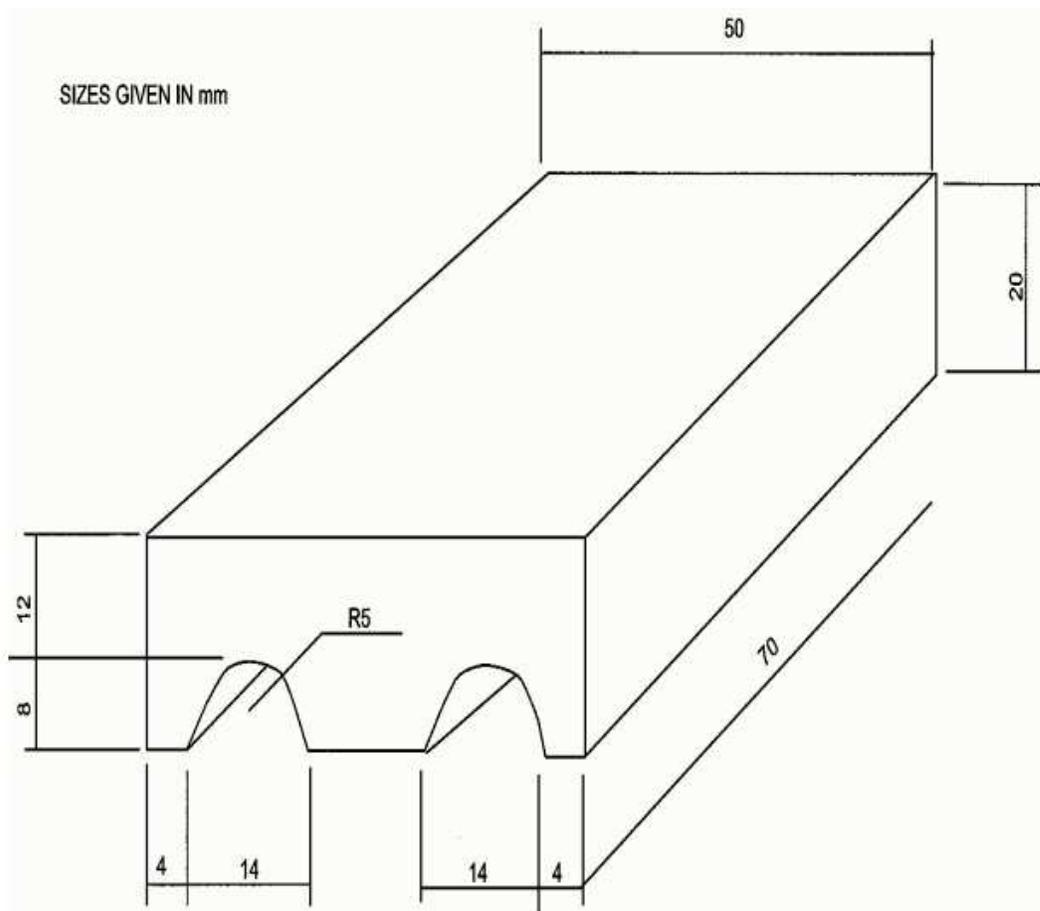


Notes:

A variation of up to 25% in tube diameter will be permitted for tubular material but wall thickness of tubes must be within the dimensions specified.

For ARC welding, substitute 14 ISWG (1,829 – 2,108mm) for 17 ISWG (1,422 – 1,473mm) and 16 ISWG (1,626 – 1,676mm) for 20 ISWG (0,899 – 1,016mm).

**FIGURE 4
BLOCK BUILD-UP**



66.03.2 TRAINING

1. Training standards

- (1) The training, referred to in regulation 66.03.2, is –
- the appropriate training set out in TS 66.02.2; and
 - satisfactory completion of a recognized (TETA Approved) training techniques course (train the trainer for a Grade Two instructor, assessor and moderator for a Grade One instructor).

66.03.3 THEORETICAL KNOWLEDGE EXAMINATION

1. Written examination requirements

The requirements of the written examination referred to in regulation 66.03.3(1) are –

- the appropriate requirements set out in TS 66.02.3; and
- the required examination/proficiency test for the training standard referred to in TS 66.03.2(1)(b).

2. Re-testing after failure

An applicant who fails the written examination referred to in paragraph 1, may apply for retesting after the appropriate period specified below:

- The pass mark for any written technical examination is 75%.
- A candidate who fails with a mark –
 - of between 71% and 74%, both inclusive, may apply in writing for a re-mark within 30 days from the date of receiving the examination results, on payment of the appropriately fee. If the remark is successful, the fee will be refunded;
 - of more than 68% may apply to be entered for the following exam sitting;
 - of between 60% and 68%, both inclusive, has to wait 6 months before applying to enter again;

- (iv) of less than 60%, will have to wait for 12 months before applying to enter again.
- (c) A candidate who is unsuccessful with his or her second attempt, and shows no improvement on previous attempts, will have to wait 18 months before he or she will be allowed to enter for the same examination.

66.03.4 EXPERIENCE

1. Requirements

The experience requirements referred to in regulation 66.03.4 are –

- (a) the appropriate experience requirements set out in TS 66.02.4;
- (b) with regard to a Grade One aircraft maintenance instructor rating, have had experience as a Grade Two instructor for not less than 3 years; and
- (c) with regard to a Grade Two aircraft maintenance instructor rating, have had experience as a Licensed Aircraft Maintenance Engineer for not less than two years, on the type applying for.

66.04.4 CATEGORIES AND CLASSES OF RATINGS

1. Airframe classification

Airframes may be classified as follows –

- (a) aeroplanes and gliders of fabric- or composite-covered wooden construction;
- (b) aeroplanes and gliders of composite construction;
- (c) aeroplanes and gliders of fabric-covered tubular-metal, aluminium and wooden construction;
- (d) unpressurised aeroplanes and gliders of all-metal construction;
- (e) rotorcraft;
- (f) balloons and airships.

2. Engine classification

Engines may be classified as follows –

- (a) certified aircraft engines;
- (b) non-certified aircraft engines;
- (c) automobile engines;
- (d) turbine engines.

66.04.9 THEORETICAL KNOWLEDGE EXAMINATION

1. Written examination

An applicant for the issuing of an approved person certificate shall have successfully passed a written examination in the following subjects:

2. Application for examination

An application to write the examination for the issue or amendment of an Approved Person Certificate shall be made on the appropriate form.

3. Marking after failure

- (1) A candidate who fails an examination conducted by the Civil Aviation Authority or, if applicable, the organization approved for the purpose in terms of Part 149, as the case may be, may within 30 days from the date of notification of the examination results apply in writing for a re-mark.
- (2) The application shall be made on the appropriate form and be accompanied by the appropriate fee prescribed in Part 187.
- (3) If the remark is successful, the fee will be refunded.

4. Re-testing after failure

A candidate who fails an examination conducted by the Civil Aviation Authority or, if applicable, the organization approved for the purpose in terms of Part 149, as the case may be, shall be required to wait for a period of 6 months before applying to write the examination again.

SA-CATS 67 Medical requirements

List of technical standards

67.00.2 CLASSES OF MEDICAL CERTIFICATES

1. General
2. Class 1 medical certificate
3. Class 2 medical certificate
4. Class 3 medical certificate
5. Class 4 medical certificate

67.00.4 DESIGNATION OF AVIATION MEDICAL EXAMINERS

1. Definitions
2. General
3. Selection and retention of DAMEs
4. Requirements relating to waiver

67.00.9 DUTIES OF HOLDER OF MEDICAL CERTIFICATE

1. Medication and flying
2. Guidelines

67.00.13 SUBSTANCE ABUSE

1. General
2. Definitions
3. Abbreviations
4. Urine specimen collection
5. Laboratory urine analysis
6. Breath specimen collection for alcohol testing
7. Analytical procedure
8. Shy-lung
9. Alcohol test errors
10. Reporting of results
11. Blood specimen collection
12. Laboratory analysis of a blood specimen

APPENDICES

Appendix A: Fatal errors in alcohol testing

Appendix B: Correctable errors in alcohol testing

SCHEDULES

Schedule 1: Protocol on neurological or neurosurgical problems

Schedule 2: Protocol on stroke

Schedule 3: Protocol on brain tumours

Schedule 4: Protocol on Parkinson's disease

Schedule 5: Protocol on previously diagnosed carcinoma of the colon and rectum

Schedule 6: Lung function assessment – flow diagram

Schedule 7: Protocol on chronic obstructive airways disease

Schedule 8: Protocol on asthma

Schedule 9: Protocol on pneumothorax

Schedule 10: Protocol on hypertension

Schedule 11: Coronary artery disease protocol

- Schedule 12: Protocol on rheumatoid arthritis
- Schedule 13: Protocol on diabetes mellitus
- Schedule 14: Protocol on diagnosed Addison's disease
- Schedule 15: Protocol on Sarcoidosis
- Schedule 16: Protocol on multiple sclerosis
- Schedule 17: Protocol on coagulation and thrombotic disorders
- Schedule 18: Protocol on previously diagnosed acute leukaemia
- Schedule 19: Protocol on previously diagnosed Seminoma
- Schedule 20: Protocol on previously diagnosed malignant melanoma
- Schedule 21: Monocular/amblyopic Protocol
- Schedule 22: Radial keratotomy/PRK/LASIK Protocol
- Schedule 23: Waiver certificate
- Schedule 24: Procedure for Farnsworth Lantern testing
- Schedule 25: Procedure for practical flight testing in colour vision deficiency
- Schedule 26: Warfarin Protocol
- Schedule 27: HIV/AIDS Protocol
- Schedule 28: Obstetrics and Gynaecology
- Schedule 29: Bone marrow protocol

67.00.2 CLASSES OF MEDICAL CERTIFICATES

The medical requirements and standards to be complied with by an applicant for, or the holder of, a Class 1, 2, 3 or 4 medical certificate are the following –

1. General

- (1) Impairment or sudden or subtle incapacitation
Applicants must be free from any risk factor, disease or disability which renders them either unable, or likely to become suddenly unable, to perform assigned duties safely. These may include effects and/or adverse effects from the treatment of any condition and drugs or substances of abuse.
- (2) Medical deficiency
Applicants must be free from any of the following, if it results in a degree of functional incapacity likely to interfere with the safe operation of an aircraft or with the safe performance of their duties –
 - (a) Congenital or acquired abnormality;
 - (b) active, latent, acute or chronic disability, disease or illness;
 - (c) wound, injury, or outcome of operation.

2. Class 1 medical certificate

1.1 Physical and mental standards

Applicants must have no established medical history or clinical diagnosis of –

1.1.1 Psychiatric

- (1) Any of the following conditions that are of a severity which renders the applicant incapable of safely exercising the privileges of the licence, or makes it likely that within two years of the assessment the applicant will be unable to safely exercise the privileges of the licence, will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation –
 - (a) a psychotic disorder, unless the psychosis was of toxic origin and there has been complete recovery;
 - (b) alcohol or other psychoactive substance abuse or dependence;
 - (c) character or behaviour disorder, severe enough to have resulted in an overt act;
 - (d) any other psychiatric disorder.

(2) An applicant who has a history of psychoactive substance abuse or dependence may apply for an exemption to the designated body or institution if the following circumstances exist –

- (a) the applicant has been under medical treatment for psychoactive substance abuse and the medical practitioner concerned, approved by the designated body or institution, certifies that the applicant is free from the effects of psychoactive substance abuse;
- (b) the applicant provides the name of a sponsor who is prepared to certify that the applicant no longer takes a psychoactive substance in any form. Such a sponsor must be a person acceptable to the designated body or institution for this purpose;
- (c) the applicant signs an undertaking not to take any psychoactive substance while holding a valid licence.

1.1.2 Neurological

(1) Any disease, injury or abnormality of the nervous system, the effects of which, according to medical conclusion, are likely to interfere with the safe exercise of the privileges of the licence or cause sudden or subtle incapacitation, will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation. In particular, the following are not acceptable:

- (a) epilepsy;
- (b) any seizure disorder;
- (c) any disturbance of consciousness without satisfactory medical explanation of the cause;
- (d) migraine;
- (e) incapacitated headaches.

(2) The relevant protocols are contained in Schedules 1, 2, 3 and 4.

1.1.3 Musculoskeletal

Any active disease of the bones, joints, muscles, or tendons, or any significant functional limitation from any previous congenital or acquired disease or injury will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation. Functional abnormalities affecting the bones, joints, muscles, or tendons, compatible with the safe exercise of the privileges of the licence, may be assessed as fit. An appropriate demonstration of ability via a skill test may be required.

1.1.4 Gastrointestinal

(1) Any disease or abnormality, or result of disease or surgical operation, affecting the digestive tract and its attachments, including the biliary system and hernial orifices, of a severity likely to cause obstruction, significant functional disorder or infection, or sudden or subtle incapacitation, will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation.

(2) The relevant protocol is contained in Schedule 5.

1.1.5 Respiratory

(1) Any disease or abnormality, or result of disease or surgical operation, affecting the lungs, mediastinum, pleura, chest wall or respiratory passages of a severity likely to cause infection, functional disorder or sudden or subtle incapacitation at altitude, will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation.

(2) The relevant protocols are contained in Schedules 6, 7, 8 and 9.

1.1.6 Cardiovascular

(1) Any disease or abnormality, or result of disease or surgical operation, which affects the heart or circulatory system and is of a severity likely to cause functional disorder or sudden or subtle incapacitation. Evidence of myocardial infarction, or significant hypertension, will

be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation.

(2) Disorders of cardiac rhythm requiring a pacemaker will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation. Applicants with evidence strongly suggestive of coronary artery disease, including the presence of excessive cardiovascular risk factors, will be assessed as unfit unless adequate myocardial perfusion can be demonstrated and reversible risk factors controlled.

(3) The relevant protocols are contained in Schedules 10 and 11.

1.1.7 Metabolic, nutritional and endocrine

(1) Any metabolic, nutritional or endocrine disorders likely to interfere with the safe exercise of the privileges of the licence, or to cause sudden or subtle incapacitation will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation. Any applicant with a diagnosis of metabolic, nutritional or endocrine disorder will generally be assessed as unfit, but may be considered for special certification by the designated body or institution.

(2) The relevant protocols are contained in Schedules 12, 13, 14, 15 and 16.

1.1.8 Haematologic and immunologic

(1) Any active disease of the lymphatic system or of the blood will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation. Those with chronic diseases of these systems in a state of remission may be assessed as fit, provided appropriate specialist reports permit medical conclusion that the condition is not likely to affect the safe exercise of the privileges of the licence. Applicants with any infectious diseases, the effects of which are likely to impede the safe exercise of the privileges of the licence or cause sudden or subtle incapacitation, must be assessed as unfit until such time as effective and acceptable treatment has removed such effects.

(2) The relevant protocols are contained in Schedules 15, 16, 17 and 18.

1.1.9 Genitourinary

(1) Any disease or abnormality, or result of disease or surgical operation, affecting the kidneys, urine, urinary tract, menstrual function or genital organs, to a degree likely to impede the safe exercise of the privileges of the licence, or cause sudden or subtle incapacitation such that the applicant will be unable to safely exercise the privileges of the licence will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation.

(2) The relevant protocol is contained in Schedule 19.

1.1.10 Oncology

The relevant protocols are contained in Schedules 3, 5, 18, 19 and 20.

1.2 Visual standards

1.2.1 General

(1) An applicant may not have –

(a) any condition or congenital abnormality of either eye or its attachments likely to impede the safe exercise of the privileges of the licence;

(b) any abnormality of visual fields or significant defect of binocular function;

(c) any manifest squint, or large errors of eye muscle balance (phoria). The acceptable limits for ocular muscle balance are 12 prism dioptres for exophoria, 6 dioptres for esophoria; and 1.5 dioptré for hyperphoria measured at distance. If corrective lenses are required, phoria must be measured while using the appropriate corrective lenses;

(d) any anatomical or functional monocular vision or substandard vision in one eye at initial issue of a Class 1 medical certificate. However, medical conclusion may permit experienced licence

holders who develop monocularly or substandard vision to be granted a medical certificate with appropriate restrictions following a period sufficient to permit adjustment to this condition.

- (2) Monocularly means that either an eye is absent, or its vision cannot be corrected to better than 6/24.
- (3) Substandard vision in one eye means central vision better than 6/24 but worse than 6/9, with normal visual fields.
- (4) For monocularly, the appropriate minimum restrictions initially are as follows –
 - (a) “If flying open cockpit aircraft, protective goggles not restricting visual field must be worn”. (This must remain as a permanent restriction);
 - (b) “Any accompanying pilot must be made aware of the holder’s monocular vision”. (This must remain as a permanent restriction);
 - (c) “Not valid for flight as pilot-in-command by day or night until a satisfactory flight test has been completed with a flight examiner in each case”. (This restriction may be removed at subsequent assessment, according to the results of the flight test, or amended to the endorsement in (d) below);
 - (d) “Not valid for flight as pilot-in-command by night until a satisfactory flight test has been completed with a flight examiner”. (This restriction may be removed at subsequent assessment, according to the result of the flight test).
- (5) For substandard vision in one eye (vision between 6/6 and 6/24), the appropriate minimum restrictions are as follows –
 - (a) “Any accompanying pilot must be made aware of the holder’s substandard vision in one eye”. (This must remain as a permanent restriction);
 - (b) “Not valid for flight as pilot-in-command by night until a satisfactory flight test has been completed with a flight examiner”. (This restriction may be removed at subsequent assessment, according to the results of the flight test).
- (6) The relevant protocols are contained in Schedules 21 and 22.

1.2.2 Near vision

- (1) Applicants must be able to read 6/9 (N5) at a distance of 33 centimetres and N14 at a distance of 100 centimetres or have equivalent visual acuity for these distances (6/12, 20/40 at 33 cm; 6/24, 20/80 at 100 cm). An applicant who meets this standard only by use of spectacles may be granted a medical certificate provided this is endorsed with the following limitation:

“Suitable corrective lenses must be readily available”.
- (2) This means that these must be available for immediate use when exercising the privileges of the licence. This limitation may be satisfied by the availability of appropriate bifocal or trifocal spectacles which permit the reading of instruments and a chart or manual held in one hand, without impeding the use of distance vision through the windscreen when wearing the spectacles. Single-vision near correction (full lenses of one power only, appropriate to reading) is not acceptable, since wearing these significantly reduces distance visual acuity.

1.2.3 Distance vision

- (1) Applicants must have a distance visual acuity of not worse than 6/6 or its equivalent (20/20, 1.0) in each eye separately, with or without corrective lenses. When this standard can be met only by the use of corrective lenses, an applicant may be granted a medical certificate provided this is endorsed with the following limitation:

“Suitable corrective lenses must be worn for distance vision”.
- (2) An applicant with uncorrected distance visual acuity of 6/24 or its equivalent (20/80, 0.25) or worse in either eye is also subject to the following limitation endorsed on the medical certificate:

“Suitable spare corrective spectacles must be readily available”.

(3) The visual acuity, with and without correction, must be recorded at each examination.

1.2.4 Combined distance and near vision correction

Applicants requiring distance vision correction must have a near point of accommodation not greater than 33 centimetres, as measured while wearing the required distance vision corrective lenses. Suitable correction for near vision may be necessary in addition to distance vision correction.

1.2.5 Dioptre limits

A need for corrective lenses for either eye within the range of plus or minus 3 dioptres (spherical equivalent) may be accepted, provided that the distance visual acuity without correction is not worse than 6/60 in each eye separately. Spectacle lenses outside this range are not routinely acceptable, but medical conclusion may permit an applicant to be assessed as fit on production of satisfactory specialist reports. The medical certificate will, where appropriate, be endorsed with the following –

- (1) “Contact lenses must be worn”; and
- (2) “Spare spectacles must be readily available”.

1.2.6 Colour perception standards

- (1) Applicants must be able to demonstrate ability to perceive readily those colours the perception of which is necessary for the safe performance of duties. The use of tinted lenses to obtain adequate colour perception is not permitted.
- (2) Applicants must be tested for the ability to correctly identify a series of pseudo-isochromatic plates (tables) in daylight or in artificial light of the same colour temperature such as that provided by Illuminant “C” or “D” as specified by the International Commission on Illumination (ICI).
- (3) Applicants shall be deemed to have scored satisfactorily in these tests if they have committed no errors on the test.
- (4) Applicants who fail to obtain a satisfactory score in such a test may nevertheless be assessed as fit if the applicants are able to readily and correctly identify aviation coloured lights displayed by means of a recognised colour perception lantern, i.e. Farnsworth, Beyenne, Holmes-Wright type A or Spectrolux.
- (5) The procedure for the performance of a Farnsworth Lantern test shall be as detailed in this document (Note: The Farnsworth D15 is not an acceptable test).
- (6) Applicants who obtain a satisfactory score in any of the tests in (4) above shall be deemed to be Grade II colour-safe.
- (7) Applicants who are deemed to be Grade II colour-safe shall repeat steps (2) to (4) as necessary on an annual basis, provided the Director reserves the right to extend such period as necessary.
- (8) Applicants who fail to obtain a satisfactory score in any of the tests detailed in (4) above may nevertheless be assessed as fit, provided the following criteria are met –
 - (a) Applicants must submit a satisfactory report from an ophthalmologist declaring the applicant deuteranomalous (Red/Green colour deficient);
 - (b) Applicants with any abnormality of colour perception other than deuteranomaly shall be assessed as unfit;
 - (c) Guidelines for Ophthalmologists as detailed in this document shall be adhered to by the examining ophthalmologist;
 - (d) Applicants must undergo a practical flight test with an instructor designated by the Director;
 - (e) The procedure for the practical flight test shall be as detailed in this document;
 - (f) A satisfactory report declaring that the applicant can safely identify all the aviation lights necessary for the safe performance of duties must be submitted;
- (9) Applicants who submit satisfactory reports related to paragraph (8) above shall be deemed to be Grade II colour-safe.

- (10) Such restriction shall appear on the applicant's medical certificate permanently.
- (11) Applicants who are deemed to be Grade II colour-safe in accordance with paragraph (10) shall submit an ophthalmologist report on an annual basis.
- (12) Any deterioration in any of the visual parameters shall result in an applicant being deemed unfit to fly, and being required to repeat point (9) above in its entirety.
- (13) Stereopsis and NPC testing will be required.
- (14) Full visual fields will be required.

1.3. Ear, nose and throat and hearing standards

- (1) Applicants must have no established medical history or clinical diagnosis of the following –
 - (a) any pathological process, acute or chronic, of the internal ear or middle ear cavities;
 - (b) any unhealed (unclosed) perforation of the tympanic membranes, except that an applicant with a single dry perforation may be eligible for a certificate if the defect does not prevent compliance with the hearing standards;
 - (c) any chronic or serious recurrent obstruction of the Eustachian tubes;
 - (d) any serious or recurrent disturbance of the vestibular system;
 - (e) any obstruction to free nasal air entry to both sides;
 - (f) any serious malformation, or serious acute or chronic condition of the buccal cavity or upper respiratory tract; or
- (g) any speech defect likely to interfere with the safe performance or duties in exercising the privileges of the licence.
- (2) Applicants must be free from any hearing defect which would interfere with the safe exercise of the privileges of the licence. Routine audiometry is required at each medical examination. Applicants must not have a hearing loss in excess of 35 dB at each frequency between 500 and 2000 Hz, or 50 dB at 3000 Hz in either ear. Applicants failing to comply with this standard in either ear may be assessed fit if the hearing loss for both ears, when averaged at each frequency does not exceed the stated limit, and the applicant achieves 90 per cent or better discrimination when speech audiometry is tested.

1.4 Electro-cardiography

Electro-cardiography must form part of the cardiovascular examination for the initial issue of a Class 1 medical certificate, and at recertification at the following intervals: At the first examination after the ages of 25, 30, 35, 38, 40, and annually thereafter.

1.5 Flow Volume Lung Function

Flow volume lung function testing must form part of the respiratory examination for the initial issue of a Class I medical certificate, and at recertification at the following intervals –
 Less than 40 years of age – four-yearly;
 40 to 59 years of age – every two years;
 60 years of age and older – annually.

Certification must be done according to Schedule 6.

C. Class 2 medical certificate

2.1 Physical and mental standards

Applicants must have no established medical history or clinical diagnosis of –

2.1.1 Psychiatric

- (1) Any of the following conditions that are of a severity which renders the applicant incapable of safely exercising the privileges of the licence, or makes it likely that within two years of the assessment the applicant will be unable to safely exercise the privileges of the licence, will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation –
 - (a) a psychotic disorder, unless the psychosis was of toxic origin and there has been complete recovery;
 - (b) alcohol or other psychoactive substance abuse or dependence;

- (c) character or behaviour disorder, severe enough to have resulted in an overt act;
 - (d) any other psychiatric disorder.
- (2) An applicant who has a history of psychoactive substance abuse or dependence may apply for an exemption to the designated body or institution if the following circumstances exist –
- (a) the applicant has been under medical treatment for psychoactive substance abuse and the medical practitioner concerned, approved by the designated body or institution, certifies that the applicant is free from the effects of psychoactive substance abuse;
 - (b) the applicant provides the name of a sponsor who is prepared to certify that the applicant no longer takes a psychoactive substance in any form. Such a sponsor must be a person acceptable to the designated body or institution for this purpose;
 - (c) the applicant signs an undertaking not to take any psychoactive substance while holding a valid licence.

2.1.2 Neurological

- (1) Any disease, injury or abnormality of the nervous system, the effects of which, according to medical conclusion, are likely to interfere with the safe exercise of the privileges of the licence or cause sudden or subtle incapacitation, will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation. In particular, the following are not acceptable –
- (a) epilepsy;
 - (b) any seizure disorder;
 - (c) any disturbance of consciousness without satisfactory medical explanation of the cause;
 - (d) migraine;
 - (e) incapacitated headaches.
- (2) The relevant protocols are contained in Schedules 1, 2, 3 and 4.

2.1.3 Musculoskeletal

Any active disease of the bones, joints, muscles, or tendons, or any significant functional limitation arising from previous congenital or acquired disease or injury will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation. Functional abnormalities affecting bones, joints, muscles, or tendons, compatible with the safe exercise of the privileges of the licence, may be assessed as fit. An appropriate demonstration of ability via a skill test may be required.

2.1.4 Gastrointestinal

- (1) Any disease or abnormality or result of disease or surgical operation, affecting the digestive tract and its attachments, including the biliary system and hernial orifices, of a severity likely to cause obstruction, significant functional disorder or infection, or sudden or subtle incapacitation, will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation.
- (2) The relevant protocol is contained in Schedule 5.

2.1.5 Respiratory

- (1) Any disease or abnormality, or result of disease or surgical operation, affecting the lungs, mediastinum, pleura, chest wall or respiratory passages of a severity likely to cause infection, functional disorder or sudden or subtle incapacitation at altitude, will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation.
- (2) The relevant protocols are contained in Schedules 6, 7, 8 and 9.

2.1.6 Cardiovascular

- (1) Any disease or abnormality, or result of disease or surgical operation, which affects the heart or circulatory system and is of a severity likely to cause functional disorder or sudden

or subtle incapacitation. Evidence of myocardial infarction, or significant hypertension, will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation.

(2) Disorders of cardiac rhythm requiring a pacemaker will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation. Applicants with evidence strongly suggestive of coronary artery disease, including the presence of cardiovascular risk factors, will be assessed as unfit unless adequate myocardial perfusion can be demonstrated and reversible risk factors controlled.

(3) The relevant protocols are contained in Schedules 10 and 11.

2.1.7 Metabolic, nutritional and endocrine

(1) Any metabolic, nutritional or endocrine disorders likely to interfere with the safe exercise of the privileges of the licence, or to cause sudden or subtle incapacitation will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation. Any applicant with a diagnosis of a metabolic, nutritional or endocrine disorder will generally be assessed as unfit, but may be considered for special certification by the designated body or institution.

(2) The relevant protocols are contained in Schedules 12, 13, 14, 15 and 16.

2.1.8 Haematologic and immunologic

(1) Any active disease of the lymphatic system or of the blood will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation. Those with chronic diseases of these systems in a state of remission may be assessed as fit, provided appropriate specialist reports permit medical conclusion that the condition is not likely to affect the safe exercise of the privileges of the licence. Applicants with any infectious diseases, the effects of which are likely to cause functional impairment or sudden or subtle incapacitation, must be assessed as unfit such time as effective and acceptable treatment has removed such effects.

(2) The relevant protocols are contained in Schedules 15, 16, 17 and 18.

2.1.9 Genitourinary

(1) Any disease or abnormality, or result of disease or surgical operation, affecting the kidneys, urine, urinary tract, menstrual function or genital organs, to a degree likely to cause functional impairment or sudden or subtle incapacitation, such that the applicant will be unable to safely exercise the privileges of the licence will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation.

(2) The relevant protocol is contained in Schedule 19.

2.1.10 Oncology

The relevant protocols are contained in Schedules 3, 5, 18, 19 and 20.

2.2 Visual standards

2.2.1 General

(1) An applicant may not have –

(a) any condition or congenital abnormality of either eye or its attachments likely to impede the safe exercise of the privileges of the licence;

(b) any abnormality of visual fields or binocular function;

(c) any manifest squint, or large errors of eye muscle balance (phoria). The acceptable limits for ocular muscle balance are 12 prism dioptres for exophoria, 6 dioptres for esophoria, and 1.5 dioptre for hyperphoria measured at distance. If corrective lenses are required, phoria must be measured while using the appropriate corrective lenses;

- (d) any anatomical or functional monocular vision or substandard vision in one eye at the initial issue of a Class 2 medical certificate. However, medical conclusion may permit experienced licence holders who develop monocular vision or substandard vision to be granted a medical certificate with appropriate restrictions following a period sufficient to permit adjustment to this condition.
- (2) Monocular vision means that either an eye is absent, or its vision cannot be corrected to better than 6/24.
- (3) Substandard vision in one eye means central vision better than 6/24 but worse than 6/9, with normal visual fields.
- (4) For monocular vision, the appropriate minimum restrictions initially are as follows –
 - (a) If flying open cockpit aircraft, protective goggles not restricting visual field must be worn”. (This must remain as a permanent restriction);
 - (b) “Any accompanying pilot must be made aware of the holder’s monocular vision”. (This must remain as a permanent restriction);
 - (c) “Not valid for flight as pilot-in-command by day or night until a satisfactory flight test has been completed with a flight examiner in each case”. (This restriction may be removed at subsequent assessment, according to the results of the flight test, or amended to the endorsement in (d) below);
 - (d) “Not valid for flight as pilot-in-command by night until a satisfactory flight test has been completed with a flight examiner”. (This restriction may be removed at subsequent assessment, according to the results of the flight test).
- (5) For substandard vision in one eye (vision between 6/6 and 6/24), the appropriate minimum restrictions initially are as follows:
 - (a) “Any accompanying pilot must be made aware of the holder’s substandard vision in one eye”. (This must remain as a permanent restriction);
 - (b) “Not valid for flight as pilot-in-command by night until a satisfactory flight test has been completed with a flight examiner”. (This restriction may be removed at subsequent assessment, according to the results of the flight test.)
- (6) The relevant protocols are contained in Schedules 21 and 22.

2.2.2 Near vision

- (1) Applicants must be able to read 6/9 (N5) at a distance of 33 centimetres and N14 at a distance of 100 centimetres or have equivalent visual acuity for these distances (6/12, 20/40 at 33 cm; 6/24, 20/80 at 100 cm). An applicant who meets this standard only by use of spectacles may be granted a medical certificate provided this is endorsed with the following limitation:
“Suitable corrective lenses must be readily available”.
- (2) This means that these must be available for immediate use when exercising the privileges of the licence. This limitation may be satisfied by the availability of appropriate bifocal or trifocal spectacles which permit the reading of instruments and a chart or manual held in one hand, without impeding the use of distance vision through the windscreen when wearing the spectacles. Single-vision near correction (full lenses of one power only, appropriate to reading) is not acceptable, since wearing these significantly reduces distance visual acuity.

2.2.3 Distance vision

- (1) Applicants must have distance visual acuity of not worse than 6/9 or its equivalent (20/30, 0.67) in each eye separately, with or without corrective lenses. When this standard can be met only by the use of corrective lenses, an applicant may be assessed as fit but the medical certificate must bear the following endorsement:
“Suitable corrective lenses (distance vision) must be worn”.

- (2) An applicant with uncorrected distance visual acuity of 6/36 or its equivalent (20/120, 0.12) or worse in either eye must also be subject to the following limitation endorsed on the medical certificate:

“Suitable spare corrective spectacles must be readily available”.

- (3) The visual acuity, with and without correction, must be recorded at each examination.

2.2.4 Combined distance and near vision correction

- (1) Applicants requiring distance vision correction must have a near point of accommodation not greater than 33 centimetres, as measured while wearing the required distance vision corrective lenses. Suitable correction for near vision may be necessary in addition to distance vision correction.

2.2.5 Diopetre limits

A need for lenses for either eye within the range of plus or minus 5 dioptres (spherical equivalent) may be accepted, provided that the visual acuity without correction is not worse than 6/60 in each eye separately. Spectacle lenses outside this range are not routinely acceptable, but medical conclusion may permit an applicant to be assessed as fit on production of satisfactory specialist reports. The medical certificate will, where appropriate, be endorsed with the following –

- (1) “Contact lenses must be worn”; and
- (2) “Spare spectacles must be readily available”.

2.2.6 Colour perception standards

- (1) Applicants must be able to demonstrate ability to perceive readily those colours the perception of which is necessary for the safe performance of duties. The use of tinted lenses to obtain adequate colour perception is not permitted.
- (2) Applicants must be tested for the ability to correctly identify a series of pseudo-isochromatic plates (tables) in daylight or in artificial light of the same colour temperature such as that provided by Illuminant “C” or “D” as specified by the International Commission on Illumination (ICI).
- (3) Applicants shall be deemed to have scored satisfactorily in these tests if they have committed no errors on the test.
- (4) Applicants who fail to obtain a satisfactory score in such a test may nevertheless be assessed as fit if the applicants are able to readily and correctly identify aviation coloured lights displayed by means of a recognised colour perception lantern, i.e. Farnsworth, Beyenne, Holmes-Wright type A or Spectrolux.
- (5) The procedure for the performance of a Farnsworth Lantern test shall be as detailed in this document (Note: The Farnsworth D15 is not an acceptable test).
- (6) Applicants who obtain a satisfactory score in any of the tests in paragraph (4) above shall be deemed to be Grade II colour-safe.
- (7) Applicants who are deemed to be Grade II colour-safe shall repeat steps in paragraphs (2) to (4) as necessary on an annual basis, provided the Director reserves the right to extend such period as necessary.
- (8) Applicants who fail to obtain a satisfactory score in any of the tests detailed in paragraph (4) above may nevertheless be assessed as fit, provided the following criteria are met –
 - (a) Applicants must submit a satisfactory report from an ophthalmologist declaring the applicant deuteranomalous (Red/Green colour deficient);
 - (b) Applicants with any abnormality of colour perception other than deuteranomaly shall be assessed as unfit, provided –
 - (i) The applicant is declared an anomalous trichomat (Protanomaly, Deuteranomaly and Tritanomaly). Dichromats (Protanopia, Deuteranopia and Tritanopia) and Monochromats (Atypical cone monochromats and typical rod monochromats) shall be declared Grade III colour-unsafe and unfit;

- (ii) A medical certificate may be issued if medical conclusion indicates that the applicant has a minor colour perception defect which is compatible with the safe exercise of the privileges of the license, provided the certificate is endorsed with the following limitations:
 - (aa) “For private pilot license privileges only”;
 - (bb) “Not valid for flight in the vicinity of a controlled aerodrome (unless the aircraft is in radio contact with aerodrome control)”;
 - (cc) “Not valid for night flying, IFR flying or flying of EFIS equipped aircraft”;
 - (dd) The applicant shall submit a satisfactory report from an ophthalmologist on an annual basis.
- (c) Guidelines for Ophthalmologists as detailed in this document shall be adhered to by the examining ophthalmologist.
- (d) Applicants must undergo a practical flight test with an instructor designated by the Director;
- (e) The procedure for the practical flight test shall be as detailed in this document;
- (f) A satisfactory report declaring that the applicant can safely identify all the aviation lights necessary for the safe performance of duties must be submitted;
- (9) Applicants who submit satisfactory reports related to (8) above shall be deemed to be Grade II colour-safe.
- (10) Such restriction shall appear on the applicant’s medical certificate permanently.
- (11) Applicants who are deemed to be Grade II colour-safe in accordance with paragraph (10) shall submit an ophthalmologist report on an annual basis.
- (12) Any deterioration in any of the visual parameters shall result in an applicant being deemed unfit to fly, and being required to repeat step (9) above in its entirety.
- (13) Applicants who fail to obtain a satisfactory report from an instructor designated by the Director shall be unfit.
- (14) Stereopsis and NPC testing will be required.
- (15) Full visual fields will be required.

2.3 Ear, nose and throat and hearing standards

- (1) Applicants must have no established medical history or clinical diagnosis of the following –
 - (a) any pathological process, acute or chronic, of the internal ear or middle ear cavities;
 - (b) any uphealed (unclosed) perforation of the tympanic membranes, except that an applicant with a single dry perforation may be eligible for a certificate if the defect does not prevent compliance with the hearing standards;
 - (c) any chronic or serious recurrent obstruction of the Eustachian tubes;
 - (d) any serious or recurrent disturbance of the vestibular system;
 - (e) any obstruction to free nasal air entry on both sides;
 - (f) any serious malformation, or serious acute or chronic condition of the buccal cavity or upper respiratory tract; or
- (g) any speech defect likely to interfere with the safe performance of duties in exercising the privileges of the licence.
- (2) Applicants must be free from any hearing defect which would interfere with the safe exercise of the privileges of the licence.
- (3) Pilots with a private pilot licence instrument rating must have routine audiometry. Applicants must not have a hearing loss in excess of 35 dB at each frequency between 500 and 2000 Hz, or 50 dB at 3000 Hz, in either ear. Applicants failing to comply with this standard in either ear may be assessed fit if the hearing loss for both ears, when averaged at each frequency, does not exceed the stated limit, and the applicant achieves 90 per cent or better discrimination when speech audiometry is tested.

2.4 Electro-cardiography

Electro-cardiography must form part of the cardiovascular examination for the initial issue of a Class 2 medical certificate and at recertification at the following intervals: At the first examination after the ages of 40, 44, 48, 52, 54, 56, 58, 60 and annually thereafter.

2.5 Flow Volume Lung Function

Flow volume lung function testing must form part of the respiratory examination for the initial issue of a Class 2 medical certificate, and at recertification at the following intervals:

At the first examination after the ages of 40, 44, 48, 52, 54, 56, 58, 60 and annually thereafter.

Certification must be done according to Schedule 6.

D. Class 3 medical certificate

3.1 Physical and mental standards

Applicants must have no established medical history or clinical diagnosis of –

3.1.1 Psychiatric

(1) Any of the following conditions that are of a severity which renders the applicant incapable of safely exercising the privileges of the licence, or makes it likely that within two years of the assessment the applicant will be unable to safely exercise the privileges of the licence, will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation –

- (a) a psychotic disorder, unless the psychosis was of toxic origin and there has been complete recovery;
- (b) alcohol or other psychoactive substance abuse or dependence;
- (c) character or behaviour disorder, severe enough to have resulted in an overt act;
- (d) any other psychiatric disorder.

(2) An applicant who has a history of psychoactive substance abuse or dependence may apply for an exemption to the designated body or institution if the following circumstances exist –

- (a) the applicant has been under medical treatment for psychoactive substance abuse and the medical practitioner concerned, approved by the designated body or institution, certifies that the applicant is free from the effects of psychoactive substance abuse;
- (b) the applicant provides the name of a sponsor who is prepared to certify that the applicant no longer takes a psychoactive substance in any form. Such a sponsor must be a person acceptable to the designated body or institution for this purpose;
- (c) the applicant signs an undertaking not to take any psychoactive substance while holding an air traffic service licence.

3.1.2 Neurological

(1) Any disease, injury or abnormality of the nervous system, the effects of which, according to medical conclusion, are likely to interfere with the safe exercise of the privileges of the licence or cause sudden or subtle incapacitation, will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation. In particular, the following are not acceptable –

- (a) epilepsy;
- (b) any seizure disorder;
- (c) any disturbance of consciousness without satisfactory medical explanation of the cause;
- (d) migraine;
- (e) incapacitated headaches.

(2) The relevant protocols are contained in Schedules 1, 2, 3 and 4.

3.1.3 Musculoskeletal

Any active disease of the bones, joints, muscles, or tendons, or any significant functional limitation arising from previous congenital or acquired disease or injury will be disqualifying unless acceptable and effective

treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation. Functional abnormalities affecting the bones, joints, muscles, or tendons, compatible with the safe exercise of the privileges of the licence, may be assessed as fit. An appropriate demonstration of ability may be required.

3.1.4 Gastrointestinal

- (1) Any disease or abnormality, or result of disease or surgical operation, affecting the digestive tract and its attachments including the biliary system and hernial orifices, of a severity likely to cause obstruction, significant functional disorder or infection, or sudden or subtle incapacitation, will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation.
- (2) The relevant protocol is contained in Schedule 5.

3.1.5 Respiratory

- (1) Any disease or abnormality, or result of disease or surgical operation, affecting the lungs, mediastinum, pleura, chest wall or respiratory passages of a severity likely to cause infection, functional disorder or sudden or subtle incapacitation, will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation. Radiographic examinations will be required for the initial issue of a Class 3 medical certificate.
- (2) The relevant protocols are contained in Schedules 6, 7, 8 and 9.

3.1.6 Cardiovascular

- (1) Any disease or abnormality, or result of disease or surgical operation, which affects the heart or circulatory system and is of a severity likely to cause functional disorder or sudden or subtle incapacitation. Evidence of myocardial infarction, or significant hypertension, will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation.
- (2) Disorders of cardiac rhythm requiring a pacemaker will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation. Applicants with evidence strongly suggestive of coronary artery disease, including the presence of cardiovascular risk factors, will be assessed as unfit unless adequate myocardial perfusion can be demonstrated and reversible risk factors controlled.
- (3) The relevant protocols are contained in Schedules 10 and 11.

3.1.7 Metabolic, nutritional and endocrine

- (1) Any metabolic, nutritional or endocrine disorders likely to interfere with the safe exercise of the privileges of the licence, or to cause sudden or subtle incapacitation will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation. Any applicant with a diagnosis of a metabolic, nutritional or endocrine disorder will generally be assessed as unfit, but may be considered for special certification by the designated body or institution.
- (2) The relevant protocols are contained in Schedules 12, 13, 14, 15 and 16.

3.1.8 Haematologic and immunologic

- (1) Any active disease of the lymphatic system or of the blood will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation. Those with chronic diseases of these systems in a state of remission may be assessed as fit, provided appropriate specialist reports permit medical conclusion that the condition is not likely to affect the safe exercise of the privileges of the licence. Applicants with any infectious diseases, the effects of which are likely to cause sudden or subtle incapacitation, must be assessed as unfit until such time as effective and acceptable treatment has removed such effects.
- (2) The relevant protocols are contained in Schedules 15, 16, 17 and 18.

3.1.9 Genitourinary

- (1) Any disease or abnormality or result of disease or surgical operation affecting the kidneys, urine, urinary tract, menstrual function or genital organs, to a degree likely to cause sudden or subtle incapacitation such that the applicant will be unable to safely exercise the privileges of the licence, will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation.
- (2) The relevant protocol is contained in Schedule 19.

3.1.10 Oncology

The relevant protocols are contained in Schedules 3, 5, 18, 19 and 20.

3.2 Visual standards

3.2.1 General

- (1) An applicant may not have –
 - (a) any condition or congenital abnormality of either eye or its attachments likely to impede the safe exercise of the privileges of the licence;
 - (b) any abnormality of visual fields or binocular function;
 - (c) any manifest squint, or large errors of eye muscle balance (phoria). The acceptable limits for ocular muscle balance are 12 prism dioptres for exophoria, 6 dioptres for esophoria; and 12 dioptre for hyperphoria measured at distance. If corrective lenses are required, phoria must be measured while using the appropriate corrective lenses;
 - (d) any anatomical or functional monocularity at the initial issue of a Class 3 medical certificate. However, medical conclusion may permit experienced licence holders who become anatomically or functionally monocular to be granted a medical certificate with appropriate restrictions, following a period sufficient to permit adjustment to the monocular state.
- (2) Monocularity means that either an eye is absent, or its vision cannot be corrected to better than 6/24.
- (3) Substandard vision in one eye means central vision better than 6/24 but worse than 6/9, with normal visual fields.
- (4) The relevant protocols are contained in Schedules 21 and 22.

3.2.2 Near vision

- (1) Applicants must be able to read 6/9 (N5) at a distance of 33 centimetres and N14 at a distance of 100 centimetres or have equivalent visual acuity for these distances (6/12, 20/40 at 33 cm; 6/24, 20/80 at 100 cm). An applicant who meets this standard only by use of spectacles may be granted a medical certificate provided this is endorsed with the following limitation:

“Suitable corrective lenses must be readily available”.
- (2) This means that these must be available for immediate use when exercising the privileges of the licence. This limitation may be satisfied by the availability of appropriate bifocal or trifocal spectacles which permit the reading of displays and a chart or manual held in one hand, without impeding the use of distance vision when wearing the spectacles. The wearing of single vision near correction (full lenses of one power only, appropriate to reading), significantly reduces distance visual acuity, and is not acceptable in an air traffic control tower. Nevertheless, full lenses may be acceptable in a radar room in which case the medical certificate must be endorsed with the following:

“Suitable corrective lenses must be readily available (full lenses permitted in radar room)”,

to indicate this option has been permitted. Whenever there is a requirement to obtain or renew corrective lenses, an applicant must advise the refractionist of reading distances for the air traffic service unit in which the applicant is likely to function.

3.2.3 Distance vision

- (1) Applicants must have distance visual acuity of not worse than 6/6 or its equivalent (20/20, 1.0) in each eye separately with or without corrective lenses. When this standard can be

obtained only by the use of corrective lenses, an applicant may be assessed as fit subject to the following endorsement on the medical certificate:

“Suitable corrective lenses (distance vision) must be worn”.

- (2) This endorsement means that these lenses must be worn when the applicant exercises the privileges of the licence.
- (3) An applicant with uncorrected distance visual acuity of 6/24 or its equivalent (20/80, 0.25) or worse in either eye is also subject to the following limitation endorsed on the medical certificate:
“Suitable spare corrective spectacles must be readily available”.
- (4) The visual acuity, with and without correction, must be recorded at each examination.

3.2.4 Combined distance and near vision correction

- (1) Applicants requiring distance vision correction must have a near point of accommodation not greater than 33 centimetres, as measured while wearing the required distance vision corrective lenses. Suitable correction for near vision may be necessary in addition to distance vision correction.

3.2.5 Dioptre limits

A need for corrective lenses for either eye within the range of plus or minus 3 dioptres (spherical equivalent) may be accepted, provided that the visual acuity without correction is not worse than 6/60 in each eye separately. Spectacle lenses outside this range are not routinely acceptable, but medical conclusion may permit an applicant to be assessed as fit on production of satisfactory specialist reports.

The medical certificate will be, where appropriate, endorsed with the following:

- (1) “Contact lenses only must be worn”; and
- (2) “Spare spectacles must be readily available”.

3.2.6 Colour perception standards

- (1) Applicants must demonstrate ability to perceive readily those colours the perception of which is necessary for the safe performance of duties. The use of tinted lenses to obtain adequate colour perception is not permitted.
- (2) Applicants must be tested for the ability to correctly identify a series of pseudoisochromatic plates (tables) in daylight or in artificial light of the same colour temperature such as that provided by Illuminant “C” or “D” as specified by the International Commission on Illumination (ICI).
- (3) Applicants who fail to obtain a satisfactory score in such a test may nevertheless be assessed as fit if the applicants are able to readily and correctly identify aviation coloured lights displayed by means of a recognised colour perception lantern, i.e. Farnsworth, Beyenne, Holmes-Wright type A or Spectrolux.
- (4) Stereopsis and NPC testing will be required.
- (5) Full visual fields will be required.

3.3 Ear, nose and throat and hearing standards

- (1) Applicants must have no established medical history or clinical diagnosis of the following –
 - (a) any pathological process, acute or chronic, of the internal ear or middle ear cavities;
 - (b) any uphealed (unclosed) perforation of the tympanic membranes, except that an applicant with a single dry perforation may be eligible for a certificate if the defect does not prevent compliance with the hearing standards;
 - (c) any serious or recurrent disturbance of the vestibular system;
 - (d) any serious malformation, or serious acute or chronic condition of the buccal cavity or upper respiratory tract; or
 - (e) any speech defect likely to interfere with the safe performance of duties in exercising the privileges of the licence.
- (2) Applicants must be free from any hearing defect which would interfere with the safe exercise of the privileges of the licence. Routine audiometry is required at each medical examination.

Applicants must not have a hearing loss in excess of 35 dB at each frequency between 500 and 2000 Hz, or 50 dB at 3000 Hz, in either ear. Applicants failing to comply with this standard in either ear may be assessed fit if the hearing loss for both ears, when averaged at each frequency does not exceed the stated limit, and the applicant achieves 90 per cent or better discrimination when speech audiometry is tested.

3.4 Electro-cardiography

Electro-cardiography must form part of the cardiovascular examination for the initial issue of a Class 3 medical certificate, and at recertification at the following intervals: At the first examination after the ages of 25, 30, 35, 38, 40, and annually thereafter.

3.5 Flow Volume Lung Function

Flow volume lung function testing must form part of the respiratory examination for the initial issue of a Class 3 medical certificate, and at recertification at the following intervals:

40 years of age and older – annually.

Certification must be done according to Schedule 6.

5. Class 4 medical certificate

4.1 Physical and mental standards

Applicants must have no established medical history or clinical diagnosis of –

4.1.1 Psychiatric

- (1) Any of the following conditions that are of a severity which renders the applicant incapable of safely exercising the privileges of the licence, or makes it likely that within two years of the assessment the applicant will be unable to safely exercise the privileges of the licence, will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation –
 - (a) a psychotic disorder, unless the psychosis was of toxic origin and there has been complete recovery;
 - (b) alcohol or other psychoactive substance abuse or dependence;
 - (c) character or behaviour disorder, severe enough to have resulted in an overt act;
 - (d) any other psychiatric disorder.
- (2) An applicant who has a history of psychoactive substance abuse or dependence may apply for an exemption to the designated body or institution if the following circumstances exist –
 - (a) the applicant has been under medical treatment for psychoactive substance abuse and the medical practitioner concerned, approved by the designated body or institution, certifies that the applicant is free from the effects of psychoactive substance abuse;
 - (b) the applicant provides the name of a sponsor who is prepared to certify that the applicant no longer takes a psychoactive substance in any form. Such a sponsor must be a person acceptable to the designated body or institution for this purpose;
 - (c) the applicant signs an undertaking not to take any psychoactive substance while holding a valid licence.

4.1.2 Neurological

- (1) Any disease, injury or abnormality of the nervous system, the effects of which, according to medical conclusion, are likely to interfere with the safe exercise of the privileges of the licence or cause sudden or subtle incapacitation, will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation. In particular, the following are not acceptable –
 - (a) epilepsy;
 - (b) any seizure disorder;
 - (c) any disturbance of consciousness without satisfactory medical explanation of the cause;

- (d) migraine;
- (e) incapacitated headaches.
- (2) The relevant protocols are contained in Schedules 1, 2, 3 and 4.

4.1.3 Musculoskeletal

Any active disease of the bones, joints, muscles, or tendons, or any significant functional limitation arising from previous congenital or acquired disease or injury will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation. Functional abnormalities affecting the bones, joints, muscles, or tendons, compatible with the safe exercise of the privileges of the licence, may be assessed as fit. An appropriate demonstration of ability via a skill test may be required.

4.1.4 Gastrointestinal

- (1) Any disease or abnormality, or result of disease or surgical operation, affecting the digestive tract and its attachments, including the biliary system and hernial orifices, of a severity likely to cause obstruction, significant functional disorder or infection, or sudden or subtle incapacitation, will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation.
- (2) The relevant protocol is contained in Schedule 5.

4.1.5 Respiratory

- (1) Any disease or abnormality, or result of disease or surgical operation, affecting the lungs, mediastinum, pleura, chest wall or respiratory passages of a severity likely to cause infection, functional disorder or sudden or subtle incapacitation at altitude, will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation.
- (2) The relevant protocols are contained in Schedules 6, 7, 8 and 9.

4.1.6 Cardiovascular

- (1) Any disease or abnormality, or result of disease or surgical operation, which affects the heart or circulatory system and is of a severity likely to cause functional disorder or sudden or subtle incapacitation. Evidence of myocardial infarction, or significant hypertension, will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation.
- (2) Disorders of cardiac rhythm requiring a pacemaker will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation. Applicants with evidence strongly suggestive of coronary artery disease, including the presence of cardiovascular risk factors, will be assessed as unfit unless adequate myocardial perfusion can be demonstrated and reversible risk factors controlled.
- (3) The relevant protocols are contained in Schedules 10 and 11.

4.1.7 Metabolic, nutritional and endocrine

- (1) Any metabolic, nutritional or endocrine disorders likely to interfere with the safe exercise of the privileges of the licence, or to cause sudden or subtle incapacitation will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation. Any applicant with a diagnosis of a metabolic, nutritional or endocrine disorder will generally be assessed as unfit, but may be considered for special certification by the designated body or institution.
- (2) The relevant protocols are contained in Schedules 12, 13, 14, 15 and 16.

4.1.8 Haematologic and immunologic

- (1) Any active disease of the lymphatic system or of the blood will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation. Those with chronic diseases of these systems in a state of remission may be assessed as fit, provided appropriate specialist reports permit medical

conclusion that the condition is not likely to affect the safe exercise of the privileges of the licence. Applicants with any infectious diseases, the effects of which are likely to cause sudden or subtle incapacitation, must be assessed as unfit until such time as effective and acceptable treatment has removed such effects.

- (2) The relevant protocols are contained in Schedules 15, 16, 17 and 18.

4.1.9 Genitourinary

- (1) Any disease or abnormality, or result of disease or surgical operation affecting the kidneys, urine, urinary tract, menstrual function or genital organs, to a degree likely to cause sudden or subtle incapacitation such that the applicant will be unable to safely exercise the privileges of the licence will be disqualifying unless acceptable and effective treatment has controlled any additional risk of functional disorder or sudden or subtle incapacitation.

- (2) The relevant protocol is contained in Schedule 19.

4.1.10 Oncology

The relevant protocols are contained in Schedules 3, 5, 18, 19 and 20.

4.2 Visual standards

4.2.1 General

- (1) An applicant may not have –
- (a) any condition or congenital abnormality of either eye or its attachments likely to impede the safe exercise of the privileges of the licence;
 - (b) any abnormality of visual fields or significant defect of binocular function;
 - (c) any manifest squint, or large errors of eye muscle balance (phoria). The acceptable limits for ocular muscle balance are 12 prism dioptres for exophoria, 6 dioptres for esophoria; and 1.5 dioptre for hyperphoria measured at distance. If corrective lenses are required, phoria must be measured while using the appropriate corrective lenses;
 - (d) any anatomical or functional monocular vision or substandard vision in one eye at the initial issue of a Class 4 medical certificate. However, medical conclusion may permit experienced licence holders who develop monocular vision or sub-standard vision to be granted a medical certificate with appropriate restrictions, following a period sufficient to permit adjustment to this condition.
- (2) Monocular vision means that either an eye is absent, or its vision cannot be corrected to better than 6/24.
- (3) Substandard vision in one eye means central vision better than 6/24 but worse than 6/12, with normal visual fields.
- (4) For monocular vision, the appropriate minimum restrictions initially are as follows –
- (a) “If flying open cockpit aircraft, protective goggles not restricting visual field must be worn”. (This must remain as a permanent restriction);
 - (b) “Any accompanying pilot must be made aware of the holder’s monocular vision”. (This must remain as a permanent restriction);
 - (c) “Not valid for flight as pilot-in-command by day or night until a satisfactory flight test has been completed with a flight examiner in each case”. (This restriction may be removed at subsequent assessment, according to the results of the flight test, or amended to the endorsement in (d) below);
 - (d) “Not valid for flight as pilot-in-command by night until a satisfactory flight test has been completed with a flight examiner”. (This restriction may be removed at subsequent assessment, according to the result of the flight test).
- (5) For substandard vision in one eye, the appropriate minimum restrictions are as follows –
- (a) “Any accompanying pilot must be made aware of the holder’s substandard vision in one eye”. (This must remain as a permanent restriction);

- (b) "Not valid for flight as pilot-in-command by night until a satisfactory flight test has been completed with a flight examiner". (This restriction may be removed at subsequent assessment, according to the result of the flight test).
- (6) The relevant protocols are contained in Schedules 21 and 22.

4.2.2 Near vision

Not applicable for this Class

4.2.3 Distance vision

- (1) Applicants must have a distance visual acuity of not worse than 6/12 or its equivalent (20/40, 0.5) in each eye separately, with or without corrective lenses. When this standard can be met only by the use of corrective lenses, an applicant may be granted a medical certificate provided this is endorsed with the following limitation:
"Suitable corrective lenses must be worn for distance vision".
- (2) An applicant with uncorrected distance visual activity of 6/24 or its equivalent (20/80, 0.25) or worse in either eye is also subject to the following limitation endorsed on the medical certificate:
"Suitable spare corrective spectacles must be readily available".
- (3) The visual acuity, with and without correction, must be recorded at each examination.

4.2.4 Combined distance and near vision correction

Not applicable to this Class

4.2.5 Diopetre limits

Not applicable to this Class

4.2.6 Colour perception standards

Not applicable to this Class

4.3 Ear, nose and throat and hearing standards

- (1) Applicants must have no established medical history or clinical diagnosis of the following –
 - (a) any pathological process, acute or chronic, of the internal ear or middle ear cavities;
 - (b) any unhealed (unclosed) perforation of the tympanic membranes, except that an applicant with a single dry perforation may be eligible for a certificate if the defect does not prevent compliance with the hearing standards;
 - (c) any chronic or serious recurrent obstruction of the Eustachian tubes;
 - (d) any serious or recurrent disturbance of the vestibular system;
 - (e) any obstruction to free nasal air entry on both sides;
 - (f) any serious malformation, or serious acute or chronic condition of the buccal cavity or upper respiratory tract; or
 - (g) any speech defect likely to interfere with the safe performance of duties in exercising the privileges of the licence.
- (2) Applicants must be free from any hearing defect which would interfere with the safe exercise of the privileges of the licence.

4.4 Electro-cardiography

Resting electro-cardiography must form part of the cardiovascular examination for the initial issue of a Class 4 medical certificate, and at recertification at the following intervals:

At the first examination after the age of 40, and three-yearly thereafter.

4.5 Flow Volume Lung Function

Flow volume lung function testing must form part of the respiratory examination for the initial issue of a Class 4 medical certificate, and at recertification at the following intervals:

At the first examination after the age of 40, and three-yearly thereafter.

67.00.4 DESIGNATION OF AVIATION MEDICAL EXAMINERS

1. Definitions

Any word or expression to which a meaning has been assigned in the Act and the Civil Aviation Regulations, bears, when used in this technical standard, the same meaning unless the context indicates otherwise, and –

“designated aviation medical examiner (DAME)” means an aeromedically qualified doctor designated by the Director, after consultation with the designated body or institution, and granted the authority to perform medical examinations or tests required for the issuing of Class 2 and Class 4 medical certificates; “designated senior aviation medical examiner” means a designated aviation medical examiner given the additional authority to perform medical examinations or tests required for the issuing of Class 1 and Class 3 medical certificates;

“designation” means the authority to exercise the powers and perform the duties of a designated aviation medical examiner, which commences on the date on which the document of designation is issued by the Director to the designated aviation medical examiner and remains in force for a period of 12 months following this date; “DSAME” means a designated senior aviation medical examiner;

“termination of designation” means the revoking of a designation before the expiry of the 12-month period.

2. General

- (1) DAMEs assume certain responsibilities directly related to the safety programme of the designated body or institution. They serve in their communities, as the aviation safety experts in respect of medical matters. They have the responsibility to ensure that only those applicants who are physically and mentally capable of performing safely, may exercise the privileges of their certificates.
- (2) To properly perform the duties associated with these responsibilities, DAMEs must keep abreast of the general medical knowledge applicable to aviation. They must also have detailed knowledge and understanding of all rules, regulations, policies and procedures relating to the medical certification of applicants. They must also possess acceptable equipment and have adequate facilities necessary to carry out the prescribed examinations.

3. Selection and retention of DAMEs

In the selection and retention of DAMEs, the designated body or institution will recommend only professionally qualified, practising physicians who have an expressed interest in promoting aviation safety. Only those physicians who enjoy the fullest respect of their associates and members of the public whom they serve shall be designated and retained as DAMEs.

3.1 Criteria for designation

3.1.1 Authority to perform Class 2 and Class 4 examinations

(1) Qualifications

The applicant for designation as a DAME with authority to perform examinations for Class 2 and Class 4 medical certificates must be a professionally qualified physician in good standing. In addition, the applicant must possess an unrestricted licence(s) to practice medicine, including unrestricted licence to practice in South Africa, the foreign country, or area in which the designation is sought. The applicant’s past professional performance and personal conduct must be suitable for a position of responsibility and trust. Special consideration will be given to those applicants who are pilots, who have special training or expertise in aviation medicine, or who were previously designated but have relocated to a new geographical area.

(2) Distribution

There must be a determined need for a DAME in the area, based on adequacy of coverage related to pilot population.

(3) Credentials

Initial application. At the time of initial application for designation, the physician must submit the following documents or copies thereof –

- (a) medical degree;

(b) certificate, diploma or degrees of any postgraduate professional training;

(c) SA Medical and Dental Council registration certificate;

(d) SA Medical and Dental Council certificate of good standing;

(e) references from three physicians in applicant's geographical location regarding professional standing, or a statement from the office of the medical society in the locality of practice, that the applicant is a medical doctor in good standing;

(f) a statement affirming that –

(i) there are no current restrictions of medical practice, and there are no adverse actions proposed or pending by the SA Medical and Dental Council that would limit medical practice; and

(ii) there are no known investigations, charged indictments, or pending actions in any court of law; and

(g) proof of the ability to read, write, speak, and understand the English language.

(4) Conditions of designation

To become a DAME, the applicant must agree to comply with the requirements.

(5) Change of status

The DAME must promptly notify the designated body or institution, should there be a change in the DAME's status of authority to practice medicine.

(6) Professionalism

To be informed regarding the progress in aviation medicine, to be thoroughly familiar with the relevant techniques of examination, medical assessment, as well as certification of applicants, and to abide by the policies, rules and regulations of the designated body or institution as approved by the Director.

(7) Examinations

To personally conduct all medical examinations. Other physicians or paraprofessional personnel may perform specialised parts of the examinations under the general supervision of the DAME, who must sign the documents, and list his/her designation identification number, both on the application form and on the medical certificate. In all cases the DAME must review, certify, and assume responsibility for accuracy and completeness of the total report of examination.

(8) Continuing education

Each physician must attend at least one aviation medical conference and/or CME course within each 4-year interval. Travel costs and other expenses for the DAME and staff to attend the conferences are the responsibility of the attendees.

(9) Office address and telephone numbers

Each DAME is required to promptly advise, in writing, the designated body or institution of any change in office location or telephone numbers. Continuation of designation at the new location is contingent on need.

(10) Facilities and equipment

The DAME must have adequate facilities for performing the required examinations and possess, or agree to obtain, such equipment, or access to the necessary facilities, prior to conducting any aviation medical examination.

(11) Conduct

The DAME must comply with the policies, orders and regulations of the designated body or institution as approved by the Director.

3.1.2 Authority to perform Class 1 and Class 3 examinations

In addition to the criteria for designation as a DAME, the physician must demonstrate, by compliance with the requirements for continued service as a DAME, acceptable prior performance as a DAME authorised to perform Class 2 and Class 4 examinations for a period of at least 3 years.

3.2 Prohibited examinations

A DAME may not perform a self-examination for the issuing of a medical certificate nor issue a medical certificate to himself or herself.

3.3 Duration of designation

Designations of physicians as DAME are effective for 1 year following the date of issue, unless terminated earlier by the Director or the designee. For continued service as a DAME, the designee must reregister annually. In the event of office relocation or change in practice, a designation will terminate and may be reissued, on request, by the Director. In respect of the relocation, a determination of adequacy or coverage will be made.

3.4 Authority of a DAME

A DAME has the authority to –

- (1) personally conduct physical examinations in accordance with the guidance and practices as laid down by the designated body or institution;
- (2) issue, defer or deny medical certificates in accordance with the provisions of Part 67 of the CAR subject to reconsideration by the designated body or institution.

3.5 Procedures for designation

(1) Designation

(a) Authority to perform Class 2 and Class 4 examinations

Physicians who request authority to perform Class 2 and Class 4 examinations must submit a written request to the Director.

(b) Authority to perform Class 1 and Class 3 examinations

Physicians who request D-SAME status must submit a written request to the Director.

(c) Notification

For designations in their geographical areas of responsibility, the Director will inform the applicant in writing of his or her designation and will issue a Certificate of Designation and an Aviation Medical Examiner Identification Card. Identification cards expire one year after the date of issue.

(d) Examination documents

The designee must obtain the required forms from the Director. These forms must be afforded an appropriate degree of security, and any loss must immediately be reported to the Director.

(2) Designation or termination of designation

(a) Evaluation

The designated body or institution continuously evaluates the performance of each DAME. Only physicians who have demonstrated satisfactory performance in the past and who continue to show a definite interest in the DAME programme will be re-designated. In addition, the designated body or institution must identify those DAMEs committing examination and certification errors and notify the Director, in writing, for appropriate action to be taken. Information collected by the designated body or institution, includes the following –

- (i) data on the adequacy of information on reports of medical examination;
 - (ii) errors made on reports of aviation medical examinations;
 - (iii) DAME interest and participation in aeromedical programmes and conferences; and
 - (iv) reports from the aviation and/or medical community concerning the DAME's professional performance and personal conduct as it may reflect on the designated body or institution as well as the Director.
- (b) Basis for termination or non-renewal of designation
- Termination or non-renewal of designation may be based, in whole or in part, on the following criteria –
- (i) failure to re-register punctually each year;
 - (ii) no examinations performed during the 12 months of initial designation;

- (iii) performing less than 15 examinations per year after 24 months. This figure shall be 30 examinations per year for D-SAMEs;
 - (iv) disregard of, or failure to demonstrate knowledge of, the rules, regulations, policies and procedures of the designated body or institution;
 - (v) repeated errors after receiving warnings from the designated body or institution;
 - (vi) failure to attend required conferences and/or continued aviation medical education;
 - (vii) movement of the location of practice from where presently designated;
 - (viii) failure to participate in any aviation medical programme when requested to do so by the designated body or institution or the Director;
 - (ix) unprofessional conduct in performing examinations;
 - (x) failure to comply with the provisions of Part 67 of the CAR;
 - (xi) personal conduct or public notoriety that may reflect adversely on the designated body or institution or the Director;
 - (xii) loss, restriction or limitation of a licence to practice medicine;
 - (xiii) any action that compromises public trust or interferes with the DAME's ability to fulfil the responsibilities of his or her designation;
 - (xiv) any illness or medical condition that may affect the physician's sound professional judgment or ability to perform examinations;
 - (xv) arrest, indictment or conviction for violation of law;
 - (xvi) request by the physician for termination of designation; or
 - (xvii) any other reason if it is determined to be in the best interest of aviation safety as determined by the Director.
- (c) Procedures for renewing designations
Before expiration of designation, the DAME concerned must apply for re-designation, in writing, to the Director. Physicians whose re-applications are not received will not be re-designated.
- (d) Procedures for terminating or not renewing designations
The designated body or institution will advise the Director when to terminate or not renew a designation. When it is determined that a designation should be terminated or not renewed, the following procedures are applicable:
- (i) The DAME will be notified in writing, by certified mail, of the reason(s) for the proposed action;
 - (ii) the written notification will give the DAME the option to respond in writing or in person within 30 days of the date of the letter;
 - (iii) in cases where a DAME is suspected of fraud or any other activity for which emergency action is necessary to assure aviation safety, the designated body or institution will advise the Director to immediately direct the DAME in writing, by certified mail, to cease all further examinations pending further investigation. The investigation must be conducted expeditiously. However, if the Director believes that the DAME's cessation of further examinations should continue pending final disposition of the matter by the Director, he or she may so direct the DAME in writing, by certified mail. The termination procedures must be accomplished expeditiously.
- (e) Return of materials
Whether by determination to not re-designate or termination of designation during the designation year, the DAME must return all SACAA materials (including forms, identification card and certificate of designation) to the Director.

4. Requirements relating to waiver

- (1) If an applicant has an established medical history or clinical diagnosis of any of the following, the DAME may not issue a medical certificate unless the applicant produces a valid waiver certificate –

- (a) Diabetes Mellitus requiring Insulin or other hypoglycaemic medication.
- (b) Angina Pectoris or clinically significant coronary artery disease.
- (c) Myocardial infarction, Coronary Angioplasty or Coronary Artery Bypass.
- (d) Cardiac valve surgery or anticoagulation therapy.
- (e) Psychosis.
- (f) Depression, anxiety disorder or personality disorder.
- (g) Alcoholism or drug dependence.
- (h) Epilepsy or convulsion(s) without satisfactory medical explanation of cause.
 - (i) Head injury with Loss of Consciousness/Post Traumatic Amnesia >30 minutes.
- (j) Intracranial surgery, intracranial haemorrhage.
 - (k) Disturbance of consciousness without satisfactory medical explanation of cause.
- (l) Obstructive airways disease on treatment with β 2 stimulants, theophylline preparations or oral steroids.
- (m) FEV1% (measured I actual) <70%.
 - (n) Pulmonary embolism or coagulation disorder.
 - (o) Menière disease.
 - (p) Malignant neoplasm.
 - (q) Colour vision defect.
 - (r) Monocular vision.
 - (s) Organ transplant.
 - (t) Loss of limb(s) or vital organ(s).
- (2) A waiver certificate may only be issued by the designated body or institution.
- (3) The waiver serial number is assigned by the designated body or institution according to a set procedure which includes the class of medical, diagnosis and date of issue.
- (4) A waiver certificate is issued on the form contained in Schedule 23.

67.00.9 DUTIES OF HOLDER OF MEDICAL CERTIFICATE

1. Medication and flying

- (1) This Chapter outlines the general principles for the use of medications in flying.
- (2) Any intake of medicine or narcotic substance must be declared in the formal declaration signed by aviation personnel and handed to physicians in charge of the evaluation of flying fitness at each medical examination. In principle, pilots taking medication either prescribed or obtained 'over the counter' have to be regarded as unfit unless a DAME /IAM / SACAA have been contacted and endorsed resumption of flying duties. The use of herbal medication and alternative treatment modalities requires particular attention to possible side effects and should also be reported to the DAME/IAM and the SACAA.
- (3) The decision as to whether a aviation personnel is medically fit for the privileges' of the license they apply for whilst taking medication has always to be taken in conjunction with knowledge of the applicants clinical situation , the dosage and side effects associated with the medication. The consumption of such substances may have consequences on qualification for three reasons:
 - (a) the disease requiring treatment may be cause for disqualification;
 - (b) flight conditions may modify the reactions of the body to a treatment (e.g. jet lag, dehydration, moderate hypoxia)
 - (c) and most importantly, medication may cause adverse side effects that impair flight safety.
- (4) It should be noted that the effects of medication do not necessarily immediately appear when treatment is started or disappear when the treatment is stopped, and that the subject may be temporarily disqualified during the withdrawal period.
- (5) Flying personnel should nevertheless not be deprived of an efficient treatment because of their professional occupation. What is important is to find a compromise between flying fitness

requirements, medical treatment and illness that is the most suitable both for the patient and flying safety.

- (6) Flying personnel must be declared fit by their DAME according to the circumstances and not by their medical practitioner. One of the goals of the DAME must be to make flying personnel aware of the problems caused by treatment so that they refrain from taking unreported medication whose side effects may not have been assessed.
- (7) It is possible that new therapeutic agents will become available that offer significant treatment advantages. If such agents are considered by the SACAA to be appropriate for use by aircrew, due consideration given to aero medical and safety aspects, their use may be approved. However, as a general rule, medication shall only be endorsed by the DAME, if the applicant has taken the respective medication whilst not on flying duty for an appropriate period of time (temporary disqualification) with proven efficacy and without any side effects that could interfere with flying duties.

2. Guidelines

- (1) The medical condition is the primary concern, and a clinical assessment of being unfit to exercise aviation related task will determine the period of unfitness.
- (2) The class of medical fitness determines which medical conditions will be allowable for the exercise of the aviation license, or how it may be waived.
- (3) Knowledge of existing criteria and protocols as produced by SACAA is mandatory for proper interpretation of aviation medical fitness.
- (4) All drugs not published in the SA-CATS 67 need to be verified by SACAA before prescribing.
- (5) Central acting drugs generally are unacceptable and unsafe as medication for aviation personnel.
- (6) The side effect profile needs careful attention to determine acceptability.
- (7) The applicant's co-morbidities may cause medical unfitness.
- (8) The applicant's possible adverse reactions to the medication must be monitored before a decision regarding fitness may be made.

The period of being unfit after the use of unacceptable medications largely depends on the manner and time of elimination of the drug.

Central Nervous System			
Central nervous system stimulants: All pharmacological in this group is unacceptable. The disease condition per se does preclude aviation related activity.			
Name	Acceptable	Unacceptable	Comments
Benzodiazepines	Themazepam		No Flying within 12h; this drug is addictive and

			should not be used with alcohol at the same time
Other	Zopiclone Zolpidem		Applicants must wait 24-48 hours after these medications have been taken before flying. These drugs must not be used more than twice a week to avoid habituation
SSIR	Fluoxetine Sertraline Citalopram, or Escitalopram		Selected non-sedating selective serotonin reuptake inhibitors (SSIR) require a minimum of three (3) months grounding period. The CAA will evaluate affected applicants on a case-by-case basis and will issue medical certificates based on medical findings, refer to the protocol
Barbiturates		These agents are unacceptable	
Anxiolytics		These agents are unacceptable	
Anti-psychotics		These agents are unacceptable	
Anti-epileptics		These agents are unacceptable to Pilots & ATC	These medications may be considered for cabin crew, case-by-case presentation. A 3-month stabilisation period is required. Refer to protocol.
Anti-Parkinson agents		These agents are unacceptable	
Anti-vertigo and anti-emetics		These agents are unacceptable	
Anti-migraine agents	Triptans		Applicant may not fly for 24 hours after being treated with this medication. Beta blockers may be considered acceptable for prophylaxis. Refer to protocol
Alzheimer's disease		These agents are unacceptable	
Anaesthetics	Acceptable		A minimum of 24 hours following local or regional (including dental) anaesthetics. (The condition for which the anaesthetic has been administered must also be considered prior to returning an

			individual to flying or controlling duties). A minimum of 72 hours following general, spinal or epidural anesthetic. This proscription includes drug-induced sedation. (The condition for which the anesthetic etc has been administered must also be considered prior to returning an individual to flying or controlling duties).
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ANALGESICS & ANTI-INFLAMMATORIES

Central Nervous System	<u>Acceptable</u>	<u>Unacceptable</u> Morphine Codeine Codethyline Cocaine Cannabis	Central analgesics and narcotics morphinics analgesics are strictly incompatible with flying status.
		Doxylamine Promethazine Meprobamate Orphenadrine Propoxyphene Diphenhydramine Tramadol	

NSAIDS Peripheral analgesics	Acetyl Salicylic Acid		
<u>Non-Selective Cox-Inhibitors</u> Acetaminophen Salicylates Propionic acid derivatives Acetic acid derivatives	<u>Acceptable</u> Paracetamol Acetyl Salicylic Acid Ibuprofen Naproxen Fenoprofen Ketoprofen Flurbiprofen Indomethacin Ketorolac	<u>Unacceptable</u> Sulindac Phenylbutazone	These substances, prescribed for short periods at moderate doses, may be compatible with flying status if the condition which justifies their prescription is itself compatible with flying status.

Enolic acid (Oxicam) derivatives	Diclofenac Nabumetone		
Fenamic acid derivatives	Piroxicam Meloxicam Tenoxicam Lornoxicam Mefenamic acid Meclofenamic acid Flufenamic acid Tolfenamic acid		
COX Inhibitors	Meloxicam		
SelectiveCOX2 inhibitors	Celecoxib Etoricoxib Parecoxib		
Musculoskeletal Agents			
Anti-Gout	Allopurinol	Colchicine	This medication may be acceptable, each application will be considered on a case-by-case basis Flying prohibited while on colchicine. Stable GIT must be demonstrated after discontinuation of colchicine.
Topical agents	These agents are acceptable		
Gold		These agents are unacceptable	
Osteoporosis	<u>Biphosphonates</u> Alendronate Risedronate Calcium and Vit D supplements <u>Other drugs:</u> Selective oestrogen receptor Modulators –Raloxifene <u>Parathyroid hormone</u> Teriparatide		Reserved on a case-by-by case basis

Autonomic		Sympathomimetics Sympatholytics Cholinergic Anti-cholinergics	All centrally acting agents are unacceptable
Autocoids			
Antihistamines	Ebastine Loratadine Desloratadine Acrivastine Fexofenadine		Sedating oral antihistamines are not authorised for flying personnel and incompatible with flying status. New generation, non-sedating oral (e.g. fexofenadine) and topical antihistamines may be acceptable.
Serotonin antagonists		All agents in this group are unacceptable Methysergide, Cyproheptadine Pizotifen Ondansetron Grinesatron	
Neurokinin1(NK1) Antagonists		All agents in this group are unacceptable Aprepitant Casopitant	Novel class of medications that possesses unique antidepressant, anxiolytic, and antiemetic properties
Cardio-Vascular Agents			
Positive Inotropic Agents		All agents in this group are unacceptable	
Anti-Arrhythmic			Case-by case presentation, individual medical may be considered
Anti-Hypertensives			
Central acting sympathetic nervous system inhibitors		All agents in this group are unacceptable	
Alpha-receptor blockers		All agents in this group are unacceptable	All L.U.T.S cases –cases presentation, individual medication will be considered.
Beta-receptor blockers	Atenolol Metoprolol Bisoprolol	Non-selective drugs are unacceptable	Cardio-selective beta blockers are acceptable, but no longer first line or choice.
Sympathetic nervous blockers		These drugs are unacceptable as they may impair alertness.	
Direct-acting vasodilators		Dihydralazine Prazozine Uradipil	These drugs are unacceptable because they frequently have adverse side effects such as orthostatic hypotension.

Calcium channel blockers	Diltiazem Verapamil Nifedipine Nitrendipine Long-acting Nifedipine	Short acting Nifedipines are unacceptable.	These medications may be compatible with flying status. They may induce peripheral oedema or headache, but they are generally well tolerated. Preference shall be given to medications with the most flexible use. If used for angina these medications are not compatible with flying status.
ACE inhibitors	Captopril Enalapril Lisinopril Benazepril Fosinopril Perindopril Quinapril Ramipril		
Angiotensin receptor antagonists	Candesartan Eprosartan Irbesartan Losartan Telmisartan Valsartan		
Anti-anginal agents			Angina pectoris per se is disqualifying.
Diuretics	Hydrochlorothiazide (< 25 mg/day) Potassium/ magnesium sparing diuretics such as amiloride and spironolactone	Furosemide Bumetanide Torasemide Acetazolamide Eplerenone	Low dose diuretics are acceptable. High dose kaliuretic diuretics (> 25 mg hydrochlorothiazide or equivalent) are unacceptable.
Other vasodilators			The indications for use are disqualifying.

Vasoconstrictors			The indications for use are disqualifying.
<u>Hypolipidaemic agents</u>			
Dyslipidaemia in flying personnel should be treated in conjunction with an appropriate diet and weight reduction if appropriate.			

Fibrates			Treatment with fibric acids (e.g. fenofibrate or gemfibrozil) should be discontinued in the case of gastrointestinal side effects or elevated transaminase concentration
Statins	Cholestyramine	Fluvastatin Lovastatin Combined formulas	HMG-CoA reductase inhibitors are acceptable with preference for hydrophilic molecules such as pravastatin rather than lipophilic substances such as simvastatin which may induce sleep disorders.
Others	Acipimox (niacin derivative) used in low doses and accepted on a case-by-case basis.		
Plasma expanders			
Plasma expanders		All agents in this group are unacceptable	
Blood and Haemopoietic	Anticoagulants-wafarin-refer to the protocol-acceptable	Haemostatics, the indications for use are disqualifying	
Fibrinolytics		All agents in this group are unacceptable	
Platelet aggregation inhibitors, Injectables	Disprin/Aspirin in low-dose ($\leq 100\text{mg/day}$) acceptable	All agents in this group are unacceptable	
Sclerosing		All agents in this group are unacceptable	
Haematinics	Prophylactics in pregnancy are acceptable		Anaemia has to be corrected before consideration.
Haemoglobin-based Oxygen carrier		This medication is not considered	
Respiratory System			
Coughs and cold	Drugs containing only carbosysteine, guaifenesin or acetylcysteine without an alcohol base are accepted	Tripolidine Pseudoephedrine Ephedrine Codeine & modifieds Theophyllin Dextromethorphan Diphenhydramine Promethazine Noscapine Phenyltoloxamine Methadone	
Bronchodilators			Sympathomimetics: The use of Short-acting Beta Agonists(SABA) /Long-

			acting Beta Agonists(LABA) should be restricted to eight(8) hours or more prior to flying, but may be used in an unusual asthmatic attack in flight to allow the safe completion of the flight.
Methylxanthines and combinations		All agents in this group are unacceptable	
Anticholinergics		All agents in this group are unacceptable	
Combinations	Only acceptable combinations are Salmeterol with Fluticasone and Budesonide and Formoterol.		
Mucolytics	Carbocysteine Acetylcysteine Bromhexidine		
Anti-asthmatics	Inhaled Glucocorticoids Leucotrine receptor antagonists		
Chromones	Cromolyn sodium Nedocromil sodium		The drugs are also called cromoglycates. They are alternative choices when initiating regular controller therapy in patients with mild asthma, although inhaled corticosteroids (ICS) are the preferred agents. They have the advantage of having a lower side effect profile than ICS.
Other anti-asthmatics		All agents in this group are unacceptable	
Surfactants		This medication is not compatible with flying.	
Ear, Nose and Throat			
Topical nasal preparations	These medications are acceptable.		
Ear drops and ointments	These medications are acceptable.		
Mouth and Throat preparations	These medications are acceptable.		
Gastro-Intestinal tract			
Digestants	These medications are acceptable.		
Appetite suppressants		All agents in this group are unacceptable	
Anti-spasmodics	Mebeverine Alverine Peppermint Oil	Hyoscine Diphenhydramine Alcohol substrates	Antimuscarinics (e.g. dicyclomine, mepenzolate, pipenzolate,

		Belladonna Chlordiazepoxide Propantheline Methixene	poldine and propantheline) are used to reduce smooth muscle spasm in non-ulcerative dyspepsia, irritable bowel syndrome and diverticular disease. They all have atropine-like side-effects of confusion, dry mouth, reduced power of accommodation, difficulty with micturition and constipation, which preclude their use.
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Acid reducers			
Antacids		Magnesium as a single drug is unacceptable.	
Antacids and combinations		Dicyclomine Magnesium dominant drugs Oxethazaine	
H2 receptor antagonists	Cimetidine allowable if taken more than 8 hours before aviation activity. Ranitidine allowable if taken more than 12 hours before aviation activity		
Proton pump inhibitors	Omeprazole		
Cycloprotective		Misoprostol	
Motility enhancers			
Motility enhancers		All agents in this group are unacceptable	
Laxatives		Magnesium salts	
Antidiarrhoeals	Loperamide not to be taken less than 6 hours before aviation activity.	Codeine phosphate Cophenotrope Morphine Atropine (Lomotil) Aminopentamide	
Liver, gall bladder and bile		These agents are unacceptable due to disease profile	Treatment for the dissolution of gallstones is not compatible with flying status as it may cause diarrhoea and cholecystitis.
Suppositories and anal ointments	These agents are acceptable		Soothing preparations containing bismuth subgallate, zinc oxide and haemamelis often mixed with a small dose of

			corticosteroid may be acceptable in short courses for topical application.
Others	Sulfasalazine enteric coated may be used with 6 monthly ophthalmology reporting, FBC, UAE, and urinalysis	Sibutramine Budesonide Infliximab Orlistat	
Anthelmintics			
Anthelmintics	Mebendazole Albendazole Praziquantel	Piperazine	
Dermatological			
Anti-bacterial antiseptic agents	These medications are acceptable.		
Anti-parasitics	These medications are acceptable.		
Fungicides	These medications are acceptable.		
Cortico-steroids	These medications are acceptable.		
Psoriasis		Systemic Etretnate Acitretin	Systemic etretinate for psoriasis may cause serious drying of the skin and mucosa and particularly of the conjunctival tissues, intensified by flying conditions. It is not recommended for aircrew.
Acne		Tretinoin Isotretinoin Cyproterone acetate Minocycline	
Melanin inhibitors and stimulants		These medications are unacceptable	
Emollients and Protectives	These medications are acceptable		
Others		Imiquimod Minoxidil	

OPHTHALMICS			
Aviation activities only to commence once all visual normality is regained			
Anti-infective and antiviral	Chloramphenicol Ciprofloxacin Ofloxacin Oxytetracycline Fusidic Acid Moxifloxacin Acyclovir		Anti-infective and anti-inflammatory eye preparations are usually not compatible with flying status due to the underlying condition. The SACAA should be consulted if there is any doubt.

Corticoids	These medications are acceptable		
Combinations		All treatment containing Aminoglycosides are unacceptable	
Decongestants		These medications are unacceptable.	
Mydriatics		These agents are unacceptable	
Others		Injectables Verteporfin	
Urinary System			
Anti-diuretics		This medication is not compatible with flying	
Urinary alkalinizes		The chronic use of this medication is not compatible with flying	
Urinary antiseptics		Pipemidic acid Nalidixic acid Tamsulosin Lanthanum Flavoxate	
Others		Lanthanum Tamsulosin Flavoxate	

Genital System			
Contraceptives	These medications are acceptable		
Vaginal Preparations	These medications are acceptable		
Oxytocics		These agents are unacceptable	
Uterine antispasmodics		These agents are unacceptable	
Sexual dysfunction			Temporary colour vision disturbance have been reported after the use of phosphodiesterase-type-5 inhibitors (e.g. vardenafil, sildenafil). 72 hours should elapse after use prior to flying.
Anti-Microbials			
Anti-Microbials	Beta-lactams, Erythromycin(short course) Azithromycin (short course) Other Macrolides, Chloramphenicols Sulphonamides and combinations	Telithromycin Roxithromycin Aminoglycosides Tetracycline	All antibiotics should be used for 48 hours without any side effects before commencing aviation activities. Injectables are not acceptable.

	Quinolones Clindamycin(short course) Na-Fusidate Fosfomycin		
Anti-fungal agents			
Anti-fungal agents	Fluconazole Itraconazole Nystatin Terbinafine Griseofulvin Ketoconazole		
Anti-protozoa agents			
Anti-protozoa agents	Metronidazole Atovaquone Chloroquine	Primethamine Tinidazole Halofantrine Mefloquine	
Anti-viral agents			
Anti-viral agents	Acyclovir		Anti-Retroviral-case-by case management, refer to protocol
Anti-retroviral agents			
Nucleoside Reverse Transcriptase Inhibitors (NRTI's)	Zizovudine Retrovir Lamivudine Didanosine Abacavir Emtricitabine Tenofovir	Efavirenz	Initially- monthly FBC for 6 months
Non-Nucleoside Reverse Transcriptase Inhibitors	Nevirapine		Initially- ALT & AST – 2 weeks, 6 weeks
Proteases Inhibitors (PI)	Atazanavir Lopinavir/Ritonavir Saquinavir Nelfinavir	Indinavir	
Others	Raltegravir Darunavir Etravirine Maraviroc Amprenvir	Tipranavir	
	Fosamprenavir		
Fusion Inhibitors	Fuzeon		
Endocrine System			
Anti-diabetic agents	<u>Oral</u> Metformin Thiazolidenediones Pioglitazone Rosiglitazone Acarbose:	<u>Insulin</u> Glargine Detemir Glulisine Lispro	<u>Oral</u> Glipizide Tolbutamide Gliclazide Glibenclamide Glimepiride Chlorpropamide
			<u>Insulin</u> Neutral protamine Hagedorn Premix analogues (biphasic)
			Refer to Diabetic Protocol

			Repaglinide Nateglinide		
Thyroid	Thyroxine		Neo-Mercazole		Refer to Protocol
Parathyroid	Corticosteroids, only low dose Prednisone is acceptable		Calcitonin,		Refer to Protocol
Hormones					
Androgens and Anabolic steroids	Testosterone Mesterolone Oestrogens Progestogens Tibolone		Metenolone Nandrolone		
Tropic Hormones	Clomiphene		Injectables and implants		
Hormone Inhibitors	Tamoxifen Anastrozole				Case-by-case basis and 3 months stabilisation period required.
Vitamins, Tonics, Minerals and Electrolytes					
Vitamins	These agents are acceptable.				In general, pilots, cabin crew, and ATCs should not exceed the Recommended Daily Allowances for these products.
Tonics			Alcohol based combinations unacceptable		
Minerals and electrolytes	These agents are acceptable				In general, pilots, cabin crew, and ATCs should not exceed the Recommended Daily Allowances for these products
Amino-Acids	These agents are acceptable				In general, pilots, cabin crew, and ATCs should not exceed the Recommended Daily Allowances for these products
Cytostatics					
Immunological Immunosuppressant's Immunostimulants			This section will come under review soon.		
Chelating agents, Ion exchange Preparations					
Chelating agents, Ion exchange Preparations			These agents are unacceptable		
Biological					
Biological	Immunisation regimens are acceptable				No aviation-related duties for 24 hours after receiving the following vaccinations (primary and boosters): ▪ Adult diphtheria and

			<ul style="list-style-type: none"> tetanus ▪ Poliomyelitis ▪ Hepatitis A & B ▪ Measles, mumps, rubella ▪ Yellow fever ▪ Typhoid ▪ Tuberculosis (Mantoux Test or Bacille Calmette-Guerin); ▪ Influenza ▪ Varicella ▪ Meningococcal ▪ Pneumococcal ▪ Cholera. <p>After receiving the following immunisations (primary and boosters) there should be no aviation-related duties for a minimum of 72 hours: <u>Japanese Encephalitis.</u></p>
Enzymes			
Enzymes		These agents are unacceptable	
Poison Antidotes			
Poison Antidotes		Bupropion is unacceptable	
Others			
Others	Nicotine adjuvants are acceptable	Bupropion is unacceptable	
Biological	Immunisation regimens are acceptable		<p>No aviation-related duties for 24 hours after receiving the following vaccinations (primary and boosters):</p> <ul style="list-style-type: none"> ▪ Adult diphtheria and tetanus ▪ Poliomyelitis ▪ Hepatitis A & B ▪ Measles, mumps, rubella ▪ Yellow fever ▪ Typhoid ▪ Tuberculosis (Mantoux Test or Bacille Calmette-Guerin); ▪ Influenza ▪ Varicella ▪ Meningococcal ▪ Pneumococcal ▪ Cholera. <p>After receiving the following immunisations (primary and boosters) there should be no</p>

Poison Antidotes			
Poison Antidotes		These agents are unacceptable	
Others			
Others	Nicotine adjuvants are acceptable	Bupropion is unacceptable	
			aviation-related duties for a minimum of 72 hours: <u>Japanese Encephalitis.</u>
Enzymes			
Enzymes		These agents are unacceptable	

67.00.13 SUBSTANCE ABUSE

1. General

These technical standards are based on the general principles that have been established internationally and are designed to ensure that the entire drug & alcohol testing process is conducted to give accurate and reliable information about a donor's drug & alcohol use.

2. Definitions

In this Technical standard, the following words shall bear the following meaning:

Adulteration means any process by which an individual knowingly interferes with (or attempts to interfere with) the processes of specimen collection, transport or analysis with the intention of avoiding a legitimate test result. The actions undertaken can include (but are not limited to) the addition of water or foreign substances to the specimen, specimen substitution, damaging bottle seals or packaging and the deliberate consumption of interfering substances or copious volumes of water prior to specimen collection;

Aliquot means a fractional part of a specimen (taken as a sample representing the whole specimen) used for testing;

Authorising Scientist means a person who reviews all pertinent data and quality control results in order to attest to the validity of the laboratory's test reports. This person may also function as the Toxicologist (see Toxicologist);

Calibrator means a solution of known concentration used to calibrate a measurement procedure or to compare the response obtained with the response of a test sample/unknown sample. The concentration of the analyte of interest in the calibrator is known within limits ascertained during its preparation. Calibrators may be used as single point measurements or to establish a calibration curve over a range of interest;

Chain of Custody refers to procedures to account for each specimen by tracking its handling and storage from point of collection to final disposal. These procedures require that the donor identity is confirmed and that a chain of custody form is used from time of collection to receipt by the laboratory. Within the laboratory appropriate chain of custody records must account for the samples until disposal;

Chain of Custody Form means a form used to document the procedures from time of collection until receipt by the laboratory;

Collection cup refers to a single-use container, made of plastic, large enough to easily catch and hold at least 55 mL of urine voided from the body. Must be individually wrapped in a sealed plastic bag or shrink wrapping; or must have a peelable, sealed lid or other easily visible tamper-evident system;

Collecting officer means a person trained to collect specimens from donors;

Collection Site means a place where individuals present themselves for the purpose of providing a specimen for subsequent analysis;

Confirmation Test means an analytical procedure to identify and quantify the presence of a specific drug or analyte which is independent of the initial test and which uses a different technique and chemical principle from that of the screen test in order to ensure reliability and accuracy;

Cut-off means a concentration level set to determine whether the sample is positive or negative for the presence of a drug;

Customer means the organisation requesting the drug testing service;

Donor means the individual from whom a specimen is collected;

Laboratory means the facility that is approved by SANAS (South African National Accreditation Standard providing the analytical services to detect drugs of abuse;

Medical Review Officer (MRO) means a medical physician responsible for receiving laboratory results from the drug-testing laboratory that has knowledge of substance abuse and has appropriate training or experience to interpret and evaluate an individual's positive test result, in light of declared information;

Negative result (screen) means a preliminary result established by screening test that indicates a drug possibly present in the sample is not detected above a specified cut-off;

Negative result (confirmation) means a result reported by the laboratory that indicates that a suspected drug present in the sample is below a specified cut-off;

Non-negative result means a preliminary result established by screening test that indicates a drug possibly present in the sample is detected above a specified cut-off. A specimen that is reported as adulterated, substituted or invalid;

Positive result (confirmation) means a result reported by the laboratory as positive means that there is conclusive evidence that a drug is present in the sample tested at level greater than or equal to the confirmation cut-off concentration;

Quality control sample means a sample used to evaluate whether or not an analytical procedure is operating within pre-defined tolerance limits;

Reference method means a method in analytical chemistry considered to be acceptable for confirmation of results (e.g. mass spectrometry, refractometry, pH electrode);

Sample means a representative portion of a specimen submitted to a laboratory for testing;

Screen Test means a test to eliminate negative samples from further consideration and to identify the non-negative specimens that require confirmation testing;

Specimen means the portion of (normally) urine, blood or breath that is collected from a donor;

Standard (1) means a reference material of known purity or a solution containing a reference material at a known concentration;

Standard (2) means an agreed protocol or procedure (e.g. ISO:17025);

Standard Operating Procedure (SOP) means a written document giving the detailed steps to be followed when undertaking a particular task (e.g. the analysis of a given drug in a urine sample);

Toxicologist means a person (holding a degree in the chemical sciences specializing in Analytical Chemistry and Toxicology) responsible for interpreting a positive analytical result for the customer or the customer's designated Medical Review Officer (MRO). This person must have suitable training and experience in the theory and practise of all methods and procedures employed in the laboratory, including a thorough understanding of chain of custody procedures, quality control practices, and analytical procedures relevant to the interpretation of a result.

3. Abbreviations

STT: Screening test technician

BAT: Breath Alcohol Technician

EBT: Evidential Breath testing device (Confirmatory breath test)

ASD: Alcohol Screening device

QAP: Quality assurance plan

ATF: Alcohol testing form

4. Urine Specimen Collection

- (1) Specimens must be collected by suitably trained personnel (Collecting Officers) who have a thorough understanding of the principles of chain of custody.
- (2) Collecting officers must be able to provide evidence of their training, and/or the instructions that they must follow during the collection process.
- (3) The following restrictions apply:
 - (a) The immediate supervisor of a donor may not serve as the collector when that donor is tested, unless there is no feasible alternative.

- (b) A co-worker who is in the same testing pool or who works with a donor on a daily basis may not serve as a collector when that donor is tested, unless there is no feasible alternative.
 - (c) An individual who has a personal relationship with the donor (e.g., spouse, ex-spouse, relative, close personal friend) may not serve as the collector, unless there is no feasible alternative.
- (4) The collector should have identification with his/her name address, and telephone number and be able to provide it upon request of the donor.
- (5) The following items should be available to the collecting officer before specimen donation occurs:
- (a) Chain-of-Custody form
 - (i) The original copy accompanies the sample to the confirmatory laboratory and all persons involved in the transport and receiving of the sample should record their name and signature on the chain-of-custody form.
 - (ii) A copy should be handed to the licence holder, the medical review officer (MRO), and the Collection officer
 - (b) A link between the chain-of-custody form and collection cup.
 - (c) A demonstrably clean and unused collection cup which can hold a minimum of 50 mL.
 - (d) At least two collection cups for split specimen collection.
 - (i) Each cup must be able to hold a minimum of 20 mL.
 - (ii) In the case of single specimen collection it must be able to hold a minimum of 40 mL.

NOTE: *In case of the use of immunoassay integrated test cup kits (also referred to as an "integrated split specimen cup"), the collection cup and sample bottle is integrated into the same device, hence a single specimen collection may be performed.*
 - (e) Blueing agent that must be added to toilet bowl water/tank before donor enters the collection area.
 - (f) Temperature measurement device able to determine temperatures between 32-38°C.
 - (g) Secure tamper-evident seal for each bottle.
 - (h) Leak resistant plastic bag.
 - (i) Disposable gloves for collector when handling donor specimens.
 - (j) Packaging components that satisfy current mail and courier regulations.
- (6) A collection site is a permanent or temporary facility where a donor provides a urine specimen for a drug test.
- (7) The site must have all necessary personnel, supplies, equipment, facilities, and supervision to provide for specimen collection, security, and temporary storage.
- (8) A urine specimen collection site must provide for donor privacy while he or she provides the urine specimen.
- (9) An observed collection must only be performed when required (e.g. as part of a re-collection in adulteration suspicion).
- (10) The following facilities provide adequate privacy for urine collections:
- (a) A single-toilet restroom with a full-length door
 - (b) A multi-stall restroom with partial-length doors
 - (c) A mobile restroom (e.g., a vehicle with an enclosed toilet stall).

- (11) A source of water for washing hands must be provided.
- (a) The water source should be external to the restroom where urination occurs.
 - (b) If the only source of water available is inside the restroom, the collector must secure the water source before the collection, and restore the water source to allow the donor to wash his or her hands after the collection.
 - (c) If a water source is not available, providing moist towelettes outside the restroom is a suitable alternative.
- (12) A suitable clean surface for the collector to use as a work area must be available.
- (a) The collector work area may be located outside the restroom or inside the restroom, only if the donor can have privacy while providing the urine specimen.
- (13) The collector must maintain line-of-sight custody or provide for the secure temporary storage of specimens from the time the specimen is collected until it is sealed in a shipping container prior to transfer to an express carrier or courier for shipment to a laboratory.
- (14) Either the collection officer or the donor, with both of them present, must unwrap or break the seal of the collection container.
- (15) During the collection process the collection site must be dedicated solely to drug testing and comply with all local health and safety requirements.
- (16) The collection officer and the donor must be present throughout all the procedures outlined in the paragraphs of this section and the entire process must be transparent.
- (17) When a donor arrives at the collection site, the collection officer will request that the donor presents photographic identification (passport, national identity document, drivers licence, SACAA license etc).
- (a) If the donor does not have proper photographic identification, the collection officer will obtain a positive identification of the donor by an authorised supervisor or manager within the parent organisation.
 - (b) If the donor's identity cannot be established, the collection officer will not proceed with the collection and notify an authority.
- (18) The collection officer will ask the donor to provide voluntary written informed consent before the collection commences.
- (19) The following minimum precautions shall be taken to ensure that unadulterated specimens are obtained and correctly identified:
- (a) To deter the dilution of specimens at the collection site, toilet water colouring agents should be placed in toilet tanks wherever accessible or in the toilet bowl, so the reservoir of water in the toilet bowl always remains coloured.
 - (i) Any other sources of water in the enclosure where urination occurs (e.g. taps, shower) will be secured prior to collection.
 - (b) The collection officer will ask the donor to remove any unnecessary outer garments that might conceal items or substances that could be used to tamper with or adulterate the donor's urine specimen.
 - (c) The donor will be instructed to wash and dry his or her hands prior to urination with inspection of the hands afterwards by the collection officer.

- (d) After washing hands, the donor will remain in the presence of the collection officer and will not have access to any unregulated source of water, soap dispenser, cleaning agent, or any other materials that could be used to adulterate the specimen.
 - (e) The collection officer will give the donor a clean specimen collection cup.
 - (f) The donor will be instructed not to flush the toilet until the specimen is handed to the collection officer.
 - (g) The collection officer will note any unusual behaviour of the donor on the chain of custody form.
- (20) Upon receiving the specimen from the donor, the collection officer will:
- (a) Check the volume of urine in the specimen container and check the temperature of the urine specimen.
 - (i) The temperature-measuring device used must accurately reflect the temperature of the specimen and not contaminate the specimen.
 - (ii) If a thermometer is used it may only be done on the residual urine in the collection cup after the specimen has been transferred to the sample bottles earmarked and secured for possible confirmatory analysis (split or single).
 - (iii) The thermometer may under no circumstances be brought into contact with the urine that is designated for possible confirmatory analysis.
 - (iv) The time from urination to temperature measurement should not exceed 4 minutes.
 - (b) Inspect the specimen to determine its colour and appearance for any signs of contaminants.
 - (c) Any unusual findings will be noted on the chain of custody form.
 - (d) A re-collection may be performed and both specimens forwarded for testing by a laboratory with special notice on the chain of custody form.
 - (e) For a split specimen collection the volume must be approx. 50 millilitres (mL) or more and the temperature within the acceptable range of 32°C - 38°C, the collection officer may then proceed with step (j).
 - (i) If the volume is less than 50 ml, the specimen will be discarded and a second specimen will be collected.
 - (f) For a single specimen collection the volume must be approx. 20 millilitres (mL) or more and the temperature within the acceptable range of 32°C -38°C, the collection officer may then proceed with step (j).
 - (g) The donor may be offered a reasonable amount of liquid to drink for the purpose of re-collection (e.g., 250ml of water every 30 min, but not to exceed a maximum of 1 litre).
 - (h) If the temperature of the urine specimen is outside the acceptable range of 32°C -38°C, a second specimen will be collected (as above).
 - (i) If there is any reason to believe (temperature outside of range, visible contamination etc) that a donor may have adulterated, diluted, altered or substituted the specimen, another specimen will be obtained as soon as possible and both specimens will be forwarded to the laboratory for testing.
 - (j) Both the donor and the collection officer will keep the specimen container /specimen bottles in view at all times prior to the urine specimen being sealed and labelled.
 - (k) For a split collection, the specimen is split into a minimum of two specimen bottles (Sample A and Sample B).
 - (i) When the specimen is transferred from the specimen container to the specimen bottles, it will be poured and the collection officer will request the donor to observe the transfer of the specimen and the attachment of the tamper-evident seal/tape on the bottles.
 - (l) The sealed specimens together with the corresponding chain of custody documentation in a tamper evident container must be dispatched to the laboratory.

- (i) In split collections one bottle will be used for the drug test (Sample A) while the second bottle (Sample B) will remain sealed at the analytical laboratory in case the donor wishes to challenge a positive confirmation result.
 - (ii) In single collections (including integrated test cups) the specimen is split immediately after reception at the laboratory, before any testing, into a sample for analysis (Sample A) and a stored challenge specimen (Sample B).
- (m) At an appropriate time after the urine specimen has been collected and sealed into the transport bottles the collection officer will invite the donor to wash his/her hands.
- (n) The specimen bottle will have an identification label that contains at a minimum the date, the donor's specimen number and the donor's signature/initials.
- (i) The collection officer will enter all information on the chain of custody form to identify the origin of the specimen.
 - (ii) Specimen bottles and all pages of the chain of custody will be labelled at the time of collection with a unique identifier.
- (o) The donor will be asked to read and sign a statement on the chain-of-custody form certifying that the specimen identified on the form was in fact the specimen provided by the donor and giving informed consent.
- (p) The collection officer will complete the specimen chain-of-custody form and package with the urine specimen ready for dispatch as soon as possible.
- (i) Specimens should be stored at 4°C (do not freeze).
- (21) The specimens will be placed in containers designed to minimise the possibility of damage during shipment.
- (22) The collection officer will keep a register of the transfer of the specimens to the courier from the collector.

5. Laboratory urine analysis

- (1) Specimens are received at the laboratory where initial checks on the chain of custody documents and sample appearance are done.
- (2) The following specimens will be deemed invalid:
- (a) No chain of custody documentation accompanied the sample
 - (b) Chain of custody documentation incomplete (collector/donor details not filled in, donor consent absent)
 - (c) Identification parameters (name/ID/barcode/numerical) mismatched on sample and documentation
 - (d) No seals on specimens or seals broken/tampered with on any sample bottle
 - (e) Insufficient sample volume
- (3) After the initial checks are complete samples may be placed in temporary storage at 2°C-10°C before further analysis.
- (4) Upon reception of a split specimen (Sample A and Sample B) samples are separated and one sample is placed in long term storage at -20°C (only Sample B) for possible challenges to results by the donor.

(5) Upon reception of a single specimen (only Sample A) the sample is documented on the chain of custody and opened for a split performed by the laboratory before any further analysis.

- (a) The sample is poured from Sample A into a clean sample bottle (Sample B) containing the unique identifier of Sample A, sealed and placed in long term storage at -20°C for possible challenges to results by the donor.

NOTE: the basic protocol of specimen collection, sample validity testing, initial drug screen test (on-site or laboratory) and confirmation of all non-negative results must be followed.

(6) Analysis performed by the laboratory is done utilising separate aliquots from the testing sample (Sample A).

- (a) Aliquots are taken in a manner to exclude contamination of the sample.

(7) The following validity tests must be performed to ensure the collected specimen is unadulterated urine:

- (a) temperature
- (b) pH
- (c) specific gravity/creatinine.
- (d) nitrite
- (e) oxidants (e.g. halogens, chromium (VI), pyridinium chlorochromate),
- (f) gluteraldehyde
- (g) surfactants (e.g. benzalkonium chloride)

(8) Any result that indicates adulteration (non-negatives) should be reported to the customer who may request additional confirmatory testing for adulterants.

(9) All preliminary drug tests must fulfill the following minimum requirements:

- (a) All preliminary test results must be reviewed with regard to the validity of the results
- (b) All assays must be calibrated against appropriate analytical standards.
- (c) Where the assay has significant cross-reactivity or selectivity to related compounds the assay must be calibrated against one named standard, and where necessary the sensitivity to other compounds must be indicated.
- (d) The SACAA must be informed of the expected sensitivity and specificity to assayed compounds of interest.
- (e) Suitable cut-offs from Substance Abuse and Mental Health Services Administration (SAMHSA) are to be employed (Table 1).
- (f) Additional drug classes may be included at cut-offs established in scientific literature as long as the above mentioned minimum criteria is applied.

Table 1. SAMHSA recommended cut-off concentrations for preliminary drug tests

Screening drug class	Cut-off (ng/mL)
Cannabis metabolites	50
Opiate metabolites	2000
Cocaine metabolites	300
Amphetamines	1000
Phencyclidine	25
Prescription medication (Benzodiazepines, Barbiturates etc) See NOTE	Therapeutic ranges

NOTE: All prescription medication needs to be declared at all times by the licence holder and it is then the prerogative and responsibility of the employer to withdraw him/her from any safety sensitive duties. Prescription medication should be declared upfront before a drug test commences and should be noted on either of the “voluntary informed consent form” or the “chain-of-custody form”.

- (10) All non-negative results from initial drug screen tests (on-site and laboratory) must be confirmed by a reference method such as Gas Chromatography-Mass spectrometry (GC- MS).
 - (a) Immunoassay and enzymatic assays (automated or point-of-care testing devices) are not regarded as confirmatory techniques for ethanol in blood but rather as preliminary testing techniques.
- (11) The confirmatory drug test must provide a quantitative result from laboratory established standard operating procedures (SOP) that are in line with international standards and quality assurance programs.
 - (a) These include, but are not limited to, the use of pure analytical standards, calibrators and quality control samples.
- (12) Suitable cut-off concentration values established by the Substance Abuse and Mental Health Services Administration (SAMHSA) are to be employed (Table 2).
- (13) Additional drugs/metabolites may be included at cut-off concentration levels established in scientific literature as long as they are closely associated with cut-off concentration levels utilised in preliminary testing.

Table 2. SAMHSA recommended cut-off concentrations for confirmatory drug tests

1 6-Acetylmorphine as evidence for heroin use is better associated (reduced false-negatives) within the un-conjugated fraction of opiate metabolites. Analysis of un-conjugated morphine and codeine allows better discernment between codeine and morphine usage (from scientific literature).

2 Positive confirmation of methamphetamine use at this cut-off requires amphetamine concentration greater or equal to 200ng/mL.

Confirmation drug or metabolite	Cut-off (ng/ml)
Cannabis metabolites	
<i>11-Nor-Δ^9-Carboxy-THC</i>	15
Opiate metabolites	
<i>Morphine (Total)</i>	2000
<i>Codeine (Total)</i>	2000
<i>Morphine (Free)¹</i>	100
<i>Codeine (Free)¹</i>	100
<i>6-Acetylmorphine (Free/Total)¹</i>	10
Cocaine metabolites	
<i>Benzoylecgonine</i>	150
Amphetamines	
<i>Amphetamine</i>	500
<i>Methamphetamine²</i>	500
<i>Phencyclidine</i>	25
<i>Prescription medication (Benzodiazepines, Barbiturates etc) See NOTF</i>	Therapeutic ranges

- (14) Only drugs which have been confirmed by a recognised confirmation test (like GC-MS) can be reported as positive.
- (15) Before any laboratory test result is released, the results are reviewed and certified as accurate by an authorising scientist.
- (16) The laboratory must report all non-negative test results for a specimen. For example, a specimen can be positive for a specific drug in addition to being adulterated.
- (17) An analytical positive result may be due to medication (prescribed or over-the-counter) or to dietary causes.
- (18) Interpretation is best carried out by a qualified toxicologist who may consult with the MRO, the donor, and the donor's GP.
- (19) The toxicologist cannot issue a negative report for a positive analytical result even if the result is likely to be due to the use of declared medication. test
- (20) Results are reported to the MRO within a maximum of 5 working days.
- (21) The laboratory report must include:
 - (a) The specimen identification number
 - (b) The quantitative result/s for each sample submitted as well as the 99% confidence interval.
 - (c) The limit of detection (LOD) and the limit of quantitation (LOQ).

- (22) Challenges to results by the donor for re-testing must be made within 72 hours of reporting results to the MRO.
- (a) The stored sample (Sample B) should be released for analysis to a drug-testing laboratory able to demonstrate that they can accurately determine the concentration of a drug or metabolite at 50% of the confirmation cut-off concentration employed.
 - (b) The release must be supported by a chain of custody that can withstand legal scrutiny and requires authorisation from the customer and the donor.
- (23) Long-term frozen storage (-20°C or below) ensures that positive urine samples will remain suitable for a retest.
- (24) Unless otherwise authorised in writing by the SACAA, the laboratory will retain all samples confirmed positive in properly secured long-term frozen storage for a minimum of 1 year.
- (a) Within this one-year period the SACAA may request the laboratory to retain the sample for an additional period of time.
 - (b) If no such request is received, the laboratory may discard the sample after the end of 1 year, except that the laboratory shall be required to maintain any samples known to be under legal challenge for a further agreed period.
- (25) The laboratory will maintain and make available for an agreed period (minimum 2 years), documentation of all aspects of the testing process involved in the generation of a positive result including the following:
- (a) Chain-of-custody forms
 - (b) Quality assurance records
 - (c) Computer generated data

6. Breath Specimen Collection for Alcohol Testing

- (1) The SST or the BAT who administers the alcohol must have qualification training and demonstrated proficiency in the alcohol testing device he or she will be using.
- (2) The qualification training for BAT's and STT's must contain the following elements:
- (a) In depth knowledge in the operation of the alcohol testing device to be used. Their responsibility for maintaining the integrity and credibility of the testing process, ensuring privacy of the donors being tested, and avoiding conduct or statements that could be viewed as offensive or inappropriate.
 - (b) Trainers should provide their students with certificate of completion.
 - (c) The BAT student should successfully demonstrate that he/she can:
 - (i) Respond to the device's messages and commands or displays.
 - (ii) Take appropriate actions when an error message or malfunction occur within the device
 - (iii) Recognize that an air blank has been conducted.
 - (iv) Identify and explain actions the technician will take when the device does not function properly.
 - (v) Explain when an external calibration check is required, if applicable to the device being used, and identify the procedures used to perform the check
 - (vi) Mock tests
- (3) After completion of training, the student must complete at least seven consecutive error-free mock tests for initial BAT qualification and at least five consecutive error-free mock test for initial STT qualification.

- (a) The mock tests must be conducted on the same device(s) the BAT/STT will use.
 - (b) If the device involves colour changes, contrasts, or colour readings, the technician must demonstrate that he/she can see the changes.
 - (c) The mock tests must portray a real event conducted with someone acting as the test subject.
- (4) The BAT and STT should go for refresher training every three years to remain eligible to conduct alcohol tests.
- (5) The content of the refresher training must include material equivalent to the initial training but updated as needed.
- (6) The refresher training includes conducting error-free mock tests monitored by the trainer.
- (7) Error correction training
- (a) A BAT or STT who makes an error causing a screening test/confirmatory test to be invalid or cancelled must undergo correction training within 30 days of notification of the error. (He/she may continue with the normal testing duties, however, the goal is to complete the error correction training as soon as practical after the error occurred).
- (8) The employer or agent designated by the SACAA should be responsible for notifying the alcohol testing site of the error and the retraining requirement and for ensuring that the training takes place.
- (9) Error correction training is not required for errors related to equipment failure, unless the failure is related to the BAT's failure to maintain EBT.
- (10) Error correction failure is also required if, in the event of equipment failure, the BAT does not try to accomplish the test using another, alternative device, provided that the device is reasonably available.
- (11) Error correction training should focus on the mistake(s) made and must include three error-free mock collections (at least two of which are related to the area in which the error was made).
- (12) Breath and blood specimens for legally defensible alcohol testing need to be collected under circumstances which respect the dignity of the individual.
- (13) Suitable records must be made when the specimen is collected to prove that:
- (a) Breath alcohol test result can be traced back to the donor.
 - (b) The blood specimen collected and the sample received by the blood alcohol testing laboratory is one and the same.
 - (c) This is the first link in the chain of custody process which, when reconstructed at a later date, can be used to prove that the final result belongs to the specimen collected.
- (14) The following restrictions apply to collecting officers:
- (a) The immediate supervisor of an employee may not serve as the collector when that employee is tested, unless there is no feasible alternative.
 - (b) A co-worker who is in the same testing pool or who works with an employee on a daily basis may not serve as a collector when that employee is tested, unless there is no feasible alternative.
 - (c) An individual who has a personal relationship with the employee (e.g., spouse, ex-spouse, relative, close personal friend) may not serve as the collector, unless there is no feasible alternative.
 - (d) The collector should have identification with his/her name and his/her employer's name, address, and telephone number and be able to provide it upon request of the donor.

- (15) A breath alcohol test site requires setup to an extent that ensure the testing devices are fully functional.
- (16) Each alcohol test should be conducted with reasonable visual and auditory privacy so that bystanders cannot know or infer the results.
- (17) A breath alcohol technician (BAT) is authorized to perform both screening and confirmation test.
- (18) A screening test technician (SST) is authorized only to perform screening tests for alcohol.
- (19) When a donor arrives at the collection site, the collection officer will request that the donor presents photographic identification (passport, national identity document, drivers licence etc).
 - (a) If the donor does not have proper photographic identification, the collection officer will obtain a positive identification of the donor by an authorised supervisor or manager within the parent organisation.
 - (b) If the donor's identity cannot be established, the collection officer will not proceed with the collection and notify an authority
- (20) The collection officer will ask the licence holder to provide voluntary written informed consent before the collection commences.
- (21) Only one donor is tested at a time.
- (22) The BAT explains the procedure and shows the donor the instructions on the back of the alcohol testing form.
- (23) The BAT completes Step 1 of the ATF and asks the donor to complete Step 2.
- (24) If the donor refuses to sign Step 2 this is a refusal to test and the BAT documents the refusal to test on the ATF, then notify the SACAA
- (25) The alcohol test is initially performed with an ASD or EBT.
- (26) If the initial concentration is at or above 0.10 mg ethanol / 1000 mL exhaled breath, the test is repeated 15-30 minutes later using an EBT.
- (27) During the 15-20 minute interval, the BAT tells the donor to not eat, drink or belch, and to wait nearby within view of the BAT or another employer representative who will watch the donor to help ensure he or she complies.
- (28) Prior to the confirmation test the BAT must ensure that an air blank reading zero is displayed, demonstrating that no alcohol is present in the EBT.
- (29) The BAT should complete the confirmation test prior to collecting a urine specimen or conducting other tasks in which the donor cannot remain under direct observation of the BAT.
- (30) If circumstances delay confirmatory testing beyond 30 minutes, the BAT still performs a confirmation test and not another screening test and notes why the delay occurred.
- (31) The breath sample may be screened (preliminarily tested) for the presence of alcohol with an alcohol screening device (ASD).
 - (a) If the screen results are negative no further analysis is necessary.

- (b) If the screen/preliminary test resulted to be non-negative for the possible presence of alcohol above a predefined cut-off level, a confirmation test to obtain the exact breath alcohol concentration must be carried out utilizing an evidentiary breath testing device (EBT).
- (32) Oral fluid preliminary testing may also be performed for preliminary testing purposes.
- (a) If the screen results are negative no further analysis is necessary.
- (33) The BAT shows the donor the result as displayed on the EBT and the EBT then prints the test result
- (34) The BAT ensures that the results are affixed or directly printed on all three copies of the ATF, preferably in the designated space on the front of the ATF.
- (35) Fixing of the result printout can take place either by:
- (a) A label that is tamper evident
 - (b) Affixing the printout to the ATF with tamper evident tape.
- (36) The BAT signs and dates Step 3 of the ATF
- (37) The result is expressed on these copies as a number, rather than as positive or negative
- (38) If the confirmation test is at or above 0.10 mg ethanol / 1000 mL exhaled breath, the BAT asks the donor to sign Step 4 of the ATF.
- (a) If the donor refuses to sign Step 4, the BAT makes a note of the refusal on the ATF (but this is not a refusal to test).
 - (b) The BAT then immediately sends/faxes the ATF to the SACAA.
- (39) On a positive breath alcohol test
- (a) The donor may ask for a blood alcohol test that should be performed by a recognized confirmatory analytical technique like HS-GC-FID.
- (40) If the result is at or above 0.10 mg ethanol / 1000 mL exhaled breath, the BAT should instruct the donor to remain at the testing site until the employer arranges transportation for the donor.

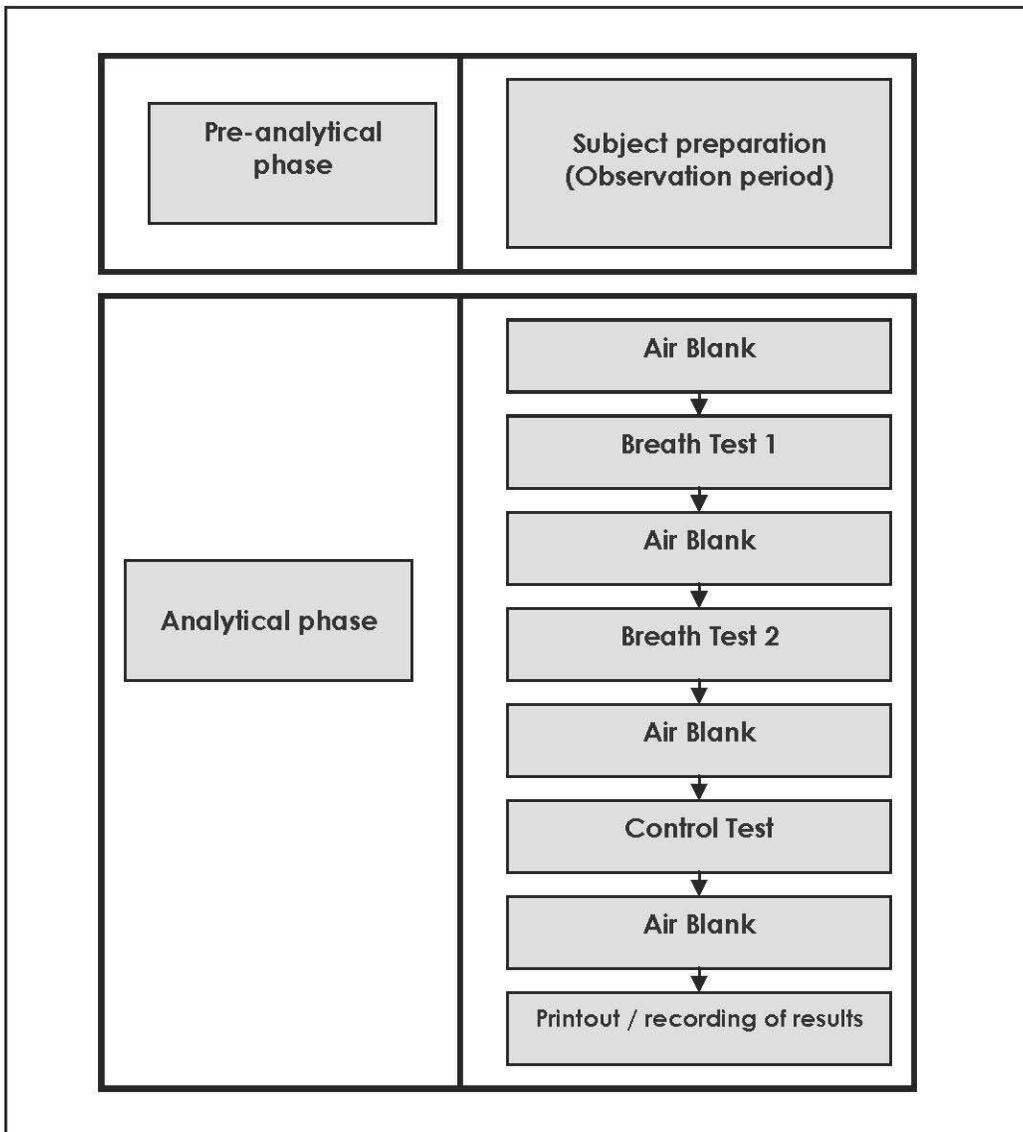
6. Analytical procedure

- (1) An evidential breath test device (EBT) must be able to print the result on triple ply paper or on three labels after an analysis.
- (2) EBT devices to be utilized should be listed in the National Road Traffic Act, 1996 (Act No. 93 of 1996)
- (3) The manufacturer of each ASD or EBT should have a quality assurance plan (QAP) that describes the accuracy checks, 95% confidence intervals or tolerance ranges, maintenance requirements and quality control procedures according to ISO 17025 guide.
- (4) Each EBT's QAP should include external calibration checks for accuracy.
 - (a) An accuracy check is performed with known alcohol standards in a liquid solution or compressed dry gas.
 - (b) These standards should originate from laboratories complying to ISO 17025 for calibration.
- (5) The EBT's measured value when analysing the standards must be within the tolerance limits designated by the manufacturers QAP, which is typically ± 0.005 mg / 1000 ml exhaled air. The site

should perform an accuracy check once a month and as soon as conveniently possible after every positive test.

- (6) If the EBT fails a check, it should be taken out of service according to the manufacturer's QAP.
- (7) Every result of 0.01 mg/ 1000 ml or above obtained on the EBT since the last valid check will be declared invalid.
- (8) A logbook of calibration records needs to be kept with each device for a minimum of 2 years.

Table 3 Scheme of a breath alcohol analysis with integral scientific safeguard steps



7. SHY-LUNG

- (1) The term “Shy-Lung” refers to a situation where the donor does not provide a sufficient amount of breath to permit a valid breath test.
- (2) The donor must be given a minimum of two attempts to provide an adequate sample.
- (3) If the donor does not provide an adequate sample based on the EBT requirement, the BAT should:

- (a) Repeat the procedure if the BAT believes there is a strong likelihood of success with additional attempts.
 - (b) Try to conduct the test in annual mode if the EBT has this capability.
 - (c) Consider using an oral fluid device if the donor fails after two attempts, and the BAT is also a qualified STT.
 - (i) Breath will still be required if confirmation testing is necessary.
 - (d) Records the circumstances on the ATF and immediately informs the SACAA.
- (4) If the BAT believes the donor is purposefully not blowing adequately or forcefully into the breath testing device, then the BAT notes in Step 3, "Refusal to Test".
- (5) Alternatively, a blood alcohol test may be performed as confirmation, after an elevated screening result.
- (6) The donor shall be sent for a Shy-Lung assessment to be conducted by a Specialist Physician or experienced MRO.
- (a) The evaluating physician will communicate his/her determination directly to the SACAA.
 - (b) If the physician states that there was a valid medical condition for the insufficient amount of breath, the test is deemed invalid.
 - (c) If the physician identifies no valid medical reason, the donor is deemed to have refused testing

8. Alcohol test errors

- (1) If a BAT or STT becomes aware of an event that will cause the test to be deemed invalid, he/she must try to correct the problem promptly, if practicable.
- (a) This may require repeating the test, using a new ATF and, if needed, a new alcohol screening device or different EBT.
 - (b) Some errors cannot be corrected;
 - (c) Some errors are potentially correctable by amending the ATF
- (2) If a valid test cannot be performed, the BAT or STT cancels the test and immediately informs the SACAA.
- (3) If the error is a fatal flaw, the test must be deemed invalid and the SACAA must be informed within 48 hours of the cancellation.
- (4) An invalid test is neither positive nor negative and does not count toward any required random rate or number of follow-up tests.

9. Reporting of Results

- (1) All results are to be communicated to the donor and to the SACAA.
- (2) The BAT should notify the SACAA within 48 hours of any test that had a fatal flaw.
- (3) If the alcohol testing result is confirmed to be at or above 0.1 mg / 1000mL:
- (a) The licence holder shall be removed from all duties

- (b) The BAT should instruct the licence to remain at the testing site until transportation for the donor is arranged.

10. Blood specimen collection

- (1) The collecting officer must be a medical/health professional registered at the Health Professions Council of South Africa (HPCSA) including a Medical doctor, phlebotomist, nursing sister etc.
- (2) The collector should have identification with his/her name and his/her employer's name, address, and telephone number and be able to provide it upon request of the donor
- (3) The following restrictions apply to collecting officers:
 - (a) The immediate supervisor of an employee may not serve as the collector when that employee is tested, unless there is no feasible alternative.
 - (b) A co-worker who is in the same testing pool or who works with an employee on a daily basis may not serve as a collector when that employee is tested, unless there is no feasible alternative.
 - (c) An individual who has a personal relationship with the employee (e.g., spouse, ex-spouse, relative, close personal friend) may not serve as the collector, unless there is no feasible alternative.
- (4) The collection site must have the following:
 - (a) All necessary personnel, supplies, equipment, facilities, and supervision to provide for specimen collection, security, and temporary storage.
 - (b) A blood specimen collection site must provide for donor privacy while the blood is drawn.
 - (c) A suitable clean clinically sterile surface for the collector to use as a work area must be available.
 - (d) A bed for the donor to lie down.
- (5) For the collection of blood specimens for alcohol analysis:
 - (a) Blood is collected from the cubital veins of the forearm
 - (b) Needles should be clean and dry and not contaminated in any manner, including water (as per standard clinical practice)
 - (c) The disinfectant used to clean the arm should not contain ethanol, isopropanol, or other volatile compounds
 - (d) Sodium fluoride (1%) is effective as preservative.
- (6) Alcohol testing should be performed in whole blood.
- (7) Potassium oxalate or EDTA will suffice as an anticoagulant.
- (8) After properly labelling the two (2) tubes with all the required information, the specimen, a laboratory request form, and a chain-of-custody form should be sealed in an appropriate container.
- (9) The samples must be stored in a fridge as soon as possible (2-4° C) until collection by the courier
- (10) The collector must maintain line-of-sight custody or provide for the secure temporary storage of specimens from the time the specimen is collected until it is sealed in a shipping container prior to transfer to an express carrier or courier for shipment to a laboratory.
- (11) Suitable records must be made when the specimen is collected to prove that:

- (a) The blood specimen collected and the sample received by the blood alcohol testing laboratory is one and the same.
 - (b) This is the first link in the chain of custody process which, when reconstructed at a later date, can be used to prove that the final result belongs to the specimen collected
- (12) The original copy accompanies the sample to the confirmatory laboratory and all persons involved in the transport and receiving of the sample should record their name and signature on the chain-of-custody form
- (13) One of three carbon copies of the chain-of-custody forms should be handed to each of the following:
- (a) The licence holder
 - (b) The medical review officer (MRO)
 - (c) Collection officer
- (14) The specimens and accompanying documents should be sent to the laboratory as soon as possible.
- (15) On receipt by the laboratory, specimens should be stored in a fridge by the laboratory and after analysis kept in a frozen or refrigerated state
- (16) Collection officers will arrange to dispatch the collected specimens to the drug-testing laboratory.
- (17) The specimens will be placed in containers designed to minimise the possibility of damage during shipment.
- (18) Transfer of the specimens to the courier from the collector, and in turn from the courier to the laboratory, should be documented on the chain of custody.

11. Laboratory Analysis of a Blood Specimen

- (1) If the screen results are negative no further analysis is necessary.
- (a) Preliminary blood alcohol testing may be performed by Immuno-assay and enzymatic assays
- (2) If the screen/preliminary tests are non-negative, a confirmation test to obtain the exact alcohol concentration must be carried out on another portion of the same blood sample.
- (3) A screening/preliminary test is not a required if the client prefers the blood sample to be subjected to the confirmatory analytical procedure directly.
- (4) The confirmatory test should not involve a repetition of the same analytical technology as was employed for the preliminary testing, but has to be performed by an Internationally recognized confirmatory technique (typically Head space- Gas Chromatography with Flame ionization detection, HS-GC-FID)
- (5) Positive results are only reported after laboratory confirmation and may require further interpretation.

NOTE:It is of prime importance to note that immunoassay and enzymatic assays are **not** regarded as confirmatory techniques for ethanol in blood but rather as preliminary testing techniques.

- (a) If the confirmatory breath alcohol test result is 0.10 mg ethanol / 1000 mL or higher in exhaled breath, the BAT then immediately sends/faxes the test result to the SACAA.
 - (b) If a laboratory performs the analysis (e.g. blood testing), the result may be reported to the MRO or directly to the SACAA if the test results is higher than 0.02 g ethanol / 100 mL blood.
 - (c) If the MRO receives the result, he/she relays it to the SACAA without interpretation
- (6) Challenges to results by the licence holder for re-testing must be made within 72 hours of reporting results to the MRO or SACAA.
- (a) The stored sample (Sample B) should be released for analysis to a drug-testing laboratory able to demonstrate that they can accurately determine the concentration of a drug or metabolite at 50% of the confirmation cut-off concentration employed.
 - (b) The release must be supported by a chain of custody and requires authorisation from the customer and the donor.
- (7) Suitable records must be made during the analytical process to prove that the sample received by the laboratory and the sample, about which the final report is written, are one and the same.
- (8) All blood samples which prove positive above the cut-off concentration of 0.02 g / 100 mL and all records of the analytical process must be kept for :
- (a) 1 year – Records of alcohol tests with a concentration of less than the company cut-off concentration and cancelled alcohol tests
 - (b) 2 years – Documentation of the inspection, maintenance, and calibration of EBT's
 - (c) 5 years – Alcohol test results for both blood and breath at or above the SACAA cut-off, and documentation of refusals and follow-up alcohol tests.
- (9) If the customer requires an independent toxicological review, the laboratory must make available, if requested, the analytical data upon which it based its final report.
- (10) Long-term frozen storage of samples will be at 0°C -4°C or below
- (11) The laboratory will retain all samples confirmed positive in properly secured long-term cold storage for a minimum of 3 months.
- (a) Within this three month period the SACAA or licence holder may request the laboratory to retain the sample for an additional period of time.
 - (b) If no such request is received, the laboratory may discard the sample after the end of three months, except that the laboratory shall be required to maintain any samples known to be under legal challenge for a further agreed period.

Appendix A

Fatal errors in alcohol testing

1. BAT/STT fails to both print his/her name and sign the ATF
2. Saliva Screening test
 - (a) The STT reads the result sooner or later than the time allotted by the manufacturer.
 - (b) The ASD does not activate.
 - (c) The ASD is used after its expiration date.
3. Screening or Confirmation evidential breath test
 - (a) The test number or alcohol concentration displayed on the EBT is not the same as the test number or alcohol concentration on the printed result
4. Confirmation Evidential Breath Test:
 - (a) Minimum 15 minute waiting period prior to confirmation test is observed.
 - (b) EBT does not print a confirmation test result
 - (c) Air blanks are not performed during a confirmation test.
 - (d) The EBT fails the next external calibration check. In this situation, every result of 0.02 or above obtained on the EBT since the last valid external calibration check is cancelled.

Appendix B

Correctable errors in alcohol testing

1. BAT/STT fails to sign the ATF
2. BAT/STT fails to note donor's refusal to sign (Step 4) if confirmation result is greater than or equal to 0.1 mg / 1000 mL exhaled breath.

SCHEDULE 1: PROTOCOL ON NEUROLOGICAL OR NEUROSURGICAL PROBLEMS

1. Head injuries

- 1.1 Mild head injury
 - LOC/PTA <30 min
 - No neurological deficit

No compounding factors (skull #, vertigo, headache)

It is recommended that all applicants who sustain a head injury and have impaired consciousness (no LOC) be declared temporarily unfit to fly for at least 7 days, as even they may develop post-traumatic epilepsy. Those who have even a fleeting LOC and amnesia should be declared temporarily unfit to fly for a period of 6 weeks. These applicants tend to recover fully, and may then fly without restrictions.

- 1.2 Moderate head injury
 - LOC/PTA >30 min but <24h
 - Focal neurological deficits
 - Skull base #
 - Surgical penetration of the dura

Following a moderate head injury (particularly if the duration of post-traumatic amnesia is >12h) the applicant should be made temporarily unfit for a period of 2 years (this decision is usually made/confirmed by the Aviation Medical Panel.) After 2 years, the applicant may apply for re-

certification. The examination should preferably be coordinated by the designated body or institution and a series of special investigations are required (e.g. sleep deprivation/photostimulation EEG, CT/MRI scans of the brain, neuropsychological evaluation etc.) in addition to these special investigations, a practical flight test is usually required. Pilots may then be made fit, fit with restrictions, or unfit by the Panel.

1.3. Severe head injury

- LOC/PTA 1 to 7 days
- Neurological/intellectual impairment
- Traumatic penetration of the dura
- Depressed skull #
- Traumatic intracranial haemorrhage
- EEG abnormalities persisting for >2 years

These applicants will most likely be unfit for flying duties. Exceptional cases with a full clinical recovery may be considered for recertification after 5 years following rigorous assessment (with several specialist reports and special investigations) coordinated from the designated body or institution.

1.4. Very severe head injury

- LOC / PTA >7 days
- Missile penetration of the brain
- Brain abscess
- Debilitating neurological deficit

These applicants will be unfit for flying duties.

2. Post-traumatic epilepsy (PTE)

Post-traumatic epilepsy is the chief cause of concern in a flight crew member following a head injury. It is subdivided, on clinical pathophysiological grounds, into early (within 7 days), and late (after 7 days) types. Convulsions that occur during or immediately after impact are a distinct, more benign entity, which will probably not influence the applicant's flying career. Where LOC and PTA are indicative of the extent of diffuse brain injury, post-traumatic epilepsy is indicative of the extent and localisation of localised brain injury.

Time distribution of PTE –

- 15% develops within the first week.
- 30% develops within the first 3 months.
- 52% develops within the first 6 months.
- 75% develops within the first year.
- 95% develops within the first 2 years.
- 100% develops within the first 5 years (but cases still occur many years later)

The diagnosis of epilepsy is usually made after the second convulsion, but the applicant is unfit to fly after the first convulsion. If there are 3 or more convulsions in the first year, the incidence of persistent epilepsy is as high as 85%.

After a head injury, the applicant is seen after 7 days, one month, and then 3 monthly for 2 years to observe for post-traumatic epilepsy and the post-traumatic syndrome. If an applicant does develop convulsions, he/she is seen weekly until they are controlled (he/she remains unfit to fly, of course!)

3. The post-traumatic syndrome

Following a head injury, some symptoms occur quite often e.g. headache, dizziness, impaired concentration, memory impairment, and impaired thought processing. This often leads to irritability, depression or even irrational behaviour. The incidence of headache and dizziness after a head injury is approximately 50%. Interestingly enough, it is often those with mild head injuries who exhibit the post traumatic syndrome. These symptoms tend to resolve with time, with virtually all

resolving within 2 years. The importance of this syndrome is that, if present, the applicant should be observed (and declared temporarily unfit to fly) for a longer period than he/she would otherwise have been.

4. Epilepsy

4.1. Important concepts

Diagnosis of even a single epileptic attack means that the applicant is permanently unfit to fly.

No applicant who has had a convulsion after the age of 5 years should be considered for pilot training.

Any inexplicable LOC should be regarded as epilepsy until proven otherwise.

An applicant with a history of a single, uncomplicated febrile convulsion between the age of 1 and 5 years will still be eligible for pilot training. If, however, the convulsion was complicated, the applicant will no longer qualify; i.e. –

- A convulsion before the age of 1 year. This holds the risk for mental retardation and epilepsy later in life.
- Multiple febrile convulsions.
- Duration of convulsions longer than 5 minutes.
- Lateralising signs during febrile convulsions.

4.2. Provocation testing

There are certain techniques which can be used to determine whether an applicant has a high risk of developing convulsions. These include –

- Vagal stimulation.
- Hypoxia.
- Hyperthermia.
- Alcohol.
- Photic stimulation.
- Certain drugs.
- Sleep deprivation.
- Hyperventilation.

An applicant who develops EEG abnormalities in response to such provocation tests will be evaluated very thoroughly before he/she is allowed to fly. An applicant who develops convulsions in response to such provocation tests will be unfit to fly.

4.3. Electroencephalography

Certain EEG patterns are associated with an increased risk of developing convulsions.

Applicants who exhibit these patterns must be fully assessed – an applicant should not be made unfit only on the grounds of an isolated EEG abnormality.

5. Syncope

Syncope is a loss of consciousness (usually fleeting) due to decreased cerebral perfusion.

Applicants who give a history of syncope must be fully assessed, as there are many organic (cardiovascular, neurological) diseases that may cause syncope.

The current recommendations are:

Any unexplained LOC –

- Unfit for initial pilot training until a five year period (without any further incidents) has elapsed.
- Unfit for re-certification until a 2-year period (without any further incidents) has elapsed.

The cause of the syncope may also be disqualifying. (E.g. cardiomyopathy)

6. Narcolepsy/sleep apnoea syndrome

These applicants are unfit to fly.

7. Transient memory loss

Loss of memory concerning a period of time (minutes to hours) is not uncommon. Causes include –

- Alcohol.
- Epilepsy (epilepsy accounts for \pm 20% of these phenomena).
- Migraine.
- TIA's.
- Certain drugs (e.g. Benzodiazepines).
- Psychiatric disturbances (e.g. psychogenic fugue).

These applicants must be evaluated according to the underlying cause. The vast majority will be unfit to fly.

8. Headache

The importance of individualising the approach to headaches cannot be overemphasised. The following must be considered:

- Frequency of headaches.
- Degree of incapacitation caused by the headache.
- Drugs used to treat the headache.

8.1. Migraine

An applicant who gets migraine headaches will be unfit to fly in the following situations –

- (1) Migraine with aura (classical migraine): If an aura, visual disturbances, aphasia, hemiparesis or hemisensory loss occurs as part of the migraine. Applicants who get classical migraine should not be allowed to pilot an aircraft. High altitude/hypoxia elicits migraine.
- (2) Vertebrobasillar migraine: These applicants may have cortical blindness, vertigo, LOC or convulsions.
- (3) Migraine equivalents: As in classical migraine.
- (4) Migraine prophylaxis.

One can thus say that an applicant who gets migraine headaches will be unfit to fly unless he/she has very mild headaches, with no neurological deficit (one might then begin to doubt the diagnosis of migraine.)

Important: Many applicants who give a history of "migraine" do not in fact get migraine headaches at all!

8.1.1. Migraine protocol

- (1) An applicant who gives a history of migraine should be made temporarily unfit and has to submit the following at initial application –
 - (a) Full neurological examination including an EEG.
 - (b) For approval by the Aviation Medical Panel.
- (2) The only pilot who can be declared fit to fly will be the pilot who fulfils the criteria for migraine without aura. There are however a few conditions –
 - (a) The headaches should not be of such severity as to incapacitate the pilot from safely operating the aircraft.
 - (b) He/she may not have nausea and/or vomiting.
 - (c) He/she may not have photo- and/or phonophobia.
 - (d) If there is any change in the pilot's medical status with the migraine, he/she would automatically be unfit.
- (e) If the pilot needs disallowable medication to abort, treat or prevent the migraine attack he/she is unfit.
- (3) Factors to be taken into consideration –
 - (a) Individual/personality factors.

- (b) Family history.
- (c) Predisposing factors.
- (d) Frequency of the headaches.
- (e) Severity and duration of the headaches.
- (f) Associated symptoms.
- (g) Any complications.
- (h) Medication.

8.1.2 Recommendation

He/she should be advised not to fly at altitudes above 8000 ft.

8.2 Cluster headache

Cluster headache typically occurs in middle-aged males and is characterised as follows –

- Deep, “boring” retro-orbital pain.
- Patient usually remains ambulatory.
- Duration between 15 minutes and 2 hours.
- Occurs a few times daily.
- This pattern lasts for 4 to 8 weeks, after which there is an attack free period of 6 months to several years.

Applicants who get cluster headaches are assessed according to frequency and severity of headaches, and need for medication. Frequent/ chronic cluster headaches are disqualifying, as is the medication. If an applicant has been attack free, without medication, for 2 years, he/she will be considered for re-certification.

8.3 Tension headache

Once again, the severity of the headaches and the need for medication are the deciding factors. The chronic use of medication is against fitness to fly. Associated depression or anxiety should also be considered.

8.4 Other headaches

- Temporal arteritis:
ESR normal, no steroid treatment, asymptomatic for 1 year – fit.
- “Sexual headache”:
Usually benign, and responds to blockers.
Fit (abstinence before flying is recommended.)
- Trigeminal neuralgia:
On medication – unfit.
After surgical treatment, asymptomatic for 2 months – fit.
- Conversion headaches:
Usually on disqualifying medications.
Mental condition of applicant per se probably disqualifying.
- Atypical facial pain:
On medication – unfit.
- Post-traumatic headache:
Assess according to original head injury.
On medication – unfit.

SCHEDULE 2: **PROTOCOL ON STROKE**

The diagnosis of a TIA can be difficult to make with certainty. An applicant who presents with symptoms suggestive of a TIA should be thoroughly assessed.

The presence of an asymptomatic bruit is associated with an increased risk for a stroke, and 6-monthly examinations should be done thereafter.

The following conditions are disqualifying –

- Cerebral infarct, embolism, or haemorrhage.
- Cerebral aneurysm or A-V malformation. These applicants may be made fit again after surgical repair (not proximal ligation or “packing”) if angiogram done after 1 year shows successful repair.

The incidental discovery of an asymptomatic occlusion of a cerebral vessel will not necessarily make an applicant unfit – he/she must be fully assessed.

SCHEDULE 3: **PROTOCOL ON BRAIN TUMOURS**

It is important to consider 2 aspects –

- Is there neurological deficit that is incompatible with flying?
 - Is the tumour likely to recur?
1. Supratentorial meningioma: These applicants should be made temporarily unfit upon diagnosis. Following successful surgery, they must be asymptomatic, and have no neurological deficit for a period of 2 years before being considered for re-certification by the Panel. They will require a MR scan of the brain that shows no tumour, and an oncologist’s report which states that –
 - (a) the applicant is in remission, and
 - (b) that he/she never had convulsions. The Panel may find the applicant fit, with the restriction of an annual medical examination (including specialist’s report).
 2. Infratentorial meningioma, acoustic neuroma, pituitary adenoma, and benign extra-axial tumours require the same conditions as a supratentorial meningioma, except that the stipulated minimum period before re-certification is considered, is 1 year.
 3. Pseudotumour Cerebri: These applicants are temporarily unfit until they have been headache free, and have had normal visual fields, for a period of 6 months.
 4. Other CNS tumours: Unfit to fly.

SCHEDULE 4: PROTOCOL ON PARKINSON’S DISEASE

Parkinson’s disease per se is not a disqualifying condition. The applicant is assessed on the following grounds –

- Bradykinesia.
- Rigidity.
- Tremor.
- Balance disturbances.
- Fast eye tracking.
- Voice quality.

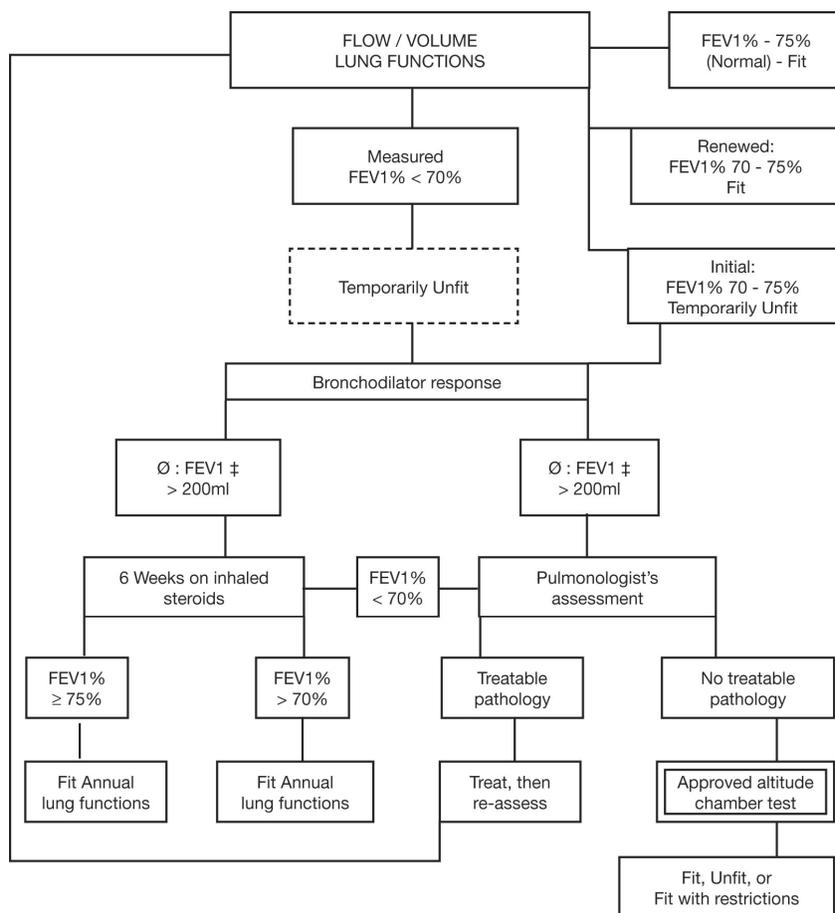
If an applicant has been stable on therapy for 6 months, exhibits no drug side effects (orolingual dyskinesia, orthostatic hypotension or on-off phenomenon), the Panel will consider him/her for flying fitness.

SCHEDULE 5: **PROTOCOL ON PREVIOUSLY DIAGNOSED CARCINOMA OF THE COLON AND RECTUM**

1. The following examination/procedure reports are required before a decision can be taken regarding an applicant’s fitness for certification as a pilot
 - (1) Specialist report, which must include clinical staging, colonoscopy findings and an indication whether adjuvant therapy is indicated or not.
 - (2) Histology report
 - (3) Blood test results –
 - (a) Full blood count, and erythrocyte sedimentation rate (ESR)

- (b) Liver function tests (LFTs), including:
 - (i) Lactate dehydrogenase (LDH)
 - (ii) Alkaline Phosphatase (Alk Phos)
 - (c) Tumour markers e.g. Colon embryonic antigen (CEA)
 - (4) Presence of occult blood in the faeces – Haemoccult
 - (5) Radiological reports –
 - (a) Chest x-ray
 - (b) If clinically indicated according to the colonoscopy and CEA findings, a CT scan of the abdomen will be required.
2. A minimum period of three months is required following colectomy before an applicant will be reconsidered for certification.
3. The decision regarding re-certification of the applicant, and future requirements is based on the staging of the disease as follows –
- (1) Dukes A, requiring no adjuvant therapy –
 - (a) A yearly aviation medical examination is required.
 - (b) The applicant must be examined annually by a specialist, and the report must be submitted to the designated body or institution.
 - (c) The following radiological examinations must be performed annually, and the specialist's report must be submitted to the designated body or institution –
 - (i) Chest x-ray
 - (ii) Liver function tests, including:
 - Lactate dehydrogenase (LDH)
 - Alkaline phosphatase
 - (iii) Tumour markers, i.e. CEA
 - (d) Results of test for the presence of occult blood in the faeces (Haemoccult) must be submitted at 3-monthly intervals.
 - (2) Dukes D: Permanently unfit for certification.

SCHEDULE 6: LUNG FUNCTION ASSESSMENT – FLOW DIAGRAM



SCHEDULE 7: PROTOCOL ON CHRONIC OBSTRUCTIVE AIRWAYS DISEASE

Applicants with COAD are assessed according to the minimum lung function standards. If they have irreversible airways obstruction outside the minimum standard, they should be referred to a pulmonologist for assessment of vital capacity reduction, increased residual volume, presence of bullae, diffusion capacity, oxygen saturation and carbon dioxide retention. Bi-annual CXRs are recommended.

SCHEDULE 8: PROTOCOL ON ASTHMA

ICAO Annex 1 – Personnel Licensing 6.3.2.8. states: “There shall be no acute disability of the lungs nor any active disease of the structures of the lungs, mediastinum or pleura.”

In the ICAO guidelines on Medical Assessment of the Respiratory System – Chapter 2, the following is stated: “Applicants with bronchial asthma should in general be assessed as unfit unless the clinical course is extremely mild and drug treatment is not required.”

In South Africa there is a slightly more lenient approach. Although applicants who comply with the following protocols are able to fly, all cases that fall outside the minimum standards must be referred to the Aviation Medical Panel for certification.

1. Special examinations

- (1) Lung function tests –
Interval: Same as ECG or more frequently on indication

- (2) Chest X-ray: PA and Lateral on initial examination. Subsequent CXRs on indication only.
- 2. Minimum lung function standards**
- (1) FEV1 and FVC \geq 70% of predicted values (to exclude restrictive lung disease) N.B. If one or both of these values are $<$ 70% refer for X-ray and pulmonologists report.
- (2) FEV1/FVC \geq 70% to exclude obstructive airways disease. N.B. Do not use % predicted values here.
- 3. Initial pilots**
- (1) If FEV1/FVC \leq 75%
Determine cause –
- (a) Infection (e.g. bronchitis):
Temporarily unfit. Repeat after 7 to 14 days when cured and off medication.
- (b) Reactive airways –
- (i) Any form of asthma in the last 5 years or previous hospitalisation due to asthma: Temporarily unfit. Pulmonologists report.
- (ii) Exercise induced asthma only: Temporarily unfit. Inhaled steroids for 4 weeks. Re-examine with provocation test (e.g. stress ECG).
- (2) Acceptable lung function with –
- (a) History of asthma in past 5 years. Temporarily unfit. Pulmonologists report.
- (b) Use of bronchodilators. Unfit to fly with bronchodilators. Pulmonologists report.
- 4. Experienced pilots**
- (1) If FEV1/FVC \leq 70%
Manage according to the cause:
- (a) Infection (e.g. bronchitis):
- (i) Temporarily unfit. Repeat after 7 to 14 days when cured and off medication
- (ii) Reactive airways:
- Treated for asthma in the last 5 years or previous hospitalisation due to asthma. Temporarily unfit. Pulmonologists report.
- Exercise induced asthma:
- Unless severe (e.g. FEV1/FVC \leq 70%) provisionally fit. Inhaled steroids for 4 weeks. Re-examine after provocation test.
- (2) Acceptable lung function with:
- (a) History of wheezing in the absence of infection. Not taking medication and never admitted to hospital due to asthma.
Provisionally fit (if medication is taken – temporarily unfit) pending the pulmonologist's report.
- (b) Use of bronchodilators.
Unfit to fly with bronchodilators. Pulmonologists report.
5. Any applicant who has had an FEV1/FVC \leq 70% for reasons other than infections, should have an initial pulmonologists report followed by an annual lung function test.
6. The only medication that may be used in the management of asthma is –
- (1) Inhalation steroids (e.g. Becotide™, Becloforte™, Becodisks™, Pulmicort™, Clenil™, Inflammide™, Flixotide™, Viarox™, Ventzone™, etc.)
- (2) Sodium cromoglycate (i.e. Lomudal™) and Nedocromil (Tilade™) – are also acceptable.

7. All medication producing bronchodilation (i.e. Theophylline, β 2-stimulants, etc.) are incompatible with flying due to the side-effects. Asthma requiring use of these medications would therefore disqualify an applicant from flying.

SCHEDULE 9: PROTOCOL ON PNEUMOTHORAX

1. Traumatic Pneumothorax

- (1) Uncomplicated cases. Fit to fly 6 weeks after discharge from hospital. Confirmatory chest x-ray and lung function test required.
- (2) Complicated cases (e.g. empyema, chronic pneumothorax, other serious injuries, etc.) – refer to pulmonologist. Decision by Aviation Medical Panel.

2. Spontaneous Pneumothorax

- (1) Initial pilots –
History of previous spontaneous pneumothorax. Temporarily unfit. Refer to pulmonologist.
- (2) Experienced pilots –
 - (a) First episode –
May be considered for recertification 6 weeks after discharge from hospital. Confirmatory chest x-ray, lung function and pulmonologists report (stipulating state of recovery, chance of recurrence and underlying pathology) required.
 - (b) More than one episode –
Temporarily unfit. May be recertified 6 to 12 weeks following successful pleurodesis.

SCHEDULE 10: PROTOCOL ON HYPERTENSION

A blood pressure which is consistently >160/100 mmHg disqualifies a person from all classes of medical certification. A person is deemed unfit, until such time the person can prove control on acceptable medication.

1. Mild Hypertension

- (1) A person is considered to be having mild hypertension if his or her systolic BP is 140–159 or diastolic BP is 90–99.
- (2) In the case of a mild hypertension referred to in paragraph (1), a person shall –
 - (a) undergo regular 3 monthly BP checks for a year;
 - (b) undergo Lifestyle Modification (According to the National Guidelines on the Management of Hypertension);
 - (c) adjust or alter medication if already on therapy;
 - (d) undergo Cardiovascular Risk Assessment; and
 - (e) may continue to fly, in the case of a pilot.

2. Moderate Hypertension

- (1) A person is considered to be having moderate hypertension if his or her systolic BP is 160–179 or diastolic BP is 100–109.
- (2) In the case of a moderate hypertension referred to in paragraph (1), a person shall –
 - (a) Exclude reactive hypertension
 - (b) If hypertension established:
 - (i) Urine Dipstix for Microalbuminurea
 - (ii) Clinical examination.
 - (iii) Blood tests:
 - (aa) Urea and Electrolytes
 - (bb) Fasting Glucose

- (cc) Fasting Total Cholesterol, and if Total Cholesterol is >5.00 a fasting Lipogram should be done
- (c) Begin therapy with an acceptable agent.
- (d) Cardiovascular Risk Assessment.
- (e) Ground pilot for two weeks .
- (f) After one month a clinical evaluation will be done.

3. Moderate/Severe Hypertension

- (1) A person is considered to be having moderate/severe hypertension if his or her Systolic BP is 160–179 mmHg or Diastolic BP is 100–109 mmHg (for moderate) or Systolic BP of >180 or Diastolic BP of >110 (for severe).
- (2) In the case of a moderate/severe hypertension referred to in paragraph (1), a person shall –
 - (a) review medication (therapy);
 - (b) be considered medically fit and not exercise the privileges of his or her licence until hypertension is adequately controlled on acceptable medication.

4. Once Normotensive/Diagnosed Reactive Hypertension

- (1) A person is considered to be normotensive if his or her Systolic BP is 120–129 or Diastolic BP is 80–84.
- (2) Once the licence holder is normotensive or diagnosed to have reactive hypertension as per paragraph (1), a person shall –
 - (a) be deemed fit to fly, with 6-monthly follow-up for one year, consisting of –
 - (i) Clinical examination
 - (ii) Resting ECG (<40 or falls into the Blue or Green Risk Categories – see Table 2)
 - (iii) Stress ECG (>40 or falls into the Yellow, Orange, or Red Risk Categories – see Table 2) See note*
 - (iv) Blood tests:
 - (aa) U & E including Creatinine
 - (bb) Fasting Glucose
 - (cc) Fasting Lipogram

Note *Stress ECG for Yellow Risk Category to be done by AME. Stress ECG for Orange and Red Risk Categories to be done by a Cardiologist. Risk categories as per Table 2.

- (b) undergo annual follow-up thereafter consisting of:
 - (i) Clinical examination
 - (ii) Resting ECG (<40 or falls into the Blue or Green Risk Categories – see Table 2)
 - (iii) Stress ECG (>40 or falls into the Yellow, Orange, or Red Risk Categories – see Table 2) See note*
 - (iv) Blood tests (U&E including Creatinine, Fasting Glucose, Fasting Lipogram).

Note *Stress ECG for Yellow Risk Category to be done by AME. Stress ECG for Orange and Red Risk Categories to be done by a Cardiologist. Risk categories as per Table 2.

CARDIOVASCULAR RISK ASSESSMENT

Cardiovascular Risk Assessment shall be done based on the South African Hypertension Guidelines.

TABLE 1

MAJOR RISK FACTORS, TARGET ORGAN DAMAGE, AND ASSOCIATED CLINICAL CONDITIONS		
MAJOR RISK FACTORS	TARGET ORGAN DAMAGE	ASSOCIATED CLINICAL

		CONDITIONS
Levels of systolic and diastolic BP	Left ventricular hypertrophy: based on ECG	Coronary heart disease
Smoking	Microalbuminuria: albumin/creatinine ratio 3–30 mg/mmol	Heart failure
Dyslipidaemia Total cholesterol >6.5 mmol/l, OR creatinine ratio >30 mg/mmol LDL >4 mmol/l, OR HDL men <1 and women <1.2 mmol/l	Slightly elevated creatinine Men 115–133 µmol/l Women 107–124 µmol/l	Chronic kidney disease: albumin creatinine ratio >30 mg/mmol
Diabetes mellitus Men >55 years Women >65 years		Stroke or transient ischaemic attack
Family history of early onset of cardiovascular disease Men aged <55 years Women aged <65 years		Peripheral arterial disease
Waist circumference – abdominal obesity Men ≥102 cm Women ≥88 cm The exceptions are South Asians and Chinese: men >90 cm and women >80 cm		Advanced retinopathy Haemorrhages OR Exudates Papilloedema

TABLE 2

Stratification of risk to quantify prognosis					
Other risk factors and disease history	BP (mmHg)				
	Normal SBP 120–129 or DBP 80–84	High-normal SBP 130–139 or DBP 85–89	Stage 1 Mild hypertension SBP 140–159 or DBP 90–99	Stage 2 Moderate hypertension SBP 160–179 or DBP 100–109	Stage 3 Severe hypertension SBP >180 or DBP >110
No other major risk factors	Average risk	Average risk	Low added risk	Moderate added risk	High added risk
1–2 major risk factors	Low added risk	Low added risk	Moderate added risk	Moderate added risk	Very high added risk
≥ 3 major risk factors or target-organ damage or diabetes	Moderate added risk	High added risk	High added risk	High added risk	Very high added risk

mellitus					
Associated clinical conditions	Very high added risk				



Average Risk and Low Added Risk

Bloods (Fasting Glucose, Fasting Lipogram, U&E-including Creatinine)

Resting ECG: less than the age of 40 years

Stress ECG: 40 years of age and above (to be done by a DAME)



Moderate Added Risk

Annual Stress ECG (done by a DAME-Designated Medical Examiner)

Annual Bloods (U&E – including Creatinine, Fasting Glucose, Fasting Lipogram) for all Classes

Applicable Protocol for Co-morbidity



High Added Risk

Stress ECG (to be done by a Cardiologist – minimum stress level should be 85%)

Annual Bloods (U&E – including Creatinine, Fasting Glucose, Fasting Lipogram)

Applicable Protocol for Co-morbidity



Very High Added Risk

Stress ECG (to be done by a Cardiologist – minimum stress level should be 85%)

Annual Bloods (U&E – including Creatinine, Fasting Glucose, Fasting Lipogram)

Applicable Protocol for Co-morbidity

SCHEDULE 11: CORONARY ARTERY DISEASE PROTOCOL

1. General

- 1.1 Aviation medical standards as laid down in Annex 1 of the Convention on International Civil Aviation by the International Civil Aviation Organisation to which South Africa is a contracting State, have identified broad medical conditions that, on the basis of expected risk of incapacitation, disqualify aviation personnel from flying.
- 1.2 South Africa is one of the countries that previously applied strict standards to initial applicants with a history of coronary heart disease who applied for a medical certificate. This previous protocol was also applied to aviation personnel regarding whom the risk of sudden incapacitation was reduced as a result of risk factor modification or rehabilitation, including therapeutic interventions.
- 1.3 The SACAA has since reviewed this protocol, and is now making provision for aviation personnel with a history of Coronary Artery Disease. Initial and experienced applicants may be considered for any class of medical certificate. This consideration will be based on the individual medical condition of the applicant and risk factor involved.
- 1.4 This protocol applies to all applicants (initial and experienced) presenting with coronary artery disease (such as Myocardial Infarction, Angina Pectoris or asymptomatic coronary

artery disease detected on investigation following assessment of risk factors). The protocol is applicable to isolated coronary artery disease and its risk factors only.

1.5 The presence of ischaemia/inducible ischaemia remains an exclusion factor.

2. Applicability

Operational Restrictions

CLASS I

ATPL Multi-crew – As/or with a co-pilot

Commercial Pilots

- (a) Instructor – Student must have completed first solo flying
- (b) Game Capturing – Applicant can fly solo only if there are no passengers.
- (c) Crop Spraying – Applicant can fly solo if there are no passengers.

CLASS II – no restrictions

CLASS III – no restrictions

CLASS IV – no restrictions

3. General Medical Requirements Applicable To All Applicants

3.1 Applicants will be temporarily taken off flying or controlling duties for a duration of not less than six months following the index event.

3.2 Applicants must be asymptomatic for at least six months following adequate intervention; the medical certificate will be withdrawn during this period.

3.3 Applicants on medication will be considered only if the medication is approved by the Medicine Control Council of South Africa and is compatible with flying.

3.4 All initial medical reports must be submitted to a panel of specialists for consideration, and should include the following –

- (a) Hospital admission summary (History and Physical).
 - (b) If catheterisation and/or angiography have been performed, all reports and actual films/CDs must be submitted for review. A cardiothoracic report, in cases of CABG/PTCI, detailing the cardiac event and procedures must be submitted.
- (c) Applicants presenting with more than two stenoses of more than 30% within a vascular tree, shall be assessed as unfit.
- (d) An Angiogram shall not reveal stenosis of greater than 50% in any major untreated vessel, in any vein/artery graft or at the site of an angioplasty/stent, except in a vessel supplying the infarct.
- (e) The medical certificate of applicants presenting with any major vessel stenosis of 50% will be withdrawn, until appropriate intervention is undertaken.

4. Cardiovascular Evaluation

4.1 General physical and clinical cardiology assessment.

4.2 Family and medical history.

4.3 Functional capacity using New York Heart Association Functional Classification or Canadian Cardiovascular Score.

4.4 Prognosis of incapacitation.

4.5 Treatment.

4.6 Blood chemistry (fasting Lipid Profile, Urea, Urate and Creatinine and Fasting Blood Glucose).

5. Risk Factors For Ischaemic Heart Disease

5.1 The following are major modifiable risk factor for ischaemic heart disease and should be under control:

5.1.1 Smoking

An applicant with known ischaemic heart disease who continues to smoke should be assessed as “medically unfit”.

5.1.2 Weight Reduction

Weight reduction in obese and overweight patients should be encouraged. Applicants are theoretically encouraged to set a goal to achieve a body mass index (BMI) <25kg/m or a waist circumference <102cm in men and 88cm in women.

5.1.3 Abnormal Lipid Profile

Applicants are encouraged to be aware of their serum cholesterol levels and to maintain a normal level. Statins are recommended early for all applicants with a history of Non-ST elevation acute coronary syndrome- (NSTEMI-ACS) in the absence of contraindications, irrespective of cholesterol levels, with the aim of achieving Low Density Lipoprotein (LDL) levels <2.6mmol/L.

5.1.4 Blood Pressure Control

Applicants are required to have a blood pressure control of <140/90, and <130/80 mmHg for those suffering from diabetes mellitus or renal dysfunction.

5.1.5 Maximal Stress ECG

- (a) Applicants are required to be symptom-free and must complete a minimum of Bruce Stage 3 or 8.5 metabolic equivalents (METS).
- (b) A minimum of 85% of the required target rate must be achieved
- (c) The applicant must be free from inducible myocardial ischaemia or significant rhythm disturbances during the study. A 24-hour Holter ECG tracing is necessary to assess any significant rhythm disturbances.
- (d) A stress Echocardiogram/Stress MRI/MIBI Scan or Coronary CT Scan will be required six months after the incident.
- (e) If any of the above-mentioned tests show any significant abnormality, a Coronary Angiogram will be required; it must be within previously described limits.
- (f) The left ventricular ejection fraction as a measure of left ventricular function using echocardiogram or gated radionuclide scintigraphy should be 50% or more at rest, and should not show a decrease of more than 5% with satisfactory exertion (85% predicted maximum heart rate or >8 (METS)
- (g) A threshold ejection fraction of 45% applies with the use of single proton emission computerised tomography (SPECT).
- (h) In applicants with an ejection fraction between 40% and 50%, restricted medical certification may be considered after review of a 24 hour Holter. This should reveal no more than 30 Ventricular ectopic beats per hour in the absence of anti-arrhythmic medication, with no more than 3 consecutive beats and a cycle length that is not less than 500msec.
- (i) A Myocardial Perfusion Scan shall be required at least six months after Angioplasty/Stenting, but not necessarily after other events (Myocardial Infarction or Coronary Artery Bypass Grafting), unless there is doubt about the diagnosis Myocardial Infarction or adequacy of Bypass Grafting.

6. THERAPEUTIC CONSIDERATIONS

Only medication that is compatible with flying will be allowed.

7. FOLLOW-UP CERTIFICATION

7.1 Annual cardiologist's report, including –

- (a) Resting and Maximal Stress ECG 12 lead ECG, symptom limited, with no evidence of myocardial ischaemia or ischaemia equivalent.(Some applicants will continue to

- have an “abnormal” stress test. A cardiologist’s opinion should be sought for these cases and if necessary, MIBI or stress ECHO may be required);
- (b) A normal 24 Hour Holter ECG will be required.
- 7.2 Blood chemistry shall include –
- (a) Urea & Creatinine.
 - (b) Fasting Lipid Profile.
 - (c) Fasting Blood Glucose.
 - (d) Haemoglobin & Platelets.
- 7.3 An angiogram will be required –
- (a) if there is any cardiac abnormality detected, including symptom relapse.
- 7.4 Chest pain –
- (a) regardless of whether typical or atypical for ischaemic heart disease, precludes medical certification insofar as it indicates an elevated probability of significant coronary artery disease and an increased risk of an incapacitating cardiac event.
- 7.5 An applicant may be considered fit if –
- (a) diagnostic testing indicates that the chest pain is not due to myocardial ischaemia.
 - (b) the initial assessment, including a review of the symptom history, must be without the effect of anti-ischaemic medication that could possibly mark adverse findings.
 - (c) If coronary arteriography reveals normal coronary arteries, coronary vasospasm should be excluded.
- 8. FOUR-YEARLY**
- (a) A stress cardiolite/MIBI Scan/Stress MRI/Stress Echo or coronary Scan will be required.
 - (b) If any of the tests show any abnormality, a repeat Angiogram will be required.

SCHEDULE 12: PROTOCOL ON RHEUMATOID ARTHRITIS

1. All pilots suffering from rheumatoid arthritis, need a rheumatologists report stating whether or not the disease is in remission or controllable on acceptable medication.
2. The only acceptable medication at present is Methotrexate™ in dosages not exceeding 5 mg per day.
3. Gold salts, NSAID’s, anti-malarials (in anti-rheumatic dosages), etc. are not compatible with flying.
4. The DAME must determine whether the arthritic damage already incurred would compromise the pilot’s flying safety.

SCHEDULE 13: PROTOCOL ON DIABETES MELLITUS

1. General

Aviation medical standards as laid down in Annex 1 of the Convention on International Civil Aviation by the International Civil Aviation Organisation to which South Africa is a Contracting State, have identified broad medical conditions that, on the basis of expected risk of incapacitation, disqualify aviation personnel from flying.

South Africa is one of the countries that previously applied strict standards to applicants with a history of Diabetes Mellitus on Insulin. The previous protocol did not take into consideration new therapeutic interventions, risk factor modification or rehabilitation, all of which reduced the risk of sudden incapacitation.

The South African Civil Aviation Authority (SACAA) has since reviewed this protocol, and is now making provision for aviation personnel with a history of Type II Diabetes Mellitus on Insulin to apply

for the privileges of the licence they wish to apply for. This consideration will be based on the individual medical condition of the applicant and risk factor involved.

2. Background

Diabetes is defined as a metabolic disease with some genetic predisposition; it is characterised by an impaired ability to break down, store and utilise carbohydrates effectively. This may be due to failure of production of Insulin from the beta-cells in the islets of Langerhans in the pancreas or the presence of Insulin resistance impeding the action of the endogenously produced hormone. Diabetes is divided into two categories –

Type I Diabetes Mellitus, formerly “childhood, juvenile or Insulin-dependent” diabetes islet cell failure (possibly autoimmune) destruction Insulin-producing B cells pancreas, significant Insulin deficiency; require Insulin.

Type 2 (non Insulin dependent diabetes) Insulin resistance due to impaired Insulin secretion (“burn out” b cells), Insulin resistance (peripheral Insulin receptors), and increased hepatic glucose production, may or may not require Insulin.

From a number of studies, the risk factors for severe hypoglycemia include previous hypoglycemia, long duration of diabetes and impaired hypoglycemic awareness. The risk to flight safety is greater in Type 1 Insulin-treated Diabetic patients than for Type 2; it is therefore recommended that Type 1 applicants should, with current treatment and level of knowledge, be precluded from obtaining a medical certificate.

The methods used to treat diabetic patients have improved over recent years, and individuals that require Insulin to maintain satisfactory blood glucose levels may apply, or re-apply, for a license to fly or to undertake air traffic control work. The key areas of concern in certificating aircrew with Insulin treated diabetes mellitus are hypoglycemia and the enhanced risks of micro- and macrovascular disease.

3. Estimated Incapacity Risk

Using data from literature review, the rate of severe hypoglycemia using, i.e. hypoglycemia requiring the help of another in Type 2 treated Insulin, is of the order of 3% per annum. These data comes from a hospital population, and is not representative of the pilot population, who are highly selected, well-motivated, and may be meticulous in managing their Diabetic.

4. General medical examination requirements applicable to all applicants

All initial applicants must submit their medical reports to the medical panel for assessment.

Applicants are required to monitor their blood glucose frequently, including daily fasting glucose measurements.

Extra snacks and glucagon should be readily available.

Applicants are required to test and record blood glucose levels before and during all flights and present the information to the SACAA on a six monthly basis.

5. Protocol for Diabetes Mellitus Type II controlled on Diet and Exercise

A blood glucose test is not a routine part of the SACAA medical evaluation, however; the examination includes routine urine test. Applicants with a history of diabetes mellitus controlled on diet alone are considered medically fit for all the classes of medical certificates, provided that they have no evidence of associated disqualifying cardiovascular, neurological, renal, or ophthalmological disease. These applicants are required to submit an annual comprehensive endocrinologist/physician report.

6. Protocol for Diabetes Mellitus Type II Medication controlled-Except Insulin

Applicants requiring oral hypoglycemic agents to control their blood glucose may be assessed as fit for all categories of licence, provided they have no cardiovascular, neurological, ophthalmological or renal complications of diabetes, or any condition which could result in sudden or subtle incapacitation while exercising the privileges of their license.

7. Acceptable Oral Medication

- Biguanides
- Arcabose
- Thiozolidenediones

8. Initial follow up for medical certification

Following initiation of medication, applicant's medical certificate will be withdrawn for a period of three (3) months; this is to ensure stabilisation, adequate control, the absence of side effects, or complications from side effects. Should the applicant's medication be changed, a comprehensive endocrinologist report indicating the reason to change the medication and stating the name of the new information will be required.

The following conditions must be adhered to –

- An initial report from a treating physician, confirming no complications of diabetes including cardiovascular, neurological, ophthalmological or renal complications of diabetes;
- A statement regarding medication used dosage, presence or absence of side effects or complications, clinical significant episode of hypoglycemia and an indication of a satisfactory of the diabetes;
- Annual cardiovascular assessment such as symptom limited exercise ECG and clinical review by cardiologists;
- The applicant must not experience any adverse symptoms or effects from the oral hypoglycemic agent; or
- The applicant may not use any medication interacting with the oral hypoglycemic agent;
- Glucose: Fasting, Post-prandial peak <6.7 mmol/L <9.0 mmol/L;
- HbA1c <7.0% with risks, HbA1c <7.5% with no other risk factors;
- Blood pressure 130/80 mmHg;
 - Total cholesterol <4.8 mmol/L, LDL-C <2.5 mmol/L, Triglycerides <2.3 mmol/L and HDL-C >1.0 mmol.

Protocol for Diabetes Mellitus Type II on Insulin treatment

Applicability

Class I

Operational Restrictions

CLASS I

ATPL/CPL with a multi-crew – as/or with a co-pilot only, restricted to fly in the South African airspace only.

Class II

Only applicable to cabin crew.

This protocol is currently not applicable to Private Pilots and Students Pilots.

Class III

Air Traffic Controllers – Required to inform their supervisors of the medical condition.

Class IV

Protocol not applicable to Class IV applicants

Initial follow-up for medical certification

The applicant must have been on Insulin for a minimum of one year and the dosage should have been stable for at least six months, this is to ensure stabilisation, adequate control, the absence of side effects, or complications from side effects.

An initial report from a treating physician, confirming no complications of diabetes including cardiovascular, neurological, ophthalmological or renal complications of diabetes should be submitted.

The following considerations must be adhered to –

- The applicant will be required to carry and use a blood glucose monitoring device with memory and report to the treating physician any hypoglycemic incidents.
- The applicant must not have a history of hypoglycemic episode requiring intervention of another party, during the previous one year.
- Applicant must have no history of recurrent (2 or more) hypoglycemic reactions resulting in a loss of consciousness or seizure within the past 5 years.
- Applicants must have no evidence of hypoglycemic unawareness, and a good diabetes education and understanding.
- Applicants are required to have a satisfactory HBA1c of 7–7.5% within the past 30 days.
- Positive attitude – monitoring and self-care.
 - Applicants are required to have adequate blood glucose self-monitoring using a calibrated memory chip glucose meter.
- Applicants are required to maintain 90% of blood glucose measurements >5.5mmol/L.

Annual follow-up for medical certification

The applicant will be required to carry and use a blood glucose monitoring device with memory and report to the treating physician any hypoglycemic incidents.

Quarterly (3 monthly) interval evaluation reports by treating physician for –

- Physical examination
- HbA1c
- Review of daily blood glucose measurements.

Results of the quarterly evaluations must be accumulated and submitted annually to the medical panel.

Glucose: Fasting, Postprandial peak <6.7mmol/l <9.0mmol/l respectively.

HbA1c <7.0% with risks, HbA1c <7.5% with no other risk factors.

Blood pressure 130/80 mmHg.

Total cholesterol <4.8mmol/L, LDL-C <2.5mmol/L, Triglycerides<2.3mmol/L and HDL-C >1.0mmol/L.

Annual cardiovascular assessment such as symptom limited exercise ECG and clinical review by cardiologist.

Annual report from a treating physician to confirm no complications of diabetes including renal, neurological and visual complications.

Monitoring and Actions required during Flight Operations

A regularly calibrated glucometer with a memory chip and 10g portions of readily absorbable carbohydrate (cho) should be included on the treatment pack to cover duration of flight.

Applicants must measure blood glucose prior to flight, blood glucose must be >6.0mmol/L .

During flight, the applicants blood glucose should be monitored every 30–60 minutes, if the blood glucose <6.0mmol/l, then 10g absorbable carbohydrate ingested.

The frequency of glucose monitoring on flight duty periods over two hours may be reduced depending on the individual circumstances, in consultation with the endocrinologist and the designated aeromedical committee.

Applicants involved in short-haul operation, are required to monitor their blood glucose at midpoint of flight. Blood sugar will fluctuate slightly over one to two hours.

Applicants presenting with blood glucose of >15mmol/l, appropriate corrective measures should be applied.

Blood glucose should be monitored 30–45 minutes prior to landing, should measurement reading fall <6.0mmol/l, 10g of cho consumed.

The crew members would need to be made aware of the potential for hypoglycemic events because of his Insulin use and should be trained on management strategies.

Applicants are required to test and record blood glucose levels before and during all flights and present the information to the SACAA on a six monthly basis.

Acceptable Insulin

Basal Insulin

Bolus Insulin

SCHEDULE 14: **PROTOCOL ON DIAGNOSED ADDISON'S DISEASE**

1. Before an applicant for a pilot licence may be considered, he/she must comply with the following standards –
 - (1) Normal physical examination.
 - (2) The following blood test results must be normal before exercise –
 - (a) Urea and electrolyte screen.
 - (b) Blood glucose (random).
 - (c) Serum cortisol.
 - (d) Liver Function Test screen (this is necessary in order to ensure that applicant is not abusing alcohol, which would predispose him to developing hypoglycaemia).
 - (3) Exercise must then be undertaken, and a series of blood samples must be taken, both during and after the exercise. The exercise must be on a treadmill, with the applicant running until he/she is exhausted, or until a heart rate equivalent to a 100% stress ECG is achieved.
 - (a) The blood test results required during exercise are the following:
 - (i) Urea and electrolyte screen (X 1).
 - (ii) Blood glucose (X 3).
 - (iii) Serum cortisol (X 1).
 - (b) The blood test results required after exercise are the following:
 - (i) Urea and electrolyte screen.
 - (ii) Blood glucose.
 - (iii) Serum cortisol.All the results must be normal.
 - (4) The blood pressure and pulse rate must be monitored throughout the exercise, and any changes must be appropriate for the intensity of the exercise.
2. If all the above standards are achieved, the applicant may be certified, but with the following restrictions –
 - (1) May only fly with or as a co-pilot.
 - (2) May not fly when suffering from any infection, or when pyrexial (including “flu” or a common cold). Must be re-examined by the designated body or institution following resolution of the infection before he/she can resume flying.
 - (3) All surgical procedures, operations or use of medication, whatever the reason, will result in the applicant becoming unfit, until cleared by the designated body or institution. Will remain unfit for at least 6 weeks following surgery.
 - (4) Must always wear a Medic Alert disk specifying that he/she has Addison's Disease.
 - (5) Must always carry an emergency supply of Cortisone when flying.

- (6) The following blood tests must be performed at least 3 times during the year (i.e. approximately every 4 months) in order to determine whether the applicant is complying with treatment –
- (a) Urea and electrolyte screen.
 - (b) Blood glucose (random).
 - (c) Serum cortisol.
 - (d) Liver Function Test screen.
 - (e) Serum Renin determination.
- (7) The applicant must be fully informed as to the disease, its treatment and possible complications.
- (8) The applicant is required to submit an annual specialist Physician's report to the designated body or institution.

SCHEDULE 15: PROTOCOL ON SARCOIDOSIS

1. For the first application after the disease process started, the following must be submitted, in addition to a flying medical examination, after which a panel decision will be taken –
 - (1) Blood tests –
 - (a) ESR
 - (b) Angiotensin Converting Enzyme
 - (c) Ca²⁺
 - (d) Uric Acid
 - (2) Stress ECG
 - (3) CXR
 - (4) Lung Function Test
2. Every six months after the first application was granted, the following must be submitted –
 - (1) Blood tests:
 - (a) ESR
 - (b) Angiotensin Reversal Enzyme
 - (c) Ca²⁺
 - (d) Uric Acid
 - (2) Lung Function Test
 - (3) Flying medical examination
3. Annually after the first application was granted, the following must be submitted –
 - (1) CXR
 - (2) Specialist Physician/Pulmonologist Report
4. Stress ECG can be submitted at the normal intervals for the specific age group.

Note: The following is not required any more by this protocol –

1. Thallium scan of the heart
2. 24-hour Hölter ECG
3. Six-monthly stress ECG

SCHEDULE 16: PROTOCOL ON MULTIPLE SCLEROSIS

It is unsafe for an applicant with multiple sclerosis to pilot an aircraft for the following reasons –
 There is a risk of sudden loss of vision, vertigo, or convulsions.
 High temperatures and stress situations tend to precipitate an attack.
 It is a progressive disease.
 It tends to repeat.

Diagnosis is made on the history and physical examination. Special examinations which can confirm the diagnosis include –

Evoked potentials –

- Visual.
- Somatosensory.
- Auditory.
- Brain stem.
- Cerebrospinal fluid:
- IgG index.
- Oligoclonal bands.

MRI

- Demonstration of periventricular plaques.

As a rule, the pattern that the disease takes in the first 3 years is the pattern that the disease will follow. It remains, however, an unpredictable disease!

When the diagnosis of multiple sclerosis is made, the applicant should be made temporarily unfit and referred to the Panel for a decision.

If an applicant is asymptomatic, the Panel may make him/her fit to fly with the restriction that he/she must have a 6 monthly examination, including a neurologist's assessment. If, at any of the follow-up examinations, any of the following are found, the applicant may be declared unfit –

Sudden visual loss.

Sensory disturbances in the hands.

Mood changes.

Vertigo or convulsion.

Exacerbations during stress situations or exposure to high temperatures.

SCHEDULE 17: **PROTOCOL ON COAGULATION AND THROMBOTIC DISORDERS**

1. General

Inherited disorders of coagulation should be disqualified if there is any history of factor replacement or serious bleeding episodes.

- (1) Haemophilia: Factor VIII deficiency should be denied certification. Von Willebrand's disease as well as other specific factor deficiencies should be denied certification if there is a history of factor replacement or serious bleeding episodes.
- (2) Iatrogenic Thrombosis: After anticoagulant therapy has been discontinued, the applicant need not be disqualified.
- (3) Deep vein Thrombosis: Certification should be denied for a period up to one year from the episode, and for six months after all anticoagulant therapy has been discontinued. Underlying contributing factors, such as malignancies, must be evaluated according to the guidelines set for those conditions.
- (4) Pulmonary Embolism: A single episode of pulmonary embolisation, not associated with chronic deep venous thrombosis, should be considered disqualifying from the date of the embolisation and for at least 6 months after all anticoagulant therapy has been discontinued. More than one episode of pulmonary embolisation documented by radio-isotopic or angiographic methods should be denied certification permanently.
- (5) Recurrent arterial emboli is disqualifying under any circumstances.
 - (6) Anticoagulant Medication: Anticoagulant drugs of the heparin class or coumarin/warfarin class are disqualifying while they are in use and for six months after they are discontinued.

- (7) Haemorrhagic Platelet Abnormalities: Decreased circulating platelet count due to any cause may result in debilitating haemorrhagic episodes. Haemorrhage can also occur when platelet counts are normal but platelet function is abnormal.
- (8) Congenital/Genetic Disorders: E.g. Protein S or Protein C Deficiency, Sneddon Syndrome. All unfit.

2. Lymphomas

- (1) Hodgkin's Disease: Applicants with active Hodgkin's disease or applicants undergoing therapy for Hodgkin's disease should not be certified because of the risk of sudden incapacitation. Applicants with stages I and II-A who have had no evidence of disease for two years after completion of treatment are certifiable. Stages II-B through IV-B should be free of disease after completion of therapy for at least five years before consideration of certification, and should be re-evaluated every 6 months for 10 years. Numerous long-term complications of treatment for Hodgkin's disease includes the development of acute leukaemia and second malignancies of other types, radiation-related heart disease, pulmonary fibrosis, and hypothyroidism. Frequent re-evaluation. After 10 years there should be annual appraisals.
- (2) Non-Hodgkin's Lymphoma: Well-differentiated and poorly-differentiated lymphocytic lymphoma, mixed lymphocytic lymphoma and histiocytic lymphoma of either nodular or diffuse type, are usually not curable, and these applicants should be disqualified permanently. B-cell, diffuse histiocytic lymphoma, particularly in the early stages, may be cured by radiation therapy and/or chemotherapy and, if they are free from disease without therapy for at least three years, they may be certified with re-evaluation to occur every three months for three years and then every 6 months. T-cell, diffuse histiocytic lymphoma, including immunoblastic lymphoma and T-cell lymphoblastic sarcoma, should not be certified because of their unpredictability. Burkitt's lymphoma should not be certified.
- (3) Plasma-cell Dyscrasia: Applicants with multiple myeloma, Waldenstrom's macroglobulinemia or multiple plasmacytomas should not be certified. These disorders are not curable, require frequent therapy that is toxic, and are associated with sick effects such as neurological impairment that may lead to sudden incapacitation. Applicants with a single plasmacytoma may be cured and, if they are free of disease more than three years after therapy has been discontinued, they may be considered for certification with frequent follow-up.
- (4) Applicants with benign monoclonal gammopathy with a monoclonal spike comprising less than 2 g/dl of protein, with fewer than 55 plasma cells in the bone marrow, and with a haematopoietic compromise or osteolytic lesions may be certified if they have no evidence of progression of the disease for three years; they should be recertified every six months. The major risks of monoclonal gammopathy are progression to multiple myeloma and an increase in serum viscosity leading to neurological impairment.
- (5) Applicants with amyloidosis associated with plasma cell dyscrasia should not be certified because of the high incidence of organ infiltration and the risk of sudden impairment. Applicants with gammopathy of alpha chain disease should not be certified. The median survival is approximately 12 months for gamma heavy chain disease, and the alpha chain disease is often associated with abdominal lymphoma, which is a progressive and fatal disorder.
- (6) Applicants with cold agglutinin disease should not be certified because of the risk of sudden haemolysis. Applicants with cryoglobulinemia syndrome should not be

certified because of the risk by sudden vascular incidents and neurological dysfunction.

3. Immunodeficiency syndromes

- (1) Applicants with the AIDS should not be certified because of the high risk of opportunistic infections which can appear suddenly and cause acute incapacitation.
- (2) Applicants with ARC (AIDS related complex) without evidence of previous opportunistic infection may be certified with follow-up every 6 months.
- (3) Applicants with common variable immunodeficiency who do not have bronchiectasis and who are controlled with regular gamma globulin therapy may be certified, but they should be re-evaluated every six months.

SCHEDULE 18: PROTOCOL ON PREVIOUSLY DIAGNOSED ACUTE LEUKAEMIA

Any applicant who has a previous history of having had any type of acute leukaemia in the past will be required to comply with the following requirements before recertification may be considered –

1. Must comply with the criteria for complete remission i.e. –
 - (1) Clinical: the disappearance of any abnormal clinical findings due to the leukaemia, and return to good physical health.
 - (2) Haematological –
 - (a) The peripheral blood must have returned to normal, with reference to:
 - (i) Haemoglobin (Hb).
 - (ii) Total, and differential, white cell count.
 - (iii) Platelet count.
 - (b) Recognisable leukaemia cells may not be present in a bone marrow preparation, and there may have been not more than 5% normal blast cells present in a marrow preparation of normal cellularity.
2. The applicant must have completed his/her last treatment at least two years before submitting his/her application to the designated body or institution. (This includes all modalities of treatment for leukaemia).
3. The applicant must have undergone at least six-monthly medical follow-up in an appropriate specialised unit. A report detailing the follow-up programme and the applicant's medical record must be submitted with the application to the designated body or institution.
4. During the initial post-remission period of two years his/her blood picture should have been closely monitored. Although the specific results are unlikely to be required by the designated body or institution, it is necessary that he/she has been monitored as follows –
 - (1) During the first year after treatment has been stopped –
 - (a) 6-weekly blood profile.
 - (b) 12-weekly bone marrow evaluation.
 - (c) 12-weekly lumbar puncture.
 - (2) During the second year after treatment has been stopped –
 - (a) 8-weekly blood profile.
 - (b) 16-weekly bone marrow evaluation.
5. After two years of documented remission the applicant may submit an application for certification. If the results of the above tests are within acceptable limits the applicant may be granted certification, with the following restrictions –
 - (1) Must continue with follow-up at a suitable specialist unit, and submit six monthly reports to the designated body or institution.
 - (2) Must continue to have blood profile monitored at 8–12 weekly intervals (for a year, then 6 monthly).

- (3) Must undergo an Aviation Medical Examination at least annually (or more frequently if indicated).
- (4) Must do an ECG and stress ECG with each aviation medical examination.

SCHEDULE 19: PROTOCOL ON PREVIOUSLY DIAGNOSED SEMINOMA

- 1. An orchidectomy must have been performed successfully, without complications.
- 2. A specialist report from an oncologist or Hospital Department of Oncology must state that no metastases have been found, and that the applicant is undergoing monthly follow-up.
- 3. For the period of 2 years following diagnosis and surgery the applicant is required to submit the following reports to the designated body or institution –
 - (1) Three monthly chest x-ray examination reports.
 - (2) CT scan reports (if considered necessary by Oncologist. Copies of CT scan reports must be submitted to the designated body or institution).
 - (3) Tumour marker results –
 - (a) Fetoprotein.
 - (b) Lactate dehydrogenase (LDH).
 - (c) Human chorionic gonadotropin (HCG).
- 4. After the initial two year period, the applicant will be required to submit these reports each six months to the designated body or institution.
- 5. The applicant is temporarily unfit to fly while on chemotherapy (and for at least one week after cessation of medication).
- 6. A yearly aviation medical examination is required.
- 7. This protocol is only valid for private pilots.

SCHEDULE 20: PROTOCOL ON PREVIOUSLY DIAGNOSED MALIGNANT MELANOMA

- 1. Initial investigations: (Required in all cases, before the applicant's case can be discussed with regard to medical certification) –
 - (1) Specialist report including clinical staging.
 - (2) Pathology report (to include) –
 - (a) Maximum thickness.
 - (b) Clark's level.
 - (c) Excision margins.
 - (3) Radiology reports –
 - (a) Chest X-ray.
 - (b) CT scan abdomen.
 - (c) CT brain scan.
 - (4) Haematology –
 - (a) FBC, ESR
 - (b) LFTs including –
 - (i) LDH.
 - (ii) Alkaline Phosphatase.
 - (iii) SGOT & SGPT.
- 2. Waiver requirements are dependent on the above reports, and may be applied once all above reports have been received. The requirements are as detailed below –
 - (1) CLARK 1: Yearly waiver with –
 - (a) Yearly clinical examination.
 - (2) CLARK 2 & CLARK 3 <1,5 MM: Yearly waiver with –
 - (a) Yearly clinical examination.

- (b) Yearly chest x-ray.
- (c) Yearly LFTs.
- (d) Yearly FBC & ESR.
- (3) CLARK 3 1,5–2,25 MM, CLARK 4 UPPER <1,5 MM: Yearly waiver with –
 - (a) 6-Monthly examination and yearly specialist report.
 - (b) Yearly chest x-ray.
 - (c) Yearly LFTs.
 - (d) Yearly FBC & ESR.
- (4) CLARK 3 >2,25 MM, CLARK 4 LOWER & STAGE 2 DISEASE WITH FEWER THAN 4 REGIONAL LYMPH NODES INVOLVED: Yearly waiver with –
 - (a) 6-Monthly specialist report for the first year.
 - (b) 6-Monthly examination with yearly specialist report.
 - (c) 6-Monthly chest x-ray in first year, then yearly chest x-ray.
 - (d) 6-Monthly LFTs.
 - (e) Yearly CT brain scan.
 - (f) 6-Monthly FBC & ESR.
- (5) CLARK 5, LESIONS >4 MM & STAGE 2 DISEASE WITH 4 OR MORE REGIONAL LYMPH NODES INVOLVED: Permanently unfit.

SCHEDULE 21: MONOCULAR/AMBLIOPIC PROTOCOL

To be applicable if (optimally corrected) vision in the weak eye is 6/12 or worse.

Pre-conditions: There must be no active ocular pathology.

Vision (uncorrected or corrected) in the better eye must be 6/6 or better (distance vision) and 6/9 or better (near vision). These are absolute requirements, not open to waiver.

Initial applicants: In addition to the required standards, initial applicants must pass a practical flight test by a SACAA approved instructor before being declared fit according to the protocol.

SCHEDULE 22: RADIAL KERATOMY/PRK/LASIK PROTOCOL

1. Initial requirements

- (1) Waiting period of six months (three months after PRK/LASIK) after surgery.
 - (2) Reports from the treating ophthalmologist immediate post-surgery and after the six month waiting period –
 - (a) Visual acuity and other visual parameters should be within the standards required for the license type applied for.
 - (b) There should not be any fluctuation of vision.
 - (c) There should not be any glare problems.
 - (d) There should not be any post-operative complications that can jeopardise flight safety.
- (e) Should not be on any unacceptable medication.

2. Procedure

- (1) After the six month waiting period the applicant should submit the initial report and also the six monthly follow-up report from the treating ophthalmologist to the designated body or institution and his/her case will be presented to the aviation medical panel.
- (2) If the reports are favourable, he/she will be declared fit to fly on this protocol.

3. Requirements once on this protocol

- (1) Follow-up reports six monthly from the treating ophthalmologist for the first year after being declared fit to fly.
- (2) Yearly reports from the treating ophthalmologist thereafter.
- (3) Any change in the status of the visual status will automatically render the applicant unfit, and will require a full investigation before further consideration.

Note: This protocol will be applicable to all licence classes of the civil aviation sector.

SCHEDULE 23: WAIVER CERTIFICATE

WAIVER CERTIFICATE			
This is not a medical certificate, and cannot be used in place of one, but should be displayed along with the medical certificate.			
This certifies that:			
Of			
Date of birth	ID number	Licence number	Sex
Has been medically waived for			
WAIVER SERIAL NUMBER:			
Restrictions:			
Class of Medical Certificate Authorised:			
FOR THE DESIGNATED BODY OR INSTITUTION:			
Date			
Signature			

SCHEDULE 24: PROCEDURE FOR FARNSWORTH LANTERN TESTING

The procedure for testing for colour deficiency using the Farnsworth lantern shall be as follows –

Note: Only the Farnsworth lantern will be acceptable

1. The test shall be conducted in a completely dark room.
2. Applicants shall be seated at a distance of 3m from the lantern.
3. Three runs comprising nine pairs of lights shall be conducted.
 4. Lights shall be flashed for a maximum period of 3 seconds only, and the applicant shall be expected to give a verbal answer during this time.
5. The first run is to familiarise the applicant with the test.
 6. The assessor shall inform the applicant that only three colours will be accepted as correct answers: White, Red or Green.
7. All answers given by the applicant during the first (practice) run shall be duly disregarded.
8. In the next two test runs, only one error will be permitted per run.
 9. Applicants who do not commit any errors in the first test run do not have to undergo a second test run.
10. If an applicant commits one error in the first test run, a second test run will be given.
11. Any errors more than one per test run will be declared a fail.
 12. Applicants who obtain a satisfactory score in the Farnsworth lantern test shall be deemed to be Grade II colour-safe.
13. Applicants who fail to obtain a satisfactory score in the test shall be deemed to be Grade III colour-unsafe, unless they submit satisfactory reports from an ophthalmologist and a flight instructor designated by the Director.

SCHEDULE 25: PROCEDURE FOR PRACTICAL FLIGHT TESTING IN COLOUR VISION DEFICIENCY

Applicants who fail to obtain a satisfactory score in the Farnsworth lantern, Beyenne, Holme-Wright type A or Spectrolux colour perception lanterns, as the case may be, shall undergo a practical flight test with an instructor designated by the Director in accordance with the following requirements –

1. The test may be conducted in a simulator or aircraft.
 2. If conducted in a simulator, the simulator shall be of the same Class as the aircraft to be flown by the applicant.
3. All tests shall be conducted in an EFIS-equipped aircraft, or EFIS cockpit simulator.
4. The procedure and environmental requirements detailed below shall be approximated as far as is practicable in a simulator test.
5. The test shall be undertaken by two (2) instructors, one of whom shall be an instructor designated by the Director for the assessment of applicants during a practical flight test for colour perception purposes.
6. An instructor designated by the Director for the assessment of applicants during a practical flight test for colour perception purposes shall have normal colour vision.
7. The instructor designated by the Director shall administer the test to the applicant, while the second instructor shall pilot the aircraft during the test.
8. The test shall be conducted at dusk.
9. The test shall be conducted at a small aerodrome with minimal lighting.
 10. The instructors shall communicate with tower/ground station operators prior to undertaking the test.
11. On the ground, the applicant shall be requested to identify ground lights, taxi lights, etc.
12. The tower/ground station shall be requested to flash lights at the aircraft.
 13. Red, Green and White lights shall be flashed by the tower/ground station in a random manner, and the applicant shall be requested to identify the lights as they are being flashed by the tower.
14. Lights shall be flashed a minimum of eighteen (18) times, and the applicant shall be requested to provide a correct answer within three (3) seconds of any light being flashed.
15. After take-off, the aircraft shall conduct low-level flying circuits at a maximum height of 3 miles for a minimum period of thirty (30) minutes while the tower/ground station continues to flash lights at the aircraft.
16. A minimum of eighteen (18) lights shall be identified by the applicant during this period.
17. The applicant shall also be requested to identify landscape features at this stage.
18. The instructor piloting the aircraft shall then fly to a pre-determined point and do a turn-around.
19. At 13 miles from the final destination, the applicant shall be requested to identify the runway.
20. At 11 miles from the final destination, on a long and high final approach, the applicant shall be requested to identify the PAPI lights.
21. At 7 miles from the final destination, the applicant shall be requested to identify the runway lights.

22. At 5 miles from the final destination, with White PAPI lights, a rapid descent shall be undertaken, and the applicant shall be requested to identify the PAPI lights as they change colour.
23. At all stages during the flight and on the ground, the applicant shall be requested identify various colours and shades on the EFIS screen, and all difficulties shall be noted.
24. The test shall be a minimum of one and a half (1½) hour duration;
25. An applicant shall be deemed to have performed satisfactorily in the test if they are able to identify all the parameters they are being tested on.

SCHEDULE 26: WARFARIN PROTOCOL

GENERAL

Aviation personnel presenting with coagulation disorders should be disqualified if there is a history of a serious bleeding episode and factor replacement.

The provision of medical certification for aviation personnel on Warfarin may be considered for any class of medical certificate based on the individual medical condition of the applicant and risk factor management.

Applicants on Warfarin may not take part in aerobatic activities.

APPLICABILITY

Class I ATPL

The applicant will only be considered with a restriction as a Multi-crew, with or as a Co-pilot.

Class I CPL

- A. Applicant may fly solo if they comply with the following restrictions
 - The applicant must not have associated co-morbidities.
 - Proof of INR control, 80% of the time in three months after initiation of Warfarin, while declared temporarily unfit to fly.
- B. Applicant may fly with a safety pilot if
 - Applicant has associated co-morbidities that are poorly controlled.
 - Safety pilots must not have any restrictions other than corrective lenses or glasses.
 - Proof of INR control, 80% of the time in three months after initiation of Warfarin, while declared temporarily unfit to fly.

Class II

- A. Applicant may fly solo if
 - There are no associated co-morbidities.
 - Proof of INR control 80% of the time in three months while declared temporarily unfit to fly.
- B. Applicant may fly with a safety pilot if
 - Applicant has associated co-morbidities that are poorly controlled.
 - Safety pilot must not have any restrictions other than corrective lenses/ glasses.
 - Proof of INR control, 80% of the time in three months after initiation of Warfarin, while declared temporarily unfit to fly.

Class III: Applicants will be considered if they meet the prescribed criteria

Class IV: Applicants will be considered if they meet the prescribed criteria

GENERAL MEDICAL EXAMINATION REQUIREMENTS APPLICABLE TO ALL CERTIFICATE HOLDERS

- (a) All initial medical reports will be submitted to the panel of specialists for approval.

- (b) Applicants will be required to submit the initial baseline INR and a cardiologist report before the initiation of Warfarin, then he/she will submit a weekly INR report after initiation of Warfarin until there is proof of stability; the applicant can then submit one monthly INR reports.
- (c) The applicant will submit his/her INR reports to the DAME on a monthly basis.
 - (d) The applicant will submit a full medical examination report, including INR and a cardiologist report to the medical panel on a six monthly basis.
- (e) Medication must be well-tolerated by the aviation personnel for a three-month observation period (during which the applicant will be declared temporarily unfit to fly to ensure safety).
- (f) All applicants must submit proof of stability of the INR, 80% of the time in three months, prior to consideration for medical certification.
- (g) Licensed aviation personnel presenting with INR outside the required range will be declared temporarily unfit to fly for a four-week observation period, in which he/she will be required to submit four reports separately (weekly) to prove INR stability to the panel.
- (h) Applicants should not take any other medication without approval, either by the DAME, or by the specialist managing his condition.
- (i) Applicants who present with an acute illness will be declared temporarily unfit to fly until they are fully recovered and their INR re-assessed.

GENERAL MEDICAL CONDITIONS

A. Deep Vein Thrombosis

Certification should be denied for the period of the episode, and for three months post initiation of anticoagulation therapy.

The applicant will be declared temporarily unfit to fly for a three month observation period, in which he/she will be required to submit three months' INR reports (baseline INR reports, weekly INR report until stability is reached, then one monthly reports) the levels of which must be between 2 and 3, 80% of the time.

The applicant will submit his/her monthly INR reports to the DAME.

Underlying contributing factors such as malignancies must be evaluated according to the guidelines set for those conditions.

B. Atrial Fibrillation

Certification should be denied for the initial period of the episode, while the condition is being investigated.

The applicant will be declared temporarily unfit to fly for a three month observation period, in which he/she will be required to submit three months' INR reports (baseline INR reports, weekly INR report until stability is reached, then one monthly reports) the levels of which must be between 2 and 3, 80% of the time.

The applicant will submit his/her monthly INR reports to the DAME.

Underlying contributing factors must be evaluated according to the guidelines set for those conditions.

C. Valvular Replacement

Certification should be denied for the period of the episode.

The applicant will be declared temporarily unfit to fly for a three month observation period, in which he/she will be required to submit three months' INR reports (baseline INR reports, weekly INR report until stability is reached, then one monthly reports) the levels of which must be between 2 and 3, 80% of the time.

The applicant will submit his/her monthly INR reports to the DAME.

Underlying contributing factors must be evaluated according to the guidelines set for those conditions.

D. Pulmonary Embolism

Certification should be denied for the initial period of the episode, while the condition is being investigated.

The applicant will be declared temporarily unfit to fly for a three month observation period, in which he/she will be required to submit three months' INR reports (baseline INR reports, weekly INR report until stability is reached, then one monthly reports) the levels of which must be between 2 and 3, 80% of the time.

Underlying contributing factors must be evaluated according to the guidelines set for those conditions.

Recurrent atrial emboli is disqualifying under any circumstances.

A single episode of pulmonary embolism, not associated with chronic deep venous thrombosis, should be considered disqualifying from the date of the embolisation and for at least three months after anti-coagulation treatment has been initiated.

More than one episode of pulmonary embolisation documented by CT scan method should be denied certification permanently.

The applicant will submit his/her monthly INR reports to the DAME.

E. Haemophilia

Applicants with Factor VIII Deficiency will be denied certification.

Applicants with Von Willebrand Disease as well as other factor deficiency diseases will be disqualified if there is a history of factor replacement or serious bleeding episodes.

F. Haemorrhagic Platelet Abnormalities

Applicants with decreased circulating platelet count and abnormal platelet function will be disqualified from flying.

SCHEDULE 27: HIV/AIDS PROTOCOL

GENERAL

Aviation personnel and students infected with the Human Immunodeficiency Virus (HIV), who have not been diagnosed with Acquired Immune Deficiency Syndrome (AIDS), may be considered for any class of medical certificate: Class I (ATPL pilots will have a multi-crew restriction), Classes II and III and Class IV (restricted to their individual class) if he/she meets the criteria below.

APPLICABILITY

This protocol applies to all Classes of Medical Certificates (1, 2, 3 & 4).

Criteria related to general medical examination applicable to all Certificate Holders

1. The license of aviation personnel who are HIV positive and symptomatic will be withdrawn.
2. Individuals on antiretroviral or another medication will be considered if the Medicine Control Council of South Africa approves the medication.
3. Medication must be well tolerated by the individual for three-month observation period, during which the medical certificate will be withdrawn.
4. The licenses of aviation personnel with AIDS will be withdrawn for 6 months post AIDS reversal stages.
5. The individual must undergo regular medical examination monitoring, no less than 3 monthly, by a physician experienced in the treatment of HIV and AIDS.
6. The individual must have experienced no acute or serious opportunistic infection for six months prior to certification.

Minimum parameters to be evaluated

() Viral Load (Roche PCR vision II) test on a 3 monthly basis.

- (a) CD4 count –
 - Applicants with CD4 count between 350 and 200 will be closely monitored, and where necessary treatment may be initiated.
 - CD4 count will be evaluated on a 3-monthly basis.
 - Applicants with CD4 count <200 will be withdrawn.
- (b) For all applicants with CD4 <200, and/or HIV/AIDS Clinical Stage 4, and/or a Viral Load between 50–100 000 a recommendation will be made to start anti-retroviral treatment.
- (c) A full blood count with differential will be done on a 3-monthly basis and a minimum of 12g/dl Haemoglobin will be acceptable.
- (d) A full renal function will be performed on a 3-monthly basis.
- (e) A full liver function test will be performed on a 3-monthly basis.

Withdrawal of the Medical Certificate

The medical certificates of applicants presenting with the following complications/side effects will be withdrawn, however; certification will be reconsidered if they meet the criteria mentioned above –

- Presence of acute or serious opportunistic infection.
- The use of any substance or medication that is not compatible with flying.
- Safety threatening side effects of any medication.
- Co-existing disqualifying medical conditions or disease.

SCHEDULE 28: OBSTETRICS AND GYNAECOLOGY

(a) General Requirements

The provision for aviation personnel with obstetrics and gynaecology medical conditions to obtain a medical certificate may be considered for any class of medical certificate based on individual medical condition of the applicant and risk factor management.

(b) Background

Approximately thirty per cent of pregnant women experience nausea and vomiting, and this can result in dehydration and malnutrition. Approximately fifteen per cent of embryos will abort in the first trimester. Cardiac output rises in early pregnancy, accompanied by an increase in stroke volume, heart rate, and plasma volume. Haemoglobin (and haematocrit) begins to fall between the third and fifth month of pregnancy and is lowest by the eighth month. Adequate diet with supplementary iron and folic acid is necessary, but self-medication and prescribed medicine should be avoided. The incidence of venous varicosities is three times higher in females than males and deep venous thrombosis and pulmonary embolism are among the most common serious vascular diseases occurring during pregnancy.

As the uterus enlarges, it compresses and obstructs the flow through the vena cava. Progressive growth of the foetus, placenta, uterus and breasts, and the vasculature of these organs, leads to an increased oxygen demand; and increased blood volume and oxygen demands produce a progressive increase in workload on both the heart and lungs. Hormonal changes affect pulmonary function by lowering the threshold of the respiratory centre to carbon dioxide, thereby influencing the respiratory rate.

In order to overcome pressure on the diaphragm, the increased effort of breathing leads to greater consciousness of breathing and possibly greater cost in oxygen consumption. The effect of hypoxia at increased altitude further increases the ventilatory effort required to provide for increasing demands for oxygen in all tissue.

Aviation personnel must inform their Designated Medical Examiner (DAME) if they become aware of any medical condition that would make them unable to meet the requirements of the licence they are applying for or if they are taking medication that is not compatible with flying.

The medical examiner should consider the important physiological changes associated with pregnancy, which might interfere with the safe operation of an aircraft at any altitude throughout a prolonged or difficult flight –

Factors which may considerably reduce flight safety and classify an “abnormal” pregnancy include:

- A history of multiple pregnancies,
 - Previous pre-term deliveries,
 - Cervical incompetence,
 - Bleeding, increased uterine activity,
 - Reduced oxygen carrying capacity in the blood (anemia),
 - Reduced placental respiratory reserve such as intrauterine growth retardation,
 - Post maturity,
 - Pre-eclampsia,
 - Chronic hypertension or
 - Placental infarction.
- Flight during pregnancy increases the risk for oedema (swelling) and blood clot formation due to obstruction of the vena cava from uterine compression and lack of mobility.

1. Menstrual Disturbances

Applicants for all classes of medical assessments, with gynecological disorders that are likely to interfere with the safe exercise of their licence and rating privileges shall be assessed as unfit to fly.

Dysmenorrhea is a common condition with symptoms ranging from mild discomfort to severe abdominal pain, headache and backache, nausea and vomiting, diarrhea, dizziness and fatigue. Usually, the condition is limited to 24–48 hours around the onset of the menstrual flow and fitness for aviation duties is rarely reduced to a significant degree. Treatment with oral contraceptives and NSAIDs (non-steroidal anti-inflammatory drugs) is very efficient and is generally well tolerated.

The use of oral contraceptives is acceptable in the aviation environment, but when medication with a NSAID is first used, an initial off-duty trial should take place so that the medical examiner can ascertain that there are no significant side effects such as gastro-intestinal symptoms, visual disturbances and drowsiness. In severe cases, especially when an underlying disease such as endometriosis or pelvic inflammatory disease is suspected (secondary dysmenorrhea), appropriate diagnostic evaluation is important and specialist opinion should be sought.

Premenstrual syndrome (PMS) may occur during the week before the onset of menstruation. The symptoms are partly mental such as mood swings, anxiety and depression, and partly physical such as bloating, headache and poor coordination. Because of the broad spectrum of symptoms and their varying severity and the many different kinds of medication usually prescribed, each case has to be assessed on its own merits. In most cases pharmaceutical therapy will prove unsatisfactory, and fitness for aviation duties is often reduced for a number of days every month.

2. Endometriosis

Endometriosis can cause quite severe discomfort such as lower abdominal or suprapubic pain, usually just before or during the first days of the menstruation period. There are several medical and surgical treatment options. If symptoms are well controlled by oral contraceptives or mild analgesics, this condition is usually compatible with aviation duties. Those who undergo surgical treatment with a successful outcome will normally be cured and able to fly safely after a suitable period of recovery. The middle group, consisting of patients with moderate symptoms but on medication and with decreased fitness several days per month, is more difficult to evaluate and assess. Usually the final decision should be deferred to the medical panel for further evaluation. The medical panel, in consultation with a gynaecologist, should weigh all relevant factors carefully before making a recommendation.

3. Genitourinary System

Applicants for all classes of Medical Assessments with sequelae of disease of or surgical procedures on the kidneys or the genito-urinary tract, in particular obstructions due to stricture or compression, shall be assessed as unfit to fly unless the applicant's condition has been investigated and evaluated in accordance with the best medical practice and is assessed not likely to interfere with the safe exercise of the applicant's licence or rating privileges.

Major gynaecological surgery will normally entail unfitness to fly for a period of two to three months and some procedures such as hysterectomy may require more extensive periods of recovery.

Applicants who are pregnant shall be assessed as unfit to fly, unless obstetrical evaluation and continued medical supervision indicate a low-risk uncomplicated pregnancy.

Once pregnant, a report from a gynaecologist and an aviation medical examiner to confirm the pregnancy.

It is advisable that a treating obstetrician is aware of the type of flying the applicant intends to carry out. Common complications of pregnancy can be detected and treated, by careful prenatal evaluation, observation, and care.

Low-risk uncomplicated pregnancy must be evaluated and supervised. Pregnancy is considered a normal, uncomplicated and low-risk, if there is supporting medical information from her obstetrician, family physician and/or midwife supporting that the applicant may continue to exercise the privileges of her licence.

Close medical supervision must be established for the part of the pregnancy where the applicant continues to carry out their duties, and all abnormalities should be reported to the medical examiner.

4. Applicability

Medical Requirements for Pregnant Class I, II & IV

Applicant may continue to exercise the privileges of her licence from the end of the 12th week (first trimester) until the end of the 26th week of the gestational period –

- Applicant will be declared to be medically fit to fly if her pregnancy is considered normal, uncomplicated and low-risk.
- A medical report from a treating obstetrician, family physician and/or midwife will be required.
- Close medical supervision where the pilot continues flying, and all abnormalities should be reported to the medical examiner.

5. Medical Requirements for Class III

During the gestational period, precautions should be taken for the timely relief of an air traffic controller in the event of early onset of labour or other complications –

- The fit assessment should be limited to the period until the end of the 34th week of gestation.
- Once pregnancy is confirmed, the pregnant air traffic controller should report to the medical examiner. If declared fit, she may continue to exercise the privileges of her licence.

6. Medical requirements following confinement or termination of pregnancy

Miscarriage (spontaneous abortion) occurs in about fifteen per cent of all pregnancies and is terminated spontaneously. Observation for a few days to ensure that bleeding has stopped may be all that is needed, but vacuum suction or dilatation and curettage to ensure completion of the abortion is frequently performed.

Induced abortion, usually by vacuum suction or by dilatation and curettage, will in the majority of cases entail unfitness for less than a week as these procedures are generally very safe, the rate of serious complications is <1% and the mortality rate is <1 in 100 000 cases. Complication rates

increase as gestational age increases. Although uncommon, post abortion bleeding and pelvic inflammation, peritonitis and septicemia may occur.

The "abortion pill" (mifepristone, a progesterone-receptor blocker) is used within the first seven weeks of pregnancy. A second drug (prostaglandin) is given two days later to start uterine contractions and complete the abortion. This method is very safe and unfitness is limited to a few days. For most women, abortion has no adverse mental sequelae but for those who have a desired pregnancy terminated for medical reasons (maternal or fetal) or who have considerable ambivalence, the mental sequelae may be pronounced. The medical examiner should therefore pay particular attention to the psychological effects of induced abortion before allowing return to aviation duties.

The applicant shall not be permitted to exercise the privileges of her licence, until she has undergone re-evaluation in accordance with best medical practice and it has been determined that she is able to safely exercise the privileges of her licence and ratings. Uncomplicated puerperium and full recovery: able to resume aviation duties six weeks after confinement.

SCHEDULE 29

BONE MARROW PROTOCOL

1. The holder of medical certificate is to be grounded from the date of harvesting.
2. Date of harvesting is calculated from the date of when the first injection of Granulocyte-Colony Stimulating Factor (G-CSF) is given.
3. The holder of medical certificate submits a Full Blood Count 2 weeks after completion of the procedure.
4. If the Full Blood Count is normal, the holder of medical certificate may be considered to exercise the privileges of their license they are applying for, if the Full Blood Count is abnormal, holder of medical certificate will remain grounded until all abnormalities have been corrected.

SA-CATS 91
General Aviation and Operating Flight Rules

List of technical standards

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91.01.5 INFORMATION ON EMERGENCY AND SURVIVAL EQUIPMENT

1. Emergency and survival list

An owner or operator shall have a list containing the following minimum information regarding the emergency and survival equipment carried on board –

- (1) the number, colour and type of life rafts and pyrotechnics;
- (2) details of emergency medical supplies;
- (3) water supplies; and
- (4) type and frequencies of emergency portable radio equipment.

91.02.1 CREW COMPOSITION AND QUALIFICATIONS

1. Cabin crew member requirement – general

- (1) The Director's decision to require cabin crew members will be based on –
 - (a) the complexity of the aircraft with respect to at least –
 - (i) it's instrumentation and equipment;
 - (ii) it's cabin size and layout;
 - (iii) the communications capability between the flight deck and the cabin to impart safety information to all passengers and to be contacted by the passengers, if required; and
 - (iv) the ability of flight crew members to visually determine the status of the passengers and to assist if need be;
 - (b) the scope of the operator's operations having due regard for the likelihood of ditching or emergency landing off-aerodrome due to the lack of *en route* emergency aerodromes and the ability of flight crew members alone to prepare passengers and administer safety provisions in such event;
 - (c) the flight envelope in which the aircraft is being operated having due regard for the ability of flight crew members alone to prepare passengers and administer safety provisions in the event of a rapid or emergency descent; and
 - (d) the number and type of emergency exits and emergency equipment carried on board and the ability of flight crew members to quickly and easily access and operate them.
- (2) Each cabin crew member required by this sub-regulation shall be licensed as prescribed in CAR Part 64.

2. Cabin crew member complement

- (1) The cabin crew complement shall be based on the originally certified maximum passenger seating capacity for the aircraft and, subject to paragraph (2), shall consist of –
 - (a) one cabin crew member for an aircraft certified for 20 to 50 passenger seats, inclusive; and
 - (b) one additional cabin crew member for each additional 50 passenger seats or part thereof.

- (2) The Director may, upon application, consider reducing the cabin crew complement for aircraft certified for greater than 50 passenger seats: Provided the operator is able to submit a means of achieving an equivalent level of safety.

3. Cabin crew member training and checking

The cabin crew member training and checking shall be as prescribed in Divisions Three and Five of Subpart 3 of Part 121.

91.03.3 AIRCRAFT CHECKLISTS

1. Human factors principles – general

Note – Guidance material on the application of human factors principles can be found in the Transport Canada documents TP12863 Human Factors for Aviation – Basic Handbook or TP12864 Human Factors for Aviation – Advanced Handbook or the ICAO Human Factors Training Manual (Doc 9683).

- (1) An owner or operator's obligation with respect to this Technical Standard shall be restricted to those checklists or portions thereof which the operator is unilaterally permitted to legally alter or for which he or she is able to obtain permission to alter from the manufacturer.
- (2) The owner or operator shall notify the Director of any checklist modified from its original form, as prepared by the manufacturer or other source approved by the State of manufacture and, if deemed necessary in the interests of safety, the Director may require the owner or operator to make additional amendments to the checklist.

2. Checklist design to incorporate human factors principles

- (1) The checklist shall be designed with simplicity, consistency with the desired human/system interface functions and compatibility with the expected operational concepts in mind and shall reflect at least the following additional considerations –
 - (a) the number of flight crew members to action the checklist;
 - (b) the physical size of the checklist;
 - (c) the ease of use and readability;
 - (d) the logical flow of checklist items;
 - (e) the workload imposed by the checklist; and
 - (f) the effect of completing each item on achieving the goal of the item.
- (2) Each revised checklist shall be tested for functionality in a controlled environment to ensure it satisfies the need for which it was created. Except as provided in paragraph (4), a satisfactory test of functionality shall involve one or more flights using the revised checklist, depending on the nature and extent of the changes to the checklist. The operator shall have sole discretion as to the extent of the functionality test with the criteria being he or she is satisfied that the change resolves the problem for which the need for change was identified.
- (3) A flight undertaken as part of the functionality test may be completed in a flight simulation training device (FSTD) approved by the Director for the purpose.
- (4) An operator who believes a checklist change is of such a minor nature that a flight test is not required, may seek approval from the Director to forego the functionality test: Provided he or she

can substantiate the request and demonstrate an alternative means of ensuring the change satisfies the need for it.

- (5) The results of any functionality testing shall be recorded and retained by the operator for a period of at least 12 months past the last date of such testing.

3. Checklist submission

- (1) Following completion of the functionality testing noted in section 2(2) above, the operator shall submit notification of the checklist change to the Director.
- (2) The Director, upon receipt of the notification referred to in paragraph (1), shall advise the operator of such receipt.

91.03.4 AIR TRAFFIC SERVICE FLIGHT PLAN AND ASSOCIATED PROCEDURES

1. Form of an air traffic service flight plan

- (1) An air traffic service flight plan filed prior to departure must contain the following items –
 - (a) aircraft identification and transponder data;
 - (b) flight rules and type of flight;
 - (c) number and type(s) of aircraft and wake turbulence category;
 - (d) radio communication, navigation and approach-aid equipment;
 - (e) aerodrome of departure and time;
 - (f) flight information region boundaries and estimated times;
 - (g) cruising speed and flight level;
 - (h) route to be followed;
 - (i) aerodrome of destination and estimated times of arrival;
 - (j) alternate aerodrome(s);
 - (k) alerting action required;
 - (l) fuel endurance;
 - (m) total number of persons on board;
 - (n) emergency and survival equipment and colour of aircraft;
 - (o) other pertinent information; and
 - (p) name, postal address, telephone and telefax number of the owner or operator of the aircraft which must be completed in field 18 of the standard flight plan form.
- (2) An air traffic service flight plan filed in flight to comply with CAR 91.03.4(6) must contain the following items –
 - (a) aircraft registration;
 - (b) flight rules;
 - (c) type of aircraft;
 - (d) aerodrome of departure;
 - (e) cruising speed and flight level;
 - (f) route to be followed and estimates as applicable;

- (g) aerodrome of destination and estimated time of arrival;
- (h) alternate aerodrome for IFR flights;
- (i) alerting action required;
- (j) fuel endurance if alerting action required;
- (k) total number of persons on board; and
- (l) name, postal address, telephone and telefax number of the owner or operator of the aircraft.

2. Arrival report

Arrival reports made by aircraft shall contain the following elements of information –

- (a) aircraft identification;
- (b) departure aerodrome;
- (c) destination aerodrome (only in the case of a diversionary landing);
- (d) arrival aerodrome; and
- (e) time of arrival.

91.03.5 FLIGHT FOLIO

1. Information to be contained in a flight folio

- (1) An owner or operator must retain the following information for each flight in the form of a flight folio –
 - (a) aircraft registration;
 - (b) date;
 - (c) name(s) of flight crew member(s);
 - (d) duty assignment of flight crew member(s);
 - (e) place of departure;
 - (f) place of arrival;
 - (g) time of departure (off-block time);
 - (h) time of arrival (on-block time);
 - (i) hours of flight;
 - (j) nature of flight;
 - (k) incidents, observations (if any);
 - (l) signature of pilot-in-command;
 - (m) the current maintenance statement giving the aeroplane maintenance status of what maintenance, scheduled or out of phase, is next due;
 - (n) all outstanding deferred defects which affect the operation of the aeroplane;
 - (o) fuel and oil used; and
 - (p) fuel and oil uplift.

- (2) The owner or operator need not keep a flight folio or parts thereof, if the relevant information is available in other documentation.
- (3) The owner or operator must ensure that all entries are made concurrently and that they are made in ink or other permanent marking.

91.04.10 FLIGHT RECORDERS

1. Flight data recorders

- (1) The data obtained from a flight data recorder shall be obtained from aircraft sources which enable accurate correlation with information displayed to the flight crew and shall be correlated to the recorded cockpit audio.
- (2) The flight data recorder shall start automatically to record the data prior to the aircraft being capable of moving under its own power and shall stop automatically after the aircraft is incapable of moving under its own power.
- (3) Parameters
 - (a) The parameters for aeroplanes are –
 - (i) A Type IA FDR shall be capable of recording, as appropriate to the aeroplane, at least the 78 parameters in the table in subparagraph (i);
 - (ii) A Type I FDR shall be capable of recording, as appropriate to the aeroplane, at least the first 32 parameters in the table in subparagraph (i); and
 - (iii) Type II and IIA FDRs shall be capable of recording, as appropriate to the aeroplane, at least the first 15 parameters in the table in subparagraph (i). In addition, a Type IIA FDR shall retain sufficient information from the preceding take-off for calibration purposes.
 - (b) The parameters for helicopters are –
 - (i) A Type IVA FDR shall be capable of recording, as appropriate to the helicopter, at least the 48 parameters in the table in subparagraph (j);
 - (ii) A Type IV FDR shall be capable of recording, as appropriate to the helicopter, at least the first 30 parameters in the table in subparagraph (j); and
 - (iii) A Type V FDR shall be capable of recording, as appropriate to the helicopter, at least the first 15 parameters in the table in subparagraph (j).
 - (c) The parameters that satisfy the requirements for FDRs are listed in the subparagraphs below. The number of parameters to be recorded shall depend on aircraft complexity. The parameters without an asterisk (*) are mandatory parameters which shall be recorded regardless of aircraft complexity. In addition, the parameters designated by an asterisk (*) shall be recorded if an information data source for the parameter is used by aircraft systems or the flight crew to operate the aircraft. However, other parameters may be substituted with due regard to the aircraft type and the characteristics of the recording equipment.

- (d) The following parameters satisfy the requirements for flight path and speed –
- (i) pressure altitude;
 - (ii) indicated airspeed or calibrated airspeed;
 - (iii) air-ground status and each landing gear air-ground sensor, when practicable;
 - (iv) total or outside air temperature;
 - (v) heading (primary flight crew reference);
 - (vi) normal acceleration;
 - (vii) lateral acceleration;
 - (viii) longitudinal acceleration (body axis);
 - (ix) time or relative time count;
 - (x) navigation data* (drift angle, wind speed, wind direction, latitude/longitude, groundspeed*); and
 - (xi) radio altitude*.

Note – For helicopters, air-ground status and each landing gear air-ground sensor data is not required.

- (e) The following parameters satisfy the requirements for attitude –
- (i) pitch attitude;
 - (ii) roll attitude;
 - (iii) yaw or sideslip angle*; and
 - (iv) angle of attack*.

Note – For helicopters, angle of attack is not required.

- (f) The following parameters satisfy the requirements for engine power –
- (i) for aeroplanes –
 - (aa) engine thrust/power (propulsive thrust/power on each engine, cockpit thrust/power lever position);
 - (bb) thrust reverse status*;
 - (cc) engine thrust command*;
 - (dd) engine thrust target*;
 - (ee) engine bleed valve position*; and
 - (ff) additional engine parameters* (EPR, N1, indicated vibration level, N2, EGT, TLA, fuel flow, fuel cut-off lever position, N3); and
 - (ii) for helicopters –
 - (aa) power on each engine: free power turbine speed (Nf), engine torque, engine gas generator speed (Ng), cockpit power control position;
 - (bb) rotor: main rotor speed, rotor brake;
 - (cc) main gearbox oil pressure*;
 - (dd) gearbox oil temperature*: main gearbox oil temperature, intermediate gearbox oil temperature, tail rotor gearbox oil temperature;

- (ee) engine exhaust gas temperature (T4)*; and
 - (ff) turbine inlet temperature (TIT)*.
- (g) The following parameters satisfy the requirements for configuration –
- (i) for aeroplanes –
 - (aa) pitch trim surface position;
 - (bb) flaps* (trailing edge flap position, cockpit control selection);
 - (cc) slats* (leading edge flap (slat) position, cockpit control selection);
 - (dd) landing gear* (landing gear, gear selector position);
 - (ee) yaw trim surface position*;
 - (ff) roll trim surface position*;
 - (gg) cockpit trim control input position pitch*;
 - (hh) cockpit trim control input position roll*;
 - (ii) cockpit trim control input position yaw*;
 - (jj) ground spoiler and speed brake* (ground spoiler position, ground spoiler selection, speed brake position, speed brake selection);
 - (kk) de-icing and/or anti-icing systems selection*;
 - (ll) hydraulic pressure (each system)*;
 - (mm) fuel quantity* in C of G trim tank;
 - (nn) AC electrical bus status*;
 - (oo) DC electrical bus status*;
 - (pp) APU bleed valve position*; and
 - (qq) computed centre of gravity*; and
 - (ii) for helicopters –
 - (aa) landing gear or gear selector position*;
 - (bb) fuel contents*; and
 - (cc) ice detector liquid water content*.
- (h) The following parameters satisfy the requirements for operation –
- (i) for aeroplanes –
 - (aa) warnings;
 - (bb) primary flight control surface and primary flight control pilot input (pitch axis, roll axis, yaw axis);
 - (cc) marker beacon passage;
 - (dd) each navigation receiver frequency selection;
 - (ee) manual radio transmission keying and CVR/FDR synchronization reference;
 - (ff) autopilot/autothrottle/AFCS mode and engagement status*;
 - (gg) selected barometric setting* (pilot, first officer);
 - (hh) selected altitude (all pilot selectable modes of operation)*;
 - (ii) selected speed (all pilot selectable modes of operation)*;

- (jj) low pressure warning* (hydraulic pressure, pneumatic pressure);
- (kk) selected Mach (all pilot selectable modes of operation)*;
- (ll) selected vertical speed (all pilot selectable modes of operation)*;
- (mm) selected heading (all pilot selectable modes of operation)*;
- (nn) selected flight path (all pilot selectable modes of operation)* (course/DSTRK, path angle);
- (oo) selected decision height*;
- (pp) EFIS display format* (pilot, first officer);
- (qq) multi-function/engine/alerts display format*;
- (rr) GPWS/TAWS/GCAS status* (selection of terrain display mode including pop-up display status, terrain alerts, both cautions and warnings and advisories, on/off switch position);
- (ss) computer failure*;
- (tt) loss of cabin pressure*;
- (uu) TCAS/ACAS (traffic alert and collision avoidance system/airborne collision avoidance system)*;
- (vv) ice detection*;
- (ww) engine warning each engine vibration*;
- (xx) engine warning each engine over temperature*;
- (yy) engine warning each engine oil pressure low*;
- (zz) engine warning each engine over speed*;
- (A) wind shear warning*;
- (B) operational stall protection, stick shaker and pusher activation*;
- (C) all cockpit flight control input forces* (control wheel, control column, rudder pedal cockpit input forces);
- (D) vertical deviation* (ILS glide path, MLS elevation, GNSS approach path);
- (E) horizontal deviation* (ILS localizer, MLS azimuth, GNSS approach path);
- (F) DME 1 and 2 distances*;
- (G) primary navigation system reference* (GNSS, INS, VOR/DME, MLS, Loran C, ILS);
- (H) brakes* (left and right brake pressure, left and right brake pedal position);
- (I) date*;
- (J) event marker*;
- (K) heads-up display in use*; and
- (L) para visual display on*; and

- (ii) for helicopters –
 - (aa) hydraulics low pressure;
 - (bb) warnings;
 - (cc) primary flight controls — pilot input and/or control output position: collective pitch, longitudinal cyclic pitch, lateral cyclic pitch, tail rotor pedal, controllable stabilator, hydraulic selection;
 - (dd) marker beacon passage;
 - (ee) each navigation receiver frequency selection;
 - (ff) AFCS mode and engagement status*;
 - (gg) stability augmentation system engagement*;
 - (hh) indicated sling load force*;
 - (ii) vertical deviation*: ILS glide path, MLS elevation, GNSS approach path;
 - (jj) horizontal deviation*: ILS localizer, MLS azimuth, GNSS approach path;
 - (kk) DME 1 and 2 distances*;
 - (ll) altitude rate*;
 - (mm) helicopter health and usage monitor system (HUMS)*: engine data, chip detectors, channel; and
 - (nn) timing, exceedance discretises, broadband average engine vibration.
- (i) The measurement range, recording interval and accuracy of parameters on installed FDR equipment on aeroplanes shall meet the specifications in the following table –

PARAMETERS FOR AEROPLANE FLIGHT DATA RECORDERS					
Serial number	Parameter	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR read-out)	Recording resolution (Note 1)
1	Time (UTC when available, otherwise relative time count or GPS time sync)	24 hours	4	± 0.125% per hour	1 second
2	Pressure altitude	–1 000 ft (–300 m) to maximum certificated altitude of	1	± 100 ft to ± 700 ft (±30 m to ± 200 m)	5 ft (1.5 m)

		aircraft +5 000 ft (+1 500 m)			
3	Indicated airspeed or calibrated airspeed	50 kt to max V _{so} (Note 2) V _{so} to 1.2 V _D (Note 3)	1	± 5% ± 3%	1 kt (0.5 kt recommended)
4	Heading (primary flight crew reference)	360°	1	± 2°	0.5°
5	Normal acceleration	- 3 g to + 6 g	0.125	± 1% of maximum range excluding datum error of ± 5%	0.004 g
6	Pitch attitude	± 75° or usable range whichever is greater	1 (0.25 Note 1)	± 2°	0.5°
7	Roll attitude	± 180°	1 (0.25 Note 1)	± 2°	0.5°
8	Radio transmission keying	On-off (one discrete)	1		
9	Power on each engine (Note 4)	Full range	1 (per engine)	± 2°	0.2% of full range or the resolution required to operate the aircraft
10*	Trailing edge flap and cockpit control section	Full range on each discrete position	2	± 5% or as pilot's indicator	0.5% of full range or the resolution required to operate the aircraft
11*	Leading edge flap and cockpit control section	Full range on each discrete position	2	± 5% or as pilot's indicator	0.5% of full range or the resolution required to operate the

					aircraft
12*	Thrust reverser position	Stowed, in transit, and reverse	1 (per engine)		
13*	Ground spoiler/speed brake selection (selection and position)	Full range or each discrete position	1	± 2% unless higher accuracy uniquely required	0.2% of full range
14	Outside air temperature	Sensor range	2	± 2°C	0.3°C
15*	Autopilot/auto throttle/AFCS mode and engagement status	A suitable combination of discretely	1		

Note: The preceding 15 parameters satisfy the requirements for a Type II FDR

16	Longitudinal acceleration	± 1 g	0.25	± 0.015 g excluding a datum error of ± 0.05 g	0.004 g
17	Lateral acceleration	± 1 g	0.25	± 0.015 g excluding a datum error of ± 0.05 g	0.004 g
18	Pilot input and/or control surface position – primary controls (pitch, roll, yaw) (Notes 5 and 6)	Full range	1 (0.25 Note 1)	± 2° unless higher accuracy uniquely required.	0.2% of full range or as installed
19	Pitch trim position	Full range	1	± 3% unless higher accuracy uniquely required	0.3% of full range or as installed
20*	Radio altitude	– 20 ft to 2 500 ft (–6 m to 750 m)	1	± 2 ft (±0.6 m) or ± 3% whichever is greater	1 ft (0.3 m) below 500 ft (150 m); 1 ft (0.3

				below 500 ft (150 m) and \pm 5% above 500 ft (150 m)	m)/0.5% of full range above 500 ft (150 m)
21*	Vertical beam deviation (ILS/GPS/GLS glide path, MLS elevation, IRNAV/IAN vertical deviation)	Signal range	1	\pm 3%	0.3% of full range
22*	Horizontal beam deviation (ILS/GPS/GLS localizer, MLS azimuth, IRNAV/IAN lateral deviation)	Signal range	1	\pm 3%	0.3% of full range
23	Marker beacon passage	Discrete	1		
24	Master warning	Discrete	1		
25	Each NAV receiver frequency selection (Note 7)	Full range	4	As installed	
26*	DME 1 and 2 distance (includes distance to runway threshold (GLS) and distance to missed approach point (IRNAV/IAN)) (Notes 7 and 8)	0 – 200 NM (0 – 370 km)	4	As installed	1 NM (1852 m)
27	Air/ground status	Discrete	1		
28*	GPWS/TAWS/GCAS status (selection of terrain display mode including pop-up display status and terrain alerts, both cautions and warnings, and advisories and on/off switch position)	Discrete	1		

29*	Angle of attack	Full range	0.5	As installed	0.3% of full range
30*	Hydraulics, each system (low pressure)	Discrete	2		0.5% of full range
31*	Navigation data (latitude/longitude, ground speed and drift angle) (Note 9)	As installed	1	As installed	
32*	Landing gear or gear selector position	Discrete	4	As installed	

Note: The preceding 32 parameters satisfy the requirements for a Type I FDR

33*	Groundspeed	As installed	1	Data should be obtained from the most accurate system	1 kt
34	Brakes (left and right brake pressure, left and right brake pedal position)	(Maximum metered brake range, discrettes or full range)	1	± 5%	2% of full range
35*	Additional engine parameters (EPR, N1, indicated vibration level, N2, EGT, fuel flow, fuel cut-off lever position, N3)	As installed	Each engine each second	As installed	2% of full range
36*	TCAS/ACAS (traffic alert and collision avoidance system)	Discrettes	1	As installed	
37*	Windshear warning	Discrete	1	As installed	
38*	Selected barometric setting (pilot, co-pilot)	As installed	64	As installed	0.1 mb (0.01 in-Hg)
39*	Selected altitude (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
40*	Selected speed (all pilot selectable modes)	As installed	1	As installed	Sufficient to determine

	of operation)				crew selection
41*	Selected Mach (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
42*	Selected vertical speed (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
43*	Selected heading (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
44*	Selected flight path (all pilot selectable modes of operation) (course/DSTRK, path angle, final approach path (IRNAV/IAN))		1	As installed	
45*	Selected decision height	As installed	64	As installed	Sufficient to determine crew selection
46*	EFIS display format (pilot, co-pilot)	Discrete(s)	4	As installed	
47*	Multi-function/engine/alerts display format	Discrete(s)	4	As installed	
48*	AC electrical bus status	Discrete(s)	4	As installed	
49*	DC electrical bus status	Discrete(s)	4	As installed	
50*	Engine bleed valve position	Discrete(s)	4	As installed	
51*	APU bleed valve position	Discrete(s)	4	As installed	
52*	Computer failure	Discrete(s)	4	As installed	
53*	Engine thrust command	As installed	2	As installed	
54*	Engine thrust target	As installed	4	As installed	2% of full range
55*	Computed centre of gravity	As installed	64	As installed	1% of full range
56*	Fuel quantity in CG trim tank	As installed	64	As installed	1% of full range

57*	Head up display in use	As installed	4	As installed	
58*	Para visual display on/off	As installed	1	As installed	
59*	Operational stall protection, stick shaker and pusher activation	As installed	1	As installed	
60*	Primary navigation system reference (GNSS, INS, VOR/DME, MLS, Loran C, localizer glideslope)	As installed	4	As installed	
61*	Ice detection	As installed	4	As installed	
62*	Engine warning each engine vibration	As installed	1	As installed	
63*	Engine warning each engine over temperature	As installed	1	As installed	
64*	Engine warning each engine oil pressure low	As installed	1	As installed	
65*	Engine warning each engine over speed	As installed	1	As installed	
66*	Yaw trim surface position	Full range	2	±3% unless higher accuracy uniquely required	0.3% of full range
67*	Roll trim surface position	Full range	2	±3% unless higher accuracy uniquely required	0.3% of full range
68*	Yaw or sideslip angle	Full range	1	± 5%	0.5°
69*	De-icing and/or anti-icing systems	Discrete(s)	4	± 5%	

	selection				
70*	Hydraulic pressure (each system)	Full range	2	± 5%	100 psi
71*	Loss of cabin pressure	Discrete	1	± 5%	
72*	Cockpit trim control input position - Pitch	Full range	1	± 5%	0.2% of full range or as installed
73*	Cockpit trim control input position - Roll	Full range	1	± 5%	0.2% of full range or as installed
74*	Cockpit trim control input position - Yaw	Full range	1	± 5%	0.2% of full range or as installed
75*	All cockpit flight control input forces (control wheel, control column, rudder pedal)	Full range (±311 N (±70 lbf), ± 378 N (±85 lbf), ± 734 N (±165 lbf))	1	± 5%	0.2% of full range or as installed
76*	Event marker	Discrete	1		
77*	Date	365 days	64		
78*	ANP or EPE or EPU	As installed	4	As installed	

Note: The preceding 78 parameters satisfy the requirements for a Type IA FDR

Notes –

1. *Applicable to aeroplanes for which a type certificate is first issued on or after 1 January 2016.*
2. *V_{SO} means stalling speed or minimum steady flight speed in the landing configuration.*
3. *V_D means design diving speed.*
4. *Record sufficient inputs to determine power.*
5. *For aeroplanes with control systems in which movement of a control surface will back drive the pilot's control, "or" applies. For aeroplanes with non-mechanical control systems in which movement of a control surface will not back drive the pilot's control, "and" applies. In aeroplanes with split surfaces, a suitable combination of inputs is acceptable in lieu of recording each surface separately. In aeroplanes with independent pilot input on primary controls, each pilot input on primary controls needs to be recorded separately.*

6. All aeroplanes which are required to record pilot input and/or control surface position primary controls (pitch, roll, yaw) for which a type certificate is first issued on or after 1 January 2016 and which are required to be fitted with an FDR shall record those parameters at a maximum sampling and recording interval of 0.125 seconds.
 7. If signal available in digital form.
 8. Recording of latitude and longitude from INS or other navigation system is a preferred alternative.
 9. If signals readily available.
- (j) The measurement range, recording interval and accuracy of parameters on installed FDR equipment on helicopters shall meet the specifications in the following table –

PARAMETERS FOR HELICOPTER FLIGHT DATA RECORDERS					
Serial #	Parameter	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR readout)	Recording resolution
1	Time (UTC) when available, otherwise relative time	24 hours	4	±0.125% per hour	1 s
2	Pressure altitude	-1 000 ft (- 300 m) to maximum certificated altitude of aircraft + 5 000 ft (+1 500 m)	1	± 100 ft to ± 700 ft (±30 m to ± 200 m)	5 ft (1.5 m)
3	Indicated airspeed	As the installed pilot display measuring	1	±3%	1 kt
4	Heading	360°	1	±2°	0.5°
5	Normal acceleration	-3 g to +6 g	0.125	±0.09 g excluding a datum error of ±0.045 g	0.004 g
6	Pitch attitude	±75° or 100% of useable range whichever is greater	0.5	±2°	0.5°
7	Roll attitude	± 180°	0.5	±2°	0.5°

8	Radio transmission keying	On-off (one discrete)	1	—	—
9	Power on each engine	Full range	1 (per engine)	±2%	0.1% of full range
10	Main rotor: Main rotor speed Rotor brake	50–130% Discrete	0.51	±2%	0.3% of full range
11	Pilot input and/or control surface position — primary controls (collective pitch, longitudinal cyclic pitch, lateral cyclic	Full range	0.5 (0.25 recommended)	±2% unless higher accuracy uniquely required	0.5% of operating range
12	Hydraulics, each system (low pressure and selection)	Discrete	1	—	—
13	Outside air temperature	Sensor range	2	±2°C	0.3°C
14*	Autopilot/ autothrottle/ AFCS mode and engagement status	A suitable combination of discretes	1	—	—
15*	Stability augmentation system engagement	Discrete	1	—	—
Note: The preceding 15 parameters satisfy the requirements for a Type V FDR.					
16*	Main gearbox oil pressure	As installed	1	As installed	6.895 kN/m ² (1 psi)

17*	Main gearbox oil temperature	As installed	2	As installed	1°C
18	Yaw rate	±400°/second	0.25	±1.5% maximum range excluding datum error of ±5%	±2°/s
19*	Sling load force	0 to 200% of certified load	0.5	±3% of maximum range	0.5% for maximum certified load
20	Longitudinal acceleration	±1 g	0.25	±0.015 g excluding datum error of ±0.05 g	0.004 g
21	Lateral acceleration	±1 g	0.25	±0.015 g excluding datum error of ±0.05 g	0.004 g
22*	Radio altitude	– 20 ft to 2 500 ft (–6 m to 750 m)		±2 ft (±0.6 m) or ±3% whichever is greater below 500 ft (150 m) and ±5% above 500 ft (150 m)	1 ft (0.3 m) below 500 ft (150 m), 1 ft (0.3 m) + 0.5% of full range above 500 ft (150 m)
23*	Vertical beam deviation	Signal range	1	±3%	0.3% of full range
24*	Horizontal beam deviation	Signal range	1	±3%	0.3% of full range
25	Marker beacon passage	Discrete	1	—	—

26	Warnings	Discrete(s)	1	—	—
27	Each navigation receiver frequency	Sufficient to determine selected frequency	4	As installed	—
28*	DME 1 and 2 distances	0–200 NM (0-370 km)	4	As installed	1 NM (1 852 m)
29*	Navigation data (latitude/longitude, ground speed, drift angle, wind speed, wind direction)	As installed	2	As installed	As installed
30*	Landing gear or gear selector	Discrete	4	—	—
Note: The preceding 30 parameters satisfy the requirements for a Type IV FDR.					
31*	Engine exhaust gas temperature (T4)	As installed	1	As installed	
32*	Turbine inlet temperature (TIT/ITT)	As installed	1	As installed	

33*	Fuel contents	As installed	4	As installed	
34*	Altitude rate	As installed	1	As installed	
35*	Ice detection	As installed	4	As installed	
36*	Helicopter health and usage monitor	As installed	—	As installed	—
37	Engine control modes	Discrete	1	—	—
38*	Selected barometric setting (pilot and co-pilot)	As installed	64 (4 recommended)	As installed	0.1 mb (0.01 in Hg)
39*	Selected altitude (all pilot selectable)	As installed	1	As installed	Sufficient to determine crew selection
40*	Selected speed (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
41*	Selected Mach (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
42*	Selected vertical speed (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
43*	Selected heading (all pilot selectable)	As installed	1	As installed	Sufficient to determine crew selection

44*	Selected flight path (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
45*	Selected decision height	As installed	4	As installed	Sufficient to determine crew selection
46*	EFIS display format (pilot and co-pilot)	Discrete(s)	4	—	—
47*	Multi-function/engine/alerts display format	Discrete(s)	4	—	—
48*	Event marker	Discrete	1	—	—
Note: The preceding 48 parameters satisfy the requirements for a Type IVA FDR.					

Note – If further recording capacity is available, recording of the following additional information should be considered –

(a) additional operational information from electronic displays, such as electronic flight information systems (EFIS), electronic centralized aircraft monitor (ECAM) and engine indication and crew alerting system (EICAS); and

(b) additional engine parameters (EPR, N1, fuel flow, etc.).

2. Cockpit voice recorders

- (1) A CVR shall start automatically to record the aircraft moving under its own power and continue to record, until the termination of the flight when the aircraft is no longer capable of moving under its own power; and

- (2) A CVR, if possible, shall start to record the cockpit checks prior to engine start at the beginning of the flight, until the cockpit checks immediately following engine shutdown at the end of the flight.
- (3) A CVR shall record on four separate channels or more, with reference to a time scale –
 - (a) for aeroplanes –
 - (i) voice communications transmitted from or received on the flight deck or in the cockpit by radio;
 - (ii) the aural environment of the flight deck or cockpit, including without interruption, the audio signals received from each microphone in use;
 - (iii) voice communications of flight crew members on the flight deck or in the cockpit using the interphone system of the aircraft, if installed;
 - (iv) voice or audio signals identifying navigation or approach aids introduced into a headset or speaker;
 - (v) digital communications with air traffic service units (ATSU), unless recorded by the flight data recorder (FDR); and
 - (b) for helicopters –
 - (i) voice communications transmitted from or received on the flight deck or in the cockpit by radio;
 - (ii) the aural environment of the flight deck or cockpit, including without interruption, the audio signals received from each microphone in use;
 - (iii) voice communications of flight crew members on the flight deck or in the cockpit using the interphone system of the aircraft, if installed;
 - (iv) voice or audio signals identifying navigation or approach aids introduced into a headset or speaker;
 - (v) voice communications of flight crew members on the flight deck or crew members in the cockpit using the public address system of the aircraft, if installed; and
 - (vi) in the case of a helicopter which is not required to be equipped with a flight data recorder, the parameters necessary to determine main rotor speed.

- (4) To aid in voice and sound discrimination, microphones in the cockpit are to be located in the best position for recording voice communications originating at the pilot and co-pilot stations and voice communications of other crew members on the flight deck when directed to those stations. This can best be achieved by wiring suitable boom microphones to record continuously on separate channels.
- (5) Performance requirements
- (a) The CVR shall be capable of recording on at least four channels simultaneously. To ensure accurate time correlation between channels, the CVR shall record in an inline format. If a bi-directional configuration is used, the in-line format and channel allocation shall be retained in both directions.
- (b) The preferred channel allocation is as follows –
- (i) Channel 1 — co-pilot headphones and live boom microphone;
 - (ii) Channel 2 — pilot headphones and live boom microphone;
 - (iii) Channel 3 — area microphone; and
 - (iv) Channel 4 — time reference plus the third and fourth crew members' headphone and live microphone, if applicable.

Notes.—

1. *Channel 1 is located closest to the base of the recording head.*
2. *The preferred channel allocation presumes use of current conventional magnetic tape transport mechanisms, and is specified because the outer edges of the tape have a higher risk of damage than the middle. It is not intended to preclude use of alternative recording media where such constraints may not apply.*

- (c) The CVR, when tested by methods approved by the appropriate certificating authority, will be demonstrated to be suitable for the environmental extremes over which it is designed to operate.
- (d) Means shall be provided for an accurate time correlation between the FDR and CVR.
- (6) An owner or operator of an aircraft equipped with a CVR or CARS for which an independent power source is required, shall ensure –
- (a) that such power source is exclusive to the CVR or CARS, as applicable, and the cockpit area microphone components; and
 - (b) that such power source will automatically engage and provide ten minutes of operation whenever aircraft power to the recorder ceases, either by normal shutdown or by any other loss of power to the recorder.

Note.— When the CVR function is combined with other recording functions within the same unit, powering the other functions is allowed.

- (7) A CARS installed in aeroplanes shall record on two or more separate channels at least the following –
- (a) voice communication transmitted from or received in the aeroplane by radio;

- (b) aural environment on the flight deck; and
- (c) voice communication of flight crew members on the flight deck using the aeroplane's interphone system, if installed.

3. Flight recorders

- (1) Flight recorders comprise four systems –
 - (a) a flight data recorder (FDR);
 - (b) a cockpit voice recorder (CVR);
 - (c) an airborne image recorder (AIR); and
 - (d) a data link recorder (DLR).

Note – Image and data link information may be recorded on either the CVR or the FDR.

- (2) Lightweight flight recorders comprise four systems –
 - (a) an aircraft data recording system (ADRS);
 - (b) a cockpit audio recording system (CARS);
 - (c) an airborne image recording system (AIRS); and
 - (d) a data link recording system (DLRS).
- (3) FDR, CVR, AIRS and DLRS performance requirements and industry crashworthiness and fire protection specifications shall meet those specified in the EUROCAE ED-112, Minimum Operational Performance Specification (MOPS) for Crash Protected Airborne Recorder Systems, or equivalent documents.
- (4) ADRS and CARS performance requirements and industry crashworthiness and fire protection specifications shall meet those specified in the EUROCAE ED-155, MOPS for Lightweight Flight Recorder Systems, or equivalent documents.

Note – Equivalent documents for flight recorders include –

- (a) *US FAA AC 20-141A Digital Flight Data Recorders;*
- (b) *ARINC 542A;*
- (b) *ARINC 573-717;*
- (c) *ARINC 717; and*
- (d) *ARINC 647A.*

- (5) Installation of flight recorder systems

Flight recorders shall meet the prescribed crashworthiness and fire protection specifications and are to be installed so that –

- (a) the probability of damage to the recordings is minimized in order that the recorded information may be preserved, recovered and transcribed. To meet this requirement it should be located as far aft as practicable. In the case of pressurized aircraft it should be located in the vicinity of the rear pressure bulkhead;
- (b) each unit receives its electrical power from a bus that provides the maximum reliability for operation of the recorder without jeopardizing service to essential or emergency loads;

- (c) there is an aural or visual means for pre-flight checking that the recorder is operating properly;
 - (d) if the recorder system has a bulk erasure device, the installation shall be designed to prevent operation of the device during flight time or crash impact; and
 - (e) a means shall be provided for an accurate time correlation between the recorder systems functions.
- (6) Each flight recorder container installed in the aircraft shall –
- (a) be bright orange or bright yellow;
 - (b) have reflective tape affixed to the external surface to facilitate its location under water; and
 - (c) have an approved underwater location device on or adjacent to each container which is secured in such a manner that they are not likely to be separated during crash impact.
- (7) Where a flight recorder is installed, it shall not –
- (a) be a source of danger in itself;
 - (b) prejudice the proper functioning of any essential service; and
 - (c) in anyway reduce the serviceability or airworthiness of the aircraft in which it is installed, even if the flight recorder fails to function.
- (8) Inspections of flight recorder systems
- (a) Prior to the first flight of the day, a check of the built-in test features on the flight deck for each installed flight recorder shall be conducted.
 - (b) Annual inspections shall be carried out as follows –
 - (i) the read-out of the recorded data from the flight recorder shall confirm that the recorder operates correctly for the nominal duration of the recording;
 - (ii) the analysis of the flight recorder shall evaluate the quality of the recorded data to determine whether the bit error rate is within acceptable limits and to determine the nature and distribution of the errors;
 - (iii) a complete flight from the flight recorder shall be examined in engineering units to evaluate the validity of all recorded parameters. Particular attention should be given to parameters from sensors dedicated to the recorder. Parameters taken from the aircraft's electrical bus system need not be checked if their serviceability can be detected by other aircraft systems;
 - (iv) the read-out facility should have the necessary software to accurately convert the recorded values to engineering units and to determine the status of discrete signals;
 - (v) an annual examination of the recorded signal for the CVR or CARS, or the recorded images on an AIR, should be carried out by re-play of the CVR,

CARS or AIR recording. While installed in the aircraft, the CVR, CARS or AIR should record test signals from each aircraft source and from relevant external sources to ensure that all required signals meet intelligibility standards; and

- (vi) where practicable, during the annual examination a sample of in-flight recordings of the CVR, CARS or AIR should be examined for evidence that the intelligibility of the signal is acceptable.
- (c) Flight recorder systems shall be considered unserviceable if there is a significant period of poor quality data, unintelligible signals or if one or more of the mandatory parameters is not recorded correctly.
- (d) When requested, a report of the annual inspection shall be made available to the Director for monitoring purposes.
- (e) Calibration of the FDR system –
 - (i) the FDR system should be recalibrated at least every five years to determine any discrepancies in the engineering conversion routines for the mandatory parameters and to ensure that parameters are being recorded within the calibration tolerances; and
 - (ii) when the parameters of altitude and airspeed are provided by sensors that are dedicated to the FDR system, a recalibration shall be performed as recommended by the sensor manufacturer but in no case longer than every two years.

4. Data link recorders

- (1) The following shall apply to aircraft equipped with a data link recorder (DLR).
- (2) DLRs are used to capture data link communications to and from an aircraft. Data link communications may be recorded on an FDR, CVR or a separate recorder.
- (3) Where the aircraft's flight path is authorized or controlled through the use of data link messages, all data link messages, both uplinks (to the aircraft) and downlinks (from the aircraft), shall be recorded on the aircraft. As far as practicable, the time the messages were displayed to the flight crew and the time of the responses shall be recorded.
- (4) Sufficient information to derive the content of the data link communications message and, whenever practical, the time the messages were displayed to or generated by the flight crew shall be recorded.
- (5) Messages applying to the applications listed below shall be recorded. Applications without the asterisk (*) are mandatory applications which shall be recorded regardless of the system complexity. Applications with an (*) are to be recorded only as far as is practicable given the architecture of the system –
 - (a) data link initiation capability;
 - (b) controller/pilot data link communications;

- (c) data link/flight information services;
- (d) automatic dependent surveillance – contract;
- (e) automatic dependent surveillance – broadcast*; and
- (f) aeronautical operational control*.

Notes —

1. *Data link communications are currently conducted by either ATN-based or FANS 1/A-equipped aircraft.*
2. *A Class B AIR could be a means for recording data link communications applications messages to and from the aeroplanes where it is not practical or is prohibitively expensive to record those data link communications applications messages on FDR or CVR.*

5. Airborne image recorder

- (1) The following shall apply to aircraft equipped with an airborne image recorder (AIR).
- (2) AIRs are recorders capable of capturing visual images and designed for use in aircraft to augment FDR and CVR information. They are classified as follows –
 - (a) a Class A AIR captures the general cockpit area in order to provide data supplemental to conventional flight recorders;

Note — To respect crew privacy, the cockpit area view may be designed as far as practical to exclude the head and shoulders of crew members whilst seated in their normal operating position.

- (b) a Class B AIR captures data link message displays; and
- (c) a Class C AIR captures instruments and control panels.

Note.— A Class C AIR may be considered as a means for recording flight data where it is not practical or is prohibitively expensive to record on an FDR or where an FDR is not required.

- (3) For aircraft equipped with an AIR, the AIR shall start to record prior to the aircraft moving under its own power and record continuously until the termination of the flight when the aircraft is no longer capable of moving under its own power. In addition, depending on the availability of electrical power, the AIR must start to record as early as possible during the cockpit checks prior to engine start at the beginning of the flight until the cockpit checks immediately following engine shutdown at the end of the flight.

6. Aircraft data recording systems

- (1) Owners and operators of aeroplanes using aircraft data recording systems (ADRS) shall ensure the ADRS is capable of recording, as appropriate to the aeroplane, at least the essential (E) parameters in the following table –

PARAMETERS FOR AIRCRAFT DATA RECORDER SYSTEMS

Serial number	Parameter Category	and	Minimum recording range	Maximum recording interval (seconds)	Minimum recording accuracy	Minimum recording resolution	Remarks

1	Heading (magnetic true) or R*	±180 degrees	1	±2 degrees	0.5 degree	* If not available, record rates
2	Pitch attitude E*	±90 degrees	0.25	±2 degrees	0.5 degree	* If not available, record rates
3	Roll attitude E*	±180 degrees	0.25	±2 degrees	0.5 degree	* If not available, record rates
4	Yaw rate E*	±300 degrees	0.25	±1% + drift of 360°/hr	2 degrees	*Essential if no heading available
5	Pitch rate E*	±300 degrees	0.25	±1% + drift of 360°/hr	2 degrees	*Essential if no pitch attitude available
6	Roll rate E*	±300 degrees	0.25	±1% + drift of 360°/hr	2 degrees	*Essential if no roll attitude available
7	Positioning system : latitude/longitude E	Latitude:±90 degrees Longitude:±180 degrees	2 (1 if available)	As installed (0.00015 degree recommended)	0.00005 degree	
8	Positioning system : estimated error E*	Available range	2 (1 if available)	As installed	As installed	*If available
9	Positioning system : altitude E	-300 m (-1 000 ft) to maximum certificated altitude of aircraft + 1 500 m (5 000 ft)	2 (1 if available)	As installed (±50 ft (±15 m) recommended)	5 ft (1.5 m)	
10	Positioning system : time* E	24 hrs	1	±.5 second	0.1 second	* UTC time preferred where available
11	Positioning system : ground speed E	0 – 1 000 kt	2 (1 if available)	As installed (±5 kt recommended)	1 kt	
12	Positioning system : channel	0 – 360 degrees	2 (1 if available)	As installed (±2 degrees)	0.5 degree	

	E			recommended)		
13	Normal acceleration E	-3 g to +6 g	0.25 (0.125 if available)	As installed (± 0.09 g excluding a datum error of ± 0.45 g recommended)	0.004g	
14	Longitudinal acceleration E	± 1 g	0.25 (0.125 if available)	As installed (± 0.015 g excluding a datum error of ± 0.05 g recommended)	0.004g	
15	Lateral acceleration E	± 1 g	0.25 (0.125 if available)	As installed (± 0.015 g excluding a datum error of ± 0.05 g recommended)	0.004g	
16	External static pressure (or pressure altitude) R	34.4 mb (3.44 in-Hg) to 310.2 mb (31.02 in-Hg) or available sensor range	1	As installed (± 1 mb (0.1 in-Hg) or ± 100 ft (± 30 m) to ± 700 ft (± 210 m) recommended)	0.1 mb (0.01 in-Hg) or 5 ft (1.5 m)	
17	Outside air temperature (or total air temperature) R	-50° to $+90^{\circ}\text{C}$ or available sensor range	2	As installed ($\pm 2^{\circ}\text{C}$ recommended)	1°C	
18	Indicated air speed R	As the installed pilot display measuring system or available sensor range	1	As installed ($\pm 3\%$ recommended)	1 kt (0.5 kt recommended)	
19	Engine RPM R	Full range including overspeed condition	Each engine each second	As installed	0.2% of full range	
20	Engine oil pressure R	Full range	Each engine	As installed (5% of full	2% of full range	

			each second	range recommended)		
21	Engine temperature oil R	Full range	Each engine each second	As installed (5% of full range recommended)	2% of full range	
22	Fuel flow or pressure R	Full range	Each engine each second	As installed	2% of full range	
23	Manifold pressure R	Full range	Each engine each second	As installed	0.2% of full range	
24	Engine thrust/power/torque parameters required to determine propulsive thrust/power* R	Full range	Each engine each second	As installed	0.2% of full range	* Sufficient parameters e.g. EPR/N1 or torque/Np as appropriate to the particular engine shall be recorded to determine power in both normal and reverse thrust. A margin for possible overspeed should be provided.
25	Engine generator gas speed (Ng) R	0 – 150%	Each engine each second	As installed	0.2% of full range	
26	Free power turbine speed (Nf) R	0 – 150%	Each engine each second	As installed	0.2% of full range	
27	Coolant	Full range	1	As installed	1°C	

	temperature R			(±5° C recommended)		
28	Main voltage R	Full range	Each engine each second	As installed	1 Volt	
29	Cylinder head temperature R	Full range	Each engine each second	As installed	2% of full range	
30	Flaps position R	Full range or each discrete position	2	As installed	0.5 degree	
31	Primary flight control surface position R	Full range	0.25	As installed	0.2% of full range	
32	Fuel quantity R	Full range	4	As installed	1% of full range	
33	Exhaust gas temperature R	Full range	Each engine each second	As installed	2% of full range	
34	Emergency voltage R	Full range	Each engine each second	As installed	1 Volt	
35	Trim surface position R	Full range or each discrete position	1	As installed	0.3% of full range	
36	Landing gear position R	Each discrete position*	1	Each gear every two seconds		* Where available, record up- and-locked and down- and-locked position
37	Novel/unique aircraft features R	As required	As required	As required	As required	

(2) Documentation concerning parameter allocation, conversion equations, periodic calibration and other serviceability/maintenance information shall be maintained by the operator. The

documentation needs to be sufficient to ensure that accident investigation authorities have the necessary information to read out the data in engineering units.

- (3) The documentation referred to in paragraph (2) shall be in electronic format where possible and take account of industry standards.

Note.— Industry specification for documentation concerning flight recorder parameters may be found in the ARINC 647A, Flight Recorder Electronic Documentation, or equivalent document.

91.04.13 FIRST AID AND UNIVERSAL PRECAUTION KITS

1. Standard first aid kits

- (1) The following medical supplies shall, as a minimum, be included in the current first aid kit for aircraft –
- (a) bandage (unspecified);
 - (b) burns dressings (unspecified);
 - (c) wound dressings, large and small;
 - (d) adhesive tape, safety pins and scissors;
 - (e) small adhesive dressings;
 - (f) antiseptic wound cleaner;
 - (g) adhesive wound closures;
 - (h) adhesive tape;
 - (i) disposable resuscitation aid;
 - (j) temperature reading device (non-mercury);
 - (k) simple analgesic e.g. paracetamol (see Note);
 - (l) nasal decongestant (see Note);
 - (m) gastrointestinal antacid (see Note);
 - (n) disposable glove;
 - (o) first aid handbook; and
 - (p) a list of contents.

Note – The owner or operator shall ensure that only Schedule 0 medication is included in the first aid kits. The Department of Health has issued exclusions to previously accepted Schedule 0 medications. Owners or operators must consult a qualified pharmacist if they intend to include Schedule 0 medications in their first aid kit.

- (2) Unless the standard first aid kit is clearly visible, its location must be indicated by a placard or sign. Appropriate symbols may be used to supplement the placard or sign.
- (3) An aircraft shall be equipped with the following number of standard first aid kits –

Number of passenger seats installed	Number of standard first aid kits required
0 to 100	1

101 to 200	2
201 to 300	3
301 to 400	4
401 to 500	5
500 and more	6

2. Additional medical supplies

- (1) An owner or operator of aeroplanes with a maximum certificated take-off mass exceeding 5 700 kg or equipped with one or more turbojet engines and for which the aeroplane was certificated for greater than 9 passenger seats shall carry, in addition to the first aid kit specified in section 1(2) of this TS, at least the additional first aid kits in the following table –

Number of passenger seats installed	Number of additional first aid kits required
10 to 100	1
101 to 200	2
201 to 300	3
301 to 400	4
401 to 500	5
500 and more	6

- (2) The contents of each first aid kit shall be as prescribed in section 1(1).

3. Location

An owner or operator shall ensure that the medical supplies specified in sections 1 and 2 are readily accessible for use and, when more than one of each type of kit is carried, they are distributed as evenly as practicable throughout the passenger cabin.

4. Universal precaution kits

- (1) An owner or operator operating aircraft as specified in CAR 91.04.13(5) shall ensure each aircraft carries on board at least two universal precaution kits.
- (2) The following items shall, as a minimum, be included in a universal precaution kit –
- (a) disposal gloves;
 - (b) dry powder that convert small liquid spill into sterile granulated gel;
 - (c) germicidal disinfectants for surface cleaning;
 - (d) skin wipes;
 - (e) face/eye mask;
 - (f) large absorbent towel;
 - (g) pick-up scoop with scraper; and
 - (h) bio-hazard disposal waste bag.

91.04.14 FIRST AID OXYGEN

1. Supply of first aid oxygen

- (1) The amount of oxygen must be calculated using an average flow rate of at least 3 litres Standard Temperature Pressure Dry (STPD)/minute/person and provided for the entire flight after cabin depressurisation at cabin altitudes of more than 8 000 ft for at least 2% of the passengers carried, but in no case for less than one person. There must be a sufficient number of dispensing units, but in no case less than two, with a means for cabin crew to use the supply.
- (2) The amount of first aid oxygen required for a particular operation must be determined on the basis of cabin pressure altitudes and flight duration, consistent with the operating procedures established for each operation and route.

2. Oxygen equipment

- (1) The oxygen equipment provided must be capable of generating a mass flow to each user of at least four litres per minute, STPD. Means may be provided to decrease the flow to not less than two litres per minute, STPD, at any altitude.
- (2) The dispensing units may be of a portable type.

91.04.15 SUPPLEMENTAL OXYGEN IN CASE OF PRESSURISED AIRCRAFT

1. General

- (1) An owner or operator may not operate a pressurised aircraft above 10 000 feet unless supplemental oxygen equipment, capable of storing and dispensing the oxygen supplies required by this technical standard, is provided.
- (2) The amount of supplemental oxygen required must be determined on the basis of cabin altitude, flight duration and the assumption that a cabin pressurisation failure will occur at the altitude or point of flight that is most critical from the standpoint of oxygen need, and that, after the failure, the aircraft will descend in accordance with emergency procedures specified in the aircraft flight manual to a safe altitude for the route to be flown that will allow continued safe flight and landing.
- (3) Following a cabin pressurisation failure, the cabin altitude must be considered the same as the aircraft altitude, unless it is demonstrated to the Director that no probable failure of the cabin or pressurisation system will result in a cabin pressure altitude equal to the aircraft altitude. Under these circumstances, this lower cabin pressure altitude may be used as a basis for determination of oxygen supply.

2. Oxygen equipment and supply requirements

- (1) Flight deck crew members
 - (a) Each flight deck crew member on flight deck duty must be supplied with supplemental oxygen in accordance with section 3. If all occupants of flight deck seats are supplied from the flight crew source of oxygen supply then they must be considered as flight deck crew members on flight deck duty for the purpose of oxygen supply. Flight deck seat occupants, not supplied by the flight deck crew source, are to be considered as passengers for the purpose of oxygen supply.
 - (b) Flight deck crew members, not covered by paragraph (1)(a) above, are to be considered as passengers for the purpose of oxygen supply.
 - (c) Oxygen masks must be located so as to be within the immediate reach of flight deck crew members whilst at their assigned duty station.

- (d) Oxygen masks for use by flight deck crew members in pressurised aeroplanes operating above 25 000 ft must be a quick donning type of mask as specified in section 4.
- (2) Cabin crew members, additional flight crew members and passengers
- (a) Cabin crew members and passengers must be supplied with supplemental oxygen in accordance with section 3. Cabin crew members carried in addition to the minimum number of cabin crew members required, and additional flight crew members, are to be considered as passengers for the purpose of oxygen supply.
- (b) When operating above 25 000 feet there must be provided sufficient spare outlets and/or portable oxygen units which are to be distributed evenly throughout the cabin to ensure immediate availability of oxygen to each required cabin crew member regardless of his or her location at the time of cabin pressurisation failure.
- (c) When operating above 25 000 feet there must be an oxygen dispensing unit connected to oxygen supply terminals immediately available to each occupant, wherever seated and which, for aircraft for which the individual certificate of airworthiness is first issued on or after 9 November 1998, the units shall be automatically deployable oxygen equipment. The total number of dispensing units and outlets must exceed the number of seats by at least 10%. The extra units are to be evenly distributed throughout the cabin.
- (d) The oxygen supply requirements, as specified in section 3 for aircraft not certificated to fly at altitudes above 25 000 feet, may be reduced to the entire flight time between 10 000 feet and 14 000 feet cabin pressure altitudes for all required cabin crew members and for at least 10% of the passengers if, at all points along the route to be flown, the aircraft is able to descend safely within 4 minutes to a cabin pressure altitude of 14 000 feet.

3. Minimum requirements for supplemental oxygen for pressurised aircraft

Supply for	Duration and cabin pressure altitude
1. All occupants of flight deck seats on flight deck duty	Entire flight time when the cabin pressure altitude exceeds 12 000 feet and entire flight time when the cabin pressure altitude exceeds 10 000 feet but does not exceed 12 000 feet after the first 120 minutes at those altitudes, but in no case less than: (i) 30 minutes for aircraft certificated to fly at altitudes not exceeding 25 000 feet (Note 2); (ii) 2 hours for aircraft certificated to fly at altitudes more than 25 000 feet (Note 3).
2. All required cabin crew members	Entire flight time when cabin pressure altitude exceeds 12 000 feet but not less than 30 minutes (Note 2), and entire flight time when cabin pressure altitude is greater than 10 000 feet but does not exceed 12 000 feet after 120 minutes at these altitudes.
3. 100% of passengers (Note 5)	10 minutes or the entire flight time when the cabin pressure altitude exceeds 15 000 feet whichever is the greater (Note 4).
4. 30% of passengers	Entire flight time when the cabin pressure altitude exceeds 14 000 feet but does not exceed 15 000 feet.

(Note 5)		
5. 10% passengers (Note 5)	of	Entire flight time when the cabin pressure altitude exceeds 10 000 feet but does not exceed 14 000 feet after the first 30 minutes at these altitudes.

Notes –

1. *The supply provided must take account of the cabin pressure altitude and descent profile for the routes concerned.*
2. *The required minimum supply is that quantity of oxygen necessary for a constant rate of descent from the aircraft's maximum certificated operating altitude to 10 000 feet in 10 minutes and followed by 20 minutes at 10 000 feet.*
3. *The required minimum supply is that quantity of oxygen necessary for a constant rate of descent from the aircraft's maximum certificated operating altitude to 10 000 feet in 10 minutes and followed by 110 minutes at 10 000 feet. The oxygen required in CAR 91.04.15 may be included in determining the supply required.*
4. *The required minimum supply is that quantity of oxygen necessary for a constant rate of descent from the aircraft's maximum certificated operating altitude to 15 000 feet.*
5. *For the purpose of this table 'passengers' means passengers actually carried and includes infants.*

4. Quick donning mask

A quick donning mask is the type of mask that –

- (a) can be placed on the face from its ready position, properly secured, sealed and supplying oxygen upon demand, with one hand and within 5 seconds and will thereafter remain in position, both hands being free;
- (b) can be put on without disturbing eye glasses and without delaying the flight crew member from proceeding with assigned emergency duties;
- (c) after being put on, does not prevent immediate communication between the flight deck crew members and other flight crew members over the aeroplane intercommunication system; and
- (d) does not inhibit radio communications.

91.04.16 SUPPLEMENTAL OXYGEN IN THE CASE OF NON-PRESSURISED AIRCRAFT

1. General

- (1) An owner or operator may not operate a non-pressurised aircraft at altitudes between 10 000 feet and 12 000 feet for longer than 120 minutes intended flight time, or above 12 000 feet unless supplemental oxygen equipment, capable of storing and dispensing the oxygen supplies required, is provided.
- (2) The amount of supplemental oxygen for sustenance required for a particular operation must be determined on the basis of flight altitudes and flight duration, consistent with the operating procedures established for each operation in the operations manual and with the routes to be flown, and with the emergency procedures specified in the operations manual, if applicable.

2. Oxygen supply requirements

(1) Flight deck crew members

Each flight deck crew member on flight deck duty must be supplied with supplemental oxygen in accordance with section 3. If all occupants of flight deck seats are supplied from the flight crew source of oxygen supply, then they are to be considered as flight deck crew members on flight deck duty for the purpose of oxygen supply.

(2) Cabin crew members, additional flight crew members and passengers

Cabin crew members and passengers must be supplied with oxygen in accordance with section 3. Cabin crew members carried in addition to the minimum number of cabin crew members required, and additional flight crew members, are to be considered as passengers for the purpose of oxygen supply.

3. Minimum requirements for supplemental oxygen for non-pressurised aeroplanes

Supply for	Duration and cabin pressure altitude
1. All occupants of flight deck seats on flight deck duty	Entire flight time at pressure altitudes above 12 000 feet and for any period exceeding 120 minutes intended flight time at pressure altitudes above 10 000 feet but not exceeding 12 000 feet.
2. All required cabin crew members	Entire flight time at pressure altitudes above 12 000 feet and for any period exceeding 120 minutes intended flight time at pressure altitudes above 10 000 feet but not exceeding 12 000 feet.
3. 100% of passengers (See Note)	Entire flight time at pressure altitudes above 12 000 feet.
4. 10% of passengers (See Note)	Entire flight time after 120 minutes intended flight time at pressure altitudes greater than 10 000 feet but not exceeding 12 000 feet.

Note – For the purpose of this table “passengers” means passengers actually carried and includes infants under the age of 2.

91.04.18 HAND HELD FIRE EXTINGUISHERS

1. Definitions

Any word or expression to which a meaning has been assigned in the Act, and the Civil Aviation Regulations, bears, when used in this technical standard, the same meaning unless the context indicates otherwise, and –

- (a) “**Class A cargo or baggage compartment**” means a cargo or baggage compartment in which –
 - (i) the presence of a fire would be easily discovered by a flight crew member while at his or her station; and

- (ii) each part of the compartment is easily accessible in flight;
- (b) **“Class B cargo or baggage compartment”** means a cargo or baggage compartment in which –
 - (i) there is sufficient access in flight to enable a flight crew member to effectively reach any part of the compartment with the contents of a hand fire extinguisher;
 - (ii) when the access provisions are being used, no hazardous quantity of smoke, flames or extinguishing agent will enter any compartment occupied by the flight crew or passengers; and
 - (iii) there is a separate approved smoke detector or fire detector system to give warning at the pilot or flight engineer station; and
- (c) **“Class E cargo compartment”** means a cargo compartment used only for the carriage of cargo and in which –
 - (i) there is a separate approved smoke or fire detector system to give warning at the pilot or flight engineer station;
 - (ii) there are means of shutting off the ventilating airflow to or within the compartment, and the controls for these means are accessible to the flight crew in the flight crew compartment;
 - (iii) there are means of excluding hazardous quantities of smoke, flames, or noxious gases, from the flight crew compartment; and
 - (iv) the required flight crew emergency exits are accessible under any cargo loading conditions.

2. Hand fire extinguishers

An owner or operator may not operate an aircraft unless hand fire extinguishers are provided for use in flight crew, passenger and, as applicable, cargo compartments and galleys in accordance with the following –

- (a) the type and quantity of extinguishing agent must be suitable for the kinds of fires likely to occur in the compartment where the extinguisher is intended to be used and, for personnel compartments, must minimise the hazard of toxic gas concentration;
- (b) at least one hand fire extinguisher, containing Halon 1211 (bromochlorodifluoromethane, CBrClF₂), or equivalent as the extinguishing agent, must be conveniently located on the flight deck for use by the flight deck crew;
- (c) at least one hand fire extinguisher must be located in, or readily accessible for use in, each galley not located on the main passenger deck;
- (d) at least one readily accessible hand fire extinguisher must be available for use in each Class A or Class B cargo or baggage compartment and in each Class E cargo compartment that is accessible to flight crew members in flight;
- (e) at least the following number of hand fire extinguishers must be conveniently located in the passenger compartment(s) –

Maximum approved passenger seating configuration	Number of extinguishers
7 to 30	1

31 to 60	2
61 to 200	3
201 to 300	4
301 to 400	5
401 to 500	6
501 to 600	7
601 or more	8

and when two or more extinguishers are required, they must be evenly distributed in the passenger compartment; and

- (f) at least one of the required fire extinguishers located in the passenger compartment of an aircraft with a maximum approved passenger seating configuration of at least 31, and not more than 60, and at least two of the fire extinguishers located in the passenger compartment of an aircraft with a maximum approved passenger seating configuration of 61 or more must contain Halon 1211 or equivalent as the extinguishing agent.
- (7) The number and location of hand fire extinguishers must be such as to provide adequate availability for use, account being taken of the number and size of the passenger compartments, the need to minimise the hazard of toxic gas concentrations and the location of toilets, galleys, etc. These considerations may result in the number being greater than the minimum prescribed.
- (8) There must be at least one fire extinguisher suitable for both flammable fluid and electrical equipment fires installed on the flight deck. Additional extinguishers may be required for the protection of other compartments accessible to the flight crew in flight. Dry chemical fire extinguishers should not be used on the flight deck, or in any compartment not separated by a partition from the flight deck, because of the adverse effect on vision during discharge and, if non-conductive, interference with electrical contacts by the chemical residues.
- (9) Where only one hand fire extinguisher is required in the passenger compartments it must be located near the cabin crew member's station, where provided.
- (10) Where two or more hand fire extinguishers are required in the passenger compartments and their location is not otherwise dictated by consideration of subparagraph (7) above, an extinguisher must be located near each end of the cabin with the remainder distributed through the cabin as evenly as is practicable.
- (11) Unless an extinguisher is clearly visible, its location must be indicated by a placard or sign, and appropriate symbols may be used to supplement such a placard or sign.

91.04.21 MEGAPHONES

1. Megaphones

- (1) An owner or operator may not operate an aircraft with a maximum approved passenger seating configuration of more than 60 seats and carrying one or more passengers unless it is equipped with portable battery-powered megaphones readily accessible for use by crew members during an emergency evacuation, to the following scales –
 - (a) for each passenger deck –

Passenger seating configuration	Number of megaphones required
61 to 99	1
100 or more	2

and

- (b) for aircraft with more than one passenger deck and in all cases when the total passenger seating configuration is more than 60 seats, at least 1 megaphone is required on each deck.
- (2) When one megaphone is required, it must be readily accessible from a cabin crew member's assigned seat. Where two or more megaphones are required, they must be suitably distributed in the passenger cabin(s) and readily accessible to cabin crew members assigned to direct emergency evacuations. This does not necessarily require megaphones to be positioned such that they can be reached by a cabin crew member when strapped in a cabin crew member's seat.
- (3) Unless the megaphone is clearly visible, its location must be indicated by a placard or sign, and appropriate symbols may be used to supplement the placard or sign.

91.04.22 EMERGENCY LIGHTING

1. Emergency lighting

- (1) An owner or operator may not operate a passenger-carrying aircraft which, in accordance with its individual certificate of airworthiness, has a maximum approved passenger seating configuration of more than nine seats unless it is provided with an emergency lighting system having an independent power supply to facilitate the evacuation of the aircraft. The emergency lighting system must include –
 - (a) for aircraft which, in accordance with their individual certificate of airworthiness, have a maximum approved passenger seating configuration of more than 19 seats –
 - (i) sources of general cabin illumination;
 - (ii) internal lighting in floor level emergency exit areas;
 - (iii) illuminated emergency exit marking and locating signs;
 - (iv) when flying by night, exterior emergency lighting at all overwing exits, and at exits where descent assist means are required on aircraft for which an application for the issuing of a type certificate was made before 1 May 1972; and
 - (v) a floor proximity emergency escape path marking system in the passenger compartments for aircraft in respect of which a type certificate was first issued on or after 1 January 1958;
 - (b) for aircraft which, in accordance with their individual certificate of airworthiness, have a maximum approved passenger seating configuration of 10 or more but less than 20 seats and are certificated according to TS 21.02.3(3) and (4) –
 - (i) sources of general cabin illumination;
 - (ii) internal lighting in emergency exit areas; and
 - (iii) illuminated emergency exit marking and locating signs; and
 - (c) for aircraft which in accordance with their individual certificate of airworthiness have a maximum approved passenger seating configuration of 10 or more but less than 20 seats and are not certificated according to TS 21.02.3(3) and (4), sources of general cabin illumination.

- (2) An owner or operator may not operate a passenger-carrying aircraft which, in accordance with its individual certificate of airworthiness, has a maximum approved passenger seating configuration of less than ten seats, when flying by night, unless it is provided with a source of internal cabin illumination to facilitate the evacuation of the aircraft. The system may use dome lights or other sources of illumination already fitted on the aircraft and which are capable of remaining operative after the battery has been switched off.

91.04.23 EMERGENCY LOCATOR TRANSMITTER (ELT)

1. Definitions

For the purposes of this TS –

“extended flights over water” means over-water flights at a distance from land equivalent to 30 minutes at normal cruising speed or 50 nautical miles, whichever is the lesser;

“where search and rescue would be especially difficult” means –

- (a) for South Africa, an area designated as such in the South African Integrated Aeronautical Information Publication (IAIP); and
- (b) for any other State –
 - (i) an area designated as such by the State; or
 - (ii) an area which is largely uninhabited and where –
 - (aa) the State responsible for managing search and rescue has not published any information to confirm that search and rescue would not be especially difficult; and
 - (bb) the State referred to in item (aa) does not, as a matter of policy, designate areas as being especially difficult for search and rescue.

2. Distress frequencies

Emergency locator transmitters (ELTs), required to be fitted in terms of CAR 91.04.23, shall be capable of transmitting on the frequencies 121,5 MHz and 406 MHz simultaneously and shall operate in accordance with the provisions of this TS.

3. Minimum number of ELTs to be carried

- (1) Aeroplanes to be operated on extended flights over water or over areas where search and rescue would be especially difficult, shall carry at least one automatic ELT.
- (2) Aeroplanes engaged in –
 - (a) a domestic-only general aviation operation using an aeroplane with a maximum certificated mass exceeding 5 700 kg; and
 - (b) an international general aviation operation,shall carry at least one automatic ELT.
- (3) Domestic-only general aviation operations of a helicopter with an approved passenger seating configuration of more than 19 seats, shall carry at least one automatic ELT and, in addition, for –

- (a) performance Class 1 and Class 2 helicopters on extended flights over water or over areas where search and rescue would be especially difficult; and
 - (b) Class 3 helicopters on over-water flights outside autorotation range from shore or over areas where search and rescue would be especially difficult,
- shall carry at least one ELT (W or S) per raft or life jacket.

(4) International general aviation operations of a helicopter shall carry at least one automatic ELT and, in addition, for –

- (a) performance Class 1 and Class 2 helicopters on extended flights over water or over areas where search and rescue would be especially difficult; and
- (b) Class 3 helicopters on over-water flights outside autorotation range from shore or over areas where search and rescue would be especially difficult,

shall carry at least one ELT (W or S) per raft or life jacket.

4. Types of ELTs

(1) It is an ICAO recommendation that all ELTs should be automatic.

(2) The ELT equipment required by regulation 91.04.23 shall meet the minimum performance standard defined in FAA's TSO C91a or TSO C126: Provided that any ELT installed prior to 1 January 1997 may meet the minimum performance standard defined in FAA's TSO C90 until such time as it becomes unserviceable other than through the need for routine maintenance, and furthermore provided that the ELT shall not be fitted with a lithium-sulphur dioxide battery that does not meet the requirements of FAA's TSO C97.

(3) The following are types of ELT's in use –

(a) Automatic Fixed – ELT/AF

This type of ELT is intended to be permanently attached to the aircraft before and after a crash and is designed to aid search and rescue teams in locating a crash site.

(b) Automatic Portable – ELT/AP

This type of ELT is intended to be rigidly attached to the aircraft before a crash, but readily removable from the aircraft after a crash. It functions as an ELT during the crash sequence. If the ELT does not employ an integral antenna, the aircraft-mounted antenna may be disconnected and an auxiliary antenna (stored on the ELT case) attached to the ELT. The ELT can be tethered to a survivor or a life raft. This type of ELT is intended to aid search and rescue teams in locating the crash site or survivor/s.

(c) Automatic Deployable – ELT/AD

This type of ELT is intended to be rigidly attached to the aircraft before the crash and automatically ejected and deployed after the crash sensor has determined that a crash has occurred. This type of ELT should float in water and is intended to aid search and rescue teams in locating the crash site.

(d) Portable – ELT/P

This type of ELT is not intended to be rigidly attached to the aircraft before a crash, but carried in such a way that it is readily removable from the aircraft after a crash. The ELT employs an integral antenna, and can be tethered to a survivor or a life raft. This type of ELT is intended to aid search and rescue teams in locating the crash site or survivor/s.

- e) ELT (S) or (W) – ELT (survival) or ELT (water-activated)

This type of ELT is not affixed to the aircraft and transmits automatically when immersed in water. It is waterproof, floats and operates on the surface of the water. It has no fixed mounting. It should be tethered to survivors or life rafts.

5. Specification

- (1) Information on technical characteristics and operational performance of 121,5 MHz ELTs is contained in RTCA Document DO-183 and EUROCAE Document ED.62.
- (2) Specification for the 121.5 MHz component of ELT for search and rescue –
- (a) the ELT shall operate on 121,5 MHz. The frequency tolerance shall not exceed plus or minus 0,005%;
 - (b) the emission from an ELT under normal conditions and attitudes of the antenna shall be vertically polarised and essentially omni-directional in the horizontal plane;
 - (c) over a period of 48 hours of continuous operation, at an operating temperature of minus 20° Celsius, the peak effective radiated power (PERP) shall at no time be less than 50 mW;
 - (d) the type of emission shall be A3X. Any other type of modulation that meets the requirements of subparagraphs (e), (f) and (g) below may be used, provided that it will not prejudice precise location of the beacon by homing equipment;
- Note – some ELTs are equipped with an optional voice capability (A3E) in addition to the A3X emission.*
- (e) the carrier shall be amplitude modulated at a modulation factor of at least 0,85;
 - (f) the modulation applied to the carrier shall have a minimum duty cycle of 33%;
 - (g) the emission shall have distinctive audio characteristics achieved by amplitude modulating the carrier with an audio frequency sweeping downward over a range of not less than 700 Hz within the range 1600 Hz to 300 Hz and with a sweep repetition rate of between 2 Hz and 4Hz; and
 - (h) the emission shall include a clearly defined carrier frequency distinct from the modulation sideband components. In particular, at least 30% of the power shall be contained at all times within plus or minus 30Hz of the carrier frequency on 121,5 MHz.
- (3) Specification for the 406 MHz component of ELT for search and rescue –
- (a) transmission characteristics for ELTs operating on 406 MHz are contained in ITU M633/1;
 - (b) information on technical characteristics and operational performance of 406 MHz ELTs is contained in RTCA Document DO-204 and EUROCAE Document ED.62;

- (c) ELTs shall operate on a frequency of 406,025 MHz plus or minus 2 kHz. The transmitted frequency shall not vary more than plus or minus 5 kHz in five years including the initial frequency offset. It shall not vary more than 2 parts in 10^9 milliseconds;
 - (d) the period between transmissions shall be 50 seconds plus or minus 5%;
 - (e) over a period of 24 hours of continuous operation at an operating temperature of minus 20° Celsius, the transmitter power output shall be within the limits of 5 W plus or minus 2 dB; and
 - (f) the 406 MHz ELT shall be capable of transmitting a digital message.
- (4) Transmitter identification coding –
- (a) ELTs operating on 406 MHz shall be assigned a unique coding for identification of the transmitter or aircraft on which it is carried; and
 - (b) the ELT shall be coded in accordance with the aviation user protocol or one of the serialised user protocols and shall be registered with the South African Civil Aviation Authority.

6. Installation

- (1) Each ELT, required to be carried in terms of CAR 91.04.23, must be attached to the aircraft in such a manner that the probability of damage to the transmitter in the event of crash impact is minimised. Fixed and deployable automatic ELTs must be attached to an aeroplane as far aft as possible. The installation of an ELT constitutes a modification of an aircraft and must therefore be completed in accordance with acceptable technical data. The acceptable standards should produce reliable and effective ELT systems, and keep unwanted activations to a minimum. Acceptable standards are based on those set out in the following sources –
- (a) FAA AC91-44A (as amended); and
 - (b) RTCA papers DO-182 and DO-183.
- (2) Except where otherwise stated, the following installation requirements shall apply to ELT installations in any aeroplane –
- (a) when installed in an aeroplane, the ELT shall be mounted with its sensitive axis pointing in the direction of flight;
 - (b) the ELT shall be installed to withstand ultimate inertia forces of 10g upward, 22.5g downward, 45g forward and 7.5g sideward;
 - (c) the location chosen for the ELT must be sufficiently free from vibration to prevent involuntary activation of the transmitter;
 - (d) the ELT shall be located and mounted so as to minimize the probability of damage to the transmitter and antenna by fire or crushing as a result of crash impact; and
 - (e) the ELT shall be accessible for manual activation and deactivation.
- (3) If it is equipped with an antenna for portable operation, the ELT shall be easily detachable from inside the aeroplane and –
- (a) the external surface of the aeroplane shall be marked to indicate the location of the ELT; and

- (b) the ELT shall not use the antenna of another avionics system.
- (4) The external antenna location shall be chosen considering the following factors –
- (a) the ELT antenna shall be mounted as far away as possible from other Very High Frequency (VHF) antennas;
 - (b) the distance between the transmitter and antenna shall be in accordance with the ELT manufacturer's installation instructions or other approved data;
 - (c) the position of the antenna shall be such as to ensure essentially omni-directional signal transmissions when the aeroplane is in its normal ground or water attitude;
 - (d) the antenna shall be mounted as far aft as possible;
 - (e) the ELT antenna shall not foul other antennas in flight; and
 - (f) the ELT shall be subjected to an operational test as specified in ELT testing standards.
- (5) No ELT with a lithium or magnesium battery shall be packed inside a life raft in an aeroplane.
- (6) Where the ELT system includes a remote control system for activating and deactivating the transmitter, provision shall be made to prevent inadvertent operation of the remote control and a placard displaying the following warning shall be placed near each remote control –

"FOR AVIATION EMERGENCY USE ONLY. UNAUTHORIZED OPERATION PROHIBITED."

- (7) When an aeroplane is upright, an antenna located externally on top of the rear fuselage provides better overall efficiency than an internal cockpit area antenna.
- (8) When an aeroplane is inverted –
- (a) an internal antenna exhibits the best overall efficiency in a high-wing aeroplane; and
 - (b) neither antenna location has a significant advantage in a low-wing aeroplane.
- (9) In helicopter installations, care needs to be taken to site the antenna so as to minimise vibratory response which could lead to premature fatigue failure.
- (10) The presence of an ELT whip antenna in close proximity to a second antenna can cause some detuning and distortion of the radiation pattern of the second antenna and possible interference by re-radiation of other signals. eg., there have been reports of an ELT radiating a weak harmonic signal to VHF transmissions, causing interference with GPS equipment.
- (11) The ELT mount must provide a load path from aircraft primary structural elements directly to the automatic activation system. The attachment should also be free and clear of cables and pulleys, etc., and be designed to minimise vibration. Excessive vibration may prevent satisfactory crash impact detection or may generate false crash signals. Attachments to thin partitions or to panels, such as the sides of baggage compartments, should be avoided. Attachments solely by means of velcro strips and other flexible material, such as tie-wrap, are not acceptable.
- (12) As approximately one fifth of light aircraft accidents result in fire, the coaxial cable between the ELT and its external antenna should be sleeved with fire-resistant materials.
- (13) Automatic fixed-type, inertially-activated ELTs are activated by an inertial force parallel to the longitudinal axis of the aircraft. However, many inadvertent activations have been caused by inertial switches actuating in other directions. For portable ELTs, the manufacturer's installation instructions must be followed precisely since placement and orientation may be critical.

- (14) The interaction of components in the ELT is often critical in arriving at acceptable overall performance. Component parts from other sources such as batteries, coaxial cables and antennae, should not be substituted for the original manufacturer's parts.
- (15) Tests after installation and tests and inspections of ELTs shall be as prescribed by CAR 43.02.11.
- (16) On completion of the modification to install the ELT the certifying person shall –
 - (a) ensure that the installation is recorded in the aircraft's logbook; and
 - (b) place the ELT manufacturer's operating instructions in the aircraft flight manual, unless the relevant information is already given in a flight manual supplement.

A release to service statement for the modification must be issued in accordance with the provisions of Part 43.

6. Batteries

- (1) Battery types in ELTs are as follows –
 - (a) most commonly: zinc-manganese dioxide (alkaline);
 - (b) magnesium-manganese dioxide (magnesium); and
 - (c) early models: lithium-sulphur dioxide (lithium).
- (2) Lithium-sulphur dioxide batteries may be used only if they meet the requirements of FAA's TSO C97. See also subsection 3.2 above.
- (3) The ELT battery expiration date must be visible without having to remove the ELT from its mount in the aircraft.
- (4) Where ELT batteries can be charged during flight, provision shall be made to –
 - (a) indicate to the flight crew that charging is taking place; and
 - (b) prevent battery discharge resulting from wiring short circuits occurring during normal service or from crash damage.

91.04.25 LIFE RAFTS AND SURVIVAL RADIO EQUIPMENT FOR EXTENDED OVER-WATER FLIGHTS

1. Equipment

- (1) An owner or operator must ensure that the aircraft is equipped with sufficient life rafts to carry all persons on board. Unless excess rafts or enough capacity are provided, the buoyancy and seating capacity beyond the rated capacity of the rafts must accommodate all occupants of the aircraft in the event of a loss of one raft of the largest rated capacity.
- (2) The life rafts must be equipped with –
 - (a) a survivor locator light; and
 - (b) life saving equipment including means of sustaining life as appropriate to the flight to be undertaken.
- (3) The following shall be included in each life-raft –
 - (a) a means for maintaining buoyancy;
 - (b) a sea anchor;

- (c) life-lines and means of attaching one life-raft to another;
- (d) paddles for life-rafts with a capacity of 6 or less;
- (e) means of protecting the occupants from the elements;
- (f) a water resistant torch;
- (g) signalling equipment to make distress signals;
- (h) for each 4, or fraction of 4 persons which the life-raft is designed to carry –
 - (i) 100 g glucose tablets;
 - (ii) 500 ml of water. This water may be provided in durable containers or by means of making seawater drinkable or a combination of both; and
- (i) first aid equipment.

Note – Items (g) – (i), inclusive, should be contained in a pack.

- (4) An aircraft must be equipped with at least two sets of survival radio equipment capable of transmitting on 121.5 MHz and 243 MHz.
- (5) Unless the life rafts and survival radio equipment are clearly visible, their location must be indicated by a placard or sign, and appropriate symbols may be used to supplement the placard or sign.

2. Information

The owner of the aircraft shall at all times have available for immediate communication to rescue coordination centres, lists containing information on the emergency and survival equipment carried on board the aircraft. Such information shall include the details of the content of the survival kits, the number, colour and type of life rafts and pyrotechnics and, where portable radio equipment is carried, the type and frequencies of that equipment.

91.04.26 SURVIVAL EQUIPMENT

1. Survival equipment

An owner or operator may not operate an aircraft across areas in which search and rescue would be especially difficult unless it is equipped with the following –

- (a) signalling equipment to make distress signals;
- (b) at least one ELT; and
- (c) additional survival equipment for the route to be flown taking account of the number of persons on board as prescribed in section 3: Provided that the additional equipment need not be carried when the aircraft either –
 - (i) remains within a distance from an area where search and rescue is not especially difficult corresponding to –
 - (aa) 120 minutes at the one engine inoperative cruising speed for aircraft capable of continuing the flight to an aerodrome with the critical power unit(s) becoming inoperative at any point along the route or planned diversions; or
 - (bb) 30 minutes at cruising speed for all other aircraft; or

- (ii) for aircraft certificated according to TS 21.02.3(4), no greater distance than that corresponding to 90 minutes at cruising speed from an area suitable for making an emergency landing.

2. Interpretation

For the purposes of this technical standard, the expression “area in which search and rescue would be especially difficult” means –

- (1) an area so designated by the State responsible for managing search and rescue, which, for South Africa, will be as specified in the South African Integrated Aeronautical Information Publication (IAIP); or
- (2) an area which is largely uninhabited and where –
 - (a) the State responsible for managing search and rescue has not published any information to confirm that search and rescue would not be especially difficult; and
 - (b) the State referred to in (a) does not, as a matter of policy, designate areas as being especially difficult for search and rescue.

3. Additional survival equipment

- (1) The following additional survival equipment should be carried when required –
 - (a) 500 ml of water for each 4, or fraction of 4, persons on board;
 - (b) one knife;
 - (c) first aid equipment; and
 - (d) one set of air/ground codes and a means of displaying them that meets the requirements specified in ICAO Annex 12, Search and Rescue.
- (2) In addition, when polar conditions are expected, the following should be carried –
 - (a) a means for melting snow;
 - (b) one snow shovel and one ice saw;
 - (c) sleeping bags for use by at least 33% of all persons on board and space blankets for the remainder or space blankets for all passengers on board; and
 - (d) one Arctic/polar suit for each flight crew member carried.

4. Duplicates

If any item of equipment contained in the above list is already carried on board the aircraft in accordance with another requirement, there is no need for this to be duplicated.

5. Location

Unless the survival equipment is clearly visible, its location must be indicated by a placard or sign, and appropriate symbols may be used to supplement the placard or sign.

6. Information

The owner of the aircraft shall at all times have available for immediate communication to rescue coordination centres, lists containing information on the emergency and survival equipment carried on

board the aircraft. Such information shall include the details of the content of the survival kits and, where portable radio equipment is carried, the type and frequencies of that equipment.

7. Ground-air visual signal code for use by survivors

No.	Message	Code symbol
1	Require assistance	V
2	Require medical assistance	X
3	No or Negative	N
4	Yes or Affirmative	Y
5	Proceeding in this direction	↑

Note – Symbols shall long and conspicuous

be at least 2.5 metres shall be made as as possible.

91.04.28 AIRBORNE COLLISION AVOIDANCE SYSTEM

1. Terminology

- (1) The term “airborne collision avoidance system” (ACAS) is used by the International Civil Aviation Organisation (ICAO) in Annex 6 to the Convention on Civil Aviation to describe a system that provides an automatic warning to the pilots when the system detects other aircraft in potentially hazardous proximity. Annex 6 prescribes a version of ACAS known as ACAS II.
- (2) The US Federal Aviation Administration (FAA) uses the term “traffic alert and collision avoidance system” (TCAS) to describe the US-developed equipment that provides the functions of ACAS. There are two versions of TCAS: TCAS I and TCAS II. TCAS I provides traffic alert (TA) messages but not resolution advisory (RA) messages to pilots. TCAS II provides both TA and TR.

2. Specifications

An operator shall equip its aeroplanes with ACAS II equipment equivalent to one of the following specifications –

- (a) the ICAO technical specifications for ACAS and its variants as contained in Annex 10, Volume IV; or
- (b) the technical specifications for TCAS II equipment as contained in the United States FAA TSO-C119c, as amended.

3. Function

- (1) ACAS II provides RA advice automatically coordinated with an intruder aeroplane if the intruder is also ACAS II equipped. If encountering a Mode C transponder-equipped aircraft, RA advice is also provided, based on the projected flight path of the Mode C transponder-equipped intruder.
- (2) It is pointed out that lower-performance systems such as TCAS I or TAS (Traffic Avoidance Systems) do not provide RA information to pilots. TCAS I systems, furthermore, have a much reduced surveillance capability than the ACAS II-based surveillance systems and are particularly prone to reduced range and interference effects when there are a number of other TCAS I or ACAS II aircraft in the area.

4. Certification and operational approval

- (1) The installation of ACAS equipment requires CAA airworthiness certification in terms of an amendment to the aeroplane’s type certificate in the issuance of a supplementary type certificate.
- (2) The operation of ACAS equipment requires CAA approval of the relevant changes to maintenance programmes, manuals, operational procedures, Minimum Equipment List (MEL) and other areas necessary for safe and effective ACAS use, and the qualification of aircrews through approved training programmes.

5. Training and checking requirements

Note – This section applies to pilots involved in general aviation operations. The training and checking requirements for pilots operating under Parts 121, 127 and 135 may be found in the respective Part.

- (1) ACAS training is applicable to at least the pilot-in-command where the aeroplane is required to be operated with an approved, serviceable ACAS.
- (2) A pilot must complete ACAS initial training in respect of each aeroplane type for which he or she is rated with an ATO or an air operator approved for ACAS training.
- (3) An ACAS training programme shall ensure that on completion the pilot is able to demonstrate proficiency in the following –
 - (a) knowledge of ACAS II concepts, systems and procedures; and
 - (b) cognitive, procedural and motor skills necessary to properly respond to ACAS advisories.
- (4) There are no formal ACAS evaluation requirements for flight testing and examination. An ACAS instructor shall ensure completion of the ACAS training objectives during training.
- (5) ACAS initial training may be provided as a stand-alone module of ground and flight training or may be integrated with other ground and flight training programmes.
- (6) The training organisation having conducted the training shall provide certification that the pilot's ACAS training and checking has been accomplished to a satisfactory standard.
- (7) ACAS renewal training is not required unless significant modifications are undertaken to the aircraft's ACAS equipment.
- (8) Each ACAS curriculum shall ensure the equipment manufacturer's recommended training and testing requirements are carried out in the manner prescribed by such manufacturer.

6. Operational use

- (1) Pilot responsibilities
 - (a) ACAS is intended to serve as a support to visual collision avoidance, application of right-of-way rules and air traffic separation services. For ACAS to work as designed, immediate and correct crew response to ACAS advisories is essential. Delayed crew response or reluctance of a flight crew to adjust the aircraft's flight path, as advised by ACAS, due to air traffic control (ATC) clearance provisions, fear of later CAA scrutiny, or other factors could significantly decrease or negate the protection afforded by ACAS.
 - (b) ACAS does not alter or diminish the pilot's basic authority and responsibility to ensure safe flight.
- (2) Potential Consequences

The potential consequences of improperly manoeuvring the aircraft in response to an RA include –

- (a) an aircraft seen visually may not necessarily be the aircraft causing the RA or may not be the only aircraft to which ACAS is responding;
- (b) it is difficult to visually determine the vertical displacement of other aircraft especially when ground reference information is unreliable or at cruise altitudes where the earth's horizon is obscured. Therefore, disregarding RA information and manoeuvring vertically based solely on visual acquisition may result in a loss of safe separation;
- (c) ATC may not know when ACAS issues RAs. It is possible for ATC to unknowingly issue instructions that are contrary to the ACAS RA indications. Safe vertical separation may be lost during ACAS co-ordination when one aircraft manoeuvres opposite the vertical direction indicated by ACAS and the other aircraft manoeuvres as indicated by ACAS. As a result, both aircraft may experience excessive altitude excursions in "vertical chase" scenarios due to the aircraft manoeuvring in the same vertical direction. Accordingly, during an RA, do not manoeuvre contrary to the RA based solely upon ATC instructions;
- (d) ATC may not be providing separation service or be communicating with the aircraft causing the RA; and
- (e) failure to manoeuvre during a co-ordinated encounter with another ACAS-equipped aircraft can result in loss of safe separation.

(3) ACAS Accepted Operating Practices

The following are accepted operating practices –

- (a) to preclude unnecessary transponder interrogations and possible interference with ground radar surveillance systems, ACAS should not be activated in either TA or TA/RA mode until taking the active runway for departure. The standby mode for a Mode S transponder is adequate in order for ATC to "see" the aircraft while taxiing on the aerodrome surface;
- (b) following landing and clearing of the runway, ACAS should be selected to the "standby" mode. and
- (c) it may be appropriate to operate ACAS in the TA-only mode in circumstances where unnecessary RAs frequently occur and where such RAs are disruptive to the operation of the aircraft. These circumstances may include –
 - (i) during take-off towards known nearby traffic that is in visual contact and which could cause an unwanted RA during initial climb, such as a visually identified helicopter passing near the departure end of the runway. The TA/RA mode should be selected after the potential for an unwanted RA ceases to exist, such as after climbing above a known VFR corridor;
 - (ii) in instrument or visual conditions during approached to closely-spaced parallel runways;
 - (iii) in visual conditions, when flying in close proximity of other aircraft;
 - (iv) in the vicinity of an aerodrome where separation standards may have been reduced, during particular procedures, or in circumstances identified by the operator as having a significant potential for unwanted or inappropriate RAs;
 - (v) in the event of particular in-flight failures, such as engine failure, as specified by the flight manual or the operator;

- (vi) during take-offs or landings outside of the nominal ACAS reference performance envelope for RAs, as designated by the flight manual or operator. ACAS reference performance for RAs is typically attainable during take-offs and landings at aerodromes within the envelope of ISA \pm -4° C, sea level to 5 300 feet MSL. When take-offs or landings are outside this envelope, use of “TA only” may be appropriate during the limited period when ACAS reference performance cannot be achieved. This typically occurs when the aircraft is at low speed in specified limiting configurations during take-off or landing at “hot day” high-altitude aerodromes; and
- (vii) when participating in Parallel Runway Monitoring (PRM) Operations.

7. ACAS/TCAS event reporting

Pilot reports –

- (a) ACAS-specific reports. Pilots should make the following reports for ACAS TAs and RAs as necessary –
 - (i) upon query from ATC or after deviation from an ATC clearance, make radio communications as appropriate to report a response to an ACAS advisory. Refer to AIC 41.6 for recommended phraseology; and
 - (ii) reports, as specified by the operator, concerning ACAS anomalies, procedural difficulties or system failures typically are made by pilots through one or more of the following methods –
 - (aa) pilot/observer questionnaire;
 - (bb) logbook entry; and
 - (cc) other record used by the operator, such as a captain’s report. An example of a typical reporting form for ACAS event information is shown in AIC 16.3.
- (b) other reports incidental to ACAS –
 - (i) flight crews should continue to submit AIRPROX reports in accordance with existing policies and procedures. Crews should be aware that there is no requirement to submit an AIRPROX report solely due to an ACAS event and that an ACAS report does not constitute an AIRPROX report;
 - (ii) unless required due to other circumstances, reports regarding emergency deviation from an ATC clearance are not necessary solely as a result of an ACAS manoeuvre; and
 - (iii) Aviation Safety Reporting System (ASRS) reports may be filed at the discretion of the flight crew.

91.04.30 TERRAIN AWARENESS AND WARNING SYSTEM (TAWS)

1. General

An aircraft fitted with a TAWS as required by CAR 91.04.30 shall meet the standards specified in this TS. A means of compliance with this TS may be obtained in the United States Federal Aviation Administration (FAA) TSO C151 (as amended), Terrain Awareness and Warning System, or an equivalent standard.

1.1 Purpose

This TS provides the minimum performance specifications for the following classes of TAWS –

- (a) Class A TAWS; and
- (b) Class B TAWS,
as described in section 1.2.

1.2 System Function and Overview

The TAWS must provide the flight crew with sufficient information and alerting to detect a potentially hazardous terrain situation that would permit the flight crew to take effective action to prevent a controlled flight into terrain (CFIT) event. The basic TAWS functions for all approved systems include the following –

- (a) a forward looking terrain avoidance (FLTA) function, which looks ahead of the airplane along and below the airplane's lateral and vertical flight path and provides suitable alerts if a potential CFIT threat exists;

Note – The FLTA function can be met by incorporating a data base with a predictive capability and/or through the use of forward-looking radar.

- (b) a premature descent alert (PDA) function, which uses the aeroplane's current position and flight path information as determined from a suitable navigation source and airport database to determine if the airplane is hazardously below the normal (typically 3 degree) approach path for the nearest runway as defined by the alerting algorithm;
- (c) an appropriate visual and aural discrete signal for both caution and warning alerts;
- (d) Class A TAWS must provide terrain information to be presented on a display system;
- (e) Class A TAWS must provide indications of imminent contact with the ground for the following conditions –
 - (i) excessive rates of descent;
 - (ii) excessive closure rate to terrain;
 - (iii) negative climb rate or altitude loss after take-off;
 - (iv) flight into terrain when not in the landing configuration;
 - (v) excessive downward deviation from an ILS glideslope; and
 - (vi) voice callout "five hundred" when the airplane descends to 500 feet above the terrain or nearest runway elevation; and
- (f) Class B TAWS must provide indications of imminent contact with the ground during the following aeroplane operations –
 - (i) excessive rates of descent;
 - (ii) negative climb rate or altitude loss after takeoff; and
 - (iii) a voice callout "five hundred" when the airplane descends to 500 feet above the nearest terrain or nearest runway elevation.

1.4 Added Features

If the manufacturer elects to add features to the TAWS, those features must at least meet the same qualification testing and software verification and validation requirements as provided under the FAA TSO

151 (as amended). Additional information such as “human-made” obstacles may be added as long as they do not adversely alter the terrain functions.

91.04.31 RVSM OPERATIONS

1. Definitions and abbreviations

(1) In this technical standard, any word or expression to which a meaning has been assigned in Part 1 of the CAR shall have that meaning and, unless the context otherwise indicates –

“**aircraft group**” means a group of aircraft that are of nominally identical design and build with respect to all details that could influence the accuracy of height-keeping performance;

“**altimetry system error**” means the difference between the pressure altitudes displayed to the flight crew when referenced to the International Standard Atmosphere ground pressure setting (1013.2 hPa/ 29.92 in.Hg) and free-stream pressure altitude (ASE);

“**appropriate authority**” means the organisation or person, empowered under national laws, to be responsible for airworthiness certification and operational or maintenance approvals, and in respect of a South African registered aircraft including the South African Civil Aviation Authority and the Director; and “responsible authority”, as used in related JAA documents, shall have the same meaning;

“**assigned altitude deviation**” means the difference between the transmitted Mode C altitude and the assigned altitude/flight level (AAD);

“**automatic altitude control system**” means any system that is designed to automatically control the aircraft to a referenced pressure altitude;

“**avionics error**” means the error in the processes of converting the sensed pressure into an electrical output, of applying any static source error correction (SSEC) as appropriate, and of displaying the corresponding altitude (AVE);

“**basic RVSM envelope**” means the range of Mach numbers and gross weights within the altitude ranges FL 290 to FL 410 (or maximum attainable altitude) where an aircraft can reasonably expect to operate most frequently;

“**full RVSM envelope**” means the entire range of operational Mach numbers, W/d, and altitude values over which the aircraft can be operated within RVSM airspace;

“**general air traffic**” means flights conducted in accordance with the rules and provisions of ICAO (GAT);

“**height-keeping capability**” means aircraft height-keeping performance that can be expected under nominal environmental operating conditions, with proper aircraft operating practices and maintenance;

“**height-keeping performance**” means the observed performance of an aircraft with respect to adherence to a flight level;

“**non-group aircraft**” means an aircraft for which the operator applies for approval on the characteristics of the unique airframe rather than on a group basis;

“**operational air traffic**” means flights that do not comply with the provisions stated for general air traffic and for which rules and procedures have been specified by appropriate authorities (OAT);

“**residual static-source error**” means the amount by which static-source error (SSE) remains under-corrected or overcorrected after the application of static-source error correction (SSEC);

“**responsible authority**”: See “appropriate authority”;

“**RVSM approval**” means the approval that is issued by the appropriate authority of the State in which the aircraft owner or operator is registered;

“**State aircraft**” means aircraft used in military, customs and police services;

“**static-source error**” means the difference between the pressure sensed by the static system at the static port and the undisturbed ambient pressure;

“**static-source error correction**” means a correction for static-source error (SSEC);

“**total vertical error**” means the vertical geometric difference between the actual pressure altitude flown by an aircraft and its assigned pressure altitude or flight level (TVE);

“**W/d**” means aircraft weight (W) divided by the atmospheric pressure ratio (d).

(2) In this technical standard the following abbreviations have the assigned meaning –

Abbreviation	Meaning
AAD	Assigned altitude deviation
ADC	Air data computer
AOA	Angle of attack
AOC	Air operator’s certificate
ASE	Altimetry system error
ATS	Air traffic service
EUR RVSM	European Reduced Vertical Separation Minima
FIR-	Flight Information Region / Upper Information
GAT	General air traffic
d	Atmospheric pressure ratio
Hp	Pressure altitude
hPa	Hectopascal
in.Hg	Inches of mercury
M	Mach number
MASPS	Minimum aircraft system performance
MEL	Minimum equipment list

MMEL	Master minimum equipment list
Mmo	Maximum operating-limit Mach number
MNPS	Minimum navigation performance specification
NAT	North Atlantic
NOTAM	Notice to Airmen
OAT	Operational air traffic
OTS	Organised track structure
QFE (or	Atmospheric pressure at aerodrome elevation
QNH	Altimeter sub-scale setting to obtain elevation
RNP	Required Navigation Performance
RTF	Radio-telephony
RVSM	Reduced vertical separation minima
SSE	Static-source error
SSEC	Static-source error correction
TVE	Total vertical error
VMO	Maximum operating-limit velocity
W	Weight

2. Applicability and purpose

- (1) The content of this technical standard applies to all aircraft operators who intend to operate in RVSM airspace. RVSM airspace is any airspace or route between FL 290 and FL 410 (both levels inclusive) where aircraft are separated vertically by 1 000 ft.
- (2) SACAA TGM “CA AOC-AC-FO-008: RVSM Approval Advisory Circular” provides technical guidance *on the Approval of Operators/Aircraft for RVSM Operations* which establishes an acceptable means, but not the only means that can be used in the approval of aircraft and operators to conduct flights in airspace or on routes where RVSM is applied.
- (3) The provides the minimum aircraft systems performance specification (MASPS) for altimetry to support the use of a 1 000 ft vertical separation.
- (4) It contains guidance on airworthiness, continued airworthiness and practices and procedures for aircraft operations in RVSM airspace.

3. The approval process

- (1) General

Airspace, where RVSM is applied, must be considered special qualification airspace. The specific aircraft type or types that the owner or operator intends to use in such airspace needs to be approved by the Director before flights may be conducted in RVSM airspace. In addition, where operations in specified airspace require approval in accordance with an ICAO Regional Navigation Agreement, an operational approval is needed. This document

provides guidance for the approval of specific aircraft type or types, and for operational approval. An application for RVSM approval shall be made using the Application for RVSM Approval form available from the SACAA.

(2) Airworthiness approval

- (a) Each aircraft type intended to be used in RVSM airspace must have received RVSM airworthiness approval from the appropriate authority, prior to approval being granted for RVSM operations, including the approval of continued airworthiness programmes.
- (b) TS 91.04.31, Section 6 provides guidance for the approval of newly-built aircraft and for aircraft that have already entered service. Section 7 contains guidance on the continued airworthiness (maintenance and repair) programmes for all RVSM operations.

(It is accepted that compliance with equivalent documents from another State Authority which satisfy the airworthiness criteria of this technical standard may be acceptable to the Director.

Note – Owners and operators are advised to check existing approvals and the aircraft flight manual for redundant regional constraints.

(3) Operational Approval

Air service operators and individual pilots will be required to hold State approval to operate in airspace designated as RVSM airspace, as defined by ICAO Regional Navigation Agreements. TS 91.04.31, Section 8, contains guidance on operational procedures that an operator will need to adopt for such airspace where RVSM is applied, including advice on the operational material that may need to be submitted for review by the Director.

(4) Approval Documentation

- (a) After all requirements have been met, the owner/operator will be issued an approval certificate (an example form may be obtained from the SACAA) signifying the aircraft's suitability for operation in RVSM airspace. In the event an original approval certificate is lost or destroyed, a replacement certificate must be requested using the Application for Replacement RVSM Certificate form, a copy of which is available from the SACAA.
- (b) A pilot having completed the training and checking requirements of Part 61 shall present the documentation showing such to the SACAA Licensing Division for the appropriate licensing action.

4. RVSM performance

- (1) For the purposes of RVSM approval, the aircraft flight envelope may be considered as two parts; the basic RVSM flight planning envelope and the full RVSM flight envelope (referred to as the Basic Envelope and the Full Envelope respectively), as defined in section 1 and

explained in TS 91.04.31, Section 6(4). For the full envelope, a larger altimetry system error (ASE) is allowed.

- (2) The aircraft and its systems shall meet the requirements in section 9 of SACAA TGM “CA AOC-AC-FO-008: RVSM Approval Advisory Circular” or its equivalent with respect to the following –
 - (a) altimetry system error; and
 - (b) altitude-keeping.

5. Aircraft systems

- (1) The aircraft’s minimum, equipment, functions and capabilities and related performance criteria shall meet the requirements of Section 9 of SACAA Technical Guidance Material CA AOC-FO_008: “RVSM approval Advisory Circular”-
 - (a) the number, type and capabilities of the aircraft altitude measuring systems, secondary surveillance radar transponder, altitude-alerting system and automatic altitude-control system;
 - (b) altimetry;
 - (c) system limitations –
 - (i) the aircraft flight manual must include a statement of compliance against this technical standard (or equivalent guidance material), quoting the applicable service bulletin or build standard of the aircraft. In addition, the following statement must be included –

“Airworthiness Approval alone does not authorize flight into airspace for which an RVSM Operational Approval is required in terms of an ICAO Regional Navigation Agreement”.
 - (ii) non-compliant aspects of the installed systems and any other limitations will need to be identified in the approved aircraft flight manual amendment or supplement and in the approved operations manual, as applicable, for example –
 - (aa) non-compliant altimeter systems, e.g. standby altimeter;
 - (bb) non-compliant modes of the automatic pilot; e.g. altitude hold, VNAV, altitude select;
 - (cc) mass limit;
 - (dd) Mach limit; or
 - (ee) altitude limit.

6. Airworthiness approval

- (1) General

- (a) Obtaining RVSM airworthiness approval is a two-step process which may involve more than one authority.
- (b) For the first step –
 - (i) in the case of a newly-built aircraft, the aircraft constructor develops and submits to the appropriate authority of the State of manufacture, the performance and analytical data that supports RVSM - airworthiness approval of a defined build standard. The data will be supplemented with maintenance and repair manuals giving associated continued airworthiness instructions. Compliance with RVSM criteria will be stated in the aircraft flight manual, including reference to the applicable build standard, related conditions and limitations. Approval by the appropriate authority and, where applicable, validation of that approval by other authorities, indicate acceptance of newly-built aircraft, conforming to that type and build standard, as complying with the RVSM airworthiness criteria.
 - (ii) in the case of an aircraft already in service, the aircraft constructor (or an approved design organisation) submits to the appropriate authority, either in the State of manufacture or the State in which the aircraft is registered, the performance and analytical data that supports RVSM airworthiness approval of a defined build standard. The data will be supplemented with a service bulletin, or its equivalent, that identifies the work to be done to achieve the build standard, continued airworthiness instructions, and an amendment to the aircraft flight manual stating related conditions and limitations. Approval by the appropriate authority and, where applicable, validation of that approval by other authorities, indicate acceptance of that aircraft type and build standard as complying with the RVSM airworthiness criteria.
- (c) For the second step, an aircraft operator may apply to the appropriate authority of the State in which the aircraft is registered, for airworthiness approval of specific aircraft. The application will need to be supported by evidence confirming that the specific aircraft has been inspected and, where necessary, modified in accordance with applicable service bulletins, and is of a type and build standard that meets the RVSM airworthiness criteria. The operator will need to confirm also that the continued airworthiness instructions are available and that the approved aircraft flight manual amendment or supplement has been incorporated. Approval by the authority indicates that the aircraft is eligible for RVSM operations. The authority will notify the designated monitoring cell accordingly. For RVSM airspace for which an operational approval is prescribed, airworthiness approval alone does not authorize flight in that airspace.

(2) Contents of the RVSM Approval Data Package

- (a) The combination of performance and analytical data, service bulletin(s) or its equivalent, continued airworthiness instructions and the approved amendment or supplement to the aircraft flight manual is known as the RVSM approval data package.

- (b) As a minimum, the data package will need to consist of the following items –
 - (i) a statement of the aircraft group or non-group aircraft and applicable build standard to which the data package applies;
 - (ii) a definition of the applicable flight envelope(s);
 - (iii) data showing compliance with the performance criteria of sections 4 and 5;
 - (iv) the procedures to be used to ensure that all aircraft submitted for airworthiness approval comply with RVSM criteria. These procedures will include the references of applicable service bulletins and the applicable approved aircraft flight manual amendment or supplement; and
 - (v) the maintenance instructions that ensure continued airworthiness for RVSM approval.

(3) Aircraft Groupings

- (a) For aircraft to be considered as members of a group for the purposes of RVSM approval, the following conditions must be satisfied –

- (i) aircraft must have been constructed to a nominally identical design and be approved on the same type certificate (TC), TC amendment, or supplemental TC, as applicable;

Note – For derivative aircraft it may be possible to use the data from the parent configuration to minimize the amount of additional data required to show compliance. The extent of additional data required will depend on the nature of the differences between the parent aircraft and the derivative aircraft.

- (ii) the static system of each aircraft must be nominally identical. The SSE corrections should be the same for all aircraft of the group; and
- (iii) the avionics units installed on each aircraft to meet the minimum RVSM equipment criteria of TS 91.04.31 Section 5(1) must comply with the manufacturer's same specification and have the same part number.

Note – Aircraft that have avionics units that are of a different manufacturer or part number may be considered part of the group, if it can be demonstrated that this standard of avionics equipment provides equivalent system performance.

- (b) If an airframe does not meet the conditions of subparagraphs (a)(i) to (iii) to qualify as a member of a group or is presented as an individual airframe for approval, then it will need to be considered as a non-group aircraft for the purposes of RVSM approval.

(4) Performance Data

The data package must contain data sufficient to show compliance with the accuracy criteria set by section 10b(4) of CA AOC-FO_008: "RVSM approval Advisory Circular"

- (a) General

ASE will generally vary with flight condition. The data package must provide coverage of the RVSM envelope sufficient to define the largest errors in the Basic and Full Envelopes. In the case of group aircraft approval, the worst flight condition may be different for each of the criterion set by 8c(3) and (4) of CA AOC-FO_008: "RVSM approval Advisory Circular" Each must be evaluated.

- (b) Where precision flight calibrations are used to quantify or verify altimetry system performance, they may be accomplished by any of the following methods. Flight calibrations should be performed only when appropriate ground checks have been completed. Uncertainties in application of the method will need to be assessed and taken into account in the data package -
 - (i) precision tracking radar in conjunction with pressure calibration of atmosphere at test altitude;
 - (ii) trailing cone;
 - (iii) pacer aircraft; or
 - (iv) any other method acceptable to the appropriate authority.

Note – When using pacer aircraft, the pacer aircraft will need to be calibrated directly to a known standard. It is not acceptable to calibrate a pacer aircraft by another pacer aircraft.

(c) Altimetry System Error Budget

It is implicit in the intent of TS 91.04.31, Section 4(2), for group aircraft approvals and for non-group approvals that a trade-off may be made between the various error sources that contribute to ASE. This document does not specify separate limits for the various error sources that contribute to the mean and variable components of ASE, as long as the overall ASE accuracy criteria of Section 4(2) are met.

For example, in the case of an aircraft group approval, the smaller the mean of the group and the more stringent the avionics standard, the larger the available allowance for SSE variations. In all cases, the trade-off adopted must be presented in the data package in the form of an error budget that includes all significant error sources. This is discussed in more detail in the following sections. Altimetry system error sources are discussed in Appendix 2 of CA AOC-FO_008: "RVSM approval Advisory Circular"

(d) Avionics Equipment

Avionics equipment must be identified by function and part number. A demonstration will need to show that the avionics equipment can meet the criteria established by the error budget when the equipment is operated in the environmental conditions expected to be met during RVSM operations.

(e) Groups of Aircraft

Where approval is sought for an aircraft group, the associated data package will need to show that the criteria sections 8c(3) and (4) of CA AOC-FO_008: "RVSM

approval Advisory Circular are met. Refer to section 10b(5)(d)(A) CA AOC-FO_008: "RVSM approval Advisory Circular" for guidance on aircraft group approval and the criteria to be met.

(f) Non-group Aircraft

When an aircraft is submitted for approval as a non-group aircraft, the data must be sufficient to show that the criteria of TS 91.04.31, Section 4(2) are met. The data package must specify how the ASE budget has been allocated between residual SSE and avionics error. The operator and appropriate authority must agree on what data is needed to satisfy approval criteria. The data in section 10(b)(5)(d) of CA AOC-FO_008: "RVSM approval Advisory Circular" must be established.

(5) Compliance Procedures

The data package will need to define the procedures, inspections and tests, and the limits that will be used to ensure that all aircraft approved against the data package 'conform to type'; that is, that all future approvals, whether of new build or in-service aircraft, meet the budget allowances developed according to section 10b(5)(b) of CA AOC-FO_008: "RVSM approval Advisory Circular". The budget allowances will be established by the data package and include a methodology that allows for tracking the mean and standard deviation for new build aircraft. Limits will need to be defined for each potential source of error. A discussion of error sources is provided in Appendix 2 of CA AOC-FO_008: "RVSM approval Advisory Circular". Examples of procedures are presented in Appendix 3 of CA AOC-FO_008: "RVSM approval Advisory Circular". Where an operating limitation has been applied, the package must contain the data and information necessary to document and establish that limitation.

(6) Continued Airworthiness

(a) The following items must be reviewed and updated as applicable to RVSM –

- (i) the Structural Repair Manual with special attention to the areas around each static source, angle of attack sensors, and doors if their rigging can affect airflow around the previously mentioned sensors; and
- (ii) the Master Minimum Equipment List (MMEL).

(b) The data package must include details of any special procedures that are not covered in subparagraph (a) above, but may be needed to ensure continued compliance with RVSM approval criteria. Examples follow –

- (i) for non-group aircraft, where airworthiness approval has been based on flight test, the continuing integrity and accuracy of the altimetry system will need to be demonstrated by ground and flight tests of the aircraft and its altimetry system at periods to be agreed with the appropriate authority. However, alleviation may be given of the flight test requirement if it can be demonstrated that the relationship between any subsequent airframe/system degradation and its effects on altimetry system accuracy is understood and that it can be corrected or compensation made for it;

- (ii) in-flight defect reporting procedures must be defined to aid identification of altimetry system error sources. Such procedures could cover acceptable differences between primary and alternate static sources, and others as appropriate; or
- (iii) for groups of aircraft where approval is based on geometric inspection, there may be a need for periodic re-inspection, and the interval required must be specified.

(7) Post Approval Modification

Any variation/modification from the initial installation that affects RVSM approval must be referred to the aircraft constructor or approved design organisation, and accepted by the appropriate authority.

7. Continued airworthiness (maintenance procedures)

(1) General

- (a) The integrity of the design features necessary to ensure that altimetry systems continue to meet RVSM approval criteria must be verified by scheduled tests and inspections in conjunction with an approved maintenance programme. The operator must review its maintenance procedures and address all aspects of continued airworthiness that may be relevant.
- (b) Adequate maintenance facilities will need to be available to enable compliance with the RVSM maintenance procedures.

(2) Maintenance Programmes

Each operator requesting RVSM operational approval must establish RVSM maintenance and inspection practices acceptable to, and as required by, the appropriate authority, which includes any required maintenance specified in the data package (TS 91.04.31, Section 6(2)). Operators of aircraft subject to maintenance programme approval will need to incorporate these practices into their maintenance programme.

(3) Maintenance Documents

The following items must be reviewed, as appropriate –

- (a) Maintenance Manuals;
- (b) Structural Repair Manuals;
- (c) Standard Practices Manuals;
- (d) Illustrated Parts Catalogues;
- (e) Maintenance Schedule; and
- (f) MMEL.

(4) Maintenance Practices

- (a) If the operator is subject to an approved maintenance programme, that programme must include, for each aircraft type, the maintenance practices stated in the

applicable aircraft and component manufacturers' maintenance manuals. In addition, for all aircraft, including those not subject to an approved maintenance programme, attention must be given to the items listed in section 10d of CA AOC-FO_008: "RVSM approval Advisory Circular".

(b) Action for Non-compliant Aircraft

Those aircraft positively identified as exhibiting height-keeping performance errors that require investigation may not be operated in RVSM airspace until the following actions have been taken –

- (i) the failure or malfunction is confirmed and isolated; and
- (ii) corrective action is taken as necessary to comply with TS 91.04.31, Section 6(5) (e) (vi) and verified to support RVSM approval.

(c) Maintenance Training

New training may be necessary to support RVSM-approval. Areas that may need to be highlighted for initial and recurrent training of relevant personnel are –

- (i) aircraft geometric inspection techniques;
- (ii) test equipment calibration and use of that equipment; and
- (iii) any special instructions or procedures introduced for RVSM approval.

(d) Test Equipment

- (i) the test equipment must have the capability to demonstrate continuing compliance with all the parameters established in the data package for RVSM approval or as approved by the appropriate authority; and
- (ii) test equipment shall be calibrated at periodic intervals, as agreed by the appropriate authority, using reference standards of which the calibration is certified as being traceable to national standards acceptable to that authority. The approved maintenance programme must include an effective quality control programme with attention to the following –
 - (aa) definition of required test equipment accuracy;
 - (bb) regular calibrations of test equipment traceable to a master standard. Determination of the calibration interval shall be a function of the stability of the test equipment. The calibration interval must be established using historical data so that degradation is small in relation to the required accuracy;
 - (cc) regular audits of calibration facilities both in-house and outside;
 - (dd) adherence to approved maintenance practices; and
 - (ee) procedures for controlling operator errors and unusual environmental conditions which may affect calibration accuracy.

8. Operational approval

(1) Purpose and Organisation

This section gives an overview of the RVSM approval processes. This section describes steps to be followed and gives detailed guidance on the required operational practices and procedures for airspace where operational approval is required. Appendices 4 and 5 of CA AOC-FO_008: "RVSM approval Advisory Circular" are related to this section and contain essential information for operational programmes.

(2) RVSM Operations

Approval will be required for each aircraft group and each aircraft to be used for RVSM operations. Approval will be required for each operator and the Director will need to be satisfied that –

- (a) each aircraft holds airworthiness approval according to section 6;
- (b) each operator has continued airworthiness programmes (maintenance procedures) according to TS 91.04.31, Section 7;
- (c) where necessary, operating procedures, unique to the airspace, have been incorporated in operations manuals, including any limitations identified in TS 91.04.31, Section 5(5); and
- (d) high levels of aircraft height-keeping performance can be maintained.

(3) Content of Operator RVSM Application

The following material must be made available to the appropriate authority, in sufficient time to permit evaluation, before the intended start of RVSM operations –

(a) Airworthiness Documents

Documentation that shows that the aircraft has RVSM airworthiness approval. This must include an approved aircraft flight manual amendment or supplement.

(b) Description of Aircraft Equipment

A description of the aircraft appropriate to operations in an RVSM environment.

(c) Training Programmes and Operating Practices and Procedures

Holders of an air services licence or equivalent document will need to submit training syllabi for initial, and where appropriate, recurrent training programmes, together with other appropriate material, to the Director. The material will need to show that the operating practices, procedures and training items, relating to RVSM operations in airspace that require State operational approval, are incorporated.

Part 91 operators will need to comply with local procedures to satisfy the Director that their knowledge of RVSM operating practices and procedures is equivalent to that set for holders of an air services licence, sufficient to permit them to conduct RVSM operations.

Guidance on the content of training programmes and operating practices and procedures is given in Appendix 4 of CA AOC-FO_008: “RVSM approval Advisory Circular”. In broad terms, this covers flight planning, pre-flight procedures, aircraft procedures before RVSM airspace entry, in-flight procedures and flight crew training procedures. The procedures used within airspace of the EUR region and the procedures unique to the North Atlantic Airspace for which specific State operational approval is required, are stated in ICAO Document 7030/4.

(d) Operations Manuals and Checklists:

The appropriate manuals and checklists must be revised to include information/guidance on standard operating procedures as detailed in Appendix 4 of CA AOC-FO_008: “RVSM approval Advisory Circular”. Manuals must include a statement of the airspeeds, altitudes and weights considered in RVSM aircraft approval; including identification of any operating limitations or conditions established for that aircraft group. Manuals and checklists must be submitted for review by the authority as part of the application process.

(e) Past Performance

Relevant operating history, where available, should be included in the application. The applicant must show that changes needed in training, operating or maintenance practices to improve poor height keeping performance have been made.

(f) Minimum Equipment List

Where applicable, minimum equipment list (MEL), adapted from the master minimum equipment list (MMEL) and relevant operational regulations, shall include items pertinent to operating in RVSM airspace.

(g) Maintenance when application is made for operational approval.

The operator must establish a maintenance programme acceptable to the appropriate authority, as detailed in section TS 91.04.31, Section 6.

(h) Plan for Participation in Verification/Monitoring Programmes

The operator shall establish a plan acceptable to the appropriate authority, for participation in any applicable verification/monitoring programme (See 12(8) of CA AOC-FO_008: “RVSM approval Advisory Circular”. This plan will need to include, as a minimum, a check on a sample of the operator’s fleet by an independent height monitoring system.

(4) Demonstration Flight(s)

The content of the RVSM application may be sufficient to verify the aircraft performance and procedures. However, the final step of the approval process may require a demonstration flight. The Director may appoint an inspector for a flight in RVSM airspace to verify that all relevant procedures are applied effectively. If the performance is satisfactory, operation in RVSM airspace may be permitted.

(5) Form of Approval Documents

(a) Holders of an Air Operator's Certificate

Approval to operate in designated RVSM airspace areas will be granted by an Approval issued by the Director in accordance with these Regulations where operational approval is required by an ICAO Regional Agreement. Each aircraft group for which the operator is granted approval will be listed in the Approval.

(b) Non-AOC Holders

These operators will be issued with an approval as required by these Regulations. These approvals will be valid for a period of two years and will require renewal.

Note – Subject to compliance with applicable criteria, the RVSM Approval may combine the airworthiness approval of TS 91.04.31, Section 6(1)(c) and the operational approval of section 8(2).

(6) Airspace Monitoring

For airspace where a numerical Target Level of Safety is prescribed, monitoring of aircraft height-keeping performance in the airspace by an independent height-monitoring system is necessary to verify that the prescribed level of safety is being achieved. However, an independent monitoring check of an aircraft is not a prerequisite for the granting of an RVSM approval.

(7) Suspension, Revocation and Reinstatement of RVSM Approval

(a) The incidence of height-keeping errors that can be tolerated in an RVSM environment is small. It is expected of each operator to take immediate action to rectify the conditions that cause an error. The operator must report an occurrence involving poor height-keeping to the appropriate authority within 72 hours. The report should include an initial analysis of causal factors and measures taken to prevent repeat occurrences. The need for follow-up reports will be determined by the appropriate authority. Occurrences that must be reported and investigated in terms of regulation 91.04.34(9) are errors of –

- (i) TVE equal to or greater than ± 300 ft;
- (ii) ASE equal to or greater than ± 245 ft; and
- (iii) assigned altitude deviation equal to or greater than ± 300 ft.

(b) Height-keeping Errors

Height-keeping errors fall into two broad categories –

- (i) errors caused by malfunction of aircraft equipment; and
- (ii) operational errors.

(c) An operator that consistently experiences errors in either category will have approval for RVSM operations suspended or revoked. If a problem is identified which is

related to one specific type of aircraft, then RVSM approval may be suspended or revoked for that specific type within that operator's fleet.

Note – The tolerable level of collision risk in the airspace would be exceeded if an operator has consistently experienced errors.

(d) Operators Actions

The operator must make an effective, timely response to each height-keeping error. The appropriate authority may consider suspending or revoking RVSM approval if the operator's responses to height-keeping errors are not effective or timely. The appropriate authority will consider the operator's past performance record in determining the action to be taken.

(e) Reinstatement of Approval

The operator will need to satisfy the appropriate authority that the causes of height-keeping errors are understood and have been eliminated and that the operator's RVSM programmes and procedures are effective. The authority may require an independent height-monitoring check of affected aircraft to be performed at its discretion and to restore confidence.

9. Height Keeping Performance Monitoring

Height keeping Performance Monitoring shall be conducted at least once every two years or within intervals of 1000 flight hours per aeroplane, whichever is greater, on a minimum number of aeroplanes per type grouping as stipulated in the table below.

RVSM Aircraft Group Category		Minimum Operator Monitoring for Each Aircraft Group
<i>Note: Refer to AIC for RVSM Aircraft Group Categories</i>		
1	Group Approved (Data indicates Compliance with RVSM MASPS)	A minimum of Two (2) airframes from each aeroplane type grouping of the operator's fleet shall be monitored.
2	Group Approved (Insufficient Data on Approved Aircraft)	A minimum of 60% (round up if fractional) of the airframes from each aeroplane type grouping of the operator's fleet shall be monitored
3	Non-Group	100%of aircraft shall be monitored

91.05.1 COMMUNICATION EQUIPMENT

1. General

- (1) An owner or operator must ensure that a flight does not commence unless the communication and navigation equipment required under Subpart 5 of the CAR Part 91 is –
 - (a) approved and installed in accordance with the applicable requirements, including the minimum performance standard and the operational and airworthiness requirements;
 - (b) installed in such manner that the failure of any single unit required for either communication or navigation purposes, or both, will not result in the inability to communicate and/or navigate safely on the route being flown;
 - (c) in an operable condition for the kind of operation being conducted except as provided in the MEL; and
 - (d) so arranged that if equipment is to be used by one flight deck crew member at his or her station during flight, it must be readily operable from his or her station. When a single item of equipment is required to be operated by more than one flight deck crew member, it must be installed so that the equipment is readily operable from any station at which the equipment is required to be operated.
- (2) Communication and navigation equipment minimum performance standards are those prescribed in the applicable ZA-TSO as listed in the ZA-TSO, unless different performance standards are approved. Communication and navigation equipment complying with design and performance specifications other than ZA-TSO on the date of commencement of the CAR may remain in service.

2. Radio equipment

- (1) An owner or operator may not operate an aircraft unless it is equipped with the number and type of radios required for the kind of operation being conducted.
- (2) Where two independent (separate and complete) radio systems are required under section 5 of this technical standard, each system must have an independent antenna installation except that, where rigidly supported non-wire antennae or other antenna installations or equivalent reliability are used, only one antenna is required.

3. Audio selector panel

An owner or operator may not operate an aircraft under IFR unless it is equipped with an audio selector panel accessible to each required flight crew member.

4. Radio equipment for operations under VFR over routes navigated by reference to visual landmarks

An owner or operator may not operate an aircraft under VFR over routes than can be navigated by reference to visual landmarks, unless it is equipped with the radio equipment

(communication and SSR transponder equipment) necessary under normal operating conditions to fulfill the following –

- (a) communicate with appropriate ground stations;
- (b) communicate with appropriate air traffic service facilities from any point in controlled airspace within which flights are intended;
- (c) receive meteorological information; and
- (d) reply to SSR interrogations as required for the route being flown.

5. Communication equipment for operations under IFR, or under VFR over routes not navigated by reference to visual landmarks

An owner or operator may not operate an aircraft under IFR, or under VFR over routes that cannot be navigated by reference to visual landmarks, unless the aircraft is equipped with communication equipment in accordance with the requirements of air traffic services in the area(s) of operation, but not less than –

- (a) two independent radio communication systems necessary under normal operating conditions to communicate with an appropriate ground station from any point on the route including diversions; and
- (b) SSR transponder equipment as required for the route being flown.

6. RCP communication equipment

For flight operations in defined portions of airspace or on routes where an RCP type has been prescribed, an aeroplane shall, in addition to the foregoing requirements, –

- (a) be provided with communication equipment which will enable it to operate in accordance with the prescribed RCP type(s); and
- (b) be authorized by the Director for such operations.

91.05.2 NAVIGATION EQUIPMENT

1. Navigation equipment for operations under IFR or under VFR over routes not navigated by reference to visual landmarks

- (1) Except as provided in paragraph (2), an owner or operator may not operate an aircraft under IFR, or under VFR over routes that cannot be navigated by reference to visual landmarks, using traditional ground-based navigation aids unless the aircraft is equipped with navigation equipment that will enable it to proceed as flight planned, including any possible routings to an alternate aerodrome.

Note – Traditional ground-based navigation aids include VOR, NDB, ILS, DME and MLS.

- (2) An owner or operator may operate an aircraft that is not equipped with the navigation equipment specified in paragraph (1): Provided that it is equipped with alternative equipment authorised by the Director for the route being flown. The reliability and the accuracy of alternative equipment must allow safe navigation for the intended route.

2. MNPS specifications

An owner or operator may not operate an aircraft in MNPS airspace unless it is equipped with navigation equipment that complies with minimum navigation performance specifications prescribed in ICAO Doc 7030 in the form of Regional Supplementary Procedures. Guidance on meeting basic MNPS navigation requirements may be found in the United States FAA Advisory Circular –

- (a) AC 91-49, General Aviation Procedures for Flight within North Atlantic Minimum Navigation Performance Specifications Airspace (as amended); and
- (b) AC 120-33, Operational Approval of Airborne Long-Range Navigation Systems for Flight within North Atlantic Minimum Navigation Performance Specifications Airspace (as amended).

3. RNP/BRNAV specifications

An owner or operator may not operate an aircraft in airspace requiring specified navigation accuracy unless it is equipped with navigation equipment that complies with the minimum navigation performance specifications prescribed in ICAO Doc 7030 in the form of Regional Supplementary Procedures. Guidance on meeting RNP/BRNAV navigation requirements may be found in the United States FAA Advisory Circulars –

- (a) AC 90-100, US Terminal and *En Route* Area Navigation (RNAV) Operations (as amended);
- (b) AC 91-70, Large Aircraft Oceanic Operations for RNAV (RNP 10) Approval (as amended); and
- (c) AC 90-96, Approval of U.S. Operators and Aircraft to Operate Under Instrument Flight Rules (IFR) in European Airspace Designated for Basic Area Navigation (B-RNAV) and Precision Area Navigation (P-RNAV) (as amended).

91.05.3 USE OF GLOBAL NAVIGATION SATELLITE SYSTEM

1. Definitions

Any word or expression to which a meaning has been assigned in the Act and the Civil Aviation Regulations, bears, when used in this technical standard, the same meaning unless the context indicates otherwise, and –

“sole means navigation system” means a navigation system that, for a given phase of flight, must allow the aircraft to meet all four navigation system performance requirements, accuracy, integrity, availability and continuity of service;

“primary means navigation system” means a navigation system that, for a given operation or phase of flight, must meet accuracy and integrity requirements, but need not meet full availability and continuity of service requirements. Safety is achieved by either limiting flights to specific time periods or through appropriate procedural restrictions and operational requirements;

“supplemental means navigation system” means a navigation system that must be used in conjunction with a sole means navigation system;

“integrity” means that quality which relates to the trust which can be placed in the correctness of information supplied by a system. It includes the ability of a system to provide timely warnings to users when the system should not be used for navigation;

“receiver autonomous integrity monitoring” means a technique whereby an airborne GPS receiver/processor autonomously monitors the integrity of the navigation signals from GPS satellites, and where reference to RAIM occurs, it includes other approved equivalent integrity monitoring systems.

2. Purpose

- (1) This paragraph prescribes the requirements for the use of a GPS within South African airspace and elsewhere if so approved, for the purpose of –
 - (a) position fixing;
 - (b) long range navigation including operations on designated area navigation (RNAV) routes;
 - (c) deriving distance information, for *en route* navigation, traffic information and ATC separation; and
 - (d) application of RNAV-based separation.
- (2) GPS may be used as a sole or primary means navigation system or for instrument approaches provided the operator and the aircraft have received approval from the Director and the operator complies with such restrictions as may be imposed on its use.
- (3) GPS may continue to be used as an *en route* supplemental navigation aid.

3. Airworthiness requirements

The following airworthiness requirements must be satisfied –

- (a) GPS navigation equipment must have US FAA Technical Standard Order (TSO) C-129 (or CAA-approved equivalent) authorisation;
- (b) if the GPS is installed in such a way that it is integrated with the aircraft’s autopilot and navigation system, the GPS must be de-energised when ILS is selected;
- (c) the aircraft must be placarded that the GPS is not approved as a sole navigation and/or approach aid; and
- (d) automatic barometric aiding function, as provided by TSO C-129, must be connected.

Notes –

1. Operators should be made aware that not all TSO C-129 receivers will meet the requirements for future non-precision approaches, other than “GPS Arrivals”, and “DME or GPS Arrivals”.

2. Operators should also be aware that TSO C-129 receivers may not be able to take advantage of future enhanced GPS capabilities, such as wide area or local area augmentation systems (WAAS or LAAS).
3. Operators should ensure that receivers are upgradable to accommodate future augmentation which will be required in terminal areas and for approaches.

4. Pilot training and certification

- (1) Pilot training shall be accomplished at an approved training organisation (ATO) or, for air operators, in accordance with their approved training programme.
- (2) The following pilot training requirements shall be satisfied –
 - (a) prior to using GPS in IFR operations for any of the purposes specified in this technical standard, the holder of a valid instrument rating shall, unless exempted by the Director, have completed a course of ground and flight training based on the syllabus contained in Part 61; and
 - (b) the course must cover both general information and procedures applicable to all types of GPS equipment, as well as the essential operating procedures for a specific type of aircraft equipment. Pilots who have completed the course and who wish to use a different type of GPS aircraft equipment, must ensure that they are familiar with, and competent in, the operating procedures required for that type of equipment, before using it in flight for any of the purposes approved in this section.
- (3) Pilot certification –
 - (a) Upon meeting the requirements of Part 61, the pilot shall furnish the relevant documentation to the SACAA Licensing Division for the appropriate licensing action.
 - (b) The licensing action referred to subparagraph (a) shall indicate the extent of the GNSS operations approved as follows –
 - (i) GNSS terminal area and *en route* only; or
 - (ii) GNSS unrestricted.
- (4) Pilot recertification shall be undertaken at least annually as part of the instrument rating skills test.

5. Operational requirements

The following operational requirements must be satisfied –

- (a) operating instructions for GPS navigation equipment must be –
 - (i) carried on board; and
 - (ii) incorporated into the operations manual for commercial operations;
- (b) GPS navigation equipment must be operated in accordance with the operating instructions and any additional requirements specified in the aircraft flight manual or flight manual supplement;

- (c) in addition to GPS, aircraft must be equipped with serviceable radio navigation systems as prescribed in section 1 of technical standard 91.05.2 of Document SA-CATS 91;
- (d) when within rated coverage of ground-based navigation aids, pilots must monitor the ground-based system and maintain track as defined by the most accurate ground-based radio navigation aid (VOR or NDB) available. If there is a discrepancy between the GPS and ground-based system information, pilots must use the information provided by the ground-based navigation system;
- (e) ATS may require GPS-equipped aircraft to establish on, and track with reference to, a particular VOR radial or NDB track for the application of separation;
- (f) GPS must not be used as a navigation reference for flight below the MSA, except as otherwise authorised by the Director.

5. Operations without RAIM

- (1) GPS systems normally provide three modes of operation –
 - (a) navigation (nav) solution with RAIM;
 - (b) 2D or 3D nav solution without RAIM; and
 - (c) dead reckoning (DR), or loss of nav solution.
- (2) ATS services, and in particular ATC separation standards, are dependent on accurate navigation and position fixing. If RAIM is lost, the accuracy of the system is assumed not to meet the required standard for both navigation and application of ATC separation. Accordingly, when RAIM is lost, the following procedures must be adopted –
 - (a) aircraft tracking must be closely monitored against other on-board systems;
 - (b) in controlled airspace, the ATS unit must be advised if –
 - (i) RAIM is lost for periods greater than ten minutes, even if GPS is still providing positional information;
 - (ii) RAIM is not available when the ATS unit requests GPS distance or if an ATC clearance or requirement based on GPS distance is imposed;
 - (iii) the GPS receiver is in DR mode or experiences loss of navigation function for more than one minute; or
 - (iv) indicated displacement from track centreline is found to exceed 2 NM; and
 ATS may then adjust separation;
 - (c) if valid position information is lost (2D and DR Mode) or non-RAIM operation exceeds ten minutes, the GPS information is to be considered unreliable and another means of navigation should be used until RAIM is restored and the aircraft is re-established on track;

- (d) following re-establishment of RAIM, the appropriate ATS unit should be notified of RAIM restoration, prior to using GPS information. This will allow the ATS unit to reassess the appropriate separation standards; and
- (e) when advising the ATS unit of the status of GPS the phrases “RAIM FAILURE” or “RAIM RESTORED” must be used.

6. GPS distance information to air traffic service units

- (1) When a DME distance is requested by an ATS unit, DME-derived distance information should normally be provided. Alternatively, GPS-derived distance information may be provided to an ATS unit, unless RAIM is currently unavailable and has been unavailable for the preceding ten minutes.
- (2) Notwithstanding paragraph (1), if an ATS unit has issued a clearance or requirement based upon GPS distance (eg. a requirement to reach a certain level by a GPS distance), pilots must inform the ATS unit if RAIM is not available.
- (3) When a DME distance is not specifically requested or when the provision of a DME distance is not possible, distance information based on GPS-derived information may be provided. When providing GPS distance, transmission of distance information must include the source and point of reference – eg 115 NM GPS JSV, 80 NM GPS VAL NDB, 267 NM GPS ORNAD, etc.
- (4) If a GPS distance is provided to an ATS unit and RAIM is not currently available, but has been available in the preceding 10 minutes, the distance report should be suffixed “NEGATIVE RAIM” – eg 26 NM GPS BLV NEGATIVE RAIM.
- (5) Databases sometimes contain waypoint information which is not shown on published AIP charts and maps. Distance information must only be provided in relation to published waypoints unless specifically requested by an ATS unit.
- (6) Where GPS distance is requested or provided from an NDB, VOR, DME or published waypoint, the latitude and longitude of the navigation air or waypoint must be derived from a validated database which cannot be modified by the operator or flight crew.

7. Data integrity

- (1) As a significant number of data errors, in general applications, occur as a result of manual data entry errors, navigation aid and waypoint latitude and longitude data should be derived from a database, if available, which cannot be modified by the operator or flight crew.
- (2) It is the responsibility of the owner or operator to ensure the GPS database is current and accurate. The GPS database shall be updated with data provided by the manufacturer or other approved source, hereinafter referred to as the “provider”. The frequency of database updating shall be as the provider determines but, in any event, an owner or operator shall, within 2 months of the date the latest issue was received, confirm with the provider that such update is the most recent.

- (3) When data is entered manually, data entries must be cross-checked by at least two flight crew members for accuracy and reasonableness, or, for single pilot operations, an independent check (eg. GPS computed tracks and distances against current chart data) must be made.
- (4) Both manually entered and database-derived position and tracking information should be checked for reasonableness (confidence check) in the following cases –
 - (a) prior to each compulsory reporting point;
 - (b) at or prior to arrival at each *en route* waypoint;
 - (c) at hourly intervals during area type operations when operating off established routes; and
 - (d) after insertion of new data (eg creation of new flight plan).

8. Integrity and interference data sheets

Coincident with the approvals contained in this technical standard, and in order to build up the data base on GPS integrity in South Africa, a system validation period has been established to verify operationally the availability of RAIM, and the quality of navigation provided by GPS at other times.

Notes –

1. *Operators or pilots using GPS are requested to provide GPS system information, as detailed below –*
 - (a) *private operators are requested to submit information on GPS interference as it occurs;*
 - (b) *commercial operators are requested to submit integrity reports for the first 30 flights after installation of approved GPS equipment. After this period, operators are requested to monitor and record the performance of GPS and provide details of the system accuracies and reliabilities from time to time. In addition to these reports, operators are requested to submit information on GPS interference as it occurs.*
2. *Pilots should particularly note cases of GPS degradation/interference around aerodromes, over populated areas, near radio or television transmission towers, and during radio or SATCOM transmissions.*
3. *Data should be entered on the GNSS Verification Data Sheet, a sample of which may be obtained from the SACAA. This data will be used to verify the predicted integrity of the GPS system in South African airspace and will, in part, form the basis for future extension of GPS approvals and revisions to ATC separation minima.*

91.05.4 OPERATIONAL CRITERIA FOR THE USE OF RNAV/BARO VNAV SYSTEMS

1. Approval of RNAV/BARO VNAV systems

Guidance for the approval for use of RNAV/BARO VNAV systems may be found in the latest edition of the United States FAA Advisory Circular AC 90-105 – *Approval Guidance for RNP Operations and Barometric Vertical Navigation in the U.S. National Airspace System*. This represents a means, though not sole means, of attaining the approval of the Director to conduct VNAV operations.

2. Operational provisions for use of RNAV/BARO VNAV systems

- (1) The following factors upon which the vertical navigational performance of the BARO VNAV procedure depends, shall be taken into account –
 - (a) atmospheric effects – atmospheric errors associated with non-standard temperatures;
 - (b) along-track position uncertainty – along-track error that may result in an error in the vertical path;
 - (c) FTE;
 - (d) other system errors – errors such as static source error, non-homogenous weather phenomena and latency defects; and
 - (e) blunder errors – errors such as the application of an incorrect or out-of-date altimeter setting either by the ATS unit or the pilot.
- (2) The pilot shall be responsible for performing and verifying any cold temperature correction that is required for all published minimum altitudes/heights, including the preceding initial and intermediate segments, Decision Attitude/Height (DA/H) and subsequent missed approach heights/altitudes.
- (3) No pilot-in-command may perform BARO VNAV IAP procedures if the aerodrome temperature is below the promulgated minimum aerodrome temperature for the procedure. If the aerodrome temperature is below the promulgated minimum aerodrome temperature for the procedure, a LNAV procedure may still be used if –
 - (a) a RNAV non-precision procedure and RNAV/LNAV Obstacle Clearance Altitude/Height (OCA/H) is promulgated for the approach; and
 - (b) the pilot-in-command applies the appropriate cold temperature altimeter correction to all minimum promulgated altitudes/heights.
- (4) The pilot-in-command shall have current knowledge of operation of the RNAV/BARO VNAV equipment to achieve the optimum level of navigation accuracy.
- (5) BARO VNAV procedures shall only be flown with a current local altimeter setting and the QNH/QFE, as appropriate, set on the altimeter of the aircraft.
- (6) The pilot-in-command shall ensure obstacle clearance by limiting vertical path excursions to a range of less than +100 ft (+30 m) and over -50 ft (-15m) from the VPA.
- (7) The operator of an aircraft approved for use in commercial air transport operations, shall, in addition to the operational requirements prescribed in this regulation, comply with the appropriate provisions of its approved operations specifications.

91.06.10 LIGHTS TO BE DISPLAYED BY AIRCRAFT

1. Definitions

Any word or expression to which a meaning has been assigned in the Act, and the Civil Aviation Regulations, bears, when used in this technical standard, the same meaning unless the context indicates otherwise, and –

“angles of coverage” means –

- (a) angle of coverage A is formed by two intersecting vertical planes making angles of 70 degrees to the right and 70 degrees to the left respectively, looking aft along the longitudinal axis to a vertical plane passing through the longitudinal axis.
- (b) angle of coverage F is formed by two intersecting vertical planes making angles of 110 degrees to the right and 110 degrees to the left respectively, looking forward along the longitudinal axis to a vertical plane passing through the longitudinal axis.
- (c) angle of coverage L is formed by two intersecting vertical planes one parallel to the longitudinal axis of the aeroplane, and the other 110 degrees to the right of the first, when looking forward along the longitudinal axis.
- (d) angle of coverage R is formed by two intersecting vertical planes one parallel to the longitudinal axis of the aeroplane, and the other 110 degrees to the right of the first, when looking forward along the longitudinal axis.

“horizontal plane” means the plane containing the longitudinal axis and perpendicular to the plane of symmetry of the aeroplane;

“longitudinal axis of the aeroplane” means a selected axis parallel to the direction of flight at a normal cruising speed, and passing through the centre of gravity of the aeroplane;

“making way” means that an aeroplane on the surface of the water is under way and has a velocity relative to the water;

“under command” means that an aeroplane on the surface of the water is able to execute manoeuvres as required by the International Regulations for Preventing Collisions at Sea for the purpose of avoiding other vessels;

“under way” means that an aeroplane on the surface of the water is not aground or moored to the ground or to any fixed object on the land or in the water;

“vertical planes” means planes perpendicular to the horizontal plane; and

“visible” means **visible on a dark night with a clear atmosphere.**

2. Aircraft operating lights

2.1 Navigation lights to be displayed in the air

As illustrated in Figure 1, the following unobstructed navigation lights must be displayed –

- (a) a red light projected above and below the plane through angle of coverage L;
- (b) a green light projected above and below the horizontal plane through angle of coverage R;
- (c) a white light projected above and below the horizontal plane rearward through angle of coverage A.

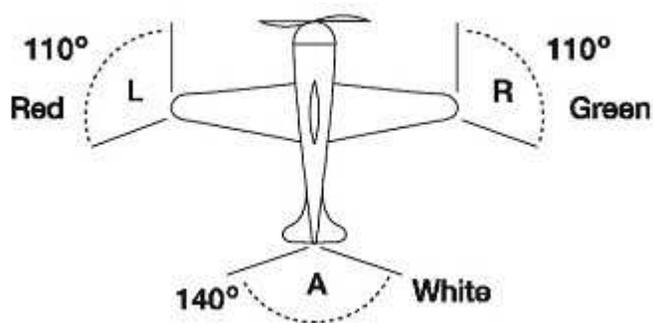


Figure 1

2.2 Lights to be displayed on the water

(1) General

- (a) The International Regulations for Preventing Collisions at Sea require different lights to be displayed in each of the following circumstances –
- (i) when under way;
 - (ii) when towing another vessel or aeroplane;
 - (iii) when being towed;
 - (iv) when not under command and not making way;
 - (v) when making way but not under command;
 - (vi) when at anchor; and
 - (vii) when aground.
- (b) The lights required by aircraft shall be displayed as described below unless it is impractical for them to do so, in which case they shall display lights as closely similar as possible in characteristics and position to those required by this TS.

(2) When under way

- (a) as illustrated in Figure 2, the following appearing as steady unobstructed lights –
- (i) a red light projected above and below the plane through angle of coverage L;
 - (ii) a green light projected above and below the horizontal plane through angle of coverage R;
 - (iii) a white light projected above and below the horizontal plane rearward through angle of coverage A; and
 - (iv) a white light projected through angle of coverage F;
- (b) the lights described in the first three items should be visible at a distance of at least 3.7 km (2 NM). The light described in the fourth item should be visible at a distance of 9.3 km (5 NM) when fitted to an aeroplane of 20 m or more in length or visible at a distance of 5.6 km (3 NM) when fitted to an aeroplane of less than 20 m in length.

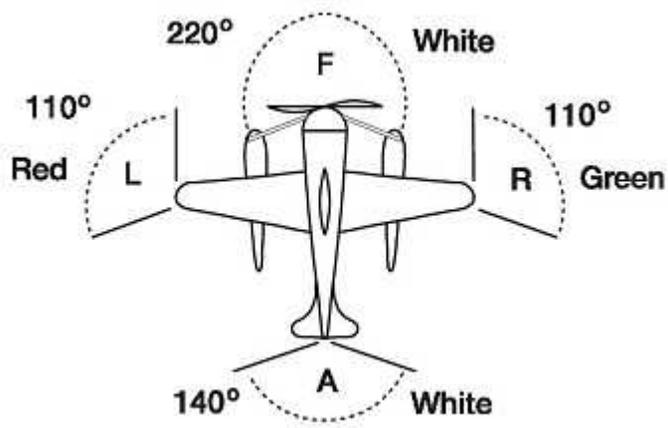


Figure 2

(3) When towing another vessel or aeroplane

As illustrated in Figure 3, the following appearing as steady, unobstructed lights –

- (a) the lights described in paragraph (2);
- (b) a second light having the same characteristics as the light described in the fourth item of paragraph (2) and mounted in a vertical line at least 2 m above or below it; and
- (c) a yellow light having otherwise the same characteristics as the light described in the third item of paragraph (2) and mounted in a vertical line at least 2 m above it.

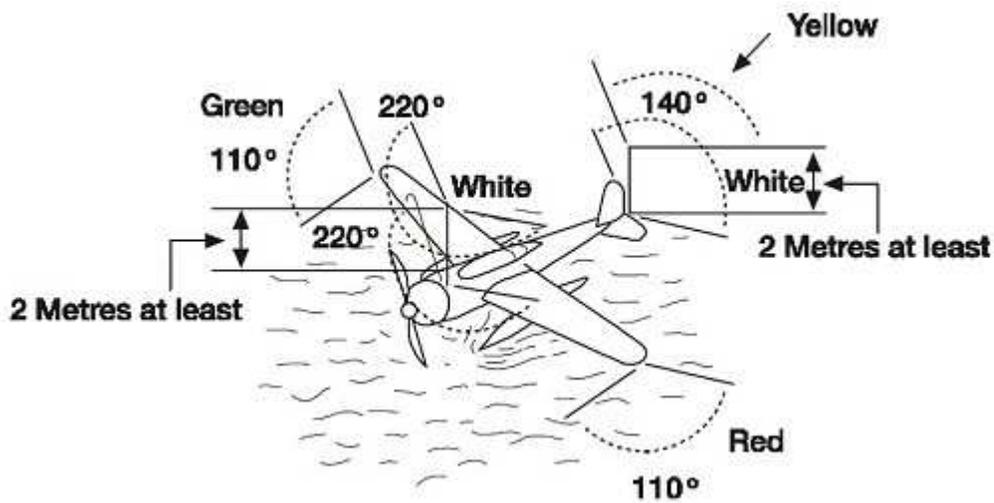


Figure 3

(4) When being towed

The lights described in the first three items of paragraph (2) appearing as steady unobstructed lights.

(5) When not under command and not making way

As illustrated in Figure 4, two steady red lights placed where they can best be seen, one vertically over the other and not less than 1 m apart, and of such a character as to be visible all around the horizon at a distance of at least 3,7 km (2 NM).

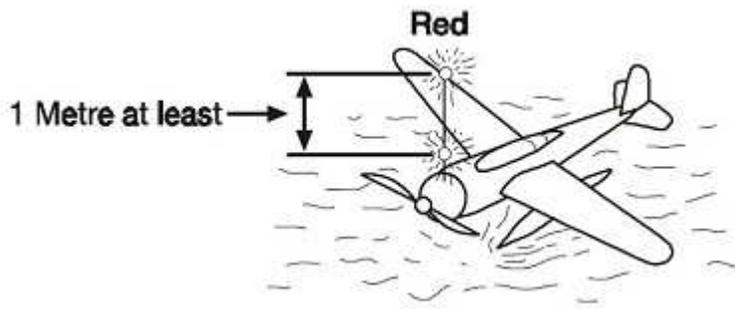


Figure 4

- (6) When making way but not under command

As illustrated in Figure 5, the lights described in paragraph (5) and the first three items of paragraph (2).

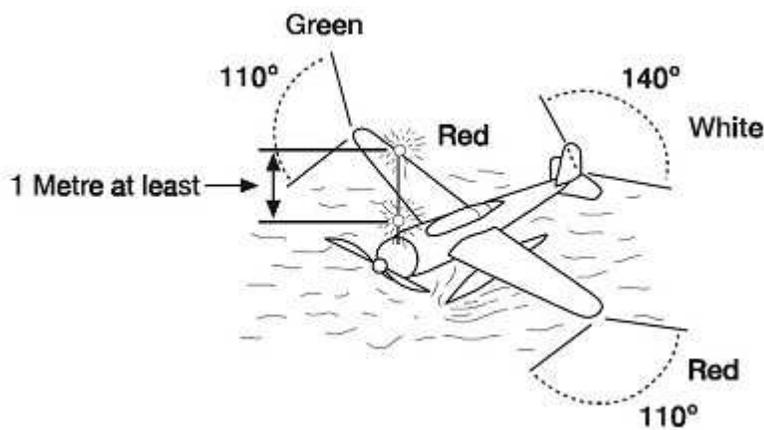


Figure 5

Note – The display of lights prescribed in paragraphs (5) and (6) above is to be taken by other aircraft as signals that the aeroplane showing them is not under command cannot therefore get out of the way. They are not signals of aeroplanes in distress and requiring assistance.

- (7) When at anchor
 - (a) If less than 50 m in length, where it can best be seen, a steady white light (Figure 6), visible all around the horizon at a distance of at least 3.7 km (2 NM).

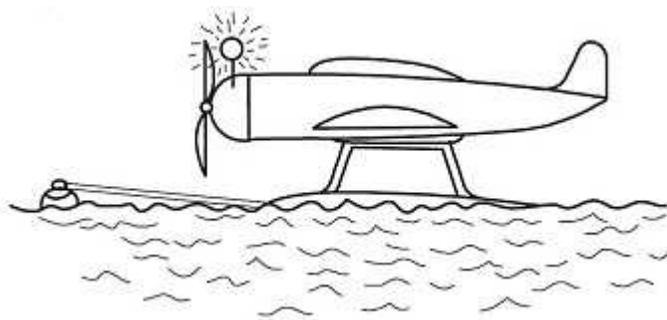


Figure 6

- (b) If 50 m or more in length, where they can best be seen, a steady white forward light and a steady white rear light (Figure 7) both visible all around the horizon at a distance of at least 5.6 km (3 NM).

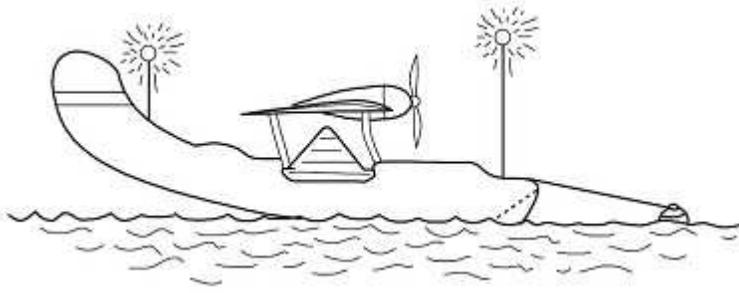


Figure 7

- (c) If 50 m or more in span a steady white light on each side (Figures 8 and 9) to indicate the maximum span and visible, so far as practicable, all around the horizon at a distance of at least 1.9 km (1 NM).

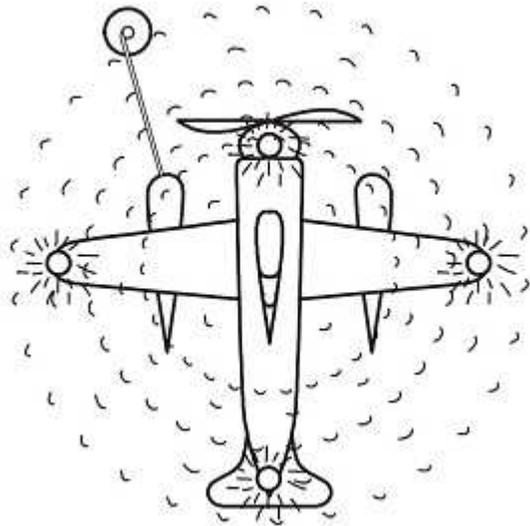


Figure 8

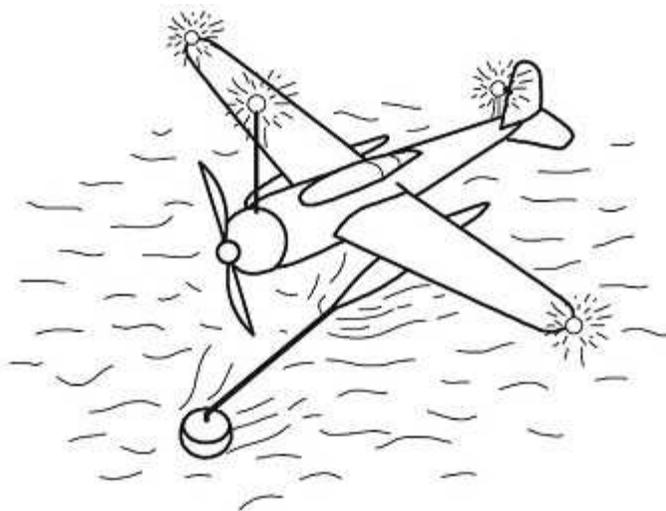


Figure 9

(8) When aground

The lights prescribed in paragraph (7) and in addition two steady red lights in vertical line, at least 1 m apart so placed as to be visible all around the horizon.

91.06.13 SIGNALS

1. Distress signals

- (1) The following signals, used either together or separately, mean that grave and imminent danger threatens and immediate assistance is requested –
 - (a) a signal made by radiotelegraphy or by any other signalling method consisting of the group SOS (. . . _ _ _ . . . in the morse code);
 - (b) a signal sent by radiotelephony consisting of the spoken word 'MAYDAY' three times;
 - (c) rockets or shells throwing red lights, fired one at a time at short intervals; and
 - (d) a parachute flare showing a red light.
- (2) Alarm signals for actuating radiotelegraph and radiotelephone auto-alarm systems –
 - (a) The radiotelegraph alarm signal consists of a series of twelve dashes sent in one minute, the duration of each dash being four seconds and the duration of the interval between consecutive dashes one second. It may be transmitted by hand but its transmission by means of an automatic instrument is recommended;
 - (b) The radiotelephone alarm signal consists of two substantially sinusoidal audio frequency tones transmitted alternately. One tone has a frequency of 2 200 Hz and the other a frequency of 1 300 Hz, the duration of each tone being 250 milliseconds; and
 - (c) The radiotelephone alarm signal, when generated by automatic means, must be sent continuously for a period of at least thirty seconds but not exceeding one minute; when generated by other means, the signal must be sent as continuously as practicable over a period of approximately one minute.
- (3) None of the provisions in this paragraph prevent the use, by an aircraft in distress, of any means at its disposal to attract attention, make known its position and obtain help.

2. Urgency signals

- (1) The following signals, used either together or separately, mean that an aircraft wishes to give notice of difficulties which compel it to land without requiring immediate assistance –
 - (a) the repeated switching on and off of the landing lights; or
 - (b) the repeated switching on and off of the navigation lights in such manner as to be distinct from flashing navigation lights.
- (2) The following signals, used either together or separately, mean that an aircraft has a very urgent message to transmit concerning the safety of a ship, aircraft or other vehicle, or of some person on board or within sight –
 - (a) a signal made by radiotelegraphy or by any other signalling method consisting of the group XXX; and

(b) a signal sent by radiotelephony consisting of the spoken words 'PAN, PAN, PAN'.

(3) None of the provisions in this paragraph prevent the use, by an aircraft in distress, of any means at its disposal to attract attention, make known its position and obtain help.

3. Visual signals used to warn an unauthorised aircraft flying in, or about to enter a restricted, prohibited or danger area

By day and by night, a series of projectiles discharged from the ground at intervals of 10 seconds, each showing, on bursting, red and green lights or stars will indicate to an unauthorised aircraft that it is flying in or about to enter a restricted, prohibited or danger area, and that the aircraft is to take such remedial action as may be necessary.

4. Signals for aerodrome traffic

(1) Light and pyrotechnic signals –

(a) instructions –

Light	From aerodrome control to	
	Aircraft in flight	Aircraft on the ground
Directed towards Aircraft concerned (see Figure 1.1) { Steady green Steady red Series of green flashes Series of red flashes Series of white flashes Steady red on final approach	Cleared to land Give way to other aircraft And continue circling Return for landing* Aerodrome unsafe, do not land Land at this aero-drome and proceed to apron* Notwithstanding any previous instructions, do not land for the being	Cleared for take-off Stop Cleared to taxi Taxi clear of landing area in use Return to starting point on the aerodrome
*clearance to land and to taxi will be given in due course.		

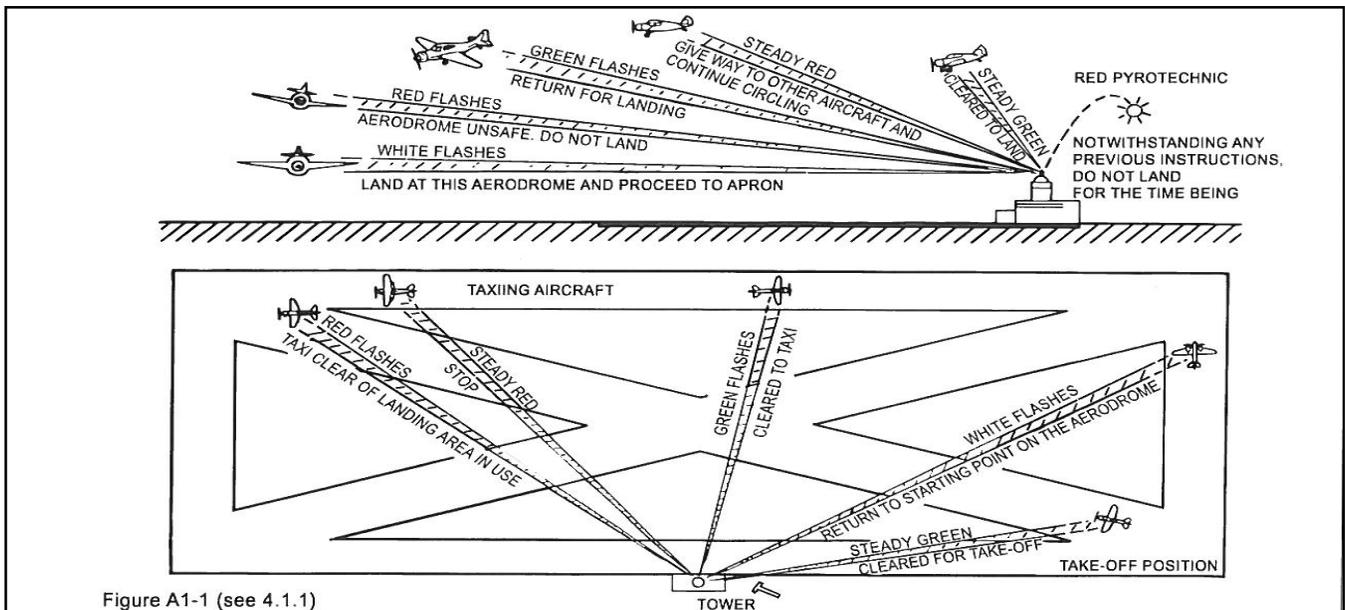


Figure A1-1 (see 4.1.1)

Figure 1.1

(b) acknowledgement by aircraft –

(i) when in flight –

(aa) during the hours of daylight, by rocking the aircraft's wings; and

Note – *This signal should not be expected on the base and final legs of the approach*

(bb) during the hours of darkness, by flashing on and off twice the aircraft's landing lights, or if not so equipped, by switching on and off twice its navigation lights; and

(ii) when on the ground –

(aa) during the hours of daylight, by moving the aircraft's ailerons or rudder; and

(bb) during the hours of darkness, by flashing on and off twice the aircraft's landing lights or, if not so equipped, by switching on and off twice its navigation lights.

(2) Visual ground signals –

(a) prohibition of landing –

A horizontal red square panel with yellow diagonals (Figure 1.2) when displayed in a signal area indicates that landings are prohibited and that the prohibition is liable to be prolonged;



Figure 1.2

(b) need for special precautions while approaching or landing –

A horizontal red square panel with one yellow diagonal (Figure 1.3) when displayed in a signal area indicates that owing to the bad state of the manoeuvring area, or for any other reason, special precautions must be observed in approaching to land or in landing;

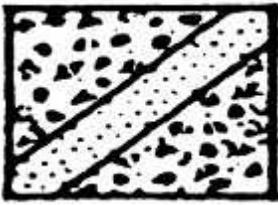


Figure 1.3

(c) use of runways and taxiways –

(i) a horizontal white dumb-bell (Figure 1.4) when displayed in a signal area indicates that aircraft are required to land, take off and taxi on runways and taxiways only; and

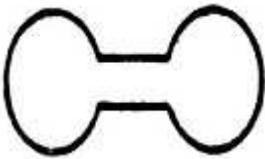


Figure 1.4

(ii) the same horizontal white dumb-bell as in Figure 1.4 but with a black bar placed perpendicular to the shaft across each circular portion of the dumb-bell (Figure 1.5) when displayed in a signal area indicates that aircraft are required to land and take off on runways only, but other manoeuvres need not be confined to runways and taxiways;

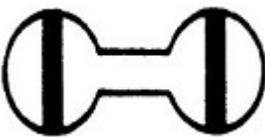


Figure 1.5

(d) closed runways or taxiways –

crosses of a single contrasting colour, yellow or white (Figure 1.6), displayed horizontally on runways and taxiways or parts thereof indicate an area unfit for movement of aircraft;

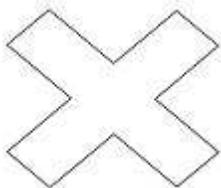


Figure 1.6

(e) directions for landing or take-off –

- (i) horizontal white or orange landing 'T' (Figure 1.7) indicates the direction to be used by aircraft for landing and take-off, which must be in a direction parallel to the shaft of the T towards the cross arm; and

Note – *When used at night, the landing T is either illuminated or outlined in white coloured lights.*

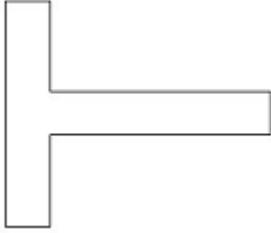


Figure 1.7

- (ii) set of two digits (Figure 1.8) displayed vertically at or near the aerodrome control tower indicates to aircraft on the manoeuvring area the direction for take-off, expressed in units of 10 degrees to the nearest 10 degrees of the magnetic compass;



Figure 1.8

(f) right-hand traffic –

when displayed in a signal area, or horizontally at the end of the runway or strip in use, a right-hand arrow of conspicuous colour (Figure 1.9) indicates that turns are to be made to the right before landing and after take-off;

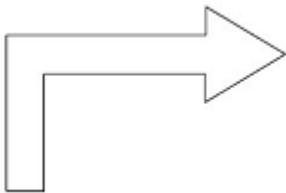


Figure 1.9

(g) air traffic services reporting office –

the letter 'C' displayed vertically in black against a yellow background (Figure 1.10) indicates the location of the air traffic services reporting office;

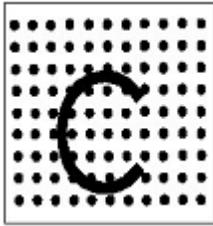


Figure 1.10

- (h) glider flights in operation –

a double white cross displayed horizontally (Figure 1.11) in the signal area indicates that the aerodrome is being used by gliders and that glider flights are being performed; and

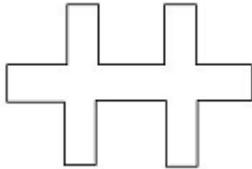


Figure 1.11

- (i) agricultural flights in operation –

a figure 'A' (figure 1.12) in the signal area indicates that the aerodrome is being used for agricultural flights.

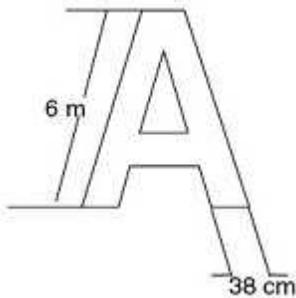


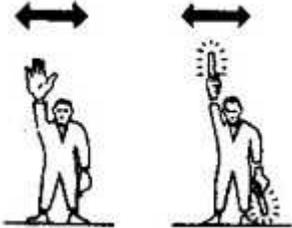
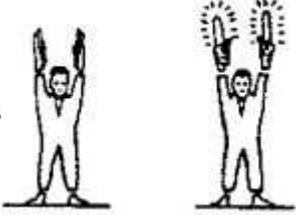
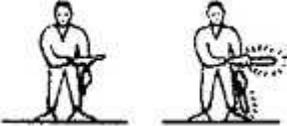
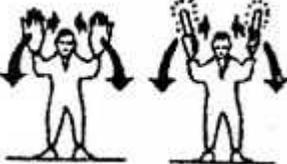
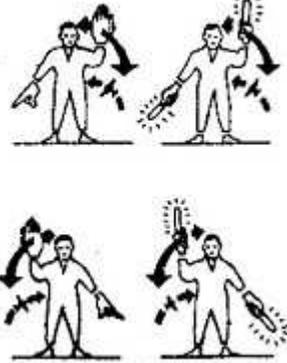
Figure 1.12

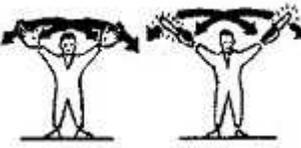
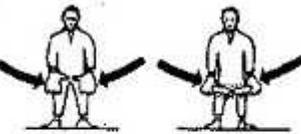
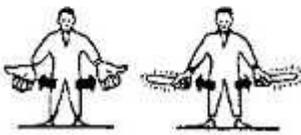
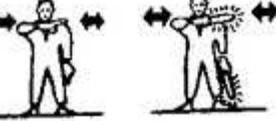
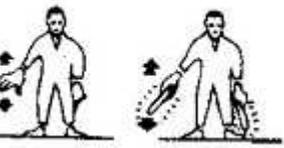
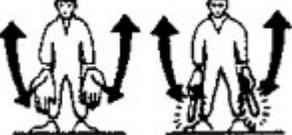
5. Marshalling signals

- (1) Upon observing or receiving any of the signals given in this TS, aircraft shall take such action as may be required by the interpretation of the signal given.
- (2) The signals contained in this TS shall, when used, have the meaning indicated therein. They shall be used only for the purpose indicated and no other signals likely to be confused with them shall be used.
- (3) A signalman shall be responsible for providing standard marshalling signals to aircraft in a clear and precise manner using the signals shown herein.

- (4) No person shall guide an aircraft unless trained, qualified and approved by the appropriate authority to carry out the functions of a signalman.
- (5) The signalman shall wear a distinctive fluorescent identification vest to allow the flight crew to identify that he or she is the person responsible for the marshalling operation.
- (6) Daylight-fluorescent wands, table-tennis bats or gloves shall be used for all signalling by all participating ground staff during daylight hours. Illuminated wands shall be used at night or in low visibility.
- (7) Prior to using the following signals, the signalman must ascertain that the area within which an aircraft is to be guided is clear of objects which the aircraft, in complying with this technical standard, might otherwise strike –
 - (a) from a signalman to an aircraft –

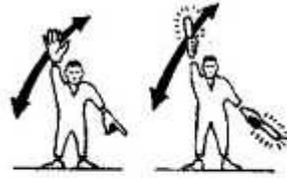
Note – *The design of many aircraft is such that the path of the wing tips, engines and other extremities cannot always be monitored visually from the flight deck while the aircraft is being manoeuvred on the ground.*

<p>1. Proceed under further guidance by signalman Signalman directs pilot if traffic conditions on aerodrome require this action.</p>	
<p>2. This bay Arms above head in vertical position with palms facing inward.</p>	
<p>3. Proceed to next signalman Right or left arm down, other arm moved across the body and extended to indicate direction of next signalman.</p>	
<p>4. Move ahead Arms a little aside, palms facing backward and repeatedly moved upward-backward from shoulder height.</p>	
<p>5. Turn</p> <p>(a) Turn to your left: right arm downward, left arm repeatedly moved upward-backward. Speed of arm movement indicating rate of turn.</p> <p>(b) Turn to your right: left arm downward, right arm repeatedly moved upward-backward. Speed of arm movement indicating rate of turn.</p>	

<p>6. Stop</p> <p>Arms repeatedly crossed above head (the rapidity of the arm movement should be related to the urgency of the stop, i.e. the faster the movement the quicker the stop).</p>	
<p>7. Brakes</p> <p>(a) Engage brakes: raise arm and hand, with fingers extended, horizontally in front of body, then clench fist.</p> <p>(b) Release brakes: raise arm, with fist clenched, horizontally in front of body, then extend fingers.</p> <p><i>Note – Do not move until receipt of “thumbs up” acknowledgement from flight crew.</i></p>	 
<p>8. Chocks</p> <p>(a) Chocks inserted: arms down, palms facing inwards, move arms from extended position inwards.</p> <p>(b) Chocks removed: arms down, palms facing outwards, move arms outwards.</p> <p><i>Note – Ensure acknowledgement is received from flight crew.</i></p>	 
<p>9. Start engine(s)</p> <p>Left hand overhead with appropriate number of fingers extended, to indicate the number of the engine to be started, and circular motion of right hand at head level.</p>	
<p>10. Cut engines</p> <p>Either arm and hand level with shoulder, hand across throat, palm downward. The hand is moved sideways with the arm remaining bent.</p>	
<p>11. Slow down</p> <p>Arms down with palms toward ground, then moved up and down several times.</p>	
<p>12. Slow down engine(s) on indicated side</p> <p>Arms down with palms toward ground, then either right or left hand waved up and down indicating the left or right side engine(s) respectively should be slowed down.</p>	
<p>13. Move back</p> <p>Arms by sides, palms facing forward, swept forward and upward repeatedly to shoulder height.</p>	

14. Turns while backing

(a) For tail to starboard: point left arm down, and right arm brought from overhead, vertical position to horizontal forward position, repeating right arm movement.

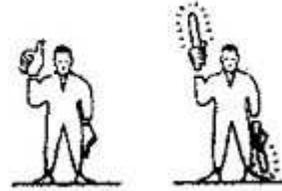


(b) For tail to port: point right arm down, and left arm brought from overhead, vertical position to horizontal forward position, repeating left arm movement.



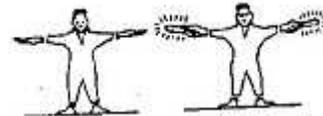
15. All clear

Right arm raised at elbow with thumb erect.



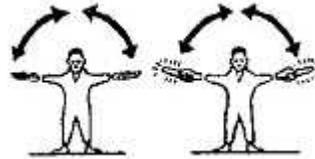
16. Hover

Arms extended horizontally sideways.



17. Move upwards

Arms extended horizontally to the side beckoning upwards, with palms turned up. Speed of movement indicates rate of ascent.



18. Move downwards

Arms extended horizontally to the side beckoning downwards, with palms turned down. Speed of movement indicates rate of descent.



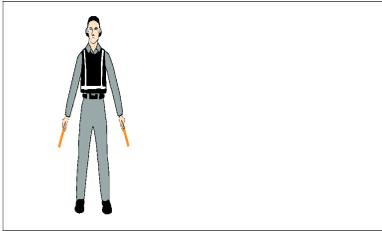
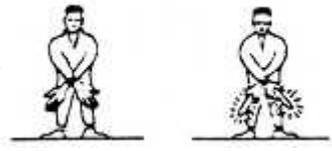
19. Move horizontally

Appropriate arm extended horizontally sideways in direction of movement and other arm moved in front of body in same direction, in a repeating movement.



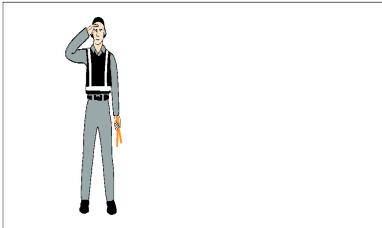
20. Land

Arms crossed and extended downwards in front of the body.



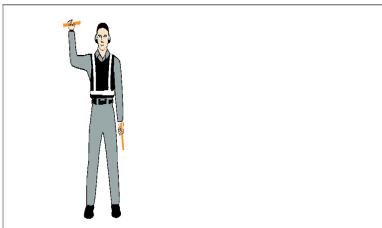
21. Hold position/stand by

Fully extend arms and wands downwards at a 45-degree angle to sides. Hold position until aircraft is clear for next manoeuvre.



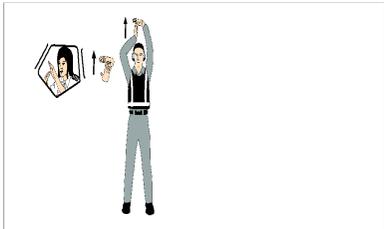
22. Dispatch aircraft

Perform a standard salute with right hand and/or wand to dispatch the aircraft. Maintain eye contact with flight crew until aircraft has begun to taxi.



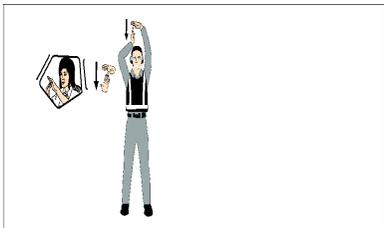
23. Do not touch controls (technical / servicing communication signal)

Extend right arm fully above head and close fist or hold wand in horizontal position; left arm remains at side by knee



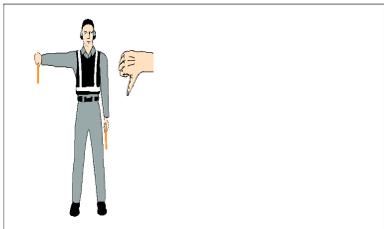
24. Connect ground power (technical / servicing communication signal)

Hold arms fully extended above head; open left hand horizontally and move finger tips of right hand into and touch open palm of left hand (forming a “T”). At night, illuminated wands can also be used to form the “T” above head.



25. Disconnect power (technical / servicing communication signal)

Hold arms fully extended above head with finger tips of right hand touching open horizontal palm of left hand (forming a “T”); then move right hand away from the left. **Do not** disconnect power until authorized by flight crew. At night, illuminated wands can also be used to form the “T” above head.



26. Negative (technical / servicing)

Hold right arm straight out at 90 degrees from shoulder and point wand down to ground or display hand with “thumbs down”; left hand remains at side by knee.



27. Establish communication via interphone (technical / servicing communication signal)

Extend both arms at 90 degrees from body and move both hands to cup both ears.



28. Open/close stairs (technical / servicing communication signal)

With right arm at side and left arm raised above head at a 45-degree angle, move right arm in a sweeping motion towards top of left shoulder.

Note — This signal is intended mainly for aircraft with the set of integral stairs at the front.

Notes –

1. *These signals are designed for use by the signalman, with hands illuminated as necessary to facilitate observation by the pilot, and facing the aircraft in a position –*
 - (a) *for fixed-wing aircraft, forward of the left-wing tip within view of the pilot; and*
 - (b) *for helicopters, where the signalman can best be seen by the pilot.*

2. *The meaning of the relevant signals remains the same if bats, illuminated wands or torchlights are held.*
3. *The aircraft engines are numbered, for the signalman facing the aircraft, from right to left (i.e. No. 1 engine being the port outer engine).*
4. *Signals marked with an asterisk are designed for use to a hovering helicopter.*

(a) from the pilot of an aircraft to a signalman –

Note – The moment the fist is clenched or the fingers are extended indicates, respectively, the moment of brake engagement or release.

(i) brakes –

(aa) brakes engaged, raise arm and hand, with fingers extended, horizontally in front of face, then clench fist; and

(bb) brakes released, raise arm, with fist clenched, horizontally in front of face, then extend fingers;

(ii) chocks –

(aa) insert chocks, arms extended, palms outwards, move hands inwards to cross in front of face; and

(bb) remove chocks, hands crossed in front of face, palms outwards, move arms outwards; and

(iii) ready to start engine –

raise the appropriate number of fingers on one hand indicating the number of the engine to be started.

Notes –

1. *These signals are designed for use by a pilot in the cockpit with hands plainly visible to the signalman and illuminated as necessary to facilitate observation by the signalman.*
2. *The aircraft engines are numbered in relation to the signalman facing the aircraft, from right to left (i.e. No. 1 engine being the port outer engine).*

6. Standard emergency hand signals

The following hand signals are established as the minimum required for emergency communication between the ARFF incident commander/ARFF firefighters and the cockpit and/or cabin crews of the incident aircraft. ARFF emergency hand signals should be given from the left front side of the aircraft for the cockpit crew.

Note – In order to communicate more effectively with the cabin crew, emergency hand signals may be given by ARFF firefighters from other positions.

- (a) **RECOMMEND EVACUATION** — Evacuation recommended based on aircraft rescue and fire-fighting and Incident Commander's assessment of external situation.

Engine

Move right-hand wand in a “fanning” motion from shoulder to knee, while at the same time pointing with left hand wand to area of fire.



Arm extended from body, and held horizontal with hand upraised at eye level. Execute beckoning arm motion angled backward. Non-beckoning arm held against body.

Night – same with wands.

- (b) **RECOMMENDED STOP** — Recommend evacuation in progress be halted. Stop aircraft movement or other activity in progress.



Arms in front of head –
Crossed at wrists

Night – same with wands

- (c) **EMERGENCY CONTAINED** — No outside evidence of dangerous conditions or “all-clear”.



Arms extended outward and down at a 45 degree angle. Arms moved inward below waistline simultaneously until wrists crossed, then extended outward to starting position (umpire’s “safe” signal).

Night – same with wands

- (d) **FIRE**



Move right hand in a “fanning” motion from shoulder to knee, while at the same time pointing with left hand to area of fire.

Night – same with wands.

91.06.16 MANDATORY RADIO COMMUNICATIONS IN CONTROLLED AIRSPACE

1. Radio communication failure (RCF) procedures – General

- (1) When an aircraft fails to establish contact with the aeronautical station on the designated frequency, it shall attempt to establish contact on another frequency appropriate to the route. If this attempt fails, the aircraft shall attempt to establish communication with other aircraft or other aeronautical stations on frequencies appropriate to the route. In addition, an aircraft shall monitor the appropriate VHF frequency for calls from nearby aircraft or aeronautical stations.
- (2) If these attempts fail, the aircraft station shall continue to transmit position reports and its intentions as appropriate on the designated frequency or frequencies, preceded by the phrase “Transmitting Blind”. Such messages shall be transmitted twice and, if necessary, include the addressee(s) for which the message is intended.
- (3) If no communication is received or other indication that one-way communications are possible, the aircraft shall set its transponder to Code 7600 and proceed with the lost communications procedures.
- (4) In any case, whereby an aircraft having suffered a communication failure in flight arrives at an aerodrome, it shall keep a watch for such instructions as may be issued by visual signals from the aerodrome control tower or other facility.

2. RCF procedures – VFR

- (1) If the communications failure occurs while operating in accordance with VFR, the aircraft shall continue to fly in visual meteorological conditions (VMC) and land at the nearest suitable aerodrome using –
 - (a) the standard RCF arrival procedures prescribed in Appendix 1 to this TS; or
 - (b) if other procedures have been published by the Director for a specific aerodrome, in accordance with such procedures.
- (2) The operator shall report its arrival by the most expeditious means to the appropriate air traffic services unit (ATSU).

3. RCF procedures – IFR

- (1) If the communications failure occurs while operating in accordance with IFR and VMC are encountered, the aircraft shall –
 - (a) continue to fly in VMC; land at the nearest suitable aerodrome in accordance with –
 - (i) the standard RCF arrival procedures prescribed in Appendix 1 to this TS; or
 - (ii) if other procedures have been published by the Director for a specific aerodrome, in accordance with such procedures, and
 - (b) report its arrival by the most expeditious means to the appropriate ATSU; or
 - (c) if unable to ensure VMC conditions exist to a suitable aerodrome, complete an IFR flight in accordance with paragraph (2).
- (2) If the communications failure occurs while operating in accordance with IFR while in IMC or, if in VMC but unable to maintain VMC, the aircraft shall –

- (a) in airspace where an ATS surveillance system is not used in the provision of air traffic control, maintain the last assigned speed and level, or minimum flight altitude if higher, for a period of 20 minutes following the aircraft's failure to report its position over a compulsory reporting point and thereafter adjust level and speed in accordance with the filed flight plan;
- (b) in airspace where an ATS surveillance system is used in the provision of air traffic control, maintain the last assigned speed and level, or minimum flight altitude if higher, for a period of 7 minutes following –
 - (i) the time the last assigned level or minimum flight altitude was reached;
 - (ii) the time the transponder was set to Code 7600; or
 - (iii) the aircraft's failure to report its position over a compulsory reporting point;

whichever is later, and thereafter adjust level and speed in accordance with the filed flight plan;

- (c) when being radar vectored or having been directed by ATC to proceed offset using area navigation (RNAV) without a specified limit, rejoin the current flight plan route no later than the next significant point, taking into consideration the applicable minimum flight altitude;
- (d) proceed according to the current flight plan route to the appropriate designated navigation aid or fix serving the destination aerodrome and, when required to ensure compliance with subparagraph (e), hold over this aid or fix until commencement of descent;
- (e) commence descent from the navigation aid or fix specified in subparagraph (d) at, or as close as possible to, the expected approach time last received and acknowledged or, if no expected approach time has been received and acknowledged, at, or as close as possible to, the estimated time of arrival resulting from the current flight plan;
- (f) complete a normal instrument approach procedure as specified for the designated navigation aid or fix; and
- (g) land, if possible, within 30 minutes after the estimated time of arrival specified in (e) or the last acknowledged expected approach time, whichever is later.

Appendix 1
Standard Radio Communications Failure Procedure –
VFR Arrivals

1. Maintain squawk of 7600.
2. Make a relevant blind broadcast to traffic in the area advising of the probability of a radio communication failure, position and intentions.
3. Select landing lights on.
4. Approaching the aerodrome, make a relevant blind broadcast to traffic on the controlled airfields frequency to indicate the probability of a radio communication failure, position and intentions.
5. Join overhead the aerodrome at a height of 1000 feet above circuit altitude to ascertain which is the active runway in use.

6. Conform to the circuit pattern while joining, preferably on the downwind leg.
7. Continue to make blind broadcasts on the controlled airfields frequency to indicate the position in the circuit pattern.
8. Land and vacate the runway expeditiously and safely.
9. Taxi to the nearest parking area and shutdown.
10. Inform the owner or operator and ATC.
11. Make the relevant entry in the aircraft's flight folio.

Note – This procedure is to be used in the event the aerodrome at which the landing is to take place does not have specific procedures to be followed as published in the AIP.

91.06.18 COMPLIANCE WITH RULES OF THE AIR AND AIR TRAFFIC CONTROL CLEARANCES AND INSTRUCTIONS

Requests for flight plan changes shall include the following information –

- (1) If the request is for a change of cruising level –
 - (a) aircraft identification;
 - (b) requested new cruising level and cruising speed at this level; and
 - (c) revised time estimates, when applicable, at subsequent flight information region boundaries;
- (2) If the request is for a change of route –
 - (a) if the destination is unchanged –
 - (i) aircraft identification;
 - (ii) flight rules;
 - (iii) description of new route of flight including related flight plan data beginning with the position from which requested change of route is to commence;
 - (iv) revised time estimates; and
 - (v) any other pertinent information; and
 - (b) if the destination is changed –
 - (i) aircraft identification;
 - (ii) flight rules;
 - (iii) description of revised route of flight to revised destination aerodrome, including related flight plan data, beginning with the position from which requested change of route is to commence;
 - (iv) revised time estimates;
 - (v) alternate aerodrome(s); and
 - (vi) any other pertinent information.

91.06.29 IDENTIFICATION AND INTERCEPTION OF AIRCRAFT

1. Principles to be observed during the interception

- (1) The principles to be followed by an aircraft when intercepting another aircraft are –
 - (a) the interception of civil aircraft will be undertaken only as a last resort;
 - (b) if undertaken, an interception will be limited to determining the identity of the aircraft, unless it is necessary to return the aircraft to its planned track, direct it beyond the boundaries of national airspace, guide it away from a prohibited, restricted or danger area or instruct it to effect a landing at a designated aerodrome;
 - (c) practice interception of civil aircraft will not be undertaken;
 - (d) navigational guidance and related information will be given to an intercepted aircraft by radiotelephony whenever radio contact can be established; and
 - (e) in the case where an intercepted civil aircraft is required to land in the territory overflowed, the aerodrome designated for the landing is to be suitable for the safe landing of the aircraft type concerned.
- (2) Secondary surveillance radar or ADS-B, where available, shall be used to identify civil aircraft in areas where they may be subject to interception.

2. Action by intercepted aircraft

- (1) An aircraft which is intercepted by another aircraft shall immediately –
 - (a) follow the instructions given by the intercepting aircraft, interpreting and responding to visual signals in accordance with the specifications in section 4;
 - (b) notify, if possible, the appropriate air traffic services unit;
 - (c) attempt to establish radio communication with the intercepting aircraft or with the appropriate intercept control unit, by making a general call on the emergency frequency 121,5 MHz, giving the identity of the intercepted aircraft and the nature of the flight; and if no contact has been established and if practicable, repeating this call on the emergency frequency 243 MHz;
 - (d) if equipped with SSR transponder, select Mode A, Code 7700, unless otherwise instructed by the appropriate air traffic services unit; and
 - (e) if equipped with ADS-B or ADS-C, select the appropriate emergency functionality, if available, unless otherwise instructed by the appropriate air traffic services unit.
- (2) If any instructions received by radio from any sources conflict with those given by the intercepting aircraft by visual signals, the intercepted aircraft shall request immediate clarification while continuing to comply with the visual instructions given by the intercepting aircraft.
- (3) If any instructions received by radio from any sources conflict with those given by the intercepting aircraft by radio, the intercepted aircraft shall request immediate clarification while continuing to comply with the radio instructions given by the intercepting aircraft.

3. Radio communication during interception

If radio contact is established during interception but communication in a common language is not possible, attempts shall be made to convey instructions, acknowledgement of instructions and essential information by using the phrases and pronunciations in the following table and transmitting each phrase twice.

Phrases for use by INTERCEPTING aircraft			Phrases for use by INTERCEPTED aircraft		
Phrase	Pronunciation ¹	Meaning	Phrase	Pronunciation ¹	Meaning
CALL SIGN	<u>KOL</u> SA-IN	What is your call sign?	CALL SIGN (call sign) ²	<u>KOL</u> SA-IN (call sign)	My call sign is (call sign)
FOLLOW	<u>FOL</u> -LO	Follow me			
DESCEND	DEE- <u>SEND</u>	Descend for landing	WILCO	<u>VILL</u> -KO	Understood
YOU LAND	<u>YOU</u> <u>LAAND</u>	Land at this aerodrome	CAN NOT	<u>KANN</u> NOTT	Unable to comply
PROCEED	PRO- <u>SEED</u>	You may proceed	REPEAT	REE- <u>PEET</u>	Repeat your instruction
			AM LOST	<u>AM</u> <u>LOSST</u>	Position unknown
			MAYDAY	MAYDAY	I am in distress
			HIJACK ³	<u>HI</u> - <u>JACK</u>	I have been hijacked
			LAND (place name)	LAAND (place name)	I request to land at (place name)
			DESCEND	DEE- <u>SEND</u>	I require descent

Notes –

1. In the second column, syllables to be emphasized are underlined.
2. The call sign required to be given is that used in radiotelephony communications with air traffic services units and corresponding to the aircraft identification in the flight plan.
3. Circumstances may not always permit, nor make desirable, the use of the phrase “HIJACK”.

4. Visual interception signals

(1) Signals initiated by intercepting aircraft and responses by intercepted aircraft –

Series	INTERCEPTING Aircraft Signals	Meaning	INTERCEPTED Aircraft Responds	Meaning
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1	<p>DAY or NIGHT — Rocking aircraft and flashing navigational lights at irregular intervals (and landing lights in the case of a helicopter) from a position slightly above and ahead of, and normally to the left of, the intercepted aircraft (or to the right if the intercepted aircraft is a helicopter) and, after acknowledgement, a slow level turn, normally to the left (or to the right in the case of a helicopter) on the desired heading.</p> <p><i>Notes —</i></p> <p>1. <i>Meteorological conditions or terrain may require the intercepting aircraft to reverse the positions and direction of turn given above in Series 1.</i></p> <p>2. <i>If the intercepted aircraft is not able to keep pace with the intercepting aircraft, the latter is expected to fly a series of race-track patterns and to rock the aircraft each time it passes the intercepted aircraft.</i></p>	<p>You have been intercepted .</p> <p>Follow me.</p>	<p>DAY or NIGHT — Rocking aircraft, flashing navigational lights at irregular intervals and follow.</p>	<p>Understood, will comply.</p>
2	<p>DAY or NIGHT — An abrupt breakaway manoeuvre from the intercepted aircraft consisting of a climbing turn of 90 degrees or more without exceeding the line of flight of the</p>	<p>You may proceed.</p>	<p>DAY or NIGHT — Rocking the aircraft.</p>	<p>Understood, will comply.</p>
3	<p>DAY or NIGHT — Lowering landing gear (if fitted), showing steady landing lights and overflying runway in use or, if the intercepted aircraft is a helicopter, overflying the helicopter landing area. In the case of helicopters, the intercepting helicopter makes a landing approach, coming to hover near to the landing area.</p>	<p>Land at this aerodrome .</p>	<p>DAY or NIGHT — Lowering landing gear, if fitted, showing steady landing lights and following the intercepting aircraft and if, after overflying the runway in use or helicopter landing area, landing is considered safe, proceeding to land.</p>	<p>Understood, will comply.</p>

(2) Signals initiated by intercepted aircraft and responses by intercepting aircraft –

Series	INTERCEPTED Aircraft Signals	Meaning	INTERCEPTING Aircraft Responds	Meaning
4	DAY or NIGHT — Raising landing gear (if fitted) and flashing landing lights while passing over runway in use or helicopter landing area at a height exceeding 1 000 ft but not exceeding 2 000 ft (in the case of a helicopter, at a height exceeding 170 ft but not exceeding 330 ft) above the aerodrome level, and continuing to circle runway in use or helicopter landing area. If unable to flash landing lights, flash any other lights available.	Aerodrome you have designated is inadequate.	DAY or NIGHT — If it is desired that the intercepted aircraft follow the intercepting aircraft to an alternate aerodrome, the intercepting aircraft raises its landing gear (if fitted) and uses the Series 1 signals prescribed for intercepting aircraft. If it is decided to release the intercepted aircraft, the intercepting aircraft uses the Series 2 signals prescribed for intercepting aircraft.	Understood, follow me. Understood, you may proceed.
5	DAY or NIGHT — Regular switching on and off of all available lights but in such a manner as to be distinct from flashing lights.	Cannot comply.	DAY or NIGHT — Use Series 2 signals prescribed for intercepting aircraft.	Understood.
6	DAY or NIGHT — Irregular flashing of all available lights.	In distress.	DAY or NIGHT — Use Series 2 signals prescribed for intercepting aircraft.	Understood.

91.06.33 SEMI-CIRCULAR RULE

1. Semi-circular rule

- (1) In areas where feet are used for altitude and where, in accordance with regional air navigation agreements, RVSM airspace with a vertical separation minimum of 1 000 ft is applied between FL 290 and FL 410 inclusive is applicable – *

MAGNETIC TRACK			
Flight level			
From 000° to 179°		From 180° to 359°	
IFR	VFR	IFR	VFR

	15	20	25
30	35	40	45
50	55	60	65
70	75	80	85
90	95	100	105
110	115	120	125
130	135	140	145
150	155	160	165
170	175	180	185
190	195	200	
210		220	
230		240	
290		260	
310		280	
330		300	
350		320	
370		340	
390		360	
410		380	
450		400	
490		430	
etc		450	
		470	
		etc	

*Except when, on the basis of regional air navigation agreements, a modified table of cruising levels based on a nominal vertical separation minimum of 1 000 ft (300 m) is prescribed for use, under specified conditions, by aircraft operating above FL 410 within designated portions of the airspace.

** Magnetic track or in polar areas at latitudes higher than 70 degrees and within such extensions to those areas as may be prescribed by the appropriate ATS authorities, grid tracks as determined by a network of lines parallel to the Greenwich Meridian superimposed on a polar stereographic chart in which the direction towards the North Pole is employed as the Grid North.

***Except where, on the basis of regional air navigation agreements, from 090 to 269 degrees and from 270 to 089 degrees is prescribed to accommodate predominant traffic directions and appropriate transition procedures to be associated therewith are specified.

- (2) In other areas where feet are the primary unit of measurement for altitude and the airspace is not designated as RVSM –

TRACK**

From 000 degrees to 179 degrees***						From 180 degrees to 359 degrees***					
IFR Flights Level			VFR Flights Level			IFR Flights Level			VFR Flights Level		
FL	Feet	Metres	FL	Feet	Metres	FL	Feet	Metres	FL	Feet	Metres
010	1 000	300	—	—	—	020	2 000	600	—	—	—
030	3 000	900	035	3 500	1 050	040	4 000	1 200	045	4 500	1 350
050	5 000	1 500	055	5 500	1 700	060	6 000	1 850	065	6 500	2 000
070	7 000	2 150	075	7 500	2 300	080	8 000	2 450	085	8 500	2 600
090	9 000	2 750	095	9 500	2 900	100	10 000	3 050	105	10 500	3 200
110	11 000	3350	115	11 500	3 500	120	12 000	3 650	125	12 500	3 800
130	13 000	3 950	135	13 500	4 100	140	14 000	4 250	145	14 500	4 400
150	15 000	4 550	155	15 500	4 700	160	16 000	4 900	165	16 500	5 050
170	17 000	5 200	175	17 500	5 350	180	18 000	5 500	185	18 500	5 650
190	19 000	5 800	195	19 500	5 950	200	20 000	6 100			
210	21 000	6 400				220	22 000	6 700			
230	23 000	7 000				240	24 000	7 300			
250	25 000	7 600				260	26 000	7 900			
2	27 000	8 250				280	28 000	8 550			

* Magnetic track, or in polar areas at latitudes higher than 70 degrees and within such extensions to those areas as may be prescribed by the appropriate ATS authorities, grid tracks as determined by a network of lines parallel to the Greenwich Meridian superimposed on a polar stereographic chart in which the direction towards the North Pole is employed as the Grid North.

** Except where, on the basis of regional air navigation agreements, from 090 to 269 degrees and from 270 to 089 degrees is prescribed to accommodate predominant traffic directions and appropriate transition procedures to be associated therewith are specified.

91.07.2 MINIMUM FLIGHT ALTITUDES

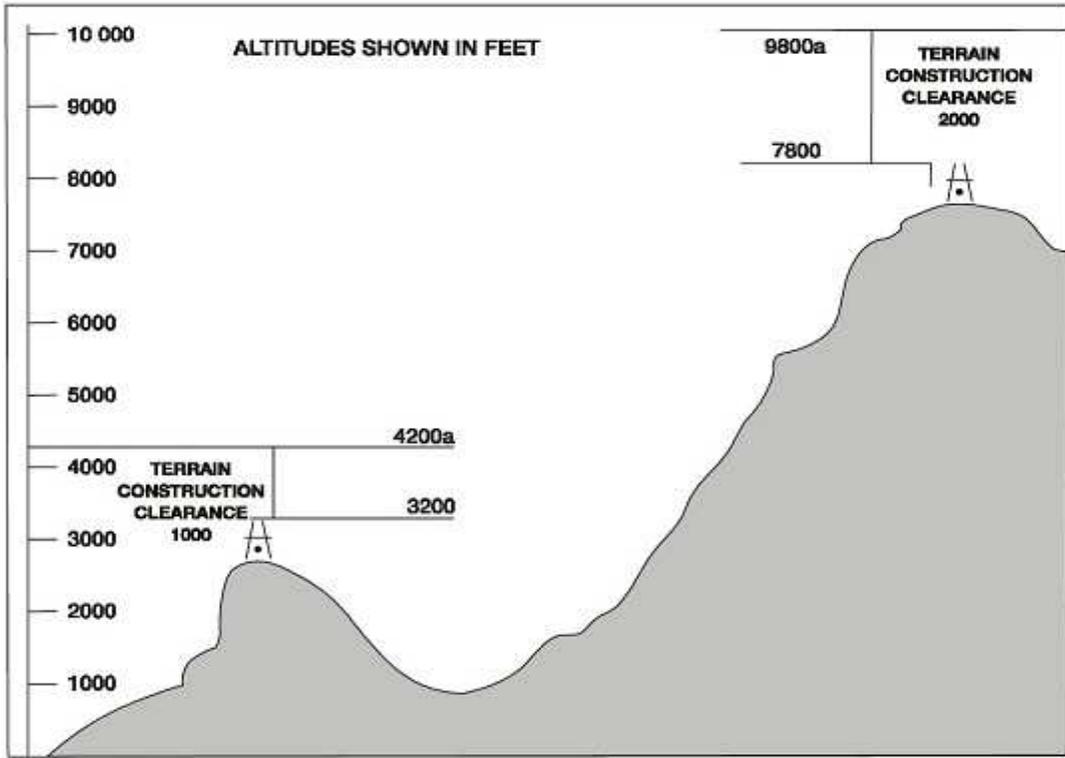
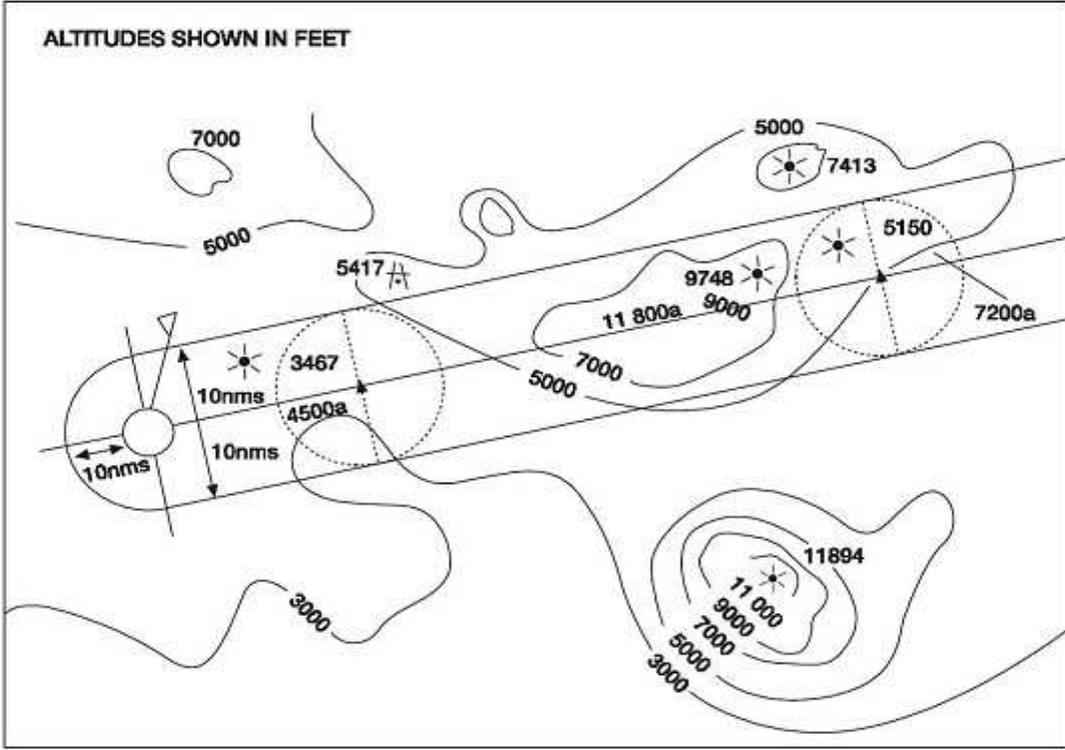
1. Minimum flight altitude formula

Minimum off route altitude (MORA) is a minimum flight altitude computed from current ONC or WAC charts. An operator must use the following method to calculate minimum flight altitudes –

- (a) two types of MORAs are charted which are –
 - (i) route MORAs eg. 9800a; and
 - (ii) grid MORAs eg. 98;
- (b) route MORA values are computed on the basis of an area extending 10 NM to either side of route centreline and including a 10 NM radius beyond the radio fix/reporting point or mileage break defining the route segment;

- (c) MORA values clear all terrain and man-made obstacles by 1 000 feet in areas where the highest terrain elevation or obstacles are up to 5 000 feet. A clearance of 2 000 feet is provided above all terrain or obstacles which are 5 001 feet and above; and
- (d) a grid MORA is an altitude computed by the formula and the values are shown within each grid formed by charted lines of latitude and longitude. Figures are shown in thousands and hundreds of feet (omitting the last two digits so as to avoid chart congestion). Values followed by \pm are believed not to exceed the altitudes shown. The same clearance criteria as explained in subparagraph (c) above apply.

MORA CLEARANCE DIAGRAM



91.07.5 AERODROME OPERATING MINIMA

Note – Reference in this TS to “category” of aircraft (eg. Category A aircraft) means the category based on the aircraft’s stall speed in the landing configuration x 1.3 for departure, and the highest approach speed flown after passing the final approach fix during an approach and are as follows –

- (a) Category A – ≤ 90 K;
- (b) Category B – 91-120 K;
- (c) Category C – 121-140 K;
- (d) Category D – 141-165 K; and
- (e) Category E – > 165 K (not normally associated with civil aircraft).

1. Take-off minima

(1) General

- (a) Take-off minima established by an owner or operator must be expressed as visibility or RVR limits, taking into account all relevant factors for each aerodrome planned to be used and the aeroplane characteristics. Where there is a specific need to see and avoid obstacles on departure and/or for a forced landing, additional conditions (e.g. ceiling) must be specified.
- (b) The pilot-in-command may not commence take-off unless the weather conditions at the aerodrome of departure are equal to or better than applicable minima for landing at that aerodrome unless a suitable take-off alternate aerodrome is available.
- (c) When the reported meteorological visibility is below that required for take-off and RVR is not reported, a take-off may only be commenced if the pilot-in-command can determine that the RVR/visibility along the take-off runway is equal to or better than the required minimum.
- (d) When no reported meteorological visibility or RVR is available, a take-off may only be commenced if the pilot-in-command can determine that the RVR/visibility along the take-off runway is equal to or better than the required minimum.

(2) Visual reference

The take-off minima must be selected to ensure sufficient guidance to control the aeroplane in the event of either a discontinued take-off in adverse circumstances or a continued take-off after failure of the critical power unit.

(3) Required RVR/Visibility

- (a) For single-engine aircraft, the take-off minima established by an owner or operator shall be expressed as RVR/visibility values not lower than 800 m.

TABLE 1: RVR/Visibility for take-off

Take –off RVR/Visibility	
Facilities	RVR/Visibility (Note3)
Nil (Day only)	500 m

Runway edge lighting and/or centerline marking	250/300 m (Notes 1)
Runway edge and centerline lighting	200/250 m (Note 1)
Runway edge and centerline lighting and multiple RVR information	150/200 m (Notes 1 and 4)

- (b) Multi-engine aircraft whose performance is such that, in the event of a critical power unit failure at any point during take-off, the aeroplane can either stop or continue the take-off to a height of 1 500 feet above the aerodrome while clearing obstacles by the required margins, the take-off minima established by an owner or operator must be expressed as RVR/visibility values not lower than the minima prescribed in Table 1 of this section unless approved by the Director for lower minima as provided in –
- (i) for general aviation operators, Part 91; and
 - (ii) for commercial operators, Parts 121, 127 and 135, as applicable.
- (c) For multi-engine aircraft whose performance is such that they cannot comply with the performance conditions in paragraph (3)(b) above in the event of a critical power unit failure, the take-off minima established by an operator must be expressed as RVR/visibility values not lower than 800 m. Such aircraft may be permitted minima as low as 400 m: Provided the owner or operator submits for the approval of the Director –
- (i) an alternative means to demonstrate that adequate obstacle clearance can be maintained; or
 - (ii) procedures that would ensure obstacle clearance during each departure..

Notes –

1. *For determination of take-off minima, RVR shall be governing.*
2. *In the event RVR information is not available, the visibility issued by an approved weather observer may be used in lieu.*
3. *When reported RVR or meteorological visibility is not available, the pilot-in-command may not commence take-off unless he or she can determine that the actual conditions satisfy the applicable take-off minima.*

2. Non-precision approach

(1) System minima

An operator must ensure that system minima for non-precision approach procedures, which are based upon the use of ILS without glidepath (LLZ only), VOR and NDB are not lower than the MDH values given in Table 1 of this section.

Table 2: System minima for non-precision approach aids

System minima	
Facility	Lowest MDH
ILS (no glide path – LLZ)	250 ft
VOR	300 ft
VOR/DME	250 ft
NDB	300 ft

(2) Minimum descent height

An operator must ensure that the minimum descent height for a non-precision approach is not lower than either –

- (a) the OCH/OCL for the category of aeroplane; or
- (b) the system minimum.

(3) Visual reference

A pilot may not continue an approach below MDA/MDH unless at least one of the following visual references for the intended runway is distinctly visible and identifiable to the pilot –

- (a) elements of the approach light system;
- (b) the threshold;
- (c) the threshold markings;
- (d) the threshold lights;
- (e) the threshold identification lights;
- (f) the visual glide slope indicator;
- (g) the touchdown zone or touchdown zone markings;
- (h) the touchdown zone lights;
- (i) runway edge lights; or
- (j) other visual references accepted by the Director.

(4) Required RVR (see Note 6 below)

The lowest minima to be used by an operator for non-precision approaches are –

Table 3: RVR for non-precision approach – full facilities

Non-precision approach minima				
Full facilities (Notes (1), (5), (6) and (7))				
MDH	RVR/Aeroplane category			
	A	B	C	D and E
250 ft – 299 ft	800 m	800 m	800 m	1 200 m
300 ft – 449 ft	900 m	1 000 m	1 000 m	1 400 m
450 ft – 649 ft	1 000 m	1 200 m	1 200 m	1 600 m

650 ft and above	1 200 m	1 400 m	1 400 m	1 800 m
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Table 4: RVR for non-precision approach – intermediate facilities

Non-precision approach minima		Intermediate facilities (Notes (2), (5), (6) and (7))		
MDH	RVR/Aeroplane category			
	A	B	C	D and E
250 ft – 299 ft	1 000 m	1 100 m	1 200 m	1 400 m
300 ft – 449 ft	1 200 m	1 300 m	1 400 m	1 600 m
450 ft – 649 ft	1 400 m	1 500 m	1 600 m	1 800 m
650 ft and above	1 500 m	1 500 m	1 800 m	2 000 m

Table 5: RVR for non-precision approach – basic facilities

Non-precision approach minima		Basic facilities (Notes (3), (5), (6) and (7))		
MDH	RVR/Aeroplane category			
	A	B	C	D and E
250 ft – 299 ft	1 200 m	1 300 m	1 400 m	1 600 m
300 ft – 449 ft	1 300 m	1 400 m	1 600 m	1 800 m
450 ft – 649 ft	1 500 m	1 500 m	1 800 m	2 000 m
650 ft and above	1 500 m	1 500 m	2 000 m	2 000 m

Table 6: RVR for non-precision approach – Nil approach light facilities

Non-precision approach minima		Nil facilities (Notes (4), (5), (6) and (7))		
MDH	RVR/Aeroplane category			
	A	B	C	D and E
250 ft – 299 ft	1 500 m	1 500 m	1 600 m	1 800 m
300 ft – 449 ft	1 500 m	1 500 m	1 800 m	2 000 m
450 ft – 649 ft	1 500 m	1 500 m	2 000 m	2 000 m
650 ft and above	1 500 m	1 500 m	2 000 m	2 000 m

Notes –

1. Full facilities comprise runway markings, 720 m or more of HI/MI approach lights, runway edge lights, threshold lights and runway end lights. Lights must be on.
2. Intermediate facilities comprise runway markings, 420 – 719 m of HI/MI approach lights, runway edge lights, threshold lights and runway end lights. Lights must be on.

3. *Basic facilities comprise runway markings, <420 m of HI/MI approach lights, any length of LI approach lights, runway edge lights, threshold lights and runway end lights. Lights must be on.*
4. *Nil approach light facilities comprise runway markings, runway edge lights, threshold lights, runway end lights or no lights at all.*
5. *The tables are only applicable to conventional approaches with a nominal descent slope of not greater than 4°. Greater descent slopes will usually require that visual glide slope guidance (e.g. PAPI) is also visible at the MDH.*
6. *The above figures are either reported RVR or meteorological visibility converted to RVR as provided in section 8 below.*
7. *The MDH mentioned in Table 2(a), 2(b), 2(c) and 2(d) refers to the initial calculation of MDH. When selecting the associated RVR, there is no need to take account of a rounding up to the nearest ten feet, which may be done for operational purposes, e.g. conversion to MDA.*

(5) Night operations

For night operations at least runway edge, threshold and runway end lights must be on.

3. Precision approach – Category I operations

(1) General

A Category I operation is a precision instrument approach procedure which provides for an approach to a decision height not lower than 200 ft and a visibility not less than 800 m or RVR not less than 550 m.

(2) Decision height

An operator must ensure that the decision height to be used for a Category I precision approach is not lower than the highest of the following –

- (a) the minimum decision height specified in the aeroplane flight manual (AFM), if stated;
- (b) the minimum height specified in the instrument approach chart for the approach being flown;
- (c) for operators who are holders of a private or air operator certificate, the minimum height authorised in their Operations Specifications; or
- (d) 200 ft.

(3) Visual reference

A pilot may not continue an approach below the Category I decision height, determined in accordance with paragraph (2) above, unless at least one of the following visual references for the intended runway is distinctly visible and identifiable to the pilot –

- (a) elements of the approach light system;
- (b) the threshold;

- (c) the threshold markings;
- (d) the threshold lights;
- (e) the threshold identification lights;
- (f) the visual glide slope indicator;
- (g) the touchdown zone or touchdown zone markings;
- (h) the touchdown zone lights; or
- (i) runway edge lights.

(4) Required RVR (see Note 5 below)

The lowest minima to be used by an operator for Category I operations are –

Table 1: RVR for Cat 1 approach vs. facilities and DH

Category 1 minima				
DH	Facilities/RVR (Note 5)			
	Full (Notes 1 and 6)	Intermediate (Notes 2 and 6)	Basic (Notes 3 and 6)	Nil (Notes 4 and 6)
200 ft	550 m	700 m	800 m	1 000 m
201 ft – 250 ft	600 m	700 m	800 m	1 000 m
251 ft – 300 ft	650 m	800 m	900 m	1 200 m
301 ft and above	800 m	900 m	1 000 m	1 200 m

Notes –

1. Full facilities comprise runway markings, 720 m or more of HI/MI approach lights, runway edge lights, threshold lights and runway end lights. Lights must be on.
2. Intermediate facilities comprise runway markings, 420 – 719 m of HI/MI approach lights, runway edge lights, threshold lights and runway end lights. Lights must be on.
3. Basic facilities comprise runway markings, <420 m of HI/MI approach lights, any length of LI approach lights, runway edge lights, threshold lights and runway end lights. Lights must be on.
4. Nil approach light facilities comprise runway markings, runway edge lights, threshold lights, runway end lights or no lights at all.
5. The above figures are either the reported RVR or meteorological visibility converted to RVR as in accordance with section 8 below.
6. The table is applicable to conventional approaches with a glide slope angle up to and including 4°.
7. The DH mentioned in Table 3 refers to the initial calculation of DH. When selecting the associated RVR, there is no need to take account of a rounding up to the nearest ten feet, which may be done for operational purposes, e.g. conversion to DA.

(5) Single pilot operations

For single-pilot operations, an RVR of less than 800 m is not permitted except when using a suitable autopilot coupled to an ILS or MLS, in which case normal minima apply. The decision height applied may not be less than 1.25 x the minimum disengagement height for the autopilot. CAT II/III minima will not be approved for single-pilot operators.

(6) Night operations

For night operations at least runway edge, threshold and runway end lights must be on.

4. Precision approach – Category II operations

(1) General

- (a) A Category II operation is an ILS approach procedure which provides for an approach to a decision height lower than 200 feet but not lower than 100 feet and a RVR of not less than 300 m.
- (b) The approval of the Director is required to conduct CAT II operations as provided in –
 - (i) for general aviation operators, Part 91; and
 - (ii) for commercial operators, Parts 121, 127 and 135, as applicable.

(2) Decision height

An operator must ensure that the decision height for a Category II operation is not lower than the highest of the following –

- (a) the minimum decision height specified in the AFM, if stated;
- (b) the minimum height specified in the instrument approach chart for the approach being flown;
- (c) for operators who are holders of a private or air operator certificate, the minimum height authorised in their Operations Specifications; or
- (d) 100 ft.

(3) Visual reference

A pilot may not continue an approach below the Category II decision height determined in accordance with paragraph (2) above, unless visual references containing a segment of at least 3 consecutive lights being the centre line of the approach lights, touchdown zone lights, runway centre line lights, runway edge lights or a combination of these is attained and can be maintained. This visual reference must include a lateral element of the ground pattern, i.e. an approach lighting crossbar or the landing threshold or a barrette of the touchdown zone lighting.

(4) Required RVR

The lowest minima to be used by an operator for Category II operations are –

Table 1: RVR for Cat II approach vs. DH

Category II minima		
Decision height	Auto-coupled to below DH (Note 1)	
	Aeroplane Category A, B and C RVR	Aeroplane Category D and E RVR
100 ft – 120 ft	300 m	350 m/300 m (Note 2)
121 ft – 140 ft	400 m	400 m
141 ft and above	450 m	450 m

Notes –

- 1: *The reference to “auto-coupled to below DH” in this table means continued use of the automatic flight control system down to a height which is not greater than 80% of the applicable DH. Thus airworthiness requirements may, through minimum engagement height for the automatic flight control system, affect the DH to be applied.*
- 2: *300 m may be used for a Category D or E aeroplane conducting an autoland.*

5. Precision approach – Category III operations

(1) General

(a) Category III operations are subdivided as follows –

(i) Category III A operations

An ILS approach procedure which provides for an approach to a decision height lower than 100 feet or with no decision height and with a RVR of not less than 175 m.

(ii) Category III B operations

An ILS approach procedure which provides for approach with either decision height lower than 50 feet or no decision height and a RVR lower than 175 m but not less than 50 m.

(iii) Category III C operations

An ILS approach procedure which provides for approach with no decision height and no runway visual range limitations.

(b) The approval of the Director is required to conduct CAT III operations as provided in –

- (i) for general aviation operators, Part 91; and
- (ii) for commercial operators, Parts 121, 127 and 135, as applicable.

(2) Decision height

For operations in which a decision height is used, an operator must ensure that the decision height is not lower than the highest of the following –

- (a) the minimum decision height specified in the AFM, if stated; or
- (b) the minimum height specified in the instrument approach chart for the approach being flown and to which the operator is approved to descend.

(3) No decision height operations

Operations with no decision height may only be conducted if –

- (a) the operation with no decision height is authorised in the AFM;
- (b) the approach aid and the aerodrome facilities can support operations with no decision height; and
- (c) the operator has an approval for CAT III operations with no decision height.

Note – In the case of a CAT III runway it may be assumed that operations with no decision height can be supported unless specifically restricted as published in an AIP or NOTAM.

(4) Visual reference

- (a) for Category III A operations, a pilot may not continue an approach below the decision height determined in accordance with paragraph (2) above unless a visual reference containing a segment of at least 3 consecutive lights being the centreline of the approach lights, touchdown zone lights, runway centre line lights, runway edge lights or a combination of these is attained and can be maintained.
- (b) for Category III B operations with a decision height a pilot may not continue an approach below the decision height, determined in accordance with paragraph (2) above, unless a visual reference containing at least one centreline light is attained and can be maintained.
- (c) for Category III operations with no decision height there is no requirement for visual contact with the runway prior to touchdown.

(5) Required RVR

The lowest minima to be used by an operator for Category III operations are –

Table 1: RVR for Cat III approach vs. flight control systems and DH

Category III minima				
		Flight control system/RVR (metres)		
		Fail passive	Fail Operational	
			Without roll-out system	With roll-out guidance or control system

Approach category	Decision height (ft)			Fail passive	Fail operational
IIIA	Less than 100 ft	175 m (Note 1)	175 m	175 m	175 m
IIIB	Less than 50 ft	Not authorised	Not authorised	125 m	75 m
IIIC	No DH	Not authorised	Not authorised	Not authorised	75 m

Note – For operations to actual RVR values less than 300 m a go-around is assumed in the event of an autopilot failure at or below DH.

6. Circling

(1) The lowest minima to be used by an operator for circling are –

Table 1: Visibility and MDH for circling vs. aeroplane category

Aeroplane category				
	A	B	C	D and E
MDH	400 ft	500 ft	600 ft	700 ft
Minimum meteorological visibility	1 500 m	1 600 m	2 400 m	3 600 m

(2) Circling with prescribed tracks is an accepted procedure within the meaning of this paragraph.

7. Visual approach

An operator may not use an RVR of less than 1 500 m for a visual approach.

8. Conversion of reported meteorological visibility to RVR

- (1) An operator must ensure that a meteorological visibility to RVR conversion is not used for calculating take-off minima, Category II or III minima or when a reported RVR is available.
- (2) When converting meteorological visibility to RVR in all other circumstances than those in paragraph (1) above, an operator must ensure that the following table is used –

Table 1: Conversion of visibility to RVR

Lighting Elements in Operation	RVR = Reported Meteorological Visibility X	
	Day	Night
HI approach and runway	1.5	2

lighting		
Any type of lighting installation other than above	1	1.5
No lighting	1	Not applicable

91.07.7 PRE-FLIGHT SELECTION OF AERODROMES

1. General

- (1) For the purposes of this TS –
 - (a) “**suitable alternate**” means a suitable aerodrome to be used as an alternate;
 - (b) “**current altimeter setting**” means an altimeter setting provided by approved direct reading or remote equipment current up to 90 min from the time of observation; and
 - (c) “**remote altimeter setting**” means an altimeter setting obtained from an aerodrome located within 75 NM of the destination aerodrome.
- (2) An owner or operator may flight-plan and conduct an IFR flight to a destination for which an approved weather forecast specific to that destination is not available provided the conditions in this TS are met.

2. Weather and operational requirements

- (1) An operator may plan and conduct the flight referred to in section 1(2) if an area forecast from an approved weather reporting source indicates that for the period from two hours prior to the estimated time of arrival at the destination, for aerodromes with a published instrument approach and the availability of a current or remote altimeter setting, the weather will be at or above the following –
 - (a) a cloud base of at least 1 000 ft above the minimum associated with the instrument approach procedure; and
 - (b) visibility of at least 5.5 km or of 4 km more than the minimum associated with the procedure, whichever is greater.
- (2) An operator may plan and conduct the flight referred to in section 1(2) to an aerodrome –
 - (a) without a published instrument approach;
 - (b) with a published instrument approach but no current or remote altimeter setting; or
 - (c) where the approach aids are unserviceable,

if the weather is such that a descent and landing from the minimum *en route* altitude (MEA) for the airway or air route being flown or, for flight off airways or air routes, the minimum sector altitude (MSA) or terminal arrival altitude (TAA for PBN operations) for the area being traversed, can be made in VMC.

Note – The operator, when flying off airways or air routes, shall ensure that, if using land-based navigation aids, they will not lose reception of their source of navigation information.

- (3) An operator may plan and conduct the flight referred to in section 1(2) to an aerodrome referred to in paragraph (2) by filing an ATS flight plan to an aerodrome *en route* where an approach can be made to encounter VMC, thence flight in VMC to the destination. An area forecast from an approved weather reporting source shall indicate that for the period from two hours prior to the estimated time of arrival at the destination the weather for the route from the *en route* aerodrome to destination will permit VFR flight.
- (4) For operations in terms of Parts 91, 121, 127 or 135, the flight referred to in section 1(2) may be planned and conducted in accordance with paragraphs (1) to (3), as applicable, or the following –
 - (a) the operator situates a person at the destination aerodrome who has been trained as a weather observer and can determine at least cloud base and visibility and, if equipped, altimeter setting;
 - (b) procedures are published in the operations manual covering –
 - (i) the method of arrival to such aerodromes and the means of rejoining the IFR environment should VMC not be encountered in descent to the destination and when departing such aerodromes;

- (ii) the availability of the weather observer during flight operations to or from the aerodrome;
 - (iii) the equipment needed to effect the determination of weather observations and the means of ensuring its continued serviceability; and
 - (iv) the qualifications and training required of the weather observer, including radiotelephony capability;
- (c) communications facilities exist that permit the operator to receive weather information from the weather observer at all times and relay such information to the PIC or allow the weather observer to relay such information directly to the PIC prior to initial descent to the destination;
- (d) for aerodromes with a published instrument approach and the availability of a current or remote altimeter setting, the weather observer issues, as a minimum, a report prior to departure and immediately prior to descent for arrival that indicates the weather is at or above the minima for the approach; and
- (e) for aerodromes referred to in paragraphs (2)(a) to (c) inclusive, –
- (i) the weather observer issues, as a minimum, a report immediately prior to descent for arrival that indicates the weather is VMC in the vicinity of the destination aerodrome;
 - (ii) the PIC notifies the weather observer that the aircraft is in descent to the destination and, thereafter, the weather observer notifies the PIC immediately if the weather deteriorates below VMC; and
 - (ii) the aircraft is flown from a pre-determined *en route* point via an approved transition route to a point either where VMC is encountered and maintained to the destination or, failing that, the flight proceeds in IMC via an approved route to a point where an IFR clearance to the alternate may be obtained:

Provided that the aircraft is equipped with an approved navigation capability not reliant on ground-based navigation aids.

Note – All routes planned for use shall ensure appropriate obstacle clearance is maintained at all times.

3. Alternate and fuel requirements

An owner or operator may plan and conduct the flight referred to in section 1(2): Provided a suitable alternate is available and filed in the ATC flight plan and the aircraft has sufficient fuel –

- (a) for general aviation and Part 93 aircraft, to meet the requirements of technical standard 91.07.12 1(2) or 2(2), as applicable; or
- (b) for aircraft operating in terms of Parts 121, 127 or 135, to meet the respective regulations governing fuel policy for which an alternate is required.

91.07.8 PLANNING MINIMA FOR IFR FLIGHTS

1. Planning minima for destination alternate aerodromes

An owner or operator may only select the destination aerodrome or alternate destination aerodrome, if required, when the appropriate weather reports or forecasts, or any combination thereof, indicate that, during a period commencing 1 hour before and ending 1 hour after the estimated time of arrival at the aerodrome, the weather conditions will be at or above the applicable planning minima as follows –

- (a) planning minima for the destination aerodrome –
 - (i) RVR/visibility must be in accordance with that specified in CAR 91.07.5; and
 - (ii) for a non-precision approach or a circling approach, the ceiling at or above MDH; and
- (b) planning minima for destination alternate aerodrome must be in accordance with Table 1.

2. Planning minima for *en route* alternate aerodromes

An owner or operator may not select an aerodrome as an *en route* alternate aerodrome unless the appropriate weather reports or forecasts, or any combination thereof, indicate that, during a period commencing 1 hour before and ending 1 hour after the expected time of arrival at the aerodrome, the weather conditions will be at or above the planning minima prescribed in Table 1.

Table 1: Planning minima – *En route* and destination alternates

Type of approach	Planning minima
Cat II and III	Cat I minima with RVR in accordance with TS 91.07.5
Cat I	Non-precision minima and ceiling must be above the MDH
Non-precision	Non-precision minima plus 200 ft added to MDH and 1 000 m added to RVR/Visibility. Ceiling must be above the MDH + 200 ft.
Circling	Circling

Note – Only operators approved for Cat II and III operations may use planning minima based on a Cat II and III approach in Table 1.

91.07.11 MASS AND BALANCE

1. Definitions

Any word or expression to which a meaning has been assigned in the Act and the Civil Aviation Regulations, bears, when used in this technical standard, the same meaning unless the context indicates otherwise, and –

“maximum structural landing mass” means the maximum permissible total aircraft mass upon landing under normal circumstances;

“maximum structural take off mass” means the maximum permissible total aircraft mass at the start of the take-off run or lift-off; and

“maximum zero fuel mass” means the maximum permissible mass of an aircraft with no usable fuel. The mass of the fuel contained in particular tanks must be included in the zero fuel mass when it is explicitly mentioned in the aircraft flight manual limitations;

“traffic load” means the total mass of passengers, baggage and cargo, including any non-revenue load.

2. Mass values for flight crew

- (1) An owner or operator not using actual masses, shall use the following mass values to determine the dry operating mass –
 - (a) actual masses including any flight crew baggage; or
 - (b) standard masses, including hand baggage, of 85 kg for flight deck crew members and 75 kg for cabin crew members.
- (2) An owner or operator must correct the dry operating mass to account for any additional baggage. The position of this additional baggage must be accounted for when establishing the centre of gravity of the aircraft.

3. Mass values for passengers and baggage

- (1) An owner or operator must compute the mass of passengers and checked baggage using either the actual weighed mass of each person and the actual weighed mass of baggage or the standard mass values specified in Tables 1 to 3 below except where the number of passenger seats available is less than 6, when the passenger mass may be established by a verbal statement by or on behalf of each passenger or by estimation. The procedure specifying when to select actual or standard masses must be included in the air operator's operations manual.
- (2) If determining the actual mass by weighing, an owner or operator must ensure that passengers' personal belongings and hand baggage are included. Such weighing must be conducted immediately prior to boarding and at an adjacent location.
- (3) If determining the mass of passengers using standards mass values, the standard mass values in Tables 1 and 2 below must be used. The standard masses include hand baggage and the mass of any infant below 2 years of age carried by an adult on one passenger seat. Infants occupying separate passenger seats are to be considered as children for the purpose of this paragraph.
- (4) Mass values for passengers – 20 seats or more
 - (a) Where the total number of passenger seats available on an aircraft is 20 or more, the standard masses of male and female in Table 1 are applicable. As an alternative, in cases where the total number of passenger seats available is 30 or more, the 'All Adult' mass values in Table 1 are applicable.

- (b) For the purpose of Table 1, holiday charter means a charter flight solely intended as an element of a holiday travel package.

Table 1

Passenger seats	20 and more		30 and more
	Male	Female	All adult
All flights except holiday charters	88 kg	70 kg	84 kg
Holiday charters	83 kg	69 kg	76 kg
Children	35 kg	35 kg	35 kg

- (5) Mass values for passengers – 19 seats or less

Table 2

Passenger seats	1 – 5	6 – 9	10 – 19
Male	104 kg	96 kg	92 kg
Female	86 kg	78 kg	74 kg
Children	35 kg	35 kg	35 kg

- (a) Where the total number of passenger seats available on an aircraft is 19 or less, the standard masses in Table 2 are applicable.
- (b) On flights where no hand baggage is carried in the cabin or where hand baggage is accounted for separately, 6 kg may be deducted from the above male and female masses. Articles such as an overcoat, an umbrella, a small handbag or purse, reading material or a small camera are not considered as hand baggage for the purpose of this paragraph.

- (6) Mass values for baggage

Where the total number of passenger seats available on the aircraft is 20 or more, the standard mass values given in Table 3 are applicable for each piece of checked baggage. For aircraft with 19 passenger seats or less, the actual mass of the checked baggage, determined by weighing, must be used.

Table 3: 20 or more seats

Type of flight	Baggage standard mass	
	20 - 49 seats	50 or more seats
Domestic	11 kg	11 kg
International	15 kg	20 kg

- (7) If an owner or operator wishes to use standard mass values other than those contained in Tables 1 to 3 above, he or she must advise the Director of his or her reasons and gain such approval in advance. After verification and approval by the Director of the results of the weighing survey, the revised standard mass values are only applicable to that

operator. The revised standard mass values can only be used in circumstances consistent with those under which the survey was conducted. Where revised standard masses exceed those in Tables 1 to 3, then such higher values must be used.

- (8) On any flight identified as carrying a significant number of passengers whose masses, including hand baggage, are expected to exceed the standard passenger mass, an owner or operator must determine the actual mass of such passengers by weighing or by adding an adequate mass increment.
- (9) If standard mass values for checked baggage are used and a significant number of passengers check-in baggage that is expected to exceed the standard baggage mass, an owner or operator must determine the actual mass of such baggage by weighing or by adding an adequate mass increment.
- (10) An owner or operator must ensure that a pilot-in-command is advised when a non-standard method has been used for determining the mass of the load and that this method is stated in the load and trim sheet.

91.07.12 FUEL SUPPLY

1. Planning criteria for aeroplanes

Except as provided in Part 91, Part 121 and Part 135, an owner or operator must base the fuel policy, including calculation of the amount of fuel to be carried by an aeroplane, on the following planning criteria –

- (1) when the flight is conducted in accordance with the instrument flight rules and a destination alternate aerodrome is not required in accordance with regulation 91.07.7(6), flight to the aerodrome of intended landing and thereafter for at least 45 minutes at the normal cruising altitude consumption rate;
- (2) when the flight is conducted in accordance with the instrument flight rules and a destination alternate aerodrome is required, flight to the aerodrome of intended landing, thence from the aerodrome of intended landing to an alternate aerodrome and thereafter for at least 45 minutes at the normal cruising altitude consumption rate;
- (3) when the flight is conducted in accordance with the visual flight rules by day, flight to the aerodrome of intended landing and thereafter for at least 30 minutes at the normal cruising altitude consumption rate; or
- (4) When the flight is conducted in accordance with the visual flight rules by night, flight to the aerodrome of intended landing and thereafter for at least 45 minutes at the normal cruising altitude consumption rate.

2. Fuel and oil supply for helicopters

- (1) A flight shall not be commenced unless, taking into account contingencies, the helicopter carries sufficient fuel and oil to ensure that it can safely complete the flight. In computing the fuel and oil required for contingencies, at least the following shall be considered –
 - (a) meteorological conditions forecast;

- (b) expected air traffic control routings and traffic delays;
 - (c) for IFR flight, one instrument approach at the destination heliport, including a missed approach;
 - (d) the procedures for loss of pressurization, where applicable, or failure of one power-unit while *en route*; and
 - (e) any other conditions that may delay the landing of the helicopter or increase fuel and/or oil consumption.
- (2) A helicopter employed in the flying training operation category or private operation category, from landing site to another on a flight which is in whole or in part an IFR or a night flight, must carry fuel and oil reserves to provide for the contingencies specified in paragraph (1) and –
- (a) when no alternate is required, to fly to the heliport to which the flight is planned and thereafter to fly 30 minutes at holding speed at 1 500 ft above the destination heliport under standard temperature conditions and approach and land;
 - (b) when an alternate is required to fly to and execute an approach, and a missed approach, at the heliport to which the flight is planned, and thereafter –
 - (i) to fly to the alternate specified in the flight plan; and
 - (ii) to fly for 30 minutes at holding speed at 1 500 ft above the alternate under standard temperature conditions, and approach and land; and
 - (c) when no suitable alternate is available (i.e. the heliport of intended landing is isolated and no suitable alternate is available), to fly to the heliport to which the flight is planned and thereafter for a period of 30 minutes.
- (3) A helicopter employed in the flying training operation category or private operation category, from one landing site to another on a VFR flight by day, must carry fuel and oil reserves to provide for the contingencies specified in paragraph (1) and –
- (a) to fly to the destination landing site, and thereafter for 20 minutes; or
 - (b) if the flight is over water, to fly to the destination landing site, thence to fly to either a suitable alternative landing site or to the nearest point of land, and thereafter for 30 minutes.
- (4) A helicopter employed in any category on a VFR flight by day may carry fuel and oil additional to that available to the powerplant, provided that this is carried in a safe manner. The additional fuel and oil may be included in the quantities specified in paragraphs (2) and (3): Provided that for the purpose of self-refuelling there must be a safe landing site *en route*, which can be reached before the levels specified in paragraph (3)(a) or (b) are reached.

91.07.21 PASSENGER HEALTH AND SAFETY

- (1) A communicable disease could be suspected and require further evaluation if a person has a fever (temperature 38°C/100°F or greater) that is associated with certain signs or symptoms such as

appearing obviously unwell, persistent coughing, impaired breathing, persistent diarrhoea, persistent vomiting, skin rash, bruising or bleeding without previous injury or irrational behaviour.

- (2) The report required by CAR 91.07.21(2) to the Port Health Authority shall contain, in addition to the person suspected of being infected, the names and contact details of the passengers seated in the same row and two rows in front and behind, in addition to any other person known to have been in close contact with the primary person of concern.

91.07.26 APPROACH BAN

1. Conversion of reported visibility

The RVR value may be obtained by converting the reported visibility in accordance with TS 91.07.5, section 8.

91.07.33 HEAD-UP DISPLAYS AND ENHANCED VISION SYSTEMS

1. Introduction

- (1) This TS provides guidance for the approval for use of head-up displays (HUD) and enhanced vision systems (EVS) intended for installation and operational use in aircraft engaged in general aviation operations. HUD and EVS may be installed and operated to enhance situational awareness or to obtain an operational credit such as lower minima for take-off, approach or landing operations. HUD and EVS may be installed separately or together as part of a hybrid system. Use of these systems during instrument flight and any operational credit gained from their use requires approval from the Director.
- (2) No pilot may use a HUD or EVS in flight in IMC unless such pilot has received the training and checking specified in this TS.
- (3) No owner or operator may permit anyone to use a HUD or EVS in flight under IFR in an aircraft so equipped unless the aircraft has been approved for such flight as specified in this TS.

2. Head-up displays

- (1) HUD may be used for the following purposes –
 - (a) to supplement conventional flight deck instrumentation in the performance of a particular task or operation. The primary cockpit instruments remain the primary means for manually controlling or manoeuvring the aircraft; and
 - (b) as a primary flight display –
 - (i) information presented by the HUD may be used by the pilot in lieu of scanning head-down displays. Operational approval of a HUD for such use allows the pilot to control the aircraft by reference to the HUD for approved ground or flight operations; and
 - (ii) information presented by the HUD may be used as a means to achieve additional navigation or control performance. Operational credits, in the form of lower minima, for HUD used for this purpose may be approved for a particular aircraft or automatic

flight control system. Additional credit may also be allowed to conduct operations with HUD in situations where automated systems are otherwise used.

- (2) Ground training in the use of the HUD shall be accomplished at an approved training organisation (ATO). The programme shall include, as a minimum, the following –
 - (a) an understanding of the HUD and symbology;
 - (b) HUD limitations and normal procedures, including maintenance and operational checks performed to ensure normal system function prior to use;
 - (c) failure modes of the HUD and the impact of the failure modes or limitations upon crew performance;
 - (d) consideration of the potential for loss of situational awareness due to "tunnel vision" (also known as cognitive tunneling or attention tunneling); and
 - (e) any effects that weather, such as low ceilings and visibilities, may have on the performance of a HUD.
- (3) Flight training of at least two hours shall be accomplished using an aircraft or flight simulation training device (FSTD) equipped with the same type of HUD to be used in the aircraft. The training shall consist of normal, abnormal and emergency use of the equipment throughout all flight phases, a variety of take-off and approach conditions and shall include –
 - (a) pilot seat adjustment to attain and maintain appropriate viewing angles and verification of HUD operating modes;
 - (b) operations during critical flight events (ACAS TA/RA, upset and wind shear recovery, engine or system failure, etc);
 - (c) crew coordination, monitoring and verbal call-out procedures for single HUD installations with head-down monitoring for pilot-not-equipped with HUD and head-up monitoring for pilot-equipped with HUD;
 - (d) crew coordination, monitoring and verbal call-out procedures for dual HUD installations with use of the HUD by the pilot flying the aircraft and either head-up or head-down monitoring by the other pilot; and
 - (e) use during low visibility operations, including taxi, take-off, instrument approach and landing in both day and night conditions. This training should include the transition from head-down to head-up and head-up to head-down operations.

2. Enhanced vision systems

- (1) Enhanced vision systems (EVS) allow the pilot to view an image of the external scene obscured by darkness or other visibility restrictions which –
 - (a) may improve situational awareness;
 - (b) may allow pilots to detect terrain or obstructions on the runway or taxiways;

- (c) may provide visual cues to enable earlier runway alignment and a more stabilized approach; and
 - (d) may also be used to obtain approval to use reduced visibility minima when the images are presented into the pilot's external field of view on a HUD without significantly restricting that view.
- (2) For an owner or operator who wishes to use EVS to increase situational awareness, ground and flight training at an ATO is recommended.
- (3) For an owner or operator who wishes operational credit for the use of EVS to lower aerodrome operating minima, ground training in the use of the EVS shall be accomplished at an ATO. The programme shall include, as a minimum, the following:
- (a) an understanding of the system characteristics and operational constraints;
 - (b) normal procedures, controls, modes and system adjustments;
 - (c) EVS limitations;
 - (d) failure modes of the EVS and the impact of the failure modes or limitations upon crew performance, in particular, for two-pilot operations; and
 - (e) any effects that weather, such as low ceilings and visibilities, may have on the performance of an EVS.
- (4) For an owner or operator who wishes operational credit for the use of EVS to lower aerodrome operating minima, flight training shall be accomplished using an aircraft or FSTD equipped with the same type of EVS to be used in the aircraft. The training shall consist of normal, abnormal and emergency use of the equipment throughout all flight phases, a variety of approaches and take-off conditions and shall include –
- (a) enhanced vision display during low visibility operations, including taxi, take-off, instrument approach and landing and system use for instrument approach procedures in both day and night conditions;
 - (b) crew coordination and monitoring procedures and pilot call-out responsibilities;
 - (c) transition from enhanced imagery to visual conditions during the runway visual acquisition; and
 - (d) rejected landing due to loss of visual cues of the landing area, touchdown zone or rollout area.

3. HUD and EVS approval

- (1) An owner or operator shall obtain operational and airworthiness approval for the use of a HUD.
- (2) Operational and airworthiness EVS approvals are required if the equipment is to be used to lower the owner or operator's aerodrome operating minima.

- (3) For enhanced situational awareness, the installation and operational procedures shall ensure that EVS operations do not interfere with normal procedures or the operation or use of other aircraft systems.
- (4) HUD or EVS, as applicable, installed in aircraft in the State of Manufacture shall meet the airworthiness requirements of such State. Provided an owner or operator can submit evidence of meeting the requirements of the State of Manufacture, airworthiness approval for the use of the HUD or EVS, as applicable, in that aircraft shall be given.
- (5) Prior to installing a HUD or EVS, as applicable, as a retrofit, an owner or operator shall contact the SACAA to determine the airworthiness requirements associated with its approval for use.
- (6) An airworthiness approval issued to an owner or operator for an aircraft shall be valid for any other aircraft of the same type operated by such owner or operator: Provided the HUD or EVS equipment, as applicable, is the same in each aircraft.
- (7) An airworthiness approval issued to an aircraft type may be extended to other aircraft types: Provided the Director is of the opinion that the other aircraft types have sufficient commonality with the approved aircraft and the HUD or EVS equipment, as applicable, is the same in all the aircraft.
- (8) Pilots shall pass a knowledge test following the ground training and a skills test following the flight training, both of which shall be administered by the ATO responsible for conducting the training. Upon successful completion of the skills test, the ATO shall issue a certificate of competency to the candidate.
- (9) Operational approval to use the HUD or EVS, as applicable, shall be issued by the SACAA to the applicant upon presentation of the certificate issued by the ATO. Such approval is pilot-specific.

91.07.34 ELECTRONIC FLIGHT BAGS

1. Introduction

- (1) This TS provides guidance for the approval for use of installed and portable electronic flight bags (EFB) for general aviation owners or operators.
- (2) Installed EFBs may be incorporated during the aircraft type design, by a change to the type design or added by a supplemental type certificate.
- (3) Portable EFBs are not considered to be part of the certified aircraft configuration and do not require airworthiness approval.

Note – Refer to section 2 for additional information concerning portable EFBs.

2. Airworthiness approval

- (1) Portable EFBs that do not require airworthiness approval –
 - (a) are generally commercial-off-the-shelf (COTS)-based computer systems used for aircraft operations (e.g. laptop, tablet PC);
 - (b) are not attached to an aircraft mounting device;
 - (c) are considered to be a controlled portable electronic device (PED);

Note.— A controlled PED is a PED that is subject to administrative control by the company. This will include, inter alia, tracking the location of the devices to specific aircraft or persons and ensuring that no unauthorized changes are made to the hardware, software or databases. A controlled PED will also be subject to procedures to ensure that it is maintained to the latest amendment state.

(d) may only connect to aircraft power through a certified power source;

Note— The EFB power source should be designed such that it may be deactivated at any time. Where there is no possibility for the flight crew to quickly remove or un-plug the power to the EFB system, a clearly labelled and conspicuous means (e.g. on/off switch) should be provided. Circuit breakers are not to be used as switches; their use for this purpose is prohibited.

(e) are normally without aircraft data connectivity except under specific conditions; and

Notes — Data connectivity of the EFB to other aircraft systems is not authorized except if the EFB system is connected to –

- 1. a system completely isolated from the avionics/aircraft systems (e.g., EFB system connected to a transmission medium that receives and transmits data for Aircraft Administrative Communications (AAC) purposes for usage on the ground only); and*
- 2. a certified data link to receive data only from aircraft systems, where the data link, through the certification process, has an approved security device to protect the aircraft systems from receiving any data from the EFB system and from the installation or use of unauthorized applications and data. Through the certification process, this data link should also have been demonstrated to protect the installed aircraft systems from adverse effects due to EFB system failures. Subject to the above provisions, there is no further evaluation required when connecting the EFB system to the aircraft data link port.*

(f) shall be secured during critical phases of flight.

- (2) Even though portable EFBs do not require an airworthiness approval as they are “non-installed equipment”, EMI demonstrations, batteries/power sources, data connectivity and rapid depressurization shall be assessed if the Director so determines.
- (3) For EFBs other than those addressed in paragraph (1), the entire EFB, or some elements of the EFB, shall require an airworthiness approval. Elements to be subject to airworthiness approval are determined upon analysis of their interface with aircraft systems and equipment. These EFBs shall be included as part of the minimum equipment list (MEL), if applicable.
- (4) EFBs integrated into the aircraft as part of its initial design or installed later as a retrofit in accordance with the requirements of the State of Manufacture shall be given approval: Provided the owner or operator can submit evidence of having met the requirements of the State of Manufacture.
- (5) For aircraft without the evidence specified in paragraph (4), an owner or operator shall contact the SACAA to determine the airworthiness requirements associated with its approval for use prior to installing an EFB as a retrofit,.

3. Operational approval

- (1) An owner or operator transitioning to a paperless flight deck (i.e., removal of charts, manuals, etc.) shall complete the requirements specified in paragraphs (2) to (7) below, inclusive, prior to operating with an EFB.
- (2) Operational approval is contingent on the owner or operator completing ground training on the EFB system including, as a minimum, –
 - (a) an overview of the system architecture;
 - (b) pre-flight checks of the system;
 - (c) limitations of the system;
 - (d) the use of each operational function on the EFB;
 - (e) restrictions on the use of the system, including when some or all of the EFB functions are not available;
 - (f) the conditions, including phases of flight, under which the EFB should not be used;
 - (g) procedures for cross-checking data entry and computed information;
 - (h) human performance considerations on the use of the EFB; and
 - (i) additional training for new applications, new features of current applications or changes to the hardware configuration.
- (3) EFB operations with no paper backup shall have a means of mitigation against the effects of a failure or malfunction of the EFB. Mitigation against EFB failure or impairment may be accomplished by a combination of –
 - (a) system design;
 - (b) separate and backup power sources for the EFB;
 - (c) redundant EFB applications hosted on different EFB platforms;
 - (d) paper products carried by selected crewmembers;
 - (e) complete set of paper backups on the flight deck; and/or
 - (f) procedural means.
- (4) The owner or operator shall be responsible for the administration and physical control of EFBs, in particular, the activation of amendments to the hardware and software.
- (5) The owner or operator shall ensure that the EFB is protected from unauthorized intervention.
- (6) The owner or operator shall ensure that the EFB is maintained in accordance with the manufacturer's recommended programme. The owner or operator should establish procedures for action to be taken when an EFB is out of service unless provided for in a MEL.
- (7) Prior to use, an assessment shall be made of how the device will be used on the flight deck. Safe stowage, crashworthiness, security and use under normal environmental conditions, including turbulence, shall be addressed by the owner or operator.
- (8) Upon receiving airworthiness approval and meeting the requirements of paragraph's (2) to (7) of this section, inclusive, the owner or operator shall undergo a six-month self-evaluation period during which paper backups of the materials on the EFB shall be carried. The back-up paper materials shall be readily available to the flight crew members during flight time.

- (9) If, following the six-month evaluation period, the owner or operator is satisfied that the equipment and procedures are adequate and the crewmembers are sufficiently trained and knowledgeable, the EFB may be used without any required manuals, documents or charts being carried, if desired.

91.08.5 PERFORMANCE LIMITATIONS CLASS A AND CLASS C AEROPLANES

1. Determination of adequate margin

- (1) No aeroplane shall be taken off at a mass in excess of that shown in the flight manual to correspond with a net take-off flight path which clears all obstacles either by at least a height of 35 ft vertically or at least 90 m plus 0.125D laterally, where D is the horizontal distance the aeroplane has travelled from the end of take-off distance available, except as provided for in paragraphs (2) to (4) inclusive. In determining the allowable deviation of the net take-off flight path in order to avoid obstacles by at least the distances specified, it is assumed that the aeroplane is not banked before the clearance of the net take-off flight path above obstacles is at least 50 ft and that the bank thereafter does not exceed 15 degrees. The net take-off flight path considered is for the altitude of the aerodrome and for the ambient temperature and wind component existing at the time of take-off.
- (2) Where the intended track does not include any change of heading greater than 15 degrees –
- (a) for operations conducted in VMC by day; or
 - (b) for operations conducted with navigation aids such that the pilot can maintain the aeroplane on the intended track with the same precision as for operations in VMC,
- obstacles at a distance greater than 300 m on either side of the intended track need not be considered when determining net take-off flight path adequate margins.
- (3) Where the intended track does not include any change of heading greater than 15 degrees for operations conducted in IMC or in VMC by night, except as provided in paragraph (2)(b), and where the intended track includes changes of heading greater than 15 degrees for operations conducted in VMC by day, obstacles at a distance greater than 600 m on either side of the intended track need not be considered when determining net take-off flight path adequate margins.
- (4) Where the intended track includes changes of heading greater than 15 degrees for operations conducted in IMC or in VMC by night, obstacles at a distance greater than 900 m on either side of the intended track need not be considered when determining net take-off flight path adequate margins.

SA-CATS 92 Conveyance of dangerous goods

List of technical standards

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92.00.28 INFORMATION TO PASSENGERS

92.00.31 ISSUING OF COMPETENCY CARDS

92.00.1 APPLICABILITY

1. Definitions

Any word or expression to which a meaning has been assigned in the Act, and the Regulations, bears the same meaning unless the context indicates otherwise, and –

“**the Instructions**” means the Technical Instructions for the Safe Transport of Dangerous Goods by Air, Doc 9284-AN/905, approved and published by a decision of the Council of ICAO, as amended from time to time; and

“**Class B aircraft cargo compartment**” means a cargo compartment of an aircraft in which both cargo and passengers are carried on the main deck, and which is located between the flight deck and the passenger cabin or behind the passenger cabin at the rear of the aircraft, and in which –

- (a) there is sufficient access in flight to enable a flight crew member to effectively reach any part of the compartment with the contents of a hand fire extinguisher;
- (b) no hazardous quantity of smoke, flames or extinguishing agent will enter any compartment occupied by the flight crew or passengers; and
- (c) there is a separate approved smoke detector or fire detector system to give warning at the pilot or flight engineer station.

2. Replacement for articles and substances required to be on board

The replacements for the articles and substances required to be on board the aircraft in accordance with the appropriate airworthiness requirements and the provisions of the operations manual, must be conveyed in accordance with Part 1; 2.3.2 of the Instructions

3. Articles and substances on board for specialised purposes

The regulations on the conveyance of dangerous goods do not apply in respect of the articles and substances carried on board an aircraft for the specialised purposes specified in Part 1; 2.3.1(b) and (c) of the Instructions.

4. Articles and substances intended for personal use

The articles and substances intended for the personal use of passengers and flight crew members must be carried in accordance with the requirements and standards prescribed in TS 92.00.27.

92.00.2 PROHIBITION OF CONVEYANCE OF DANGEROUS GOODS

1. Conveyance of dangerous goods forbidden under any circumstances

The dangerous goods specified in Part 1; 2.1 of the Instructions and the dangerous goods listed as “forbidden” in the Dangerous Goods List, Table 2-14 of the Instructions, are forbidden for conveyance by air under any circumstances.

2. Conveyance of dangerous goods forbidden under normal circumstances

The dangerous goods specified in Part 1; 2.2 of the Instructions are forbidden for conveyance by air under normal circumstances.

3. Conveyance of any other dangerous goods

- (1) The dangerous goods specified in Part 1; 2.4, 2.5 and 2.6 and listed in Part 2; Chapters 1 to 12, must be packed and conveyed in accordance with the procedures and requirements prescribed by the Instructions.
- (2) Any dangerous goods defined in the Instructions which are to be conveyed by airmail, may only be conveyed in accordance with the provisions of the Post Office Act, 1958 (Act No. 44 of 1958).

92.00.4 CLASSIFICATION, DIVISION AND LISTING OF DANGEROUS GOODS

1. Classes, divisions and listing

The classes, divisions and listing of dangerous goods are contained in Part 2, Chapters 1 to 12 of the Instructions.

92.00.6 DESIGNATION OF DANGEROUS GOODS INSPECTORS

1. Conditions, requirements, rules, procedures and standards for a designation

The conditions and requirements for and the rules, procedures and standards connected with the designation of a dangerous goods inspector, are the following:

1.1 Conditions

- (1) The candidate may not be employed by any shipper, air service operator, packer or freight forwarder.
- (2) The candidate must be independent.

1.2 Requirements

- (1) The candidate must at least possess the following qualifications:

- (a) A Further Education and Training Certificate; and
 - (b) successful completion of the initial dangerous goods training and the refresher dangerous goods training, at the intervals referred to in CAR 92.00.8(4).
- (2) The candidate must at least have the following experience:
 - (a) Two years experience either as a flight crew member or as an air cargo handler; or
 - (b) two years experience in road or rail dangerous goods handling.
 - (3) The candidate must have sufficient ability in reading, speaking and understanding the English language to enable such candidate to duly exercise the powers of a designated dangerous goods inspector.
 - (4) The candidate must be a fit and proper person to duly exercise the powers of a designated dangerous goods inspector.

1.3 Rules

Once designated, the dangerous goods inspector must –

- (1) conduct ad hoc inspections;
- (2) report back to the Director on every inspection;
- (3) maintain competency; and
- (4) stay abreast of new developments regarding the conveyance of dangerous goods, both locally and internationally.

1.4 Procedures

- (1) Any person who desires to be designated as a dangerous goods inspector, must apply in writing to the Director.
- (2) An application for the designation as a dangerous goods inspector must be accompanied by proof that the applicant complies with the conditions, requirements and standards prescribed in this technical standard.
- (3) The Director may, after due consideration of the application, designate the applicant as a dangerous goods inspector.
- (4) The Director may designate the applicant as a dangerous goods inspector for the period determined by the Director, which period may not exceed one year, calculated from the date of designation.
- (5) The Director may withdraw a designation if –
 - (a) it becomes evident that the designated dangerous goods inspector does not comply with the provisions of this technical standard; or
 - (b) the withdrawal is necessary in the interests of aviation safety.
- (6) The designated dangerous goods inspector must, upon the withdrawal of the designation by the Director, forthwith surrender the document referred to in CAR 92.00.6(3) to the Director.

1.5 Standards

The candidate must comply with the conditions, requirements and rules prescribed in this technical standard.

92.00.7 POWERS OF DANGEROUS GOODS INSPECTORS

1. Compliance

The reference to Document SA-CATS 92 in CAR 92.00.7(1), (2) and (3)(b) means the requirements and standards as prescribed in the Instructions.

2. Separation of dangerous goods

The separation of classes of dangerous goods are prescribed in CAR 92.00.19 and TS 92.00.19

3. Documentation

The documentation relating to a consignment of dangerous goods is prescribed in CAR 92.00.13 and TS 92.00.13.

4. Qualifications of persons handling dangerous goods

Any person handling dangerous goods must comply with CAR 92.00.8 and TS 92.00.8.

92.00.8 TRAINING

1. Dangerous goods training courses

- (1) The initial dangerous goods training course and refresher dangerous goods training course must be conducted by the designated body or organisation in accordance with the Dangerous Goods Training Programme prescribed by ICAO, Doc 9375-AN913, Books 1, 2, 3 and 4, and are subject to review by the Director.
- (2) Dangerous goods training requirements for all categories of personnel shall be as stipulated in CAR 92.00.8, Part 1, Chapter 4, 4.2.6 and 4.2.7 of the Technical Instructions.

2. Subject matter of the dangerous goods training courses

The subject matter of the initial dangerous goods training course and refresher dangerous goods training course are the aspects referred to in Part 6, Chapter 2 of the Instructions.

92.00.10 PACKING AND PACKAGING

1. Packing requirements and standards

The requirements and standards for the packing of dangerous goods are contained in Part 3 of the Instructions.

2. Material and construction specifications and testing

The material and construction specifications of packaging and the requirements and standards for the testing of packaging are contained in Parts 3 and 7 of the Instructions and such packaging must, if required by the Instructions, be tested by an approved testing facility.

3. Packaging for retention of liquid

Packaging for which retention of liquid is a basic function, must withstand the pressure prescribed in Part 3; 1.1.6.1 of the Instructions or must comply with Part 3; 1.1.6.2 of the Instructions.

92.00.11 RESPONSIBILITY OF SHIPPER

1. Responsibilities of the shipper

The responsibilities of the shipper regarding the identification, classification, marking and labelling of packages containing dangerous goods and completion of the dangerous goods transport document are contained in Part 4 of the Instructions.

92.00.12 LABELLING AND MARKING

1. Labelling of packages

The requirements and standards for the labelling of packages that contain dangerous goods are contained in Part 4, Chapter 3 of the Instructions.

2. Marking of packages

The requirements and standards for the marking of packages that contain dangerous goods are contained in Part 4, Chapter 2 of the Instructions.

3. Marking of specification packaging

Each outer or single packaging used for dangerous goods, for which specification packaging is required in Part 3 of the Instructions, must bear the markings appropriate to the contents as prescribed in Part 7, Chapter 2 of the Instructions.

92.00.13 DANGEROUS GOODS TRANSPORT DOCUMENT

1. Circumstances when dangerous goods transport document need not be completed

A dangerous goods transport document need not be completed for dangerous goods conveyed in airmail and dangerous goods conveyed in excepted quantities as prescribed in TS 92.00.2.2 and 92.00.2.3(2).

2. Other documentation

The other documents that are required for the conveyance of dangerous goods by air are contained in Part 4; 4.2, 4.3, 4.4 and 4.5 of the Instructions under the following headings:

- Air waybill;
- Additional documentation for other than radioactive material;
- Additional documentation for radioactive material;
- Documentation for radioactive material excepted package.

3. Contents of dangerous goods transport document

The information that must be contained in a dangerous goods transport document is prescribed in Part 4; 4.1 of the Instructions.

4. Declaration

The information that has to be contained in the declaration referred to in CAR 92.00.13(2)(b) and (c), is the information prescribed in the Instructions.

92.00.14 ACCEPTANCE PROCEDURES

1. Circumstances when dangerous goods transport document need not be completed

The dangerous goods for which a dangerous goods transport document need not be completed, are those referred to in TS 92.00.13(1).

2. Acceptance procedures

The acceptance procedures that an operator has to follow when accepting dangerous goods for conveyance by air, are prescribed in Part 5, Chapter 1 of the Instructions.

3. Acceptance checklist

The requirements for an acceptance checklist are prescribed in Part 5; 1.3 of the Instructions.

92.00.15 INFORMATION TO BE PROVIDED

1. Information to pilot-in-command

The minimum information that an operator must provide to a pilot-in-command is contained in Part 5, 4.1 of the Instructions.

2. Information to flight crew members and employees

The information that an operator must provide to his or her flight crew members and employees, must include the information referred to in Part 5; 4.2 of the Instructions.

92.00.16 INSPECTION FOR DAMAGE OR LEAKAGE BY OPERATOR

1. Radiation level

The radiation level resulting from the fixed contamination at any accessible surface and non-fixed contamination must be below the values prescribed in Part 5; 3.2.4 and Table 5-6 of the Instructions.

92.00.17 STORAGE AND LOADING

1. Storage and loading

The requirements for the storage and loading of dangerous goods are contained in Part 5, Chapter 2 of the Instructions.

92.00.18 LOADING RESTRICTIONS IN CABIN OR ON FLIGHT DECK

1. Conveyance of dangerous goods in aircraft cabin or flight deck

Dangerous goods may not be conveyed in an aircraft cabin occupied by passengers or on the flight deck or cockpit of an aircraft, except as permitted by Part 1, 2.3.1 and Part 9.1 of the instructions and for radioactive material, excepted packages under Part 2, 7.9 of the Instructions.

2. Class B aircraft cargo compartment

Dangerous goods may be carried in a main deck cargo compartment of a passenger aircraft provided that the compartment meets all the certification requirements for a Class B aircraft cargo compartment.

92.00.19 SEPARATION AND SEGREGATION

1. Stowage of poison or infectious substances

The stowage of poison or an infectious substance must be done in accordance with Part 5; 2.8 of the Instructions.

2. Stowage of radioactive materials

The stowage of radioactive materials must be done in accordance with Part 5; 2.9 of the Instructions.

92.00.21 LOADING IN CARGO AIRCRAFT

1. Loading in cargo aircraft

The packages or overpacks of dangerous goods described in Part 5; 2.4.1 of the Instructions do not have to comply with the requirements referred to in CAR 92.00.21.

92.00.22 DANGEROUS GOODS ACCIDENT AND INCIDENT REPORTING

1. Dangerous goods accident and incident reporting

The operator of an aircraft carrying dangerous goods which is involved in a dangerous goods accident or dangerous goods incident must notify the relevant authority of the matters required in Part 5; 4.6 of the Instructions.

92.00.24 DANGEROUS GOODS ACCIDENT AND INCIDENT INFORMATION

1. Dangerous goods accident and incident information

The operator must ensure that the emergency response information prescribed in Part 5; 4.8(a) and (b) of the Instructions, is available at all times as required in terms of CAR 92.00.24.

2. Reporting of incidents

(1) An operator, cargo handling organization or aerodrome managers shall keep records of and report dangerous goods incidents or accidents to the Director within 48 hours as per CAR 92.00.22(1). The documents shall include:

- (a) Dangerous goods transport documents
- (b) Acceptance checklists, if completion of the checklist is required.

(2) An operator or cargo handling organization shall retain dangerous goods documents for the purposes of investigation as per CAR 92.00.26(1).

92.00.27 DANGEROUS GOODS CARRIED BY PASSENGERS OR FLIGHT CREW MEMBERS

1. Dangerous goods carried by passengers or flight crew members

No passenger or flight crew member may carry dangerous goods except in accordance with the requirements and standards contained in Part 9, Chapter 1 of the Instructions.

92.00.28 INFORMATION TO PASSENGERS

An operator shall ensure that passengers are informed regarding carriage of dangerous goods and that questions relating to dangerous goods are asked from passengers at the check-in counters and self check-in machines at all times to seek information regarding the carriage of dangerous goods as per CAR 92.00.28.

92.00.31 ISSUING OF COMPETENCY CARDS

All personnel required to have dangerous goods qualification as prescribed by CAR 92.00.8 shall be issued with a competency cards as per CAR 92.00.31, Technical Standard 92.00.8 and Technical Standard 92.00.1 which shall have the following:

- (a) Training Category
- (b) Name and Surname
- (c) Identification Document Number
- (d) A.T.O. Name and Number
- (e) Expiry Date
- (f) Signed by Designated Official/Appointed Official

SA-CATS 94 Operation of Non-Type Certificated Aircraft

List of regulations

94.02.1 EX-MILITARY AIRCRAFT

1. Required training
2. Training syllabus
3. Guidelines for the establishment of training criteria
4. Information to be supplied
5. Prescribed individual training programme
6. Continuation training
7. Documentation

94.06.14 DISPLAY AUTHORISATION

1. Introduction
2. Information required
3. Display authorisation

94.02.1 EX-MILITARY AIRCRAFT

1. Required training

The additional training, required for conversion onto ex-military aircraft shall include ground as well as flight training.

2. Training syllabus

(1) Ground Training

- (a) Ground training may be done on a self-study or formal-lecture basis, after which the applicant must complete a written examination to prove his or her knowledge of all aircraft systems.
- (b) The technical examinations shall cover the following aspects:
 - (i) Engine
 - (ii) Fuel system
 - (iii) Oil system
 - (iv) Hydraulic system
 - (v) Electrical system
 - (vi) Pressurization system
 - (vii) Ejection system
 - (viii) Emergency systems
- (c) The technical examinations must be passed with the following minimum results:
 - (i) Limitations: 80%
 - (ii) Procedures: 80%
 - (ii) Emergency Procedures: 95%
- (d) The ground course shall include an introduction to the use of the survival equipment. Special attention must be given to the use of the parachute, the dinghy and any medical equipment fitted in the aircraft. It would be beneficial for the trainee to do an introductory parachute course. This will enable the individual to brief any future passenger better on the use of a parachute.

(2) Flying training

- (a) The flying training should only be initiated after the completion of the ground phase. During this phase it will be imperative to take previous experience into account. After completion of this phase, the applicant should be able to handle the aircraft safely during all flying conditions, to the satisfaction of the testing flight instructor and the Director.
- (b) Aspects to be covered during the flying training phase, to the extent applicable to type, shall include the following:
 - (i) Aircraft familiarization
 - (ii) Effect of controls
 - (iii) Climbing and descending
 - (iv) Stalling at various speeds and configurations
 - (v) Medium and steep turning
 - (vi) Incipient spinning and spinning, if allowed
 - (vii) Acrobatic manoeuvres applicable to the specific type
 - (viii) Precautionary landings
 - (ix) Forced landings
 - (x) Approaches (different speeds and configurations as applicable to type)
 - (xi) Landings (different speeds and configurations as applicable to type)
 - (xii) Navigation (low, medium and high level)
 - (xiii) Introduction to instrument flying
 - (xiv) Introduction to night flying
 - (xv) Handling of emergencies
 - (xvi) Engine failures during different stages of flight
 - (xvii) Engine fire/overheat during different stages of flight
 - (xviii) Hydraulic failure
 - (xix) Flap failure
 - (xx) Dragchute failure

3. Guidelines for the establishment of training criteria

- (1) Guideline used by the Director for the approval of training criteria for an individual:

Candidate has less than 300 hours total flying time.	Minimum of 40 hours instruction on type, of which 5 hours could be on a simulator of that type. Minimum of 15 hours with a check pilot who should be a qualified instructor on type. If an instructor is not available, it must be someone who has done the conversion to the instructor's position on type.
Candidate has less than 300 hours total flying time of which 100 hours are on a jet-engine aircraft.	Minimum of 30 hours instruction on type, of which 5 hours could be on a simulator of that type. Minimum of 10 hours with a check pilot.
Candidate has more than 500 hours total flying time including more than 100 hours as pilot-in-	Minimum of 10 hours instruction on type. Minimum of 10 hours with a check

command on a civilian jet aircraft.	pilot.
Candidate has a military jet rating obtained as a civilian on a similar aircraft type.	Minimum of 7 hours instruction on type. Minimum of 5 hours with a check pilot.
Candidate has held a military jet licence issued by an air force.	Will be determined by CAA.

(2) Guideline used by the Director for the approval of aerobatic training criteria for an individual:

Candidate has no previous aerobatic experience.	An aerobatic rating and a minimum of 10 hours aerobatic training on the aircraft type.
Candidate has an aerobatic rating issued in terms of Part 61 and has flown more than 6 hours of aerobatics during the preceding twelve months.	Minimum of 4 hours aerobatic training on type.
Candidate has previous aerobatic experience but does not have a civilian acrobatic rating.	An aerobatic rating and a minimum of 6 hours aerobatic training on aircraft type.
Candidate has more than 6 hours aerobatic experience on military jet aircraft during the preceding twelve months and has an aerobatic rating.	Minimum of 2 hour aerobatic training on type.

4. Information to be supplied

- (1) Information to be supplied to the Director in respect of the candidate when applying for approval of training criteria:
- (a) Summary of the Pilot Logbook
The pilot's logbook should be summarised and a copy of the summary page submitted to the Director
 - (b) Hours flown per month
The average number of hours that the applicant flies per month.
 - (c) Aerobatic Experience
The total number of hours aerobatic experience and the number of hours aerobatic flying during the preceding twelve months.
 - (d) Type of Aircraft
The details of the aircraft type for which the applicant is applying.
 - (e) Licence Details
Details of the licences held, including aircraft types, systems, and night or instrument rating.
- (2) Information to be supplied to the Director in respect of the person or organization to provide the training when applying for approval of training criteria:
- (a) Approved Training Organisation
The name and certificate number of the Approved Training Organisation.
 - (b) Flight Instructor

- (i) the name and licence number of the flight instructor; and
 - (ii) the qualification of the flight instructor, including flying experience and type ratings held.
- (3) When applying for approval of training criteria the Information to be supplied to the Director shall include –
- (a) the proposed emergency training procedures; and
 - (b) the physical and medical requirements for the candidate to operate the aircraft and the limitations imposed.

5. Prescribed individual training programme

Once the Director has studied the information submitted in terms of sub-paragraphs (3), (4) and (5), and is satisfied that the training will be done in a responsible and safe manner, minimum requirements regarding the training of the particular individual will be supplied in writing by the Director on Form CA94.02.1.

6. Continuation training

After completion of the conversion onto type, it will be the responsibility of the pilot and the aircraft owner to ensure that the pilot remains current on type. As a guideline, the following should be used:

(1) Ground training:

An emergency, handling, limitations and procedural quiz must be completed at least every second month.

(2) Flying training:

To remain current, the pilot must –

- (a) complete at least 12 hours, as pilot-in-command of an ex-military aircraft, over a twelve-months period; or
- (b) should this not be the case, or if the pilot has not flown the specific type for a period exceeding three months, the pilot must undergo a check flight with a flight instructor who is current on type; and
- (c) undergo at least one check flight on type not later than six months since the previous check flight on type with a flight instructor who is current on type.

7. Documentation

All documentation generated during the conversion and continuation training shall be filed in the pilot's personal training file, which must be kept at the aircraft owner's office, and which must be made available on request to an authorized officer, an inspector, or an authorized person.

94.06.14 DISPLAY AUTHORISATION

1. INTRODUCTION

When an applicant wishes to participate in public flying demonstrations the applicant should submit the information detailed below to the CAA. The CAA will, if it is satisfied that the aircraft can be operated in a safe manner during an air show, issue a Display Authorisation to the applicant.

2. INFORMATION REQUIRED

2.1 FLYING EXPERIENCE

The applicant should supply a summary of previous flying experience and details of experience on the type of aircraft to be flown during the display.

2.2 AIR SHOW EXPERIENCE

The applicant should provide the CAA with a detailed list of previous air show experience. This should include the dates, duration, aircraft type and sequence flown.

2.3 DETAILS OF THE SEQUENCE

The applicant should submit the detail of the sequence to be flown which should include the following:

(a) *Good weather sequence*

The display sequence to be flown, in textual and graphical form, where the weather conditions do not impose any restriction. The minimum meteorological conditions for this sequence should be specified.

(b) *Bad Weather Sequence*

The display to be flown, in textual and graphical form, where the weather conditions such as cloud ceiling imposes a restriction on the display. The minimum meteorological conditions for this sequence should be specified.

(c) *Emergency Procedures*

The specific procedures to be followed for the possible emergency situations that may occur including diversion aerodromes.

2.4 AIRCRAFT CONFIGURATION

The applicant should supply details of the aircraft configuration including weight, takeoff fuel and landing fuel.

2.5 FEES

The applicant should supply the receipt for the payment of the prescribed fees.

3. DISPLAY AUTHORISATION

Once the information has been reviewed, a display authorisation may be issued at the discretion of the Director or the organisation, designated for the purpose in terms of Part 149, as the case may be. The display authorisation details the sequence to be flown and any other conditions that may be imposed.

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Commercial Operation of Non-Type Certificated Aircraft

List of regulations

96.02.3 FLIGHT TIME AND DUTY PERIODS

96.02.4 TRAINING AND CHECKING

96.03.1 OPERATIONS MANUAL

1. Structure of operations manual
2. Contents of operations manual

96.04.7 DUTIES OF HOLDER OF OPERATING CERTIFICATE

1. Notification

96.02.3 FLIGHT TIME AND DUTY PERIODS

The provisions to be included in a flight time and duty period scheme shall be those prescribed in Documents SA-CATS 121, SA-CATS 127 or SA-CATS 135, as applicable to the type of non-type certificated aircraft engaged in commercial air transport operations.

96.02.4 TRAINING AND CHECKING

The training programme to be established shall be based on those prescribed in Documents SA-CATS 121, SA-CATS 127 or SA-CATS 135, as applicable to the type of non-type certificated aircraft engaged in commercial air transport operations.

96.03.1 OPERATIONS MANUAL

1. Structure of operations manual

- (1) An operator must ensure that the main structure of the operations manual is as follows:
Part 1: General

This part must comprise all non aircraft type-related operational policies, instructions and procedures needed for a safe operation and must comply with all relevant CAR.

Part 2: Aircraft operating matters

This part must comprise all aircraft type-related instructions and procedures needed for a safe operation. It must take account of the different types of aircraft or variants used by the operator.

Part 3: Route and aerodrome instructions and information

This part must comprise all instructions and information needed for the area of operation.

Part 4: Training

This part must comprise all training instructions for personnel required for a safe operation.

Part 5: Maintenance Control Manual

This part must comprise all instructions and information needed for the continuous airworthiness of the aircraft.

- (2) An operator must ensure that the contents of the operations manual are in accordance with Section 2 of this technical standard, and relevant to the area and type of operation.
- (3) An operator must ensure that the detailed structure of the operations manual is approved by the Director.

2. Contents of operations manual

An operator shall ensure that those items, listed below, which are applicable to his or her particular operation and the type of aircraft operated, are included in his or her operations manual. Most, if not all of the items would be applicable to the operator of a large veteran aircraft, operating a charter flight internationally, while only a few would be applicable to the commercial operator of a single-seater production-built aircraft operated in terms of a Class III air service licence.

2.1 PART 1: GENERAL

2.1.1 Administration and control of operations manual

- (1) Introduction
 - (a) A statement that the manual complies with all applicable CAR and with the terms and conditions of the applicable operating certificate.
 - (b) A statement that the manual contains operational instructions that are to be complied with by the relevant personnel.
 - (c) A list and brief description of the various parts, their contents, applicability and use.
 - (d) Explanations and definitions of terms and words needed for the use of the manual.
- (2) System of amendment and revision
 - (a) Who is responsible for the issuance and insertion of amendments and revisions.
 - (b) A record of amendments and revisions with insertion dates and effective dates.
 - (c) A statement that handwritten amendments and revisions are not permitted except in situations requiring immediate amendment or revision in the interests of aviation safety.
 - (d) A description of the system for the annotation of pages and their effective dates.
 - (e) A list of effective pages.
 - (f) Annotation of changes (on text pages and, as far as practicable, on charts and diagrams).
 - (g) Temporary revisions.
 - (h) A description of the distribution system for the manuals, amendments and revisions.

2.1.2 Organisation and responsibilities

- (1) Organisational structure

A description of the organisational structure including the general organogram and operations department organogram. The organogram must depict the relationship between the Operations Department and the other Departments of the organisation. In particular, the subordination and

reporting lines of all Divisions, Departments etc., which pertain to the safety of flight operations, must be shown.

(2) Nominated post holders

The name of each nominated post holder responsible for flight operations, the maintenance system, flight crew training and ground operations. A description of their functions and responsibilities must be included.

(3) Responsibilities and duties of operations management A description of the duties, responsibilities and authority of operations management personnel pertaining to the safety of flight operations and the compliance with the applicable CAR.

(4) Authority, duties and responsibilities of the pilot-in-command

A statement defining the authority, duties and responsibilities of the pilot-in-command.

(5) Duties and responsibilities of flight crew members other than the pilot-in-command.

A statement defining the duties and responsibilities of flight crew members other than the pilot-in-command.

2.1.3 Operational control and supervision

(1) Supervision of the operation by the operator

A description of the system for supervision of the operation by the operator. This must show how the safety of flight operations and the qualifications of personnel are supervised. In particular, the procedures related to the following items must be described:

(a) licence and qualification validity;

(b) competence of operations personnel; and

(c) control, analysis and storage of records, flight documents, additional information and data.

(2) System of promulgation of additional operational instructions and information

A description of any system for promulgating information which may be of an operational nature but is supplementary to that in the operations manual. The applicability of this information and the responsibilities for its promulgation must be included.

(3) Accident prevention and flight safety programme

A description of the main aspects of the flight safety programme including –

(a) programmes to achieve and maintain risk-awareness by all persons involved in flight operations; and

(b) evaluation of aviation accidents and incidents and the promulgation of related information.

(4) Operational control

A description of the procedures and responsibilities necessary to exercise operational control with respect to flight safety.

2.1.4 Quality control system

A description of the quality control system adopted.

2.1.5 Flight crew composition

(1) Flight crew composition

An explanation of the method for determining flight crew compositions taking account of the following:

(a) the type of aircraft being used;

(b) the area and type of operation being undertaken;

(c) the phase of the flight;

(d) the minimum flight crew requirement and flight duty period planned;

(e) experience (total and on type), recency and qualification of the flight crew members; and

(f) the designation of the pilot-in-command and, if necessitated by the duration of the flight, the procedures for the relief of the pilot-in-command or other members of the flight crew.

(2) Designation of the pilot-in-command

The rules applicable to the designation of the pilot-in-command.

(3) Flight crew incapacitation

Instructions on the succession of command in the event of flight crew incapacitation.

2.1.6 Qualification requirements

(1) A description of the required licence, rating(s), qualification/competency (e.g. for routes and aerodromes), experience, training, checking and recency for operations personnel to conduct their duties. Consideration must be given to the aircraft type, kind of operation and composition of the flight crew.

(2) Flight crew

- (a) Pilot-in-command
- (b) Co-pilot
- (c) Pilot under supervision
- (d) Operation on more than one type or variant.

(3) Cabin crew

- (a) Senior cabin crew member
- (b) Cabin crew member
 - (i) Required cabin crew member
 - (ii) Additional cabin crew member and cabin crew member during familiarisation flights.
- (c) Operation on more than one type or variant.

(4) Training, checking and supervision personnel

- (a) For flight crew
- (b) For cabin crew.

(5) Other operations personnel.

2.1.7 Flight crew health precautions

(1) Flight crew health precautions

The relevant regulations and guidance to flight crew members concerning health including –

- (a) alcohol and other intoxicating liquor;
- (b) narcotics;
- (c) drugs;
- (d) sleeping tablets;
- (e) pharmaceutical preparations;
- (f) immunisation;
- (g) scuba diving;
- (h) blood donation;
- (i) meal precautions prior to and during flight;
- (j) sleep and rest; and
- (k) surgical operations.

[Note: See Document SA-CATS 67]

2.1.8 Flight time limitations

(1) Flight time and duty period limitations and rest requirements

A description of the flight time and duty period limitations and rest requirements prescribed in TS 96.02.3 as applicable to the operation.

(2) Exceedances of flight time and duty period limitations and/or reductions of rest periods

Conditions under which flight time and duty periods may be exceeded or rest periods may be reduced and the procedures used to report these modifications.

2.1.9 Operating procedures

(1) Flight preparation instructions

As applicable to the operation:

- (a) Minimum flight altitudes
A description of the method of determination and application of minimum altitudes including
 -
 - (i) a procedure to establish the minimum altitudes/flight levels for VFR flights; and
 - (ii) a procedure to establish the minimum altitudes/ flight levels for IFR flights.
- (b) Criteria for determining the usability of aerodromes
- (c) Methods for the determination of aerodrome operating minima
The method for establishing aerodrome operating minima for IFR flights in accordance with CAR 91.07.5 and TS 91.07.8. Reference must be made to procedures for the determination of the visibility and/or runway visual range and for the applicability of the actual visibility observed by the pilots, the reported visibility and the reported runway visual range.
- (d) *En route* operating minima for VFR flights or VFR portions of a flight and, where single-engine aircraft are used, instructions for route selection with respect to the availability of surfaces that permit a safe forced landing.
- (e) Presentation and application of aerodrome and *en route* operating minima
- (f) Interpretation of meteorological information
Explanatory material on the decoding of MET forecasts and MET reports relevant to the area of operations, including the interpretation of conditional expressions.
- (g) Determination of the quantities of fuel, oil and water methanol carried
The methods by which the quantities of fuel, oil and water methanol to be carried, are determined and monitored in flight. This section must also include instructions on the measurement and distribution of the fluid carried on board. Such instructions must take account of all circumstances likely to be encountered on the flight, including the possibility of in-flight replanning and of failure of one or more of the aircraft's power plants. The system for maintaining fuel and oil records must also be described.
- (h) Mass and centre of gravity
The general principles of mass and centre of gravity including:
 - (i) definitions;
 - (ii) methods, procedures and responsibilities for preparation and acceptance of mass and centre of gravity calculations;
 - (iii) the policy for using either standard and/or actual masses;
 - (iv) the method for determining the applicable passenger, baggage and cargo mass;
 - (v) the applicable passenger and baggage masses for various types of operations and aircraft type;
 - (vi) general instruction and information necessary for verification of the various types of mass and balance documentation in use;
 - (vii) last-minute changes procedures;
 - (viii) specific gravity of fuel, oil and water methanol; and
 - (ix) seating policy/procedures.
- (i) ATS flight plan
Procedures and responsibilities for the preparation and submission of the air traffic service flight plan. Factors to be considered include the means of submission for both individual and repetitive flight plans.
- (j) Operational flight plan
Procedures and responsibilities for the preparation and acceptance of the operational flight plan. The use of the operational flight plan must be described including samples of the operational flight plan formats in use.
- (k) Operator's flight folio

The responsibilities and the use of the operator's flight folio must be described, including samples of the format used.

A technical log may be used in place of a flight folio, if it contains the required information.

(l) List of documents, forms and additional information to be carried.

(2) Ground handling instructions

(a) Fuelling procedures

A description of fuelling procedures, including –

- (i) safety precautions during refuelling and defueling including when an APU is in operation or when a turbine engine is running and the prop-brakes are on;
- (ii) refuelling and defueling when passengers are embarking, on board or disembarking ; and
- (iii) precautions to be taken to avoid mixing fuels.

(b) Aircraft, passengers and cargo handling procedures related to safety

A description of the handling procedures to be used when allocating seats and embarking and disembarking passengers and when loading and unloading the aircraft. Further procedures, aimed at achieving safety whilst the aircraft is on the apron, must also be given. Handling procedures must include –

- (i) disembarking of persons;
- (ii) sick passengers and persons with reduced mobility;
- (iii) transportation of inadmissible passengers, deportees or persons in custody;
- (iv) permissible size and weight of hand baggage;
- (v) loading and securing of items in the aircraft;
- (vi) special loads and classification of load compartments;
- (vii) positioning of ground equipment;
- (viii) operation of aircraft doors;
- (ix) safety on the apron, including fire prevention, blast and suction areas;
- (x) start-up, ramp departure and arrival procedures;
- (xi) servicing of aircraft;
- (xii) documents and forms for aircraft handling; and
- (xiii) multiple occupancy of aircraft seats.

(c) Procedures for the refusal of embarkation and for disembarkation

Procedures to ensure that persons who appear to be intoxicated or who demonstrate by manner or physical indications that they are under the influence of drugs, except medical patients under proper care, are refused embarkation.

(d) De-icing and anti-icing on the ground

A description of the de-icing and anti-icing policy and procedures for aircraft on the ground. These must include descriptions of the types and effects of icing and other contaminants on aircraft whilst stationary during ground movements and during take-off. In addition, a description of the fluid types used must be given including –

- (i) proprietary or commercial names;
- (ii) characteristics;
- (iii) effects on aeroplane performance;
- (iv) hold-over times; and
- (v) precautions during usage.

(3) Flight procedures

- (a) VFR/IFR policy
A description of the policy for allowing flights to be made under VFR, or of requiring flights to be made under IFR, or of changing from one to the other.
- (b) Navigation procedures
A description of all navigation procedures relevant to the type(s) and area(s) of operation. Consideration must be given to –
 - (i) standard navigation procedures including policy for carrying out independent cross-checks of keyboard entries where these affect the flight path to be followed by the aircraft;
 - (ii) MNPS and POLAR navigation and navigation in other designated areas;
 - (iii) RNAV;
 - (iv) in-flight replanning; and
 - (v) procedures in the event of system degradation.
- (c) Altimeter setting procedures.
- (d) Altitude alerting system procedures.
- (e) Ground proximity warning system procedures.
- (f) Policy and procedures for the use of ACAS.
- (g) Policy and procedures for in-flight fuel management.
- (h) Adverse and potentially hazardous atmospheric conditions.
Procedures for operating in, and/or avoiding, potentially hazardous atmospheric conditions including –
 - (i) thunderstorms;
 - (ii) icing conditions;
 - (iii) turbulence;
 - (iv) windshear;
 - (v) jetstream;
 - (vi) volcanic ash clouds;
 - (vii) heavy precipitation;
 - (viii) sand storms;
 - (ix) mountain waves; and
 - (x) significant temperature inversions.
- (i) Wake turbulence
Wake turbulence separation criteria, taking into account aircraft types, wind conditions and runway location.
- (j) Flight crew members at their stations
The requirements for flight crew members to occupy their assigned stations or seats during the different phases of flight or whenever deemed necessary in the interests of aviation safety.
- (k) Use of safety belts for flight crew and passengers
The requirements for flight crew members and passengers to use safety belts and/or harnesses during the different phases of flight or whenever deemed necessary in the interests of aviation safety.
- (l) Admission to flight deck
The conditions for the admission to the flight deck of persons other than the flight crew.

- (m) Use of vacant flight crew seats
The conditions and procedures for the use of vacant flight crew seats.
 - (n) Incapacitation of flight crew members
Procedures to be followed in the event of incapacitation of flight crew members in flight. Examples of the types of incapacitation and the means for recognising them, must be included.
 - (o) Cabin safety requirements
Procedures covering:
 - (i) cabin preparation for flight, in-flight requirements and preparation for landing including procedures for securing cabin and galleys;
 - (ii) procedures to ensure that passengers are seated where, in the event that an emergency evacuation is required, they may best assist and not hinder evacuation from the aeroplane;
 - (iii) procedures to be followed during passenger embarkation and disembarkation;
 - (iv) procedures in the event of fuelling with passengers on board or embarking and disembarking; and
 - (v) smoking on board.
 - (p) Passenger briefing procedures
The contents, means and timing of passenger briefing in accordance with CAR 91.07.20.
 - (q) Procedures for aircraft operated whenever required cosmic or solar radiation detection equipment is carried.
 - (r) Procedures for the use of cosmic or solar radiation detection equipment and for recording its readings including actions to be taken in the event that limit values specified in the operations manual are exceeded. In addition, the procedures, including ATS procedures, to be followed in the event that a decision to descend or re-route is taken.
- (4) All weather operations
- (5) ETOPS
- (6) Use of the minimum equipment and configuration deviation list(s)
- (7) Non-revenue flights
Procedures and limitations for –
- (a) training flights;
 - (b) test flights;
 - (c) delivery flights;
 - (d) ferry flights;
 - (e) demonstration flights; and
 - (f) positioning flights,
including the kind of persons who may be carried on such flights.
- (8) Oxygen requirements
- (a) An explanation of the conditions under which oxygen must be provided and used.
 - (b) The oxygen requirements specified for –
 - (i) flight deck crew;
 - (ii) cabin crew; and
 - (iii) passengers.
- (9) Display criteria
Where a non-type certificated aircraft is to be used in aerial displays, the criteria for such displays shall be listed here. Sequences are not required to be set out as these may vary from display to display.

2.1.10 Dangerous goods and weapons

- (1) Information, instructions and general guidance on the conveyance of dangerous goods including –
 - (a) operator's policy on the conveyance of dangerous goods;
 - (b) guidance on the requirements for acceptance, labelling, handling, stowage and segregation of dangerous goods;
 - (c) procedures for responding to emergency situations involving dangerous goods; and
 - (d) duties of all personnel involved as referred to in Part 92; and
- (2) The conditions under which weapons, munitions of war and sporting weapons may be carried.

2.1.11 Security

- (1) Security instructions and guidance of a non-confidential nature which must include the authority and responsibilities of operations personnel. Policies and procedures for handling and reporting crime on board such as unlawful interference, sabotage, bomb threats, and hijacking must also be included.
- (2) A description of preventative security measures and training.

[Note: Parts of the security instructions and guidance may be kept confidential.]

2.1.12 Handling of aviation accidents and incidents

Procedures for the handling, notifying and reporting of aviation accidents and incidents. This section must include –

- (1) definitions of aviation accidents and incidents and the relevant responsibilities of all persons involved;
- (2) the description of which operator departments, authorities or other institutions have to be notified by which means and in which sequence in case of an aviation accident;
- (3) special notification requirements in the event of an aviation accident or incident when dangerous goods are being carried;
- (4) a description of the requirements to report specific aviation accidents and incidents;
- (5) the forms used for reporting and the procedure for submitting them to the relevant authority must also be included; and
- (6) if the operator develops additional safety related reporting procedures for its own internal use, a description of the applicability and related forms to be used.

2.1.13 Rules of the air

Rules of the air including –

- (1) visual and instrument flight rules;
- (2) territorial application of the rules of the air;
- (3) communication procedures including COM-failure procedures;
- (4) information and instructions relating to the interception of civil aircraft;
- (5) the circumstances in which a radio listening watch is to be maintained;
- (6) signals;
- (7) time system used in operation;
- (8) ATC clearances, adherence to flight plan and position reports;
- (9) visual signals used to warn an unauthorised aircraft flying in or about to enter a restricted, prohibited or danger area;
- (10) procedures for pilots observing an aviation accident or receiving a distress transmission;
- (11) the ground/air visual codes for use by survivors, description and use of signal aids; and
- (12) distress and urgency signals.

2.2 PART 2: AIRCRAFT OPERATING MATTERS – TYPE RELATED

Taking account of the differences between types, and variants of types, under the following headings:

2.2.1 General information and units of measurement

General information (e.g. aircraft dimensions), including a description of the units of measurement used for the operation of the aircraft type concerned and conversion tables.

2.2.2 Limitations

A description of the certified limitations and the applicable operational limitations including –

- (a) certification status;
- (b) passenger seating configuration for each aircraft type including a pictorial presentation;
- (c) types of operation that are approved (e.g. IFR/VFR, CAT II/III, flights in known icing conditions, etc.);
- (d) flight crew composition;
- (e) mass and centre of gravity;
- (f) speed limitations;
- (g) flight envelope(s);
- (h) wind limits including operations on contaminated runways;
- (i) performance limitations for applicable configurations;
- (k) runway slope;
- (l) limitations on wet or contaminated runways;
- (m) airframe contamination; and
- (n) system limitations.

2.2.3 Normal procedures

The normal procedures and duties assigned to the flight crew, the appropriate check-lists, the system for use of the check-lists and a statement covering the necessary co-ordination procedures between flight deck crew and cabin crew. The following normal procedures and duties must be included:

- (a) pre-flight;
- (b) pre-departure;
- (c) altimeter setting and checking;
- (d) taxi, take-off and climb;
- (e) noise abatement;
- (f) cruise and descent;
- (g) approach, landing preparation and briefing;
- (h) VFR approach;
- (i) instrument approach;
- (j) visual approach and circling;
- (k) missed approach;
- (l) normal landing;
- (m) post landing; and
- (n) operation on wet and contaminated runways.

2.2.4 Abnormal and emergency procedures

The abnormal and emergency procedures and duties assigned to the flight crew, the appropriate check-lists, the system for use of the check-lists and a statement covering the necessary co-ordination procedures between flight crew and cabin crew. The following abnormal and emergency procedures and duties must be included:

- (a) flight crew incapacitation;
- (b) fire and smoke drills;
- (c) unpressurised and partially pressurised flight;
- (d) exceeding structural limits such as overweight landing;
- (e) exceeding cosmic radiation limits;
- (f) lightning strikes;

- (g) distress communications and alerting ATC to emergencies;
- (h) engine failure;
- (i) system failures;
- (j) guidance for diversion in case of serious technical failure;
- (k) ground proximity warning;
- (l) ACAS warning;
- (m) windshear; and
- (n) emergency landing/ditching.

2.2.5 Performance

- (1) Performance data must be provided in a form in which it can be used without difficulty.
- (2) Performance data
Performance material which provides the necessary data for compliance with the performance requirements prescribed in Part 1 of this technical standard must be included to allow the determination of –
 - (a) take-off climb limits – mass, altitude, temperature;
 - (b) take-off field length (dry, wet, contaminated);
 - (c) net flight path data for obstacle clearance calculation or, where applicable, take-off flight path;
 - (d) the gradient losses for banked climb-outs;
 - (e) *en route* climb limits;
 - (f) approach climb limits;
 - (g) landing climb limits;
 - (h) landing field length (dry, wet, contaminated) including the effects of an in-flight failure of a system or device, if it affects the landing distance;
 - (i) brake energy limits; and
 - (j) speeds applicable for the various flight stages (also considering wet or contaminated runways).
- (3) Supplementary data covering flights in icing conditions
Any certificated performance related to an allowable configuration, or configuration deviation, such as anti-skid inoperative, must be included.
If performance data, as required for the appropriate performance class, is not available in the approved aircraft flight manual, then other data acceptable to the Director must be included. Alternatively, the operations manual may contain cross-reference to the approved data contained in the aircraft flight manual where such data is not likely to be used often or in an emergency.
- (4) Additional performance data
Additional performance data, where applicable, including –
 - (a) all-engine climb gradients;
 - (b) drift-down data;
 - (c) effect of de-icing/anti-icing fluids;
 - (d) flight with landing gear down;
 - (e) for aircraft with 3 or more engines, one engine inoperative ferry flights; and
 - (f) flights conducted under the provisions of the Configuration Deviation List.

2.2.6 Flight planning

- (1) Data and instructions necessary for pre-flight and in-flight planning including factors such as speed schedules and power settings. Where applicable, procedures for engine(s)-out operations, ETOPS and flights to isolated aerodromes must be included.
- (2) The method for calculating fuel needed for the various stages of flight in accordance with TS 91.07.12.

2.2.7 Mass and balance

Instructions and data for the calculation of the mass and balance including –

- (a) calculation system (e.g. index system);
- (b) information and instructions for completion of mass and balance documentation, including manual and computer generated types;
- (c) limiting masses and centre of gravity of the various versions; and
- (d) dry operating mass and corresponding centre of gravity or index.

2.2.8 Loading

Procedures and provisions for loading and securing the load in the aircraft.

2.2.9 Configuration deviation list

The Configuration Deviation List(s) (CDL), if provided by the manufacturer, taking account of the aircraft types and variants operated including procedures to be followed when an aircraft is being dispatched under the terms of its CDL.

2.2.10 Minimum equipment list

The Minimum Equipment List (MEL) taking account of the aircraft types and variants operated and the type(s)/area(s) of operation.

2.2.11 Survival and emergency equipment including oxygen

- (1) A list of the survival equipment to be carried for the routes to be flown and the procedures for checking the serviceability of this equipment prior to take-off. Instructions regarding the location, accessibility and use of survival and emergency equipment and its associated check-lists(s) must also be included.
- (2) The procedure for determining the amount of oxygen required and the quantity that is available. The flight profile, number of occupants and possible cabin decompression must be considered. The information provided must be in a form in which it can be used without difficulty.

2.2.12 Emergency evacuation procedures

- (1) Instructions for preparation for emergency evacuation including flight crew co-ordination and emergency station assignment.
- (2) Emergency evacuation procedures
A description of the duties of all members of the flight crew for the rapid evacuation of an aircraft and the handling of the passengers in the event of a forced landing, ditching or other emergency.

2.2.13 Aircraft systems

A description of the aircraft systems, related controls and indications and operating instructions.

2.3 PART 3: ROUTE AND AERODROME INSTRUCTIONS AND INFORMATION

Instructions and information relating to communications, navigation and aerodromes including minimum flight levels and altitudes for each route to be flown and operating minima for each aerodrome planned to be used, including –

- (a) minimum flight level/altitude;
- (b) operating minima for departure, destination and alternate aerodromes;
- (c) communication facilities and navigation aids;
- (d) runway data and aerodrome facilities;
- (e) approach, missed approach and departure procedures including noise abatement procedures;
- (f) COM-failure procedures;
- (g) search and rescue facilities in the area over which the aeroplane is to be flown;

- (h) a description of the aeronautical charts that must be carried on board in relation to the type of flight and the route to be flown, including the method to check their validity;
- (i) availability of aeronautical information and MET services;
- (j) en route COM/NAV procedures including holding; and
- (k) aerodrome categorisation for flight crew competence qualification.

2.4 PART 4: TRAINING

- (1) Training syllabi and checking programmes for all operations personnel assigned to operational duties in connection with the preparation and/or conduct of a flight.
- (2) Training syllabi and checking programmes must include:
 - (a) For flight crew
All relevant items prescribed in Parts 94, 61 and 63, and Subpart 2 of Part 96;
 - (b) For cabin crew
All relevant items prescribed in Part 64 and Subpart 2 of Part 96;
 - (c) For operations personnel concerned, including flight crew members:
 - (i) All relevant items prescribed in Part 92; and
 - (ii) All relevant items regarding operator security.
 - (d) For operations personnel other than flight crew members (e.g. dispatcher, handling personnel etc.)
All other relevant items pertaining to their duties.
- (3) Procedures
 - (a) Procedures for training and checking.
 - (b) Procedures to be applied in the event that personnel do not achieve or maintain the required standards.
 - (c) Procedures to ensure that abnormal or emergency situations requiring the application of part or all of abnormal or emergency procedures and simulation of IMC by artificial means, are not simulated during commercial flights.
- (4) Description of documentation to be stored and storage periods.

96.04.6 DUTIES OF HOLDER OF OPERATING CERTIFICATE

1. Notification

Before change is effected to an operating certificate, the holder of the operating certificate must notify the Director in the following manner:

- (1) the notification must be made in the appropriate form; and
- (2) be accompanied by a certified true copy of the air service licence held by the holder and the operating certificate concerned.

SA-CATS 105

Operation of parachutes

List of technical standards

105.01.10 GROUND SIGNAL

- 1. Ground signal

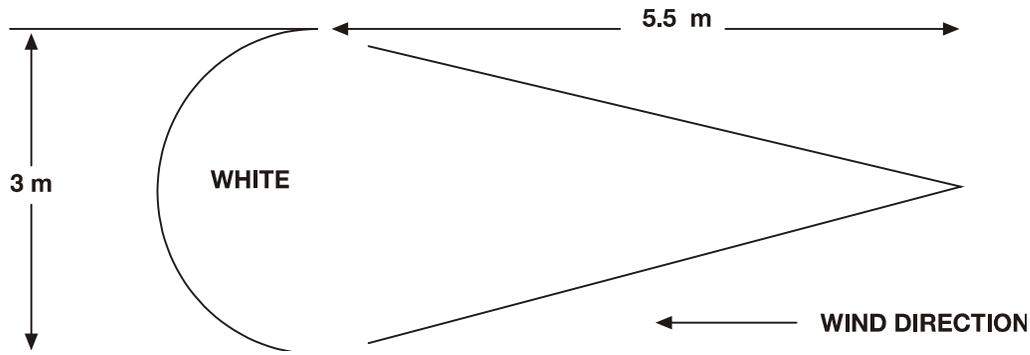
105.01.15 VISIBILITY AND CLEARANCE FROM CLOUD

- 1. Visibility and clearance from cloud

105.01.10 GROUND SIGNAL

1. Ground signal

The ground signal for an unattended aerodrome is the following:



105.01.15 VISIBILITY AND CLEARANCE FROM CLOUD

1. Visibility and clearance from cloud

The visibility and clearance requirements are the following:

Airspace designation	Visibility	Distance from clouds
Class A	Not permitted	Not permitted
Class C, D and E	8 km	Horizontal 500 m Vertical 500 ft
Class G Above 3 000 ft above MSL or 1 000 ft above terrain whichever is higher	8 km	Horizontal 500 m Vertical 500 ft
At or below 3 000 ft above MSL or 1 000 ft above terrain whichever is higher	5 km	Clear of clouds and in sight of the surface

**SA-CATS 108
Air Cargo Security**

These technical standards are available on written request to the General Manager: Aviation Security in the SACAA.

**SA-CATS 109
Aviation Security Training Organisations**

These technical standards are available on written request to the General Manager: Aviation Security in the SACAA.

SA-CATS 110
Aviation Security Screener Certification

These technical standards are available on written request to the General Manager: Aviation Security in the SACAA.

SA-CATS 121
Air Transport Operations – Carriage on aeroplanes of more than 19 passengers or cargo

List of regulations

121.01.6 LANGUAGE PROFICIENCY

1. General

121.02.2 CREW PAIRING AND IN-FLIGHT RELIEF OF FLIGHT CREW MEMBERS

1. Crew pairing

121.02.3 FLIGHT AND CABIN CREW MEMBER EMERGENCY DUTIES

1. Emergency evacuation demonstration
2. Full land evacuation demonstration
3. Partial land evacuation demonstration
4. Water evacuation demonstration

121.02.4 CABIN CREW MEMBER COMPLEMENT

1. Minimum number of cabin crew

121.02.5 OPERATION ON MORE THAN ONE TYPE OR VARIANT BY CABIN CREWMEMBER

1. Type or variant of aeroplane

121.02.9 FLIGHT CREW MEMBER QUALIFICATIONS

1. Operation on more than one aeroplane type
2. Area, route and aerodrome familiarisation

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121.01.6 LANGUAGE PROFICIENCY

1. General

- (1) SACAA has adopted the ICAO language standards with respect to the minimum comprehension that would qualify any flight crew member to be assigned or accept an assignment that requires the use of the aeronautical language in the area or areas being travelled by such crew member. For the purposes of this TS that language is normally considered to be English unless it can be shown that another language is used by the aeronautical community at the location where the aeroplane is being operated. Notwithstanding this standard, the English language criteria specified in Part 61 still applies with respect to personnel licensing matters.
- (2) In order to comply with regulation 121.01.6 in an area where English is not the language of radiotelephony, a language proficiency rating of level 4 or higher in the language used shall be demonstrated.

Note – A full description of the proficiency testing benchmarks may be found in Document SA-CATS 61.

121.02.2 CREW PAIRING AND IN-FLIGHT RELIEF OF FLIGHT CREW MEMBERS

1. Crew pairing

- (1) Flight crew member pairing restrictions establish minimum experience requirements for flight crew members. This is to ensure an entire flight crew is not comprised of flight crew members with very low operational experience on a new type and establishes the minimum level of total crew experience that shall be achieved. The intent is to provide each pilot with a certain period of time, measured in flight hours over a fixed time period, to consolidate their acquisition of new knowledge and skills. While that is the goal of the regulation this TS does make provision to allow pairing but only where an equivalent level of safety can be achieved.
- (2) Flight crew pairing restrictions apply when any of the following situations occurs with respect to either the pilot-in-command (PIC) or the second-in-command (SIC) –
 - (a) initial appointment to PIC or SIC on a new aeroplane type;
 - (b) transition from a reciprocating-powered aeroplane to a turbo-prop or turbo-jet powered aeroplane;
 - (c) transition from a turbo-prop-powered aeroplane to a turbo-jet-powered aeroplane;
 - (d) transition to an aeroplane with control systems that use a technology or philosophy that differs significantly in access, interpretation or usage from that with which the pilot is familiar; and
 - (e) upon completion of training on a second aeroplane type, regardless of previous experience, when the pilot will be flying both types of aeroplanes in service.

- (3) When crew pairing restrictions apply, they come into effect after completion of the pilot proficiency check (PPC) in the new position or new type, and remain in effect until the completion of the consolidation period for this flight crew member.
- (4) Where one of the flight crew members is subject to pairing restrictions he or she shall be paired with a flight crew member that has satisfied the consolidation period requirements.
- (5) Where crew pairing restrictions apply to the PIC and to the SIC, they may be paired together provided a training pilot or company check pilot qualified on that aeroplane type occupies the jump seat.
- (6) All flight hours accumulated during line indoctrination training may be applied toward the consolidation time requirements.
- (7) Consolidation period requirements are –

Note – “Consolidation period” means that period of time following initial type training during which a pilot shall acquire a specified number of flight hours on the actual aeroplane.

- (a) the consolidation period shall take place in accordance with the time limits from the following sliding scale and shall begin upon successful completion of an initial PPC on each aeroplane type –
 - (i) 50 hours in 60 days;
 - (ii) 75 hours in 90 days; or
 - (iii) 100 hours in 120 days;
- (b) if the consolidation period is not completed within 120 days, an extension to 150 days is permitted, at the operator's discretion, under the following conditions –
 - (i) on or before the 120th day, the operator shall make a ground evaluation of the pilot's level of competency;
 - (ii) when the pilot is assessed as not possessing a satisfactory level of competence, the pilot shall undergo additional training, followed by a supervised line operating flight, after which the consolidation period may be extended to 150 days; and
 - (iii) when the pilot's proficiency is judged satisfactory, the pilot shall be observed on at least one supervised line operating flight, after which, subject to (ii) above, the consolidation period may be extended to 150 days;
- (c) if at any time before the consolidation period ends a pilot is assigned to another aeroplane type, the pilot shall undergo refresher training with a training pilot or check pilot before resuming the consolidation process; and
- (d) if the pilot fails to complete the consolidation requirements in the maximum time of 150 days allowed, the complete line indoctrination and consolidation period requirements shall be repeated.

121.02.3 FLIGHT AND CABIN CREW MEMBER EMERGENCY DUTIES

1. Emergency evacuation demonstration

An emergency evacuation demonstration shall be commenced with the crew members seated at their assigned duty stations from where such crew members shall proceed to accomplish the following tasks in accordance with the approved emergency evacuation procedures –

- (a) actual operation of all types of exits; and
- (b) demonstration of the method used to operate a slide where fitted.

2. Full land evacuation demonstration

- (1) The demonstration must be conducted either during the dark of the night or during daylight with the dark of the night simulated. If the demonstration is conducted indoors during daylight hours, it must be conducted with each window covered and each door closed to minimise the daylight effect.

Illumination on the floor or ground may be used, but it must be kept low and shielded against shining into the aeroplane's window or doors.

- (2) The aeroplane must be in normal ground attitude with landing gear extended.
- (3) Unless the aeroplane is equipped with an off-wing descent means, stands or ramps may be used for descent from the wing to the ground. Safety equipment such as mats or inverted life rafts may be placed on the floor or ground to protect participants. No other equipment that is not part of the emergency evacuation equipment of the aeroplane may be used to aid the participants in reaching the ground.
- (4) The aeroplane's normal electrical power sources must be de-energised.
- (5) All emergency equipment for the type of passenger-carrying operation involved must be installed in accordance with the operations manual.
- (6) Each external door and exit, and each internal door or curtain must be in position to simulate a normal take-off.
- (7) A representative passenger load of persons in normal health must be used. At least 40 percent of the passenger load must be females. At least 35 percent of the passenger load must be over 50 years of age. At least 15 percent of the passenger load must be female and over 50 years of age. Three life-size dolls, not included as part of the total passenger load, must be carried by passengers to simulate live infants 2 years old or younger. Crew members, mechanics, and training personnel, who maintain or operate the aeroplane in the normal course of their duties, may not be used as passengers.
- (8) No passenger may be assigned a specific seat except as the Director may require. Except as required by paragraph (12) of this technical standard, no employee of the operator may be seated next to an emergency exit.
- (9) Seat belts and shoulder harnesses (as required) must be fastened.
- (10) Before the start of the demonstration, approximately one-half of the total average amount of carry-on baggage, blankets, pillows, and other similar articles must be distributed at several locations in the aisles and emergency exit access ways to create minor obstructions.
- (11) The seating density and arrangement of the aeroplane must be representative of the highest capacity passenger version of that aeroplane the operator operates or proposes to operate.
- (12) Each crew member must be a member of a regularly scheduled line crew. Each crew member must be seated in the seat the crew member is normally assigned for take-off, and must remain in that seat until the signal for commencement of the demonstration is received.
- (13) No crew member or passenger may be given prior knowledge of the emergency exits available for the demonstration.
- (14) The operator may not practice, rehearse, or describe the demonstration for the participants nor may any participant have taken part in this type of demonstration within the preceding 6 months.
- (15) The pre-take-off passenger briefing may be given in accordance with the operations manual. The passengers may also be warned to follow directions of crew members, but may not be instructed on the procedures to be followed in the demonstration.

- (16) If safety equipment as allowed by paragraph (3) of this paragraph is provided, either all passenger and flight deck windows must be blacked out or all of the emergency exits must have safety equipment in order to prevent disclosure of the available emergency exits.
- (17) Not more than 50 percent of the emergency exits in the sides of the fuselage of an aeroplane that meet all of the requirements applicable to the required emergency exits for that aeroplane, may be used for the demonstration. Exits that are not to be used in the demonstration, must have the exit handle deactivated or must be indicated by red lights, red tape, or other acceptable means, placed outside the exits to indicate fire or other reason that they are unusable. The exits to be used must be representative of all of the emergency exits on the aeroplane and must be designated by the operator, subject to approval by the Director. At least one floor level exit must be used.
- (18) Except as provided in paragraph (3), all evacuees must leave the aeroplane by a means provided as part of the aeroplane's equipment.
- (19) The operator's approved procedures and all of the emergency equipment that is normally available, including slides, ropes, lights, and megaphones, must be fully utilised during the demonstration, except that the flight crew must take no active role in assisting others inside the cabin during the demonstration.
- (20) The evacuation time period is completed when the last occupant has evacuated the aeroplane and is on the ground. Evacuees using stands or ramps allowed by paragraph (3) above are considered to be on the ground when they are on the stand or ramp: Provided that the acceptance rate of the stands or ramps is no greater than the acceptance rate of the means available on the aeroplane for descent from the wing during an actual crash situation.

3. Partial land evacuation demonstration

- (1) Operator Requirements
 - (a) The operator is to conduct the demonstration without passengers, using the operators approved procedures.
 - (b) 50% of the total exits must be opened, and 50% of slides deployed.
 - (c) Prepare those exits and slides for use within 15 seconds.
 - (d) The operator is to use crew members, randomly selected by the CAA, who have completed the operator's training.
 - (e) If the demonstration is conducted during daylight, prior to the demonstration the cabin will be dimmed to simulate night time.
- (2) Conduct of the Demonstration
 - (a) Crew members shall prepare for normal departure in accordance with the applicant's procedures.
 - (b) Crew members shall conduct the required passenger briefings eg safety demonstration.
 - (c) Crew members shall be seated at assigned positions with their restraint systems fastened.
 - (d) The flight deck crew accomplishes all pre-takeoff actions.
 - (e) The PIC informs the CAA team leader over the PA system that the aircraft is ready for take-off.
 - (f) CAA ensures team is ready and in position.

- (g) Pilot issues evacuation command.
 - (h) The CAA inspectors begin timing with stop watches.
 - (i) At the 15 second point, the CAA team leader issues a signal to stop the demonstration.
 - (j) CAA inspectors assigned to exits will report back as to whether exits were opened and slide prepared for use before the termination signal. Inspectors will also assess all operator's emergency procedures (eg shouted commands, door opening/blocking procedures etc).
- (3) What constitutes an unsatisfactory demonstration:
- (a) Exits, slides/slide rafts not prepared for use at the termination signal (15 seconds).
 - (b) Equipment malfunctions even if time limit was met.
 - (c) Deficiencies in crewmember effectiveness.

4. Water evacuation demonstration

The demonstration must assume that daylight hours exist outside the aeroplane, and that all required crew members are available for the demonstration.

- (1) If the operations manual requires the use of passengers to assist in the launching of liferafts, the needed passengers must be on board the aeroplane and participate in the demonstration according to the manual.
- (2) A stand must be placed at each emergency exit and wing, with the top of the platform at a height simulating the water level of the aeroplane following a ditching.
- (3) After the ditching signal has been received, each evacuee must don a life vest according to the operations manual.
- (4) Each liferaft must be launched and inflated, according to the operations manual, and all other required emergency equipment must be placed in rafts.
- (5) Each evacuee must enter a liferaft, and *the crew* members assigned to each liferaft must indicate the location of emergency equipment aboard the raft and describe its use.
- (6) Either the aeroplane, a mockup of the aeroplane or a floating device simulating a passenger compartment must be used as follows –
 - (a) if a mockup of the aeroplane is used, it must be a life-size mockup of the interior and representative of the aeroplane currently used by or proposed to be used by the operator, and must contain adequate seats for use of the evacuees. Operation of the emergency exits and the doors must closely simulate those on the aeroplane. Sufficient wing area must be installed outside the over-the-wing exits to demonstrate the evacuation; and
 - (b) if a floating device simulating a passenger compartment is used, it must be representative, to the extent possible, of the passenger compartment of the aeroplane used in operations. Operation of the emergency exits and the doors must closely simulate operation on that aeroplane. Sufficient wing area must be installed outside the over-the-wing exits to demonstrate the evacuation. The device must be equipped with the same survival equipment as is installed on the aeroplane, to accommodate all persons participating in the demonstration.

121.02.4 CABIN CREW MEMBER COMPLEMENT

1. Minimum number of cabin crew

An operator must ensure that, when carrying one or more passengers, not less than one cabin crew member is carried for every 50 passenger seats, or part thereof, installed on the same deck of the large aeroplane: Provided that the minimum number of cabin crew members carried is not less than the number of cabin crew members who actually participated in the emergency evacuation demonstration referred to in CAR 121.02.3 or were assumed to have taken part in the relevant analysis required during the certification of the large aeroplane.

121.02.5 OPERATION ON MORE THAN ONE TYPE OR VARIANT BY CABIN CREW MEMBER

1. Type or variant of aeroplane

- (1) With the approval of the Director, cabin crew may operate on four aeroplane types if emergency exits and safety equipment are similar.
- (2) When assessing if a fourth aeroplane type is permissible the following factors must be taken into consideration –
 - (a) similarity of emergency procedure and drills; and
 - (b) similarity and location of emergency equipment.
- (3) When assessing aeroplane variants as same types the following factors must be taken into consideration –
 - (a) the variant has the same type of exits with identical operating mechanisms;
 - (b) emergency procedures and drills are essentially the same; and
 - (c) emergency equipment on board each variant is essentially the same and that its location is standardised.
- (4) Aeroplane variants not meeting these criteria are considered to be a separate aeroplane type.

121.02.9 FLIGHT CREW MEMBER QUALIFICATIONS

1. Operation on more than one aeroplane type

Notes –

1. *The provisions of this TS apply to flight crew members operating more than one aeroplane under Part 121 and assumes the flight crew member will be operating two types of aeroplanes under this Part.*
2. *“Base aeroplane” means, with respect to the two types flown, the aeroplane for which a type rating was first obtained.*
3. *Refer to technical standard 61.09 in Document SA-CATS 61 for the determination of aircraft types and variants and guidance as to the training required to obtain the type rating or convert to another type.*

- (1) The maximum number of different aircraft types having a maximum certificated take-off mass in excess of 5 700 kg that may be operated under another Part is one if operating two types under this Part or two if operating one type under this Part. An operator shall establish the conditions under which a flight crew member will be permitted to operate the aircraft under the other Part.
- (2) When considering operations of more than one type, an operator shall ensure that the differences and/or similarities of the aeroplanes concerned justify such operations, taking account of the following –
 - (a) the level of technology;
 - (b) operational procedures; and
 - (c) handling characteristics.
- (3) An operator shall ensure that a flight crew member operating more than one type complies with all of the requirements prescribed in Subpart 3 for each type unless the Director has approved the use of credit(s) related to the training, checking and recent experience requirements.
- (4) An operator shall specify appropriate procedures and/or operational restrictions, approved by the Director, in the operations manual, for any operation on more than one type covering –
 - (a) the flight crew member's minimum experience level;
 - (b) the minimum experience level on one type before beginning training for and operation on another type;
 - (c) the process whereby flight crew qualified on one type will be trained and qualified on another type;
 - (d) all applicable recent experience requirements for each type.
- (5) When a flight crew member operates more than one aeroplane type within one or more licence endorsements as specified in technical standard 61.13 of Document SA-CATS 61, an operator shall ensure that –
 - (a) the minimum flight crew complement specified in the operations manual is the same for each type to be operated;
 - (b) a flight crew member does not operate more than two aeroplane types for which a separate licence endorsement is required; and
 - (c) only aeroplanes within one licence endorsement are flown in any one flight duty period unless the operator has established procedures to ensure adequate time for preparation.
- (6) When a flight crew member operates more than one aeroplane type listed in technical standard 61.09 of Document SA-CATS 61, but not within a single licence endorsement, an operator shall comply with the following –
 - (a) subparagraphs (4)(a), (b) and (c) above;
 - (b) before exercising the privileges of two licence endorsements –
 - (i) the flight crew member shall have completed two consecutive operator proficiency checks and shall have 500 hours in the relevant crew position in commercial air transport operations with the same operator; and
 - (ii) in the case of a pilot having experience with an operator and exercising the privileges of two licence endorsements and then being upgraded to pilot-in-command (PIC) with the same operator on one of those types, the required minimum experience as PIC is 6 months and 300 hours and the pilot shall have completed two

consecutive operator pilot proficiency checks (PPCs) before again being eligible to exercise two licence endorsements;

- (c) before commencing training for and operation of another type, flight crew members shall have completed 3 months and 150 hours flying on the base aeroplane, which shall include at least one proficiency check;
- (d) after completion of the initial line check on the new type, 50 hours flying or 20 sectors shall be achieved solely on aeroplanes of the new type rating;
- (e) recency shall be maintained for each type operated unless credits have been allowed by the Director in accordance with subparagraph (g) below;
- (f) the period within which line flying experience is required on each type shall be specified in the operations manual;
- (g) where credits are sought to reduce the training, except as provided in subparagraph (h), checking and recent experience requirements between aeroplane types –
 - (i) for training, the operator shall demonstrate to the Director which items need not be repeated on each type because of similarities. If credits are approved, the reduced recurrent training shall be specified in the operations manual;
 - (ii) for proficiency checks, credit may be given for operator proficiency checks to be alternated between the two types, in which case each proficiency check revalidates the proficiency check for the other type; and
 - (iii) for line checks, alternating the checks between types may be approved, in which case each line check revalidates the line check for the other type; and
- (h) annual emergency and safety equipment training and checking shall cover all requirements for each type.

2. Area, route and aerodrome familiarisation

- (1) An air service operator shall not assign, and a pilot shall not act, as PIC of an aeroplane conducting passenger-carrying operations unless the pilot is qualified for that area, route and aerodrome as provided in this TS.
- (2) To meet the area, route and aerodrome familiarization requirement, the PIC of an aeroplane conducting scheduled passenger-carrying operations shall –
 - (a) demonstrate to the operator an adequate knowledge of the route to be flown and the aerodromes which are to be used including –
 - (i) the terrain and minimum safe altitudes;
 - (ii) the seasonal meteorological conditions;
 - (iii) the meteorological, communication and air traffic facilities, services and procedures;
 - (iv) the search and rescue procedures;
 - (v) the aerodrome obstructions, physical layout, approach aids and arrival, departure, holding and instrument approach procedures and weather minima; and

- (vi) the navigational facilities and procedures, including any long-range navigation procedures, associated with the route along which the flight is to take place;
- (b) subject to subparagraph (d) below, have within the preceding 12 months, either operated over the area and route and into the aerodrome as a pilot or as an observer in a flight deck observer seat or have undergone training in –
- (i) the route to be flown;
 - (ii) the aerodromes to be used;
 - (iii) the procedures applicable to flight paths over densely inhabited areas and areas of higher traffic density; and
 - (iv) obstructions, physical layout, lighting, approach aids and arrival, departure, holding and instrument approach procedures including operating minima;
- (c) if a route requires a specific type of navigation qualification, have within the 12 months immediately preceding a flight on such route, demonstrated his or her ability to the operator by –
- (i) flying over a route or area as PIC using the applicable special type of navigation system;
 - (ii) flying over a route or area under the supervision of a suitably qualified pilot using the applicable special type of navigation system, or
 - (iii) having acted as an observer in a flight deck observer seat, while flying over a route or area over which such PIC is to operate;
- (d) a PIC need not have made an actual approach into each aerodrome of landing on the route if –
- (i) the approach to the aerodrome is not over difficult terrain and the instrument approach procedures and aids available are similar to those with which the pilot is familiar and the operator adds a margin to the normal operating minima, or there is reasonable certainty that the approach and landing can be made in visual meteorological conditions;
 - (ii) the operator qualifies the PIC to land at the aerodrome concerned by means of an adequate pictorial presentation or the use of a flight simulation training device; or
 - (iii) the aerodrome concerned is located in the same geographical area as another aerodrome at which the PIC is currently qualified to land and there are no terrain or other major differences associated with that aerodrome that could pose a threat to safety: Provided –
 - (aa) the operator submits the names of all aerodromes in a given geographical area that it wishes to be deemed as one aerodrome for the purposes of this TS to the Director for approval; and
 - (bb) the operator lists all approved aerodromes in its operations manual; and
- (e) a PIC whose area, route or aerodrome familiarisation lapses shall regain qualification by completing the requirements of subparagraphs (a), (b) or (c), as applicable.
- (3) To meet the area, route and aerodrome familiarization requirement, the PIC of an aeroplane conducting non-scheduled passenger-carrying operations shall demonstrate to the operator that

he or she is knowledgeable about the area, route and aerodrome prior to operating there, including –

- (a) the aerodrome operating minima, terrain and minimum safe altitudes;
- (b) the seasonal meteorological conditions, in particular any localized adverse weather patterns;
- (c) the meteorological, communication and air traffic facilities, services and procedures;
- (d) the aerodrome obstructions, physical layout, approach aids and arrival, departure, holding and instrument approach procedures and weather minima; and
- (e) the navigational facilities and procedures, including any long-range navigation procedures, associated with the route along which the flight is to take place.

121.02.13 FLIGHT TIME AND DUTY PERIODS SCHEME

Note – CAR 121.02.13 requires each air service operator to establish a scheme for the administration of flight time and duty periods. Operators are reminded that they bear sole responsibility for such schemes being in full compliance with any Acts, laws and regulations that are external to the South African Civil Aviation Regulations, notwithstanding any approvals given by the SACAA.

1. Definitions

- (1) Any word or expression to which a meaning has been assigned in the Act and the Civil Aviation Regulations, bears, when used in this technical standard, the same meaning unless the context indicates otherwise.
- (2) In addition, the definition of “duty period” is applicable to flight operations officers employed by an operator.
- (3) Time spent on flight watch or home reserve may also be deemed to be part of a rest period as provided in section 8(2)(e) of this technical standard.

2. Maximum Flight Time

- (1) An operator may not exceed the following maximum flight times –
 - (a) 40 hours during the preceding seven days;
 - (b) 120 hours during the preceding thirty days;
 - (c) 300 during the preceding 90 days; or
 - (d) 1000 hours during the preceding 365 days.
- (2) If a flight crew member expects his or her cumulative flight hours projected for a particular operation, to exceed the appropriate limit the flight crew member shall inform the operator accordingly.
- (3) Every flight crew member is required to inform the operator of all flying he or she has undertaken if the cumulative amount of such flying and any scheduled duties is likely to exceed the maximum laid down in the Regulations.

3. Operators’ schemes and their approval

- (1) An operator shall submit a proposed scheme for the regulation of flight time and duty periods and minimum rest periods to the Director for approval which shall be based upon scientific principles and knowledge, where available, with the aim of ensuring that crew members are performing at an adequate level of alertness.
- (2) Any deviation from the approved scheme shall be submitted to the Director for consideration.

- (3) Non-availability of auto pilot or auto stabilisation systems requires a reduction in flight time and duty period in respect of public air transport and IFR operations.

4. General principles of control of flight, duty and rest time

- (1) The prime objective of any scheme of flight time and duty limitations is to ensure that flight crew members are adequately rested at the beginning of each flight duty period (FDP). Aeroplane operators will therefore need to take account of inter-related planning constraints on –
- (a) individual duty and rest periods;
 - (b) the length of cycles of duty and the associated periods of rest; and
 - (c) cumulative duty hours within specific periods.
- (2) Duties shall be scheduled within the limits of the operator's scheme. To allow for unforeseeable delays the pilot-in-command (PIC) may, within prescribed conditions, use his or her discretion to exceed the limits on the day. Nevertheless, flight schedules shall be realistic, and the planning of duties shall be designed to avoid as far as possible exceeding the flight time and duty limits.
- (3) Other general considerations in the sensible planning of duties are –
- (a) the need to construct consecutive work patterns which will avoid as far as possible such undesirable rostering practices as alternating day/night duties and the positioning of flight crews in a manner likely to result in a serious disruption of established sleep/work patterns;
 - (b) the need, particularly where flights are carried out on a programmed basis, to allow a reasonable period for the pre-flight notification of duty to flight crews, other than those on standby duty; and
 - (c) the need to plan time off and also to ensure that crew members are notified of their allocation well in advance.

5. Responsibilities of crew members

It is the responsibility of all flight crew members to make optimum use of the opportunities and facilities for rest provided by the operator, and to plan and use their rest periods properly so as to minimise the risk of fatigue.

6. Standard provisions required for an operator's scheme

- (1) The standard provisions which the Director regards as the basis for an acceptable scheme of flight time and duty limitations and which, if included in an operator's scheme, will facilitate approval by the Director are contained in sections 7 to 13 below.
- (2) Although operators are expected to plan their schemes in accordance with the requirements, it is however, recognised that the standard provisions will not necessarily be completely adaptable to every kind of operation. In exceptional circumstances therefore, operators may apply to have variations from the standard provisions included in their schemes. However, such variations should be kept to a minimum and approval will only be granted where an operator can show that these proposed provisions will ensure an equivalent level of protection against fatigue.

7. Limitations of single flight duty periods – flight deck crew

Note – Tables 1-4 referred to in this section may be found at the end of this technical standard.

7.1 Maximum rostered flight duty periods

The maximum rostered FDP (in hours) shall be in accordance with Table 1 or 2, or Table 3 or 4. Rostering limits in the tables may be extended by in-flight relief or split duty under the terms of sections 7.2 and 7.3. On the day, the PIC may at his or her discretion further extend the FDP actually worked in accordance with section 7.6.

(1) Maximum FDP – Two pilot crews: Aeroplanes

Table 1 applies when the FDP starts at a place where the flight crew member is acclimatised to local time, and Table 2 applies to other times. To be considered acclimatised for the purpose of this technical standard, a flight crew member shall be allowed three consecutive local nights free of duty within a local time zone band which is two hours wide. He or she will thereafter be considered to remain acclimatised to that same time zone band until he or she ends a duty period at a place where local time falls outside this time zone band.

(2) Maximum FDP – Two pilots plus additional flight crew member: Aeroplanes

Table 3 applies when the FDP starts at a place where the flight crew member is acclimatised to local time, and Table 4 applies at other times. To be considered acclimatised for the purposes of this technical standard, a flight crew member shall be allowed three consecutive local nights free of duty within a local time zone band which is two hours wide. He or she will thereafter be considered to remain acclimatised to that same time zone band until he or she ends a duty period at a place where local time falls outside this time zone band.

(3) Limits on two flight crew long range operations

(This paragraph does not apply to cabin crew members)

When an aeroplane flight deck crew comprises only two pilots, the allowable FDP is calculated as follows: A sector scheduled for more than 7 hours is considered as a multi-sector flight, as below:

Scheduled sector times	Acclimatised to local time Sectors	Not acclimatised to local time Sectors
Sector length over 7 hrs but not more than 9 hrs	2	4
Sector length over 9 hrs but not more than 11 hrs	3	4
Sector length over 11 hrs	4	Not applicable

7.2 Extension of flight duty period by in-flight relief

- (1) When any additional flight crew member is carried to provide in-flight relief for the purpose of extending a FDP, he or she shall hold qualifications which will meet the requirements of the operational duty for which he or she is required as a relief.
- (2) When in-flight relief is provided, there shall be available, for the flight crew member who is resting, a comfortable reclining seat or bunk separated and screened from the flight deck and passengers.
- (3) A total of in-flight rest of less than three hours will not count towards extension of an FDP, but where the total of in-flight rest (which need not be consecutive) is three hours or more, the rostered FDP may be extended beyond that permitted in Tables 1 and 2 or 3 and 4 by –

- (a) if rest is taken in a bunk, a period equal to one half of the total of rest taken, provided that the maximum FDP permissible is 18 hrs (or 19 hrs in the case of cabin crew members); and
- (b) if rest is taken in a seat, a period equal to one third of the total of rest taken, provided that the maximum FDP permissible is 15 hrs (or 16 hrs in the case of cabin crew members).
- (4) The maximum extension allowable is equivalent to that applying to the basic flight crew member with the least rest.
- (5) Where a flight crew member undertakes a period of in-flight relief and after its completion is wholly free of duty for the remainder of the flight, that part of the flight following completion of duty may be classed as positioning and be subject to the controls on positioning detailed in section 7.4.

7.3 Extension of flight duty period by split duty

When a FDP consists of two or more flight duties separated by less than a minimum rest period, then the FDP may be extended beyond that permitted in the tables by the amounts indicated below –

Consecutive rest	hour	Maximum extension of the FDP
Less than 3		Nil
3 – 10		Period equal to half of the consecutive hours rest taken

The rest period shall not include the time required for immediate post-flight and pre-flight duties. When the rest period is not more than six hours it will be sufficient if a quiet and comfortable place is available, not open to the public, but if the rest period is more than six consecutive hours, then a bed shall be provided.

7.4 Positioning

All time spent on positioning as required by the operator is classed as duty, but positioning as a passenger does not count as a sector when assessing the maximum permissible FDP. Positioning, as required by the operator, which immediately precedes a FDP, is included as part of the FDP for the purpose of section 7.1.

7.5 Travelling time

- (1) Travelling time other than that time spent on positioning may not be classed as duty time and may not be included in cumulative totals of duty hours.

Note – Travelling time from home to departure aerodrome can become an important factor if long distances are involved. If the journey time from home to the normal departure aerodrome is lengthy, flight crew members should make arrangements for accommodation nearer to their bases to ensure adequate pre-flight rest.

- (2) Where travelling time between the aerodrome and sleeping accommodation provided by the operator exceeds thirty minutes each way, the rest period shall be increased by the amount of the excess, or such lesser time as is consistent with a minimum of ten hours at the sleeping accommodation.
- (3) When flight crew members are required to travel from their home to an aerodrome other than the one from which they normally operate, the assumed travelling time from the normal aerodrome to the other aerodrome is classed as positioning and is subject to the controls of positioning detailed in section 7.4.

7.6 Pilot-in-command's discretion to extend a flight duty period

- (1) A PIC may, at his or her discretion, extend a FDP beyond the maximum normally permitted, provided he or she is satisfied that the flight can safely be made. In these circumstances the maximum normally permitted is calculated according to what actually happens, not on what was planned to happen. The operator's scheme shall include guidance to PICs on the limits within which discretion to extend a FDP may be exercised. An extension of three hours beyond the maximum normally permitted should be regarded as the maximum, except in cases of emergency.

Note – It is important to note that the PIC discretion shall take into consideration whether or not a "...crew member is suffering from or, having regard to the circumstances of the flight to be undertaken, is likely to suffer from fatigue which may endanger the safety of the aeroplane or its crew members and passengers..." as provided in CAR 121.02.13(2)(b).

- (2) Whenever a PIC so exercises his or her discretion, he or she shall report it to the operator and, should the maximum normally permitted be exceeded by more than two hours, both the PIC and the operator shall submit a written PIC's discretion report – extension of flying duty period, to the Director within thirty days.

Notes –

1. *Discretion reports either concerning extension of a FDP in excess of two hours or reduction of a rest period shall be submitted in the PIC's Discretion Report form, which is available from the SACAA. Those reports will be used by the Director when assessing the realism of particular schedules.*
2. *An emergency in respect of an extension of a FDP is a situation which in the judgment of the PIC presents serious risk to health or safety.*

7.7 Delayed reporting time

When flight crew members are informed of a delay before leaving their place of rest the FDP starts at the new reporting time or four hours after the original reporting time, whichever is the earlier. The maximum FDP is based on the original reporting time. This subsection does not apply if flight crew members are given ten hours or more notice of a new reporting time.

8. Rest periods

- (1) It is the responsibility of the operator to notify flight crew members of a FDP and not to schedule them for duty other than flight watch or home reserve, so that adequate and, within reason, uninterrupted pre-flight rest can be obtained by the flight crew before the commencement of the next FDP. Away from base the operator shall provide the opportunity and facilities for the flight crew to obtain adequate pre-flight rest. It is the operator's responsibility to ensure that rest accommodation is satisfactory. When operations are carried out at such short notice that it is impracticable for an operator to ensure that rest accommodation is satisfactory, it will be the PIC's responsibility to obtain satisfactory accommodation.
- (2) The following rest period requirements shall be followed –
 - (a) each flight duty period, as well as flight watch and home reserve, shall be preceded by a rest period of at least –
 - (i) nine consecutive hours including a local night;
 - (ii) ten consecutive hours; or
 - (iii) if the preceding FDP, adjusted for split duty, exceeds eleven hours, an additional rest period shall be provided for in the operator's scheme to the satisfaction of the Director;

- (b) where a flight crew member has completed two consecutive flight duty periods, the aggregate of which exceeds eight hours flight time or eleven hours flight duty time (extensions by in-flight relief or split-duty disregarded), and the intervening rest period has been less than twelve consecutive hours embracing the hours between 22h00 and 06h00 local time, he or she shall have a rest period on the ground of at least twelve consecutive hours embracing the hours between 22h00 and 06h00 local time or so much longer as to embrace these hours prior to commencing any further duties, but not necessarily longer than twenty-four consecutive hours; provided that this requirement does not apply in respect of consecutive flight watch and home reserve duties;
- (c) following fifty hours of duty of any nature associated with his or her employment, except flight watch and home reserve duty, a flight crew member shall have a rest period of not less than twenty-four consecutive hours before commencing further duties;
- (d) when a flight crew member has completed a flight time and duty period in excess of eighteen hours, he or she shall receive a rest period of at least eighteen hours including a local night before he or she commences any further duties; and
- (e) time spent on flight watch and home reserve duty prior to a FDP shall not be counted when determining the limitations associated with the FDP.

(3) Pilot-in-command's discretion to reduce a rest period

A PIC may, at his or her discretion, reduce a rest period to below the minimum required by section 8(2) and 12(2)(b). The exercise of such discretion shall be considered exceptional and should not be used to reduce successive rest periods. A rest period shall be long enough to allow flight crew members at least eight hours rest, at the accommodation where the rest is taken. If a rest period is reduced, the PIC shall submit a report to his or her employer, and if the reduction exceeds two hours, a written report shall be submitted to the Director within thirty days. (See note 1 to section 7.6(2)).

- (4) For the purpose of calculating the minimum rest period before commencement of flight duty, the required post-flight duties on completion of the previous FDP is added to such FDP.

9. Duty periods

- (1) The following limits apply =

Duty	Maximum duration
Flight watch	No limit*
Home reserve	No limit*
Positioning	No maximum**
Standby	Maximum 12 hours (not necessarily consecutive) in any 24 hour period
Standby + FDP	20 hours

* However, the provisions of paragraph (2) apply.

** However, the provisions of section 7.4 apply.

- (2) For the purpose of calculating duty time, the following applies –

- (a) for the calculation of accumulated duty time in terms of section 11, flight watch and home reserve is credited on the basis of eight hours for every period of twenty-four or fewer consecutive hours, or on a one-for-one basis, whichever is the lesser;
- (b) standby duty time shall count fully as duty time for the calculation of accumulated duty time in terms of sections 8(2)(c) and (d) and 11; and
- (c) see section 7.4 in respect of positioning time.

10. Days off

Flight crew members shall –

- (a) not work more than seven consecutive days between days off;
- (b) have two consecutive days off in any consecutive fourteen days;
- (c) have a minimum of six days off in any consecutive four weeks at the aerodrome from which they normally operate; and
- (d) have an average of at least eight days off in each consecutive four week period, averaged over three such periods.

11. Cumulative duty and flying hours

Maximum cumulative duty hours: The average weekly total of duty hours may not exceed sixty hours over seven days, or fifty hours averaged over any four consecutive weeks. All types of duty, flight duty, ground duty, split duty, stand-by and positioning is counted in full for this purpose. Any period of seven or more consecutive days within which the flight crew member is employed on duty other than flight duty, flight watch or home reserve, standby or positioning is not included in calculating the above average weekly total of duty hours.

12. Cabin crew members

- (1) The requirements detailed in this section are applicable to all cabin crew members carried as cabin crew members.
- (2) The limitations which apply to cabin crew members are those contained in sections 7 to 11 applicable to flight deck crew members, but with the following adjustment –
 - (a) rostered FDPs may not be more than one hour longer than those permitted to flight deck crew members and contained in section 7.1. In order to remove anomalies which might arise when cabin crew members and flight deck crew members report at different times for the same flight, the maximum FDP for cabin crew members shall be based on the time at which the flight deck crew start their FDP;
 - (b) rostered minimum rest periods must not be more than one hour shorter than those required by flight deck crew as contained in section 8(2);
 - (c) for the purpose of a FDP extension following in-flight rest by cabin crew members –
 - (i) a period of a minimum of two consecutive hours of rest shall allow for the extension of such FDP by half the actual rest period; and
 - (ii) where in-flight rest is provided for more than three hours, the provisions of section 8(2)(a)(iii) apply;
 - (d) the combined sum of standby duty and following FDP may not exceed 21 hours;

- (e) the average weekly total of duty hours may not exceed fifty-five hours; and
- (f) the annual and monthly limits on flying hours need not be applied.

13. Flight operations officer or flight follower maximum duty and rest periods

- (1) An operator’s flight time and duty period scheme shall also include the requirements detailed in this section applicable to all flight operations officers and flight followers.
- (2) The maximum duty period to which a flight operations officer or flight follower may be assigned are –
 - (a) where the entire duty period falls between the hours of 06h00 and 23h59 local time a flight operations officer or a flight follower may be assigned to a maximum duty period of 10 consecutive hours; and
 - (b) where any part of the duty period falls between the hours of 00h00 and 05h59 a flight operations officer or flight follower may be assigned to a maximum duty period of eight consecutive hours.
- (3) Upon completion of any duty period, a flight operations officer or flight follower shall receive a rest period of not less than 10 consecutive hours.
- (4) Where necessitated by unforeseen operational circumstances, any duty period prescribed in paragraph (2) above may be extended by a maximum of two hours provided –
 - (a) the flight operations officer or flight follower has had a rest period of not less than 12 consecutive hours immediately preceding the duty period; and
 - (b) the maximum cumulative duty hours in any 6 day period does not exceed, in the case of a duty period prescribed in paragraph (2)(a), 66 duty hours; and in the case of a duty period prescribed in paragraph (2)(b), 54 duty hours.
- (5) A duty period shall include the time taken to perform all hand-off procedures as laid down in the operator’s operations manual.
- (6) Each the flight operations officer or flight follower shall receive not less than one day off in every seven day period exclusive of any earned holidays or allowed sick leave.

14. Records to be maintained

- (1) An operator shall retain flight crew member flight time and duty period records as provided in CAR 121.04.6.
- (2) An operator shall retain all PIC discretion reports of extended FDPs and reduced rest periods for a period of at least six months.

TABLES to Technical Standard 121.02.13

Table 1 – Maximum flight duty period: Two pilot crews – aeroplanes: acclimatised to local time

Local time of start	Sectors							
	1	2	3	4	5	6	7	8 or more
0500 – 0659	13	12¼	11½	10¾	10	9¼	9	9
0700 – 1359	14	13¼	12½	11¾	11	10¼	9½	9
1400 – 2059	13	12¼	11½	10¾	10	9¼	9	9
2100 – 2159	12	11¼	10½	9¾	9	9	9	9

2200 – 0459	11	10¼	9½	9	9	9	9	9
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Table 2 – Maximum flight duty period: Two pilot crews – aeroplanes: not acclimatised to local time

Length of preceding rest (hours)	Sectors						
	1	2	3	4	5	6	7 or more
Up to 18 or over 30	13	12¼	11½	10¾	10	9¼	9
Between 18 and 30	12	11¼	10½	9¾	9	9	9

Note – The reason that available duty times are less following rest periods inside 18 – 30 hours is the aeromedical advice that the quality of rest is less due to the disturbance of the body’s natural rhythm.

Table 3 – Maximum flight duty period: Basic crew consisting of three flight crew members – aeroplanes certified for three crews members: acclimatised to local time

Local time of start	Sectors							
	1	2	3	4	5	6	7	8 or more
0500 – 0659	13	12¼	11½	10¾	10	9¼	9	9
0700 – 1359	14	13¼	12½	11¾	11	10¼	9½	9
1400 – 2059	13	12¼	11½	10¾	10	9¼	9	9
2100 – 2159	12	11¼	10½	9¾	9	9	9	9
2200 – 0459	11	10¼	9½	9	9	9	9	9

Table 4 – Maximum flight duty period: Basic crew consisting of three flight crew members – aeroplanes certified for three flight crew members: not acclimatised to local time

Length of preceding rest (hours)	Sectors						
	1	2	3	4	5	6	7 or more
Up to 18 or over 30	13	12¼	11½	10¾	10	9¼	9
Between 18 and 30	12	11¼	10½	9¾	9	9	9

Note – The reason that available duty times are less following rest periods inside 18 – 30 hours is the aeromedical advice that the quality of rest is less due to the disturbance of the body’s natural rhythm.

121.03.1 AIR SERVICE OPERATOR APPROVED TRAINING PROGRAMME

Note – While this technical standard establishes the means of compliance with Subpart 3 of the South African Civil Aviation Regulations, existing training programmes approved by the Director shall maintain an approved status and do not require restructuring in order to meet this TS. The intent of this TS is concerned with content not necessarily structure or layout. If during the auditing or oversight process an existing programme is found to be deficient, the SACAA inspector or DFE will record the deficiencies and given a reasonable period of time, the operator will be required to produce the appropriate revision. Notwithstanding the foregoing all new or revised training programme submissions must comply with this TS in content and where noted, structure.

1. Equipment, facilities and personnel of a training programme

An operator shall ensure that its training equipment and facilities and personnel are adequate for their intended purpose.

- (a) Equipment – While no specific standards are published for the training equipment used as teaching aids, a benchmark that will be applied is whether or not the information being presented is represented by adequate training aids so as to make the material understandable to the trainee. Equipment will be measured against the state of the art with reasonable consideration given to the scope and size of the operator.
- (b) Facilities – Training facilities like equipment do not have any hard benchmarks but again are assessed for their suitability by a comparison to the state of the art training facilities giving due consideration for the scope and size of the operator. Facilities normally must be such that the trainee will not be distracted from the course material or training aids being displayed and provides an environment conducive to learning. Such benchmarks as control over lighting, noise, temperature control, location, orientation and general comfort of learning stations, and where needed sound enhancement or amplification must be favourable to a learning environment.
- (c) Personnel – Qualifications of training and checking personnel listed herein shall be documented by the operator and approved in the manner prescribed herein.

2. Use of FFS for training and checking

- (1) It is anticipated that in the delivery of its flight training programme, an operator will make every reasonable effort to use the most updated FSTDs where such FSTD is available to the operator.
- (2) In the case of flight training for which there is in service a suitable FFS, the aeroplane-specific training shall be completed in a FFS approved for that purpose.
- (3) Reference to a FFS in this regulation means a FFS of a level required to accomplish the training programme approved for the operator.
- (4) Where an operator has been approved for LVO, all training and checking with respect to LVO shall be performed in a FFS approved for that purpose.

3. Qualifications of training and checking personnel

- (1) General qualifications

Notes –

- 1. *Unless otherwise specified, reference to an aeroplane type shall be taken to mean type or variant of that type of aeroplane, where applicable.*
- 2. *Other than regaining qualification training as noted, reference to training and/or checking shall be taken to mean initial, upgrade, recurrent or differences training.*
 - (a) An operator shall not assign any person to provide and no person shall provide any flight crew member training required in terms of Division Two of Subpart 3, unless such person has completed the operator's instructor training programme that shall include –
 - (i) *for instructor pilots (aircraft) –*
 - (aa) the safety measures for emergency situations that are likely to develop during instruction;
 - (bb) the potential results of improper, untimely or non-execution of safety measures during instruction;

- (cc) inflight training and practise in conducting flight instruction from the left and right pilot seats using the required normal, abnormal and emergency procedures to ensure competence as an instructor; and
 - (dd) the safety measures to be taken from either pilot seat for emergency situations that are likely to develop during instruction; and
- (ii) *for flight instructors (FSTD) –*
- (aa) training and practise in the required normal, abnormal and emergency procedures to ensure competence to conduct the flight instruction required by this Subpart. This training and practise shall be accomplished in full or in part in a FFS; and
 - (bb) training in the operation of FFSs or FSTDs, as applicable to the training programme, to ensure competence to conduct the flight instruction required by this TS.
- (b) An operator shall not assign any person to provide and no person shall provide any flight crew member required training unless such person is the holder of a flight instructor rating or has satisfactorily demonstrated to the operator knowledge of –
- (i) the fundamental principles of the teaching/learning process;
 - (ii) teaching methods and procedures;
 - (iii) the instructor/student relationship;
 - (iv) proper evaluation of student performance including the detection of student performance of –
 - (aa) improper and insufficient training, and
 - (bb) personal characteristics of an applicant that could adversely affect safety;
 - (v) learning impediments;
 - (vi) human factors relating to the effects of stress and hazardous attitudes;
 - (vii) the objectives and standards of the operator's training programme;
 - (viii) the effective use of training devices used in the programme;
 - (ix) safety in the training environment; and
 - (x) the CAR and CATS relating to training requirements.
- (c) All training personnel shall have demonstrated to the satisfaction of the operator, a proficient level of practical and theoretical knowledge of –
- (i) the subject the instructor is to teach;
 - (ii) the aeroplane type the instructor is to teach on;

- (iii) the basic principles of learning and techniques of instruction;
- (iv) preparation and use of lesson plans;
- (v) the administrative procedures with respect to the established trainee progress forms;
- (vi) briefing and debriefing techniques relative to the exercises;
- (vii) all associated training devices, including applicable FSTDs to be used;
- (viii) the procedures established in the training programme for the administration, review and correction of required examinations or other approved methods of establishing comprehension;
- (ix) the appropriate corrective action and subsequent administrative procedures in the case of unsatisfactory performance during training; and
- (x) the system of record keeping approved to be used in conjunction with the training programme.

(2) Qualifications of a ground instructor

Each ground instructor shall meet the requirements of section 3(1) of this TS and –

- (i) if conducting aeroplane type training, the ground instructor shall have successfully completed the initial and recurrent technical training and testing as applicable for each type of aeroplane;
- (ii) if conducting training relating to special operations or non-aeroplane specific courses shall have completed the associated training and testing and be certified by the training manager or equivalent company officer, as competent to teach such subject(s);
- (iii) have a sound knowledge of the Aircraft Flight Manual, Aircraft Operating Manual, manuals for special equipment training and the Company Operations and Training Manuals; and
- (iv) where the type of training includes interfacing with other crew members, an appropriate level of knowledge of the functional manuals assigned to such other crew members.

(3) Qualifications of flight training pilot (aeroplane)

Each flight training pilot shall have met the requirements of section 3(1) of this TS and –

- (i) hold a valid airline transport pilot licence (ATPL), instrument rating, medical certificate and a type rating for the type of aeroplane on which training will be given and, for any training requiring licensing action such as an initial type rating or instrument rating, a valid flight instructor rating with appropriate endorsements as specified in Part 61;
- (ii) be qualified for line flying on the type of aeroplane;
- (iii) be qualified to perform PF and PNF duties while occupying either flight crew member seat;

- (iv) know the content of the Aircraft Operating Manual, Special Equipment Manuals, as appropriate, Company Operations and Training Manuals and the operator's Aircraft Flight Manual/Standard Operating Procedures for the aeroplane type;
- (v) know the relevant provisions of the South African and where international operations are involved, the foreign regulations; and
- (vi) within the preceding 24 calendar months, have satisfactorily conducted instruction under the observation of an inspector, authorised officer or DFE.

(4) Qualifications of flight training pilot (FSTD)

Each FSTD training pilot shall –

- (i) hold or have held an ATPL and an instrument rating appropriate for the class of aeroplane and, for any training requiring licensing action such as an initial type rating or instrument rating, a valid flight instructor rating with appropriate endorsements as specified in Part 61;
- (ii) have completed the operator's ground school and synthetic training device programme for the type of aeroplane;
- (iii) have successfully completed within the past 12 months a pilot proficiency check in the synthetic training device or aeroplane for that type;
- (iv) know the content of the Aircraft Flight Manual, Aircraft Operating Manual, Special Equipment Manuals as appropriate, Company Operations, Training Manuals and the operator's Standard Operating Procedures for the aeroplane type;
- (v) know the relevant provisions of the South African and where international operations are involved, the foreign regulations; and
- (vi) have received instruction on and demonstrated ability with respect to the operation of the synthetic training device from an instructor qualified to operate the FSTD.

(5) Qualifications of a LOFT facilitator

Each LOFT facilitator shall –

- (i) have completed a CRM course in the preceding three years;
- (ii) have at least two years of line flying with the operator and on the specific aeroplane type;
- (iii) have previous experience in training of operator crews;
- (iv) hold or have held a valid Airline Transport Pilot Licence with the appropriate aeroplane endorsement or at least the equivalent experience that could lead to the issue of this licence;
- (v) have completed the initial/recurrent training approved in the company operations manual;

- (vi) know the content of the Aircraft Flight Manual, Special Equipment Manuals, as appropriate, Company Operations and Training Manuals and the operator's Aircraft Operating Manual/Standard Operating Procedures for the aeroplane type;
- (vii) maintain line familiarity as a flight crew member or observer, of at least six flight sectors within the preceding twelve months on the aeroplane on which the instruction will be given; and
- (viii) demonstrate yearly, on a check, a satisfactory level of proficiency and knowledge of the operator's operations.

(6) Qualifications of Flight Engineer instructor (FSTD)

Each flight engineer instructor shall –

- (i) have completed the operator's ground school and synthetic flight training device programme for the type of aeroplane;
- (ii) have successfully completed within the past 12 months a flight engineer check in a synthetic flight training device for that type;
- (iii) know the content of the Aircraft Flight Manual, Aircraft Operating Manual, Special Equipment Manuals as appropriate, Company Operations, Training Manuals and the operator's Standard Operating Procedures for the aeroplane type; and
- (iv) have received instruction on the operation of the FSTD from an instructor qualified to operate the FSTD.

(7) Qualifications of pilot checking personnel

Each person authorized to conduct pilot skills tests shall –

- (i) in the case of a PPC conducted in an aeroplane –
 - (aa) have met all the qualification requirements specified in sections 3(1) and (3) of this TS;
 - (bb) for PPCs involving an initial issue or revalidation of an instrument rating or an initial issue of a multi-engine piston class rating or turbine rating, be the holder of a DFE authority issued by the Director appropriate to the aeroplane in which such PPC is to be conducted and for all other PPCs, be a current Grade I or Grade II flight instructor qualified on that aeroplane;
 - (cc) have been monitored in the preceding 12 months conducting a PPC, in the same aeroplane type for which the authority is being sought –
 - (A) for DFEs, by a SACAA inspector or, in exceptional circumstances, another DFE approved by the Director; and
 - (B) for flight instructors, by a DFE;
 - (dd) hold a valid medical certificate;
 - (ee) have completed the operator's training programme and be qualified as a line captain; and
 - (ff) be qualified to perform PF and PNF duties while occupying either flight crew member seat;
- (ii) in the case of a PPC conducted in a FSTD –

- (aa) have met all the qualification requirements specified in sections 3(1) and (3) of this TS;
- (bb) for PPCs involving an initial issue or revalidation of an instrument rating or an initial issue of a multi-engine piston class rating or turbine rating, be the holder of a DFE authority issued by the Director appropriate to the aeroplane in which such PPC is to be conducted and for all other PPCs, be a current Grade I or Grade II flight instructor qualified on that aeroplane;
- (cc) have been monitored in the preceding 12 months conducting a PPC, in the same aeroplane type for which the authority is being sought –
 - (A) for DFEs, by a SACAA inspector or, in exceptional circumstances, another DFE approved by the Director; and
 - (B) for flight instructors, by a DFE;
- (dd) have completed the operator's training programme, hold a current PPC and have participated in or observed at least six flight sectors of line_operations from a pilot or observer seat in the preceding 12 months;
- (iii) in the case of line checks performed by company check pilots (CCPs) –
 - (aa) have met all the qualification requirements specified in sections 3(1), (3) and (5)(a)(i) of this TS;
 - (bb) hold a valid medical certificate;
 - (cc) have completed the operator's training programme and be qualified as a line captain on the aircraft type on which the check will be given;
 - (dd) be qualified to perform PF and PNF duties while occupying either flight crew member seat; and
 - (ee) be certified in his or her training file as authorised by the operator to conduct line checks as specified in such certification;
- (iv) in the case of a check flight engineer –
 - (aa) have met all the qualification requirements specified in sections 3(1) and (6) of this TS;
 - (bb) be the holder of a flight engineer DFE authority issued by the Director appropriate to the type of aeroplane used for the FE check; and
 - (cc) have been monitored in the preceding 12 months conducting an FE proficiency check on a flight engineer, in the same aeroplane type as the authority being sought, by a SACAA inspector or, in exceptional circumstances, another DFE appointed by the Director.

(8) Qualifications of cabin crew instructors and persons authorised to conduct checks

An operator shall not assign any person to provide and no person shall provide any cabin crew member training or checking, as required in terms of Division Three or Five of this Subpart, unless such person –

- (i) is the holder of a valid cabin crew member licence issued in terms of Part 64 and Class II medical certificate;
- (ii) has completed an approved train the trainer course;
- (iii) has undergone an approved assessor course;
- (iv) has a minimum of 2 years and at least 1 000 flying hours experience as an active cabin crew member; and
- (v) is fully qualified and current on the aeroplane type.

(9) Qualifications of Flight Operations Officer (FOO) instructors and examiners

- (a) an operator shall not assign any person to provide and no person shall provide any generic or operator-specific FOO training required in terms of Division Four of Subpart 3, unless such person –
 - (i) is the holder of a valid FOO certificate of competency issued in terms of Division Five of Subpart 3;
 - (ii) has completed the FOO generic course of studies;
 - (iii) has completed the operator-specific FOO training for each type of operational control system and each aeroplane type he or she will be required to perform training on; and
 - (iv) has successfully completed a proficiency check as specified in Division Five of Subpart 3 in the preceding 12 months.
- (b) An operator shall not assign and no person shall act as a FOO examiner unless such person –
 - (i) is the holder of a current FOO certificate of competency appropriate to their assigned duties;
 - (ii) has completed the FOO training referred to in subparagraph (a) appropriate to their assigned duties,
 - (iii) has successfully completed a proficiency check as specified in Division Five of Subpart 3; and
 - (iv) has been certified by the operator to act as a FOO examiner for those types_of operational control systems and aeroplanes listed in the certification.

(10) Training for other than crew members and FOO

Training for ground personnel whose function is essential to safety of flight operations shall be conducted by a competent person assigned by the manager responsible for the department to which such ground personnel are assigned. Specific qualifications for such instructors shall be published in the operators' operations manual.

121.03.2 APPROVAL OF TRAINING PROGRAMME

1. Approval process of an air service operator training programme

- (1) Each air service operator shall submit two complete copies of its proposed training programme along with a list of effective pages to the Director for review and approval.
- (2) Where in the opinion of the Director the proposed programme has been presented in sufficient detail to enable him to make a preliminary evaluation and determine the programme meets the requirements of these technical standards, an initial approval of the training programme will be given. One copy of the programme will be returned along with a copy of the list of effective pages which will bear an initial approval stamp. An operator is then authorized to present the programme.
- (3) Where insufficient detail has been provided the Director may return the syllabus either in whole or in part for further development.
- (4) The initial approval referred to in paragraph (2) will normally be given for an initial period of one year during which time the programme will be monitored in sufficient depth to enable a final decision to be made with respect to the effectiveness of the programme in terms of meeting the established training goals.
- (5) When the Director is satisfied that the training programme meets the requirements of this technical standard, a final approval will be issued.

- (6) After the initial approval has been received but before the final approval has been issued, each operator is required to advise the Director within seven days of the intention to present the training programme. Unless otherwise advised, the operator shall make accommodation for an inspector to attend.

2. Approval of contracted training services

- (1) An operator may contract crew member training to another organisation provided –
- (a) the arrangement is clearly provided for in the approved training programme;
 - (b) the contracted training organisation is the holder of a valid ATO certificate issued in terms of Part 141, or is otherwise approved by the Director to conduct training;
 - (c) the contracted organisation uses the manuals and publications approved for use by the operator (SOPs, Aircraft Flight Manual, Aircraft Operating Manual, if applicable, Company Operations Manual, including training and Cabin Crew Member's Manual, etc.);
 - (d) the operator ensures that the training is conducted in accordance with the approved programme;
 - (e) where type training is conducted the training is provided on the same type and model aeroplane operated by the operator unless appropriate differences training is provided and described in the approved training programme;
 - (f) the operator remains responsible to ensure the training records approved in the operator's training programme are completed by the contracted organisation and maintained in the trainee's file at the base of the operator; and
 - (g) The operator ensures that a service level agreement is in place with the contracted organisation.

121.03.3 FLIGHT CREW MEMBER TRAINING

For the purposes of this TS the following terms shall be taken to mean as indicated –

“aeroplane type training” means initial aeroplane type training;

“company/operator induction training” means company-specific generic training covering a number of subjects as prescribed by regulation. Certain subjects may be presented only as a generic, introductory overview where an operator determines it would be more appropriate to provide amplified training in connection with a specific aeroplane type or operational environment;

“crew resource management training” means training including the principles of human factors designed to ensure the individual and collective efforts of all crew members on board an aeroplane are coordinated for maximum effectiveness;

“differences training” means training required to ensure a flight or cabin crew member is proficient on similar aeroplane types or variants having significant differences in terms of equipment, configuration or operation;

“emergency equipment procedures training” means training given to an aeroplane crew member to familiarize them with the location, inspection, testing and use of all emergency equipment required to be carried on board an aeroplane and includes specific training required to ensure passenger safety;

“familiarisation training” means training required to ensure a flight or cabin crew member is proficient on similar aeroplane types or variants having only minor differences in terms of equipment, configuration or operation;

“full flight simulator” means a full size replica of a specific type or make, model and series aeroplane flight deck, including the assemblage of all equipment and computer programmes necessary to represent the aeroplane in ground and flight operations, a visual system providing an out-of-the-flight deck view and a force cueing motion system;

“line induction training” means training provided a flight crew member in the form of approved supervised flying during line operations;

“**regaining competency**” means the training and where specified, the check required when a person exceeds the currency criteria of any qualification required by this Part and is designed to return such person to a satisfactory level of competence;

“**surface contamination training**” means training in an operators procedures for removal of frozen contaminants from the critical surfaces of an aeroplane as established by the manufacture from the time of initial de-icing application to the point of last chance prior to the take off; and

“**upgrade training**” means training provided to advance a flight crew member from one flight crew position to a higher flight crew position.

Note – Refer to the technical guidance material (TGM) for course content for all of the following training programme elements.

1. Ground training course syllabi

CAR 121.03.1(4) requires the operator's ground and flight training programme to be developed in detail. In order to properly assess a training programme a detailed syllabus shall be published for each component making up the total programme. The following programme components shall contain the details of at least the following subject areas. While the company induction would normally be the first course provided to a new hire employee the sequence of the following curriculum is not necessarily intended to be sequential to the delivery of an operator's programme.

2. Company induction

- (1) Company induction is required only upon initial employment for all flight crew members except where changes in the company are sufficient enough that the Director may require supplemental training for existing flight crew members.
- (2) The programme shall ensure that persons involved in flight operations are aware of their responsibilities, know company reporting relationships and are competent to fulfill their assigned duties as related to flight operations.

3. Crew Resource Management

- (1) An operator shall provide a flight crew member with crew resource management (CRM) training including human factors, risk analysis and error and threat management training –
 - (a) upon initial appointment to the operator unless such person has, within the preceding 12 months, received initial CRM training from another approved training organisation. In such cases, the operator shall provide the flight crew member with training in those elements of CRM that are company-specific; and
 - (b) on a recurrent basis every 12 months thereafter.
- (2) The annual refresher CRM training may be included in the cabin safety, emergency_equipment and security training curriculum specified in subsection 1.3.
- (3) CRM training shall include both classroom lectures and practical exercises. The use of group discussions as forums to problem solving or accident reviews to analyse the human factors breakdown as possible contributing or causal factors contributes significantly to CRM training.

- (4) An operator may use a course provided by another operator, if that course has already been approved by the Director and the training agreement complies with the requirements as prescribed in section 2 of TS 121.03.3.

4. Cabin safety, emergency equipment and security training

- (1) Each flight crew member shall be trained in the operator's cabin safety, emergency equipment and security procedures –
- (a) upon initial appointment to the operator and for each aeroplane type to which a crew member is assigned that may employ different equipment or procedures; and
 - (b) on a recurrent basis every 12 months thereafter, consisting of items from the initial programme that may have changed since the last training session.
- (2) Each flight crew member shall be trained in the use of the following emergency equipment during initial training on each new aeroplane type, unless such equipment is the same or similar as previously used, and every three years thereafter –
- (a) donning and inflation of life preservers, when equipped;
 - (b) removal from stowage, deployment, inflation and boarding of life rafts/slide rafts, when equipped;
 - (c) use of fire extinguishers; and
 - (d) operation and use of emergency exits.
- (3) Training devices approved to simulate flight operating emergency conditions, static aeroplanes, ground demonstrations, classroom lectures where adequate visual aids are provided, films or other devices may be used for training: Provided the method used ensures that each crew member is adequately trained in the operation or use of all emergency equipment. This training should, where practicable, be provided either in whole or in part, as determined by the operator, as part of the CRM training scenario and involve all flight crew members.
- (4) Each flight crew member shall be trained in the operator's security policies and procedures and, in particular, the procedures associated with hijacking, bomb threats and unlawful interference.

5. Aeroplane type initial and recurrent ground and flight training

5.1 General

- (1) Each flight crew member shall undergo ground and flight training on each aeroplane type to be flown as follows –
- (a) upon initial appointment to an aeroplane for which a different type rating is required; and
 - (b) on a recurrent basis every 12 months thereafter, unless otherwise approved by the Director based on training credits for similar aeroplane types as provided in paragraph (3).
- (2) A flight crew member joining an operator with a type rating on the aeroplane to be operated with that operator and whose training and proficiency check on such aeroplane have not lapsed for more than 24 months, shall undergo the operator's recurrent ground and flight training programme, including sufficient training to ensure he or she is familiar with the operator's standard operating procedures. A proficiency check shall be completed following such training.

- (3) An operator may be permitted training credits for different types or variants of aeroplanes based on the demonstrated similarities between the aeroplanes, hereinafter referred to as “aeroplane grouping”. Notwithstanding approved aeroplane grouping, the initial training shall be completed on each type of aeroplane operated and the subsequent training shall be accomplished on a rotating basis between the aeroplanes involved. For the purposes of this TS and CAR 121.03.3, recurrent training completed on one aeroplane type shall be deemed to have been completed on all aeroplane types for which aeroplane grouping has been approved.

5.2 Ground training

- (1) Initial aeroplane type ground training shall consist of a detailed programme covering at least –
- (a) all of the aeroplane’s systems and their associated limitations, if any;
 - (b) the aeroplane’s normal, abnormal and emergency procedures;
 - (c) the mass and balance and performance data and calculations; and
 - (d) the aeroplane’s emergency equipment.

Note – Initial ground training involving emergency equipment may be restricted to the identification of what equipment is on board the aeroplane and it’s location. Emergency equipment use and practical demonstration requirements are covered under subsection 1.3.

- (2) Recurrent ground training shall consist of a review of such of the subjects outlined in an initial training programme that would ensure critical information is reviewed timeously, including any changes to the aeroplane or operating procedures that occurred since any previous training.
- (3) Comprehension examinations shall be administered and successfully completed by the trainee following any ground training and prior to advancing to the next phase of learning.

5.3 Flight training

Note – For the purposes of this TS, “zero flight time training” means that training on an actual aeroplane is not required.

- (1) The operator shall specify the training syllabi and proposed training times in its operations manual.
- (2) Refer to TS 121.03.1 section 2 for the requirements for mandatory FSTD use.
- (3) The training times allocated to initial and recurrent flight training shall not be less than –
- (a) for initial flight training –

Flight Training (PF Hours)¹			
Simulator and Aircraft		Level D²	Level E²
Level A, B or C²	Aircraft	(simulator only)	(aeroplane only)
10.0	2.0 ³	12.0	12.0 ⁴

- (b) Recurrent flight training –

Recurrent Flight Training (PF Hours)¹ Except as approved in an advanced qualification programme			
Simulator and Aircraft		Level D² (simulator only)	Level E² (aeroplane only)
Level A, B or C²	Aircraft		
4.0	1.5	4.0	3.0 ⁴

Notes –

1. *Flight training times in the tables are expected to be flight times (block to block). 15 minutes is factored into the ground time for each flight. Time spent in excess of 15 minutes on the ground is to be added to the air time spent in training for aeroplane-only training. Recurrent flight training is an annual requirement. Pilots will complete an equal amount of Pilot Not Flying (PNF) time in addition to the Pilot Flying (PF) times given in the tables.*
2. *The times specified refer to the level of the training programme approved in accordance with subsections 5.3(8) through (12) of this section. FSTDs approved as part of a training programme are characteristically classified as –*
 - (a) *Level A Full Flight Simulator (FFS) – a synthetic training device that has a motion and visual system that permits completion of a visual training programme and PPC. However, the sophistication of the device is such that there is also a requirement to complete airborne training and an airborne PPC following initial training. Recurrent training and PPCs may be conducted wholly in a Level A device, if approved by the Director;*
 - (b) *Level B FFS – a synthetic training device that has a higher fidelity visual and motion system than that of a Level A device. The system allows the device to accurately replicate aircraft handling when within ground effect and permits accurate depth perception and visual cues to assess sink rate. As a result, it has “landing credits” attached to it. All recurrent training and 90 day currency requirements may be completed in a Level B or higher synthetic training device; and*
 - (c) *Level C and D FFS – synthetic training devices that have a much higher level of fidelity in their visual and motion systems compared to Level B simulators. Zero flight time training may be authorised for programmes utilising a Level D FFS.*
3. *May be reduced to that time necessary to complete the following: Provided all other training has been completed in a FFS –*
 - (a) *one normal and one balked landing;*
 - (b) *one take-off with engine failure after the gear is up;*
 - (c) *one full stop landing with simulated engine failure; and*
 - (d) *one other landing of any type (flapless, from an IFR approach, etc).*
4. *Aircraft-only training to be approved in exceptional instances only.*
 - (4) *Initial and recurrent flight training for flight crew members*

- (a) Flight training for flight crew members shall be carried out in accordance with one of the following training programmes –
 - (i) level A training programme;
 - (ii) level B training programme;
 - (iii) level C training programme;
 - (iv) level D training programme; or
 - (v) level E aeroplane-only flight training programme.
 - (b) Where an operator utilises an FSTD other than those included in the flight training programmes specified in subparagraph (a), the Director shall make a determination with respect to the training and checking credits allowed for such FSTD on a case by case basis.
- (5) Recurrent training for all flight crew members shall meet the following requirements –
- (a) all items identified in the initial training syllabus shall be covered over a defined period of time (through a cycle); and
 - (b) a briefing shall be provided on changes that have occurred to the aeroplane or its operation since the flight crew member's last training.
- (6) Each operator shall publish a flight training syllabus containing all items and manoeuvres outlined in the applicable training programme unless the training is contracted out, in which case the training syllabus of the contracted agency shall be published and available to the operator's flight crew members.
- (7) The flight training syllabus referred to in paragraph (3) shall incorporate training sequences that reflect –
- (a) the type of operation, whether VFR, IFR or both;
 - (b) the type of aeroplane and the equipment carried on board; and
 - (c) the flight regime in which operated.
- (8) Level A training programme for pilots other than cruise relief pilots
- (a) An operator with an approved Level A training programme shall provide the flight training using a combination of an approved Level A FFS of the type of aeroplane to be operated and the aeroplane. The operator is permitted to conduct most of the training elements of an initial and recurrent training programme in that simulator. Flight training in an aeroplane shall be carried out for general handling and landing manoeuvres following training as specified in subparagraph (c) below.
 - (b) Flight training shall include and be in accordance with all flight profiles published by the manufacturer, when such profiles are published, including training in normal, abnormal and emergency operation of the aeroplane systems and components using the FFS. For operators of aeroplanes for which standard operating procedures (SOPs) are required, the training shall be given using such SOPs.

- (c) In addition to the training in a Level A FFS following initial training and, if required, recurrent training, at least 3 take-offs and landings and the following items and manoeuvres shall be completed in the aeroplane –
- (i) interior and exterior aeroplane pre-flight checks;
 - (ii) ground handling for pilots-in-command only, unless the aeroplane provides full steering capability from the second-in-command (SIC) flight crew stations and company procedures permit the SIC to conduct taxi operations;
 - (iii) normal take-off, visual circuit, where possible, and landing;
 - (iv) a full circling approach off an instrument approach to circling minima where the flight crew member is authorised to perform circling manoeuvres;
 - (v) a simulated engine failure procedure after take-off (at safe altitude and airspeed);
 - (vi) a normal missed approach;
 - (vii). a simulated engine inoperative landing; and
 - (viii) any other manoeuvre for which the simulator was not given training credits.
- (d) If a Level A flight simulator has differences in performance, systems or cockpit layout and configuration from the operator's aeroplane, additional training on these differences shall be provided either in the aeroplane or a training device that is representative of the operator's actual aeroplanes and is approved for use by the Director.

(9) Level B training programme for pilots other than cruise relief pilots

- (a) An operator with an approved Level B training programme shall provide the flight training using an approved Level B FFS of the type of aeroplane to be operated.. Additionally, initial flight training in an aeroplane shall be carried out for ground handling, landing manoeuvres and any other manoeuvre for which the Level B FFS has not been given training and checking credit and shall include, as a minimum, interior and exterior aeroplane pre-flight checks. Flight training in the aeroplane following recurrent FFS training need not be completed.
- (b) In addition to the training required in a Level A training programme, training in an approved Level B FFS shall include recovery from turbulence and windshear on take-off and approach.
- (c) If a Level B flight simulator has differences in performance, systems or cockpit layout and configuration from the operator's aeroplane, additional training on these differences shall be provided either in the aeroplane or a training device that is representative of the operator's actual aeroplane and is approved for use by the Director.

(10) Level C training programme for pilots other than cruise relief pilots

- (a) An operator with an approved Level C training programme shall provide the flight training using an approved Level C FFS of the type of aeroplane to be operated. Except as provided in subparagraph (b), initial flight training in an aeroplane shall be carried out for ground handling, landing manoeuvres and any other manoeuvre for which the Level B FFS

has not been given a training and checking credit and shall include, as a minimum, interior and exterior aeroplane pre-flight checks. Flight training in the aeroplane following recurrent FFS training need not be completed.

- (b) Zero flight time training for candidates undergoing initial training with at least second-in-command experience on a similar aeroplane with the same operator or has otherwise had verifiable line currency as at least a second-in-command on a similar aeroplane within the previous two years is permitted.

Note – For the purpose of this provision, "similar aeroplane" means both aeroplanes are operated in terms of Part 135 and are within the following categories –

1. *turbo-jet to turbo-jet;*
2. *turbo-prop to turbo-prop; and*
3. *reciprocating to reciprocating.*

- (d) If a Level C flight simulator has differences in performance, systems or cockpit layout and configuration from the operator's aeroplane, additional training on these differences shall be provided either in the aeroplane or a training device that is representative of the operator's actual aeroplanes and is approved for use by the Director.

(11) Level D training programme for pilots other than cruise relief pilots

- (a) An operator with an approved Level D training programme using an approved Level D FFS of the type of aeroplane to be operated is permitted zero flight time training.
- (b) If a Level D flight simulator has differences in performance, systems or cockpit layout and configuration from the operator's aeroplane, additional training on these differences shall be provided either in the aeroplane or a training device that is representative of the operator's actual aeroplane and is approved for use by the Director.

(12) Level E aeroplane-only flight training for pilots other than cruise relief pilots

- (a) An aeroplane-only flight training programme will only be approved in accordance with the simulator-use policy specified in section 3 of TS 135.03.1 of Document SA-CATS 135.
- (b) Any simulated failure of aeroplane systems shall only take place under operating conditions which do not jeopardise safety of flight and never with passengers on board.
- (c) The training programme shall include and be in accordance with all flight profiles published by the manufacturer, when such profiles are published, including SOPs for normal, abnormal and emergency operation of the aeroplane systems and components.

(13) Cruise Relief Pilot (CRP) Training

- (a) Initial training will be to type rating standard and shall consist of –
 - (i) flight simulator training sufficient to assure that the CRP is proficient with respect to all normal, abnormal and emergency procedures, including upset training on initial

and every two years thereafter, that would be encountered during the cruise phase of flight, and instrument flight to an instrument rating standard; and

- (ii) operations training sufficient to assure that the CRP is proficient with respect to procedures unique to the airspace that will be flown.
- (b) Annual training shall be conducted consisting of selected items from the initial course.
- (c) A CRP PPC shall be completed as per Schedule 3 of TS 121.03.11.

6. Line induction training

- (1) On initial aeroplane assignment or upgrade line induction training shall be conducted over parts of the operator's route structure which are typical of those over which the flight crew will be expected to fly. Those items that cannot be covered as a natural occurrence during the line flying operations shall be covered by briefing or other discussion.
- (2) Line Induction for Flight Crew Members Sectors/Hours Requirements
 - (a) Initial line induction is required for crew members who have not qualified and served in the same capacity on the same group of aeroplanes.
 - (b) Transition line induction is authorized for crew members who have qualified and served in the same capacity on the same group of aeroplanes.
 - (c) For the purposes of this TS, the aeroplane groups are –
 - (i) reciprocating engine;
 - (ii) turbo-propeller engine; or
 - (iii) turbo-jet engine,aeroplanes.
 - (d) During line induction, a flight crew member shall be given the minimum flight times and sectors in accordance with this TS while performing the duties appropriate to the crew station. Line induction training is calculated by a combination of flight hours and flight sectors. A flight sector is considered as any flight consisting of a take off, en route segment of not less than 50 nautical miles and an approach and landing. For the purposes of cruise relief the en route segment only shall be considered as a sector. The required number of flying hours and sectors may be completed during proving or ferry flights or during normal line operations and apply to the pilot-in-command (PIC), the second-in-command (SIC), cruise relief pilot (CRP) and where applicable, the flight engineer (FE).
 - (e) Initial line induction shall be conducted under the supervision of a training pilot during which time the PIC and SIC shall perform their duties in their respective position, with the training pilot occupying the opposite pilot operating position.
 - (f) Initial or upgrade line induction requires that each flight crew member receives the following minimum number of flight sectors –

- (i) in the case of PIC and SIC, not less than 6 flight sectors, 3 sectors of which are to be performed as pilot flying and 3 sectors as pilot not flying;
 - (ii) in the case of a CRP or cruise relief FE, 3 sectors; and
 - (iii) in the case of FEs, not less than 3 sectors, one of which shall be an originating flight.
- (g) Initial or upgrade line induction requires that each flight crew member receives the following minimum number of flight hours –
- (i) in the case of aeroplanes with reciprocating engines –
 - (aa) 15 hours; and
 - (bb) after completing the 4 mandatory sectors, the remaining time may be reduced by 1 hour for each additional sector flown to a maximum reduction of 7.5 hours;
 - (ii) in the case of aeroplanes with turbo-propeller engines –
 - (aa) 20 hours; and
 - (bb) after completing the 4 mandatory sectors, the remaining time may be reduced by 1 hour for each additional sector flown to a maximum reduction of 10 hours; and
 - (iii) in the case of aeroplanes with turbo-jet engines –
 - (aa) 25 hours; and
 - (bb) no reduction of the original time requirement shall be permitted.
- (h) Transition line induction requires that each flight crew member receives the following minimum number of flight sectors –
- (i) in the case of PIC and SIC, not less than 3 flight sectors, 1 sector of which is to be performed as pilot flying and 1 sector as pilot not flying;
 - (ii) in the case of a CRP, or cruise relief FE, 2 sectors; and
 - (iii) in the case of FEs, not less than 2 sectors, one of which shall be an originating flight.
- (i) Transition line induction requires that each flight crew member receives the following minimum number of flight hours –
- (i) in the case of aeroplanes with reciprocating engines –
 - (aa) 10 hours; and

- (bb) after completing the 3 mandatory sectors, the remaining time may be reduced by 1 hour for each additional sector flown to a maximum reduction of 5 hours;
- (ii) in the case of aeroplanes with turbo-propeller engines –
 - (aa) 15 hours; and
 - (bb) after completing the 3 mandatory sectors, the remaining time may be reduced by 1 hour for each additional sector flown to a maximum reduction of 7.5 hours; and
- (iii) in the case of aeroplanes with turbo-jet engines –
 - (aa) 20 hours; and
 - (bb) after completing the 3 mandatory sectors, the remaining time may be reduced by 1 hour for each additional sector flown to a maximum reduction of 10 hours.

7. Differences and familiarisation training

- (1) Where the operator intends to assign a flight crew member to variant types in accordance with regulation 121.02.9(1)(c), the operator shall determine whether the pilot shall be provided differences or familiarisation training.
- (2) Where significant differences exist within the operator's fleet of aeroplanes, or variants of aeroplanes or between the aeroplanes operated and the training device approved for use, the aeroplane type technical and flight training syllabus shall contain such differences training.
- (3) Where only minor differences exist within the operator's fleet of aeroplanes, or variants of aeroplanes, or between the aeroplanes operated and the training device approved for use, the aeroplane familiarisation training appropriate to the differences shall be given and recorded in the crew member's training file.
- (4) Differences and familiarisation training shall include, as a minimum, a knowledge examination following the ground training. The requirement for a skills test will be determined by the Director based upon an assessment of the degree of the differences.

8. Upgrade training on initial upgrade

- (1) Where a person who is currently proficient as a second-in-command (SIC) and has never upgraded to PIC on the class or category of aeroplane to be flown, such person shall undergo upgrade training.
- (2) Where a SIC has never upgraded to PIC on the class or category of aeroplane to be flown and whose SIC proficiency has expired within the preceding 24 months, such SIC shall complete a technical ground training course consisting of an aeroplane system review on that aeroplane type prior to or as part of the upgrade training programme.
- (3) Prior to or included in the training required by paragraph (1) above, pilots who have not held a valid SIC PPC on the aeroplane type for a period greater than 24 months shall be given a complete initial aeroplane type training course: Provided that a reduction in the ground training

and minimum flight hours required may be granted by the Director based on the experience of the flight crew member on that aeroplane type.

9. Pilot qualification to operate in either pilot's seat

- (1) A PIC whose duties also require him or her to carry out the duties of pilot-flying and pilot-not-flying from both flight crew stations shall complete additional training and checking as specified in this TS. This additional training shall be accomplished from the SIC crew position and include at least two landings during completion of the following –
 - (a) an engine failure during take-off;
 - (b) one engine inoperative approach and go-around;
 - (c) one engine inoperative landing;
 - (d) Category II or Category III operations, if applicable; and
 - (e) operation of the normal and emergency checklist as pilot-not-flying.
- (2) The training required by paragraph (1) shall be completed upon initial assignment and every 12 months thereafter unless the pilot has completed all of the training elements specified in the training programme during normal line operations within the preceding 12 month period prior to operating from a seat for which he or she is not qualified.
- (3) A record of the training completed and/or operational means of qualifying to act from either flight crew station shall be maintained in the pilot's training file.

10. Regaining recency and requalification training for pilots

10.1 For pilots other than cruise relief pilots – where recency has not been maintained, the following shall be completed for pilots who have not maintained, for a period between 90 and 180 days, their recency qualifications in accordance with CAR 91.02.4 –

- (a) a briefing on changes that have occurred to the aeroplane or its operation since the pilot's last flight;
- (b) training in an aeroplane or FFS that includes not less than 3 take-offs and landings, an engine failure on take-off, an engine failure on the missed approach and an engine-out landing; and
- (c) a line check consisting of at least two sectors during which the candidate will complete all take-offs and landings.

10.2 For pilots other than cruise relief pilots after PPC expiry

- (1) Where a pilot's recency requirements have not been maintained in accordance with regulation 91.02.4 and that pilot's PPC has expired for less than 6 months the following shall be completed to regain type qualification –
 - (a) all the requirements specified in section 11 of this TS; and
 - (b) any recurrent training, including a PPC, that may have come due during the absence from flying duties.
- (2) Where the PPC referred to in paragraph (1) above has expired from between 6 and 24 months, inclusive, the following shall be completed to regain type qualification –

- (a) all the requirements of section 11 of this TS;
 - (b) a technical ground training course consisting of an aeroplane system review and FTD training, where applicable; and
 - (c) a PPC as specified in this TS.
- (3) Where the PPC has expired for a period greater than 24 months a complete initial aeroplane type training course shall be carried out: Provided that a reduction in the ground training and minimum flight hours required may be granted by the Director based on the experience of the flight crew member on that aeroplane type.

10.3 For cruise relief pilots

- (1) Where a CRP's recency requirements have not been maintained as specified in CAR 121.02.9(1)(d) for a period of between 90 and 180 days, the following shall be completed to regain type qualification –
- (a) a briefing on changes that have occurred to the aeroplane or its operation since the pilot's last flight; and
 - (b) a LOFT session in a FFS consisting of normal and emergency scenarios, including an emergency descent.
- (2) Where the CRP PPC has expired for less than 12 months, competency shall be regained by completing the CRP recurrent training program;
- (3) Where the PPC has expired from between 12 and 24 months, competency shall be regained by –
- (a) completing the CRP recurrent training program; and
 - (b) completing a technical ground training course consisting of an aeroplane system review and FTD training, where applicable.
- (4) Where the PPC has expired for a period greater than 24 months a complete initial aeroplane type training course shall be carried out: Provided that a reduction in the ground training and minimum flight hours required may be granted by the Director based on the experience of the flight crew member on that aeroplane type.

11. ACAS or ACAS II training including ACAS II cyclic training

- (1) ACAS training is applicable to at least the PIC where the aeroplane is required to be operated with an approved, serviceable airborne collision avoidance system (ACAS).
- (2) An ACAS training programme shall ensure that on completion the pilot is able to demonstrate proficiency in the following –
- (a) knowledge of ACAS II concepts, systems and procedures; and
 - (b) cognitive, procedural and motor skills necessary to properly respond to ACAS advisories.
- (3) There are no formal ACAS evaluation requirements for flight testing and examination. An ACAS instructor shall accomplish evaluation of ACAS objectives during training.
- (4) A pilot shall complete ACAS initial training in respect of each aeroplane type for which he or she is rated.

- (5) ACAS initial training may be provided as a stand-alone module of ground and flight training or may be integrated with other initial, differences or upgrade ground and flight training programmes.
- (6) An operator may contract with another operator, or with an ATO approved to operate an aeroplane for instrument flight instruction, to provide the ACAS initial training to its flight crew, provided such contract is in accordance with the provisions specified in TS 121.03.3 (2).
- (7) An operator shall certify in the pilot's file that the ACAS training and checking has been accomplished to a satisfactory standard.
- (8) ACAS renewal training
 - (a) ACAS renewal training –
 - (i) shall be integrated with recurrent flight training during proficiency training or line-orientated flight training; and
 - (ii) ground training shall be provided as a stand-alone module and should address any significant issues identified by line operating experience, system changes, procedural changes or unique characteristics such as the introduction of new aircraft display systems or operations in airspace where high numbers of traffic advisories (TA) and resolution advisories (RA) have been reported.
 - (b) Routine ACAS operations must be included in all evaluation environments and testing officers should include ACAS as a routine discussion item.
 - (c) A pilot completes ACAS renewal training when –
 - (i) an ACAS instructor certifies in the pilot's logbook that the pilot has completed ACAS renewal training conducted by the operator as part of its approved training programme or an ATO approved to operate aircraft for instrument flying training; or
 - (ii) a CAA flying inspector certifies in the pilot's logbook that the pilot has completed ACAS renewal training conducted by the CAA.
 - (d) An ACAS instructor is deemed to have completed ACAS renewal training when the instructor conducts ACAS initial training or ACAS renewal training.
- (9) ACAS cyclic training
 - (a) A pilot completes a session of ACAS cyclic training when a check pilot certifies in the pilot's logbook that the pilot has successfully completed a training session.
 - (b) A pilot is deemed to have completed –
 - (i) ACAS initial training on the first occasion that the pilot completes a session of ACAS cyclic training; and
 - (ii) ACAS renewal training on the second or a subsequent occasion that the pilot completes a session of ACAS cyclic training.

- (c) A check pilot is deemed to have completed ACAS renewal training when the check pilot conducts ACAS cyclic training.

(10) ACAS training programme requirements

- (a) Each ACAS curriculum shall ensure the equipment manufacturer's recommended training and testing requirements are carried out in the manner prescribed by such manufacturer.
- (b) In any case a pilot's ability to demonstrate system and procedural concepts shall be included in the initial, recurrent and where applicable, the regaining competency testing.

12. Reduced Vertical Separation Minima (RVSM) training

- (1) No pilot may operate in RVSM airspace unless such pilot has received initial training from an approved training organisation or through an operator's approved training programme with respect to operating in RVSM airspace and, for pilots who have not operated in RVSM airspace in the preceding 12 months, recurrent training.
- (2) For a flight crew member to qualify for operations in RVSM airspace, he or she shall be proficient in the following areas –
 - (a) knowledge of the floor, ceiling and horizontal boundaries of the RVSM airspace to be operated in;
 - (b) rules on exclusion of non-RVSM compliant aircraft;
 - (c) pilot procedures with respect to –
 - (i) pre-flight and in-flight altimeter checks;
 - (ii) use of the automatic altitude control system;
 - (iii) minimum equipment list (MEL) items applicable to RVSM operations;
 - (iv) special procedures for in-flight contingencies;
 - (v) weather deviation procedures;
 - (vi) track offset procedures for wake turbulence and inconsequential collision avoidance systems alerts; and
 - (vii) pilot level-off call; and
 - (d) use of ACAS.

13. Line oriented flight training (LOFT)

The following attributes are considered to be appropriate for a LOFT training session –

- (a) sessions are accomplished on a real-time basis without interruption by the instructor. Strict attention is paid to realism through the duplication of line environmental conditions. Where the route segments for the aeroplane type are inordinately long, the cruise portion of the segment can be broken;

- (b) a line qualified or line familiar PIC, SIC and FE/second officer, as applicable, is required for recurrent, upgrade or regaining competency training;
- (c) LOFT training is conducted without the requirement for a passing grade. If deficiencies are identified, further training is provided;
- (d) all training is conducted in Level C or Level D FSTDs or a Level A or Level B FSTD where it meets the minimum requirement of the LOFT programme;
- (e) the flight shall be planned as one would a real line trip. All communication must be conducted in a manner normally found on a line flight. The operator shall use recognisable company route and airports or, if not available, similar routes; and
- (f) a LOFT facilitator guide shall be developed which will contain a detailed script of all sequences and scenarios for each LOFT session, instructions for facilitator role playing, adherence to the script and conformance to realism in briefings and operational conditions.

14. Training and qualifications for low visibility operations

(1) General

- (a) Low visibility operations (LVO) are comprised of lower-than-normal visibility minima take-off (LVTO) and lower-than-normal weather and visibility minima approach operations (Category II and III (CAT II/III) approaches).
- (b) An operator must ensure that flight crew member training programmes for LVO include structured courses of ground, simulator and flight training. The training is aeroplane-specific; however, credits may given from one aeroplane type to another based on the similarities between the types. The operator may abbreviate the course content as prescribed by subparagraphs (d), (e) and (f) below provided the content of the abbreviated course is acceptable to the Director.
- (c) Flight crew members with no CAT II or III experience must complete the full training programme prescribed in paragraphs (2), (3) and (4) below.
- (d) Flight crew members with CAT II or III experience with another owner or operator may undertake an abbreviated ground training course but shall complete the flight training, check and line flying under supervision.
- (e) Flight crew members with CAT II or III experience with the owner or operator may undertake an abbreviated ground, simulator and/or flight training course, which shall include at least the requirements of paragraphs (5)(a) or (b), as appropriate, of this section.

(2) Ground training

An operator shall provide a ground training programme commensurate with its approvals. Such training shall be given to flight crew members upon their initial introduction to LVTO or CAT II/III operations and thereafter as required to introduce new policies, procedures or equipment associated with LVO.

(3) Flight training

- (a) An operator shall use an approved simulation training device (FSTD) for the training and checking of flight crew members in LVO.
- (b) An operator must ensure that each flight crew member is trained to carry out his or her duties and instructed on the coordination required with other flight crew members.

(4) Conversion training requirements to conduct low-visibility take-off and Cat II and III operations

An operator must ensure that each flight crew member completes the following low visibility procedures training if converting to a new type or variant of aircraft in which LVTO and CAT II and III operations will be conducted. The flight crew member experience requirements to undertake an abbreviated course are prescribed in paragraphs (1)(d) and (e) above.

(a) Ground training –

The appropriate requirements prescribed in paragraph (2) above shall be completed, taking into account the flight crew member's LVTO and CAT II and III training and experience.

(b) FSTD training –

- (i) a minimum of 8 LVTO departures and CAT II/III approaches in a simulator approved for the purpose;
- (ii) a minimum of 5 landings following CAT II/III approaches of which at least 2 shall be with an engine out;
- (iii) a minimum of 3 missed approaches initiated at various stages of the approach, during which at least one engine failure shall be introduced; and
- (iv) appropriate additional training if any special equipment is required such as head-up displays or enhanced vision equipment.

(5) Line flying under supervision

An operator must ensure that each flight crew member undergoes the following line flying under supervision –

- (a) for CAT II when a manual landing is required, a minimum of 3 landings from autopilot disconnect; and
- (b) for CAT III, a minimum of 3 autolands except that only 1 autoland is required when the training required in paragraph (3) or (4), as applicable, has been carried out in a full flight simulator usable for zero flight time training.

(6) Type and command experience

- (a) The following additional requirements are applicable to pilots-in-command who are new to the aircraft type –
 - (i) 50 hours or 20 sectors, whichever is later, as pilot-in-command on the type before performing any CAT II or III operations; and

(ii) 100 m must be added to the applicable CAT II or III RVR minima unless he or she has previously qualified for CAT II or III operations with another owner or operator until attaining 100 hours or 40 sectors, whichever is later, as pilot-in-command on the type.

(b) The Director may authorise a reduction in the above command experience requirements for flight crew members who have CAT II or III command experience.

(7) LVTO

(a) An operator must ensure that prior to authorisation to conduct take-offs with RVR below 400 m the following training is carried out –

(i) normal take-off in minimum authorised conditions or RVR conditions;

(ii) take-off in minimum authorised conditions or RVR conditions with an engine failure between V1 and V2 or as soon as safety considerations permit; and

(iii) take-off in minimum authorised conditions or RVR conditions with an engine failure before V1 resulting in a rejected take-off.

(b) An operator shall ensure that the training required by paragraph (3) or (4) above, as appropriate, above is carried out in an approved simulator. This training shall include the use of any special procedures and equipment.

(c) An operator must ensure that a flight crew member has completed a check before conducting low visibility take-offs with an RVR of less than 400 m.

(8) LVO recurrent training and checking

(a) An operator must ensure that, in conjunction with the normal recurrent training and pilot proficiency checks, a pilot's knowledge and ability to perform the tasks associated with the particular category of operation, including LVTO, for which he or she is authorised, is checked. The required number of approaches to be conducted during such recurrent training is to be a minimum of two, one of which is to be a missed approach and at least one low visibility take-off to the lowest applicable minima. The period of validity for this check shall be the same as the recurrent training approved for the operator.

(b) For LVO training and checking, an operator shall use an approved flight simulator.

(c) An operator must ensure that, for CAT III operations on aeroplanes with a fail passive flight control system, a missed approach is completed at least once every 18 months as the result of an autopilot failure at or below decision height when the last reported RVR was 300 m or less.

(9) LVTO and CAT II or III recency requirements

(a) An operator must ensure that, in order for pilots to maintain a CAT II or III qualification, they have conducted a minimum of 3 approaches and landings using approved CAT II or III procedures during the previous six month period, at least one of which must be conducted in the aircraft.

- (b) Recency for LVTO is maintained by retaining the CAT II or III qualification prescribed in subparagraph (a) above.
- (c) An operator may not substitute this recency requirement for recurrent training.

15. Dangerous goods

- (1) An operator authorised to transport dangerous goods shall complete the training specified in regulation 92.00.8 and publish such training in its operations manual.
- (2) An operator not authorised to transport dangerous goods shall complete dangerous goods awareness training for operations personnel and other employees likely to come into contact with passengers or their baggage or personal effects –
 - (a) upon initial employment; and
 - (b) every 24 months thereafter.

16. Other courses of training as deemed appropriate by the Director

- (1) CAR 121.03.3(1)(q) makes provision for the Director to determine, in consideration of the type of operation being conducted or applied for, whether it would be prudent to expand a training programme to include other courses of study.
- (2) Provided that an operator is authorised to conduct the following specialised operations, the associated courses are considered to be necessary to ensure safety of flight during operations–
 - (a) ETOPS;
 - (b) all weather operations;
 - (c) RNAV;
 - (d) GNSS;
 - (e) land and hold short operations; and
 - (f) simultaneous operations on parallel or near-parallel instrument runways – ILS/Precision Runway Monitor (PRM) and Localizer Type Directional Aid (LDA)/PRM - Simultaneous Offset Instrument Approaches (SOIA) Training.
- (3) Other courses that may be considered necessary to ensure safety of flight operations may include but not be limited to –
 - (a) MEL training;
 - (b) high altitude training;
 - (c) operations in ground icing conditions, if applicable;
 - (d) one-engine Inoperative ferry flight training;
 - (e) CFIT;
 - (f) low-energy awareness training; and
 - (g) other relevant subjects identified from time to time.

121.03.4 ADVANCED QUALIFICATION PROGRAMME

Note – Guidance in meeting the requirements for an AQP approval may found in US FAA Advisory Circular AC 120-54a, Advanced Qualification Program, as amended.

- (1) Advanced qualification programme (AQP) training in lieu of a 6 month pilot proficiency check (PPC) may be approved: Provided the following conditions are met:
 - (a) Pilots, after an initial PPC on type, shall be required to complete at least the first due recurrent PPC. Thereafter, the pilot proficiency requirements may be met by alternating the AQP training and a PPC every six months. In no case shall a period longer than 12 months pass between successive PPCs.
 - (b) The operator shall submit for approval an AQP training programme. The programme shall be based on the use of an approved FSTD as follows –
 - (i) for all advanced technology aeroplanes and all turbo-jets certificated for 50 or more passengers, this training shall be conducted in a FSTD, regardless of its location. “Advanced technology aeroplanes” include the following types as well as aeroplanes of any manufacturer for which a type certificate was issued subsequent to that of these aeroplanes –
 - (aa) Airbus A319, A320, A321, A330, A340 and A380; or
 - (bb) Boeing B757/767, 777 and B747-400; and
 - (ii) for aeroplanes certified for less than 50 passengers, this training shall be conducted in a FSTD if one for that type is reasonably available. “Reasonably available” shall be taken to mean within a 14 hour travel day by the most direct means.
 - (c) The AQP training shall be in addition to the normally required training and be of 1.0 to 1.5 hours duration. The training must be incorporated in a LOFT scenario where the FSTD capability permits and meets the requirements of a LOFT in accordance with TS 121.03.3 (13).
 - (d) If training is completed in a FSTD, the 12 month PPC shall also be completed in the FSTD.

121.03.5 AEROPLANE TYPE AND DIFFERENCES TRAINING

Note – See Table 1 following TS 121.03.10 for training requirements for all phases of training.

1. General

- (1) A cabin attendant shall complete the initial type-rating training on each aeroplane the operator intends to employ the cabin attendant, notwithstanding that the cabin attendant has a type-rating on an aeroplane of a type used by the operator.
- (2) An operator shall ensure that –
 - (a) type and differences training are conducted by SACAA-approved instructors or designated examiners (DEs); and
 - (b) during type, and if applicable, differences training, training is given on the location, removal and use of all emergency and survival equipment carried in the aeroplane, as well as all emergency procedures and emergency training related to the aeroplane type, variant and configuration to be operated.

2. Operation of doors and exits

An operator shall ensure that –

- (a) each cabin crew member operates and actually opens all normal and emergency exits for passenger evacuation in an aeroplane or representative training device; and

- (b) the operation of all other exits is demonstrated.

3. Evacuation slide training

An operator shall ensure that –

- (a) each cabin crew member descends on an evacuation slide from a height representative of the aeroplane main deck sill height;
- (b) the slide is fitted to an aeroplane or a representative training device; and
- (c) a further descent is made when the cabin crew member qualifies on an aeroplane type in which the main deck exit sill height differs significantly from any aeroplane type previously operated.

4. Evacuation procedures and emergency situations

An operator shall ensure that –

- (a) emergency evacuation training includes the recognition of planned or unplanned evacuations on land or water. This training shall include recognition of when exits are unusable or when evacuation equipment is unserviceable; and
- (b) each cabin crew member is trained to deal with the following –
 - (i) an in-flight fire, with particular emphasis on identifying the actual source of the fire;
 - (ii) sudden decompression, including the donning of portable oxygen equipment; and
 - (iii) other in-flight emergencies.

5. Pilot incapacitation

An operator shall ensure that, unless the minimum flight crew is more than two, each cabin crew member is trained to assist if a pilot becomes incapacitated. This training shall include a demonstration of –

- (a) the pilot's seat mechanism;
- (b) fastening and unfastening the pilot's seat harness;
- (c) use of the pilot's oxygen equipment; and
- (d) use of pilots' checklists.

6. Safety equipment

An operator shall ensure that each cabin crew member is given realistic training on, and demonstration of, the location and use of safety equipment where applicable, including the following –

- (a) slides, and where non self-supporting slides are carried, the use of any associated ropes;
- (b) life-rafts and slide-rafts, including the equipment attached to, and/or carried in, the raft;
- (c) life-jackets, infant life-jackets and flotation cots;
- (d) dropdown oxygen system;
- (e) first aid oxygen;

- (f) fire extinguishers;
- (g) fire axe or crow-bar;
- (h) emergency lights, including torches;
- (i) communications equipment, including megaphones;
- (j) survival packs, including their contents;
- (k) pyrotechnics (actual or representative devices);
- (l) first aid kits, universal precaution kits and emergency medical equipment, including their contents; and
- (m) other cabin safety equipment or systems where applicable.

7. Passenger briefing/safety demonstrations

An operator shall ensure that training is given in the preparation of passengers for normal and emergency situations in accordance with CAR 91.07.20.

121.03.6 OPERATOR INDUCTION TRAINING

Note – See Table 1 following TS 121.03.10 for training requirements for all phases of training.

1. Operator induction training

- (1) General. An air service operator shall provide training to an initial hire cabin crew member covering topics needed as necessary to function in the company and during flight operations.
- (2) Syllabus. The following subjects, as a minimum, shall be included in induction training –
 - (a) company mission statement and goals, history, organization, structure, reporting relationships, communication procedures and administrative procedures;
 - (b) air operator certificate and operations specifications;
 - (c) documentation and manuals i.e. cabin crew manual, operations manual, and document revision process;
 - (d) roles and responsibilities of the operator and its crew members;
 - (e) where applicable, standard operating procedures;
 - (f) review of aircraft systems, equipment and emergency procedures applicable to the operator;
 - (g) security awareness training and operator-specific security procedures;
 - (h) operator-specific ground handling procedures;
 - (i) operator-specific medical emergency procedures;
 - (j) handling of disabled passengers, unaccompanied minors and infants; and
 - (k) pre-flight briefing content including confirmation as to the discrete alerting procedures for suspected security breaches.
- (3) An operator shall ensure that operator induction training is conducted by SACAA approved instructors or designated examiners.

121.03.8 RECURRENT TRAINING

Note – See Table 1 following TS 121.03.10 for training requirements for all phases of training.

Recurrent Training Syllabus

1. Aviation – general

A cabin crew member shall complete the recurrent training on each aeroplane on which the crew member operates.

1.1 Regulatory overview

1.1.1 Training objective

The cabin crew member must identify and describe the legislation relating to flight crew members.

An asterisk (*) denotes operator applicable components. Should a * be listed next to a component of training that is not applicable to the operator, this component of training may be omitted.

2. Roles and responsibilities

2.1 Cabin crew members

2.1.1 Training objective

The cabin crew member will be able to describe their legislated roles and responsibilities relating to their duties and in the interests of aviation safety.

2.1.2 Syllabus

(1) General

- (a) Describe the responsibility of cabin crew members to maintain knowledge of all safety and emergency procedures relating to their duties.
- (b) Identify the requirement for cabin crew members to perform their duties in accordance with the operations manual.
- (c) Outline cabin crew member responsibilities to ensure all flight documentation, publications, manuals are up to date and available on board and that cabin crew members are familiar with their contents. Cabin crew members are required to ensure that –
 - (i) competency qualification documents signed by the authorized operator personnel, as designated in the operations manual, date of expiry, specific aircraft types and series which the cabin crew member is qualified to operate on;
 - (ii) a record of revisions is in the flight attendant manual (FAM) tracking the amendments received and when they were inserted into the FAM;
 - (iii) all amendments are inserted in the appropriate section of the FAM and not in their issued format, ie stapled, cello-wrapped; and
 - (iv) operations manual and revisions – see roles and responsibilities.

- (d) Identify the responsibility of cabin crew members to report any on-board safety concerns to the pilot-in-command, including the use of discrete signals to the flight deck.
- (e) Identify the requirement to keep all documentation relative to flight duties up to date at all times ie. licence.
- (f) Outline cabin crew member responsibilities to ensure that all equipment is operable.
- (g) Review the responsibility for cabin crew members to successfully complete required training and qualifications.
- (h) Define the chain-of-command and describe the authority of the pilot-in-command and describe their importance relating to flight safety.
- (i) Describe the requirement to be aware of the duties and responsibilities of other flight crew members and be prepared to assume those duties, if necessary.
- (j) Define the procedure regarding attending and participating in cabin crew briefings.
- (k) Review the importance of cabin crew members to be constantly alert and therefore prepared to handle any abnormal/emergency situation as it may occur.
- (l) Update general security awareness and review aeroplane-specific security procedures.

3. Safety procedures

3.1 Communication

3.1.1 Training objective

The cabin crew member will be able to describe and demonstrate the importance and the procedures for effective communication in normal, abnormal/non-routine and emergency situations.

3.1.2 Syllabus

(1) General

- (a) Describe the procedures for normal, abnormal/non-routine and emergency communication.
- (b) Describe the importance of effective communication especially when dealing with abnormal and emergency situations.
- (c) Describe the responsibility of cabin crew members to provide complete and accurate information to the pilot-in-command to assist in decision-making.

(2) Communication

- (a) Review the difference between verbal and non-verbal communication and describe the effects of communicating different messages. Describe the potential hazards to flight safety if communication is not effective.

3.2 Surface contamination

3.2.1 Training objective

The cabin crew member will be able to define what is meant by surface contamination, describe his or her responsibilities and identify the procedures for reporting suspected surface contamination to the pilot-in-command.

3.2.2 Syllabus

- (1) General
 - (a) Define surface contamination and hazards to flight associated with surface contamination.
 - (b) Define aircraft critical surfaces for each of the aircraft types in the operator's fleet.
 - (c) Identify an awareness of the conditions most likely to produce surface contamination.
 - (d) Give examples of a clean wing, and visible signs of surface contamination, eg frost, ice, snow, including rain and clear, etc.
- (2) Cabin crew responsibilities
 - (a) Define the responsibilities of cabin crew members to report suspected surface contamination prior to take-off roll to the pilot-in-command as soon as it is discovered.
 - (b) State the requirement for the pilot-in-command or a person designated by the pilot-in-command, to investigate reports of suspected surface contamination.
 - (c) Describe the advice to passengers whenever aircraft de-icing is taking place and who is responsible for this announcement.
- (3) De-icing *
 - (a) Describe when the senior cabin crew member will be advised in adverse weather conditions whether or not de-icing will occur.
 - (b) Describe the different types of equipment used to accomplish de-icing. Example: cherry-picker, wash etc.

Note: Use of video or photographic material is recommended.
 - (c) Identify that icing conditions can recur on critical surfaces of the aircraft if the take-off is prolonged for any period of time after de-icing has occurred.
 - (d) Describe the possible hazards whenever de-icing is taking place, ie inhaling de-icing fluid, de-icing fluid entering cabin through open doorways, the presence of glycol fumes in the cabin. Identify the procedures to deal with these situations.

3.3 Briefings

3.3.1 Training objective

The cabin crew member will be able to identify the different types of briefings which are required by the operations manual and the information which must be included in each.

3.3.2 Syllabus

- (1) Cabin crew briefings
 - (a) Identify the importance of cabin crew briefings including enhancing cabin crew communication and coordination, establishing expectations and clarifying procedures.

Note – Where operationally practicable, the pilots and cabin crew members should combine their briefings.

- (b) Outline when cabin crew briefings are required including normal, abnormal and emergency situations.
- (c) Identify the types of flight crew briefings, i.e. pilot-in-command/cabin crew member and senior cabin crew member/other cabin crew members.
- (d) Describe the topics to be covered in the cabin crew briefing(s).
- (e) Identify the cabin crew member responsibility to ask questions if all the required information has not been given in a briefing or if the information is unclear.
- (f) Identify who is required to attend each type of briefing and their expected level of preparedness and participation.

(2) Passenger briefings

- (a) Review the contents of the following mandatory announcements and when they must be performed –
 - (i) cabin baggage;
 - (ii) pre-flight safety announcement/demonstration;
 - (iii) after take-off;
 - (iv) en route turbulence;
 - (v) pre-landing;
 - (vi) after landing; and

3.4 Pre-flight checks

3.4.1 Training objective

The cabin crew member will be able to identify the importance of pre-flight checks and will define what is meant by the aircraft minimum equipment list.

3.4.2 Syllabus

(1) General

- (a) Identify the importance of pre-flight checks and the impact on flight safety.
- (b) Define what is meant by the minimum equipment list and identify the cabin items which are included.
- (c) Identify types of conditions which may have airworthiness implications and which should be brought to the immediate attention of the pilot-in-command i.e. cracked windows, damaged door seals, excessive water spills or leaks, obvious structural damage.

3.5 Passenger handling

3.5.1 Training objective

The cabin crew member will be able to identify the types of passenger which may be carried and the general handling considerations which relate to safety.

3.5.2 Syllabus

(1) General *

- (a) Describe the procedures for acceptance and carriage of the following and include special handling considerations, seating and securing the persons and the equipment for all phases of the flight –
 - (i) incubators;
 - (ii) stretchers;
 - (iii) disabled persons;
 - (iv) persons travelling with medical oxygen;
 - (v) child restraint system; and
 - (vi) guide and service animals.
- (b) Identify the operator's policy for accepting or denying boarding to passengers and who is responsible for making this decision.
- (c) Identify the procedures for handling special passengers ie restrictions on different aircraft types.
- (d) Outline the regulatory requirements regarding passengers who appear to be impaired due to alcohol or drugs, and the operator's policies and procedures regarding alcohol service to passengers. Include cabin crew responsibilities in serving passengers who appear to be impaired.
- (e) Identify the procedures for dealing with unruly passengers.

(2) Passenger boarding

- (a) Define cabin crew member responsibilities for passenger supervision while the aircraft is on the ground, including boarding, disembarking and station stops. Include the number of cabin crew members that must be present in the aircraft for the above.
- (b) Review the importance of safety duties over service duties during passenger boarding.

3.6 Passenger and flight crew seats/restraints

3.6.1 Training objective

The cabin crew member will be able to identify the requirements and established procedures relating to on-board seating for passengers and flight crew members.

3.6.2 Syllabus

(1) Passenger seating

- (a) Define exit row and describe the operator's policy and procedures regarding exit row seating, and who may not occupy seats in these rows.
- (b) Describe the procedures associated with the relocation of passengers in compliance with exit row seating policies.

- (c) Describe where special attention passengers may be seated, taking into consideration proximity to exits, availability of supplemental oxygen, ease of evacuation etc.
- (d) Identify the passenger seating restriction on aircraft equipped with upper deck/lower deck passenger seating where applicable.
- (e) Outline the seating restrictions regarding arm held infants.
- (f) Describe the procedures for the use of on-board skycots, stating when these devices may be used, and restrictions regarding the occupant of the skycot.
- (g) Identify any placards or signage associated with passenger seating and describe appropriate usage. Example: "Seat Unserviceable", "For Crew Use Only" *

(2) Flight crew seating

- (a) Describe the importance of ensuring serviceability of cabin crew seats, who is responsible to ensure this, when to check serviceability.
- (b) Identify the components of a pre-flight serviceability check for a cabin crew seat eg. "sit and fit" to enable quick access.
- (c) Describe the procedures to follow and approved alternate seating in case of an unserviceable cabin crew seat.
- (d) Describe the requirements for cabin crew to be seated with restraint system fastened for taxi (except for safety related duties), take-off, landing and turbulence whenever directed to do so by the pilot-in-command.
- (e) Identify the signals/verbal command for cabin crew members to take their assigned seats and to secure themselves. State who is responsible for these signals.

3.7 Cabin baggage

3.7.1 Training objective

The cabin crew member will be able to define what is meant by cabin baggage and will describe the procedures for accepting and stowing cabin baggage and any applicable restrictions.

3.7.2 Syllabus

- (1) Passenger cabin baggage
 - (a) Describe the operator's procedures for dealing with carry-on baggage that cannot be correctly stowed.
 - (b) Describe the requirement to keep the exit areas clear and free from obstructions, such as cabin baggage.
 - (c) Describe the requirement to maintain clear access to emergency equipment.

3.8 Electronic devices

3.8.1 Training objective

The cabin crew member will be able to define what is meant by electronic devices, and describe policies and procedures for their acceptance and use on board aircraft.

3.8.2 Syllabus

(1) General

- (a) An update of the electronic devices currently carried on board aircraft and relevant policy amendments.
- (b) Review the safety concerns associated with the use of mobile listening devices type headsets during critical phases of flight, abnormal operations, boarding and disembarking across an open ramp.

3.9 Service to passengers on the ground

3.9.1 Training objective

The cabin crew member will be able to review what is meant by service to passengers on the ground, the conditions under which this can be accomplished and the procedures to do so.

3.9.2 Syllabus

(1) Cabin crew responsibilities

- (a) Review the need for flight crew communication and whenever passenger service is being offered on the ground, i.e. cabin crew to let pilot know service is taking place and pilot to let cabin crew know how much time before taxiing.
- (b) State the requirement for the pilot-in-command to give cabin crew adequate notice prior to taxi so that equipment and supplies may be stowed and pre-take-off duties can be completed.

3.10 Fuelling with passengers on board

3.10.1 Training objective

The cabin crew member will be able to identify the regulatory requirements regarding fuelling with passengers on board and the procedures established for this situation.

3.10.2 Syllabus

(1) General

- (a) List the potential hazards associated with fuelling aircraft to occupants and the aircraft.
- (b) Identify the types of fuelling procedures which require that passengers and flight crew be off-loaded and why the potential hazard is greater.
- (c) Describe the procedures and precautions for fuelling with passengers on board.
- (d) Define what is meant by designated evacuation exits during fuelling and associated procedures.

(2) Cabin crew responsibilities

- (a) Identify flight crew responsibilities and communication when fuelling with passengers on board.

- (b) Describe the fuel leak or spill procedures and identify the communication and coordination procedures cabin crew members are responsible for as contained in the operations manual.
- (c) Describe the procedures whenever fumes are detected in the cabin including flight crew communication and the decision to disembark passengers.

3.11 Pre-take-off and pre-landing

3.11.1 Training objective

The cabin crew member will be able to identify safety procedures associated with take-off and landing and be able to implement them.

3.11.2 Syllabus

- (1) Cabin crew responsibilities
 - (a) Identify when cabin crew members are required to violate the sterile flight deck rule. Describe safety related information that should be conveyed and the requirement to be clear, concise, specific and
 - (b) Define “silent review” and identify the components, when it must be done and who is required to complete it.
- (2) Abnormal situations
 - (a) Define “rejected take-off”, and describe the associated procedures.
 - (b) Define “missed approach” and describe the associated procedures.
 - (c) Define abnormal landing situations e.g. no landing gear, partial landing gear, burst tyres/deflated tyres.
 - (d) Identify cabin, galley and passenger safety checks.

3.12 Propeller abnormalities *

3.12.1 Training objective

The cabin crew member will be able to identify the characteristics of overspeeding and a runaway propeller and be aware of the procedures associated with this situation.

3.12.2 Syllabus

- (1) General
 - (a) Define what is meant by over-speeding propeller/runaway propeller, and emergencies that may occur as a result.
 - (b) Describe how to recognize these propeller malfunctions and their effect on flight characteristics.
 - (c) Identify the flight crew communication procedures associated with these propeller abnormalities.
 - (d) Outline the procedures for relocating passengers.
 - (e) Identify propeller abnormalities, propeller functioning turn/no turn.

3.13 Apron safety

3.13.1 Training standard

The cabin crew member will be able to identify the components of apron safety, the responsibilities for passenger movement on aerodrome aprons and the procedures established to accomplish this safety.

3.13.2 Syllabus

- (1) Hazards on aprons
 - (a) Identify the hazards associated with aerodrome apron example: aircraft/ground service traffic, noise and weather, foreign objects.
 - (b) Describe the hazards associated with traffic on the apron, including aircraft movement, propellers, jet blast/exhaustion, vehicles.
- (2) Cabin crew responsibilities
 - (a) Identify the established procedures and requirements for escorting passengers across aerodrome aprons.
 - (b) Describe the coordination required between cabin crew members and ground staff to ensure passenger safety; i.e. stairs in place, props are secured and ways to achieve it.

3.14 Turbulence

3.14.1 Training objective

The cabin crew member will be able to identify the hazards associated with turbulence and the procedures for ensuring passenger and cabin crew safety during periods of in-flight turbulence.

3.14.2 Syllabus

- (1) General
 - (a) Describe turbulence and the classification of turbulence i.e. light, moderate, severe. (A.I.P)
 - (b) List the potential hazards to aircraft, flight crew and passengers in turbulence.
- (2) Cabin crew responsibilities
 - (a) Identify the importance of flight crew communication and flight crew coordination in conditions of turbulence and describe communication and coordination procedures.
 - (b) Describe safety advice to passengers during turbulence.
 - (c) Outline the cabin crew responsibilities to ensure that passengers comply with requirements and procedures.

3.15 Flight crew member incapacitation

3.15.1 Training objective

The cabin crew member will be able to identify the procedures for dealing with an incapacitated flight crew member.

3.15.2 Syllabus

(1) General

- (a) Define what is meant by incapacitated flight crew member and identify possible causes, i.e. illness, injury, death, physical and mental incapacitation, food poisoning.
- (b) Identify the impact on flight safety of an incapacitated pilot or cabin crew member on different aircraft types in the fleet.
- (c) Identify the preferred locations for relocating incapacitated flight crew members on different aircraft in the operator's fleet.
- (d) Identify how and where to secure an incapacitated flight crew member for landing or during periods of in-flight turbulence.
- (e) Identify the flight crew communication procedures to advise of flight crew member incapacitation including flight deck/cabin, senior cabin crew member/other flight crew members.

(2) Pilot incapacitation

- (a) Identify the assistance cabin crew members will be required to provide in the flight deck.
- (b) Describe the procedures for assisting an incapacitated pilot.
- (c) Describe and demonstrate the procedures for administering first aid oxygen to an incapacitated pilot.
- (d) Describe the procedures for removing an incapacitated pilot from the flight deck.

(3) Cabin crew incapacitation

- (a) Identify the cabin crew coordination procedures to ensure that the safety and emergency duties of the incapacitated cabin crew member are assumed; who is responsible for this decision.
- (b) Outline the procedures associated with incapacitated cabin crew members, including procedures for dealing with more than one incapacitated cabin crew member.

3.16 Post-flight duties

3.16.1 Training objective

The cabin crew member will be able to identify their post-flight safety related duties.

3.16.2 Syllabus

(1) Communication

In instances of a flight crew change, identify the responsibility of the flight crew to brief the new cabin crew regarding any unserviceabilities, special passengers, any other safety related matters pertinent to their flight.

4. Emergency procedures

4.1 Smoke/fumes in the cabin

4.1.1 Training objective

The cabin crew member will be able to identify the hazards associated with fumes and/or smoke in the cabin, potential sources and the established procedures if fumes and/or smoke are detected in the cabin in flight or on the ground.

4.1.2 Syllabus

- (1) General. Identify the possible sources of fumes and smoke in the cabin.
- (2) Flight crew responsibilities
 - (a) List the flight crew communication procedures associated with smoke/fumes in the cabin including how to notify the pilot-in-command of the situation and what information is required.
 - (b) Describe the procedures for dealing with smoke/fumes in the cabin including locating the source, notifying the pilot-in-command, flight crew coordination, ensuring passengers' breathing comfort, preparation for rapid disembarkation or evacuation.
 - (c) Describe the authority of the pilot-in-command to relocate passengers if smoke/fumes are present in the cabin and when this decision may be made.

4.2 Rapid decompressions and decompression problems

4.2.1 Training objective

The cabin crew member will be able to recognize the types of decompressions, cabin crew responsibilities and the established procedures for dealing with decompressions.

4.2.2 Syllabus

- (1) Cabin crew responsibilities
 - (a) Describe the flight crew and passenger communication procedures for each type of decompression.
 - (b) Identify the immediate actions cabin crew members must take in the event of decompression.
 - (c) Describe the flight crew communication procedures ie. signal for beginning a post-decompression walkaround, who is responsible for giving this signal and when it will be given.
 - (d) List the cabin flight crew member duties in a post-decompression walkaround and safety priorities.
 - (e) Identify the importance of flight crew coordination including passenger relocation during decompressions and methods of achieving this coordination.

4.3 Evacuations

4.3.1 Training objective

The cabin crew member will be able to identify the types of evacuations, cabin crew responsibilities and procedures relating to the different types of evacuation situations.

4.3.2 Syllabus

(1) General

- (a) Identify the types of occurrences which may require evacuation or rapid disembarkation, who is responsible for this decision and the factors to be considered when making this decision.
- (b) Describe the operator's experience with accidents/incidents involving rapid disembarkment and evacuation.
- (c) Outline factors affecting survivability in evacuation such as fuselage break-up, smoke, fire etc.
- (d) Describe the flotation characteristics of aircraft in the fleet. Identify the factors which could adversely affect aircraft flotation in water landings; i.e. structural damage, weight, centre of gravity, outside conditions.
- (e) Describe the different attitudes possible as a result of accidents/incidents; i.e. gear collapse, off-runway, shift in centre of gravity. Include the effect of different aircraft attitudes on exit usability.
- (f) Describe the effect of environmental conditions in evacuations; i.e. strong winds, terrain, snow/ice.
- (g) Identify the importance of time in evacuations and how time affects survivability in different accident situations.
- (h) Describe the type of assistance which may be available at the various aerodromes in the operator's route system. Include ways cabin crew members can manage the evacuation to coordinate their actions with the ground rescue personnel.

(2) Cabin crew responsibilities

- (a) Identify the responsibility of cabin crew members to assist passengers and fellow flight crew members in an evacuation and any limitation to this responsibility. Outline the conditions when cabin crew members should evacuate themselves.
- (b) Describe ways to assist incapacitated passengers and fellow flight crew members in evacuations.
- (c) Describe the importance of flight crew communication in an evacuation and the established communication signals for evacuations. Include who is responsible for activating evacuation signals.
- (d) Identify when cabin crew members have the authority and the responsibility to initiate an evacuation.
- (e) Identify the briefings required between flight deck crew, cabin crew and passengers in an emergency situation which may require an evacuation. Include the following information in the description –
 - (i) who is responsible to conduct briefing;
 - (ii) when and where to conduct the briefing;
 - (iii) what information is required; and
 - (iv) how to conduct the briefing including time management.

- (f) Describe the different types of passenger behaviour (passive, aggressive and hysteric) and identify effective ways of managing passenger behaviour in evacuations.
- (g) Identify the responsibility of cabin crew members to provide leadership in an evacuation and list ways this may be achieved.
- (h) Define an Able-Bodied-Person (ABP). Describe the types of persons a cabin crew member would choose for an ABP, the assistance they could provide and the special briefing instructions.
- (i) Identify the responsibility of cabin crew members to assess conditions prior to opening any exit.

(3) Evacuation procedures

- (a) Describe the established evacuation procedures for each of the following types of evacuation –
 - (i) land evacuation – prepared and unprepared;
 - (ii) ditching;
 - (iii) inadvertent water landing;
 - (iv) evacuation with PTV mated to aircraft; and
 - (v) evacuation at an aerodrome gate jetway.
- (b) Define brace position. Describe the effect of seat pitch on preferred brace positions. Identify the brace positions for cabin crew members in forward or aft-facing seats, passengers (seat orientation as appropriate), including pregnant passengers, disabled passengers and children and infants. Describe the effectiveness of each brace position and the importance of assuming the preferred brace position to minimize injury.
- (c) Identify the signal for assuming the brace position in different evacuation situations, when it is given, who is responsible for giving it and the cabin crew responsibilities when the brace signal has been given. Identify when cabin crew members should assume the brace position if no signal has been given.
- (d) Identify the shouted commands for each type of evacuation and describe the rationale behind each of the commands. Describe ways to increase the effectiveness of commands; i.e. voice tone, pace, volume, diction, body language, phraseology (commands in unison).
- (e) Identify the evacuation procedures for each type of exit; i.e. doors, windows, hatches, ventral exits, tailcones.
- (f) Describe the procedures for using evacuation aids; i.e. slides, ramps, ropes or any other evacuation aid that is provided on the operator's aircraft. Include instructions on operation, use and instructions to passengers for using these.
- (g) Identify the inflation times for the different evacuation aids; i.e. slides, ramps, slide/rafts. Describe how to recognize if an evacuation device is fully inflated.
- (h) Describe alternate procedures if initial inflation fails and if the inflation fails during the course of the evacuation.
- (i) Describe the preferred techniques for special attention passengers using evacuation slides; i.e. elderly, disabled passengers with guide animals.

- (j) Identify how cabin crew members can manage evacuations in adverse conditions; i.e. heavy smoke, darkness.
 - (k) Identify the importance of checking the cabin; flight deck and lavatories after all passengers have been evacuated and describe how and under what conditions this should be accomplished.
 - (l) Identify the cabin crew responsibilities for removal of equipment when they evacuate the aircraft and under what conditions this should be accomplished.
- (4) Post-evacuation
- (a) Describe the responsibilities of cabin crew members after an evacuation; i.e. grouping passengers, assisting with first aid.
 - (b) Identify the importance of post-crash procedures to increase survivability in each of the survival situations. Include the following–
 - (i) first aid;
 - (ii) survival priorities;
 - (iii) hazards inherent in different environments;
 - (iv) survival skills for different environments based on aircraft and equipment and supplies carried;
 - (v) survival equipment; and
 - (vi) signalling and recovery techniques.
 - (c) Identify the on board equipment and supplies which cabin crew members could remove from an aircraft after an evacuation that would enhance survivability.
 - (d) Describe the process of accident investigation and describe the official groups tasked with accident investigation, internationally and nationally. Identify their mandate and their role in aviation safety.
- (5) Accident/Incident review
- (a) Describe the operator's accidents/ incidents and accidents of other operators.
 - (b) List the factors which had a positive and a negative effect on survivability.

Note – It is acceptable to use the accident/incident data from other operators when teaching points can be universally applied.

5. Equipment overview

5.1 Training objective

The cabin crew member will be able to identify the location of each piece of safety and emergency equipment on board the operator's aircraft.

5.2 Syllabus

- (1) General
 - (a) Review the location of each piece of safety and emergency equipment the operator has available on board each aircraft.

- (b) Describe each piece of safety and emergency equipment the operator has available on board each aircraft on the following points –
 - (i) general description;
 - (ii) uses;
 - (iii) locations;
 - (iv) pre-flight serviceability check;
 - (v) removal from storage;
 - (vi) how to operate;
 - (vii) conditions for operation;
 - (viii) operational limitations;
 - (ix) operation under adverse conditions;
 - (x) precautions for use; and
 - (xi) care after use.

6. Aircraft specific

6.1 Galleys

6.1.1 Training objectives

The cabin crew member will be able to identify the procedures relating to the use of galleys.

6.1.2 Syllabus

(1) General *

- (a) Identify the cabin crew procedures for dealing with any electrical malfunctions in the galley.
- (b) Where galleys are located on the lower deck, include the following –
 - (i) policies and procedures relating to lower deck galleys;
 - (ii) maximum number of persons allowed in the lower deck galley;
 - (iii) communication procedures with lower galley cabin crew member; and
 - (iv) escape routes from the lower deck galley.
- (c) Identify the procedures relating to lifts; i.e. cart-lifts/dumb waiter, how and when they are to be operated, safety features, alternate procedures if lift becomes unserviceable.

6.2 Lighting system

6.2.1 Training objective

The cabin crew member will be able to identify the different components of the interior and exterior lighting systems and be able to use them effectively in any situation.

6.2.2 Syllabus

(1) General

- (a) Identify the responsibilities for activating components of the lighting system in normal and emergency situations.

- (b) Describe the alternate procedures for use in case of system failure.

6.3 Water and waste systems

6.3.1 Training objective

The cabin crew member will be able to implement the correct procedures relating to these systems.

6.3.2 Syllabus

- (1) General
 - (a) Describe the cabin crew responsibilities for the operation/malfunctions of the water and waste system.
 - (b) Describe the shut-off valves, importance, location, operation and identification.

6.4 Oxygen systems

6.4.1 Training objective

The cabin crew member will be able to recognize the components of the fixed oxygen systems and be able to use the systems effectively in any on board situation.

6.4.2 Syllabus

- (1) General
 - (a) Describe the components of the oxygen system on board the aircraft, including flight deck, cabin sources and galleys.
 - (b) Describe when each of the oxygen system components is used. Include description of use for first aid, decompression and supplementary purposes.
 - (c) Identify the location of the components of the oxygen system including the location of O₂ masks and spares.
 - (d) Identify alternate procedures to access oxygen mask when the system fails.
 - (e) Describe the flight crew communication procedures required to activate the oxygen system.

6.5 Heating and ventilation systems

6.5.1 Training objective

The cabin crew member will be able to identify the components of the heating and ventilation systems and be able to implement correct procedures relating to these systems.

6.5.2 Syllabus

- (1) General
 - (a) Identify the location of the heating and exhaust vents which cabin crew members need to be aware of.
 - (b) Describe any flight crew communication and flight crew coordination procedures when using the heating and ventilation system.

- (c) Identify conditions that may occur in the cabin associated with the system; i.e. condensation, glycol fumes and residual oil smoke.

6.6 Exits

6.6.1 Training objective

The cabin crew member will be able to identify the features of different types of exits and be able to effectively use them in any on board situation.

6.6.2 Syllabus

(1) General

- (a) Identify safety precautions associated with exit operation. Include potential hazards, e.g. inadvertent slide deployment, injury to flight crew and ground personnel, etc.
- (b) Identify the MEL relief given to operators when a door or slide is inoperative. Outline the conditions for this relief to be granted and the procedures which must be followed.

(2) Normal operation

- (a) Describe the flight crew communication and coordination procedures, including any established signals associated with exit operation in normal situations. Identify who is responsible for ensuring that this communication occurs and the importance of this communication for flight safety.

(3) Abnormal operation (non-routine)

- (a) Describe the procedures for abnormal/non-routine operation of this exit, including who is responsible for the exit operation, flight crew communication and flight crew coordination procedures.
- (b) Identify any precautions for abnormal/non-routine operation of this exit.

(4) Emergency operation

- (a) Identify the visual indicators that verify the off-wing slide, ramp is inflated.
- (b) Describe the procedures for operating the airstairs in normal, abnormal and emergency situations. Identify the cabin crew member responsibility for airstair operation.
- (c) Describe the flight crew communication and the coordination procedures whenever the airstairs are being used.

6.7 Unique features

6.7.1 Training objective

The cabin crew member will be able to recognize the unique features of this aircraft type or differences within the type as a result of interior configuration or manufacturer series differences.

6.7.2 Syllabus

(1) General

- (a) Identify any features, procedures and/or equipment unique or different to each aircraft in the operator's fleet; e.g. electrical outlets, main deck cargo compartment fire/smoke detection systems.
- (b) Describe each of the differences, their impact on the operator's standard operating procedures and the importance to flight safety of cabin crew members being familiar with them.

7. Drills

7.1 Passenger briefing drills

7.1.1 Equipment criteria

Demonstration equipment representative of all of the equipment used on the aircraft in the operator's fleet.

7.1.2 Performance criteria

Each cabin crew member will perform each of the following:

- (a) Pre-flight safety briefing to a special attention passenger (ie. blind, physically disabled, unaccompanied minor);

7.1.3 Evaluation criteria

Cabin crew member performance will be observed, rated and debriefed according to –

- (a) completeness of briefing content (i.e. all relevant points included);
- (b) effective usage of communication techniques (i.e. clarity, comprehension, absence of jargon;
- (c) correctly modified in accordance with requirements of the individual to whom briefing is being delivered;
- (d) proper usage of eye contact body language;
- (e) displays confidence and leadership;
- (f) displays openness and ability to answer questions; and
- (g) verifies that briefing points were understood.

7.2 Aircraft operation drills for each aircraft type

7.2.1 Equipment criteria

- (1) Each drill will be performed using the appropriate aircraft or an approved training device.
- (2) Individual aircraft exits may be substituted by an approved equivalent and as authorized in the training programme. Exits equipped with slides must include slide attached or slide drag simulation for emergency mode operations.
- (3) Floor level exits for which operations are identical under both normal and emergency conditions and which are a routine cabin crew member responsibility to open under normal conditions may be excluded from the drills specified under section 7.2.2.

7.2.2 Performance criteria

- (1) Each cabin crew member will operate each floor level exit type, for each aircraft type in the emergency mode that was not operated in the conduct of the drills required in section 7.3.3 and perform the following –
 - (a) recognise the signal for and/or the conditions under which the exit is to be opened in the emergency mode;
 - (b) verify the exit is in the correct mode;
 - (c) assess conditions outside the exit to determine exit usability; i.e. clear of obstruction, fire, aircraft attitude;
 - (d) position escape device;
 - (e) open the exit in the emergency mode;
 - (f) secure exit in the fully open position;
 - (g) simulate pulling of the manual inflation handle(s) and verify deployment inflation of ramp, slide;
 - (h) assume and maintain appropriate protective body and hand positions; and
 - (i) physically identify release handle(s) (i.e. slide disconnect, ventral stairs, etc).

- (2) Each cabin crew member will operate each cabin window or hatch exit type for each aircraft type that was not operated in the drills required in section 7.3.3 and perform the following –
 - (a) recognise the signal for and/or the conditions under which the exit is to be opened;
 - (b) assess conditions outside the exit to determine exit usability; i.e. clear of obstruction, fire, aircraft attitude;
 - (c) open and correctly stow the exit;
 - (d) verbally describe correct exit placement following removal, if the training procedure differs from the operational procedure;
 - (e) simulate pulling of the manual inflation handle(s) and verify deployment, inflation of ramp, slide;
 - (f) assume and maintain appropriate protective body and hand positions;
 - (g) physically identify location of the escape tapes or escape ropes; and
 - (h) physically identify release handle(s); i.e. slide disconnect, tailcone jettison, etc.

7.2.3 Evaluation criteria

Cabin crew member performance will be observed, rated and debriefed according to the following –

- (a) acknowledgment and timely responses to signals;
- (b) assessment of the conditions outside the exit to determine exit usability; i.e. clear of obstruction, fire, aircraft attitude;
- (c) correct usage of exit operating mechanisms including hand and body position;
- (d) usage of proper terminologies and procedures;
- (e) correctly positions escape device;
- (f) secures exit in the fully opened position or ensures correct stowage position of exit door, window or hatch;
- (g) simulates the pulling of the manual inflation handle(s) and verifies deployment and inflation of evacuation slide/ramp;
- (h) assumes and maintains appropriate protective hand and body positions;
- (i) correctly identifies release handle(s); i.e. slide disconnect, tailcone jettison, ventral stairs; and
- (k) correctly applies procedures (i.e. positioning of seatbacks, armrest, tray tables).

7.3 Evacuation drills

7.3.1 General

- (1) Evacuations are emergency situations which cabin crew members must effectively manage using their knowledge of procedures and the resources available to them. Skills are developed and maintained through practice.
- (2) It is recognized that on aircraft with more than one cabin crew member, an evacuation will likely involve multiple exits and cabin crew members. Therefore, where a drill is performed on an aircraft with more than one cabin crew member, the drill scenario will involve a “typical” number of cabin crew members. Where a cabin simulator is used to conduct the drills, the number of cabin crew members who could participate at any time, will be appropriate to the cabin simulator configuration.
- (3) Each participant will perform the designated evacuation responsibilities for the assigned position. Where a double cabin crew member seat is available and would normally be occupied by two cabin crew members, the drill will be conducted to reflect this reality.
- (4) A cabin crew member who is qualified exclusively on aircraft operating with one cabin crew member and who is being qualified on aircraft with more than one cabin crew member, must perform at least one drill with additional cabin crew members.

7.3.2 Simulation scenarios

- (1) An evacuation drill is a training and evaluation scenario which must portray an operational flight and include abnormal and emergency occurrences and interaction amongst cabin crew members (if applicable), other cabin crew members and passengers.
- (2) A drill scenario should not incorporate excessive or multiple unrelated variables that would overload a cabin crew member nor should it be limited so that there is reduced value to the exercise. The variables should differ in sequence from one drill to the next and can include, but are not limited to, the following –
 - (a) unserviceable exits;
 - (b) inflation devices that fail or only partially inflate;
 - (c) aircraft attitude which will necessitate a decision to use the exit or redirect passengers;
 - (d) poor visibility; ie. darkness, smoke;
 - (e) incapacitated flight crew members;
 - (f) exits which become unusable during the evacuation;
 - (g) special needs passengers; ie. elderly, disabled;
 - (h) passengers in panic; ie. positive, negative, false leadership;
 - (i) failure of aircraft emergency systems; ie. lighting, evacuation signal, communication;
 - (j) decompression; and
 - (k) exits which require the use of non-standard “commands”; ie. ramp with slide.

7.3.3 Unprepared land and unprepared water evacuation drill performance criteria

Each cabin crew member will perform at least one land or one unprepared water evacuation drill that incorporates the procedures pertinent to a specific exit and perform the following:

- (a) secure themselves in a cabin crew member seat;

- (b) recognise that an emergency situation is developing and react appropriately to the drill scenario;
- (c) apply all applicable commands;
- (d) recognise when and how to initiate the evacuation; i.e. commands, evacuation horn;
- (e) activate emergency lights, evacuation horn if applicable;
- (f) locate and don life jacket and command passengers as appropriate;
- (g) assess conditions inside and outside the exit to determine exit usability throughout the evacuation;
- (h) prepare and open the exit;
- (i) secure exit in fully open position or ensure correct stowage;
- (j) pull the manual inflation handle(s) and verify deployment, inflation of ramp, slide (simulated);
- (k) assume appropriate protective position;
- (l) initiate passenger evacuation;
- (m) final cabin and flight deck checks and remove required emergency equipment;
- (n) evacuate aircraft/simulator correctly;
- (o) physically identify location of escape tapes or escape ropes, if applicable; and
- (p) physically identify release handle(s); i.e. slide disconnect, ventral stairs, tailcone jettison, etc.

7.3.4 Evaluation criteria

Cabin crew member performance will be observed, rated and debriefed according to the following –

- (a) correct usage of the seat mechanism, restraint system and brace position as appropriate for seat direction and location;
- (b) correct and timely reaction to emergency situations;
- (c) consistent usage of appropriate terminologies; i.e. commands, ABP briefings, with clear, positive authoritative communication techniques, as appropriate for drill scenario;
- (d) activates emergency lights, evacuation horn, if applicable (simulated);
- (e) selects appropriate exit for the evacuation scenario and the aircraft type;
- (f) assessment of the conditions inside and outside the exit to determine exit usability throughout evacuation; i.e. clear of obstruction, fire, aircraft attitude;
- (g) preparation and correct operation of exit;
- (h) secures exit in the fully open position or ensures correct stowage;
- (i) pulls inflation handle(s) and verifies deployment, inflation of slide/ramp (simulated);
- (j) assumes and maintains appropriate protective body and hand positions;
- (k) effective usage of able-bodied persons for special needs passengers; i.e. assisting outside aircraft and directing people away from the aircraft or onto flotation devices, crowd control, etc;

- (l) adequacy of cabin checks, removal of equipment and additional supplies as scenario and operator procedures dictate;
- (m) correctly identifies release handle(s); i.e. slide disconnect, tailcone jettison, ventral stairs;
- (n) correct application of procedures as related to scenario; and
- (o) consequences of errors.

7.3.5 Crew prepared evacuation drill performance criteria

Each cabin crew member must participate in at least one prepared land evacuation drill or at least one ditching evacuation drill and perform the following –

- (a) recognize the in-flight emergency signal from the flight deck and react according to procedures;
- (b) prepare passengers, cabin and self according to procedures and scenario;
- (c) select and brief able-bodied passengers to assist as required, opening non-crewed exits, crowd control, buddy-up with special needs passengers, assisting outside aircraft and directing people away from the aircraft or onto flotation devices;
- (d) recognize the emergency brace and evacuation signals and react accordingly;
- (e) activate emergency lights, evacuation horn if applicable (simulated);
- (f) prepare and operate exits;
- (g) evacuate passengers;
- (h) final cabin and flight deck checks, remove required emergency equipment; and
- (i) evacuate aircraft/simulator.

7.3.6 Evaluation criteria

Cabin crew member performance will be observed, rated and debriefed according to the contents of section 7.3.4 and the following –

- (a) correct application of emergency landing preparation procedures;
- (b) awareness of and appropriate response to passenger behaviour;
- (c) communication acknowledgement;
- (d) accuracy in briefing of ABPs;
- (e) debrief will include a discussion with all participants describing, in general terms, procedures and responsibilities which must be completed following and as appropriate to evacuation scenarios; i.e. flotation devices, equipment, location, movement of passengers to a safe area, protection from the elements, first aid, etc.

7.4 Life raft drill *

7.4.1 Equipment criteria

Life raft drill must be conducted using life saving equipment that is representative of that which is installed on each aircraft type with respect to weight, dimensions, appearance, features and operation.

7.4.2 Performance criteria

- (1) Each cabin crew member will participate in a life raft drill once every third training year in water and perform the following –
 - (a) access the raft compartment and experience the difficulty associated with moving the weight of a packaged life raft within a space representative of the aircraft aisle;
 - (b) identify all features of a fully inflated raft;
 - (c) board raft(s), assist persons into raft;
 - (d) access the inflation lanyard;
 - (e) access the slide, raft quick release mechanism while verbally describing the procedure to release the life raft from the aircraft; and
 - (f) identify and examine the life raft survival kit and components.
- (2) Each cabin crew member will participate as a cabin crew member or a passenger in the following –
 - (a) launching, inflating, and disconnecting raft(s) either actual or by video;
 - (b) observe the righting of an overturned raft, or view audio visual material;
 - (c) effective raft management; i.e. distribution of passengers, deploying sea anchor, etc;
 - (d) erecting the raft canopy;
 - (e) distribution of duties to passengers;
 - (f) discuss the hazards associated with moving a packaged life raft through the cabin to an exit; i.e. inadvertent inflation, passenger movement and panic; and
 - (g) water survival principles, a review of the operations of survival kit components including raft maintenance.

7.5 Life jacket drill

7.5.1 Equipment criteria

Life jackets used for this drill must be representative of those most commonly carried on the aircraft.

7.5.2 Performance criteria

- (1) Each cabin crew member must perform the following –
 - (a) observe removal of life jacket from closed pouch;
 - (b) don life jacket;
 - (c) locate and review operation of inflation toggles;
 - (d) partially inflate one chamber of life vest orally;
 - (e) practice deflation technique;
 - (f) locate and review light activation;

(g) locate whistle, if applicable; and

(h) fit a life jacket.

(2) Each cabin crew member shall, every third year, in addition to performance criteria 7.4.2 and 7.5.2 perform the following at a facility approved by the Director –

(a) water entry;

(b) assume and maintain a heat escape lessening position for a period of at least ten (10) seconds each and assume the group huddle (minimum of two crew members);

(c) move in one direction unaided and without touching the sides of the pool for a minimum distance of 15m;

(d) board raft(s), assist persons into raft; and

(e) demonstrate knowledge and use of raft survival and other equipment, including erecting the canopy.

7.6 Aircraft slide drill

7.6.1 Equipment criteria

(1) The evacuation slide must be representative of the type installed in the aircraft with respect to the following categories –

(a) inflatable, double lane slides;

(b) inflatable slide and ramp combination; and

(c) inflatable, single lane slides.

(2) Non-inflatable slides must be representative of the type installed in the aircraft.

7.6.2 Performance criteria

Each cabin crew member will perform an aircraft slide drill annually according to the following –

(1) inflatable evacuation slide –

(a) slide down an inflatable slide; or

(b) slide down an inflatable slide from one of the categories, and for each other slide category, view a video which depicts slide, ramp activation and inflation, both externally from a side angle and a slide base angle and internally from the cabin crew member protected position, including slide inflation sound, and slide disconnect sequence; or

(2) Non inflatable evacuation slide

Where the evacuation slide is not door mounted, each cabin crew member must retrieve the slide(s) from its stowed location and attach the evacuation slide clips to the appropriate attachment on door frames.

7.7 Fire fighting drills

7.7.1 General

(1) Drill scenarios will provide each cabin crew member with the opportunity to merge procedural knowledge with practical skills. Their ability to successfully react to different fire situations will enhance their level of confidence and their ability to deal with fires in flight.

- (2) Simulated cabin fire fighting drills shall include class A, B, or C fires in a minimum of one of the following locations –
- (a) cabin area (i.e. under seat, over-head bin, closet);
 - (b) galley area (i.e. garbage bin, upper electrical panel, oven);
 - (c) confined area (i.e. waste bin, lavatory); and
 - (d) hidden (i.e. behind panels).

7.7.2 Fire fighting syllabus

The cabin crew member will be able to identify the types of fire, fire detection and fire fighting systems and the established fire fighting procedures.

- (1) General
- (a) Identify hazards associated with on board fires including toxicity of fumes, flammability of cabin materials, variety of materials to burn.
 - (b) Identify the impediments to fire fighting on board the aircraft, including limited visibility due to smoke/fumes, fire fighting in confined space, difficulty in locating the source of the fire, limited resources to fight the fire and distance to suitable aerodrome for landing.
 - (c) Describe experience with fire accidents/incidents. Identify the safety lessons learned as a result.
 - (d) Define fire chemistry including the elements which must be present for fire to occur; i.e. fuel, heat, oxygen, chemical reaction.
 - (e) List the classes of fire which may occur on aircraft Class A –combustible material fires; Class B – grease/spill fires; Class C – electrical and Class D – fire involving metals and the possible sources for these fires.
 - (f) Describe importance of early detection and correct recognition.
 - (g) Identify the characteristics and behaviour of fire; i.e. what you will see, how the fire will behave, in different cabin environments, fire-propagation.
 - (h) Describe the means of fire smoke detection; i.e. smell, auditory, visual, touch, tactile.
 - (i) Describe the chemical properties of each type of fire extinguisher including hazards to occupants and aircraft systems, how it extinguishes fire.
- (2) Cabin crew responsibilities
- (a) List fire prevention measures and cabin crew responsibilities for fire prevention including but not limited to –
 - (i) practising and maintaining safe work habits;
 - (ii) enforcing smoking regulations;
 - (iii) monitoring cabin, toilets, cargo compartments;
 - (iv) awareness of popped circuit breaker procedures; and

(v) prompt investigation of fire detection alarms, unusual odours, heat build-up, deformation of aircraft components, etc.

(b) Describe the importance of cabin crew coordination in fire fighting and identify ways that this may be achieved.

(c) Describe the importance of flight cabin crew communication in fire fighting and providing pilot-in-command with accurate information on fire source, location, extent/severity of fire/smoke, fire fighting actions.

(3) Procedures – cabin

(a) Describe the fire fighting procedures for specific types of fires; e.g. galley, oven, lavatory, electrical, upholstery, etc.

(b) Describe the technique and procedures for fighting these fires including finding the source of the fire, type of extinguisher to use, additional fire fighting equipment needed, technique for using extinguisher, complications to fighting this type of fire, limitations to fighting this type of fire, post-fire procedures, flight crew communication and flight crew coordination procedures, passenger-handling.

(c) Identify ways to maintain breathing comfort for cabin occupants.

(d) Define “smoke removal”, and smoke control, and describe the associated procedures on the different types of aircraft including flight crew communication, flight crew coordination and advice to passengers.

Note – May be in the aircraft type specific.

(e) Define flashover and flash-fire. Describe the cause of each and conditions under which each is likely to occur.

(4) Procedures – external

(a) Identify the types of external fires which could affect flight safety included but not limited to –

(i) engine fires;

(ii) APU and engine torching;

(iii) fuel spill/apron fires;

(iv) fires on loading bridges; and

(v) service vehicle fires.

(b) Describe established procedures for dealing with these fire situations including recognition, flight crew communication and flight crew coordination.

(c) Identify the communication and coordination required with ground personnel and describe the fire fighting assistance ground personnel can offer and the assistance cabin crew members can provide to ground personnel.

7.7.3 Equipment criteria

- (1) Fire fighting drills will be conducted using furnishings representative of those found on the operator's aircraft as appropriate to the drill scenario (i.e. such as seats, galley units, panels, waste bins, etc).
- (2) Fire fighting equipment and the brackets used for restraint must be representative to those installed in the aircraft with respect to weight, dimensions, controls, types and operations. Fire extinguishers used for live fire fighting must be charged with the appropriate agent or with an environmentally friendly agent. Protective Breathing Equipment (PBE) consisting of portable oxygen bottle and full face mask must be charged with oxygen. Self contained PBE may be substituted with a training smoke hood which is not operational.

7.7.4 Equipment practice

Each cabin crew member must demonstrate the ability to use fire fighting equipment and perform the following –

- (1) remove from stowage, don and activate PBE and practice communication;
- (2) remove from stowage and operate each type of fire extinguisher (uncharged) and associated attachments (i.e. extinguisher fitted with hose attachment, extension (wand), etc.);
- (3) don each piece of protective clothing; and
- (4) initiate fire fighting procedures involving at least one cabin crew member and a passenger(s).

7.7.5 Live fire fighting

- (1) Each cabin crew member must demonstrate the effectiveness of a fire extinguisher correctly applied to extinguish an actual fire once every third annual training year.
- (2) Each cabin crew member shall (following equipment practice 7.7.4) demonstrate his/her ability to extinguish a live cabin fire in at least two of the following areas –
 - (a) cabin area (i.e. under seat, over-head bin, closet);
 - (b) galley area (i.e. garbage bin, upper electrical panel, oven);
 - (c) confined area (i.e. waste bin, lavatory); and
 - (d) hidden (i.e. behind panels).

7.7.6 Evaluation criteria

Cabin crew member performance will be observed, rated and debriefed according to the following –

- (a) recognition or identification of the problem;
- (b) locates the source of the fire; i.e. tactile search, use of crash axe, etc;
- (c) effective communication/coordination procedures throughout the drill; i.e. notifying fellow flight crew members of the situation, providing clear, concise and consistent information to the pilot-in-command, advice and assistance to passengers;
- (d) response in a timely manner;
- (e) correct use of fire fighting equipment consistent with the type of fire, location of the fire and maximum effective position of the fire extinguisher;
- (f) undertake further action as required; and

- (g) consequences of error.

7.8 Pilot incapacitation drill

7.8.1 Training objective

The cabin crew member will apply the procedures relating to an incapacitated pilot.

7.8.2 Syllabus

For each aircraft where the operation of the pilot seats is significantly different, each cabin crew member shall –

- (a) pull the pilot away from the flight controls and correctly fasten and lock the restraint system;
- (b) position the pilot seat using the controls, i.e. horizontal, vertical, recline; and
- (c) apply flight crew coordination and communication procedures to assist the remaining flight deck crew.

121.03.9 REGAINING QUALIFICATION TRAINING

Note – See Table 1 following this TS for training requirements for all phases of training.

1. Refresher training

- (1) A cabin crew member who has been absent from flying duties for more than six months up to and including twelve months on a particular type of aeroplane on which that person is qualified, shall be given training prior to operating on such type of aeroplane that includes at least the subjects listed below –
 - (a) a briefing on changes to company procedures since the person was last involved in flying operations;
 - (b) a review of aircraft systems, equipment and procedures for each aeroplane on which the person is to operate;
 - (c) the operation and actual opening of all normal and emergency exits for passenger evacuation in an aeroplane or approved representative training device;
 - (d) demonstration of the operation of all other exits; and
 - (e) any other information deemed necessary by the Director.
- (2) The operator shall ensure that refresher training is conducted by SACAA-approved instructors or designated examiners (DEs).

2. Requalification training

- (1) An operator shall ensure that requalification training is conducted by SACAA approved instructors or DEs.
- (2) A cabin crew member who has been absent from flying duties for more than twelve months up to and including thirty-six months shall undergo recurrent training as prescribed

in this technical standard, at least two familiarisation sectors during commercial operations.

- (3) A cabin crew member who has been absent from flying duties for more than thirty-six months shall complete initial training as prescribed in Document SA-CATS 64 and type training as appropriate.

Table 1: Cabin crew training syllabus

	Company Induction	Initial Aeroplane Type	Recurrent	Requalification	Refresher
OPERATOR SPECIFIC					
Structure	•				
History	•				
Vision & Mission	•				
AVIATION – GENERAL					
REGULATORY OVERVIEW					
Regulatory overview					
Legislation			•	•	
AVIATION TERMINOLOGY					
Terminology					
Terms of reference					
THEORY OF FLIGHT					
General aircraft description					
Aerodynamics of flight					
Meteorology					
Air traffic control					
PHYSIOLOGY OF FLIGHT					
General			•	•	
Effects of altitude			•	•	
FLIGHT DECK OBSERVATION FLIGHT					
General		•	•	•	
ROLES AND RESPONSIBILITIES					
OPERATOR					
Operating requirements		•		•	•
Operations manual		•	•	•	•
CABIN CREW MEMBERS					
General		•	•	•	•
CAA INSPECTORS					

General		•	•	•	•
SAFETY PROCEDURES					
FLIGHT CREW COORDINATION					
General		•	•	•	•
Flight crew coordination		•	•	•	•
COMMUNICATIONS					
General		•	•	•	•
Communication		•	•	•	•
Passenger announcements		•			
SURFACE CONTAMINATION					
General		•	•	•	•
Cabin crew member responsibilities		•	•	•	•
De-icing/anti-icing		•	•		
BRIEFINGS					
Cabin crew briefings		•	•	•	•
Passenger briefings		•	•	•	•
SAFETY CHECKS					
General		•	•	•	•
PASSENGER HANDLING					
General		•	•	•	
Passenger boarding		•	•	•	•
PASSENGER AND CABIN CREW MEMBER SEATS AND RESTRAINTS					
Passenger seating		•	•	•	•
Cabin crew seating		•	•	•	•
CABIN BAGGAGE					
Passenger carry-on baggage	•	•	•	•	•
Flight crew carry-on baggage	•	•	•	•	•
ELECTRONIC DEVICES					
General		•	•	•	•
SERVICE TO PASSENGERS ON THE GROUND					
General		•			
Cabin crew member responsibilities		•	•	•	•
FUELLING WITH PASSENGERS ON BOARD					
General		•	•	•	•
Cabin crew member responsibilities		•	•	•	•

PRE-TAKE OFF AND PRE-LANDING					
Cabin preparation		•	•	•	•
Cabin crew member responsibilities		•	•	•	•
Abnormal situations		•	•		
PROPELLER ABNORMALITIES					
General		•	•	•	
TURBULENCE					
General		•	•	•	•
Cabin crew member responsibilities		•	•	•	•
CREW MEMBER INCAPACITATION					
General		•	•	•	•
Pilot incapacitation		•	•	•	•
Cabin crew incapacitation		•	•	•	•
FLIGHT DECK PROTOCOL					
General		•		•	
FUEL DUMPING					
General		•		•	
POST-FLIGHT DUTIES					
Documentation		•	•	•	•
Communication		•	•	•	•
OXYGEN ADMINISTRATION					
General		•		•	
Procedures		•		•	
EMERGENCY PROCEDURES					
FIRE FIGHTING					
General		•	•	•	•
Cabin crew member responsibilities		•	•	•	•
Procedures – cabin		•	•	•	•
Procedures – external		•	•	•	•
SMOKE/FUMES IN THE CABIN					
General		•	•	•	•
Cabin crew member responsibilities		•	•	•	•
RAPID DECOMPRESSIONS AND PRESSURIZATION PROBLEMS					
General		•	•	•	•

Cabin crew member responsibilities		•	•	•	•
EVACUATIONS					
General		•	•	•	•
Cabin crew member responsibilities		•	•	•	•
Evacuation procedures		•	•	•	•
Post-evacuation		•	•	•	•
Accident/Incident review		•			
EMERGENCY EQUIPMENT					
EQUIPMENT OVERVIEW					
General		•		•	•
AEROPLANE SPECIFIC					
PHYSICAL DESCRIPTION					
General		•			
Exterior description		•			
Interior description		•		•	
GALLEYS					
General		•	•	•	
COMMUNICATION SYSTEMS					
General		•			
Interphone		•		•	•
Public address system		•		•	•
Passenger call system		•			
Entertainment system		•		•	
Automatic announcement system		•		•	
LIGHTING SYSTEMS					
General		•	•	•	•
WATER AND WASTE SYSTEMS					
General		•	•	•	•
OXYGEN SYSTEMS					
General		•	•	•	•
HEATING AND VENTILATION SYSTEMS					
General		•	•	•	
EXITS					
General		•	•	•	•
Normal operation		•	•	•	•

Abnormal operation		•	•	•	•
Emergency operation		•	•	•	•
Airstairs		•	•	•	•
UNIQUE FEATURES					
General		•	•	•	•
DRILLS					
PUBLIC ADDRESS SYSTEM AND INTERPHONE SYSTEM DRILLS					
Introduction		•		•	
Equipment criteria		•		•	
Performance criteria		•		•	
Evaluation criteria		•		•	
PASSENGER BRIEFING DRILL					
Equipment criteria		•		•	
Performance criteria		•		•	
Evaluation criteria		•		•	
AEROPLANE EXIT OPERATION DRILLS					
Equipment criteria		•	•	•	
Normal door operation performance criteria		•	•	•	
Emergency door operation performance criteria		•	•	•	
Cabin window exit operation		•	•	•	
Evaluation criteria		•	•	•	
Airstair operation performance criteria		•	•	•	
EVACUATION DRILLS					
General		•	•	•	
Simulation scenarios		•	•	•	
Unprepared land/unprepared water evacuation		•	•	•	
Evaluation criteria		•	•	•	
Cabin crew prepared land/ditching evacuation drills		•	•	•	
Evacuation criteria		•	•	•	
RAFT DRILL (WET OR DRY)					
Equipment criteria		•	•	•	
Performance criteria		•	•	•	
LIFE JACKET DRILL					

Equipment criteria		•	•	•	
Performance criteria		•	•	•	
AEROPLANE SLIDE DRILL					
Equipment criteria		•	•	•	
Performance criteria		•	•	•	
FIRE FIGHTING DRILLS					
General		•	•	•	
Equipment criteria		•	•	•	
Equipment practice performance criteria		•	•	•	
Live fire fighting performance criteria		•	•	•	
Fire fighting/Cabin performance criteria		•	•	•	
Evaluation criteria		•	•	•	
Fires/Class B main deck cargo compartment		•	•	•	
OXYGEN ADMINISTRATION DRILL					
Equipment criteria		•		•	
Portable oxygen bottle performance criteria		•		•	
Fixed first aid oxygen performance criteria		•		•	
PRE-FLIGHT CHECK					
Equipment criteria		•	•	•	
Performance criteria		•	•	•	
Evaluation criteria		•	•	•	
PRE-TAKE OFF CHECK					
Equipment criteria		•	•	•	
Performance criteria		•	•	•	
Evaluation criteria		•	•	•	
PRE-LANDING CHECK					
Equipment criteria		•	•	•	
Performance criteria		•	•	•	
Evaluation criteria		•	•	•	
POST-LANDING CHECK					
Equipment criteria		•	•	•	
Performance criteria		•	•	•	
Evaluation criteria		•	•	•	

PILOT INCAPACITATION DRILL			
Procedures		•	•

121.03.10 EMPLOYEES AND SERVICE AGENT TRAINING

A. FLIGHT OPERATIONS OFFICERS AND FLIGHT FOLLOWERS

Notes –

1. Any reference to “equivalent course of studies” in this TS means that credit may be given for previous training received towards a pilot licence but that additional training may be required.
2. For persons without any formal training, credit may be given based on relevant experience but is subject to a knowledge assessment by the CAA or a CAA-approved person.

1. Qualifications of Flight Operations Officer instructors and examiners

- (1) An air service operator shall not assign any person to provide and no person shall provide any generic or operator-specific flight operations officer (FOO) training required in terms of Division Four of Subpart 3, unless such person –
 - (a) has successfully completed a FOO generic course of studies or an acceptable equivalent course of studies and received certification from the approved training organisation having conducted the training; and
 - (b) has successfully completed the operator-specific FOO training and received a certificate of competency issued by the operator in terms of this technical standard.
- (2) An operator shall not assign and no person shall act as a FOO examiner unless such person –
 - (a) is the holder of a current FOO certificate of competency appropriate to their assigned duties;
 - (b) has completed the FOO training referred to in subparagraph (a) appropriate to their assigned duties, and
 - (c) has been certified by the operator to act as a FOO examiner for those types of operational control systems and aeroplanes listed in the certification.

2. Qualifications of a Flight Operations Officer

- (1) No person may be assigned to FOO duties, except under adequate supervision, unless such person –
 - (a) in the case of a new hire FOO, has –
 - (i) completed the generic training outlined in section 3 or an acceptable equivalent course of studies;
 - (ii) completed the operator-specific training required by section 4; and
 - (iii) been issued a certification of competence by the operator indicating the operational control system(s) and company aeroplane(s) authorized; or
 - (b) has undergone the operator’s specific FOO training and demonstration of competence within the 12 months preceding such assignment: Provided –
 - (i) the FOO’s training file provides evidence of the completion of the training and demonstration of competence approved by that operator; and
 - (ii) the FOO has been issued a certification of competence issued by the operator indicating the operational control system/s and company aeroplanes authorized.
- (2) Where a FOO has previously undergone the generic training prescribed in section 3, the validity of which has not lapsed, the requirements of paragraph (1)(a)(i) above are deemed to have been met.
- (3) No operator shall assign a FOO to duty when such person has not acted in that capacity –

- (a) for a period of six months, unless such person has undergone a briefing on changes to procedures or other changes in the operational control system (OCS) that have occurred since the person last served;
- (b) for a period of one to two years, unless such person has undergone the recurrent course of studies;
- (c) for a period of greater than 2 years, unless such person has undergone the initial course of studies of the company-specific training and has successfully completed the appropriate check; and
- (d) for a period of 5 years since completion of the generic operations officer training, unless such person has acted as a FOO for at least 6 months in the preceding 24 months, unless such person –
 - (i) has undergone refresher training based upon the generic course; and
 - (ii) has completed the company-specific training and has successfully completed the appropriate check.

3. Flight Operations Officer Generic Training

- (1) The following subjects form the basis for generic training –
 - (a) air law – rules and regulations relevant to a FOO, appropriate air traffic services practices and procedures;
 - (b) aircraft general knowledge –
 - (i) principles of operation of aeroplane powerplants, systems and instruments;
 - (ii) operating limitations of aeroplanes and powerplants; and
 - (iii) minimum equipment list;
 - (c) flight performance calculation, planning procedures and loading –
 - (i) effects of loading and mass distribution on aircraft performance and flight characteristics; mass and balance calculations;
 - (ii) operational flight planning; fuel consumption and endurance calculations; alternate aerodrome selection procedures; *en route* cruise control; extended range operation;
 - (iii) preparation and filing of air traffic services flight plans; and
 - (iv) basic principles of computer-assisted planning systems;
 - (d) human performance – human performance relevant to dispatch duties;
 - (e) meteorology –
 - (i) aeronautical meteorology; the movement of pressure systems; the structure of fronts, and the origin and characteristics of significant weather phenomena which affect take-off, en-route and landing conditions; and
 - (ii) interpretation and application of aeronautical meteorological reports, charts and forecasts; codes and abbreviations; use of, and procedures for obtaining, meteorological information;
 - (f) navigation – principles of air navigation with particular reference to instrument flight;
 - (g) operational procedures –
 - (i) use of aeronautical documentation;
 - (ii) operational procedures for the carriage of freight and dangerous goods;
 - (iii) procedures relating to aircraft accidents and incidents;
 - (iv) emergency in-flight procedures; and
 - (v) procedures relating to unlawful interference and sabotage of aircraft;
 - (h) principles of flight – principles of flight relating to the appropriate category of aircraft; and

- (i) radio communication – procedures for communicating with aircraft and relevant ground stations.

(2) Practical Training.

The applicant shall have served under the supervision of a FOO or, in the case of an operator having only one FOO, a suitably qualified person designated by the person responsible for flight operations or approved by the Director, for at least 90 working days within the six months immediately preceding the application.

4. Air service operator-specific flight operations officer and flight follower training - general

- (1) The operator shall establish and maintain approved ground training programmes for FOOs and flight followers in its employ whether on a full-time or part-time basis or are otherwise engaged under the provisions of contractual services approved by the Director for that operator.
- (2) Each training programme shall be published in the operations manual.
- (3) Each training curriculum shall be appropriate to the employee's duties and in consideration of the type and complexity of the OCS approved for the operator.
- (4) Each FOO or flight follower trainee shall receive operator-specific training as outlined in the applicable curriculum.

5. Flight operations officer training

The operator-specific FOO training programme shall be published as individual syllabi in terms of initial, recurrent, transition, flight familiarisation and regaining competency training based upon the following –

- (a) initial training is a course of studies given to each new hire and covers the complete initial company induction syllabus and complete aeroplane type training syllabus as relating to the person's assigned duties. Initial training and the related examinations must be reviewed and revised from time to time and at any time new information becomes relevant to the OCS as the result of operational or safety management system (SMS) feedback;
- (b) recurrent training shall occur every 12 months and include new material that may have been added to the initial course of studies or new information resulting from operational experience that may affect the efficiency, effectiveness or safety of the operator's OCS;
- (c) transition training is training provided for any FOO to make a transition from one type of aeroplane type or variant to another except where the Director allows such aeroplanes or variants to be grouped together as, an aeroplane type;
- (d) flight familiarisation is training provided to each FOO for the purpose of ensuring an enhanced knowledge of the operational practices of a flight in progress and the manner of interfacing with the flight watch system.; and
- (e) regaining competency is training provided to a FOO when such person has not acted in the capacity for which they have been trained.

6. Flight follower training

- (1) Each person assigned to act as a flight follower who is not the holder of a FOO certification shall receive training appropriate to his or her assigned duties.
- (2) Where flight followers are utilized only under the direct supervision of a certified FOO, training may be accomplished in an on-the-job training programme that includes sufficient technical knowledge in the

training programmes required in section 5 above. Such on-the-job-training programme and the specific duties of a flight follower who does not hold a FOO credential shall be published in the operator's operations manual.

- (3) Where flight followers are not utilized under the direct supervision of a certified FOO, training may be accomplished in an on-the-job training programme under a suitably qualified flight follower.

7. Air service operator's company induction syllabus for initial training

- (1) The content of a company induction training programme for a FOO shall include –
- (a) the operations manual system covering pertinent information dealing with –
- (i) manual structure including all manuals providing need to know information for dispatchers and the amendment procedures for such manual system;
 - (ii) company management organisation and how the OCS interfaces with management;
 - (iii) duties and responsibilities of those exercising operational control of flight following services;
 - (iv) operators approved for categories A or B operational control system, a full description of the system so approved;
 - (v) specific domestic and foreign rules and regulations significant to the operator by virtue of its type and area of operation giving emphasis on regulatory differences from the South African regulations;
 - (vi) dispatch release policy;
 - (vii) procedures for the resolution of conflict between the dispatcher and the PIC;
 - (viii) flight following services and provision of information to a flight;
 - (ix) local weather patterns and tendencies;
 - (x) operator's fuel policy;
 - (xi) dispatch interface with the operator's SMS;
 - (xii) dispatch interface with the operator's QA programme;
 - (xiii) details of the operator's security programme;
 - (xiv) details of the maintenance release policy;
 - (xv) details of the operator's emergency response plan including OCS participation in overdue or missing aeroplanes;
 - (xvi) handling a declaration of an emergency;
 - (xvii) operational weather minima;
 - (xviii) the approved types of operational flight plans and flight planning procedures;

- (xix) crew resource management training including human factors, risk analysis and error management training;
- (xx) dangerous goods training as applicable;
- (xxi) details of the operator's load control procedures;
- (xxii) details of the operator's communication equipment and policies including communication failure procedures;
- (xxiii) details of the operator's official reporting systems;
- (xxiv) surface contamination training where the operator operates into areas where surface contamination is known to exist; and
- (xxv) company policy with respect to the dissemination of information relating to –
 - (aa) weather specials, severe or weather phenomena;
 - (bb) notams; or
 - (cc) security measures;

(b) details of the air operator certificate and operations specifications including –

- (i) Part A General provisions;
- (ii) Part B *En route* authorisations and limitations including special authorities;
- (iii) Part C Aerodrome authorisations and limitations;
- (iv) Part D Maintenance;
- (v) Part E Mass and balance;
- (vi) Part F Interchange of equipment operations; and
- (vii) Part G Aircraft leasing operations; and

(c) any other subject area the Director deems to be pertinent.

- (2) The content of a company induction training programme for a flight follower shall include those items from paragraph (1) related to the flight follower's duties.

8. Aeroplane type specific training – FOO

- (1) An operator shall provide to each FOO a course of studies relating to each type of aeroplane over which operational control is to be exercised by such person.
- (2) The aeroplane course shall be named by the aeroplane type and where a variant or aeroplane group is represented, the course title shall be so revised.
- (3) Each aeroplane type specific course shall provide a systems overview appropriate to the duties of a FOO. In addition, a detailed description in the normal, abnormal, emergency and supplementary procedures, including the related limitations and how those limitations may impact the decisions and assistance rendered by the person responsible for flight following.

- (4) Where the aeroplane is authorized to be operated in accordance with an MEL, those systems so authorized must be discussed with reference to the appropriate ATA number of the MEL.
- (5) Each course shall be based upon the aeroplane manufacturer's AFM, AOM or SOPs, as applicable, as adopted by the operator.
- (6) The aeroplane technical training syllabus must include a description of at least the following –
 - (a) Aircraft General –
 - (i) exterior features;
 - (ii) interior features;
 - (iii) weights and dimensions; and
 - (iv) bridge and gate requirements;
 - (b) Electrical System – general overview to ensure the FOO has acquired a working knowledge of what consequences may result from a variety of failures of the systems and how assistance could be rendered;
 - (c) Fuel System –
 - (i) general;
 - (ii) fuelling and defueling procedures;
 - (iii) fuelling with passengers on board and special considerations during foul weather; and
 - (iv) fuel consumption in terms of endurance and range;
 - (d) Power Plant –
 - (i) general overview with emphasis placed upon limitations and their impact upon flight dispatch procedures/decisions; and
 - (ii) each FOO must acquire a knowledge of normal, abnormal and emergency procedures sufficient to know how certain malfunctions must be handled and the appropriate level of urgency to be placed upon a flight experiencing problems with its powerplants;
 - (e) Pneumatic System –
 - (i) general understanding sufficient to intervene on occasions where normal systems are not functioning normally or not available;
 - (ii) air sources;
 - (iii) distribution; and
 - (iv) external cart;
 - (f) Ice and Rain Protection –
 - (i) engine anti-ice;
 - (ii) wing and airframe anti-ice;
 - (iii) normal operation;
 - (iv) limitations; and
 - (v) knowledge of the capabilities of the aeroplanes in icing conditions that they oversee;
 - (g) Air Conditioning and Pressurization – general overview of the consequences of failure of the system as related to altitude, range and safety/health issues;
 - (h) Hydraulic Power – general description and the impact of failure on aeroplane performance;
 - (i) Landing Gear – general description and dispatch considerations in the event of failure or malfunction;
 - (j) Avionics –
 - (i) general; and
 - (ii) navigation and communication equipment and company adopted procedures relating to navigation and communication; and
 - (k) Performance –

- (i) general;
- (ii) flight planning;
- (iii) take-off performance;
- (iv) *en route* performance;
- (v) landing performance;
- (vi) abnormal operations / non-standard configurations; and
- (vii) MEL/CDL considerations.

9. Flight familiarisation training – FOO

- (1) An operator shall provide to each FOO flight familiarisation training every 12 months as an observer occupying a flight deck observer seat during not less than one flight sector. The flight deck seat should provide the FOO with the ability to hear all voice communications.
- (2) Flight familiarisation must commence at the dispatch centre and the observer given the opportunity to receive the briefing and to witness how this information is used for the different phases of the flight.
- (3) Flight familiarisation shall be recorded and signed by the observer and the pilot-in-command.

B. OTHER EMPLOYEES AND SERVICE AGENT TRAINING

1. Security training for ground personnel

- (1) An operator shall provide security training for the purpose of heightening overall security awareness within the ground operating personnel whose function is essential to flight operations. Ground personnel considered significant to aeroplane operations would include but not be limited to –
 - (a) personnel designated as dangerous goods packing, shipping or loading of dangerous materials;
 - (b) service counter personnel;
 - (c) personnel designated as cargo, mail or baggage handlers;
 - (d) catering personnel;
 - (d) service personnel whose function would require coming into contact with or have access to an aircraft or its loading or service bays;
 - (e) maintenance personnel; or
 - (f) personnel who man stores handling anything that is designated for, or is likely to be placed on an aeroplane.
- (2) The training required by paragraph (1) must be designed to acquaint appropriate employees with preventive measures and techniques in relation to passengers, baggage, cargo, mail, equipment, stores and supplies intended for carriage on an aeroplane so that they contribute to the prevention of acts of sabotage or other forms of unlawful interference.

121.03.11 TRAINING, CHECKING, CERTIFICATION AND VALIDITY PERIOD

1. Checking – flight crew members

- (1) Upon completion of the applicable ground and flight training in accordance with TS 121.03.4 or 121.03.5, and following upgrade training, each flight crew member shall successfully demonstrate their proficiency by undergoing the appropriate skills test as described in Schedules 1, 2 or 3 of this TS and where deemed necessary, a combination of such tests.
- (2) In addition, each flight crew member shall successfully complete a line check following initial or upgrade line induction training and annually thereafter. Such line check shall be completed by a company check pilot and the results of the check recorded in the crew member's training records. A line check is to consist of an assessment of the flight crew member's ability to conduct safe operations over a representative route of the operator's route structure.

2. Checking – Cabin crew members

- (1) Each cabin crew member shall, upon completion of the training indicated below, successfully complete the knowledge examinations and checks as outlined herein—
 - (a) following operator induction training, an examination of the subjects;
 - (b) following initial training, an examination covering the subjects referred to in CAR 64.02.2, as applicable;
 - (c) following type and differences training, an examination covering the subjects listed in TS 121.03.7; and
 - (d) following recurrent training, an examination covering the subjects for which training was received.
- (2) The operator shall conduct in-flight proficiency checks on cabin crew members on at least one of the aeroplane types flown using personnel approved by the Director.
- (3) The operator shall specify the frequency of the checks referred to in paragraph (2) above in its operations manual. In no case shall the interval between checks exceed 24 months.

3. Checking and certification – Flight operations officers and flight followers

- (1) Each flight operations officer (FOO) undergoing generic FOO training is subject to the following checking requirements –
 - (a) examinations shall be administered to each FOO-trainee at least at the completion of each phase of training. A FOO-trainee shall not progress to a higher level of training until he or she has achieved a passing grade on each examination. All examinations shall be to a depth that ensures a high level of comprehension has been demonstrated by the trainee; and
 - (b) following completion of all segments of the generic programme, the FOO-trainee shall pass a practical examination consisting of the simulated flight dispatch of an aeroplane over a route.
- (2) Each FOO undergoing operator-specific training is subject to the following checking requirements –
 - (a) following completion of initial operator-specific training, each FOO shall successfully complete a proficiency check involving the dispatch and flight following of an aircraft and crew. The FOO shall –

- (i) make an accurate and operationally acceptable weather analysis from a series of daily weather maps and weather reports; provide an operationally valid briefing on weather conditions prevailing in the general neighbourhood of a specific air route; forecast weather trends pertinent to air transportation with particular reference to destination and alternates;
 - (ii) determine the optimum flight path for each segment and create accurate manual and/or computer generated flight plans;
 - (iii) provide operating supervision and all other assistance to a flight in actual or simulated adverse weather conditions, as appropriate to the duties of the holder of a FOO certificate; and
 - (iv) assist in accordance with established procedures in a simulated or actual emergency or overdue aeroplane; and
- (b) following completion of any recurrent, transition or regaining qualifications training, the FOO shall demonstrate to the operator his or her ability to perform the functions assigned and display adequate knowledge of the policies and procedures associated with the operational control system (OCS).
- (3) Each flight follower shall undergo a technical examination to establish a satisfactory level of knowledge and demonstrate flight following skills to the operator following initial operator-specific training. The results of the examination shall be retained on the flight follower's training file.

2. Certification

- (1) A check report shall be used for all skills tests of a FOO required by this TS. A copy of each FOO check report must be retained on the FOO training file.
- (2) The training organisation conducting the generic training of a FOO shall issue a certificate attesting that the FOO has satisfactorily completed the FOO generic course.
- (3) The operator or organisation conducting FOO operator-specific training shall issue a certificate of competency to a FOO who has successfully completed the approved training programme and the subsequent check.
- (4) Any certificate required by this TS shall be retained on the FOO's training file.

Note – Sample copies of the report referred to in paragraph (1) and the certificate in paragraphs (2) and (3) are available from the SACAA.

SCHEDULE 1

PPC Criteria For Level A, B, C and D Training and Checking Programmes Using Level A, B, C and D FSS

1. Pre-flight Phase

- (1) Flight planning and equipment examinations are not mandatory when there are, in the training records, written examinations from initial or annual training for which the validity period has not expired.

- (2) Flight planning shall include a practical examination on the crew's knowledge of operator's approved SOPs and the AFM including aeroplane and runway performance charts, and weight and balance procedures.
- (3) The equipment examination shall consist of a display of practical knowledge of the airframe, engine, major components and systems including the normal, abnormal and emergency operating procedures and limitations relating thereto.

2. Flight Phase

(1) Taxiing –

- (a) the use of the taxiing check list; and
- (b) taxiing in compliance with clearances and instructions issued by the person conducting the PPC;
- (c) where a second-in-command is undergoing the pilot proficiency check, outlined above to the extent practicable from the second-in-command position.

(2) Engine Checks –

Engine checks shall be conducted as appropriate to the aeroplane type.

(3) Take-off

- (a) one normal take-off to be performed in accordance with the AFM;
 - (b) an instrument take-off in the minimum visibility approved for the operator;
 - (c) a take-off in a minimum of a 10 kt crosswind component;
- Note – Any or all of the above take-offs may be combined.*
- (d) a take off with failure of the critical engine at a speed greater than V_1 and at an altitude of less than 50 feet AGL; or at a speed as close as possible to, but greater than V_1 when V_1 and V_2 , or V_1 and V_r are identical; and
 - (e) a rejected take-off prior to V_1 or as appropriate to the aeroplane type.

(4) Instrument Procedures –

Instrument procedures shall consist of IFR pre-flight preparations, terminal and *en route* procedures, arrival and departure procedures, system malfunctions and where applicable, the proper programming and use of flight management systems, as applicable –

- (a) an area departure and an area arrival procedure shall be performed where the crew –
 - (i) adheres to air traffic control clearances and instructions; and
 - (ii) properly uses the available navigation equipment and facilities;
- (b) a holding procedure;
- (c) at least two instrument approaches performed in accordance with the procedures and limitations in the AIP or in the equivalent foreign publication or approved company approach procedure for the facility used. One of the approaches shall be a precision approach and one a non precision approach;
- (d) one approach and manoeuvre to land using a scene approved for circling where the operator is authorized for approaches at the published circling minima, and is required during initial qualification check and annually thereafter; and
- (e) one complete missed approach.

(5) Manoeuvres –

Manoeuvres for initial PPC type rating should be as published by the manufacturer in the aeroplane profiles section. For a recurrent PPC, flight profiles may be selected as deemed appropriate by the examiner but in any case the selected profiles must be demonstrated in accordance with the manufacturer's profiles. At least the following flight manoeuvres must be demonstrated –

(a) at least one steep turn in each direction with a bank angle of 45° and a change in heading of at least 180° but not more than 360°;

(b) approaches to stalls –

Note – For the purpose of this manoeuvre the required approach to a stall is reached when there is a perceptible buffet or other alert to an impending stall.

(i) the following approaches to stall configurations are required for initial and upgrade PPCs –

(aa) one in the take-off configuration, except where a zero-flap take-off configuration is normally used in that model and type of aeroplane. In such case one stall should be demonstrated with the aeroplane configured for normal manoeuvring;

(bb) one in a clean configuration; and

(cc) one in a landing configuration; and

(ii) on the approach to a stall demonstrated in the manoeuvring configuration the aeroplane shall be placed into a turn with a bank angle of between 15° and 30°.

Note – Steep turns and approach to stalls are not required for an initial PPC on a fly-by-wire aeroplane if steep turns and approach to stalls have been satisfactorily demonstrated during initial training and for a recurrent PPC on any aircraft if steep turns and approaches to stalls have been satisfactorily demonstrated during the recurrent training.

(6) Landings and Approaches to Landings –

(a) one normal landing;

(b) one landing from an approach in Instrument Meteorological Conditions (IMC) not greater than the minimum recommended for the approach;

(c) one crosswind landing with a minimum of a 10 kt crosswind component;

(d) one landing and manoeuvre to that landing with, depending on aeroplane type, an engine failure as follows –

(i) for a two engine aeroplane, failure of one engine;

(ii) for a three engine aeroplane, failure of the centre engine combined with the failure of one outboard engine for the pilot-in-command, and failure of one outboard engine only for other than the pilot-in-command;

(iii) for a four engine aeroplane, failure of two engines on the same side for the pilot-in-command and, failure of one outboard engine only for other than the pilot-in-command.

Note – For three and four engine aeroplanes, the pilot-in-command is required to perform a two engine inoperative procedure during the initial qualification check and annually thereafter.

(e) one rejected landing. For the purposes of the rejected landing the landing shall be rejected at a height of approximately 50 feet when the aeroplane is approximately over the runway threshold. The rejected landing may be combined with a missed approach;

(f) Category II or Category III approaches during the initial qualification flight and annually thereafter as follows –

(i) where CAT II approaches are authorized in the air operator certificate, the following is required –

(aa) for a pilot-in-command initial qualification –

(A) one CAT II ILS approach during which a practical emergency is introduced aimed at assessing crew co-ordination in decision making and the resultant missed approach; and

(B) a second CAT II ILS approach to a landing in CAT II weather minima;

- (bb) for a pilot-in-command requalification on CAT II approaches, at least one CAT II ILS approach to a landing annually; and
 - (ii) where both CAT II and CAT III approaches are authorized in the air operator_certificate, the following is required –
 - (aa) for a pilot-in-command initial qualification –
 - (A) one CAT II ILS approach during which a practical emergency is introduced aimed at assessing crew co-ordination in decision making and the resultant missed approach; and
 - (B) a CAT III ILS approach conducted to a landing in CAT III weather minima; and
- Note – For a pilot-in-command requalification on CAT II and CAT III approaches, successive 6 month PPCs in an approved simulator will alternate CAT II and CAT III renewal checks.*
- (g) one landing without the use of an auto-land system.

Note – Any of the landings and approaches to landings specified in this section may be combined. A minimum of two landings are required.

(7) Normal Procedures –

The crew shall demonstrate use of as many of the operator's approved SOPs and normal procedures as are necessary to confirm that the crew has the knowledge and ability to properly use installed equipment (auto-pilot and hand-flown manoeuvres as appropriate).

(8) Abnormal and Emergency Procedures –

- (a) the crew shall demonstrate use of as many of the operator's approved SOPs and abnormal and emergency procedures for as many of the situations as are necessary to confirm that the crew has an adequate knowledge and ability to perform these procedures;
- (b) system malfunctions shall consist of a selection adequate to determine that the crew has satisfactory knowledge and ability to safely handle malfunctions; and
- (c) at least two simulated engine failures, excluding failures on the runway followed by a rejected take-off, at any time during the check.

(9) Airborne Manoeuvres –

Where the PPC is conducted following initial training in a level A or B training programme, the following flight checking is required within 30 days after the PPC in a synthetic training device and may be run concurrent with the flight training requirements on the aeroplane type in the applicable training programme

- (a) interior and exterior aeroplane pre-flight checks;
- (b) ground handling for pilots-in-command;
- (c) normal take-off, visual circuit (where possible) and landing;
- (d) a simulated engine failure procedure after take-off (at safe altitude and airspeed);
- (e) a simulated engine inoperative landing; and
- (f) a normal missed approach.

SCHEDULE 2

PPC Criteria for Level E Training and Checking Programme using the Aeroplane only

1. Pre-flight Phase

(1) Flight Planning and Equipment Examination –

- (a) Flight planning and equipment examinations are not mandatory when there are, in the training records, written examinations from initial or annual training for which the validity period has not expired;

- (b) Flight planning shall include a practical examination on the pilot's knowledge of standard operating procedures and the Aircraft Flight Manual including performance charts, loading, weight and balance and Flight Manual Supplements; and
- (c) The equipment examination shall show a practical knowledge of the airframe, engine, major components and systems including the normal, abnormal and emergency operating procedures and limitations relating thereto.

(2) Aeroplane Inspection –

A pre-flight aeroplane inspection that includes –

- (a) a visual inspection of the exterior and interior of the aeroplane, locating each item to be inspected and explaining the purpose of the inspection;
- (b) the proper use of the pre-start, start and pre-taxi check lists; and
- (c) checks of the appropriate radio communications, navigation and electronic equipment and selection of the appropriate communications and navigation frequencies prior to flight.

2. Flight Phase

(1) Taxiing

- (a) taxiing procedures;
- (b) a taxiing check including –
 - (i) the use of the taxiing check list; and
 - (ii) taxiing in compliance with clearances and instructions issued by the appropriate air traffic control unit or by the person conducting the pilot proficiency check; and
 - (iii) where a second-in-command is undergoing the pilot proficiency check, the taxiing check outlined above to the extent practicable from the second-in-command position.

(2) Engine Checks

Engine checks shall be conducted as appropriate to the aeroplane type.

(3) Take-off

- (a) One normal take-off to be performed in accordance with the AFM or where the aeroplane is a turbo-jet, a noise abatement take-off performed in accordance with the AFM (where applicable) and the procedures specified in the departure procedures for the aerodrome being operated from;

- (b) An instrument take-off performed in the same manner as the normal take-off except that instrument flight rules are simulated at or before reaching an altitude of 200 feet above the airport elevation;
- (c) Where practicable under existing meteorological, airport or airport traffic conditions, one crosswind take-off performed in accordance with the aeroplane operating manual where applicable;

Note – Any or all of the above take-offs may be combined.

- (d) a simulated engine failure after take-off (at a safe altitude and airspeed) appropriate to the aeroplane type under the prevailing conditions; and
- (e) a rejected take-off explained by the candidate prior to the flight.

(4) Instrument Procedures

Instrument procedures shall consist of IFR pre-flight preparation, departure and *en route* procedures, terminal procedures and system malfunction:

- (a) an area departure and an area arrival procedure shall be performed where the pilot –
 - (i) adheres to actual or simulated air traffic control clearances and instructions; and
 - (ii) properly uses the available navigation facilities;
- (b) a holding procedure;
- (c) at least two instrument approaches performed in accordance with procedures and limitations in the AIP or the equivalent foreign publication, or approved company approach procedure for the approach facility used. Where practicable one of the approaches shall be a precision approach and one a non- precision approach;
- (d) a circling approach, where the operator is authorized for circling minima below ceiling 1000 feet and 3 miles ground visibility, except where local conditions beyond the control of the pilot prevent a circling approach from being performed.

(5) In Flight Manoeuvres

- (a) at least one step turn in each direction with a bank angle of 45° and a change in heading of at least 180° but not more than 360°; and
- (b) approaches to stalls –

Note: For the purpose of this manoeuvre the required approach to a stall is reached when there is a perceptible buffet or other alert to an impending stall.

The following approaches to stall configurations are required for initial and upgrade PPCs –

- (i) one in the take-off configuration, except where a zero-flap take-off configuration is normally used in that model and type of aeroplane. In such case one stall should be demonstrated with the aeroplane configured for normal manoeuvring;
- (ii) one in a clean configuration; and
- (iii) one in a landing configuration.

On the approach to a stall demonstrated in the manoeuvring configuration the aeroplane shall be placed into a turn with a bank angle of between 15° and 30°; For the purpose of this manoeuvre the required recovery from a stall is initiated when there is a perceptible buffet or other alert of an impending stall entry.

When performed in an aeroplane the approach to stalls shall be conducted at an altitude of at least 5000 feet AGL and if conducted above cloud at an altitude of at least 2000 feet above the cloud tops.

(6) Landings and Approaches to Landings

- (a) one normal landing which shall, where practicable, be conducted without external or internal glideslope information;
- (b) one landing from an instrument approach, and where prevailing conditions prevent an actual landing, an approach to a point where a landing could have been made;
- (c) one cross wind landing where practicable under existing meteorological, airport and airport traffic conditions;
- (d) one landing and manoeuvring to that landing with a simulated failure of 50 percent of the available engines which shall be on one side of the aeroplane for the pilot-in-command and on outboard engine only for other than the pilot-in-command. Where the aeroplane type is a three engine aeroplane, the loss of power shall be an outboard engine and the centre engine for the pilot-in-command and on outboard engine for other than the pilot-in-command. For three- and four-engine aeroplanes the pilot-in-command is required to perform a two-engine inoperative procedure during initial qualification check and annually thereafter; and
- (e) one landing under simulated circling approach conditions except that where prevailing conditions prevent a landing, an approach to a point where a landing could have been made.

Note – Any of the landings and approaches to landings specified in this section may be combined. A minimum of two landings are required.

(7) Normal Procedures

The crew shall demonstrate use of as many of the operator's approved SOPs and normal procedures as are necessary to confirm that the crew has the knowledge and ability to properly use installed equipment (auto-pilot and hand flown manoeuvres as appropriate).

(8) Abnormal and Emergency Procedures

- (a) The crew shall demonstrate use of as many of the operator's approved SOPs and abnormal and emergency procedures for as many of the emergency situations as is necessary to confirm that the crew has an adequate knowledge and ability to perform these procedures.
- (b) System malfunctions shall consist of a selection adequate to determine that the crew has satisfactory knowledge and ability to safely handle malfunctions.
- (c) At least two simulated engine failures any time during the check shall be introduced.

SCHEDULE 3

PPC for a Cruise Relief Pilot using a FFS

(1) Flight Planning and Equipment Examination

- (a) Flight planning and equipment examinations are not mandatory when there are, in the training records, written examinations from initial or annual training for which the validity period has not expired.
- (b) Flight planning shall include the CRP's knowledge of the operator's SOPs and the AFM.
- (c) The equipment examination shall consist of a display of practical knowledge of the aeroplane systems including normal, abnormal and emergency operating procedures.

(2) Aeroplane Manoeuvres

The following shall be demonstrated –

- (a) climb and descent as well as climbing and descending turns;
- (b) steep turns;
- (c) approach to stalls in the clean configuration;
- (d) manoeuvring the aeroplane at minimum and maximum speeds (mach) at optimum altitude;
and
- (e) auto-pilot use, including during normal climb and descent and turbulence.

Note – Steep turns and approach to stalls are not required if the PPC is conducted via either a LOFT scenario, a scripted PPC or on a fly-by-wire aeroplane; and –

(1) *for an initial PPC on aeroplane type, steep turns and approach to stalls have been satisfactorily demonstrated during initial training;*

(2) *for a semi-annual PPC if –*

- (a) *steep turns and approach to stalls are required in the applicable annual training syllabus and they have been satisfactorily demonstrated during this training; or*
- (b) *steep turns and approaches to stalls are not required in the applicable annual training syllabus.*

(3) Normal procedures

The CRP shall demonstrate use of as many of the operator's approved SOPs and normal procedures for installed systems, devices and aids as are necessary to confirm that the CRP has the knowledge and ability to properly use installed equipment.

(4) Abnormal and Emergency Procedures

The CRP shall demonstrate use of as many of the operator's SOPs and abnormal and emergency procedures for as many of the emergency situations relating to cruise flight as are necessary to confirm that the CRP has an adequate knowledge and ability to perform these procedures.

(5) Instrument Rating Renewal

If the cruise relief pilot's instrument rating is to be renewed, all of the manoeuvres required to satisfy renewal of an instrument rating shall be part of the proficiency check.

121.04.2 OPERATIONS MANUAL

Note – The required information may be contained in one manual or, due the size and complexity of the operator, may be contained in several manuals, in which case the operator has established an operations manual system. For the purposes of this regulation the term “operations manual” includes an “operations manual system” if that is what the operator has established.

1. Structure of operations manual

- (1) An operator must ensure that the main structure of the operations manual is as follows –

Part 1: General

This part must comprise all non type-related operational policies, instructions and procedures needed for a safe operation and must comply with all relevant CAR.

Part 2: Aeroplane operating matters

This part must comprise all type-related instructions and procedures needed for a safe operation. It must take account of the different types of aeroplanes or variants used by the operator.

Part 3: Route and aerodrome instructions and information

This part must comprise all instructions and information needed for the area of operation.

Part 4: Training

This part must comprise all training instructions for personnel required for a safe operation.

- (2) An operator must ensure that the contents of the operations manual are in accordance with section 2 of this technical standard and relevant to the area and type of operation.
- (3) An operator must ensure that the detailed structure of the operations manual is approved by the Director.

2. Contents of operations manual

2.1 PART 1: GENERAL

2.1.1 Administration and control of operations manual

- (1) An operations manual must contain certain statements and provisions for the manual administration and control and include at least the following –
 - (a) a statement that the manual is intended to comply with all applicable acts, regulations and associated technical standards and with the terms and conditions of the applicable operating certificate and operations specifications attached thereto;
 - (b) a statement that where any person is confronted with an operational situation not contemplated by the operations manual, such person will be expected to act in accordance with his or her most conservative discretion. Furthermore, where any part of the manual is considered to be repugnant to any provision referred to in subparagraph (a), such person shall comply with the respective legal statute and report the discrepancy to the Operations Manager by the quickest means possible;
 - (c) a statement that the manual contains operational instructions that are to be complied with by the relevant personnel;
 - (d) a list and brief description of the various parts, their contents, applicability and use;
 - (e) explanations and definitions of terms and words needed for the use of the manual;
 - (f) provisions for the issuance of an a operations manual in separate parts corresponding to specific aspects of operations, provided in accordance; and
 - (g) a brief description of the operator's manual system that lists all operational_and technical manuals developed or adopted by the operator for the purpose of ensuring operations personnel have been provided all information necessary for the performance of their duties. Such description must also indicate which of such manuals will be available on board an aeroplane during flight time.
- (2) System of amendment and revision –
 - (a) who is responsible for the issuance and insertion of amendments and revisions;
 - (b) a record of amendments and revisions with insertion dates and effective dates;
 - (c) in the interests of aviation safety, a statement that provides for the rapid dissemination of operational information with a system of priorities governing the implementation process. Handwritten amendments and revisions are not permitted except in situations requiring immediate amendment or revision in the interests of aviation safety;
 - (d) a description of the system for the annotation of pages and their effective dates;
 - (e) a list of effective pages;

- (f) annotation of changes (on text pages and, as far as practicable, on charts and diagrams);
- (g) temporary revisions; and
- (h) a description of the distribution system for the manuals, amendments and revisions.

2.1.2 Organisation and responsibilities

(1) Organisational structure

A description of the organisational structure including the general organogram and operations department organogram. The organogram must depict the relationship between the Operations Department and the other Departments of the organisation. In particular, the subordination and reporting lines of all Divisions, Departments etc, which pertain to the safety of flight operations, must be shown.

(2) Nominated postholders

The name of each nominated postholder responsible for flight operations, the safety management system, the maintenance system, flight crew training and ground operations. A description of their functions and responsibilities must be included.

(3) Responsibilities and duties of operations management personnel

A description of the duties, responsibilities and authority of operations management personnel pertaining to the safety of flight operations and the compliance with the applicable CAR.

(4) Authority, duties and responsibilities of the pilot-in-command

A statement defining the authority, duties and responsibilities of the pilot-in-command.

(5) Duties and responsibilities of crew members other than the pilot-in-command

A statement defining the duties and responsibilities of crew members other than the pilot-in-command.

2.1.3 Operational control and supervision

(1) Supervision of the operation by the operator

A description of the system for supervision of the operation by the operator. This must show how the safety of flight operations and the qualifications of personnel are supervised. In particular, the procedures related to the following items must be described –

- (a) licence and qualification validity;
- (b) competence of operations personnel; and
- (c) control, analysis and storage of records, flight documents, additional information and data.

(2) System of promulgation of additional operational instructions and information

A description of any system for promulgating information which may be of an operational nature but is supplementary to that in the operations manual. The applicability of this information and the responsibilities for its promulgation must be included.

(3) Operational control

A description of the procedures and responsibilities necessary to exercise operational control with respect to flight safety.

2.1.4 Safety management system (SMS)

A description of the organisation of, roles and responsibilities of the personnel employed in, and policies and procedures associated with the safety management system. The description of the SMS may be contained in a separate manual depending upon the size and complexity of the operator.

2.1.5 Quality management system (QMS)

A description of the organisation of, roles and responsibilities of the personnel employed in, and policies and procedures associated with the QMS, which is normally integrated with the SMS. The description of the QMS may be contained in the SMS manual or a quality management manual (QMM) depending upon the size and complexity of the operator.

2.1.6 Flight crew composition

(1) Flight crew composition

An explanation of the method for determining flight crew compositions taking account of the following =

- (a) the type of aeroplane being used;
- (b) the area and type of operation being undertaken;
- (c) the phase of the flight;
- (d) the minimum flight crew requirement and flight duty period planned;
- (e) experience (total and on type), recency and qualification of the flight crew members; and
- (f) the designation of the pilot-in-command and, if necessitated by the duration of the flight, the procedures for the relief of the pilot-in-command or other members of the flight crew.

(2) Designation of the pilot-in-command

The rules applicable to the designation of the pilot-in-command.

(3) Flight crew incapacitation

Instructions on the succession of command in the event of flight crew incapacitation.

2.1.7 Qualification requirements

- (1) A description of the required licence, rating(s), qualification/competency (e.g. for routes and aerodromes), experience, training, checking and recency for operations personnel to conduct their duties. Consideration must be given to the aeroplane type, kind of operation and composition of the flight crew.
- (2) Flight deck crew (as applicable)
 - (a) Pilot-in-command
 - (b) Second-in-command

- (c) Pilot under supervision
 - (d) Cruise relief pilot
 - (e) Flight engineer
 - (f) Operation on more than one type or variant.
- (3) Cabin crew
- (a) Senior cabin crew member
 - (b) Cabin crew member
 - (i) Required cabin crew member
 - (ii) Additional cabin crew member and cabin crew member during familiarisation flights.
 - (c) Operation on more than one type or variant.
- (4) Training, checking and supervision personnel
- (a) For flight deck crew
 - (b) For cabin crew.
- (5) Other operations personnel.

2.1.8 Flight crew health precautions

The relevant regulations and guidance to flight crew members concerning health including –

- (a) alcohol and other intoxicating liquor;
- (b) narcotics;
- (c) drugs;
- (d) sleeping tablets;
- (e) pharmaceutical preparations;
- (f) immunisation;
- (g) scuba diving;
- (h) blood donation;
- (i) meal precautions prior to and during flight;
- (j) sleep and rest; and
- (k) surgical operations.

Note – See Document SA-CATS 67.

2.1.9 Flight time limitations

- (1) Flight time and duty period limitations and rest requirements

A description of the flight time and duty period limitations and rest requirements prescribed in TS 121.02.15 as applicable to the operation.

- (2) Exceedances of flight time and duty period limitations and/or reductions of rest periods

Conditions under which flight time and duty periods may be exceeded or rest periods may be reduced and the procedures used to report these modifications.

2.1.10 Operating procedures

- (1) Flight preparation instructions

As applicable to the operation –

- (a) a description of the method of determination and application of minimum altitudes including –
 - (i) a procedure to establish the minimum altitudes/flight levels for VFR flights; and
 - (ii) a procedure to establish the minimum altitudes/flight levels for IFR flights;
- (b) criteria for determining the usability of aerodromes;
- (c) the method for establishing aerodrome operating minima for IFR flights in accordance with TS 91.07.5. Reference must be made to procedures for the determination of the visibility and/or runway visual range and for the applicability of the actual visibility observed by the pilots, the reported visibility and the reported runway visual range;
- (d) *en route* operating minima for IFR and VFR flights or VFR portions of a flight;
- (e) presentation and application of aerodrome and *en route* operating minima, including the increase of aerodrome operating minima in case of degradation of approach or aerodrome facilities;
- (f) interpretation of meteorological information, including explanatory material on the decoding of MET forecasts and MET reports relevant to the area of operations, including the interpretation of conditional expressions;
- (g) the methods by which the quantities of fuel, oil and water methanol to be carried, are determined and monitored in flight. This section must also include instructions on the measurement and distribution of the fluid carried on board. Such instructions must take account of all circumstances likely to be encountered on the flight, including the possibility of in-flight replanning and of failure of one or more of the aeroplane's power plants or loss of pressurisation. The system for maintaining fuel and oil records must also be described;
- (h) the general principles of mass and centre of gravity including –
 - (i) definitions;
 - (ii) methods, procedures and responsibilities for preparation and acceptance of mass and centre of gravity calculations;
 - (iii) the policy for using either standard and/or actual masses;

- (iv) the method for determining the applicable passenger, baggage and cargo mass;
 - (v) the applicable passenger and baggage masses for various types of operations and aeroplane type;
 - (vi) general instruction and information necessary for verification of the various types of mass and balance documentation in use;
 - (vii) last minute changes procedures;
 - (viii) specific gravity of fuel, oil and water methanol; and
 - (ix) seating policy/procedures;
 - (i) procedures and responsibilities for the preparation and submission of the air traffic service flight plan. Factors to be considered include the means of submission for both individual and repetitive flight plans;
 - (j) procedures and responsibilities for the preparation and acceptance of the operational flight plan. The content and use of the operational flight plan must be described including samples of the operational flight plan formats in use;
 - (k) the responsibilities and the use of the operator's flight folio must be described, including samples of the format used. A technical log may be used in place of a flight folio, if it contains the required information; and
 - (l) list of documents, forms and additional information to be carried.
- (2) Ground handling instructions

As applicable to the operation –

- (a) a description of fuelling procedures, including –
 - (i) safety precautions during refuelling and defuelling including when an APU is in operation or when a turbine engine is running and the prop-brakes are on;
 - (ii) refuelling and defuelling when passengers are embarking, on board or disembarking ; and
 - (iii) precautions to be taken to avoid mixing fuels;
- (b) a description of the handling procedures to be used when allocating seats and embarking and disembarking passengers and when loading and unloading the aeroplane. Further procedures, aimed at achieving safety whilst the aeroplane is on the apron, must also be given. Handling procedures must include –
 - (i) disembarking of persons;
 - (ii) sick passengers and persons with reduced mobility;
 - (iii) transportation of inadmissible passengers, deportees or persons in custody;
 - (iv) permissible size and weight of hand baggage;
 - (v) loading and securing of items in the aeroplane;
 - (vi) special loads and classification of load compartments;

- (vii) positioning of ground equipment;
 - (viii) operation of aeroplane doors;
 - (ix) safety on the apron, including fire prevention, blast and suction areas;
 - (x) start-up, ramp departure and arrival procedures;
 - (xi) servicing of aeroplanes;
 - (xii) documents and forms for aeroplane handling; and
 - (xiii) multiple occupancy of aeroplane seats;
- (c) procedures to ensure that persons who appear to be intoxicated or who demonstrate by manner or physical indications that they are under the influence of drugs, except medical patients under proper care, are refused embarkation;
- (d) a description of the de-icing and anti-icing policy and procedures for aeroplanes on the ground. These must include descriptions of the types and effects of icing and other contaminants on aeroplanes whilst stationary during ground movements and during take-off. In addition, a description of the fluid types used must be given including –
- (i) proprietary or commercial names;
 - (ii) characteristics;
 - (iii) effects on aeroplane performance;
 - (iv) hold-over times; and
 - (v) precautions during usage.

(3) Flight procedures

As applicable to the operation –

- (a) a description of the policy for allowing flights to be made under VFR, or of requiring flights to be made under IFR, or of changing from one to the other.
- (b) a description of all navigation procedures relevant to the type(s) and area(s) of operation and equipment required to operate therein. Consideration must be given to –
 - (i) standard navigation procedures including policy for carrying out independent cross-checks of keyboard entries where these affect the flight path to be followed by the aeroplane;
 - (ii) RVSM as contemplated in Technical Standard 91.04.34 in Document SA-CATS 91;
 - (iii) RNP, MNPS and POLAR navigation and navigation in other designated areas,
 - (iv) RNAV;
 - (v) in-flight replanning; and
 - (vi) procedures in the event of system degradation;
- (c) circumstances in which a radio listening watch is maintained;

- (d) instructions on –
 - (i) the use of normal checklists and the timing of such use;
 - (ii) departure contingency procedures;
 - (iii) altimeter setting procedures;
 - (iv) altitude alerting system procedures;
 - (v) stabilised approach procedure and the limitation on high rates of descent near the surface;
 - (vi) the conduct of instrument approaches and the conditions required to commence or to continue an instrument approach;
 - (vii) CRM procedures at night or in IMC;
- (e) TAWS procedures;
- (f) policy and procedures for the use of ACAS;
- (g) policy and procedures for in-flight fuel management;
- (h) procedures for operating in, and/or avoiding and reporting potentially hazardous atmospheric conditions including –
 - (i) thunderstorms;
 - (ii) icing conditions;
 - (iii) turbulence;
 - (iv) windshear;
 - (v) jetstreams;
 - (vi) volcanic ash clouds;
 - (vii) heavy precipitation;
 - (viii) sand storms;
 - (ix) mountain waves; and
 - (x) significant temperature inversions;
- (i) wake turbulence separation criteria, taking into account aeroplane types, wind conditions and runway location;
- (j) procedures in the event that a decision to descend is taken while *en route*, covering –
 - (i) the necessity of giving the appropriate ATS unit prior warning of the situation and of obtaining a provisional descent clearance; and
 - (ii) the action to be taken in the event that communication with the ATS unit cannot be established or is interrupted.
- (k) the requirements for flight crew members to occupy their assigned stations or seats during the different phases of flight or whenever deemed necessary in the interests of aviation safety;

- (l) the requirements for flight crew members and passengers to use safety belts and/or harnesses during the different phases of flight or whenever deemed necessary in the interests of aviation safety;
 - (m) the conditions for the admission to the flight deck of persons other than the flight crew;
 - (n) the conditions and procedures for the use of vacant flight crew seats;
 - (o) procedures to be followed in the event of incapacitation of flight crew members in flight. Examples of the types of incapacitation and the means for recognising them, must be included;
 - (p) procedures covering –
 - (i) cabin preparation for flight, in-flight requirements and preparation for landing including procedures for securing cabin and galleys;
 - (ii) procedures to ensure that passengers are seated where, in the event that an emergency evacuation is required, they may best assist and not hinder evacuation from the aeroplane;
 - (iii) procedures to be followed during passenger embarkation and disembarkation;
 - (iv) procedures in the event of fuelling with passengers on board or embarking and disembarking; and
 - (v) smoking on board;
 - (q) the contents, means and timing of passenger briefing in accordance with CAR 91.07.20;.
 - (r) lists of the survival and emergency equipment required for each route or area of operation and the procedures to ensure such equipment has been inspected and/or is functioning properly prior to departure;
 - (s) information and instructions relating to the interception of civil aircraft including –
 - (i) procedures for pilots-in-command of intercepted aircraft; and
 - (ii) visual signals for use by intercepting and intercepted aircraft.
 - (t) procedures for aeroplanes operated whenever required cosmic or solar radiation detection equipment is carried;
 - (u) procedures for the use of cosmic or solar radiation detection equipment and for recording its readings including actions to be taken in the event that limit values specified in the operations manual are exceeded; and
 - (v) procedures for the use of head-up displays (HUD) and enhanced vision systems (EVS) equipment as applicable.
- (4) All weather operations
 - (5) ETOPS procedures, including engine failure procedures and the nomination of alternate aerodromes
 - (6) Use of the minimum equipment and configuration deviation list(s)

- (7) Development and use of standard operating procedures (SOPs) whether stand alone or as part of an aeroplane operating manual (AOM)
- (8) With respect to non-revenue flights, procedures and limitations for –
 - (a) training flights;
 - (b) test flights;
 - (c) delivery flights;
 - (d) ferry flights;
 - (e) demonstration flights; and
 - (f) positioning flights,including the kind of persons who may be carried on such flights.
- (9) Oxygen requirements
 - (a) An explanation of the conditions under which oxygen must be provided and used.
 - (b) The oxygen requirements specified for –
 - (i) flight deck crew;
 - (ii) cabin crew; and
 - (iii) passengers.

2.1.11 Dangerous goods and weapons

- (1) Information, instructions and general guidance on the conveyance of dangerous goods including –
 - (a) operator's policy on the conveyance of dangerous goods;
 - (b) guidance on the requirements for acceptance, labelling, handling, stowage and segregation of dangerous goods;
 - (c) procedures for responding to emergency situations involving dangerous goods;
 - (d) duties of all personnel involved as referred to in a Part 92; and
 - (e) instructions on the carriage of the operator's employees.
- (2) The conditions under which weapons, munitions of war and sporting weapons may be carried.

2.1.12 Security

- (1) Security instructions and guidance of a non-confidential nature which must include the authority and responsibilities of operations personnel. Policies and procedures for handling and reporting crime on board such as unlawful interference, sabotage, bomb threats and hijacking must also be included.
- (2) An operator will publish the means of establishing and communicating on board an aeroplane, discrete signals as a defense against air piracy without providing specific information with respect to the actual discrete communications.
- (3) A description of preventative security measures and training.

Note – Parts of the security instructions and guidance may be kept confidential.

2.1.13 Handling of aviation accidents and incidents

Procedures for the handling, notifying and reporting of aviation accidents and incidents. This section must include –

- (a) definitions of aviation accidents and incidents and the relevant responsibilities of all persons involved;
- (b) the description of which operator departments, authorities or other institutions have to be notified by which means and in which sequence in case of an aviation accident;
- (c) special notification requirements in the event of an aviation accident or incident when dangerous goods are being carried;
- (d) a description of the requirements to report specific aviation accidents and incidents;
- (e) the forms used for reporting and the procedure for submitting them to the relevant authority must also be included; and
- (f) if the operator develops additional safety related reporting procedures for its own internal use, a description of the applicability and related forms to be used.

2.1.14 Rules of the air

Rules of the air including –

- (a) visual and instrument flight rules;
- (b) territorial application of the rules of the air;
- (c) communication procedures including COM-failure procedures;
- (d) information and instructions relating to the interception of civil aeroplanes;
- (e) the circumstances in which a radio listening watch is to be maintained;
- (f) signals;
- (g) time system used in operation;
- (h) ATC clearances, adherence to flight plan and position reports;
- (i) visual signals used to warn an unauthorised aeroplane flying in or about to enter a restricted, prohibited or danger area;
- (j) procedures for pilots observing an aviation accident or receiving a distress transmission;
- (k) the ground/air visual codes for use by survivors, description and use of signal aids; and
- (l) distress and urgency signals.

2.2 PART 2: AEROPLANE OPERATING MATTERS – TYPE RELATED

Taking account of the differences between types and variants of types under the following headings –

2.2.1 General information and units of measurement

General information (e.g. aeroplane dimensions), including a description of the units of measurement used for the operation of the aeroplane type concerned and conversion tables.

2.2.2 Limitations

A description of the certified limitations and the applicable operational limitations including –

- (a) certification status;
- (b) passenger seating configuration for each aeroplane type including a pictorial presentation;
- (c) types of operation that are approved (e.g. IFR/VFR, CAT II/III, flights in known icing conditions, etc);
- (d) flight crew composition;
- (e) mass and centre of gravity;
- (f) speed limitations;
- (g) flight envelope(s);
- (h) wind limits including operations on contaminated runways;
- (i) performance limitations for applicable configurations;
- (j) runway slope;
- (k) limitations on wet or contaminated runways;
- (l) airframe contamination; and
- (m) system limitations.

2.2.3 Normal procedures

The normal procedures and duties assigned to the flight crew, the appropriate check-lists, the system for use of the checklists and a statement covering the necessary coordination procedures between flight deck crew and cabin crew. The following normal procedures and duties must be included –

- (a) pre-flight;
- (b) pre-departure;
- (c) altimeter setting and checking;
- (d) taxi, take-off and climb;
- (e) noise abatement;
- (f) cruise and descent;
- (g) approach, landing preparation and briefing;
- (h) VFR approach;
- (i) instrument approach;

- (j) visual approach and circling;
- (k) missed approach;
- (l) normal landing;
- (m) post landing; and
- (n) operation on wet and contaminated runways.

2.2.4 Abnormal, emergency and supplementary procedures

The abnormal, emergency and supplementary procedures and duties assigned to crew members, the appropriate check-lists, the system for use of the check-lists and a statement covering the necessary coordination procedures between flight crew and cabin crew. The following abnormal and emergency procedures and duties must be included –

- (a) flight crew incapacitation;
- (b) fire and smoke drills;
- (c) unpressurised and partially pressurised flight;
- (d) exceeding structural limits such as overweight landing;
- (e) exceeding cosmic radiation limits;
- (f) lightning strikes;
- (g) distress communications and alerting ATC to emergencies;
- (h) engine failure;
- (i) system failures;
- (j) guidance for diversion in case of serious technical failure;
- (k) ground proximity warning;
- (l) TCAS warning;
- (m) windshear;
- (n) emergency landing/ditching; and
- (o) emergency evacuation.

2.2.5 Performance

- (1) Performance data must be provided in a form in which it can be used without difficulty.
- (2) Performance material which provides the necessary data for compliance with the performance requirements prescribed in Subpart 8 of this Part must be included to allow the determination of –
 - (a) maximum crosswind and tailwind components and the reductions to be applied to these values having regard to gusts, low visibility, runway surface conditions, crew experience, abnormal or emergency circumstances or any other relevant operational factors;
 - (b) take-off climb limits – mass, altitude, temperature;

- (c) take-off field length (dry, wet, contaminated);
 - (d) net flight path data for obstacle clearance calculation or, where applicable, take-off flight path;
 - (e) the gradient losses for banked climbouts;
 - (f) *en route* climb limits;
 - (g) approach climb limits;
 - (h) landing climb limits;
 - (i) landing field length (dry, wet, contaminated) including the effects of an in-flight failure of a system or device, if it affects the landing distance;
 - (j) brake energy limits; and
 - (k) speeds applicable for the various flight stages (also considering wet or contaminated runways).
- (3) Supplementary data covering flights in icing conditions, in consideration of –
- (a) any certificated performance related to an allowable configuration, or configuration deviation, such as anti-skid inoperative, must be included; and
 - (b) if performance data, as required for the appropriate performance class, is not available in the approved AFM, then other data acceptable to the Director must be included. Alternatively, the operations manual may contain cross-reference to the approved data contained in the AFM where such data is not likely to be used often or in an emergency.
- (4) Additional performance data, where applicable, including –
- (a) all engine climb gradients;
 - (b) drift-down data;
 - (c) effect of de-icing/anti-icing fluids;
 - (d) flight with landing gear down;
 - (e) for aeroplanes with 3 or more engines, one engine inoperative ferry flights; and
 - (f) flights conducted under the provisions of the CDL.

2.2.6 Flight planning

- (1) Data and instructions necessary for pre-flight and in-flight planning, including factors such as speed schedules and power settings. Where applicable, procedures for engine(s)-out operations, ETOPS and flights to isolated aerodromes must be included.
- (2) The method for calculating fuel needed for the various stages of flight in accordance with TS 121.07.10.

2.2.7 Mass and balance

Instructions and data for the calculation of the mass and balance including –

- (a) calculation system (e.g. index system);
- (b) information and instructions for completion of mass and balance documentation, including manual and computer generated types;
- (c) limiting masses and centre of gravity of the various versions; and
- (d) dry operating mass and corresponding centre of gravity or index.

2.2.8 Loading

Procedures and provisions for loading and securing the load in the aeroplane.

2.2.9 Configuration deviation list

The company approved procedures for the use of a CDL, if provided by the manufacturer, taking account of the aeroplane types and variants operated including procedures to be followed when an aeroplane is being dispatched under the terms of its CDL.

2.2.10 Minimum equipment list

The company approved procedures for the use of a MEL taking account of the aeroplane types and variants operated and the type(s)/area(s) of operation.

2.2.11 Survival and emergency equipment including oxygen

- (1) A list of the survival equipment to be carried for the routes to be flown and the procedures for checking the serviceability of this equipment prior to take-off. Instructions regarding the location, accessibility and use of survival and emergency equipment and its associated check lists(s) must also be included.
- (2) The procedure for determining the amount of oxygen required and the quantity that is available. The flight profile, number of occupants and possible cabin decompression must be considered. The information provided must be in a form in which it can be used without difficulty.

2.2.12 Emergency evacuation procedures

- (1) Instructions for preparation for emergency evacuation including flight crew coordination and emergency station assignment.
- (2) A description of the duties of all crew members for the rapid evacuation of an aeroplane and the handling of the passengers in the event of a forced landing, rejected take-off, ditching or other emergency.

2.2.13 Aeroplane systems

A description of the aeroplane systems, related controls and indications and operating instructions.

2.3 PART 3: ROUTE AND AERODROME INSTRUCTIONS AND INFORMATION

Instructions and information relating to communications, navigation and aerodromes including minimum flight levels and altitudes for each route to be flown and operating minima for each aerodrome planned to be used, including –

- (a) minimum flight level/altitude;

- (b) operating minima for departure, destination and alternate aerodromes;
- (c) instructions for determining aerodrome operating minima for instrument approaches using HUD and EVS;
- (d) communication facilities and navigation aids;
- (e) runway data and aerodrome facilities;
- (f) approach, missed approach and departure procedures including noise abatement procedures;
- (g) COM-failure procedures;
- (h) search and rescue facilities in the area over which the aeroplane is to be flown;
- (i) a description of the aeronautical charts that must be carried on board in relation to the type of flight and the route to be flown, including the method to check their validity;
- (j) availability of aeronautical information and MET services;
- (k) *en route* COM/NAV procedures including holding; and
- (l) aerodrome categorisation for flight crew competence qualification.

2.4 PART 4: TRAINING

- (1) Training syllabi and checking programmes for all operations personnel assigned to operational duties in connection with the preparation and/or conduct of a flight.
- (2) Training syllabi and checking programmes must include –
 - (a) for flight deck crew, all relevant items prescribed in Parts 61 and 63 and Subpart 3 of Part 121;
 - (b) for cabin crew, all relevant items prescribed in Part 64 and Subpart 3 of Part 121;
 - (c) for operations personnel concerned, including flight crew members –
 - (i) all relevant items prescribed in Part 92; and
 - (ii) all relevant items regarding operator security;
 - (d) for operations personnel other than flight crew members (e.g. flight operations officers, handling personnel, etc.), all other relevant items pertaining to their duties.
- (3) Procedures –
 - (a) for training and checking;
 - (b) to be applied in the event that personnel do not achieve or maintain the required standards; and
 - (c) to ensure that abnormal or emergency situations requiring the application of part or all of abnormal or emergency procedures and simulation of IMC by artificial means, are not simulated during commercial flights.
- (4) Description of documentation to be stored and storage periods.

121.04.3 AIRCRAFT OPERATING MANUAL

1. Aeroplane operating manual contents

The Aeroplane Operating Manual required for compliance with this regulation shall be designed with human factors principles in mind and contain the following information for each type of aeroplane operated. Where there are significant differences in equipment and procedures between aeroplanes of the same type operated, the AOM shall show the registration mark of the aeroplane to which it is applicable –

- (a) table of contents;
- (b) list of effective pages;
- (c) amending procedure;
- (d) preamble;
- (e) the normal, abnormal and emergency procedures relating to the aeroplane;
- (f) details of the aeroplane system;
- (g) the checklists and standard operating procedures to be used by the flight crew members; and
- (h) the aeroplane performance data and limitations specified in the AFM. Such information shall be clearly identified as aeroplane flight manual data.

2. Standard operating procedures content

SOPs contain the detailed procedures to be followed by flight crew members in the conduct of aeroplane operations with particular emphasis on the interaction between crew members (crew resource management). SOPs shall not be contrary to any information or procedure included in the AFM. Required information, if contained in another publication carried on board the aeroplane during flight, need not be repeated in the SOP. The SOP shall include, as a minimum, the following as applicable to the operation –

- (a) communications;
- (b) crew coordination;
- (c) use of check lists;
- (d) standard briefings;
- (e) standard calls;
- (f) ramp/gate procedures;
- (g) battery/APU engine starts;
- (h) taxi;
- (i) rejected take-off;
- (j) take-off and climb;
- (k) cruise;

- (l) descent;
- (m) approaches IMC, visual, VFR, and circling;
- (n) landing;
- (o) missed approaches and balked landings procedures;
- (p) stall recovery;
- (q) fuelling with passengers onboard;
- (r) use of onboard navigation and alerting aids;
- (s) mass and balance control procedures;
- (t) check lists;
- (u) emergencies –
 - (i) planned and unplanned;
 - (ii) pilot incapacitation;
 - (iii) two - challenge rule;
 - (iv) bomb threat and hijacking;
 - (v) engine fire/failure/shutdown;
 - (vi) propeller over speed;
 - (vii) fire, internal/external;
 - (viii) smoke removal;
 - (ix) rapid decompression;
 - (x) flapless approach and landing;
 - (xi) any inadvertent encounter with moderated to severe in-flight icing;
- (v) diagrams –
 - (i) normal take-off;
 - (ii) engine out take-off;
 - (iii) precision approach, all engines operating;
 - (iv) precision approach, engine out;
 - (v) non-precision approach, all engines operating;
 - (vi) non-precision approach, engine out;
 - (vii) go-around, all engines operating;
 - (viii) go-around, engine out;
 - (ix) VFR circuits;
 - (x) partial flaps/slats approach; and
 - (xi) flapless approach.

121.04.5 OPERATIONAL FLIGHT PLAN

1. Operational flight plan – General

- (1) The operational flight plan (OFP) may be in any format at the air service operator's discretion: Provided the content meets the requirements of this TS.

- (2) Based on the type of flight being undertaken, an operator shall prepare one of the following types of OFPs –
- (a) for IFR flights, except as provided in subparagraph (b), a formal OFP containing all the items listed in section 2 of this TS;
 - (b) for VFR or IFR short positioning flights, a short-form 18-item OFP containing those items indicated by an asterisk in the list in section 2 of this TS; or
 - (c) for local test flights, flight tests, training or other non-commercial local flights where passengers are not carried, an informal OFP, being either an ATC flight plan or other flight following document as appropriate to the flight. Documents developed as the result of this subparagraph shall also be retained in accordance with CAR 121.04.5(4).

2. Items in operational flight plan

- (1) The minimum required content of an (OFP) is as follows but each field shall be considered as applicable to the type of flight, the type of aeroplane and the type of operational control system to which the OFP applies.

Note – Asterisks by an item indicates information required for the OFP short form as provided in section 1(2) of this TS.

- (a)* air service operator's name;
- (b)* date and ETD at points of departure and ETA at destinations;
- (c)* aeroplane registration;
- (d)* aeroplane tail number, as applicable;
- (e)* aeroplane type and model and variant, as applicable;
- (f)* flight number, as applicable;
- (g) type of flight; IFR, VFR, ETOPS, RVSM or other;
- (h)* flight crew members names and assigned position;
- (i)* flight operations officer's name, or PIC if pilot self-dispatch, as applicable;
- (j)* number of cabin crew members and passengers on board, as amended by final load figures;
- (k)* departure aerodrome;
- (l)* destination aerodrome;
- (m)* alternate aerodrome, as applicable, including *en route* alternates where required;
- (n) routing to destination by successive navigational way points and a method to obtain associated tracks for each;
- (o) routing to alternate aerodrome, as applicable;
- (p) specification of any way points *en route* to satisfy special operations requirements (ETOPS, etc.);

- (q)* planned cruise altitudes to destination and alternate, as applicable and minimum safe altitudes along planned routes;
 - (r) planned cruise indicated air speed or mach number, as applicable, true air speed and ground speed or wind component during cruise;
 - (s) winds at planned cruise altitude (expressed in terms of direction/velocity or as a component/drift angle);
 - (t) temperature at cruise altitude;
 - (u)* estimated time *en route* (if broken down into way point time components, a total shall be specified);
 - (v) time from destination to alternate, as applicable;
 - (w) distance to destination (if broken down into way point distance components, a total shall be specified);
 - (x) distance from destination to alternate, as applicable;
 - (y)* fuel burn en route and from destination to alternate;
 - (z)* fuel component breakdown required for the type of flight plan for, as applicable –
 - (i) taxi;
 - (ii) destination;
 - (iii) alternate;
 - (iv) holding reserve;
 - (v) *en route* reserve, as applicable;
 - (vi) contingency fuel, as applicable; and
 - (vii) the minimum and actual fuel on board at break release (entered by flight crew);
 - (aa)* mass and balance showing –
 - (i) total planned fuel on board;
 - (ii) zero fuel weight; and
 - (iii) planned maximum take-off weight and c of g location or trim position, as applicable; and
 - (bb)* signature of pilot-in-command and the flight operations officer (FOO), as applicable, or alternate means of certifying acceptance.
- (2) The format of the full OFP shall allow the crew to record the fuel state and the progress of the flight relative to the plan. The OFP may be computer-generated or produced manually, working from charts and tables, by either the FOO or the flight crew. When an OFP is prepared manually, an approved form displaying the requisite information and providing the necessary space to make flight following entries as the flight progresses shall be used.
 - (3) The operator shall specify in its company operations manual how formal acceptance of the OFP by the PIC and the FOO shall be recorded.

121.04.7 RECORDS OF EMERGENCY AND SURVIVAL EQUIPMENT

1. Emergency and survival equipment list

The minimum information to be contained in an emergency and survival equipment list is prescribed in CAR 91.01.5.

121.04.8 TRAINING RECORDS

1. Training records

- (1) Every air service operator shall, for each person who is required to receive training in terms of Subpart 3, establish and maintain a record of –
 - (a) the person's name and, where applicable, personnel licence number, type and ratings or validation of foreign licence, if applicable;
 - (b) if applicable, the person's medical category and the expiry date of that category;
 - (c) the dates on which the person, while in the operator's employ, successfully completed any training, pilot proficiency check, examination or other crew member skills test required in terms of Subpart 3 or obtained any qualification required in terms of Part 61, 63 or 64, or this TS;
 - (d) the report of any check or skills test completed;
 - (e) information relating to any failure of the person, while in the operator's employ, to successfully complete any training, pilot proficiency check or examination required in terms of Subpart 3 or to obtain any qualification required in terms of Part 61, 63 or 64 or this TS;
 - (f) the type of aircraft or flight training equipment used for any training, pilot proficiency check, line check or qualification required under this Subpart; and
 - (g) any certificate required to be kept in terms of Subpart 3.
- (2) An operator shall maintain a system for recording the qualifications and training of instructional and examining staff, as appropriate.
- (3) An operator shall retain a copy of the most recent written examination completed by each person for each type of aircraft, where applicable, for which the person has a qualification.
- (4) An operator shall retain the records referred to in paragraphs (1)(c) and (d) and a record of each pilot proficiency check for at least three years.
- (5) An operator shall retain any certificate referred to in paragraph (1)(g) for at least 90 days beyond the duration of its validity period.

121.04.9 LOAD AND TRIM SHEET

1. Load and trim sheet

- (1) The load and trim sheet must contain the following information –
 - (a) the aeroplane registration and type;
 - (b) the flight identification number and date;
 - (c) the identity of the pilot-in-command;
 - (d) the identity of the person who prepared the document;
 - (e) the dry operating mass and the corresponding CG of the aeroplane;
 - (f) the mass of the fuel at take-off and the mass of trip fuel;
 - (g) the mass of consumables other than fuel;
 - (h) the components of the load including passengers, baggage, freight and ballast;
 - (i) the take-off mass, landing mass and zero fuel mass;
 - (j) the load distribution;
 - (k) the applicable aeroplane CG positions; and
 - (l) the limiting mass and CG values.
- (2) The person superintending the loading of an aeroplane must certify that the load distribution is in accordance with the requirements prescribed in the operations manual or flight manual and that the maximum certificated mass has not been exceeded.
- (3) The load and trim sheet must be signed by the pilot-in-command unless the load and trim sheet is sent to the aeroplane by electronic data transfer. When the load and trim sheet is sent to the aeroplane by electronic data transfer, a copy of the final load and trim sheet, as accepted by the pilot-in-command, must be available on the ground.

121.05.13 FIRST AID, EMERGENCY MEDICAL AND UNIVERSAL PRECAUTION KITS

1. Standard first aid kit contents

The following items shall, as a minimum, be included in the current first aid kit –

- (a) bandage, adhesive strips;
- (b) bandage, gauze 7.5cm x 4.5;
- (c) bandage, triangular 100cm folded and safety pins;
- (d) burns dressing 10cm x 10cm;
- (e) wound dressing, large and small;
- (f) adhesive tape and scissors;
- (g) small adhesive dressings;
- (h) antiseptic swabs(10/pack);
- (i) adhesive tape;
- (j) sponge gauze;
- (k) surgical mask;
- (l) umbilical cord clamp;
- (m) thermometer(non-mercury);
- (n) basic or advanced life support cards;

- (o) bag-valve mask;
- (p) torch (flashlight) and batteries;
- (q) pocket mask;
- (r) first aid manual, current edition; and
- (s) incident record form.

Note – The owner or operator shall ensure that only Schedule 0 medication is included in the first aid kits. The Department of Health has issued exclusions to previously accepted Schedule 0 medications. Owners or operators must consult a qualified pharmacist if they intend to include Schedule 0 medications in their first aid kit.

2. Medical kit contents

The following must be included in the emergency medical kit:

- (1) Sphygmomanometer – non-mercury
- (2) Stethoscope
- (3) Syringes and needles
- (4) Oropharyngeal airways (2 sizes)
- (5) Tourniquet
- (6) Coronary vasodilator e.g. nitro-glycerine
- (7) Anti-spasmodic e.g. hyascene
- (8) Epinephrine 1:1000
- (9) Adrenocortical steroid e.g. hydrocortisone
- (10) Major analgesic e.g. nalbuphine
- (11) Diuretic e.g. furosemide
- (12) Antihistamine e.g. diphenhydramine hydrochloride
- (13) Sedative/anticonvulsant e.g. diazepam
- (14) Medication for Hypoglycaemia e.g. hypertonic glucose
- (15) Antiemetic e.g. metoclopramide
- (16) Atropine
- (17) Digoxin
- (18) Uterine contractant e.g. Ergometrine/ Oxytocin
- (19) Disposable gloves
- (20) Bronchial dilator – including an enjectable form
- (21) Needle disposal box

(22) Anti-spasmodic drugs

(23) Catheter

(24) A list of contents in at least 2 languages (English and one other). This must include information on the effects and side effects of drugs carried.

3. Universal precaution kit

- (1) An owner or operator operating aircraft for which the maximum certificated passenger seating is 20 or more shall ensure each aircraft carries on board at least two universal precaution kits.
- (2) The following items shall, as a minimum, be included in a universal precaution kit –
 - (a) disposal gloves;
 - (b) dry powder that convert small liquid spill into sterile granulated gel;
 - (c) germicidal disinfectants for surface cleaning;
 - (d) skin wipes;
 - (e) face/eye mask;
 - (f) large absorbent towel;
 - (g) pick-up scoop with scraper; and
 - (h) bio-hazard disposal waste bag.

121.05.17 FLIGHT RECORDERS

1. Flight recorders - General

- (1) Flight recorders comprise four systems –
 - (a) a flight data recorder (FDR);
 - (b) a cockpit voice recorder (CVR);
 - (c) an airborne image recorder (AIR); and
 - (d) a data link recorder (DLR).
- (2) Lightweight flight recorders comprise four systems –
 - (a) an aircraft data recording system (ADRS);
 - (b) a cockpit audio recording system (CARS);
 - (c) an airborne image recording system (AIRS); and
 - (d) a data link recording system (DLRS).

Note – Image and data link information may be recorded on either the CVR, FDR, CARS or the ADRS.

- (3) FDR, CVR, AIRS and DLRS performance requirements and industry crashworthiness and fire protection specifications are as contained in the EUROCAE ED-112, Minimum Operational Performance Specification (MOPS) for Crash Protected Airborne Recorder Systems, or equivalent documents.
- (4) ADRS and CARS performance requirements and industry crashworthiness and fire protection specifications are as contained in the EUROCAE ED-155, Minimum Operational Performance Specification (MOPS) for Lightweight Flight Recorder Systems, or equivalent documents.

2. Inspections of flight recorders

- (1) Prior to the first flight of the day, the built-in test features on the flight deck for the CVR, FDR and Flight Data Acquisition Unit (FDAU), when installed, shall be monitored.
- (2) Annual inspections shall be carried out as follows –
 - (a) the read-out of the recorded data from the FDR and CVR should confirm that the recorder operates correctly for the nominal duration of the recording;
 - (b) the analysis of the FDR should evaluate the quality of the recorded data to determine whether the bit error rate is within acceptable limits and to determine the nature and distribution of the errors;
 - (c) a complete flight from the FDR should be examined in engineering units to evaluate the validity of all recorded parameters. Particular attention should be given to parameters from sensors dedicated to the FDR. Parameters taken from the aircraft's electrical bus system need not be checked if their serviceability can be detected by other aircraft systems;
 - (d) the read-out facility should have the necessary software to accurately convert the recorded values to engineering units and to determine the status of discrete signals;
 - (e) an annual examination of the recorded signal on the CVR should be carried out by re-play of the CVR recording. While installed in the aircraft, the CVR should record test signals from each aircraft source and from relevant external sources to ensure that all required signals meet intelligibility standards; and
 - (f) where practicable, during the annual examination, a sample of in-flight recordings of the CVR should be examined for evidence that the intelligibility of the signal is acceptable.
- (3) The results of the annual inspections shall be recorded and retained for a period of five years calculated from the date of such check.
- (4) Flight recorder systems should be considered unserviceable if there is a significant period of poor quality data, unintelligible signals or if one or more of the mandatory parameters is not recorded correctly.
- (5) When requested, a report of the annual inspection should be made available to the Director for monitoring purposes.
- (6) Calibration of the FDR-system –
 - (a) the FDR-system shall be recalibrated at least every five years to determine any discrepancies in the engineering conversion routines for the mandatory parameters and to ensure that parameters are being recorded within the calibration tolerances; and
 - (b) when the parameters of altitude and airspeed are provided by sensors that are dedicated to the FDR system, a recalibration shall be performed as recommended by the sensor manufacturer or at least every two years.

3. Flight recorder specifications

All digital flight recorders must comply with one of the following specifications as applicable –

- (a) ARINC 542A;

(b) ARINC 573-717;

(c) ARINC 717; or

(d) ICAO Annex 6, Part I, Appendix 7.

4. Aeroplanes for which flight data recorders are required

An operator shall ensure any aeroplane operated in a commercial air transport operation is equipped with an FDR in accordance with the following table –

CRITERIA FOR FDR REQUIREMENTS

Group	Initial C of A or Type Certificate	Maximum Mass (kg)	Propulsion System	FDR T.A.A. A+H ²	FDR TYPE 1	FDR TYPE 1A	FDR TYPE II	Class C AIR	ADRS
1	C of A on or after 1 January 1989	>27 000	All		X				
2	C of A on or after 1 January 1989	>5 700 to ≤27 000	All				X		
3	C of A on or after 1 January 1987 to before 1 January 1989 ³	>5 700	Turbine	X					
4	TC after 30 September 1969 and C of A on or after 1 January 1987 to before 1 January 1989	>27 000	Turbine				X		
5	C of A before 1 January 1987	>5 700	Turbine	X					
6	C of A after 1 January 2005	>5 700	All			X			
7	TC on or	≤5 700	Turbine				X ⁴	X ⁴	X ⁴

	after January 2016	1								
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Notes –

1. *Based on date of initial issue of the first aeroplane of that type, not the date of certification of particular aeroplane variants or derivative models.*
2. *FDR T.A.A.A+H means a FDR that records time, altitude, airspeed, normal acceleration and heading.*
3. *Except for aeroplanes covered under Group 4.*
4. *The recording system may be any one of these.*

5. FDR Parameters

- (1) A Type IA FDR shall be capable of recording, as appropriate to the aeroplane, at least the 78 parameters in the table in paragraph (10).
- (2) A Type I FDR shall be capable of recording, as appropriate to the aeroplane, at least the first 32 parameters in the table in paragraph (10).
- (3) Type II and IIA FDRs shall be capable of recording, as appropriate to the aeroplane, at least the first 16 parameters in the table in paragraph (10). In addition, a Type IIA FDR shall retain sufficient information from the preceding take-off for calibration purposes.
- (4) The parameters that satisfy the requirements for FDRs are listed in the paragraphs below. The number of parameters to be recorded shall depend on aeroplane complexity. The parameters without an asterisk (*) are mandatory parameters which shall be recorded regardless of aeroplane complexity. In addition, the parameters designated by an asterisk (*) shall be recorded if an information data source for the parameter is used by aeroplane systems or the flight crew to operate the aeroplane. However, other parameters may be substituted with due regard to the aeroplane type and the characteristics of the recording equipment.
- (5) The following parameters satisfy the requirements for flight path and speed –
 - (a) pressure altitude;
 - (b) indicated airspeed or calibrated airspeed;
 - (c) air-ground status and each landing gear air-ground sensor when practicable;
 - (d) total or outside air temperature;
 - (e) heading (primary flight crew reference);
 - (f) normal acceleration;
 - (g) lateral acceleration;
 - (h) longitudinal acceleration (body axis);
 - (i) time or relative time count;
 - (j) navigation data* (drift angle, wind speed, wind direction, latitude/longitude, groundspeed*);
and
 - (k) radio altitude*.
- (6) The following parameters satisfy the requirements for attitude –
 - (a) pitch attitude;
 - (b) roll attitude;
 - (c) yaw or sideslip angle*; and
 - (d) angle of attack*.
- (7) The following parameters satisfy the requirements for engine power –

- (a) engine thrust/power (propulsive thrust/power on each engine, cockpit thrust/power lever position);
 - (b) thrust reverse status*;
 - (c) engine thrust command*;
 - (d) engine thrust target*;
 - (e) engine bleed valve position*; and
 - (f) additional engine parameters* (EPR, N1, indicated vibration level, N2, EGT, TLA, fuel flow, fuel cut-off lever position, N3).
- (8) The following parameters satisfy the requirements for configuration –
- (a) pitch trim surface position;
 - (b) flaps* (trailing edge flap position, cockpit control selection);
 - (c) slats* (leading edge flap (slat) position, cockpit control selection);
 - (d) landing gear* (landing gear, gear selector position);
 - (e) yaw trim surface position*;
 - (f) roll trim surface position*;
 - (g) cockpit trim control input position pitch*;
 - (h) cockpit trim control input position roll*;
 - (i) cockpit trim control input position yaw*;
 - (j) ground spoiler and speed brake* (ground spoiler position, ground spoiler selection, speed brake position, speed brake selection);
 - (k) de-icing and/or anti-icing systems selection*;
 - (l) hydraulic pressure (each system)*;
 - (m) fuel quantity in CG trim tank*;
 - (n) AC electrical bus status*;
 - (o) DC electrical bus status*;
 - (p) APU bleed valve position*; and
 - (q) computed centre of gravity*.
- (9) The following parameters satisfy the requirements for operation –
- (a) warnings;
 - (b) primary flight control surface and primary flight control pilot input (pitch axis, roll axis, yaw axis);
 - (c) marker beacon passage;

- (d) each navigation receiver frequency selection;
- (e) manual radio transmission keying and CVR/FDR synchronization reference;
- (f) autopilot/autothrottle/AFCS mode and engagement status*;
- (g) selected barometric setting* (pilot, first officer);
- (h) selected altitude (all pilot selectable modes of operation)*;
- (i) selected speed (all pilot selectable modes of operation)*;
- (j) selected mach (all pilot selectable modes of operation)*;
- (k) selected vertical speed (all pilot selectable modes of operation)*;
- (l) selected heading (all pilot selectable modes of operation)*;
- (m) selected flight path (all pilot selectable modes of operation)* (course/DSTRK, path angle);
- (n) selected decision height*;
- (o) EFIS display format* (pilot, first officer);
- (p) multi-function/engine/alerts display format*;
- (q) GPWS/TAWS/GCAS status* (selection of terrain display mode including pop-up display status, terrain alerts, both cautions and warnings and advisories, on/off switch position);
- (r) low pressure warning* (hydraulic pressure, pneumatic pressure);
- (s) computer failure*;
- (t) loss of cabin pressure*;
- (u) airborne collision avoidance system (ACAS)*;
- (v) ice detection*;
- (w) engine warning each engine vibration*;
- (x) engine warning each engine over temperature*;
- (y) engine warning each engine oil pressure low*;
- (z) engine warning each engine over speed*;
- (aa) wind shear warning*;
- (bb) operational stall protection, stick shaker and pusher activation*;
- (cc) all cockpit flight control input forces* (control wheel, control column, rudder pedal cockpit input forces);
- (dd) vertical deviation* (ILS glide path, MLS elevation, GNSS approach path);
- (ee) horizontal deviation* (ILS localizer, MLS azimuth, GNSS approach path);
- (ff) DME 1 and 2 distances*;

(gg) primary navigation system reference* (GNSS, INS, VOR/DME, MLS, Loran C, ILS);

(hh) brakes* (left and right brake pressure, left and right brake pedal position);

(ii) date*;

(jj) event marker*;

(kk) head-up display in use*; and

(ll) para visual display on*.

(10) The measurement range, recording interval and accuracy of parameters on installed FDR equipment shall meet the specifications in the following table –

PARAMETERS FOR AEROPLANE FLIGHT DATA RECORDERS					
Serial number	Parameter	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR read-out)	Recording resolution (Note 1)
1	Time (UTC when available, otherwise relative time count or GPS time sync)	24 hours	4	± 0.125% per hour	1 second
2	Pressure altitude	–1 000 ft (–300 m) to maximum certificated altitude of aircraft +5 000 ft (+1 500 m)	1	± 100 ft to ± 700 ft (±30 m to ± 200 m)	5 ft (1.5 m)
3	Indicated airspeed or calibrated airspeed	50 kt to max V _{so} (Note 2) V _{so} to 1.2 V _D (Note 3)	1	± 5% ± 3%	1 kt (0.5 kt recommended)
4	Heading (primary flight crew reference)	360°	1	± 2°	0.5°
5	Normal acceleration (Note 4)	– 3 g to + 6 g	0.125	± 1% of maximum range	0.004 g

				excluding datum error of $\pm 5\%$	
6	Pitch attitude	$\pm 75^\circ$ or usable range whichever is greater	1 (0.25 Note 1)	$\pm 2^\circ$	0.5°
7	Roll attitude	$\pm 180^\circ$	1 (0.25 Note 1)	$\pm 2^\circ$	0.5°
8	Radio transmission keying	On-off (one discrete)	1		
9	Power on each engine (Note 5)	Full range	1 (per engine)	$\pm 2^\circ$	0.2% of full range or the resolution required to operate the aircraft
10*	Trailing edge flap and cockpit control section	Full range on each discrete position	2	$\pm 5\%$ or as pilot's indicator	0.5% of full range or the resolution required to operate the aircraft
11*	Leading edge flap and cockpit control section	Full range on each discrete position	2	$\pm 5\%$ or as pilot's indicator	0.5% of full range or the resolution required to operate the aircraft
12*	Thrust reverser position	Stowed, in transit, and reverse	1 (per engine)		
13*	Ground spoiler/speed brake selection (selection and position)	Full range or each discrete position	1	$\pm 2\%$ unless higher accuracy uniquely required	0.2% of full range
14	Outside air temperature	Sensor range	2	$\pm 2^\circ\text{C}$	0.3°C

15*	Autopilot/auto throttle/AFCS mode and engagement status	A suitable combination of discrettes	1		
16	Longitudinal acceleration (Note 4)	± 1 g	0.25	± 0.015 g excluding a datum error of ± 0.05 g	0.004 g
Note: The preceding 16 parameters satisfy the requirements for a Type II FDR					
17	Lateral acceleration (Note 4)	± 1 g	0.25	± 0.015 g excluding a datum error of ± 0.05 g	0.004 g
18	Pilot input and/or control surface position – primary controls (pitch, roll, yaw) (Notes 6 and 7)	Full range	1 (0.25 Note 1)	$\pm 2^\circ$ unless higher accuracy uniquely required.	0.2% of full range or as installed
19	Pitch trim position	Full range	1	$\pm 3\%$ unless higher accuracy uniquely required	0.3% of full range or as installed
20*	Radio altitude	- 20 ft to 2 500 ft (-6 m to 750 m)	1	± 2 ft (± 0.6 m) or $\pm 3\%$ whichever is greater below 500 ft (150 m); below 500 ft (150 m) and $\pm 5\%$ above 500 ft (150 m)	1 ft (0.3 m) below 500 ft (150 m); 1 ft (0.3 m)/0.5% of full range above 500 ft (150 m)
21*	Vertical beam deviation (ILS/GPS/GLS glide path, MLS elevation,	Signal range	1	$\pm 3\%$	0.3% of full range

	IRNAV/IAN vertical deviation)				
22*	Horizontal beam deviation (ILS/GPS/GLS localizer, MLS azimuth, IRNAV/IAN lateral deviation)	Signal range	1	± 3%	0.3% of full range
23	Marker beacon passage	Discrete	1		
24	Master warning	Discrete	1		
25	Each NAV receiver frequency selection (Note 8)	Full range	4	As installed	
26*	DME 1 and 2 distance (includes distance to runway threshold (GLS) and distance to missed approach point (IRNAV/IAN)) (Notes 8 and 9)	0 – 200 NM (0 – 370 km)	4	As installed	1 NM (1852 m)
27	Air/ground status	Discrete	1		
28*	GPWS/TAWS/GCAS status (selection of terrain display mode including pop-up display status and terrain alerts, both cautions and warnings, and advisories and on/off switch position)	Discrete	1		
29*	Angle of attack	Full range	0.5	As installed	0.3% of full range
30*	Hydraulics, each system (low pressure)	Discrete	2		0.5% of full range
31*	Navigation data (latitude/longitude, ground speed and drift angle) (Note 10)	As installed	1	As installed	
32*	Landing gear or gear selector position	Discrete	4	As installed	

Note : The preceding 32 parameters satisfy the requirements for a Type I FDR

33*	Groundspeed	As installed	1	Data should be obtained from the most accurate system	1 kt
34	Brakes (left and right brake pressure, left and right brake pedal position)	(Maximum metered brake range, discrettes or full range)	1	± 5%	2% of full range
35*	Additional engine parameters (EPR, N1, indicated vibration level, N2, EGT, fuel flow, fuel cut-off lever position, N3)	As installed	Each engine each second	As installed	2% of full range
36*	ACAS (airborne collision avoidance system)	Discrettes	1	As installed	
37*	Windshear warning	Discrete	1	As installed	
38*	Selected barometric setting (pilot, co-pilot)	As installed	64	As installed	0.1 mb (0.01 in-Hg)
39*	Selected altitude (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
40*	Selected speed (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
41*	Selected Mach (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
42*	Selected vertical speed (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection

43*	Selected heading (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
44*	Selected flight path (all pilot selectable modes of operation) (course/DSTRK, path angle, final approach path (IRNAV/IAN))		1	As installed	
45*	Selected decision height	As installed	64	As installed	Sufficient to determine crew selection
46*	EFIS display format (pilot, co-pilot)	Discrete(s)	4	As installed	
47*	Multi-function/engine/alerts display format	Discrete(s)	4	As installed	
48*	AC electrical bus status	Discrete(s)	4	As installed	
49*	DC electrical bus status	Discrete(s)	4	As installed	
50*	Engine bleed valve position	Discrete(s)	4	As installed	
51*	APU bleed valve position	Discrete(s)	4	As installed	
52*	Computer failure	Discrete(s)	4	As installed	
53*	Engine thrust command	As installed	2	As installed	
54*	Engine thrust target	As installed	4	As installed	2% of full range
55*	Computed centre of gravity	As installed	64	As installed	1% of full range
56*	Fuel quantity in CG trim tank	As installed	64	As installed	1% of full range
57*	Head up display in use	As installed	4	As installed	
58*	Para visual display on/off	As installed	1	As installed	

59*	Operational stall protection, stick shaker and pusher activation	As installed	1	As installed	
60*	Primary navigation system reference (GNSS, INS, VOR/DME, MLS, Loran C, localizer glideslope)	As installed	4	As installed	
61*	Ice detection	As installed	4	As installed	
62*	Engine warning each engine vibration	As installed	1	As installed	
63*	Engine warning each engine over temperature	As installed	1	As installed	
64*	Engine warning each engine oil pressure low	As installed	1	As installed	
65*	Engine warning each engine over speed	As installed	1	As installed	
30*	Hydraulics, each system (low pressure)	Discrete	2		0.5% of full range
31*	Navigation data (latitude/longitude, ground speed and drift angle) (Note 10)	As installed	1	As installed	
32*	Landing gear or gear selector position	Discrete	4	As installed	
Note : The preceding 32 parameters satisfy the requirements for a Type I FDR					
33*	Groundspeed	As installed	1	Data should be obtained from the most accurate system	1 kt
34	Brakes (left and right brake pressure, left and	(Maximum metered brake range,	1	± 5%	2% of full range

	right brake pedal position)	discretes or full range)			
35*	Additional engine parameters (EPR, N1, indicated vibration level, N2, EGT, fuel flow, fuel cut-off lever position, N3)	As installed	Each engine each second	As installed	2% of full range
36*	ACAS (airborne collision avoidance system)	Discretes	1	As installed	
37*	Windshear warning	Discrete	1	As installed	
38*	Selected barometric setting (pilot, co-pilot)	As installed	64	As installed	0.1 mb (0.01 in-Hg)
39*	Selected altitude (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
40*	Selected speed (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
41*	Selected Mach (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
42*	Selected vertical speed (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
43*	Selected heading (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
44*	Selected flight path (all pilot selectable modes of operation) (course/DSTRK, path angle, final approach path (IRNAV/IAN))		1	As installed	
45*	Selected decision height	As installed	64	As installed	Sufficient to determine

					crew selection
46*	EFIS display format (pilot, co-pilot)	Discrete(s)	4	As installed	
47*	Multi-function/engine/alerts display format	Discrete(s)	4	As installed	
48*	AC electrical bus status	Discrete(s)	4	As installed	
49*	DC electrical bus status	Discrete(s)	4	As installed	
50*	Engine bleed valve position	Discrete(s)	4	As installed	
51*	APU bleed valve position	Discrete(s)	4	As installed	
52*	Computer failure	Discrete(s)	4	As installed	
53*	Engine thrust command	As installed	2	As installed	
54*	Engine thrust target	As installed	4	As installed	2% of full range
55*	Computed centre of gravity	As installed	64	As installed	1% of full range
56*	Fuel quantity in CG trim tank	As installed	64	As installed	1% of full range
57*	Head up display in use	As installed	4	As installed	
58*	Para visual display on/off	As installed	1	As installed	
59*	Operational stall protection, stick shaker and pusher activation	As installed	1	As installed	
60*	Primary navigation system reference (GNSS, INS, VOR/DME, MLS, Loran C, localizer glideslope)	As installed	4	As installed	
61*	Ice detection	As installed	4	As installed	

62*	Engine warning each engine vibration	As installed	1	As installed	
63*	Engine warning each engine over temperature	As installed	1	As installed	
64*	Engine warning each engine oil pressure low	As installed	1	As installed	
65*	Engine warning each engine over speed	As installed	1	As installed	
66*	Yaw trim surface position	Full range	2	±3% unless higher accuracy uniquely required	0.3% of full range
67*	Roll trim surface position	Full range	2	±3% unless higher accuracy uniquely required	0.3% of full range
68*	Yaw or sideslip angle	Full range	1	± 5%	0.5°
69*	De-icing and/or anti-icing systems selection	Discrete(s)	4	± 5%	
70*	Hydraulic pressure (each system)	Full range	2	± 5%	100 psi
71*	Loss of cabin pressure	Discrete	1	± 5%	
72*	Cockpit trim control input position - Pitch	Full range	1	± 5%	0.2% of full range or as installed
73*	Cockpit trim control input position - Roll	Full range	1	± 5%	0.2% of full range or as installed
74*	Cockpit trim control input position - Yaw	Full range	1	± 5%	0.2% of full range or as installed

75*	All cockpit flight control input forces (control wheel, control column, rudder pedal)	Full range (± 311 N (± 70 lbf), ± 378 N (± 85 lbf), ± 734 N (± 165 lbf))	1	$\pm 5\%$	0.2% of full range or as installed
76*	Event marker	Discrete	1		
77*	Date	365 days	64		
78*	ANP or EPE or EPU	As installed	4	As installed	

Note : The preceding 78 parameters satisfy the requirements for a Type IA FDR

Notes –

1. *Applicable to aeroplanes for which a type certificate is first issued on or after 1 January 2016.*
2. *V_{SO} means stalling speed or minimum steady flight speed in the landing configuration.*
3. *V_D means design diving speed.*
4. *All aeroplanes which are required to record normal acceleration, lateral acceleration and longitudinal acceleration for which a type certificate is first issued on or after 1 January 2016 and which are required to be fitted with an FDR shall record those parameters at a maximum sampling and recording interval of 0.0625 seconds.*
5. *Record sufficient inputs to determine power.*
6. *For aeroplanes with control systems in which movement of a control surface will back drive the pilot's control, "or" applies. For aeroplanes with non-mechanical control systems in which movement of a control surface will not back drive the pilot's control, "and" applies. In aeroplanes with split surfaces, a suitable combination of inputs is acceptable in lieu of recording each surface separately. In aeroplanes with independent pilot input on primary controls, each pilot input on primary controls needs to be recorded separately.*
7. *All aeroplanes which are required to record pilot input and/or control surface position primary controls (pitch, roll, yaw) for which a type certificate is first issued on or after 1 January 2016 and which are required to be fitted with an FDR shall record those parameters at a maximum sampling and recording interval of 0.125 seconds.*
8. *If signal available in digital form.*
9. *Recording of latitude and longitude from INS or other navigation system is a preferred alternative.*
10. *If signals readily available.*

6. Aeroplanes for which voice or aural recorders are required

Notes —

1. *CVR performance requirements are as contained in the EUROCAE ED-112, Minimum Operational Performance Specification (MOPS) document for Flight Recorder Systems of the European Organization for Civil Aviation Equipment (EUROCAE) for Crash Protected Airborne Recorder Systems, or equivalent documents.*

2. CARS performance requirements are as contained in the EUROCAE ED-155, MOPS for Lightweight Flight Recorder Systems, or equivalent documents.

(1) An operator shall ensure any aeroplane operated in a commercial air transport operation is equipped with a CVR or CARS capable of recording the aural environment of the flight deck during flight time in accordance with the following table –

CRITERIA FOR CVR REQUIREMENTS

Group ¹	Initial C of A or Type Certificate ²	Maximum Mass (kg)	Propulsion System	Recording retained for the last 30 minutes of operation	Recording retained for the last 2 hours of operation
1	C of A on or after 1 January 1987	>5 700	All	X	
2	C of A before 1 January 1987 and TC after 30 September 1969	>27 000	Turbine	X	
3	C of A on or after 2003	>5 700	All		X
4	C of A on or after 1 January 2016	All	Turbine		X

Notes –

1. Group 1, 2 and 3 recorders shall be CVRs. Group 4 shall be either a CVR or a CARS.

2. Based on the initial date of issue not that for a variant.

(2) Any recorder required to be installed shall have an independent power source with the capability of automatically engaging and providing ten minutes of operation whenever aircraft power to the recorder ceases, either by normal shutdown or by any other loss of power to the recorder.

(3) For all aeroplanes for which the type certificate is first issued on or after 1 January 2016 and which are required to be fitted with a CVR, the CVR shall be provided with an independent power source that shall power exclusively the CVR and the cockpit area microphone components. In installations where two CVRs are fitted in aeroplanes, the forward CVR shall be provided with an independent power source.

Note.— When the CVR function is combined with other recording functions within the same unit, powering the other functions is allowed.

(4) For all aeroplanes for which the individual certificate of airworthiness is first issued on or after 1 January 2016 and which are required to be fitted with a CVR, the CVR shall be provided with an independent power source. In installations where two CVRs are fitted in aeroplanes, the forward CVR shall be provided with an independent power source.

- (5) The CVR shall record on four separate channels, or more, at least the following –
- (a) voice communication transmitted from or received in the aeroplane by radio;
 - (b) aural environment on the flight deck;
 - (c) voice communication of flight crew members on the flight deck using the aeroplane's interphone system, if installed;
 - (d) voice or audio signals identifying navigation or approach aids introduced in the headset or speaker; and
 - (e) voice communication of flight crew members using the passenger address system, if installed
- (6) The CARS shall record on two separate channels, or more, at least the following –
- (a) voice communication transmitted from or received in the aeroplane by radio;
 - (b) aural environment on the flight deck; and
 - (c) voice communication of flight crew members on the flight deck using the aeroplane's interphone system, if installed.
- (7) The CVR shall be capable of recording on at least four channels simultaneously. On a tape-based CVR, to ensure accurate time correlation between channels, the CVR is to record in an in-line format. If a bi-directional configuration is used, the in-line format and channel allocation shall be retained in both directions.
- (8) The preferred track channel allocation is shall be as follows –
- (a) Channel 1 — co-pilot headphones and live boom microphone;
 - (b) Channel 2 — pilot headphones and live boom microphone;
 - (c) Channel 3 — area microphone; and
 - (d) Channel 4 — time reference plus the third and fourth crew members' headphone and live microphone, if applicable.

Notes —

1. *Channel 1 is to be located closest to the base of the recording head.*
2. *The preferred channel allocation presumes use of current conventional magnetic tape transport mechanisms and is specified because the outer edges of the tape have a higher risk of damage than the middle. It is not intended to preclude use of alternative recording media where such constraints may not apply.*

7. Combination recorders

- (1) All aeroplanes of a maximum certificated take-off mass of over 15 000 kg for which the type certificate is first issued on or after 1 January 2016 and which are required to be

equipped with both a CVR and an FDR, shall be equipped with two combination recorders (FDR/CVR).

- (2) Aeroplanes fitted with combination flight data and aural recorders shall, as far as practicable, locate one recorder close to the cockpit and the other as far aft as possible.

8. Airborne image recorder

- (1) Airborne image recorders (AIR) are classified as follows –

- (a) a Class A AIR captures the general cockpit area in order to provide data supplemental to conventional flight recorders;

Note — To respect crew privacy, the cockpit area view may be designed as far as practical to exclude the head and shoulders of crew members whilst seated in their normal operating position.

- (b) a Class B AIR captures data link message displays; and

- (c) a Class C AIR captures instruments and control panels.

Note.— A Class C AIR may be considered as a means for recording flight data where it is not practical or is prohibitively expensive to record on an FDR or where an FDR is not required.

- (2) For aeroplanes equipped with an AIR, the AIR shall start to record prior to the aeroplane moving under its own power and record continuously until the termination of the flight when the aeroplane is no longer capable of moving under its own power. In addition, depending on the availability of electrical power, the AIR must start to record as early as possible during the cockpit checks prior to engine start at the beginning of the flight until the cockpit checks immediately following engine shutdown at the end of the flight.

9. Aircraft data recording systems

- (1) Operators of aircraft using aircraft data recording systems (ADRS) shall ensure the ADRS is capable of recording, as appropriate to the aeroplane, at least the essential (E) parameters in the following table –

PARAMETERS FOR AIRCRAFT DATA RECORDER SYSTEMS

Serial number	Parameter Category	and Minimum recording range	Maximum recording interval (seconds)	Minimum recording accuracy	Minimum recording resolution	Remarks
1	Heading (magnetic or true) R*	±180 degrees	1	±2 degrees	0.5 degree	* If not available, record rates
2	Pitch attitude E*	±90 degrees	0.25	±2 degrees	0.5 degree	* If not available, record rates

3	Roll attitude E*	±180 degrees	0.25	±2 degrees	0.5 degree	* If not available, record rates
4	Yaw rate E*	±300 degrees	0.25	±1% + drift of 360°/hr	2 degrees	*Essential if no heading available
5	Pitch rate E*	±300 degrees	0.25	±1% + drift of 360°/hr	2 degrees	*Essential if no pitch attitude available
6	Roll rate E*	±300 degrees	0.25	±1% + drift of 360°/hr	2 degrees	*Essential if no roll attitude available
7	Positioning system : latitude/longitude E	Latitude:±90 degrees Longitude:±180 degrees	2 (1 if available)	As installed (0.00015 degree recommended)	0.00005 degree	
8	Positioning system : estimated error E*	Available range	2 (1 if available)	As installed	As installed	*If available
9	Positioning system : altitude E	-300 m (-1 000 ft) to maximum certificated altitude of aircraft + 1 500 m (5 000 ft)	2 (1 if available)	As installed (±50 ft (±15 m) recommended)	5 ft (1.5 m)	
10	Positioning system : time* E	24 hrs	1	±.5 second	0.1 second	* UTC time preferred where available
11	Positioning system : ground speed E	0 – 1 000 kt	2 (1 if available)	As installed (±5 kt recommended)	1 kt	
12	Positioning system : channel E	0 – 360 degrees	2 (1 if available)	As installed (±2 degrees recommended)	0.5 degree	
13	Normal acceleration E	-3 g to +6 g	0.25 (0.125 if available)	As installed (± 0.09 g excluding a datum error of ±0.45 g)	0.004g	

				recommended)		
14	Longitudinal acceleration E	±1 g	0.25 (0.125 if available)	As installed (±0.015 g excluding a datum error of ±0.05 g recommended)	0.004g	
15	Lateral acceleration E	±1 g	0.25 (0.125 if available)	As installed (±0.015 g excluding a datum error of ±0.05 g recommended)	0.004g	
16	External static pressure (or pressure altitude) R	34.4 mb (3.44 in-Hg) to 310.2 mb (31.02 in-Hg) or available sensor range	1	As installed (±1 mb (0.1 in-Hg) or ±100 ft (±30 m) to ±700 ft (±210 m) recommended)	0.1 mb (0.01 in-Hg) or 5 ft (1.5 m)	
17	Outside air temperature (or total air temperature) R	-50° to +90°C or available sensor range	2	As installed (±2°C recommended)	1°C	
18	Indicated air speed R	As the installed pilot display measuring system or available sensor range	1	As installed (±3 % recommended)	1 kt (0.5 kt recommended)	
19	Engine RPM R	Full range including overspeed condition	Each engine each second	As installed	0.2% of full range	
20	Engine oil pressure R	Full range	Each engine each second	As installed (5% of full range recommended)	2% of full range	
21	Engine oil temperature R	Full range	Each engine each second	As installed (5% of full range recommended)	2% of full range	

22	Fuel flow or pressure R	Full range	Each engine each second	As installed	2% of full range	
23	Manifold pressure R	Full range	Each engine each second	As installed	0.2% of full range	
24	Engine thrust/power/torque parameters required to determine propulsive thrust/power* R	Full range	Each engine each second	As installed	0.2% of full range	* Sufficient parameters e.g. EPR/N1 or torque/Np as appropriate to the particular engine shall be recorded to determine power in both normal and reverse thrust. A margin for possible overspeed should be provided.
25	Engine gas generator speed (Ng) R	0 – 150%	Each engine each second	As installed	0.2% of full range	
26	Free power turbine speed (Nf) R	0 – 150%	Each engine each second	As installed	0.2% of full range	
27	Coolant temperature R	Full range	1	As installed (±5° C recommended)	1°C	
28	Main voltage R	Full range	Each engine each second	As installed	1 Volt	

29	Cylinder head temperature R	Full range	Each engine each second	As installed	2% of full range	
30	Flaps position R	Full range or each discrete position	2	As installed	0.5 degree	
31	Primary flight control surface position R	Full range	0.25	As installed	0.2% of full range	
32	Fuel quantity R	Full range	4	As installed	1% of full range	
33	Exhaust gas temperature R	Full range	Each engine each second	As installed	2% of full range	
34	Emergency voltage R	Full range	Each engine each second	As installed	1 Volt	
35	Trim surface position R	Full range or each discrete position	1	As installed	0.3% of full range	
36	Landing gear position R	Each discrete position*	1	Each gear every two seconds		* Where available, record up-and-locked and down-and-locked position
37	Novel/unique aircraft features R	As required	As required	As required	As required	

- (2) Documentation concerning parameter allocation, conversion equations, periodic calibration and other serviceability/maintenance information shall be maintained by the operator. The documentation needs to be sufficient to ensure that accident investigation authorities have the necessary information to read out the data in engineering units.
- (3) The documentation referred to in paragraph (2) shall be in electronic format where possible and take account of industry standards.

Note.— Industry specification for documentation concerning flight recorder parameters may be found in the ARINC 647A, Flight Recorder Electronic Documentation, or equivalent document.

121.05.20 DATA LINK RECORDERS

Data link recorders – General

Notes —

1. *Data link communications are currently conducted by either ATN-based or FANS 1/A-equipped aircraft.*
 2. *A Class B AIR could be a means for recording data link communications applications messages to and from the aeroplanes where it is not practical or is prohibitively expensive to record those data link communications applications messages on FDR or CVR.*
 3. *Data link recorders performance requirements are as contained in the EUROCAE ED-112, Minimum Operational Performance Specifications (MOPS) for Crash Protected Airborne Recorder Systems, or equivalent documents.*
- (1) The minimum recording duration of a data link recorder shall be equal to the duration of the CVR.
 - (2) Data link recording shall be able to be correlated to the recorded cockpit audio.
 - (3) Where the aircraft flight path is authorized or controlled through the use of data link messages, all data link messages, both uplinks (to the aircraft) and downlinks (from the aircraft), shall be recorded on the aircraft. As far as practicable, the time the messages were displayed to the flight crew and the time of the responses shall be recorded.
Note — Sufficient information to derive the content of the data link communications message and the time the messages were displayed to the flight crew is needed to determine an accurate sequence of events on board the aircraft.
 - (4) Messages applying to the applications listed below shall be recorded. Applications without the asterisk (*) are mandatory applications which shall be recorded regardless of the system complexity. Applications with an (*) shall be recorded only as far as is practicable given the architecture of the system –
 - (a) data link initiation capability;
 - (b) controller – pilot data link communications;
 - (c) data link – flight information services;
 - (d) automatic dependent surveillance – contract;
 - (e) automatic dependent surveillance – broadcast*; and
 - (f) aeronautical operational control*.

121.06.2 APPLICATION FOR THE ISSUANCE OR AMENDMENT OF AN AIR OPERATOR CERTIFICATE AND OPERATIONS SPECIFICATIONS

1. Application for operating certificate

- (1) The form and manner referred to in CAR 121.06.2 on which application is made for the issuance or amendment of an air operator certificate (AOC) or operations specifications is referred to in this TS as the certification process. This process is designed to address the following certification actions –
 - (a) initial certification of an air service operator in terms of this Part;

- (b) revision to any existing AOC or operations specification issued in terms of this Part;
 - (c) corrective certification action of an existing AOC or operations specification where deficiencies have been discovered through the continuing safety oversight programme, or where appropriate; or
 - (d) any other certification action requested by an operator, operating or desiring to operate in terms of this Part.
- (2) To assist in the processes, technical guidance material (TGM), outlining the means of meeting the certification requirements, has been developed. This guidance material and personal consultation is obtainable from SACAA.
- (3) The process used to accomplish any certification activity entails the applicant successfully completing the five phases of certification. An application may not progress where any phase is not completed satisfactorily. On this issue an applicant is cautioned of the need to review any deficiencies as indicated in CAR 121.06.3(3). The five phases of certification are comprised of –
- (a) the pre-application phase;
 - (b) the formal application phase;
 - (c) the documentation review phase;
 - (d) the demonstration and inspection phase; and
 - (e) the certification phase.

Note – The certification TGM provides the details of each phase.

- (4) As part of the certification process an applicant shall complete and submit the following as a minimum –
- (a) a statement of compliance (SOC) document, which is the means by which the operator ensures him or herself and the Director that the company will comply with all applicable regulatory requirements;
- Note – See paragraph (6) for more information on the SOC.*
- (b) a number of application forms, depending upon the type of authority being applied for, which are intended to provide evidence of qualification for the specific authorities requested. The number and type of forms required vary with the size, scope and complexity of the proposed operation and are at the discretion of the certification officer; however, all will be made available to the applicant;
 - (c) copies of all required manuals; and
 - (d) payment of the application fee required by CAR 121.06.2(1) shall be non-refundable unless otherwise approved by the Director.
- (5) The applicant must submit to any inquiry or investigation, referred to in CAR 121.06.3(1), as deemed necessary in support of the application and to the certification audit referred to in CAR 121.06.5(1).
- (6) With respect to the SOC, for each operator or applicant, –
- (a) a SOC is required whether applying for domestic or international authority;
 - (b) the SOC shall be in the form of a complete listing of all parts of the regulations, including technical standards, as applicable to the operation the applicant is proposing, with space for the applicant to show how each regulation applicable to him or her has been met

- through specific reference to the operator's operations, maintenance or other required manuals;
- (c) the SOC shall be updated by operators to reflect amended regulatory requirements or if the references showing the means of compliance in the SOC change as a result of amendments to the operator's manuals; and
 - (d) the Director may require the completion of a SOC by an operator at any time deemed necessary in the interest of public safety.

2. Required management positions

- (1) An operator shall employ the management personnel required by CAR 121.06.2(5) on a full time basis to ensure proper control and supervision of its personnel and operation. Section 3 of this TS states the minimum qualifications and responsibilities of the incumbents.
- (2) The application forms for the required managerial positions will be reviewed to ensure the minimum qualifications are met. The assessment process may involve the use of quizzes or interviews to establish the suitability of each nominee. Where a nominee is known within SACAA, the Director may approve such nominee without the need for further assessment.
- (3) An operator may use whatever title deemed necessary for its managers and may assign some of the responsibilities for a given position to another person or persons or the responsibilities of more than one position to one person; however, all the responsibilities noted in section 3 shall be assigned to a nominated manager and such assignment clearly identified in the operations manual. Furthermore, every person assigned any responsibility associated with a required position shall also meet the qualification requirements associated with the responsibilities assigned.
- (4) An operator shall develop a method of ensuring that, in the absence of a responsible manager for any reason, all the responsibilities of that manager are assigned to another individual. Such individual shall meet the qualifications required for the responsibilities assigned except that the knowledge requirements may be demonstrated to the operator rather than the Director. Any assignment issued for a period greater than 30 days must be acceptable to the Director.

3. Approved positions, minimum qualifications and responsibilities

- (1) Chief Executive Officer (CEO)

- (a) Qualifications

The CEO shall not have had any conviction or administrative sanction under the Act or these Regulations which, in the view of the Director, was sufficiently serious to render such person not fit and proper to exercise the responsibilities of such position.

- (b) Responsibilities

The CEO shall –

- (i) have full authority for all human resources;
 - (ii) have authority for major financial decisions;

- (iii) have direct responsibility for the conduct of the company's affairs; and
- (iv) have final responsibility for all safety and security issues.

(2) Person Responsible for Flight Operations (PRFO)

- (a) Qualifications: The PRFO shall, as a minimum, –
- (i) hold or have held the pilot licence and ratings appropriate to the aeroplanes being operated; or
 - (ii) demonstrate adequate knowledge of the operation of such aeroplanes; or
 - (iii) have acquired not less than 3 years supervisory experience in the flight operations department of an operator whose flight operations are similar in size and scope or acceptable alternative experience;

Notes –

1. *In determining similar size of flight operations, the grouping of operators is based upon the following categories –*
 - (a) *large aeroplanes having a maximum certificated passenger seating capacity of 20 or more up to and including 50; and*
 - (b) *large aeroplanes having a maximum certificated passenger seating capacity of more than 50.*
 2. *The PRFO of an operator acquiring larger aeroplanes or increasing the complexity of its operations may continue in such position: Provided –*
 - (a) *the operator is not acquiring aeroplanes more than 1 category higher than presently operated; and*
 - (b) *he or she becomes conversant with the new aeroplane or new operations, as applicable, within 3 months of the change.*
 3. *A PRFO leaving an operator to take a PRFO position with another operator having a fleet of larger aeroplanes may do so: Provided –*
 - (a) *the new operator does not operate aeroplanes more than 1 category higher than those with which the PRFO has experience;*
 - (b) *he or she had at least 3 years experience as the PRFO of the operator having smaller aeroplanes; and*
 - (c) *he or she demonstrates adequate knowledge of the aeroplanes and flight operations of the new operator prior to acting in the position.*
- (iii) demonstrate knowledge to the Director of the content of the operations manual, the operator's certificate and operations specifications, as well as

those provisions of the regulations and technical standards necessary to carry out his or her duties and responsibilities to ensure safety; and

- (iv) not have had any conviction or administrative sanction under the Act or the Regulations which, in the view of the Director, was sufficiently serious to render such person not fit and proper to exercise the responsibilities of such position.

(b) Responsibilities

The PRFO is responsible for safe flight operations, in particular –

- (i) the control of operations and operational standards of all aeroplanes operated;
- (ii) the identification of operations coordination functions which impact on operational control (eg. maintenance, crew scheduling, load control, equipment scheduling);
- (iii) the supervision, organization, manning and efficiency of the following –
 - (aa) flight operations;
 - (bb) cabin safety;
 - (cc) crew scheduling and rostering; and
 - (dd) training programmes;
- (iv) the timely resolution of safety issues;
- (v) the contents of the operator's operations manual;
- (vi) the supervision of and the production and amendment of the operations manual;
- (vii) liaison with the regulatory authority on all matters concerning flight operations, including any variations to the operator's AOC;
- (viii) liaison with any external agencies which may affect the operator's operations;
- (ix) ensuring that the operator's operations are conducted in accordance with current regulations, standards and the operator's policy;
- (x) ensuring that crew scheduling complies with flight and duty time regulations and that all crew members are kept informed of any changes to the regulations and standards;
- (xi) the receipt and actioning of any aeronautical information affecting the safety of flight;
- (xii) the dissemination of aeroplane safety information, both internal and external, in conjunction with the safety management system;
- (xiii) the qualifications of flight and cabin crews; and

(xiv) the maintenance of a current operations library.

(3) Person Responsible for Aircraft (PRA)

(a) Qualifications

The PRA shall, as a minimum, –

- (i) have or have held an aircraft maintenance engineer (AME) licence, issued in terms of Part 66, or –
 - (aa) at least have training and experience that may qualify the individual to obtain an AME licence;
 - (bb) hold or have held a pilot licence and ratings appropriate to the aeroplanes being operated or demonstrate adequate knowledge of the maintenance of such aeroplanes; or
 - (cc) hold an engineering degree in aeronautics, electrical, mechanical or avionics or other studies relevant to aircraft maintenance with 5 years experience in the aviation domain after obtaining that qualification;
- (ii) have at least two years experience in an executive position within aviation, or at least as a Quality Assurance Manager within the aviation domain;
- (iii) have worked directly with the SACAA for at least one year and have not been the Quality Manager of the assigned maintenance organisation; and
- (iv) within the preceding 5 years, have not held a similar position at any different aviation-related organisation where the approval issued by the Director has been suspended or cancelled by the Director or the Minister as a result of the organisation failing to comply with the requirements of the Act.

(b) Responsibilities

The PRA is responsible for safe aeroplane operations, in particular –

- (i) is responsible for all maintenance and inspection personnel and signing of Part D of the operations specifications;
- (ii) ensures that company aircraft are maintained in an airworthy condition;
- (iii) ensures that all inspections, repairs and component changes are accomplished in accordance with the manufacturer's approved procedures;
- (iv) ensures compliance with maintenance procedures, airworthiness directives, service bulletins, service letters and the regulations;
- (v) ensures all maintenance technicians are trained and current on the types of aircraft for which approved;
- (vi) ensures that all maintenance technicians are certified and supervised according to the requirements specified in the regulations;

- (vii) is responsible for the production and amendment of the policy and procedures manual;
- (viii) coordinates with maintenance contracting agencies when maintenance activities are being performed on company aircraft;
- (ix) provides the operations manager with the current airworthiness status of the aircraft and the forecast down times to facilitate maintenance scheduling and insure timely deferral or correction of aircraft discrepancies;
- (x) maintains a close liaison with manufacturer's representatives, parts supply houses, repair facilities and the SACAA;
- (xi) makes available to maintenance personnel the necessary overhaul manuals, service bulletins, service letters, airworthiness directives, applicable sections of the MCM/MPM and any other required technical data;
- (xii) maintains all necessary work records and logbooks, including certification in the aircraft permanent maintenance records that the aircraft is approved for return to service;
- (xiii) maintains the mass and balance records for all aircraft; and
- (xiv) completes all required reports and submits them to the operations manager for forwarding to the SACAA.

(5) Chief Pilot

Note – Where an operator appoints a chief pilot for each aeroplane type operated, it must name one person in its operations manual who is responsible for the overall flight standards of the operator's aeroplane fleet. Notwithstanding, the qualifications and responsibilities stipulated below shall apply to all chief pilots.

(a) Qualifications

The chief pilot shall, as a minimum –

- (i) hold a valid ATPL, a valid multi-engine aeroplane instrument rating and a type rating for at least one of the types of aeroplanes operated;
- (ii) have at least 3 years aeroplane experience as pilot-in-command of a multi-engine aeroplane of a type operated by the operator and in the type of operations contemplated (domestic, international, cargo, passenger);
- (iii) be qualified for line flying on one of the types of aeroplanes operated;
- (iv) demonstrate knowledge to the Director with respect to the content of the operations manual, training manuals, AOMs, DFE programme, if DFEs are to be employed, and the provisions of the regulations and technical standards necessary to carry out the duties and responsibilities of the position; and
- (v) the chief pilot shall not have had any conviction under the Act.

(b) Responsibilities

The chief pilot is responsible for the professional standards of the flight crews under his/her authority, and in particular –

- (i) developing standard operating procedures for inclusion in the AOM;
- (ii) developing and/or implementing all required approved training programmes for the operator's flight crews;
- (iii) issuing directives and notices to the flight crews as required;
- (iv) the operational suitability and requirements of all aerodromes and routes served by the operator;
- (v) the processing and actioning of any flight crew reports;
- (vi) the supervision of flight crews; and
- (vii) assuming any responsibilities delegated by the PRFO.

(6) Cabin Crew Manager

Note – Required only for an operator authorised to carry passengers in terms of this Part.

(a) Qualifications

The cabin crew manager shall, as a minimum, –

- (i) hold a valid cabin crew member licence valid for at least one of the aeroplanes being operated;
- (ii) know the contents of the operator's operations and cabin crew member manual, the air operator certificate and operations specifications as are necessary for the performance of the assigned duties;
- (iii) know the provisions of the Act, the regulations and technical standards as are necessary for the performance of the assigned duties; and
- (iv) demonstrate to the Director that the person has the ability to fulfil the responsibilities of the position.

(b) Responsibilities

The cabin crew manager is responsible for the professional standards of the cabin crews under his/her authority and in particular –

- (i) assuring a current and approved cabin crew member manual is in place;
- (ii) assuring a current and approved cabin crew member training programme;

- (iii) the issuance of directives and notices to the cabin crew members as required;
- (iv) the actioning and distribution of accident, incident and other occurrence reports, if applicable;
- (v) the processing and actioning of any cabin crew member reports;
- (vi) the supervision of cabin crew members;
- (vii) assuming any responsibilities delegated by the person responsible for operations;
- (viii) training of cabin crew members in accordance with the approved training programme;
- (ix) the maintenance of cabin crew member training records;
- (x) liaison with other company departments; and
- (xi) the development of safety features cards.

(7) Air Safety Officer (ASO)

(a) Qualifications

The ASO shall, as a minimum, have –

- (i) broad operational knowledge in the functions of the organisation or similar type of organisation;
- (ii) completed an approved safety management system (SMS) course;
- (iii) at least 2 years of experience closely involved in the management of an aviation safety programme, SMS or quality assurance programme;

(b) Responsibilities

The ASO is responsible for the operator's SMS and in particular –

- (i) the establishment and maintenance of a reporting system to ensure the timely collection of information related to potential hazards, incidents and accidents that may adversely affect safety;
- (ii) the identification of latent hazards and carry out risk management analyses of those hazards;
- (iii) the investigation, analysis and identification of the root cause of all hazards or the contributing factors of incidents and accidents identified under the SMS to ensure the operator has adequate mitigation in place;
- (iv) the establishment and maintenance of a safety data system, either by electronic or by other means, to monitor and analyse trends in hazards, incidents and accidents;

- (v) the maintenance of a continuous monitoring system that evaluates the results of corrective actions with respect to hazards, incidents and accidents;
- (vi) the monitoring of the concerns of the civil aviation industry in respect of safety and their perceived effect on the operator;
- (vii) the co-ordination of the organisation's aviation safety programme and all related safety matters;
- (viii) co-operation with the training section with regard to safety training of flight, cabin and ground crews, as applicable;
- (ix) the supervision of aircraft handling regarding matters related to safety in co-operation with ground support services;
- (x) the investigation of all incidents and accidents involving the organisation's aircraft, equipment and property, including fire and emergency procedures, not undertaken in accordance with Part 12;
- (xi) the actioning and distribution of accident, incident and other occurrence reports;
- (xii) the co-ordination with security personnel to ensure all aspects of security regarding the organisation's aircraft;
- (xiii) the development and maintenance of a mandatory occurrence reporting scheme;
- (xiv) the establishment of an emergency plan in the event of an accident, which includes the actions to be followed by relevant personnel;
- (xv) in concert with the person responsible for quality, the maintenance of a quality assurance programme within the organisation; and
- (xvi) the realisation of other duties which include –
 - (aa) promulgation of flight safety bulletins to all staff within the organisation;
 - (bb) conducting meetings with all relevant personnel regarding safety matters;
 - (cc) maintenance of safety equipment;
 - (dd) safety audits; and
 - (ee) occupational health and safety.

(8) Quality Manager (QM)

(a) Qualifications

The QM shall, as a minimum, have –

- (i) grade 12 school level or equivalent;
- (ii) certificate/s or diploma in quality management; and

- (iii) at least 5 years experience in implementation and maintenance of quality management systems.

(b) Responsibilities

The QM is responsible for ensuring that the operator's quality assurance programme is properly established, implemented and maintained and in particular –

- (i) the monitoring of compliance with, and the adequacy of, the procedures required to ensure safe operational practices and airworthy aircraft;
- (ii) the monitoring of activity in flight operations, maintenance, crew training and ground operations, to ensure that the standards required by the Director, and any additional requirements defined by the operator, are being met; and
- (iii) any additional tasks that may be assigned with respect to the financial and non-operational efficiency aspects of the company.

(9) Security Manager (SM)

(a) Qualifications

The SM shall have, as a minimum, –

- (i) broad operational knowledge in the functions of the organisation or similar type of organisation;
- (ii) completed an approved aviation security course or other course related to aviation security; and
- (iii) at least 2 years of experience closely involved in the field of security or a combination of experience in aviation and training in security acceptable to the Director.

(b) Responsibilities

The SM is responsible for ensuring that the operator's security programme is properly established, implemented and maintained and in particular –

- (i) the monitoring of compliance with, and the adequacy of, the procedures established to ensure the security of the operator's facilities, aircraft and personnel through an inspection/audit programme;
- (ii) the provision of training in all matters related to security either directly or through the operator's training department;
- (iii) the identification of threats to aviation security, notification to the appropriate authority of such threats and the development of countermeasures to combat those threats, if applicable; and
- (iv) liaising with aerodrome security personnel and other law enforcement authorities with respect to security matters.

121.06.3 APPLICATION, ADJUDICATION OF AND ISSUANCE OF AIR OPERATOR CERTIFICATE OR OPERATIONS SPECIFICATIONS

1. Document format and layout

The format and content of all South African air operator certificates (AOCs) and associated operations specifications (OpSpecs) shall be as prescribed by Appendix 6, to Annex 6, Part 1 of the ICAO Annexes.

2. Contents of an Air Operator Certificate

Each AOC shall contain at least the following information –

- (a) the State of the Operator and the issuing authority;
- (b) the AOC number and its expiration or valid to date or other means to indicate its validity;
- (c) the operator name, trading name (if different) and address of the principal place of business;
- (d) the date of issue and the name, signature and title of the authority representative; and
- (e) the location, in a controlled document carried on board, where the contact details of operational management can be found.

Note – For the purposes of establishing a controlled document to provide the information required by paragraph (e), an operator's operations manual is considered a good means of compliance provided it is contained in a Part of the operations manual required to be carried on board the operator's aeroplanes at all times.

3. Contents of an Operations Specification

OpSpecs are issued in different parts and contain the following information as applicable to the authority being granted by the operations specification –

- (a) telephone number;
- (b) AOC number;
- (c) business name of the operator including 'doing business as' (dba), where applicable;
- (d) date of issue of the operations specification;
- (e) aeroplane makes, types and models to which the specification applies;
- (f) areas and types of operations approved; and
- (g) special limitations, authorisations and approvals.

Note – For more information with respect to the AOC or associated operations specifications an operator/applicant should contact the Certification Division of the South African Civil Aviation Authority.

121.07.1 ROUTES AND AREAS OF OPERATION AND AERODROME FACILITIES

1. Destination Alternate Aerodrome Planning Minima

- (1) Except as provided in paragraph (2), an operator shall meet the applicable planning minima specified in the following table in order to select an aerodrome as a destination alternate, when required –

Approach and landing provisions	Ceiling	Visibility conditions
Aerodromes supporting instrument approach and landing operations, but not supporting straight-in approach and landing operations to at least two runway ends.	Applicable aerodrome operating minima plus an increment of 400 ft	Applicable aerodrome operating minima plus an increment of 1 500 m
Aerodromes supporting a straight-in instrument approach and landing operation to different suitable runways.	Applicable aerodrome operating minima plus an increment of 200 ft	Applicable aerodrome operating minima plus an increment of 800 m
Aerodromes supporting a minimum of two instrument approach and landing operations to different suitable runways, at least one shall be CAT II or III.	For CAT II operations at least 300 ft For CAT III operations at least 200 ft	For CAT II operations, a prevailing visibility corresponding to at least an RVR of 1 200 m For CAT III operations, a prevailing visibility corresponding to at least

Note.— The term “different suitable runways” may denote either two or more separate runways or a single runway with a straight-in instrument approach and landing procedure to each end of the runway.

- (2) The criteria specified in paragraph (1) need not be complied with: Provided alternative selection criteria are submitted by the operator that are developed as a result of a safety risk assessment, based on the operator’s SMS programme, which provide a level of safety equivalent to that in paragraph (1) and are approved by the Director.

2. Extended Range Twin-Engine Operations

2.1 Application

- (1) Applications to the Director for an Operations Specification to operate flights in terms of the ETOPS provisions shall be made in a manner acceptable to the Director and that meets the requirements of this TS. Specific certification information is contained in Document TGM CA-AOC-AC-013 ETOPS, available on the SACAA website, which provides an acceptable method of ensuring all certification requirements have been met.

(2) Only turbine-powered aeroplanes shall be considered for approval to conduct ETOPS flights.

2.2 Aerodrome Criteria

(1) Adequate aerodrome

An adequate aerodrome is an aerodrome which the operator considers to be satisfactory, taking into account landing performance requirements at the expected landing weight and runway characteristics. In addition, it should be anticipated that, at the expected time of use, the aerodrome will be available and equipped with necessary ancillary services, such as ATS, sufficient lighting, communications, weather reporting, nav aids and emergency services.

(2) ETOPS *en route* alternate airport

An ETOPS *en route* alternate airport means an adequate airport that is listed in the operator’s company operations manual and meets the planning minima specified in section 3.

2.3 Planning minima for an ETOPS *en route* alternate

To be suitable to be listed in the flight plan as an ETOPS *en route* alternate aerodrome, the following additional criteria must be met –

- (a) the availability of an ATC facility;
- (b) the availability of at least one letdown aid for an instrument approach; and
- (c) the appropriate weather reports or forecasts, or any combination thereof, indicate that, during a period commencing 1 hour before and ending 1 hour after the expected time of arrival at the aerodrome, crosswind landing limits will not be exceeded and the weather conditions will be at or above the planning minima prescribed in the table below, and in accordance with the operator’s ETOPS approval.

Planning minima – ETOPS

Type of approach	Planning minima (ceiling and RVR/visibility required, if applicable) Aerodrome with		
		at least 2 separate approach procedures based on 2 separate aids serving 2 separate runways	at least 2 separate approach procedures based on 2 separate aids serving 1 runway
Precision approach Cat II, III (ILS MLS)	Precision approach Cat I minima	Non-precision approach minima	

Precision approach Cat I (ILS MLS)	Non-precision approach minima	Circling minima or, if not available, non-precision approach minima plus 200 ft/1 000 m
Non-precision approach	The lower of non-precision approach minima plus 200 ft/1 000 m or circling	The higher of circling minima or non-precision approach minima plus 200 ft/1 000 m

Notes:

1. *“Tempo” and “Inter” conditions published in the forecast are not limiting unless these conditions are forecast to be below published planning minima. Where a condition is forecast as “Prob”, provided the probability percent factor is less than 40%, it is not limiting. However the PIC will be expected to exercise good aviation judgment in assessing the overall “Prob” conditions.*
2. *Runways on the same aerodrome are considered to be separate runways when –*
 - (a) *they are separate landing surfaces which may overlay or cross such that if one of the runways is blocked, it will not prevent the planned type of operations on the other runway; and*
 - (b) *each of the landing surfaces has a separate approach procedure based on a separate aid.*
3. *Only operators approved for Category II or III operations may use the planning minima applicable to Categories II and III in the table and then only if the aeroplane is certificated for a one engine inoperative Category II or III approach, as applicable.*
4. *The JAA Information Leaflet No. 20, IL20, may also be used by an operator to conduct an ETOPS operation, together with the ETOPS en route alternate weather criteria determined in this technical standard.*

121.07.10 REFUELLING AND DEFUELLING WITH PASSENGERS ON BOARD

Aeroplanes may be fuelled with passengers embarking, disembarking or on board under the following conditions –

- (a) in order to ensure that crew members receive prompt notification of a situation threatening safety such as major fuel spill or a fire, two way communication is maintained between the ground crew supervising the fuelling and the qualified personnel on board the aeroplane so that the aeroplane can be deplaned or evacuated as necessary;
- (b) a means of communication among the qualified personnel on board the aeroplane, ground/maintenance crews and fuelling agencies is determined and established and the procedures are provided to the appropriate personnel;
- (c) the aeroplane engines are not running unless the aeroplane incorporates a propeller brake and the brake is set. The Aeroplane Flight Manual must refer to the propeller brake/engine as an auxiliary power unit (APU);

- (d) during the fuelling process –
 - (i) aeroplane ground power generators or other electrical ground power supplies are not being connected or disconnected;
 - (ii) combustion heaters installed on the aeroplane (e.g. wing and tail surface heaters, integral cabin heaters) are not operated;
 - (iii) other combustion heaters used in the vicinity of the aeroplane are manufactured to the standards of Underwriters Laboratories or South African Bureau of Standards and approved for use in a hazardous atmosphere;
 - (iv) known high energy equipment such as High Frequency (HF) radios are not operated, unless in accordance with the aeroplane manufacturer's approved flight manual where the manual contains procedures for the use of this equipment during fuelling;
 - (v) weather-mapping radar equipment in the aeroplane is not operated unless in accordance with the manufacturer's approved aeroplane flight manual where the manual contains procedures for use during fuelling;
 - (vi) aeroplane batteries are not being removed or installed;
 - (vii) external battery chargers are not being connected, operated or disconnected;
 - (viii) aeroplane-borne auxiliary power units (APUs) which have an efflux discharging into the zone are not started after filler caps are removed or fuelling connections are made;
 - (ix) if an auxiliary power unit is stopped for any reason during fuelling it shall not be restarted until the flow of fuel has ceased and there is no risk of igniting fuel vapours; however, the APU may be operated in accordance with the manufacturer's approved aeroplane flight manual if the manual contains procedures for starting the APU during fuelling;
 - (x) electric tools or similar tools likely to produce sparks or arcs are not being used; and
 - (xi) photographic equipment is not used within 3 m of the fuelling equipment or the fill or vent points of the aeroplane fuel systems;
- (e) fuelling is immediately suspended when there are lightning discharges within 8 km of the aerodrome;
- (f) the aeroplane is fuelled in accordance with manufacturer's procedures for that type of aeroplane;
- (g) the aeroplane emergency lighting system is armed or on;
- (h) "No Smoking" signs on board the aeroplane are illuminated, as applicable;
- (i) procedures are established to ensure that passengers do not smoke, operate portable electronic devices or otherwise produce sources of ignition;

- (j) a minimum of two exits are designated evacuation exits during fuelling; one of which must be the entry doors through which the passengers embarked;
- (k) the designated evacuation exits during fuelling are identified by aeroplane type and published in the operator's operations manual and are clear and available for immediate use by passengers and crew members should an evacuation be required;
- (l) the operator has procedures in place to ensure that there is a ready escape route from each designated evacuation exit during fuelling and that designated evacuation exits which are equipped with slides have the slides armed or a crew member is in the immediate vicinity to arm the slides if required;
- (m) a means of evacuation such as a deployed integral stair, a loading stair or stand, a loading bridge or a passenger transfer vehicle (PTV) is in place at the aeroplane door used for the embarking and disembarking of passengers and is free of obstruction and available for immediate use by the aeroplane occupants, if necessary;
- (n) for aeroplanes requiring a minimum cabin crew of one, a qualified person trained in the operation and use of emergency exits and in emergency evacuation procedures who is ready to initiate and direct an evacuation is at or near the passenger entry door;
- (o) for aeroplanes requiring a minimum cabin crew of more than one, at least the minimum number of cabin attendants for the aeroplane type or the number of passengers on board, whichever is greater, are on board and positioned at or near each designated evacuation exit during fuelling. Cabin attendants may be replaced by an equivalent number of other staff provided that they have successfully completed the operator's approved emergency evacuation procedures training for that aeroplane type;
- (p) flight crew members inform the senior cabin attendant when they are leaving the aeroplane;
- (q) where desirable for climatic reasons and provided a flight crew member is on board or a means of communication is available to the cabin attendants, an aeroplane embarking door, that is inward opening or that can be fully opened to the exterior without repositioning of loading stairs or stand, may be closed and latched if necessary to keep it closed, but may not be locked; and
- (r) procedures are established to ensure that cabin attendants or qualified persons replacing cabin attendants in accordance with subparagraph (o) are made aware of when fuelling will take place.

121.07.13 OPERATIONAL CONTROL AND SUPERVISION OF FLIGHT OPERATIONS

1. Operational control and supervision

- (1) Operational control is the exercise of authority over the formulation, execution and amendment of an operational flight plan (OFP) in respect of a flight.
- (2) An operator's organisational chart must clearly show that the executive and commercial functions of the operator have no direct link or authority over the operator's operational control system

(OCS) except where such functions are directed through the “operations co-ordination process” as defined herein.

(3) Operations conducted under this Part require either a Type A or Type B OCS.

(4) Definitions

"co-authority dispatch" means a flight where a flight operations officer (FOO) and the pilot-in-command (PIC) share responsibility for the acceptance/completion of the OFP, flight release and flight watch;

"complex operations" means operations where the following conditions exist –

(a) the operator operates more than 10 aeroplanes having an approved passenger seating configuration of more than 50; and

(b) the operator's operations involve international flights;

"conflict resolution" means the process established by the operator and published in its operations manual employed to ensure that any conflict between the FOO and PIC is resolved in a manner that would provide the greatest level of safety;

"direct communication" means the ability of the FOO and PIC to communicate using the operator's facilities, an electronic data link facility or a facility operated by a third party as provided by an agreement;

"flight follower" means the person assigned the responsibility for flight following and such other duties as may be assigned;

"flight following" means the monitoring of a flight's progress, the provision of such operational information as may be requested by the PIC and the notification to appropriate operator and search-and-rescue authorities if the flight is overdue or missing. Meteorological information provided to the PIC by a flight follower shall not include analysis or interpretation by the flight follower unless such flight follower is a certified flight operations officer;

"flight release" means the means by which an operator authorises a flight to depart and represents –

(a) for a co-authority dispatch system, agreement between the PIC and the FOO that the flight has been planned and is being released for flight in accordance with the provisions of the operations manual; and

(b) for pilot self-dispatch, that the PIC is satisfied that the flight is safe for departure in accordance with the provisions of the operations manual;

"flight watch" means maintaining current information on the progress of the flight and monitoring all factors and conditions that might affect the OFP. Meteorological information provided to the PIC by the FOO may include analysis or interpretation;

"operations co-ordination process" means the process by which executive, financial or marketing or other upper management decisions can be effected without circumventing the established operational control system approved for an operator; may be assigned; and

“**timely communication**” means the ability to establish communications domestically within thirty minutes of first trying and internationally within one hour when the flight is in cruise.

2. General

- (1) In order to meet its own operational needs, an operator may choose to operate under an OCS of a higher classification than would normally be required as defined below. In such cases the operator shall fully comply with the higher OCS.
- (2) The Director may require an operator to upgrade its OCS in order to satisfy the conditions for issuance of certain operations specifications.
- (3) Flight dispatch tasks include but are not limited to –
 - (a) obtaining and analysing the weather for the route and any destination or alternate aerodromes, including the determination of any adverse weather that may affect the safety of the flight;
 - (b) obtaining NOTAM information relevant to the flight and determining any effects on the proposed flight(s);
 - (c) determining the mass and balance for the flight;
 - (d) preparing the operational flight plan (OFP) as specified in regulation 121.04.5, with emphasis on fuel requirements and navigational data;
 - (e) preparing and submitting the ATC flight plan;
 - (f) determining the maintenance status of the aircraft, in particular the effects of any unserviceabilities on the proposed route (ETOPS, RVSM, PBN/RNP, etc);
 - (g) determining that the crew is qualified for the area, route and/or aerodromes;
 - (h) preparing the passenger and crew manifest;
 - (i) determining the suitability and availability of all destination or alternate aerodromes, including ensuring aircraft performance and aerodrome operating minima criteria are met for each; and
 - (j) for ETOPS flights, determining that *en route* alternates are within the required diversion time.

3. OCS Types

(1) Type A

A Type A OCS classification shall apply to operators carrying passengers or a combination of cargo and passengers using aeroplanes involved in complex operations.

(2) Type B

A Type B OCS classification shall apply to operators involved in cargo-only operations or carrying passengers or a combination of cargo and passengers using aeroplanes not involved in complex operations.

4. Operational Control Systems Description

(1) Type A OCS

(a) Responsibility and Authority

A Type A OCS is based on a co-authority dispatch system. Under a co-authority dispatch system, the operations manager has delegated authority and responsibility for operational control over each flight jointly to the PIC and the FOO, under which system –

- (i) the FOO is responsible for –
 - (aa) completion of the flight dispatch tasks noted in section 2(3) of this TS;
 - (bb) briefing the flight crew in terms of –
 - (A) forecast and actual weather for each route to be flown and each airport to be used, including forecasts of weather phenomena that may affect the safety of flight, including adverse weather phenomena such as clear air turbulence, thunderstorms and low altitude windshear;
 - (B) current reports or information on airport conditions and irregularities of navigation facilities that may affect the safety of the flight, including NOTAMs and where applicable, relevant operations bulletins affecting the proposed flight;
 - (C) maintenance status of the aeroplane; and
 - (D) a review of all the elements of the OFP;
 - (cc) signing or otherwise acknowledging responsibility for preparation of the flight release, as approved in the OCS;
 - (dd) monitoring the progress of each flight;
 - (ee) issuing necessary information for the safety of the flight, including weather, navigation or aerodrome updates as may be required;
 - (ff) coordinating with air traffic control in the event operational instructions to an aeroplane *en route* are required to be issued that would necessitate a change to the air traffic services flight plan;
 - (gg) assisting the PIC in decision-making with respect to the continuation, diversion or termination of a flight; and
 - (hh) following the procedures prescribed in section 5 of this TS during the progress of an emergency;
- (ii) the PIC is responsible for –
 - (aa) reviewing all dispatch documents relating to the proposed flight and signing for the acceptance of the flight release or otherwise indicating acceptance of the flight release, as approved in the OCS;
 - (bb) providing the FOO with flight information relating to the progress, condition and arrival of the flight, if required;
 - (cc) returning his or her copy of the documents required to be retained in terms of CAR 121.04.1 to the operator, as provided in the operations manual;
 - (dd) conducting the flight in accordance with all published rules and regulations relating to such flight; and

- (ee) following the procedures specified in section 5 of this TS during the progress of an emergency;
 - (iii) the FOO and the PIC share responsibility for flight watch. The FOO shall provide pertinent and related flight information to the PIC including any changes to the OFP proposed by the FOO or the operator;
 - (iv) once a flight has commenced, the final decision on any changes to the OFP shall be taken by the PIC based on considerations of safety. For the purpose of operational control systems, a flight is deemed to be "commenced" after brake release for take-off; and
 - (v) limited pilot self-dispatch of flights may be permitted at those *en route* stops where a lack of communications facilities prevents the co-authority dispatch of a flight. In such cases, the operator shall develop, and submit to the Director for approval, those additional procedures that are intended to compensate for the lack of FOO participation in the release of the next flight.
- (b) Communications
- (i) Timely and direct communication between the responsible flight dispatch centre and the PIC of a flight shall be maintained during flight time over all or almost all of the route structure. A communications capability similar to that required for a Type B OCS may be authorized for mid-route sectors of flights and certain destinations, where direct communication is not practical.
 - (ii) A direct communications capability between the PIC and the flight dispatch centre shall be provided at any station regularly served by the operator. The equipment used shall be accessible to the PIC and may include any or all of the following –
 - (aa) VHF/HF radio voice;
 - (bb) telephone, including satellite or cellular phones;
 - (cc) data link; and
 - (dd) teletype.

Note – This requirement may be waived by the Director at those stations where a lack of facilities prevents communication between the PIC and a flight dispatch centre.

- (c) Flight dispatch centre manning
- (i) The operator shall provide sufficient personnel to operate its OCS based on the operator's workload analysis. In no case shall there be fewer than one qualified FOO on duty per duty period.
 - (ii) Flight followers may be used to augment FOOs: Provided they have been trained with respect to the duties they will be performing, are current and operate under the direction of a qualified FOO.
- (d) Flight dispatch centre
- (i) The flight dispatch centre shall be established so as to ensure operational control throughout the operator's entire route structure or area of operations.
 - (ii) The operator shall establish a system to inform FOOs at each centre of significant changes in flight conditions and in conditions at stations significant to the operator's flights.
 - (iii) Each centre shall have a means of providing to the FOOs without delay –
 - (aa) NOTAM and NOTAM summaries;

- (bb) all weather reports for airports used as destination or alternate airports or for emergencies;
 - (cc) forecasts, area and terminal, for the area of responsibility and such wider area as is needed for proper weather trend analysis; and
 - (dd) weather radar summaries, where available as part of the normal weather reporting system.
- (iv) Each centre shall be provided with –
- (aa) aeroplane operating manuals and MELs, as appropriate;
 - (bb) company operations manual;
 - (cc) airport runway data; and
 - (dd) such additional information as may be needed to enable the formulation of an OFP or to exercise flight watch.
- (v) Each centre shall be provided with communications equipment that ensures –
- (aa) a means to provide a hard copy of or an amendment to an OFP to the PIC; and
 - (bb) direct ATS contact.
- (e) Flight operations officer
- (i) An operator shall establish the daily duty period for each FOO so that it begins at a time that allows him or her to receive a briefing or become familiar with at least –
 - (aa) all pertinent weather charts, weather reports;
 - (bb) NOTAMs or operational restrictions in force; and
 - (cc) flights in the air, flights for which OFPs have been issued but that have not yet commenced and for which he or she will be responsible, as well as the forecast flight schedule.
 - (ii) A FOO shall remain on duty until –
 - (aa) each aeroplane dispatched by him or her has completed its flight or gone beyond his or her jurisdiction; or
 - (bb) relieved by another qualified FOO.
 - (iii) The operator shall ensure that each FOO is trained and qualified in accordance with the requirements of its approved training programme.
 - (iv) The responsible FOO may supervise personnel, including flight followers or other assistants, as part of an approved on-the-job training programme: Provided this supervision does not interfere with the performance of his or her duties.
 - (v) The FOO shall maintain a record of information generated or exchanged in relation to any flight for which that FOO has responsibility.
- (f) Flight release
- (i) The flight release of a flight occurs when the FOO approves the OFP after which it is submitted to the PIC for acceptance and an agreement is reached between both parties with respect to the OFP and the conduct of the flight. When there is disagreement between the FOO and the PIC over the dispatch of a flight, the conflict resolution policy,

as specified in the operations manual, shall be followed. The flight release may be in the form of an OFP or a separate document forming part of the OFP, signed by the FOO and the PIC and issued in accordance with the company operations manual.

Notes –

1. *A flight release need not be signed by the FOO and PIC if an acceptable alternative means of indicating acceptance by both the FOO and PIC has been approved by the Director. 2. In the event the conflict resolution policy is invoked for a flight, a report shall be submitted to the operations manager for his or her assessment and follow-up action, giving full details of the area of conflict and the action taken. Consideration should be given as to whether or not the person responsible for safety is informed of the conflict and the resolution action taken.*

(ii) Each flight release is issued subject to regulations 121.07.13(4) and (5) with respect to the continued validity of a flight release.

(iii) A means shall be provided and procedures developed to ensure that at each location where flights originate, the PIC –

(aa) receives meteorological and NOTAM information related to the flight;

(bb) obtains a hard copy of the OFP; and

(cc) except where communication is not practical, can contact the responsible FOO prior to take-off, if necessary.

(iv) A means shall be provided and procedures developed to ensure that at each location where flights operate, the PIC is able to receive updates on weather, NOTAMs or other information critical to the next flight.

(g) Flight watch

(i) A FOO shall maintain current information on the progress of flights for which he or she is responsible.

(ii) Flight watch shall continue until completion of the flight and all factors and conditions that might affect the OFP shall be communicated to the PIC.

(iii) In-flight reports shall be directed from the PIC to the FOO performing flight watch –

(aa) after each take-off and landing;

(bb) at least once an hour on any flight longer than one hour conducted in uncontrolled airspace;

(cc) at intervals not greater than two hours on international operations where communications are possible;

(dd) when the fuel remaining at any time on the flight falls below the minimum specified in the OFP; and

(ee) where the PIC determines a change is necessary to the OFP *en route*.

(2) Type B OCS

(a) Application for approval

(i) An operator seeking approval to use a Type B OCS shall clearly identify in its operations manual the specific tasks to be performed by the flight crew and flight operations personnel with respect to the flight dispatch tasks as identified in section 2 of this TS.

- (ii) Prior to approval to use a Type B OCS, the operator shall demonstrate to the satisfaction of the Director that the time allotted to the flight crew to complete the flight dispatch tasks assigned to them –
 - (aa) is sufficient to complete all tasks prior to flight and at *en route* stops; and
 - (bb) has been considered when scheduling flight duty periods; in particular, time spent for pre-flight preparation and at *en route* stops.
- (b) Responsibility and authority
 - (i) A Type B OCS is based on pilot self-dispatch. Operational control is delegated to the PIC by the operations manager, who retains responsibility for the day-to-day conduct of flight operations. Under a pilot self-dispatch system, the delegation includes the authority and responsibilities specified in paragraphs (1)(a)(i)(aa) to (dd) and (1)(a)(ii) of this section. However, in the event of an emergency other than an in-flight emergency for which pilot actions are required, the operations manager or his delegate, shall be responsible for the appropriate actions prescribed in section 5 of this TS.
 - (ii) The responsibility for flight following shall be shared between the PIC and the person assigned to flight following in the operator's operational control centre.
- (c) Operational control centre
 - (i) An operator shall establish a centre at which current information on the location of the operator's aeroplanes shall be maintained. Such centre is normally located at the main base of operations or, where appropriate, at a sub-base of operations.
 - (ii) The operator shall establish a system to inform the person responsible for flight following at each centre of significant changes in flight conditions and in conditions at stations significant to the operator's flights.
 - (iii) Each centre shall have a means of providing to the person responsible for flight following without delay –
 - (aa) NOTAM and NOTAM summaries;
 - (bb) all weather reports for airports used as destination or alternate airports or for emergencies; and
 - (cc) forecasts, area and terminal, for the area of responsibility and such wider area as is needed for proper weather trend analysis.
 - (iv) Each centre shall be provided with communications equipment that ensures –
 - (aa) for domestic operations, direct contact with the PIC during flight when operating in the vicinity of airports regularly served by the operator. At those stations where a lack of facilities prevents direct communications between the PIC and flight dispatch centre, reliable indirect contact through a ground station and radio relay from that station by the operator's personnel to the PIC may be permitted;
 - (bb) for international operations, indirect communication with the PIC while airborne through any available means; and
 - (cc) direct ATS contact.
- (d) Communications
 - (i) Direct or indirect communication between the operational control centre and the PIC shall be maintained during flight time with as short a delay of delivery as practical. A private agency under contract to the operator may be approved to provide the required communications services. The use of ATS communications is permitted if the services of a private agency are not available.

- (ii) The means of communicating may be the same as that specified in section 1(1)(b)(ii) of this Technical Standard.
- (e) Operational control centre manning
 - The operator shall provide sufficient personnel to operate its operational control system based on the operator's workload analysis. The operator may utilise FOOs or flight followers or a combination of both.
- (f) Flight operations officers/flight followers
 - (i) The FOO or flight follower, as applicable, shall be qualified in accordance with Subpart 3 of this Part and knowledgeable in the operator's flight alerting procedures.
 - (ii) The operator shall ensure that any other person assigned a responsibility within the OCS is trained and qualified in accordance with the requirements of its approved training programme.
 - (iii) The person responsible for flight following shall maintain a record of information generated or exchanged in relation to any flight for which that FOO or flight follower has responsibility.
- (g) Flight release

Flights operated under this system are self-dispatched and released by the PIC. An operator choosing to use a pilot self-dispatch system shall develop policies and procedures acceptable to the Director for the official flight release and where the PIC is responsible for the development of the OFP, specialised training shall be provided to that pilot.

Note – A pilot self-dispatch system does not provide exemption from the pre-flight duties normally undertaken by the FOO or flight follower; it only allows that such duties are accomplished by the pilot. Normally flight releases would be prepared by a qualified FOO and sent to the line stations where pilot self-dispatch was required.

- (h) Flight following
 - (i) The person responsible for flight following shall monitor each flight from its commencement to its termination, including any intermediate stops or diversions from the flight planned route, and maintain current information on the progress of flights for which he or she is responsible.
 - (ii) Flight following shall include provision for the notification to the operations manager of any missing or overdue aeroplanes.
 - (iii) Flight following procedures shall be described in the operator's operations manual.
 - (iv) The PIC shall ensure that messages concerning aeroplane landings and departures from point of origin, *en route* stops and final destination are passed to the person responsible for flight following for that flight.

5. Emergency response plan

- (1) In a situation in which the PIC is required to take emergency action, he or she shall, in addition to any reports required by regulation 91.02.6, report the matter to the FOO or flight follower responsible for flight monitoring as soon as practical.
- (2) Where the flight operations officer (FOO), flight follower or operations manager becomes aware of any emergency situation that could pose a hazard to a flight in progress, they shall advise the PIC and the appropriate authorities of such emergency by the quickest means available. Furthermore, he or she shall –
 - (a) remain available to the PIC of that flight on a continuous basis until –
 - (i) the threat of such emergency has passed;
 - (ii) the PIC has made a decision and acted upon it and it has been determined that the operator's assistance is no longer required; or
 - (iii) the flight is handed off to another competent person who is able to be of assistance;
 - (b) relay required messages through third parties as necessary to communicate with the flight; and
 - (c) request such assistance from the appropriate authority as may be necessary.
- (3) In the event an aeroplane becomes overdue or is missing, an emergency shall be declared and the overdue or missing aeroplane procedures, as appropriate, shall be followed as prescribed in the operations manual. Such procedures shall include, as a minimum, reporting the overdue or missing aeroplane to an air traffic services unit, the appropriate authority and search and rescue authorities.
- (4) Whenever a PIC, FOO or operations manager exercises emergency authority, he shall declare an emergency and keep the appropriate ATC facility and dispatch centres fully informed of the progress of the flight.
- (5) The person declaring the emergency shall send a written report of the circumstances surrounding the emergency to the operator's operations manager within 48 hours. The operations manager shall submit a report to the Director and any other authority, if required, within 10 days of the incident.

121.07.19 REQUIREMENTS FOR MINIMUM EQUIPMENT LIST

SACAA reviews an operator's proposed MEL in accordance with Technical Guidance Material TGM CA-AOC-008. It is recommended that an operator planning to present a MEL for review first becomes familiar with the procedures contained therein in order to interface with the SACAA operations and airworthiness processes.

TGM CA-AOC-008 is available on the SACAA Website

121.07.23 FUEL POLICY

1. Planning criteria for aeroplanes

- (1) An air operator shall base the fuel policy, including calculation of the amount of fuel to be carried by an aeroplane, on the planning criteria specified in this Technical Standard.

- (2) If the operator's fuel policy is not based on planning as provided in paragraph's (3), (4) or (5), the amount shall be based on –
- (a) taxi fuel, which must not be less than the amount, expected to be used prior to take-off. Local conditions at the departure aerodrome and APU consumption shall be taken into account;
 - (b) trip fuel, which must include –
 - (i) fuel for take-off and climb from aerodrome elevation to initial cruising level/altitude, taking into account the expected departure routing;
 - (ii) fuel from top of climb to top of descent, including any step climb/descent;
 - (iii) fuel from top of descent to the point where the approach is initiated, taking into account the expected arrival procedure; and
 - (iv) fuel for approach and landing at the destination aerodrome;
 - (c) contingency fuel which shall, in addition to the factors noted in section 2 of this Technical Standard, be –
 - (i) the calculated result of a data-driven method using safety risk assessment based on a fuel consumption monitoring programme or advanced use of available *en route* alternates; or
 - (ii) 5 per cent of the planned trip fuel based on the consumption rate used to plan the trip fuel but in any case not lower than an amount to fly for 5 minutes at holding speed at 1 500 feet (450 m) above the destination aerodrome in standard conditions;
 - (d) alternate fuel, which must be sufficient for –
 - (i) if a destination alternate aerodrome is required –
 - (aa) a missed approach from applicable MDA/DH at the destination aerodrome to missed approach altitude, taking into account the complete missed approach procedure;
 - (bb) a climb from the missed approach altitude to cruising level/altitude;
 - (cc) the cruise from top of climb to top of descent;
 - (dd) descent from top of descent to the point where the approach is initiated, taking into account the expected arrival procedure; and
 - (ee) executing an approach and landing at the destination alternate aerodrome;
 - (ii) if two destination alternates are required, alternate fuel shall be sufficient to proceed to the alternate which requires the greater amount of alternate fuel allowing for the consumption specified in sub-subparagraph (i); or

- (iii) if a destination alternate aerodrome is not required, as specified in CAR 121.07.1(4), an amount of fuel sufficient to enable the aeroplane to hold for 15 minutes at 1 500 ft above destination aerodrome elevation in standard conditions;
 - (e) final reserve fuel, which shall be –
 - (i) for aeroplanes with reciprocating engines, fuel to fly for 45 minutes; or
 - (ii) for aeroplanes with turbine engines, fuel to fly for 30 minutes,at holding speed at 1 500 feet above aerodrome elevation in standard conditions, calculated with the estimated mass on arrival at the alternate or the destination, when no alternate is required;
 - (f) additional fuel, which shall be a supplementary amount of fuel required if the minimum fuel calculated in accordance with subparagraphs (c) and (d) above is not sufficient to permit the aeroplane –
 - (i) following the possible failure of a power unit or loss of pressurisation, whichever requires the greater amount of fuel based on the assumption that such a failure occurs at the most critical point along the route, to –
 - (aa) descend as necessary and proceed to an adequate aerodrome;
 - (bb) hold there for 15 minutes at 1 500 feet above aerodrome elevation in standard conditions; and
 - (cc) make an approach landing, and
 - (ii) meet additional requirements not covered in subparagraph (f)(i); and
 - (g) discretionary fuel, which is at the discretion of the PIC.
- (3) If an operator's fuel policy includes replanning based on the use of a decision point while *en route*, the amount of fuel shall be the greater of subparagraph (a) or (b) below –
- (a) the sum of –
 - (i) taxi fuel as specified in paragraph (2)(a) above;
 - (ii) trip fuel to the destination aerodrome as specified in paragraph (2)(b) above, via the decision point;
 - (iii) contingency fuel equal to not less than 5% of the estimated fuel consumption from the decision point to the destination aerodrome;
 - (iv) alternate fuel, if a destination alternate is required, as specified in paragraph (2)(d) above;
 - (v) final reserve fuel as specified in paragraph (2)(e) above;
 - (vi) additional fuel as specified in paragraph (2)(f) above; and
 - (vii) discretionary fuel, if required by the PIC; or

- (b) the sum of –
 - (i) taxi fuel as specified in paragraph (2)(a) above;
 - (ii) the estimated fuel consumption from the departure aerodrome to a suitable *en route* alternate, via the decision point;
 - (iii) contingency fuel equal to not less than 3% of the estimated fuel consumption from the departure aerodrome to the *en route* alternate;
 - (iv) final reserve fuel as specified in paragraph (2)(e) above;
 - (v) additional fuel as specified in paragraph (2)(f) above; and
 - (vi) discretionary fuel, if required by the PIC.

- (4) If an operator's fuel policy includes planning to a destination alternate where the distance between the destination aerodrome and the destination alternate is such that a flight can only be routed via a predetermined point to one of these aerodromes, the amount of fuel must be the greater of subparagraph (a) or (b) below –
 - (a) the sum of –
 - (i) taxi fuel as specified in paragraph (2)(a) above;
 - (ii) trip fuel from the departure aerodrome to the destination aerodrome, via the predetermined point;
 - (iii) contingency fuel calculated in accordance with paragraph (2)(c) above;
 - (iv) additional fuel as specified in paragraph (2)(f) above, if required, but not less than –
 - (aa) for aeroplanes with reciprocating engines, fuel to fly for 45 minutes plus 15% of the flight time planned to be spent at cruising level or two hours, whichever is less; or
 - (bb) for aeroplanes with turbine engines, fuel to fly for two hours at normal cruise consumption after arriving overhead the destination aerodrome, including final reserve fuel; and
 - (v) discretionary fuel, if required by the PIC; or
 - (b) the sum of –
 - (i) taxi fuel as specified in paragraph (2)(a) above;
 - (ii) trip fuel from the departure aerodrome to the alternate aerodrome, via the predetermined point;
 - (iii) contingency fuel calculated in accordance with paragraph (2)(c) above;
 - (iv) additional fuel as specified in paragraph (2)(f) above, if required, but not less than –

- (aa) for aeroplanes with reciprocating engines, fuel to fly for 45 minutes; or
 - (bb) for aeroplanes with turbine engines, fuel to fly for 30 minutes at holding speed at 1 500 feet above aerodrome elevation in standard conditions, including final reserve fuel; and
 - (v) discretionary fuel, if required by the PIC.
- (5) If an operator's fuel policy includes planning to an isolated aerodrome for which a destination alternate is not required or does not exist as specified in regulation 121.07.1(4)(c), the amount of fuel at departure shall include –
- (a) taxi fuel as specified in paragraph (2)(a) above;
 - (b) trip fuel as specified in paragraph (2)(b) above;
 - (c) contingency fuel calculated in accordance with paragraph (2)(c) above;
 - (d) final reserve fuel as specified in paragraph (2)(e) above;
 - (e) additional fuel as specified in paragraph (2)(f) above, if required, but not less than –
 - (i) for aeroplanes with reciprocating engines, fuel to fly for 45 minutes plus 15% of the flight time planned to be spent at cruising level, or two hours, whichever is the lesser; or
 - (ii) for aeroplanes with turbine engines, fuel to fly for two hours at normal cruise consumption after arriving overhead the destination aerodrome; and
 - (f) discretionary fuel, if required by the PIC.

2. Unforeseen circumstances

- (1) At the planning stage, not all factors which could have an influence on the fuel consumption to the destination aerodrome can be foreseen. Therefore, fuel is carried to compensate for unforeseen circumstances such as –
- (a) deviations of an individual aeroplane from the expected fuel consumption data;
 - (b) deviations from forecast meteorological conditions; and
 - (c) deviations from planned routings and/or cruising levels/altitudes.
- (2) This fuel is to be included as part of the contingency fuel planning considerations.

121.07.28 INERTIAL NAVIGATION AND INERTIAL REFERENCE SYSTEMS

1. General

Inertial navigation may be authorised in an air operator's operations specifications. For the holders of an operations specification, inertial navigation may be used to satisfy the requirements

for navigation in airspace where minimum navigation performance specifications apply. The inertial navigation system (INS) or inertial reference system (IRS) and its installation must be certified by the Director as meeting the airworthiness standards prescribed in Part 21.

Notes:

1. *Airworthiness requirements will be satisfied provided that –*
 - (a) *the equipment has been installed to the manufacturer's requirements;*
 - (b) *the installation is listed in the aircraft type certificate or has a supplemental type certificate for the specific aircraft type;*
 - (c) *there is a flight manual supplement covering any system limitations; and*
 - (d) *the system is included in the operator's maintenance program.*
2. *Outside SA (for example, in Europe and over the North Atlantic) other State authorities might require navigation performance different to that required by these standards.*

2. Minimum performance for operational approval

- (1) An INS/IRS must meet the following criteria for operational approval and must be maintained to ensure performance in accordance with the criteria –
 - (a) with a 95% probability the radial error rate is not to exceed 2 nm per hour for flights up to 10 hours duration; and
 - (b) with a 95% probability the cross-track error is not to exceed ± 20 nm and along track error is not to exceed ± 25 nm at the conclusion of a flight in excess of 10 hours.
- (2) The INS/IRS should have the capability for coupling to the aircraft's autopilot to provide steering guidance.
- (3) The navigation system should have the capability for updating the displayed present position.

3. Serviceability requirements

- (1) An INS/IRS may be considered as serviceable for navigation purposes until such time as its radial error exceeds $3 + 3t$ nm (t being the hours of operation in the navigation mode).
- (2) Maintenance corrective action must also be taken when an INS/IRS is consistently providing radial error rates in excess of 2 nm per hour and/or track and along track errors in excess of the tolerance given at subparagraph (1) on more than 5% of the sectors flown.

4. System performance monitoring

The operator is to monitor and record the performance of INS/IRS and may be required to provide details of the system accuracies and reliabilities from time to time.

5. Navigation criteria

Navigation using INS/IRS as the primary navigation means is permitted in accordance with the following conditions –

- (a) initial confidence check. The INS/IRS must be checked for reasonable navigation accuracy by comparison with ground-referenced radio navigation aids (which may include ATC radar) before proceeding outside the coverage of the short range radio navigation aids system;
- (b) maximum time –
 - (i) single INS/IRS –
 - (aa) the maximum operating time since the last ground alignment is not to exceed 10 hours;
 - (bb) on flights of more than 5 hours, any route sector may be planned for navigation by INS/IRS within the appropriate time limits (given in (c) below) but contingency navigation procedures must be available in the event of an INS/IRS inflight unserviceability which would preclude the aircraft's operation on a subsequent route sector for which area navigation is specified; and
 - (cc) INS/IRS may be used as a sole source of tracking information for continuous period not exceeding –
 - (A) 3 hours in controlled airspace other than oceanic control area (OCA);
or
 - (B) 5 hours in OCA or outside controlled airspace (OCTA);
 - (ii) two or more INS/IRS –
 - (aa) if, during a flight, 10 hours elapsed time since the last ground alignment will be exceeded, ground alignment is to be included in the pre-flight flight deck procedures prior to pushback/taxi for departure; and
 - (bb) INS/IRS may be used as the sole source of tracking information for continuous periods not exceeding –
 - (A) 5 hours in controlled airspace other than OCA; or
 - (B) 12 hours in OCA or OCTA;

Notes –

1. *Provided that the use of INS/IRS as the sole means of navigation does not exceed the time limit, the aircraft may be operated for longer periods using the INS/IRS with either manual or automatic updating.*
2. *The 5 hour limit on single INS/IRS ensures 99.74% (3 sigma) probability that loss of satisfactory navigation capability will not occur with equipment mean time between failures (MTBF) of approximately 1900 hours. If the demonstrated MTBF exceeds 2000 hours, the maximum time may be increased.*

- (c) updating inertial present position in flight is permitted in the following instances only
–

- (i) manually –
 - (aa) overhead a VOR beacon;
 - (bb) within 25 nm of a co-located VOR/DME beacon; or
 - (cc) over a visual fix when at a height not more than 5 000 ft above the feature.
- (ii) automatically –
 - (aa) within 200 nautical miles of a DME site when the aircraft's track will pass within 140 nm of the site;
 - (bb) within 200 nm of both DME sites for a DME/DME Fix;
 - (cc) from a co-located VOR/DME beacon provided that updates from a receding beacon are not accepted when the beacon is more than 25 nm from the aircraft;

Notes:

1. *En route VOR and DME sites separated by not more than 500 metres are considered to be co-located.*
 2. *DME slant range error correction might be necessary in some circumstances.*
 3. *Updating a present position from a visual fix may not be planned for IFR flights.*
 4. *A receding beacon is one from which the distance to the aircraft is increasing.*
 5. *Updating in other circumstances (for example, over a NDB) will not provide sufficient accuracy to ensure that the INS/IRS operates within the prescribed tolerances for navigation.*
 6. *Because INS/IRS are essentially accurate and reliable, and ground alignment is more accurate than in-flight updating, updating of present position is usually not warranted especially during the initial few hours of operation. However, INS/IRS errors generally increase with time and are not self-correcting. Unless the error is fairly significant (for example, more than 4 nm/hr along track or 2 nm/hr cross track) it may be preferable to retain the error rather than manually update.*
- (d) Limitation on use. Wherever track guidance is provided by radio navigation aids, the PIC must ensure that the aircraft remains within the appropriate track-keeping tolerances of the radio navigation aids. INS/IRS is not to be used as a primary navigation reference during IFR flight below lowest safe altitude (LSALT); and
 - (e) Pre-flight and *en route* procedures. The following practices are required –
 - (i) new data entries are to be cross-checked between at least two flight crew members for accuracy and reasonableness, or, for single pilot operations, an independent check (for example, of INS/IRS-computed tracks and distances against the flight plan) must be made;
 - (ii) as a minimum, position and tracking information is to be checked for reasonableness (confidence check) in the following cases –
 - (aa) prior to each compulsory reporting point;

- (bb) at or prior to arrival at each *en route* way point during RNAV operation along RNAV routes;
- (cc) at hourly intervals during area type operation off established RNAV routes; and
- (dd) after insertion of new data.

6. Operating criteria

(1) For two or more INS/IRS installations –

- (a) if one INS/IRS fails or can be determined to have exceeded a radial error of $3+3t$ nm, operations may continue on area navigation routes using the serviceable system(s) in accordance with the navigation criteria applicable to the number of INS/IRS units remaining serviceable;
- (b) if –
 - (i) the difference of pure inertial readouts between each pair of INS/IRS is less than $1.4 (3+3t)$ nm, no action is required;
 - (ii) the difference of pure inertial readouts between any pair of INS/IRS exceeds $1.4 (3+3t)$ nm and it is possible to confirm that one INS/IRS has an excessive drift error, that system should be disregarded and/or isolated from the other systems) and the apparently serviceable system(s) should be used for navigation; and

Note – This check and its isolation action are unnecessary if a multiple INS/IRS installation is protected by a serviceability self-test algorithm.

- (iii) if neither condition (i) or (ii) can be satisfied, another means of navigation should be used, and the PIC must advise the appropriate ATS unit.

(2) For single INS/IRS installations, if the INS/IRS fails or exceeds the serviceability tolerance –

- (a) the PIC must advise the appropriate ATS unit of INS/IRS failure;
- (b) another means of navigation is to be used; and
- (c) the aircraft is not to begin a route sector for which area navigation is specified unless it is equipped with an alternative, serviceable, approved area navigation system.

(3) Autopilot coupling to the INS/IRS should be used, whenever practicable, if this feature is available. If for any reason the aircraft is flown without autopilot coupling, the aircraft is to be flown within an indicated cross-track tolerance of ± 2 nm. In controlled airspace the ATS unit is to be advised if this tolerance is exceeded.

7. Navigation tolerances

(1) The maximum drift rate expected from INS/IRS is 2 nm per hour (2 sigma probability). For the purposes of navigation and determining aircraft separation, the 3 sigma figure of 3 nm

is allowed so that the maximum radial error with 3 sigma confidence equals $3+3t$ nm, where t equals the time in hours since the INS/IRS was switched into the navigation mode.

- (2) DME and other inputs can automatically influence the INS/IRS to improve the accuracy of its computed position. The pilot may also insert known position co-ordinates to update the INS/IRS. Therefore, if the system is updated with known position information the position error is reduced and the INS/IRS can be assumed to operate within the radial error tolerance of $3+3T$ nm where T is the time (hours elapsed since the last position update).
- (3) The accuracy of the data used for updating must be considered. The navigation aid positions used for updating inertial present position are accurate to within 0.1 nm. However, the aircraft in flight cannot be "fixed" to the same order of magnitude. The accuracy of the position fix is taken as ± 3 nm radial error.
- (4) Because the INS/IRS error, the navigation aid position accuracy and the position fix errors are independent of each other, the total radial error is determined by the root-sum-square method –

$$\text{Total error} = \sqrt{(3 + 3T)^2 + 0.1^2 + 3^2 \text{ nm}}$$

- (5) The effect of navigation aid position accuracy on the total error is negligible, and so,

$$\begin{aligned} \text{Total error} &= \sqrt{(3 + 3T)^2 + 3^2 \text{ nm}} \\ &= \sqrt{(1 + T)^2 + 1 \text{ nm}} \end{aligned}$$

Substituting values for T at time of update, total

radial error	= 4,2 nm
after 1 hour	= 6,7 nm
after 2 hours	= 9,5 nm
after 3 hours	= 12,4 nm
after 4 hours	= 15,3 nm
after 5 hours	= 18,2 nm
after 6 hours	= 21,2 nm

- (6) If two INS/IRS are installed and the aircraft is navigated by averaging, the inertial present position formula for the total radial error given in subparagraph (4) is modified by multiplying by –

$$\frac{1}{\sqrt{2}} = (= 0,7)$$

- (7) If three INS/IRS are installed and “triple mix” is used, the total radial error is further reduced. For simplicity for navigation and aircraft separation, the tolerances applicable to dual installations apply and the third system provides redundancy.

121.07.30 LOW VISIBILITY OPERATIONS

1. Certification overview

- (1) Low visibility operations (LVO) are comprised of lower-than-normal visibility minima take-off (LVTO) and lower-than-normal weather and visibility minima approach operations (CAT II/III approaches). An applicant for an operations specification authorising low visibility operations shall meet the certification criteria contained in this TS.

Note – To assist an operator in the certification process and establishing operational procedures for CAT II/III operations, SACAA has placed TGM CA AOC-AC-FO-011 Category II and III Operations on its website.

- (2) An operator shall only conduct LVO if –
- (a) the operator has the appropriate operations specifications and its aeroplanes are certificated for LVO and are equipped in accordance with this technical standard or an equivalent regulation accepted by the Director;
 - (b) the operator has an approved training programme and the flight crews and supporting crews, as applicable, are trained and tested in LVO;
 - (c) the operator has established procedures to ensure LVO are conducted to the highest possible level of safety;
 - (d) a suitable system for recording approach or automatic-landing success and failure is established and maintained to monitor the overall safety of the operation;
 - (e) the ground-based equipment meets the LVO criteria for safe operation; and
 - (e) the low visibility operational zone is maintained in a sterile condition during LVO.

Note – Failure to meet any of the above criteria or the certification standards described herein is cause for LVO operations specifications to be suspended.

- (3) The available approvals for LVTO operations are dependent upon the aircraft category and aerodrome equipment and may be –
- (a) RVR not lower than 75 m if using an approved lateral guidance system; and
 - (b) RVR not less than 150 m for Category A, B and C aeroplanes or RVR not less than 200 m for Category D and E aeroplanes if not using an approved lateral guidance system.
- (4) The categories referred to in paragraph (3) above are established on the basis of 1.3 times the stall speed of the aeroplanes in the landing configuration at maximum certificated landing mass and are as follows –
- (a) Category A – less than 91 knots indicated airspeed;

- (b) Category B – 91 knots indicated airspeed or more, but less than 121 knots indicated airspeed;
- (c) Category C – 121 knots indicated airspeed or more, but less than 141 knots indicated airspeed;
- (d) Category D – 141 knots indicated airspeed or more, but less than 166 knots indicated airspeed; and
- (e) Category E – 166 knots indicated airspeed or more, but less than 211 knots indicated airspeed.

Note – In the event of low-visibility procedures being in force, the Air Traffic and Navigation Services Company will report to the Director details of all aeroplanes attempting an approach, the RVR visibility at the time, and the outcome of the approach attempt. This information will be used by the CAA in investigation of approaches attempted outside of the operator's equipment and PIC limitations or approval.

- (5) CAT II/III limits may be found technical standard 91.07.5 of Document SA-CATS 91.

2. Equipment requirements

- (1) The operator of an aeroplane shall include the minimum equipment which shall be serviceable at the commencement of a LVTO or a CAT II or III approach in its operations manual. Details of required equipment for CAT II/III may be found in TGM CA AOC-AC-FO-011 Category II and III Operations, Chapter 2 - Aircraft Requirements.
- (2) An operator shall establish procedures to ensure that the PIC satisfies him or herself that the status of the aeroplane and the relevant airborne systems thereof is appropriate for the specific operation to be conducted.

3. Facilities requirements

- (1) The specific facilities required to ensure safe LVO involve both the aerodrome and the operator.
- (2) No PIC of an aeroplane shall use an aerodrome for LVO, unless the aerodrome is approved for such operations by the appropriate authority of the State in which the aerodrome is located.
- (3) The operator of an aeroplane intended to be used in LVO shall verify that low-visibility procedures have been established and are in force at the aerodromes where such operations are to be conducted.
- (4) Criteria for the approval of an aerodrome to allow LVO to be conducted are –
 - (a) for low visibility take-offs with RVR of ≥ 150 m (≥ 200 m for Category D and E aeroplanes) to < 400 m –
 - (i) multiple RVR sources;
 - (ii) runway high intensity edge lights spaced 60 m or less;

- (iii) runway centreline lights spaced 15 m or less and marking;
- (iv) runway electrical multi-looping (multi-circuit design); and
- (v) a secondary power supply;

- (b) for low visibility take-offs with RVR ≥ 75 m to < 150 m (< 200 m for Category D and E aeroplanes), in addition to those noted in subparagraph (a), a functioning lateral guidance system for take-off; and

Note – For an aerodrome to be approved for LVTO operations, additional criteria are applied based on guidance in ICAO Document 9476, Manual of Surface Movement Guidance and Control Systems, and Document 9365, All Weather Operations Manual. It is up to the operator to ensure an aerodrome is suitably qualified for LVO before using it.

- (c) for CAT II/III operations, refer to TGM CA AOC-AC-FO-011 Category II and III Operations, Chapter 4 - The Airport.

(5) The special requirements for the operator to conduct LVO are –

- (a) the establishment of procedures and instructions to be used for LVTO and Category II and III operations that will ensure-

- (i) the PIC establishes that the status of the visual and non-visual facilities is sufficient prior to commencing a LVTO or a Category II and III approach; and
- (ii) the PIC confirms with the air traffic service unit, before commencing a LVTO or a Category II and III approach, that appropriate low-visibility procedures are in force and the aircraft has been issued the appropriate clearances;
- (iii) a 90 m visual segment is available from the cockpit at the start of the take-off run; and
- (iv) the required RVR value has been achieved for all of the relevant RVR reporting points.

- (b) the flight crew members are properly qualified to carry out a low-visibility take-off or a Category II and III approach; and

- (c) the PIC ensures there are no MEL items or other aeroplane unserviceabilities that would disqualify the flight from attempting a LVO.

4. Personnel requirements

- (1) Criteria for pilot qualifications and crew certification to allow CAT II/II operations to be conducted are covered in TGM CA AOC-AC-FO-011 Category II and III Operations, Chapter 3 - Operation of the Aircraft.
- (2) Each operator applying for authorisation to conduct LVO shall establish and maintain an initial and recurrent flight and ground training and checking programme as specified in section 14 of TS 121.03.3 of Document SA-CATS 121 that will ensure its flight crew are proficient in operating in such environment and shall publish its LVO training programme in its operations manual.
- (3) The flight deck crew qualification requirements are specific to the operator and the type of aeroplane operated and the operator shall ensure that each flight deck crew member completes a flight check (skills test) before conducting LVTO or Category II or III operations and that subsequent proficiency checks include LVO take-offs and approaches.

121.07.31 OPERATION WITH HEAD-UP DISPLAYS OR ENHANCED VISION SYSTEMS

1. Introduction

- (1) This TS provides guidance for the approval for use of head-up displays (HUD) and enhanced vision systems (EVS) intended for installation and operational use in aircraft engaged in commercial operations. HUD and EVS may be installed and operated to enhance situational awareness or to obtain an operational credit such as lower minima for take-off, approach or landing operations. HUD and EVS may be installed separately or together as part of a hybrid system. Use of these systems during instrument flight and any operational credit gained from their use requires approval from the Director.
- (2) No pilot may use a HUD or EVS in flight in IMC unless such pilot has received the training and checking specified in this TS.
- (3) No operator shall permit anyone to use a HUD or EVS in flight under IFR in an aircraft so equipped unless the aircraft has been approved for such flight as specified in this TS.

2. Head-up displays

- (1) HUD may be used for the following purposes –
 - (a) to supplement conventional flight deck instrumentation in the performance of a particular task or operation. The primary cockpit instruments remain the primary means for manually controlling or manoeuvring the aircraft; and
 - (b) as a primary flight display –
 - (i) information presented by the HUD may be used by the pilot in lieu of scanning head-down displays. Operational approval of a HUD for such use allows the pilot to control the aircraft by reference to the HUD for approved ground or flight operations; and
 - (ii) information presented by the HUD may be used as a means to achieve additional navigation or control performance. Operational credits, in the form of lower minima, for HUD used for this purpose may be approved for a particular aircraft or automatic flight control system. Additional credit may also be allowed to conduct operations with HUD in situations where automated systems are otherwise used.
- (2) Ground training in the use of the HUD shall be accomplished at an approved training organisation (ATO) or as part of an approved training programme. The programme shall include, as a minimum, the following –
 - (a) an understanding of the HUD and symbology;
 - (b) HUD limitations and normal procedures, including maintenance and operational checks performed to ensure normal system function prior to use;
 - (c) failure modes of the HUD and the impact of the failure modes or limitations upon crew performance;
 - (d) consideration of the potential for loss of situational awareness due to "tunnel vision" (also known as cognitive tunnelling or attention tunnelling); and

- (e) any effects that weather, such as low ceilings and visibilities, may have on the performance of a HUD.
- (3) Flight training of at least two hours shall be accomplished using an aircraft or flight simulation training device (FSTD) equipped with the same type of HUD to be used in the aircraft. The training shall consist of normal, abnormal and emergency use of the equipment throughout all flight phases, a variety of take-off and approach conditions and shall include –
- (a) pilot seat adjustment to attain and maintain appropriate viewing angles and verification of HUD operating modes;
 - (b) operations during critical flight events (ACAS TA/RA, upset and wind shear recovery, engine or system failure, etc);
 - (c) crew coordination, monitoring and verbal call-out procedures for single HUD installations with head-down monitoring for pilot-not-equipped with HUD and head-up monitoring for pilot-equipped with HUD;
 - (d) crew coordination, monitoring and verbal call-out procedures for dual HUD installations with use of the HUD by the pilot flying the aircraft and either head-up or head-down monitoring by the other pilot; and
 - (e) use during low visibility operations, including taxi, take-off, instrument approach and landing in both day and night conditions. This training should include the transition from head-down to head-up and head-up to head-down operations.

2. Enhanced vision systems

- (1) Enhanced vision systems (EVS) allow the pilot to view an image of the external scene obscured by darkness or other visibility restrictions which –
- (a) may improve situational awareness;
 - (b) may allow pilots to detect terrain or obstructions on the runway or taxiways;
 - (c) may provide visual cues to enable earlier runway alignment and a more stabilized approach; and
 - (d) may also be used to obtain approval to use reduced visibility minima when the images are presented into the pilot's external field of view on a HUD without significantly restricting that view.
- (2) For an operator who wishes to use EVS in IFR flight, EVS ground training shall be accomplished at an ATO or as part of an approved training programme. The programme shall include, as a minimum, the following –
- (a) an understanding of the system characteristics and operational constraints;
 - (b) normal procedures, controls, modes and system adjustments;
 - (c) EVS limitations;
 - (d) failure modes of the EVS and the impact of the failure modes or limitations upon crew performance, in particular, for two-pilot operations; and

- (e) any effects that weather, such as low ceilings and visibilities, may have on the performance of an EVS.
- (4) For an operator who wishes to use EVS in IFR flight, flight training shall be accomplished using an aircraft or FSTD equipped with the same type of EVS to be used in the aircraft. The training shall consist of normal, abnormal and emergency use of the equipment throughout all flight phases, a variety of approaches and take-off conditions and shall include –
 - (a) enhanced vision display during low visibility operations, including taxi, take-off, instrument approach and landing and system use for instrument approach procedures in both day and night conditions;
 - (b) crew coordination and monitoring procedures and pilot call-out responsibilities;
 - (c) transition from enhanced imagery to visual conditions during the runway visual acquisition; and
 - (d) rejected landing due to loss of visual cues of the landing area, touchdown zone or rollout area.

3. HUD and EVS approval

- (1) An operator shall obtain operational and airworthiness approval for the use of a HUD or EVS in IFR flight.
- (2) For enhanced situational awareness, the installation and operational procedures shall ensure that EVS operations do not interfere with normal procedures or the operation or use of other aircraft systems.
- (3) HUD or EVS, as applicable, installed in aircraft in the State of Manufacture shall meet the airworthiness requirements of such State. Provided an owner or operator can submit evidence of meeting the requirements of the State of Manufacture, airworthiness approval for the use of the HUD or EVS, as applicable, in that aircraft shall be given.
- (4) Prior to installing a HUD or EVS, as applicable, as a retrofit, an owner or operator shall contact the SACAA to determine the airworthiness requirements associated with its approval for use.
- (5) An airworthiness approval issued to an operator for an aircraft shall be valid for any other aircraft of the same type operated by such operator: Provided the HUD or EVS equipment, as applicable, is the same in each aircraft.
- (6) An airworthiness approval issued to an aircraft type may be extended to other aircraft types: Provided the Director is of the opinion that the other aircraft types have sufficient commonality with the approved aircraft and the HUD or EVS equipment, as applicable, is the same in all the aircraft.
- (7) Pilots shall pass a knowledge test following the ground training and a skills test following the flight training, both of which shall be administered by the operator or an authorised person. Upon successful completion of the skills test, the operator shall record the candidate's qualification to operate with a HUD or EVS, as applicable, in his or her training records.
- (8) Annual recurrent training in the use of a HUD or EVS, as applicable, shall be accomplished.

1. Introduction

- (1) This Technical Standard provides guidance for the approval for use of installed and portable electronic flight bags (EFB).
- (2) Installed EFBs may be incorporated during the aeroplane type design, by a change to the type design or added by a supplemental type certificate.
- (3) Portable EFBs are not considered to be part of the certified aeroplane configuration and do not require airworthiness approval.

Note – Refer to section 2 for additional information concerning portable EFBs.

2. Airworthiness approval

- (1) Portable EFBs that do not require airworthiness approval –
 - (a) are generally commercial-off-the-shelf (COTS)-based computer systems used for aircraft operations (e.g. laptop, tablet PC);
 - (b) are not attached to an aeroplane mounting device;
 - (c) are considered to be a controlled portable electronic device (PED);

Note.— A controlled PED is a PED that is subject to administrative control by the company. This will include, inter alia, tracking the location of the devices to specific aeroplanes or persons and ensuring that no unauthorized changes are made to the hardware, software or databases. A controlled PED will also be subject to procedures to ensure that it is maintained to the latest amendment state.

- (d) may only connect to aircraft power through a certified power source;

Note— The EFB power source should be designed such that it may be deactivated at any time. Where there is no possibility for the flight crew to quickly remove or unplug the power to the EFB system, a clearly labelled and conspicuous means (e.g. on/off switch) should be provided. Circuit breakers are not to be used as switches; their use for this purpose is prohibited.

- (e) are normally without aeroplane data connectivity except under specific conditions; and

Notes — Data connectivity of the EFB to other aeroplane systems is not authorized except if the EFB system is connected to –

- 1. *a system completely isolated from the avionics/aeroplane systems (e.g., EFB system connected to a transmission medium that receives and transmits data for Aircraft Administrative Communications (AAC) purposes for usage on the ground only); and*
- 2. *a certified data link to receive data only from aeroplane systems, where the data link, through the certification process, has an approved security device to protect the aeroplane systems from receiving any data from the EFB system and from the installation or use of unauthorized applications and data. Through the certification process, this data link should also have been demonstrated to protect the installed*

aeroplane systems from adverse effects due to EFB system failures. Subject to the above provisions, there is no further evaluation required when connecting the EFB system to the aeroplane data link port.

- (f) shall be secured during critical phases of flight.
- (2) Even though portable EFBs do not require an airworthiness approval as they are “non-installed equipment”, electro-magnetic interference (EMI) demonstrations, batteries/power sources, data connectivity and rapid depressurization shall be assessed if the Director so determines.
- (3) For EFBs other than those addressed in paragraph (1), the entire EFB, or some elements of the EFB, shall require an airworthiness approval. Elements to be subject to airworthiness approval are determined upon analysis of their interface with aeroplane systems and equipment. These EFBs shall be included as part of the minimum equipment list (MEL), if applicable.
- (4) EFBs integrated into the aeroplane as part of its initial design or installed later as a retrofit in accordance with the requirements of the State of Manufacture shall be given approval: Provided the operator can submit evidence of having met the requirements of the State of Manufacture.
- (5) For aeroplanes without the evidence specified in paragraph (4), an operator shall contact the SACAA to determine the airworthiness requirements associated with its approval for use prior to installing an EFB as a retrofit,.

3. Operational approval

- (1) An operator transitioning to a paperless flight deck (i.e., removal of charts, manuals, etc.) shall complete the requirements specified in paragraph's (2) to (6), inclusive, prior to operating with an EFB.
- (2) Operational approval is contingent on the operator completing ground training for personnel using the EFB system. The programme shall include, as a minimum, –
 - (a) an overview of the system architecture;
 - (b) pre-flight checks of the system;
 - (c) limitations of the system;
 - (d) the use of each operational function on the EFB;
 - (e) restrictions on the use of the system, including when some or all of the EFB functions are not available;
 - (f) the conditions, including phases of flight, under which the EFB should not be used;
 - (g) procedures for cross-checking data entry and computed information;
 - (h) human performance considerations on the use of the EFB; and
 - (i) additional training for new applications, new features of current applications or changes to the hardware configuration.
- (3) EFB operations with no paper backup shall have a means of mitigation against the effects of a failure or malfunction of the EFB. Mitigation against EFB failure or impairment may be accomplished by a combination of –

- (a) system design;
 - (b) separate and backup power sources for the EFB;
 - (c) redundant EFB applications hosted on different EFB platforms;
 - (d) paper products carried by selected crew members;
 - (e) complete set of paper backups on the flight deck; and/or
 - (f) procedural means.
- (4) The operator shall assign responsibility for the administration and physical control of EFBs and the associated software; in particular, the activation of amendments to the hardware and software.
- (5) The operator shall ensure that the EFB is protected from unauthorized intervention.
- (6) The operator shall ensure that the EFB is maintained in accordance with the manufacturer's recommended programme. The operator shall establish procedures for action to be taken when an EFB is out of service unless provided for in a MEL.
- (7) Prior to use of a portable EFB, an assessment shall be made of how the device will be used on the flight deck. Safe stowage, crashworthiness, security and use under normal environmental conditions, including turbulence, shall be addressed by the operator.
- (8) Whether the EFB is portable or integrated with the aeroplane, the operator shall carry out an assessment of the human-machine interface and aspects of crew coordination when using the EFB. Whenever possible the EFB/user interface should be consistent with, but not necessarily identical to, the flight deck design philosophy. The assessment should include –
- (a) general considerations including flight crew member workload, integration of the EFB into the flight deck, display and lighting issues, system shutdown and system failures;
 - (b) physical placement issues, including stowage area, use of unsecured EFBs, design and placement of the mounting cradle;
 - (d) consideration of possible interference with aeroplane controls, outside vision, view of other flight deck displays, oxygen mask access, egress, crew cooling and speaker sound;
 - (e) software considerations, including ease of access to common and time-critical system functions, consistency of symbols, terms and abbreviations, legibility of text, system responsiveness, use of colour, display of system status, error messages, management of multiple applications and use of active regions;
 - (f) hardware considerations, including controls and input devices and flight crew accessibility to these devices; and
 - (g) application-specific considerations, including organization and appearance of information, system detection of data entry errors and user interaction with applications.
- (9) If an EFB generates information similar to that provided by existing flight deck systems, procedures should clearly identify –

- (a) which information source will be primary;
 - (b) which source will be used for back-up information;
 - (c) under what conditions the back-up source will be used; and
 - (d) what actions will be taken when information provided by an EFB does not agree with that from other flight deck sources or, if more than one EFB is used, when one EFB disagrees with another.
- (10) Upon receiving airworthiness approval and meeting the requirements of paragraph's (2) to (9), inclusive, the operator shall undergo a six-month self-evaluation period during which paper backups of the materials on the EFB shall be carried. The back-up paper materials shall be readily available to the flight crew members during flight time.
- (11) If, following the six-month evaluation period, the operator is satisfied that the equipment and procedures are adequate and the crew members, maintenance personnel and other persons involved in the use of the EFB are sufficiently trained and knowledgeable, the operator shall submit a request to the SACAA seeking approval to use the EFB.
- (12) The SACAA assessment of an application to use EFBs will be based upon –
- (a) confirmation that the requirements of paragraph's (2) to (9), inclusive, have been met;
 - (b) a demonstration of system reliability and that information provided will not be inaccurate or misleading;
 - (c) that the operator has established a means to carry out quality assurance approval of data content prior to installation on the EFB; and
 - (d) satisfactory completion of a demonstration flight using the EFB.
- (13) The authorisation to use EFBs shall contain any restrictions or limitations that the Director deems necessary in the interests of safety.
- (14) If the EFB provides electronic displays that replace paper products formerly required for safe flight operations or is a source for other required information or displays, operations of the EFB should be described in the Operations Manual.

121.07.37 CARRY-ON BAGGAGE

1. Procedures for stowing of carry-on baggage

- (1) Procedures established by an operator to ensure that carry-on baggage is adequately and securely stowed shall take account of the following –
- (a) each item carried in a cabin must be stowed only in a location that is capable of restraining it;
 - (b) mass limitations placarded on or adjacent to stowages shall not be exceeded;
 - (c) underseat stowage areas shall not be used unless the seat is equipped with a restraint bar and the baggage is of such size that it may adequately be restrained by this equipment;

- (d) items shall not be stowed in toilets or against bulkheads that are incapable of restraining articles against movement forwards, sideways or upwards and unless the bulkheads carry a placard specifying the greatest mass that may be placed there;
 - (e) baggage placed in lockers shall not be of such size that they prevent latched doors from being closed securely;
 - (f) baggage shall not be placed where it will impede access to emergency equipment; and
 - (g) checks shall be made before take-off, before landing and whenever the PIC illuminates the fasten seat belts sign, or otherwise so orders, to ensure that baggage is stowed where it cannot impede evacuation from the aeroplane or cause injury by falling, or other movement, as may be appropriate to the phase of flight.
- (2) All baggage which is required to be brought into the cabin area shall be –
- (a) of a size as established by the operator but shall not exceed the dimensions 56cm x 36cm x 23cm;
 - (b) of a weight as established by the operator but shall not exceed 7kg per item; and
 - (c) of an amount as established by the operator but shall not exceed one bag per economy class seat or two bags per first or business class seat; and

121.07.38 HOLD BAGGAGE SCREENING

1. Applicability

The requirements prescribed in this technical standard applies to –

- (a) the operator of a large commercial air transport aeroplane, engaged in international civil aviation operations;
- (b) the operator of a commercial air transport aeroplane engaged in scheduled commercial air service; and
- (c) the holder of an aerodrome licence.

2. Definitions

Any word or expression to which a meaning has been assigned in the Act, the Regulations, or the National Aviation Security Plan, bears, when used in this technical standard, the same meaning unless the context indicates otherwise, and –

“hold baggage” means the personal property of passengers or crew carried in the hold of an aircraft by agreement with the operator and refers to both originating baggage and transfer baggage; and

"mishandled baggage" means baggage involuntarily or inadvertently separated from the passenger or crew.

3. General principles for the handling of hold baggage

- (1) No hold baggage shall be loaded onto an aircraft unless it has been screened in accordance with regulations prescribed in this Part and Part 139 respectively
- (2) The operator or holder of an aerodrome licence referred to in section 1 must ensure that all hold baggage is subjected to security screening prior to being placed on board an aeroplane.

- (3) The screening of hold baggage must be carried out either before, during or after check-in.
- (4) Transfer baggage may only be carried if such baggage is positively matched with the passenger after he/she has been accepted for the flight.
- (5) Areas that may be considered for hold baggage screening point locations are –
 - (a) point of entry into passenger terminal;
 - (b) point of entry into check-in area;
 - (c) point of check-in; and
 - (d) post check-in.
- (6) It must be noted that these location points have their advantages and disadvantages and must be selected appropriately and according to the airport infrastructure. The processes thereof shall be carefully developed taking into account the flow of baggage system. These processes shall be documented and made part of the hold baggage process which shall be included in the Airport Security Programme.
- (7) The four areas referred to in paragraphs (5)(a) to (d) above must all provide for a decent searching point, reconciling the passenger and his or her baggage for searching purposes should a suspicious item/article be identified.

4. Check in and reconciliation of hold baggage

- (1) In addition to other requirements prescribed in the CAR and in the associated technical standards, the following minimum requirements must be followed during check-in –
 - (a) hold baggage shall not be accepted for carriage by air unless the relevant passenger is present and has been questioned to help detect situations in which a device may have been placed in the passenger's hold baggage without his or her knowledge;
 - (b) should questioning of the passenger raise any doubts about packing or supervision of the hold baggage, then the hold baggage shall be subjected to extra security screening;
 - (c) hold baggage must only be accepted from ticketed passengers who have been issued with boarding/similar pass and by a responsible or authorized representative of the air carrier; and
 - (d) hold baggage labels and tags used by operators must be strictly controlled to minimize theft and their subsequent use thereof to introduce hold baggage into the baggage handling system at a point beyond the screening process.
- (2) The operator shall conduct baggage reconciliation and authorization confirming or ensuring that the hold baggage that has been loaded belongs to passengers of the relevant flight who have actually boarded the aircraft and that the hold baggage has been subjected to the necessary security controls and is authorized for loading on that aircraft.
- (3) Special procedures shall be implemented to ensure that in the event of a passenger disembarking at a station earlier than his or her final destination, his or her hold baggage is removed from the aeroplane.
- (4) Mishandled baggage shall be dealt with and transported according to the procedures prescribed in the operator's security programme for mishandled baggage.
- (5) Hold baggage of a passenger who is denied boarding for security reasons, or for refusal to be screened or who has not boarded the aeroplane, must be off-loaded. The same applies to a passenger who decides, for any reason whatsoever, to disembark after boarding. This requirement is in addition to, and shall be applied irrespective of, other security measures such as screening aimed at ensuring that the hold baggage does not contain any explosives or explosive devices.

- (6) Any hold baggage intended for carriage on passenger flights originating from off-airport check-in facilities must be subjected to higher security measures than those carried out at airport check-in facilities as per the agreed upon and approved Standard Operating Procedure between the operator and the SACAA. Any operator wishing to carry out off-airport check-in must first develop written procedures and contingency plan and shall submit those for approval by the Director. Off-airport check-in shall not be carried out unless there has been prior written approval by the Director.

5. Minimum requirements for screening of hold baggage

- (1) The operator referred to in section 1 shall establish written procedures to ensure that hold baggage is screened taking into account the minimum requirements prescribed in this technical standard.
- (2) The under-mentioned security measures shall be applied either individually, except the method prescribed in subparagraph (a), or in combination, but never exclusively, to screen hold baggage checked in for carriage by air –
- (a) searching by hand or physical search;
 - (b) screening by x-ray machine;
 - (c) screening by explosive trace detection or other similar acceptable and approved devices; or
 - (d) applying other means, both technical and bio sensory as vapour, trace detectors and dogs.
- (3) When using the method of physical search or search by hand, the following requirements shall be followed –
- (a) the search shall be done in the presence of the passenger;
 - (b) the hold baggage shall be opened by or in front of the passenger;
 - (c) the search shall be conducted in a systematic manner, by searching between each layer of clothing and other items packed within the hold baggage;
 - (d) other loose bags within the hold baggage shall also be opened and searched; and
 - (e) upon completion of the search, the passenger shall repack the hold baggage before leaving the search area.
- (4) When using the method of screening by x-ray machine, the following requirements shall be followed –
- (a) the operator shall ensure that all personnel handling the machine are adequately trained to operate the machine, and that such staff are able to clear alarms in terms of the protocols and layout of the system;
 - (b) the personnel operating the x-ray machine shall rotate between positions at least every twenty minutes; and
 - (c) where the x-ray machine is unserviceable or cannot be used for any other reason, measures shall be put in place for an appropriate supplementary procedure to be carried out and in line with the standard operating procedure
- (5) The screening of hold baggage shall be conducted by an authorized security officer duly qualified and certified in terms of the CAR to perform such function.
- (6) Should a suspicious item be detected in the hold baggage, the passenger must be summoned to account for such baggage, and thereafter the baggage must be subjected to additional security checks. All suspicious items or baggage shall be kept aside and not loaded into the aeroplane until they are subjected to additional security measures and are cleared.

- (7) Hold baggage that has been subjected to the screening process –
- (a) must be kept under the supervision and control of security or authorized agent;
 - (b) must be protected from unauthorized access until it is claimed by the passenger at final destination;
 - (c) must be kept under constant surveillance from time of acceptance until loaded in the aeroplane and if transported by vehicle, it shall be enclosed and capable of being locked. It may be necessary in increased threat situations to provide a security escort from the baggage make-up area to the aeroplane; and
 - (d) must not be mixed with unscreened baggage.
- (8) No hold baggage shall be exempted from screening.
- (9) The levels of screening applied at any period shall be determined by the level of threat and detection of any device intended to commit an act of unlawful interference.

6. Procurement and maintenance of security screening equipment

- (1) Any equipment operated by an operator to screen hold baggage, shall comply with the requirements specified in the National Aviation Safety Plan.
- (2) Prior to procurement of security screening equipment for use in compliance with this technical standard, a request shall be made to the Chief, Civil Aviation Security for the minimum specifications and approval of the equipment.
- (3) The Chief, Civil Aviation Security shall approve the hold baggage screening equipment after the operator has met all required processes ranging from procurement, implementation and development of relevant written procedures.
- (4) The screening equipment must be kept in a serviceable condition and tested at all times, according to the requirements prescribed in the National Aviation Security Plan.
- (5) Records of maintenance and testing must be kept and made available for inspection on request by the Director.
- (6) A contingency plan must be put in place to be applied in case of malfunction of the screening equipment.

7. Monitoring

Incidents, discrepancies and non-compliances shall be recorded and reported to the Aviation Security Supervisor or relevant authority.

121.07.42 BRIEFING OF PASSENGERS

1. Standard Safety Briefing

The standard safety briefing shall consist of an oral briefing provided by a crew member or by audio or audio-visual means in at least the English language or as required by the Director, which includes the following information as applicable to the aeroplane, equipment and operation –

- (a) prior to take-off –
 - (i) when, where, why and how carry-on baggage is required to be stowed;

- (ii) the fastening, unfastening, adjusting and general use of safety belts or safety harnesses;
- (iii) when seat backs must be secured in the upright position and tray tables must be stowed;
- (iv) the location of emergency exits;
- (v) the floor proximity emergency escape path lighting system;
- (vi) the location, purpose of, and advisability of reading the safety features card;
- (vii) the regulatory requirement to obey crew instructions regarding safety belts and no smoking or 'Fasten Seat Belt' and 'No Smoking' signs and the location of these signs;
- (viii) where cabin crew members are not required, the location of any emergency equipment the passenger may have a need for in an emergency situation such as the ELT, fire extinguisher, survival equipment, including the means to access it if in a locked compartment, first aid kits and life rafts;
- (ix) the use of passenger operated portable electronic devices;
- (x) the location and operation of the fixed passenger oxygen system, including the location and presentation of the masks; the actions to be performed by the passenger in order to obtain the mask, activate the flow of oxygen and correctly don and secure the mask. This will include a demonstration of their location, method of donning, including the use of elastic band, and operation and instruction on the priority for persons assisting others. This briefing may be completed after take-off but prior to reaching 25 000 feet; and
- (xi) the location, use of and when to inflate life jackets, including how to remove them from stowage/packaging, and a demonstration of the method of donning and inflation. This briefing may be completed after take-off but prior to the overwater portion of the flight;
- (b) after take-off –
 - (i) that smoking is prohibited; and
 - (ii) the advisability of using safety-belts or safety harnesses during flight;
- (c) in-flight when the 'Fasten Seat Belt' sign has been turned on for reasons of turbulence –
 - (i) when the use of seat belts is required; and
 - (ii) when the level of turbulence is anticipated to exceed light, the requirement to stow carry-on baggage;
- (d) prior to landing –
 - (i) carry on baggage stowage requirements;
 - (ii) correct seat back and chair table positioning;
 - (iii) on flights scheduled for four hours duration or more, the location of emergency exits; and
 - (iv) the seat belt requirement; and
- (e) after landing, prior to gate arrival –
 - (i) the no smoking requirement; and
 - (ii) that there will be guidance given with respect to –
 - (aa) the safest direction and most hazard-free route for passenger movement away from the aeroplane following disembarkment; and
 - (bb) any dangers associated with the aeroplane type such as pitot tube locations, propellers or engine intakes.

Note – The safety message of the briefing may not be diluted by the inclusion of any service information, advertising or non-related comments that would affect the integrity of the safety briefing.

2. Individual Safety Briefing

The individual safety briefing shall include –

- (a) any information contained in the standard safety briefing and the safety_features card that the passenger would not be able to receive during the normal conduct of that safety briefing; and
- (b) additional information applicable to the needs of that person as follows –
 - (i) the most appropriate brace position for that passenger in consideration of his/her condition, injury, stature and/or seat orientation and pitch;
 - (ii) the location to place any service animal that accompanies the passenger;
 - (iii) for a mobility-restricted passenger who needs assistance in moving expeditiously to an exit during an emergency –
 - (aa) a determination of what assistance the person would require to get to an exit;
 - (bb) the route to the most appropriate exit;
 - (cc) the most appropriate time to begin moving to that exit; and
 - (dd) a determination of the most appropriate manner of assisting the passenger;
 - (iv) for a visually impaired person –
 - (aa) detailed information of and facilitating a tactile familiarization with the equipment that he/she may be required to use;
 - (bb) advising the person where to stow his/her cane if applicable;
 - (cc) the number of rows of seats between his/her seat and his/her closest exit and alternate exit;
 - (dd) an explanation of the features of the exits; and
 - (ee) if requested, a tactile familiarization of the exit;
 - (v) for a comprehension-restricted person: while using the safety features card, pointing out the emergency exits and alternate exits to use and any equipment that he/she may be required to use;
 - (vi) for persons with a hearing impairment –
 - (aa) while using the safety features card, point out the emergency exits and alternate exits to use and any other equipment that the person may be required to use; and
 - (bb) communicating detailed information by pointing, face-to-face communication permitting speech reading, pen and paper, through an interpreter or through their attendant;
 - (vii) for a passenger who is responsible for another person on board, information pertinent to the needs of the other person, as applicable –
 - (aa) in the case of an infant –
 - (A) seat belt instructions;
 - (B) method of holding infant for take-off and landing;
 - (C) instructions pertaining to the use of a child restraint system;
 - (D) oxygen mask donning instructions;
 - (E) recommended brace position; and
 - (F) location and use of life preservers, as required.
 - (bb) in the case of any other person –
 - (A) oxygen mask-donning instructions;
 - (B) instructions pertaining to the use of a child restraint system;and
 - (C) evacuation responsibilities; and

- (viii) for an unaccompanied minor, instructions to pay close attention to the normal safety briefing and to follow all instructions. A passenger that has been provided with an individual safety briefing need not be re-briefed following a change in crew if the crew member that provided the individual safety briefing has advised a member of the new crew of the contents of that briefing, including any information respecting the special needs of that passenger. A passenger may decline an individual safety briefing.

3. Passenger Preparation for Emergency Landing

The emergency briefing provided in the event of an emergency where time and circumstances permit shall consist of instructions pertaining to –

- (a) safety belts/safety harnesses;
- (b) seat backs and chair tables;
- (c) carry-on baggage;
- (d) safety features cards;
- (e) brace position (how to brace, when to assume position, how long to remain);
- (f) if applicable, life preservers;
- (g) location of exits;
- (h) if applicable, evacuation procedures for an occupant of a child restraint system; and
- (i) the removal of any other item that may cause harm to passengers during evacuation; i.e. sharp objects, high heeled shoes, pencils, etc.

121.07.43 SAFETY FEATURES CARD

The safety features card shall contain the following information as applicable to the aeroplane and equipment carried –

- (a) general safety information including –
 - (i) smoking is prohibited on board the aeroplane;
 - (ii) each type of safety belt or safety harness installed for passenger use, including when to use, and how to fasten, tighten and release;
 - (iii) where carry-on baggage must be stowed for take-off and landing and any other related requirements and restrictions pertinent to that particular aeroplane; and
 - (iv) correct positioning of seat backs and chair tables for take-off and landing;
- (b) emergency procedures and equipment including –
 - (i) fixed passenger oxygen system showing –
 - (A) mask location and presentation; the actions to be performed by the seated passenger in order to obtain the mask, activate the flow of oxygen and correctly don and secure the mask; and
 - (B) priority for persons assisting others with oxygen;
 - (ii) for aeroplanes where cabin crew members are not carried or are otherwise exempted from being carried –
 - (A) location of first aid kits;
 - (B) location of fire extinguishers that would be accessible to the passengers;
 - (C) location of ELTs; and
 - (D) location of survival equipment and if the stowage compartment is locked, the means of access or location of the key;
 - (iii) passenger brace position for impact, as appropriate for each type of seat and restraint system installed for passenger use; including the brace position for an adult holding an infant;

- (iv) the location, operation and method of using each emergency exit type on the aeroplane, including identification of those emergency exits known to be rendered unusable in a ditching or because of the aeroplane configuration such as a combi configuration;
 - (v) the safest direction and most hazard-free escape route for passenger movement away from the aeroplane following evacuation;
 - (vi) the attitude of the aeroplane while floating;
 - (vii) location of life preservers and correct procedures for removal from stowage/packaging; donning and use of the life jacket for adult, child and infant users, including when to inflate;
 - (viii) location and use of life rafts;
 - (ix) location, removal and use of flotation devices; and
 - (x) the form, function, color and location of any floor proximity emergency escape path lighting system that is installed; and
- (c) the safety features card shall bear the name of the operator and the aeroplane type and shall contain only safety information that is –
- (i) accurate for the aeroplane type and configuration in which it is carried and in respect of the equipment carried;
 - (ii) presented with clear separation between each instructional procedure. All actions required to complete a multi-action procedure to be presented in correct sequence and the sequence of actions to be clearly identified; and
 - (iii) depicted in a clear and distinct manner.

121.08.1 GENERAL REQUIREMENTS

1. General

- (1) Operations Using Other than Approved Performance Data - Contaminated Runway
 An operator may elect to use performance data from a source other than the aeroplane flight manual when operating an aeroplane to or from a contaminated runway: Provided –
- (a) the aeroplane shall be operated in accordance with a contaminated runway operations supplement to the flight manual that has been prepared or approved by the aeroplane manufacturer;
 - (b) take-off mass limitations may be based on an engine-out condition using a 15-foot screen height, provided the area to be used for first segment climb contains no obstacles taller than 15 feet;
 - (c) where the manufacturer permits, stopping distance calculations may include credit for reverse thrust on the operative engine;
 - (d) operation at reduced thrust settings shall not be permitted and V_{mc} shall be based on full-rated thrust;
 - (e) the approved operations manual shall set out procedures for operations using contaminated runways; and
 - (f) pilot and, where applicable, flight operations officer ground training shall address contaminated runway operations.
- (2) Operations Using Other than Approved Performance Data – Reciprocating-Engine Aeroplanes in Cargo-only Operations
 An operator may elect to use performance data from a source other than the aeroplane flight manual when operating a reciprocating-engine aeroplane during cargo-only operations from or to unprepared surfaces: Provided –

- (a) the operator's approved operations manual sets out the programme for operations involving unprepared surfaces. The programme shall include –
 - (i) pilot-in-command training, checking and experience requirements, which shall include –
 - (aa) at least 100 hours on type;
 - (bb) completion of a course of ground and flight training covering topics such as take-off and landing surface characteristics, obstacle assessment and interpretation of pertinent aeroplane data;
 - (cc) completion of at least 25 hours of line indoctrination involving unprepared surface operations; and
 - (dd) passing a line check covering unprepared surface operations;
 - (b) procedures for company operational approval for unprepared surface operations; and
 - (c) procedures for assessing and operating from/to unprepared surfaces and unfamiliar approach and departure routes.

2. Take-off Mass Limitations - Accelerate-Stop Distance

An operator may operate a reciprocating-engine aeroplane where the accelerate-stop distance required exceeds the accelerate-stop distance available: Provided the operator restricts the aeroplane to no more than 9 passenger seats being occupied.

3. Net Take-off Flight Path - Visual Obstacle Avoidance

An operator may conduct a departure of an aeroplane without determining net take-off flight path for a reciprocating-engine aeroplane when visual obstacle avoidance is possible: Provided the following conditions are met –

- (1) Obstacle Assessment –
 - (a) the operator shall obtain the best available data concerning obstacles in the proposed take-off path. Transient obstacles (such as construction equipment or moored watercraft, etc.) shall be considered when they are estimated to lie within 300 feet of the centreline of the proposed take-off path; and
 - (b) where the precise height, bearing and distance of an object is not known (such as objects depicted on a topographical map), the operator shall use a reasonable estimate for performance calculations. Calculations shall clearly indicate where estimated information is used;
- (2) Departure Planning –
 - (a) the person responsible for operations or his/her delegate shall establish a company engine-out departure plan using procedures set out in the approved operations manual, including at least the following –
 - (i) obstacle assessment;
 - (ii) aeroplane performance, including turn radii; and
 - (iii) visual reference points to be used during the departure route;

NOTE – In all cases the operator shall retain the departure plan for audit purposes.

- (b) prior to commencing a take-off, the PIC shall, in consideration of the current winds, density altitude and aeroplane mass, satisfy himself or herself that the departure plan to be followed in the event of an engine failure on take-off avoids all obstacles in the departure path by either 35 feet vertically or 95 metres horizontally; and

- (c) in considering visual contact with the controlling obstacles during the departure phase, an operator shall establish to the satisfaction of the Director that, taking into account flight deck angle and alterations in the field of view during turns, the flight crew will be able to maintain continuous visual contact with all significant obstacles located within the departure route.

121.10.3 DEVELOPMENT AND APPROVAL OF SAFETY MANAGEMENT MANUAL

1. Standards for the development and execution of a Safety Management Manual

Note — Guidance on safety programmes is contained in the Safety Management Manual (SMM) ICAO technical document (Doc 9859),

(1) Safety Management Manual (SMM) and Documents

The safety management system is an expansion of the previous safety programme formally known as the “*Aviation Safety and Accident Prevention Programme*” and Safety Documents System. In the context of a safety management system (SMS) and dependant upon the scope and size of the operator, a number of documents may be required to implement and control the programme elements. These documents become part of the larger manual system falling under the control of the operations manual referred to in paragraph (8) below. Except as noted in this TS, all documents generated for the SMS must be consistent with the established policies and procedures published in the operations manual and approved for an operator’s use.

(2) Use of Third Party Generated SMM.

While a number of organizations have produced safety management manuals that may be acceptable to the Director, such manuals must be presented to SACAA for the Director’s approval using the same establishment and amendment procedures approved for the operations manual. Operators are cautioned when adopting an SMS produced by a third party that they will be required to comply with all the provisions published in that SMM. It is also important for operators to ensure they have revision rights with the producer of such manuals as amendments when so required are the responsibility of the operator not the publisher of a manual.

(3) Principle of Operational Control:

In developing a safety management manual it is vital that the principle of operational control and supervision be maintained. Operational control is the legal responsibility of the operations manager as laid down in CAR 121.07. and this principle of authority must be maintained notwithstanding any responsibilities, policies and procedures, or reporting relationships established for the SMS programme.

(4) Development criteria of an SMM

An SMM, sometimes referred to as the SMS document system, shall be considered part of the operations manual system. As such, the information contained in the SMS documents must use a common language, definitions and manual of procedures as have been approved for the operations manual. (see paragraph (7) below)

Notes –

1. *Where a SMM is produced in electronic format it must employ a means of ensuring ease and speed of access to the information at least equivalent to hard copy manuals. Electronic manuals must also employ an information pick list, be appropriately hyper-linked and provide a search engine that will provide logical access to all time-critical, emergency, abnormal or other information as deemed appropriate by the Director Where electronic manuals are used the bulletin system intended to provide quick dissemination of information shall be produced in both electronic and hard copy.*

2. *An operator may not introduce electronic manuals until the intended user groups have been equipped and trained in the use of the electronic system.*

(5) Organization

Information relating to flight safety policies and procedures should be organized according to criteria which ensure quick and easy access to information required for flight and ground operations.

Distribution and revision of operational documents shall be in the same manner as provided for in the operations manual except where the urgent issue of safety related information or procedures necessitates a non standard distribution of revision procedure. Such procedure shall in any case be described in the operations manual. Information contained in a flight safety documents system should be grouped according to the importance and use of the information, as follows –

- (a) time critical information, eg. information that if not immediately available could jeopardize the safety of the operation;
- (b) time sensitive information, eg. information that if not available in a quick and easy manner could affect the level of safety or delay the operation;
- (c) frequently used information; eg. information that while not directly affecting safety is required for operational or safety considerations;
- (d) reference information, eg. information that is required for the operation but does not fall under (b) or (c) above; and
- (e) information that can be grouped based on the phase of operation in which it is used. eg. preflight, the various flight profiles, post flight, report writing etc.

Notes –

- 1. *Time critical information should be placed early and prominently in the flight safety manuals/chapters.*
- 2. *Time critical information, time sensitive information, and frequently used information should be placed in quick-reference sections, guides and checklists.*

(6) Validation

The flight safety policies and procedures should where possible be introduced by using a validation process before final implementation. The validation process should employ the critical aspects of the information used, in order to verify its effectiveness and the users be made aware of the validation status and their responsibility for the prudent use, assessment and feedback of the policies and procedures. Interactions among all groups that can occur during operations should also be included in the validation process. During any validation period where a procedure affects or may affect approved operational matters, such procedures must be validated with the operations manager's full knowledge and consent. Copies of draft procedures produced for validation purposes must be reviewed by the Director before validation commences and approved for use by the Director prior to becoming formal policy. The Director will determine what level of involvement the CAA will take during this process. The validation procedures shall be described in the SMM.

(7) Design

An SMM shall be suitably divided and indexed so as to provide quick and easy access to the information contained therein. (see paragraph (8)). Documents must maintain consistency in terminology and in the use of standard terms for common items and actions as expressed in the operations manual system. Inasmuch as practical, manuals or chapters of manuals containing flight safety information should be in the form and style of the operations manual. Flight safety information pages must be consistent with the company's manual system in terms of writing style, terminology, use of graphics and symbols. Common formatting of all documents is essential to enhance accessibility of information and reduction of publication and review times. Notwithstanding the foregoing where deemed necessary certain pages or bulletins produced under the authority of the operations or safety manual may be developed or designed in a manner so as to be conspicuous for easy recognition of their significance.

(8) Manual indexing and control

Where the SMM consists of more than one safety manual, a comprehensive master index must be included in the manual detailing the list of manuals comprising the SMM. Manual control for each manual in the system shall be in the same manner as approved for the operations manual; eg. page numbering, list of effective pages, amendment instructions, etc.

Note — The master index must be placed in the front of each document.

(9) Use of SMM

Operators should monitor the use of the SMM to ensure the procedures are appropriate and realistic, based on the characteristics of the operational environment and are both operationally relevant and beneficial to operational personnel. This monitoring should include a formal feedback system for obtaining input from operational personnel. Those portions of the SMM that provide information with respect to the operation of aeroplanes must be made available to the appropriate crew members during flight time.

(10) Amendment

- (a) SMM shall employ the manual amendment procedures approved for the operations manual. For revision planning, operators should develop an information gathering, review assessment and distribution control system to prioritise the amendment process. Information and data obtainable from all sources relevant to the type of operation conducted, including any other State where similar aircraft operations take place, as well as manufacturer and equipment vendors, shall form part of the operator's amendment research process.
- (b) Amendment procedures must include a tracking system to ensure currency by operational personnel. The tracking system should include a procedure to verify that operational personnel have the most recent updates.

Notes —

- 1. *Manufacturers provide information for the operation of specific aircraft that emphasizes the aircraft systems and procedures under conditions that may not fully match the requirements of operators. Operators should ensure that such information meets their specific needs and those determined by the Director.*
- 2. *Operators must ensure that crew coordination philosophy, policies and SOPs are specific to, or adapted to their operation.*

(11) Mandatory amendments

The operator must ensure their information gathering, review and assessment process focuses on information resulting from changes that originate from within the operator. Mandatory amendments shall be promulgated for at least the following situations –

- (a) changes resulting from the installation of new equipment;
- (b) changes in response to operating experience;
- (c) changes in an operator's policies and procedures;
- (d) changes in an operator certificate;

- (e) changes for purposes of maintaining cross fleet standardization; and
- (f) whenever deemed necessary by the Director.

(12) SMM review schedule

Operators must publish their SMM review schedule and ensure their SMMs are reviewed –

- (a) on a regular basis (at least once a year);
- (b) after major events (mergers, acquisitions, rapid growth, downsizing, etc.);
- (c) after technology changes (introduction of new equipment);
- (d) after significant occurrences involving the company or similar companies where unanticipated hazards were implicated; and
- (e) after changes in safety regulations, or any time so directed by the Director.

(13) Content of an SMM

The information to be published in the operator's SMM shall include a detailed description of the SMS including –

- (a) those components outlined in CAR 121.10.2,
- (b) the structural establishment and functions referred to in CAR 121.10.4;
- (c) the responsibilities of the air safety officer referred to in CAR 121.06.2; and
- (d) the provisions of this Technical Standard.

Note – Where an operator has developed a quality assurance programme, the elements in this TS referring to quality assurance would not be required except to ensure the auditing requirements of the SMS referred to in paragraph (5) are adhered to.

121.10.4 ESTABLISHMENT AND STRUCTURE OF SAFETY MANAGEMENT SYSTEM

1. General

- (1) While it is accepted that the operator's safety management system (SMS) will be developed in view of the scope and size of the operator, every SMS must be capable of delivering at least the following safety services at a level commensurate with the scope and size of the operator –
 - (a) a safety chain of command that clearly defines the lines of authority throughout the company and all departments to the chief executive officer of the company, identifying in particular, the air safety officer (ASO);
 - (b) an effective and timely method of identifying and reporting safety hazards;
 - (c) a mechanism for the timely resolution of safety issues on both a short and long term basis and where safety issues are proven to be systemic, an effective way of precluding the likelihood of recurrence;
 - (d) a quality assurance programme designed to monitor on a continuous basis the operational and safety programmes being implemented and make critical assessment as to the effectiveness of such programmes;
 - (e) an information reporting system that is non-punitive in nature and capable upon request of the person providing information, of a means of assuring anonymity; and

- (f) where the operator operates aeroplanes weighing in excess of 27 000 kg, such operator shall establish and maintain a flight data analysis programme as part of its safety management system. Where the operator contracts the flight data analysis programme to a third party such operator remains accountable to the Director for the maintenance of the programme;

Note – Legal guidance for the protection of information from safety data collection and processing systems is contained in ICAO Annex 13, Attachment E.

- (g) safety risk management is a critical part of the safety process and must be expressed in a measurable way by using the following process –

- (i) the operator shall develop and maintain a formal process for effectively collecting, recording, acting on and generating feedback about hazards in operations, based on a combination of reactive, proactive and predictive methods of safety data collection; and

Note – Reactive methods refer to methods of identifying hazards that are based on the investigation of occurrences. Proactive methods aim to use any other information within the organisation for the identification of potential hazards. Predictive methods rely on data that is collected within the organisation that could be used effectively to predict the existence of hazards, usually done by trend analysis.

- (ii) the operator shall develop and maintain a formal risk management process that ensures analysis (in terms of probability and severity of occurrence), assessment (in terms of tolerability or acceptability) and control (in terms of mitigation) of risks to an acceptable level.

The following matrixes should be used for purposes of analyzing and assessing risk –

Risk Severity Matrix

Risk Severity definition	Description: Consequence (can lead to)...	Examples of what to look out for...
Category A Catastrophic	One or multiple deaths & complete loss/ destruction of equipment	A major accident.
Category B Hazardous	Serious injuries/Major Damage to equipment	Large reduction in safety margins, physical distress or workload such that the operators cannot be relied upon to perform their tasks accurately or completely.
Category C Major	Minor injuries/ Minor equipment damage	A significant reduction in safety margins, a reduction in the ability of the operators to cope with adverse operating conditions as a result of increase in workload, or as a result of conditions impairing their efficiency.
Category D Minor	Incidents	Operating limitations are breached. Procedures are not used correctly.
Category E Negligible	Negligible/Inconvenience	Few consequences. No safety consequences. Nuisance.

Risk Probability Matrix

Likelihood/ Probability Category	Description	Examples of what to look out for
1	Extremely improbable (Rare)	Almost inconceivable that the event will occur.
2	Improbable (Seldom)	Very unlikely that the event will occur. It is not known that it has ever occurred before.
3	Remote (Unlikely)	Unlikely but could possibly occur. Has occurred rarely.
4	Occasional	Likely to occur sometimes. Has occurred infrequently.
5	Frequent	Likely to occur many times/regularly. Has occurred frequently/regularly.

RISK PROBABILITY	RISK SEVERITY				
	Catastrophic A	Hazardous B	Major C	Minor D	Negligible E
5	5A	5B	5C	5D	5E
4	4A	4B	4C	4D	4E
3	3A	3B	3C	3D	3E
2	2A	2B	2C	2D	2E
1	1A	1B	1C	1D	1E

Risk assessment Index	Suggested Criteria
5A, 5B, 5C, 4A, 4B, 4C, 3A, 3B, 2A	Unacceptable under the existing circumstances. Risk mitigation critical.
5D, 4D, 3C, 3D, 2B, 2C, 1A,	Risk mitigation required. It might require
1 B	Management decision.
5E, 4E, 3E, 2D, 2E, 1C, 1D, 1E	Acceptable

2. Qualifications of key SMS personnel

Selection criteria for safety officers must be based upon the following qualifications and attributes –

- (a) broad operational knowledge and experience in the functions of the organisation;
- (b) sound knowledge of safety management principles and practices, including theoretical training in SMS and experience;
- (c) at least 2 years of experience in aviation safety;
- (d) good written and verbal communication skills;

- (e) well-developed interpersonal skills;
- (f) computer literacy;
- (g) the ability to relate at all levels, both inside and outside the organisation;
- (h) organisational skills;
- (i) capable of working unsupervised;
- (j) good analytical skills;
- (k) leadership skills and authoritative approach;
- (l) worthy of respect among peers and management; and
- (m) project management skills.

3. **Goals of the SMS**

The primary goals of an SMS shall be –

- (a) to achieve a level of safety acceptable to the Director; and
- (b) to strive to make continuous improvements to the safety status of the company.

4. **Auditing**

Safety management system auditing is part of the Director's air service operator regulatory oversight programme and is conducted as deemed appropriate by the Director.

121.10.8 **REQUIREMENT FOR QUALITY MANAGEMENT SYSTEM**

1. **Definitions**

The terms used in this Technical Standard have the following meaning –

- (a) **“accountable manager”** means the person designated as specified in CAR 121.06.2(4) and who has overall responsibility for the operation of the company (CEO or equivalent);
- (b) **“quality manager”** means the manager responsible for the implementation, management and monitoring of the quality system and for requesting corrective action;
- (c) **“audit”** means a methodical, planned review used to determine how a business is being conducted and compares the results with how that business should have been conducted according to regulations and established procedures;
- (d) **“inspection”** means the act of observing a particular event or action, to ensure that correct procedures and requirements are followed during the accomplishment of that event or action. The primary purpose of an inspection is to verify that established standards are followed during the observed event or action; and
- (e) **“quality assurance”** (QA) means all those planned and systematic actions necessary to provide adequate confidence that operational and maintenance practices satisfy prescribed requirements.

2. **Quality management system (QMS) requirements**

The QMS shall –

- (a) ensure the adequacy of operational and maintenance activities in maintaining compliance with requirements, standards and operational procedures;
- (b) specify the basic structure of the quality system applicable to the operation and be structured according to the size and complexity of the operation to be monitored; and
- (c) as a minimum, address the following –

- (i) establishment of the objectives of the QA programme, which are to meet the following criteria –
 - (aa) the objectives must be written for quality;
 - (bb) the objectives must be specific, measurable, attainable, realistic and time-based; and
 - (cc) the achievement of the objectives must be measured and tracked;

Note – The QA objectives are not simply related to safety goals but are also part of the strategic and business objectives of the organization; for example, improve the turn around time of the aircraft to 20 minutes on domestic flights without deviations from the standards.

- (ii) how to ensure meeting the provisions of the CAR;
- (iii) how to ensure meeting the operator's additional standards and operating procedures;
- (iv) how to ensure meeting the operator's quality policy;
- (v) assignment of the person or persons with the responsibility for the development, establishment and management of the quality system;
- (vi) what documentation, including manuals, reports and records are required in support of the QA programme and how they are to be controlled;
- (vii) the quality processes and procedures to be employed in support of the QA programme;
- (viii) the establishment and implementation of a schedule of the monitoring process;
- (ix) the procedures to be utilised in effecting the QA programme, including –
 - (aa) audit procedures;
 - (bb) reporting procedures; and
 - (cc) follow-up and corrective action procedures;
- (x) the recording system; and
- (xi) the training syllabus.

3. QMS policy

An air operator shall establish a formal, written quality policy statement, constituting a commitment by the accountable manager as to what the quality system is intended to achieve. The quality policy should –

- (a) reflect the commitment to the goal of achieving and continuing with compliance with the regulatory requirements together with any additional standards specified by the operator; and
- (b) reflect the accountable manager's commitment to –
 - (i) appoint resources to manage the system;

- (ii) ensure the structure required to meet the goals is established and maintained;
- (iii) establish objectives and measure their achievement; and
- (iv) ensure continual improvement in the QMS.

4. Structure

- (1) The accountable manager shall appoint an accountable QM to manage the system and who meets the experience and qualifications requirements specified in CAR 135.06.2(5).
- (2) The QM must have direct link to the accountable manager to discuss QMS matters when required.
- (3) The roles and responsibilities of the QM and all other role players within the QMS must be defined in writing (normally job descriptions or delegation documents).
- (4) QA responsibilities must be independent from all other line functions within the organization.
- (5) The structure of the organisation varies with the size and complexity of the company but in all cases, should be developed so as to properly interface with other operator departments or divisions and with external agencies with which the company is involved. Each operator will have at least an operations and a maintenance department with which the QA personnel will be required to interface.

5. Process requirements

- (1) Processes are the means by which the QA goals are meant to be attained and must be documented, whether written as procedures or mapped in flow chart format, for every activity and task within the organization (this depends upon the scope of the QMS but is normally company wide).
- (2) Depending on the complexity of the system, there could also be a distinction between high level processes, which are generic in nature, and the detailed processes needed to achieve the QA goals.
- (3) The inputs, sequential steps and outputs must be shown, as well as the people responsible for these.
- (4) Processes must list –
 - (a) the references that must be consulted in using the process;
 - (b) the records that must be completed as evidence of the process having been followed; and
 - (c) the minimum retention periods for these documents as specified in the document and records control procedures.
- (5) Processes normally fall into the following categories of which quality control must be part and in which segregation of duties is a critical principle –

- (a) key/core business processes critical to the company's reason for existence. In an airline it would typically be flight operations, ground operations, maintenance, safety management, etc;
- (b) support processes that are developed in support of the core processes, e.g. recruitment, procurement, etc; and
- (c) quality processes, like auditing, management review of the system, document control, records control, measurement of objectives, measurement of the ability of processes to achieve their intended results, customer satisfaction measurement, data analysis corrective action and preventive action.

6. Documentation

- (1) Except as provided in paragraph (3), the QMS must be supported by a quality management manual (QMM), the contents of which shall include –
 - (a) the system of amendment and revision –
 - (i) the procedure for amending the manual, including temporary revisions;
 - (ii) who is responsible for the issuance and insertion of amendments and revisions;
 - (iii) a record of amendments and revisions with insertion dates and effective dates;
 - (iv) a description of the system for the annotation of pages and their effective dates;
 - (v) a list of effective pages; and
 - (vi) a description of the distribution system for the manual, amendments and revisions.
 - (b) the company's policy statement;
 - (c) the company's structure;
 - (d) the company's objectives;
 - (e) the roles, duties and responsibilities of the company's key personnel, including the accountable manager and QM. Where there is more than one QM, the mandate and specific functions of each and the interrelationship between them must be clearly identified; and
 - (f) the procedures/processes whether written or mapped (some companies include only high level cross-departmental processes in the QMM and others include all processes in their QMM – they would end up with a series of manuals). Detailed manuals are normally the responsibility of the line managers but they still form part of the QMS and will fit into the QMS to meet requirements.
- (2) In addition, the following documentation, usually residing in the QMM, shall be prepared and used within the QMS –
 - (a) forms and checklists that have to be used in the execution of the processes;
 - (b) a list of records used in the system;
 - (c) a list of forms used in the system;
 - (d) a list of registers or software systems in use as support to the system; and

(e) a list of external documents that impact on the system (called references).

(3) The information required by paragraph (1) may be included in the company's safety management manual (SMM) or operations manual if the company's size and complexity are such that a separate manual is not required.

7. Quality Manager

(1) In the case of small/very small operators, the posts of the accountable manager and the QM may be combined. However, in such event, independent personnel should conduct the quality inspections/audits.

(2) The specific duties and responsibilities of the QM will vary in relation to the size and complexity of the company but shall be identified in the QMM or other manual, if a separate QMM is not produced.

8. Quality assurance programme

(1) A QMS shall include a quality assurance programme that includes all planned and systematic actions necessary to provide confidence that all operations and maintenance are conducted in accordance with all applicable requirements, standards and operational procedures. When establishing a quality assurance programme, consideration should, at least, be given to the following tools and considerations –

(a) Inspection

The primary purpose of a quality inspection is to observe a particular event/action/document, etc., in order to verify whether established operational procedures and requirements are followed during the accomplishment of that event and whether the required standard is achieved. Typical subject areas for quality inspections are –

- (i) actual flight operations;
- (ii) ground de-icing/anti-icing;
- (iii) flight support services;
- (iv) load control;
- (v) maintenance;
- (vi) technical standards; and
- (vii) training standard;

(b) Audit

As identified in its definition, an audit is an in-depth review of all or several facets of the company's operations with the goal of identifying systemic faults in those operations. Factors to consider are –

- (i) audits should include quality procedures and processes covering at least the following –
 - (aa) a statement explaining the scope of the audit;
 - (bb) planning and preparation;

- (cc) gathering and recording evidence; and
- (dd) analysis of the evidence; and
- (ii) techniques which contribute to an effective audit are –
 - (aa) interviews or discussions with personnel;
 - (bb) a review of published documents;
 - (cc) the examination of an adequate sample of records;
 - (dd) the witnessing of the activities which make up the operation; and
 - (ee) the preservation of documents and the recording of observations;

(c) Auditors

The audit process is only as effective as the persons chosen to participate in the audit are. It follows that particular care must be exercised in selecting each auditor. Some considerations are –

- (i) auditors should not have any day-to-day involvement in the area of the operation and/or maintenance activity which is to be audited. An operator may, in addition to using the services of full-time dedicated personnel belonging to a separate quality department, undertake the monitoring of specific areas or activities by the use of part-time auditors;
- (ii) an operator whose structure and size does not justify the establishment of full-time auditors may undertake the audit function by the use of part-time personnel from within his or her own organisation or from an external source under the terms of an agreement acceptable to the Director. In all cases, the operator should develop suitable procedures to ensure that persons directly responsible for the activities to be audited are not selected as part of the auditing team;
- (iii) where external auditors are used, it is essential that any external specialist is familiar with the type of operation or maintenance conducted by the operator;
- (iv) the operator's quality assurance programme should identify the persons within the company who have the experience, responsibility and authority to –
 - (aa) perform quality inspections and audits as part of ongoing quality assurance;
 - (bb) identify and record any concerns or findings, and the evidence necessary to substantiate such concerns or findings;
 - (cc) initiate or recommend solutions to concerns or findings through designated reporting channels;
 - (dd) verify the implementation of solutions within specific timescales; and
 - (ee) report directly to the QM.

(d) Audit Scope

Operators are required to monitor compliance with the operational procedures they have designed to ensure safe operations, airworthy aircraft, and the serviceability of both

operational and safety equipment. In so doing, they should as a minimum and where appropriate, monitor the following –

- (i) the organisation;
- (ii) plans and company objectives;
- (iii) operational procedures;
- (iv) flight safety;
- (v) operator certification (AOC/Operations Specifications);
- (vi) supervision within the organisation;
- (vii) aircraft performance;
- (viii) all-weather operations;
- (ix) communications and navigational equipment and practices;
- (x) mass, balance and aircraft loading;
- (xi) instruments and safety equipment;
- (xii) manuals, logs and records;
- (xiii) aircraft maintenance/operations interface;
- (xiv) use of the MEL;
- (xv) maintenance programmes and continued airworthiness;
- (xvi) airworthiness directives management;
- (xvii) maintenance accomplishment;
- (xviii) defect deferral;
- (xix) flight crew;
- (xx) cabin crew;
- (xxi) operational control personnel;
- (xxii) dangerous goods;
- (xxiii) security;
- (xxiv) training; and
- (xxv) safety management system.

(e) Audit Scheduling

A quality assurance programme should include a defined audit schedule and a periodic review-cycle, area by area, with consideration being given to the following factors –

- (i) the schedule should be flexible and allow unscheduled audits when trends are identified. An operator should establish a schedule of audits to be completed during a specified calendar period. All aspects of the operation shall be reviewed within every period of 12 months in accordance with the programme unless an extension to the audit period is accepted by the Director;
- (ii) an operator may increase the frequency of audits at his or her discretion but shall not decrease the frequency unless accepted by the Director. It is considered unlikely that an interval between audits greater than 24 months would be acceptable;
- (iii) follow-up audits should be scheduled when necessary to verify that corrective action was carried out and that it was effective; and
- (iv) the operator's defined audit schedule can be affected by significant changes to the management, organisation, operation or technologies, as well as changes to the regulatory requirements, resulting in the requirement for an ad hoc audit.

(f) Monitoring

Monitoring entails keeping abreast of the activities within the company as a part of the QA programme but also to monitor the QA activities to ensure they are adequate (monitor the monitors). Factors to consider are –

- (i) the aim of monitoring within the quality system is primarily to investigate and judge its effectiveness and thereby to ensure that defined policy and operational and maintenance standards are continuously complied with. Monitoring activity is based upon quality inspections, audits, corrective action and follow-up; and
- (ii) the operator should establish and publish a procedure to monitor regulatory compliance on a continuing basis. This monitoring activity should be aimed at eliminating the causes of unsatisfactory performance. Any non-compliance identified as a result of monitoring shall be communicated to the manager responsible for taking corrective action or, if appropriate, the accountable manager. Such non-compliance shall be recorded, for the purpose of further investigation, in order to determine the cause and to enable the recommendation of appropriate corrective action.

(g) Corrective Action

The quality assurance programme shall include procedures to ensure that corrective actions are taken in response to findings. These quality procedures should result in the monitoring of such actions to verify their effectiveness and having been completed. Organisational responsibility and accountability for the implementation of corrective action resides with the department cited in the report as identifying the finding. The accountable manager will have the ultimate responsibility for resourcing the corrective action and ensuring, through the quality manager, that the corrective action has re-established compliance with the standard required by the Director and any additional requirements defined by the operator. The procedures and responsibilities associated with a corrective action programme are –

- (i) subsequent to the quality inspection/audit, the operator shall establish –
 - (aa) the seriousness of any findings and any need for immediate corrective action;
 - (bb) the origin of the finding;

- (cc) which corrective actions are required to ensure that the non-compliance does not recur;
 - (dd) a schedule for corrective action;
 - (ee) the identification of individuals or departments responsible for implementing corrective action; and
 - (ff) allocation of resources by the accountable manager, where appropriate; and
- (ii) the QM shall —
- (aa) verify that corrective action is taken by the manager responsible in response to any finding of non-compliance;
 - (bb) verify that corrective action includes the elements outlined in paragraph (1)(g)(i) above;
 - (cc) monitor the implementation and completion of corrective action;
 - (dd) provide management with an independent assessment of corrective action, implementation and completion; and
 - (ee) evaluate the effectiveness of corrective action through the follow-up process;

(h) Follow-up

Proper follow-up is a mandatory part of the QA process. It is the responsibility of the QM to ensure that each finding of non-compliance has been resolved_satisfactorily and that the resultant solution is effectively implemented, such that a re-occurrence of the situation leading to the non-compliance is not or is highly unlikely to recur. Follow-up normally requires at least an inspection of the area identified as being non-compliant but may require a more in-depth audit to ensure a satisfactory resolution of the issue.

(i) Management Evaluation

A management evaluation is a comprehensive, systematic, documented review by the management of the quality system, operational policies and procedures and should consider the following –

- (i) the results of quality inspections, audits and any other indicators;
- (ii) the overall effectiveness of the management organisation in achieving stated objectives;
- (iii) a management evaluation should identify and correct trends and prevent, where possible, future non-conformities. Conclusions and recommendations made as a result of an evaluation shall be submitted in writing to the responsible manager for action. The responsible manager should be an individual who has the authority to resolve issues and take action; and
- (iv) the accountable manager should decide upon the frequency, format and structure of internal management evaluation activities;

(j) Recording

The operator shall maintain accurate, complete and readily accessible records documenting the results of the quality assurance programme. Records are essential data to enable an

operator to analyse and determine the root causes of non-conformity, so that areas of non-compliance can be identified and addressed. The following records shall be retained for a period of at least five years –

- (i) audit schedules;
- (ii) quality inspection and audit reports;
- (iii) responses to findings;
- (iv) corrective-action reports;
- (v) follow-up and closure reports; and
- (vi) management evaluation reports.

(2) An operator may decide to sub-contract out certain activities to external agencies for the provision of services. The QA programme must include an examination of such sub-contractors. Considerations with respect to sub-contracting are –

(a) Sub-contracts may be issued as follows –

- (i) ground de-icing/anti-icing;
- (ii) maintenance;
- (iii) ground handling;
- (iv) flight support (including performance calculations, flight planning, navigation database and dispatch and flight following);
- (v) training; and
- (vi) manual preparation; and

(b) The ultimate responsibility for the product or service provided by the sub-contractor always remains with the operator. A written agreement should exist between the operator and the sub-contractor, clearly defining the safety-related services and quality to be provided. The sub-contractor's safety-related activities relevant to the agreement should be included in the operator's quality assurance programme. The operator should ensure that the sub-contractor has the necessary authorisation/approval, when required, and commands the resources and competence to undertake the task. If the operator requires the sub-contractor to conduct an activity that exceeds the sub-contractor's authorisation/approval, the operator is responsible for ensuring that the sub-contractor's quality assurance takes account of such additional requirements.

(3) Complex quality systems could be inappropriate for operators with fewer than 20 full-time persons on staff. Such operators should consider the following when establishing a QA programme –

(a) the effort required to draw up the manuals and quality procedures and implement the QMS required for a complex system may stretch the operator's resources. It is therefore accepted that such operators would tailor their quality systems to suit the size and complexity of their operation and allocate resources accordingly;

(b) it may be appropriate to develop a quality assurance programme that employs a checklist. The checklist should have a supporting schedule that requires completion of all checklist items within a specified timescale, together with a statement acknowledging completion of a

periodic review by top management. An occasional independent review of the checklist content and achievement of the quality assurance should be undertaken; and

- (c) the operator may decide to use internal or external auditors or a combination of the two. In these circumstances it would be acceptable for external specialists and/or qualified organisations to perform the quality audits on behalf of the quality manager. If the independent quality audit function is being conducted by external auditors, the audit schedule should be shown in the relevant documentation.

Note – Whatever sub-contract arrangements are made, the operator retains the ultimate responsibility for the quality system, especially the completion and follow-up of corrective actions.

- (4) A QA programme shall include a training programme that provides the following –
 - (a) for those responsible for managing the quality system, receive training covering at least —
 - (i) an introduction to the concept of the quality system;
 - (ii) quality management;
 - (iii) the concept of quality assurance;
 - (iv) quality manuals;
 - (v) audit techniques;
 - (vi) reporting and recording; and
 - (vii) the way in which the quality system will function in the organisation;
 - (b) for those involved in the inspection or audit functions, training covering at least –
 - (i) an introduction to the concept of the quality system;
 - (ii) the concept of quality assurance;
 - (iii) reporting and recording; and
 - (iv) audit techniques; and
 - (c) a briefing to the remainder of the employees consisting of background information about the QA programme and their role in maximizing safety and efficiency in the organisation. The allocation of time and resources should be governed by the size and complexity of the operation concerned.

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127.01.2 EXEMPTIONS

1. Exemptions

- (1) The Director may, on application, exempt any person or helicopter involved in or used for emergency operations, from the provisions of Part 127, on condition that the Director is satisfied that –
 - (a) exceptional circumstances prevail which necessitates the exemption;
 - (b) there is a need for the exemption; and
 - (c) an acceptable level of safety is maintained.
- (2) The Director may determine any supplementary condition that he or she deems necessary in order to ensure that an acceptable level of safety is maintained.

127.02.2 FLIGHT CREW MEMBER EMERGENCY DUTIES

1. Emergency evacuation demonstration

An emergency evacuation demonstration must be performed by the flight crew members in accordance with the following:

- (a) Actual operation of all types of exits;
- (b) demonstration of the method used to operate a slide where fitted;
- (c) actual fire fighting using equipment representative of that carried in the helicopter on an actual or simulated fire except that, with Halon extinguishers, an approved alternative method may be used;
- (d) the effects of smoke in an enclosed area and actual use of all relevant equipment in a simulated smoke-filled environment;
- (e) actual handling of pyrotechnics, real or simulated, where fitted; and
- (f) demonstration in the use of the life-raft (s) where fitted.

127.02.4 CABIN CREW COMPLEMENT

1. Minimum number of cabin crew

An operator must ensure that, when carrying one or more passengers, not less than one cabin crew member is carried for every 50 passenger seats, or part thereof, installed on the same deck of the helicopter: Provided that the minimum number of cabin crew members carried is not less than the number of cabin crew members who actually participated in the emergency evacuation demonstration referred to in CAR 127.02.2 or were assumed to have taken part in the relevant analysis required during the certification of the helicopter.

127.02.5 OPERATION ON MORE THAN ONE TYPE OR VARIANT BY CABIN CREW MEMBER

1. Type or variant of helicopter

- (1) With the approval of the Director cabin crew may operate on four helicopter types if emergency exits and safety equipment are similar.
- (2) When assessing if a fourth helicopter type is permissible the following factors must be taken into consideration:
 - (a) Similarity of emergency procedure and drills; and
 - (b) similarity and location of emergency equipment.
- (3) When assessing helicopter variants as same types the following factors must be taken into consideration:
 - (a) The variant has the same type of exits with identical operating mechanisms;
 - (b) emergency procedure and drills are essentially the same; and
 - (c) emergency equipment on board each variant is essentially the same and that its location is standardised.

Helicopter variants not meeting these criteria are considered to be a separate helicopter type.

127.02.9 FLIGHT TIME AND DUTY PERIODS

1. Definitions

Any word or expression to which a meaning has been assigned in the Act, and the Civil Aviation Regulations, bears, when used in this technical standard, the same meaning unless the context indicates otherwise, and –

“**days off**” means periods available for leisure and relaxation, no part of which forms part of a duty period. A single day off includes two local nights. Consecutive days off must include a further local night for each consecutive day off. A rest period may be included as part of a day off;

“**duty period**” means any continuous period throughout which either a flight crew member flies in any helicopter, whether as a flight crew member or as a passenger, at the behest of his or her employer, or otherwise carries out a required duty in the course of his or her employment. It includes any flight duty period, positioning at the behest of the operator, ground training, office duties, flight watch, home reserve and standby duty;

“**flight duty period**” means any time during which a person operates in a helicopter as a member of its flight crew. It starts when the flight crew member is required by an operator to report for a flight, and finishes at on-chocks or engines off, or rotors stopped, on the final sector for that flight crew member;

“**flight watch**” means a period of time during which a flight crew member be required to check with the operator at specified times as to whether his or her services as a flight crew member will be required and, should this be the case, will report for duty at the time then specified;

“**home reserve**” means a period of time during which a flight crew member must be prepared to respond to a call out for flight duties as yet unspecified. The flight crew member must report for duty within a specified time from call out;

“**local night**” means a period of eight hours falling within the ten hour period from 21h00 to 07h00 local time;

“**positioning**” means the practice of transferring flight crew from place to place as passengers in surface or air transport at the behest of the operator;

“**rest period**” means a period before starting a flight duty period which is intended to ensure that a flight crew member is adequately rested before a flight;

“**split duty**” means a flight duty period which consists of two or more flight duties which are separated by less than the minimum rest period;

“**standby duty**” means a period of time during which a flight crew member is in a position to commence a flight duty at once.

2. Requirements of the Civil Aviation Regulations

- (1) CAR 127.02.9 requires that an operator of a helicopter must have a scheme for the regulation of flight times and duty times of his or her flight crews.
- (2) CAR 127.02.9 also requires that a flight crew member may not fly, and an operator may not require that flight crew member to fly, if either has reason to believe that he or she is suffering or is likely to suffer while flying, from such fatigue as may endanger the safety of the helicopter or of its occupants.
- (3) Every flight crew member is required to inform the operator of all flying he or she has undertaken if the cumulative amount of such flying and any scheduled duties is likely to exceed the maximum laid down in the Regulations.

3. Operators' schemes and their approval

- (1) An operator must submit a proposed scheme for the regulation of flight time and duty periods and minimum rest periods to the Director for approval.
- (2) Any deviation from the approved scheme must be submitted to the Director for consideration.
- (3) Non-availability of auto pilot or auto stabilisation systems requires a reduction in flight time and duty period in respect of public air transport and IFR operations.

4. General principles of control of flight, duty and rest time

- (1) The prime objective of any scheme of flight time limitations is to ensure that flight crew members are adequately rested at the beginning of each flight duty period. Helicopter operators will therefore need to take account of inter-related planning constraints on –
 - (a) individual duty and rest periods;
 - (b) the length of cycles of duty and the associated periods of time off; and
 - (c) cumulative duty hours within specific periods.
- (2) Duties must be scheduled within the limits of the operator's scheme. To allow for unforeseeable delays the pilot-in-command may, within prescribed conditions, use his or her discretion to exceed the limits on the day. Nevertheless, flight schedules must be realistic, and the planning of duties must be designed to avoid as far as possible exceeding the flight duty limits.
- (3) Other general considerations in the sensible planning of duties are –
 - (a) the need to construct consecutive work patterns which will avoid as far as possible such undesirable rostering practices as alternating day/night duties and the positioning of flight crews in a manner likely to result in a serious disruption of established sleep/work patterns;
 - (b) the need, particularly where flights are carried out on a programmed basis, to allow a reasonable period for the preflight notification of duty to flight crews, other than those on standby; and
 - (c) the need to plan time off and also to ensure that flight crews are notified of their allocation well in advance.

5. Responsibilities of flight crew members

It is the responsibility of all flight crew members to make optimum use of the opportunities and facilities for rest provided by the operator, and to plan and use their rest periods properly so as to minimise the risk of fatigue.

6. Standard provisions required for an operator's scheme

- (1) The standard provisions which the Director regards as the basis for an acceptable scheme of flight and duty limitations and which, if included in an operator's scheme, will facilitate approval by the Director are contained in paragraphs 7 to 13 below.
- (2) Although operators are expected to plan their schemes in accordance with the requirements, it is however, recognised that the standard provisions will not necessarily be completely adaptable to every kind of operation. In exceptional circumstances therefore operators may apply to have variations from the standard provisions included in their schemes. However, such variations should be kept to a minimum and approval will only be granted where an operator can show that these proposed provisions will ensure an equivalent level of protection against fatigue.

7. Limitations of single flight duty periods – flight deck crew

7.1 Maximum rostered flight duty periods

The maximum rostered flight duty period (FDP) (in hours) must be in accordance with Table 1. Rostering limits in the tables may be extended by in-flight relief or split duty under the terms of paragraphs 7.2 or 7.3. On the day, the pilot-in-command may at his or her discretion further extend the FDP actually worked in accordance with paragraph 7.6.

7.2 Extension of flight duty period by in-flight relief

- (1) When any additional flight crew member is carried to provide in-flight relief for the purpose of extending a FDP, he or she must hold qualifications which will meet the requirements of the operational duty for which he or she is required as a relief.
- (2) When in-flight relief is provided, there must be available, for the flight crew member who is resting, a comfortable reclining seat or bunk separated and screened from the cockpit and passengers.
- (3) A total of in-flight rest of less than three hours will not count towards extension of an FDP, but where the total of in-flight rest (which need not be consecutive) is three hours or more, the rostered FDP may be extended beyond that permitted in Table 1 by –
 - (a) if rest is taken in a bunk, a period equal to one half of the total of rest taken, provided that the maximum FDP permissible is 18 hrs (or 19 hrs in the case of cabin crew members); and
 - (b) if rest is taken in a seat, a period equal to one third of the total of rest taken, provided that the maximum FDP permissible is 15 hrs (or 16 hrs in the case of cabin crew members).The maximum extension allowable is equivalent to that applying to the basic flight crew member with the least rest.
- (4) Where a flight crew member undertakes a period of in-flight relief and after its completion is wholly free of duty for the remainder of the flight, that part of the flight following completion of duty may be classed as positioning and be subject to the controls on positioning detailed in paragraph 7.4.

7.3 Extension of flying duty period by split duty

When a FDP consists of two or more duties separated by less than a minimum rest period, then the FDP may be extended beyond that permitted in the tables by the amounts indicated below:

Consecutive hour rest	Maximum extension of the FDP
Less than 33	Nil
3 – 10	Period equal to half of the consecutive hours rest taken

The rest period must not include the time required for immediate post-flight and pre-flight duties. When the rest period is not more than six hours it will be sufficient if a quiet and comfortable place is available, not open to the public, but if the rest period is more than six consecutive hours, then a bed must be provided.

7.4 Positioning

All time spent on positioning as required by the operator is classed as duty, but positioning does not count as a sector when assessing the maximum permissible FDP. Positioning, as required by the operator, which immediately precedes a FDP, is included as part of the FDP for the purpose of paragraph 7.1.

7.5 Travelling time

- (1) Travelling time other than that time spent on positioning may not be classed as duty time and may not be included in cumulative totals of duty hours.

Note: Travelling time from home to departure heliport can become an important factor if long distances are involved. If the journey time from home to the normal departure heliport is lengthy,

flight crew members should make arrangements for accommodation nearer to their bases to ensure adequate pre-flight rest.

- (2) Where travelling time between the heliport and sleeping accommodation provided by the operator exceeds thirty minutes each way, the rest period must be increased by the amount of the excess, or such lesser time as is consistent with a minimum of ten hours at the sleeping accommodation.
- (3) When flight crew members are required to travel from their home to a heliport other than the one from which they normally operate, the assumed travelling time from the normal heliport to the other heliport is classed as positioning and is subject to the controls of positioning detailed in paragraph 7.4.

7.6 Pilot-in-command's discretion to extend a flight duty period

- (1) A pilot-in-command may, at his or her discretion, extend a FDP beyond the maximum normally permitted provided he or she is satisfied that the flight can safely be made. In these circumstances the maximum normally permitted is calculated according to what actually happens, not on what was planned to happen. The operator's scheme must include guidance to pilots-in-command on the limits within which discretion to extend a FDP may be exercised. An extension of three hours beyond the maximum normally permitted should be regarded as the maximum, except in cases of emergency.
- (2) Whenever a pilot-in-command so exercises his or her discretion, he or she must report it to the operator and, should the maximum normally permitted be exceeded by more than two hours, both the pilot-in-command and the operator must submit a written pilot-in-command's discretion report – extension of flying duty period, to the Director within 30 days.

Notes:

- 1. Discretion reports either concerning extension of a flight duty period or reduction of a rest period must be submitted in the form contained in Annexure A. Those reports will be used by the Director when assessing the realism of particular schedules.**
- 2. An emergency in respect of an extension of a flight duty period is a situation which in the judgement of the pilot-in-command presents serious risk to health or safety.**

7.7 Delayed reporting time

When flight crew members are informed of a delay before leaving their place of rest the FDP starts at the new reporting time or four hours after the original reporting time, whichever is the earlier. The maximum FDP is based on the original reporting time. This paragraph does not apply if flight crew members are given ten hours or more notice of a new reporting time.

7.8 Additional limits applicable to helicopter flying

- (1) Pilots engaged in repetitive short flights, with an average of ten or more take-offs and landings per hour, must have a break of at least thirty minutes away from the aircraft within any continuous period of three hours.
- (2) Operators must specify maximum periods of continuous operation on the more demanding aspects of helicopter flying, such as winching and external-load carrying. The limits applied should not exceed those set out in paragraph (1) but, depending on the nature and circumstances of a particular operation, may need to be more restrictive.

8. Rest periods

- (1) It is the responsibility of the operator to notify flight crew members of a flight duty period so that adequate and, within reason, uninterrupted pre-flight rest can be obtained by the flight crew. Away

from base the operator must provide the opportunity and facilities for the flight crew to obtain adequate pre-flight rest. It is the operator's responsibility to ensure that rest accommodation is satisfactory. When operations are carried out at such short notice that it is impracticable for an operator to ensure that rest accommodation is satisfactory, it will be the pilot-in-command's responsibility to obtain satisfactory accommodation.

- (2) (a) Each duty period, including flight watch and home reserve, must be preceded by a rest period of at least:
 - (i) Nine consecutive hours including a local night; or
 - (ii) ten consecutive hours; or
 - (iii) if the preceding FDP, adjusted for split duty, exceeds eleven hours, an additional rest period must be provided for in the operator's scheme to the satisfaction of the Director.
 - (b) Where a flight crew member has completed two consecutive duty periods, the aggregate of which exceeds eight hours flight time or eleven hours duty time (extensions by in-flight relief or split-duty disregarded), and the intervening rest period has been less than twelve consecutive hours embracing the hours between 11h00 and 06h00 local time, he or she must have a rest period on the ground of at least twelve consecutive hours embracing the hours between 22h00 and 06h00 local time or so much longer as to embrace these hours prior to commencing any further duties, but not necessarily larger than twenty four consecutive hours; provided that this requirement does not apply in respect of consecutive flight watch and home reserve duties.
 - (c) Following sixty hours of duty of any nature associated with his or her employment, except flight watch and home reserve duty, a flight crew member must have a rest period of not less than twenty-four consecutive hours before commencing further duties.
 - (d) When a flight crew member has completed a flight time and duty period in excess of eighteen hours, he or she must have a rest period of at least eighteen hours including a local night before he or she commences any further duties.
 - (e) Time on flight watch and home reserve duty may be counted towards the required rest periods preceding a period of duty.
- (3) Pilot-in-command's discretion to reduce a rest period
 A pilot-in-command may, at his or her discretion, reduce a rest period to below the minimum required by paragraph 8(2) and 12(2)(b). The exercise of such discretion must be considered exceptional and should not be used to reduce successive rest periods. A rest period must be long enough to allow flight crew members at least eight hours, at the accommodation where the rest is taken. If a rest period is reduced, the pilot-in-command must submit a report to his or her employer, and if the reduction exceeds two hours, must submit a written report to the Director within thirty days. (See note 1 to paragraph 7.6(2)).
- (4) For the purpose of calculating the minimum rest period before commencement of duties, the required post flight duties on completion of the previous FDP is added to such FDP.

9. Duty periods

- (1) The following limits apply:

Duty	Maximum duration
Flight watch	No limit*
Home reserve	No limit*
Positioning	No maximum**
Standby	Maximum 12 hours (not necessarily consecutive) in any 24 hour period
Standby + FDP	20 hours

* However, the provisions of subparagraph (2) applies.

** However, the provisions of paragraph 7.4 applies.

- (2) For the purpose of calculating duty time, the following applies:
 - (a) For the calculation of accumulated duty time in terms of paragraph 11 flight watch and home reserve is credited on the basis of eight hours for every period of twenty four or fewer consecutive hours, or on a one-for-one basis, whichever is the lesser.
 - (b) Standby duty time must count fully as duty time for the calculation of accumulated duty time in terms of paragraphs 8(2)(c) and (d) and 11.
 - (c) See paragraph 7.4 in respect of positioning time.

10. Days off

Flight crew members must –

- (1) not work more than seven consecutive days between days off; and
- (2) have two consecutive days off in any consecutive fourteen days; and
- (3) have a minimum of six days off in any consecutive four weeks at the heliport from which they normally operate; and
- (4) have an average of at least eight days off in each consecutive four week period, averaged over three such periods.

11. Cumulative duty and flying hours

Maximum cumulative duty hours: The average weekly total of duty hours may not exceed seventy hours over seven days, or sixty hours averaged over any two consecutive weeks. All types of duty, flight duty, ground duty, split duty, stand-by and positioning is counted in full for this purpose. Any period of seven or more consecutive days within which the flight crew member is employed on duties other than flight duties, flight watch or home reserve, standby, office duties or positioning is not included in calculating the above average weekly total of duty hours.

12. Cabin crew members

- (1) The requirements detailed in this paragraph are applicable to all cabin crew members carried as cabin crew members.
- (2) The limitations which apply to cabin crew members are those contained in paragraph 7 to 11 applicable to cockpit crew members, but with the following adjustment:
 - (a) Rostered flight duty periods may not be more than one hour longer than those permitted to cockpit crew members and contained in paragraph 7.1. In order to remove anomalies which might arise when cabin crew members and cockpit crew members report at different times for the same flight, the maximum FDP for cabin crew members must be based on the time at which the cockpit crew start their flight duty period.
 - (b) Rostered minimum rest periods must not be more than one hour shorter than those required by cockpit crew and contained in paragraph 8(2).
 - (c)
 - (i) For the purpose of a FDP extension following in-flight rest by cabin crew members, a period of a minimum of two consecutive hours of rest must allow for the extension of such FDP by half the actual rest period.
 - (ii) Where in-flight rest is provided for more than three hours, the provisions of paragraph 7.2(iii) apply.
 - (d) The combined sum of standby duty and following FDP may not exceed twenty-one hours.
 - (e) The average weekly total of duty hours may not exceed fifty-five hours.
 - (f) The annual and monthly limits on flying hours need not be applied.

13. Records to be maintained

An operator must retain all pilot-in-command discretion reports of extended flight duty periods and reduced rest periods for a period of at least six months.

127.03.1 TRAINING OF FLIGHT CREW MEMBERS

1. Training syllabus

The training syllabus for flight crew members required in terms of CAR 127.03.1, is –

- (1) the syllabi prescribed in Parts 61 and 64 for initial training;
- (2) the syllabi prescribed in TS 127.03.3 and 127.03.11 for conversion training;
- (3) the syllabi prescribed in TS 127.03.7, 127.03.13, 127.03.14 and 127.03.15 for recurrent training and checking and refresher training; and
- (4) the syllabi prescribed in Part 92 for initial and refresher dangerous goods training courses.

127.03.3 CONVERSION TRAINING

1. Operator's conversion training course syllabus

- (1) An operator's conversion course syllabus must include the following items:
 - (a) Ground training and checking including helicopter systems, normal, abnormal and emergency procedures;
 - (b) emergency and safety equipment training and checking which must be completed before helicopter training commences;
 - (c) cockpit crew resource management training;
 - (d) helicopter/flight simulator training and checking; and
 - (e) line flying under supervision and line check.
- (2) The conversion course must be conducted in the order set out in subparagraph (1) above.

2. Cockpit crew resource management training

The cockpit crew resource management training referred to in CAR 127.03.3(1)(h) is the cockpit crew resource management training contemplated in TS 127.03.5.1.

127.03.5 UPGRADING TO PILOT-IN-COMMAND

1. Cockpit crew resource management training

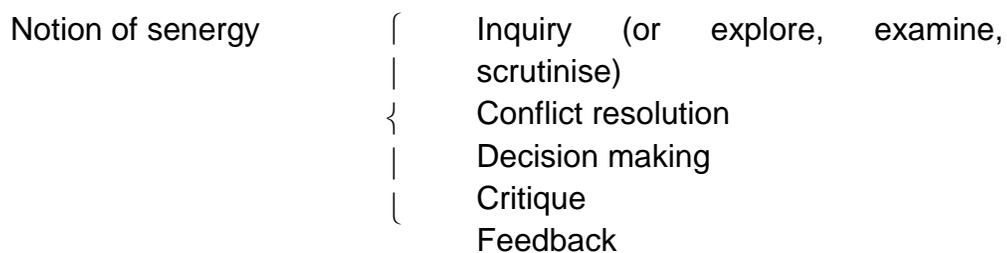
1.1 Procedures

- (1) If the cockpit crew member has not previously completed an operator's conversion course then the operator should ensure that a cockpit crew resource management (CRM) course with a full length syllabus is completed. The cockpit crew member should not be assessed either during or upon completion of this course.
- (2) If the cockpit crew member undergoes a subsequent conversion course with the same or a change of operator, he or she should complete the appropriate elements of the CRM course. The cockpit crew member should not be assessed either during or upon completion of this training.
- (3) Recurrent training:
 - (a) Where an operator utilises line orientated flying training (LOFT) in the recurrent training programme, the cockpit crew member should complete elements of CRM training. The cockpit crew member should not be assessed.
 - (b) Where an operator does not utilise LOFT, the cockpit crew member should complete elements of CRM training every year. The cockpit crew member should not be assessed.

- (c) An operator should ensure that cockpit crew members complete the major elements of the full length CRM course over a four year recurrent training cycle. The cockpit crew member completing this refresher training should not be assessed.
- (d) When a cockpit crew member undergoes an operator proficiency check, line check or command course, then CRM skills should be included in the overall assessment.
- (4) Operators should, as far as is practicable, provide combined training for cockpit crew and cabin crew.
- (5) There should be an effective liaison between cockpit crew and cabin crew training departments. Provision should be made for cockpit and cabin crew instructors to observe and comment on each others training.
- (6) The successful resolution of helicopter emergencies requires interaction between cockpit crew and cabin crew and emphasis should be placed on the importance of effective coordination and two-way communication between all cockpit crew members in various emergency situations. Initial and recurrent CRM training should include joint practice in helicopter evacuations so that all who are involved are aware of the duties other flight crew members should perform. When such practice is not possible, combined cockpit crew and cabin crew training should include joint discussion of emergency scenarios.

1.2 Objective and contents

- (1) CRM is the effective utilisation of all available resources (e.g. flight crew members, helicopter systems and supporting facilities) to achieve safe and efficient operation.
- (2) The objective of CRM is to enhance the communication and management skills of the cockpit crew member concerned. The emphasis is placed on the non-technical aspects of cockpit crew performance.
- (3) CRM training should include the following elements:
 - (a) Statistics and examples of human factor related accidents;
 - (b) human perception, learning process;
 - (c) situational awareness;
 - (d) management of workload, tiredness or fatigue, and vigilance – management of stress;
 - (e) operator’s standard operating procedures;
 - (f) personality type, delegation, leadership, effective communication skills;
 - (g) the CRM loop:



- (h) effective communication and co-ordination within the flight crew, and between flight crew members and other operational personnel (air traffic controllers, maintenance personnel etc);
- (i) error chain and taking actions to break the error chain; and
- (j) implications of automation on CRM.
- (4) CRM training should also address the nature of the operator’s operations as well as the associated flight crew operating procedures. This will include areas of operations which produce particular difficulties, adverse climatological conditions and any unusual hazards.
- (5) CRM training should include both:
 - (a) Classroom training; and

- (b) practical exercises including group discussions and accident reviews to analyse communication problems and instances or examples of a lack of information or flight crew management.
- (6) Ideally, the CRM training course should last a minimum of 3 days, but providing the whole syllabus is covered, then a 2 day course may be acceptable. A one day course for single pilot operations may be acceptable.
- (7) As part of the operations manual, the CRM course (for conversion and recurrent training) will be approved by the Director. An operator may use a course provided by another operator, if that course has already been accepted.

127.03.7 RECURRENT TRAINING AND CHECKING

1. Cockpit crew resource management training

The cockpit crew resource management training referred to in CAR 127.03.7, is the cockpit crew resource management training contemplated in section 1 of TS 127.03.5.

127.03.8 PILOT QUALIFICATION TO OPERATE IN EITHER PILOT'S SEAT

1. Training

- (1) A pilot-in-command whose duties also require him or her to operate in the co-pilot seat and carry out the duties of co-pilot, or a pilot-in-command required to conduct training or examining duties from the co-pilot seat, must complete additional training and checking as specified in the operations manual, concurrent with the proficiency checks prescribed in CAR 127.03.7. This additional training must include at least the following:
 - (a) An engine failure during take-off;
 - (b) a one engine inoperative approach and go-around;
 - (c) a one engine inoperative landing; and
 - (d) Category II or Category III operations, if applicable.
- (2) When engine-out manoeuvres are carried out in a helicopter, the engine failure must be simulated.
- (3) When operating in the co-pilot seat, the checks required for operating in the pilot-in-command seat must, in addition, be valid and current.
- (4) A pilot relieving as pilot-in-command must demonstrate practice of drills and procedures, concurrent with the proficiency checks prescribed in CAR 127.03.7, which would otherwise have been the responsibility of the pilot-in-command. Where the differences between pilot-in-command and co-pilot seats are not significant (for example because of use of autopilot) then practice may be conducted in either seat.
- (5) A pilot other than the pilot-in-command occupying the pilot-in-command seat must demonstrate practice of drills and procedures, concurrent with the proficiency checks prescribed in CAR 127.03.7 which would otherwise have been the pilot-in-command's responsibility acting as pilot non-flying. Where the differences between pilot-in-command and co-pilot seats are not significant (for example because of use of autopilot) then practice may be conducted in either seat.

127.03.11 TYPE AND DIFFERENCES TRAINING

1. General

An operator must ensure that –

- (1) type and differences training is conducted by suitably qualified persons; and
- (2) during type and differences training, training is given on the location, removal and use of all emergency and survival equipment carried on the helicopter, as well as all emergency procedures and emergency training related to the helicopter type, variant and configuration to be operated.

2. Fire and smoke training

An operator must ensure that either –

- (1) each cabin crew member is given realistic and practical training in the use of all fire fighting equipment including protective clothing representative of that carried in the helicopter. This training must include –
 - (a) each cabin crew member extinguishing a fire characteristic of a helicopter interior fire except that, in the case of Halon extinguishers, an alternative extinguishing agent may be used; and
 - (b) the donning and use of protective breathing equipment by each cabin crew member in an enclosed, simulated smoke-filled environment; or
- (2) each cabin crew member fulfils the recurrent training requirements of TS 127.03.12.

3. Operation of doors and exits

An operator must ensure that –

- (1) each cabin crew member operates and actually opens all normal and emergency exits for passenger evacuation in a helicopter or representative training device; and
- (2) the operation of all other exits is demonstrated.

4. Evacuation slide training

An operator must ensure that –

- (1) each cabin crew member descends an evacuation slide from a height representative of the helicopter main deck sill height;
- (2) the slide is fitted to a helicopter or a representative training device; and
- (3) a further descent is made when the cabin crew member qualifies on a helicopter type in which the main deck exit sill height differs significantly from any helicopter type previously operated.

5. Evacuation procedures and emergency situations

An operator must ensure that –

- (1) emergency evacuation training includes the recognition of planned or unplanned evacuations on land or water. This training must include recognition of when exits are unusable or when evacuation equipment is unserviceable; and
- (2) each cabin crew member is trained to deal with the following:
 - (a) An in-flight fire, with particular emphasis on identifying the actual source of the fire;
 - (b) severe air turbulence; and
 - (c) other in-flight emergencies.

6. Crowd control

An operator must ensure that training is provided on the practical aspects of crowd control in various emergency situations, as applicable to the helicopter type.

7. Pilot incapacitation

An operator must ensure that, unless the minimum flight crew is more than two, each cabin crew member is trained to assist if a pilot becomes incapacitated. This training must include a demonstration of –

- (1) the pilot's seat mechanism;
- (2) fastening and unfastening the pilot's seat harness;
- (3) use of the pilot's oxygen equipment; and
- (4) use of pilots' checklists.

8. Safety equipment

An operator must ensure that each cabin crew member is given realistic training on, and demonstration of, the location and use of safety equipment where applicable, including the following:

- (1) Life-rafts, including the equipment attached to, and/or carried in, the raft;
- (2) life-jackets, infant life-jackets and flotation cots;
- (3) first aid oxygen;
- (4) fire extinguishers;
- (5) fire axe or crow-bar;
- (6) emergency lights including torches;
- (7) communications equipment, including megaphones;
- (8) survival packs, including their contents;

- (9) pyrotechnics (actual or representative devices);
- (10) first aid kits, their contents and emergency medical equipment; and
- (11) other cabin safety equipment or systems where applicable.

9. Passenger briefing/safety demonstrations

An operator must ensure that training is given in the preparation of passengers for normal and emergency situations in accordance with CAR 91.07.20.

127.03.13 RECURRENT TRAINING

1. Aviation – general

1.1 Regulatory overview

1.1.1 Training objective

The cabin crew member must identify and describe the legislation relating to flight crew members.

1.1.2 Syllabus

- (1) Identify and describe the specific regulations applicable to flight crew members and cabin safety and outline the applicable operator's policies and procedures including –
 - (a) seatbelts and related restraint systems;
 - (b) survival equipment, ie life rafts, life vests, survival kits;
 - (c) oxygen equipment;
 - (d) first aid kits;
 - (e) minimum equipment lists;
 - (f) floor proximity lighting;
 - (g) cabin fire protection;
 - (h) flight crew stations;
 - (i) infant (ie definition of);
 - (j) minimum flight crew requirements;
 - (k) passenger safety briefings;
 - (l) emergency duties;
 - (m) passenger safety briefing cards;
 - (n) surface contamination training;
 - (o) carry-on baggage;
 - (p) aircraft journey log/cabin logbook (equivalent);
 - (q) liquor/drugs;
 - (r) refuelling (fuelling with one engine running);
 - (s) emergency equipment;
 - (t) survival equipment;
 - (u) duty time limitations – flight crew/cabin crew;
 - (v) crew rest – flight crew/cabin crew;
 - (w) designated flight crew rest areas/policies;
 - (x) cabin crew manual as part of operations manual;
 - (y) non-smokers legislation; and
 - (z) take-off and landing stations.

1.2 Physiology of flight

1.2.1 Training objective

The cabin crew member will be able to identify and describe the most common physiological effects of flight in pressurized and non-pressurized aircraft including likely causes, recognition and ways to minimize these effects.

1.2.2 Syllabus

- (1) General
(Reserved.)
- (2) Effect of altitude

- (a) Define what is meant by decompression sickness and describe the physiological effects of pressure changes on gases in the body. Define 'safe' times between scuba-diving and flight.
- (b) Define what is meant by hypoxia, the hazards associated with it, signs and symptoms, ways to detect it and minimize its effects.
- (c) Define time of useful consciousness and factors affecting it.
- (d) Describe the effects of oxygen deficiency on human performance and identify the importance of recognizing these signs and symptoms in other flight crew members.
- (e) Identify persons most susceptible to the effects of hypoxia.
- (f) Describe the effects of altitude on night vision and the impact this has on flight safety and personal safety.

1.3 Drills: Cockpit observation flights

1.3.1 Training objective

The cabin crew member will be able to recognize the duties and expectations of flight crew members as they apply to different helicopters the cabin crew member will be operating on.

1.3.2 Syllabus

- (1) General
 - (a) Flight crew communication and flight crew coordination depend on each flight crew member having an understanding of each other's duties, responsibilities, workloads and expectations for all phases of flight. While this knowledge can be taught in a classroom, a more valid forum would be in an actual operating environment.
 - (b) At least one cockpit observation flight will be completed prior to a cabin crew member becoming qualified and thereafter on an annual basis. The following conditions will apply:
 - (i) Cabin crew members will be in uniform; however they will be in addition to the minimum flight crew and will not be assigned any normal safety or cabin service duties;
 - (ii) each cockpit observation flight will include a minimum of 2 take-offs and 2 landings over a total flight time of not less than 1 hour;
 - (iii) each cockpit observation flight will begin at the regular check- in time for the cockpit crew. Cabin crew members will observe the normal pre-flight pilot duties ie. flight planning, weather briefing, cockpit crew briefing, pre-flight walkaround:
 - Cockpit workloads and safety duties;
 - flight crew communication procedures;
 - flight crew coordination procedures;
 - cockpit layout;
 - location of emergency equipment;
 - location and operation of cockpit windows;
 - location and operation of cockpit escape hatches;
 - location of controls and operation of pilot and observer seats;
 - location and operation of cockpit oxygen; and
 - location of emergency checklists.
 - (c) Each cabin crew member will participate in a post-flight debriefing on the cockpit observation flight.

2. Roles and responsibilities

2.1 Cabin crew members

2.1.1 Training objective

The cabin crew member will be able to describe their legislated roles and responsibilities relating to their duties and in the interests of aviation safety.

2.1.2 Syllabus

- (1) General

- (a) Describe the responsibility of cabin crew members to maintain knowledge of all safety and emergency procedures relating to their duties.
- (b) Identify the requirement for cabin crew members to perform their duties in accordance with the operations manual.
- (c) Outline cabin crew member responsibilities to ensure all flight documentation, publications, manuals are up to date and available on board and that cabin crew members are familiar with their contents. Cabin crew members are required to ensure that –
 - (i) competency qualification documents signed by the authorised operator personnel, as designated in the operations manual, date of expiry, specific helicopter types and series which the cabin crew member is qualified to operate on;
 - (ii) a record of revisions is in the FAM tracking the amendments received and when they were inserted into the FAM;
 - (iii) all amendments are inserted in the appropriate section of the FAM and not in their issued format, ie stapled, cello-wrapped; and
 - (iv) operations manual and revisions – see roles and responsibilities.
- (d) Identify the responsibility of cabin crew members to report any on board safety concerns to the pilot-in-command.
- (e) Identify the requirement to keep all documentation relative to flight duties up to date at all times ie. passport, security pass.
- (f) Outline cabin crew member responsibilities to ensure that all equipment and supplies are available and in good working order.
- (g) Review the responsibility of cabin crew members to report unserviceable equipment following established operator procedures.
- (h) Review the responsibility for cabin crew members to successfully complete required training and qualifications.
- (i) Define the chain-of-command and describe the authority of the pilot-in-command and describe their importance relating to flight safety.
- (j) Describe the requirement to be aware of the duties and responsibilities of other flight crew members and be prepared to assume those duties, if necessary.
- (k) Define the procedure regarding attending and participating in cabin crew briefings.
- (l) Describe a cabin crew member under training and the duties they may perform when assigned to a flight.
- (m) Review the importance of cabin crew members to be constantly alert and therefore prepared to handle any abnormal/emergency situation as it may occur.
- (n) Identify the importance of cabin crew members to be constantly alert and therefore prepared to handle any abnormal/emergency situation as it may occur.
- (o) Identify uniform policies and the importance of the uniform as an identifier especially in abnormal and emergency situations, and the operator's policy regarding the wearing of uniform in an emergency.

3. Safety procedures

3.1 Flight crew coordination

3.1.1 Training objective

The cabin crew member will review the components of flight crew coordination and its importance to operational safety.

3.1.2 Syllabus

- (1) Describe the importance of flight crew coordination when applying approved procedures.
- (2) List the positive effects of flight crew coordination in enhancing flight safety.
- (3) Outline the benefits of flight crew coordination on working environment and morale and the effect this has on flight safety.

- (4) Define the one crew concept and list ways this may be achieved.
- (5) Review the importance of flight crew coordination especially in abnormal and emergency situations.
- (6) Discuss how poor flight crew coordination has contributed to aviation accidents and incidents and outline strategies to improve flight crew coordination.
- (7) Cockpit crew to be included in the review discussions.

3.2 Communication

3.2.1 Training objective

The cabin crew member will be able to describe and demonstrate the importance and the procedures for effective communication in normal, abnormal/non-routine and emergency situations.

3.2.2 Syllabus

- (1) General
 - (a) Describe the procedures for normal, abnormal/non-routine and emergency communication.
 - (b) Describe the importance of effective communication especially when dealing with abnormal and emergency situations.
 - (c) Describe the responsibility of cabin crew members to provide complete and accurate information to the pilot-in-command to assist in decision-making.
- (2) Communication
 - (a) Review the difference between verbal and non-verbal communication and describe the effects of communicating different messages. Describe the potential hazards to flight safety if communication is not effective.
 - (b) Review how poor communication has contributed to aviation accidents and incidents and discuss ways to minimize these communication deficiencies.

3.3 Surface contamination

3.3.1 Training objective

The cabin crew member will be able to define what is meant by surface contamination, describe his or her responsibilities and identify the procedures for reporting suspected surface contamination to the pilot-in-command.

3.3.2 Syllabus

- (1) General
 - (a) Define surface contamination and hazards to flight associated with surface contamination.
 - (b) Define helicopter critical surfaces for each of the helicopter types in the operator's fleet.
 - (c) Identify an awareness of the conditions most likely to produce surface contamination.
 - (d) Give examples of a clean wing, and visible signs of surface contamination, eg frost, ice, snow, including rain and clear, etc.
- (2) Cabin crew responsibilities
 - (a) Define the responsibilities of cabin crew members to report suspected surface contamination prior to take-off roll to the pilot-in-command as soon as it is discovered.
 - (b) State the requirement for the pilot-in-command or a person designated by the pilot-in-command to investigate reports of suspected surface contamination.
 - (c) Describe the advice to passengers whenever de-icing is taking place and who is responsible for this announcement.
- (3) De-icing
 - (a) Describe when the senior cabin crew member will be advised in adverse weather conditions whether or not de-icing will occur.
 - (b) Describe the different types of equipment used to accomplish de-icing. Example: cherry-picker, car wash, rope, etc.

Note: *Use of video or photographic material is recommended.*

- (c) Identify that icing conditions can recur on critical surfaces of the helicopter if the take-off is prolonged for any period of time after de-icing has occurred.
- (d) Describe the possible hazards whenever de-icing is taking place, ie inhaling de-icing fluid, de-icing fluid entering cabin through open doorways, the presence of glycol fumes in the cabin. Identify the procedures to deal with these situations.

3.4 Briefings

3.4.1 Training objective

The cabin crew member will be able to identify the different types of briefings which are required by the operations manual and the information which must be included in each.

3.4.2 Syllabus

- (1) Cabin crew briefings
 - (a) Identify the importance of cabin crew briefings including enhancing cabin crew communication and coordination, establishing expectations and clarifying procedures. (Where operationally practicable, the pilots and cabin crew members should be encouraged to combine their briefings.)
 - (b) Outline when cabin crew briefings are required including normal, abnormal and emergency situations.
 - (c) Identify the types of flight crew briefings, ie pilot-in-command/ cabin crew member and senior cabin crew member/other cabin crew members.
 - (d) Describe the topics to be covered in the cabin crew briefing(s).
 - (e) Identify the cabin crew member responsibility to ask questions if all the required information has not been given in a briefing or if the information is unclear.
 - (f) Identify who is required to attend each type of briefing and their expected level of preparedness and participation.
- (2) Passenger briefings
 - (a) Review the contents of the following mandatory announcements and when they must be performed:
 - (i) Cabin baggage;
 - (ii) pre-flight safety announcement/demonstration;
 - (iii) after take-off;
 - (iv) en route turbulence;
 - (v) pre-landing;
 - (vi) after landing; and
 - (vii) individual pre-flight briefing for special attention passengers.

3.5 Pre-flight checks

3.5.1 Training objective

The cabin crew member will be able to identify the importance of pre-flight checks and will define what is meant by the aircraft minimum equipment list.

3.5.2 Syllabus

- (1) General
 - (a) Identify the importance of pre-flight checks and the impact on flight safety.
 - (b) Define what is meant by the Minimum Equipment List and identify the cabin items which are included.
 - (c) Identify types of conditions which may have airworthiness implications and which should be brought to the immediate attention of the pilot-in-command ie. cracked windows, damaged door seals, excessive water spills or leaks, obvious structural damage.

3.6 Passenger handling

3.6.1 Training objective

The cabin crew member will be able to identify the types of passenger which may be carried and the general handling considerations which relate to safety.

3.6.2 Syllabus

- (1) General
 - (a) Identify the requirement for passengers to comply with instructions of flight crew members.
 - (b) Describe the types of passengers which may be carried including passengers who require special handling.
 - (c) Describe the procedures for acceptance and carriage of the following and include special handling considerations, seating and securing the persons and the equipment for all phases of the flight:
 - (i) Incubators;
 - (ii) stretchers;
 - (iii) disabled persons;
 - (iv) persons travelling with medical oxygen;
 - (v) child restraint system; and
 - (vi) guide and service animals.
 - (d) Identify the operator's policy for accepting or denying boarding to passengers and who is responsible for making this decision.
 - (e) Identify the procedures for handling special passengers including safety briefings and seating restrictions on different helicopter types.
 - (f) Outline the regulatory requirements regarding passengers who appear to be impaired due to alcohol or drugs, and the operator's policies and procedures regarding alcohol service to passengers. Include cabin crew responsibilities in serving passengers who appear to be impaired.
- (2) Passenger boarding
 - (a) Define cabin crew member responsibilities for passenger supervision while the helicopter is on the ground, including boarding, disembarking and station stops. Include the number of cabin crew members that must be present in the helicopter for the above.
 - (b) Review the importance of safety duties over service duties during passenger boarding.

3.7 Passenger and flight crew seats/restraints

3.7.1 Training objective

The cabin crew member will be able to identify the requirements and established procedures relating to on board seating for passengers and flight crew members.

3.7.2 Syllabus

- (1) Passenger seating
 - (a) Outline the requirement for each person to have a seat with an individual safety belt.
 - (b) Define exit row and describe the operator's policy and procedures regarding exit row seating, and who may not occupy seats in these rows.
 - (c) Describe the procedures associated with the relocation of passengers in compliance with exit row seating policies.
 - (d) Describe where special attention passengers may be seated, taking into consideration proximity to exits, availability of supplemental oxygen, ease of evacuation etc.
- (e) Identify the passenger seating restriction on helicopters equipped with upper deck/lower deck passenger seating where applicable.
 - (f) Outline the seating restrictions regarding arm held infants.
 - (g) Describe the procedures for the use of on board skycots, stating when these devices may be used, and restrictions regarding the occupant of the skycot.

- (h) Describe the requirement for passengers to be seated in their assigned seats for take-off, landing and whenever advised by a cabin crew member. Describe the required positioning of seats for take-off and landing.
 - (i) Describe the different types of seat belts/harnesses found on passenger seats on helicopters in the fleet, and the correct method of operation for each.
 - (j) Identify any placards or signage associated with passenger seating and describe appropriate usage. Example: "Seat Unserviceable", "For Crew Use Only".
- (2) Flight crew seating
- (a) Identify the persons authorized to occupy any of the flight crew seats on board and who has the authority to make this decision.
 - (b) Describe the importance of ensuring serviceability of cabin crew seats, who is responsible to ensure this, when to check serviceability.
 - (c) Identify the components of a pre-flight serviceability check for a cabin crew seat eg. "sit and fit" to enable quick access.
 - (d) Describe the procedures to follow and approved alternate seating in case of an unserviceable cabin crew seat.
 - (e) Describe the requirements for cabin crew to be seated with restraint system fastened for taxi (except for safety related duties), take-off, landing and turbulence whenever directed to do so by the pilot-in-command.
 - (f) Identify rationale behind wearing the seat belt and shoulder harness and the hazards of improper use.
Examples: "Seat Unserviceable", "For Crew Use Only".
 - (g) Identify the signals/verbal command for cabin crew members to take their assigned seats and to secure themselves. State who is responsible for these signals.

3.8 Cabin baggage

3.8.1 Training objective

The cabin crew member will be able to define what is meant by cabin baggage and will describe the procedures for accepting and stowing cabin baggage and any applicable restrictions.

3.8.2 Syllabus

- (1) Passenger cabin baggage
 - (a) Describe cabin baggage policies and procedures with respect to approved storage areas.
 - (b) Identify the safety implications of improperly stowed cabin baggage.
 - (c) Identify the cabin crew responsibilities for ensuring that all carry-on baggage is correctly stowed when required.
 - (d) Describe the operator's procedures for dealing with carry-on baggage that cannot be correctly stowed.
 - (e) Outline the operator's policies and procedures for the carriage of live animals in the passenger cabin.
 - (f) Describe the cabin crew responsibility for monitoring cabin baggage security during flight.
 - (g) Identify the effects of cabin baggage on weight and balance (as applicable to the operator's fleet).
 - (h) Describe the approved procedures for accepting and restraining seat-loaded baggage and cargo in the passenger cabin, and approved devices/equipment for accomplishing this.
 - (i) Describe the requirement to keep the exit areas clear and free from obstructions, such as cabin baggage.
 - (j) Describe the requirement to maintain clear access to emergency equipment.
 - (k) Describe safety precautions for cabin personnel when opening overhead bins, and when handling items of cabin baggage in order to prevent personal injury.
- (2) Flight crew carry-on baggage

- (a) Describe the policies and procedures for stowing flight crew baggage in the passenger cabin including accepting baggage from deadheading flight crew.
- (b) Identify the flight crew carry-on baggage stowage locations for each helicopter type.

3.9 Electronic devices

3.9.1 Training objective

The cabin crew member will be able to define what is meant by electronic devices, and describe policies and procedures for their acceptance and use on board helicopters.

3.9.2 Syllabus

(1) General

- (a) Identify the electronic devices most likely to be carried on board helicopters.
- (b) List the potential hazards to flight safety associated with these electronic devices.
- (c) Describe the operator's policy/procedures relating to electronic devices and list exceptions to these regulations.
- (d) Review the safety concerns associated with the use of "walkman" type headsets during critical phases of flight, abnormal operations, boarding and disembarking across an open ramp.

3.10 Service to passengers on the ground

3.10.1 Training objective

The cabin crew member will be able to review what is meant by service to passengers on the ground, the conditions under which this can be accomplished and the procedures to do so.

3.10.2 Syllabus

(1) Cabin crew responsibilities

- (a) Review the need for flight crew communication and whenever passenger service is being offered on the ground, ie cabin crew to let pilot know service is taking place and pilot to let cabin crew know how much time before take-off.
- (b) State the requirement for the pilot-in-command to give cabin crew adequate notice prior to take-off so that equipment and supplies may be stowed and pre-take-off duties can be completed.

3.11 Fuelling with passengers on board

3.11.1 Training objective

The cabin crew member will be able to identify the regulatory requirements regarding fuelling with passengers on board and the procedures established for this situation.

3.11.2 Syllabus

(1) General

- (a) List the potential hazards associated with fuelling helicopters to occupants and the helicopter.
- (b) Identify the types of fuelling procedures which require that passengers and flight crew be off-loaded and why the potential hazard is greater.
- (c) Describe the procedures and precautions for fuelling with passengers on board.
- (d) Define what is meant by designated evacuation exits during fuelling and associated procedures.

(2) Cabin crew responsibilities

- (a) Identify flight crew responsibilities and communication when fuelling with passengers on board.
- (b) Describe the fuel leak or spill procedures and identify the communication and coordination procedures cabin crew members are responsible for as contained in the operations manual.
- (c) Describe the procedures whenever fumes are detected in the cabin including flight crew communication and the decision to disembark passengers.

3.12 Pre-take-off and pre-landing

3.12.1 Training objective

The cabin crew member will be able to identify safety procedures associated with take-off and landing and be able to implement them.

3.12.2 Syllabus

- (1) Cabin crew responsibilities
 - (a) Describe safety related information that should be conveyed and the requirement to be clear, concise, specific and timely.
 - (b) Define “silent review” and identify the components, when it must be done and who is required to complete it.
- (2) Abnormal situations
 - (a) Define “rejected take-off”, and describe the associated procedures.
 - (b) Define “missed approach” and describe the associated procedures.
 - (c) Define abnormal landing situations.
 - (d) Identify cabin, galley and passenger safety checks.

3.13 Rotor abnormalities

3.13.1 Training objective

The cabin crew member will be able to identify the characteristics of rotor abnormalities and be aware of the procedures associated with this situation.

3.13.2 Syllabus

- (1) General
 - (a) Define what is meant by rotor abnormalities and emergencies that may occur as a result.
 - (b) Describe how to recognize rotor malfunctions and their effect on flight characteristics.
 - (c) Identify the flight crew communication procedures associated with these rotor abnormalities.
 - (d) Outline the procedures for relocating passengers.
 - (e) Identify rotor abnormalities.

3.14 Heliport safety

3.14.1 Training standard

The cabin crew member will be able to identify the components of heliport safety, the responsibilities for passenger movement on heliports and the procedures established to accomplish this safety.

3.14.2 Syllabus

- (1) Hazards on heliports
 - (a) Identify the hazards associated with heliports, example: heliport/ground service traffic, noise and weather, foreign objects.
 - (b) Describe the hazards associated with traffic on the heliport including helicopter movement, propellers, jet blast/exhaustion vehicles.
- (2) Cabin crew responsibilities
 - (a) Identify the established procedures and requirements for escorting passengers across the heliport.
 - (b) Describe the coordination required between cabin crew members and ground staff to ensure passenger safety ie. stairs in place, props are secured and ways to achieve it.
- (3) Operations
 - (a) List the heliport safety hazards associated with helicopter operations.
 - (b) Describe the correct ways to approach a helicopter with and without the rotor engaged.
 - (c) Identify communication and coordination procedures between flight crew and ground staff to ensure passengers are escorted to and from the helicopter.
 - (d) Describe when it is safe to board/disembark passengers and who is responsible for this decision, and the how this information is conveyed to cabin crew members.
 - (e) Describe operational regulations differing from fixed wing operations.

3.15 Turbulence

3.15.1 Training objective

The cabin crew member will be able to identify the hazards associated with turbulence and the procedures for ensuring passenger and cabin crew safety during periods of in-flight turbulence.

3.15.2 Syllabus

- (1) General
 - (a) Describe turbulence and the classification of turbulence ie. light, moderate, severe. (A.I.P)
 - (b) List the potential hazards to helicopters, flight crew and passengers in turbulence.
- (2) Cabin crew responsibilities
 - (a) Identify the importance of flight crew communication and flight crew coordination in conditions of turbulence and describe communication and coordination procedures.
 - (b) Describe safety advice to passengers during turbulence.
 - (c) Outline the cabin crew responsibilities to ensure that passengers comply with requirements and procedures.

3.16 Flight crew member incapacitation

3.16.1 Training objective

The cabin crew member will be able to identify the procedures for dealing with an incapacitated flight crew member.

3.16.2 Syllabus

- (1) General
 - (a) Define what is meant by incapacitated flight crew member and identify possible causes, ie. illness, injury, death, physical and mental incapacitation, food poisoning.
 - (b) Identify the impact on flight safety of an incapacitated pilot or cabin crew member on different helicopter types in the fleet.
 - (c) Identify the preferred locations for relocating incapacitated flight crew members on different helicopters in the operator's fleet.
 - (d) Identify how and where to secure an incapacitated flight crew member for landing or during periods of in-flight turbulence.
 - (e) Identify the flight crew communication procedures to advise of flight crew member incapacitation including cockpit/cabin, senior cabin crew member/other flight crew members.
- (2) Pilot incapacitation
 - (a) Identify the assistance flight crew members will be required to provide in the cockpit.
 - (b) Describe the procedures for assisting an incapacitated pilot.
 - (c) Describe and demonstrate the procedures for administering first aid oxygen to an incapacitated pilot.
 - (d) Describe the procedures for removing an incapacitated pilot from the cockpit.
- (3) Cabin crew incapacitation
 - (a) Identify the cabin crew coordination procedures to ensure that the safety and emergency duties of the incapacitated cabin crew member are assumed; who is responsible for this decision.
 - (b) Outline the procedures associated with incapacitated cabin crew members (including procedures for dealing with more than one incapacitated cabin crew member).

3.17 Post-flight duties

3.17.1 Training objective

The cabin crew member will be able to identify their post-flight safety related duties.

3.17.2 Syllabus

- (1) Documentation

Describe the safety related documentation which must be completed after each flight and who is responsible for its completion.
- (2) Communication

In instances of a flight crew change, identify the responsibility of the flight crew to brief the new cabin crew regarding any un-serviceabilities, special passengers, any other safety related matters pertinent to their flight.

4. Emergency procedures

4.1 Fire fighting

4.1.1 Training objective

The cabin crew member will be able to identify the types of fire, fire detection and fire fighting systems and the established fire fighting procedures.

4.1.2 Syllabus

(1) General

- (a) Identify hazards associated with on board fires including toxicity of fumes, flammability of cabin materials, variety of materials to burn.
- (b) Identify the impediments to fire fighting on board helicopters including limited visibility due to smoke/fumes, fire fighting in confined space, difficulty in locating the source of the fire, limited resources to fight the fire and distance to suitable heliport for landing.
- (c) Describe experience with fire accidents/incidents. Identify the safety lessons learned as a result.
- (d) Define fire chemistry including the elements which must be present for fire to occur ie. fuel, heat, oxygen, chemical reaction.
- (e) List the classes of fire which may occur on aircraft Class A combustible material fires; Class B – grease/spill fires; Class C – electrical and Class D – fire involving metals and the possible sources for these fires.
- (f) Describe importance of early detection and correct recognition.
- (g) Identify the characteristics and behaviour of fire (ie. what you will see, how the fire will behave) in different cabin environments, fire-propagation.
- (h) Describe the means of fire smoke detection, ie. smell, auditory, visual, touch, tactile.
 - (i) Describe the chemical properties of each type of fire extinguisher including hazards to occupants and helicopter systems, how it extinguishes fire.

(2) Cabin crew responsibilities

- (a) List fire prevention measures and cabin crew responsibilities for fire prevention including but not limited to –
 - (i) practising and maintaining safe work habits;
 - (ii) enforcing smoking regulations;
 - (iii) monitoring cabin, toilets, cargo compartments;
 - (iv) awareness of popped circuit breaker procedures; and
 - (v) prompt investigation of fire detection alarms, unusual odours, heat build-up, deformation of helicopter components, etc.
- (b) Describe the importance of cabin crew coordination in fire fighting and identify ways that this may be achieved.
- (c) Describe the importance of flight crew communication in fire fighting and providing pilot-in-command with accurate information on fire source, location, extent/severity of fire/smoke, fire fighting actions.

(3) Procedures – cabin

- (a) Describe the fire fighting procedures for specific types of fires, eg. galley, oven, lavatory, electrical, upholstery, etc.
- (b) Describe the technique and procedures for fighting these fires including finding the source of the fire, type of extinguisher to use, additional fire fighting equipment needed, technique for using extinguisher, complications to fighting this type of fire, limitations to fighting this type of fire, post-fire procedures, flight crew communication and flight crew coordination procedures, passenger-handling.

- (c) Identify ways to maintain breathing comfort for cabin occupants.
- (d) Define “smoke removal”, and smoke control, and describe the associated procedures on the different types of helicopters including flight crew communication, flight crew coordination and advice to passengers.

Note: *May be in the helicopter type specific.*

- (e) Define flashover and flash-fire. Describe the cause of each and conditions under which each is likely to occur.
- (4) Procedures – external
 - (a) Identify the types of external fires which could affect flight safety included but not limited to –
 - (i) engine fires;
 - (ii) APU and engine torching;
 - (iii) fuel spill/heliport fires;
 - (iv) fires on loading bridges; and
 - (v) service vehicle fires.
 - (b) Describe established procedures for dealing with these fire situations including recognition, flight crew communication and flight crew coordination.
 - (c) Identify the communication and coordination required with ground personnel and describe the fire fighting assistance ground personnel can offer and the assistance cabin crew members can provide to ground personnel.

4.2 Smoke/fumes in the cabin

4.2.1 Training objective

The cabin crew member will be able to identify the hazards associated with fumes and/or smoke in the cabin, potential sources and the established procedures if fumes and/or smoke are detected in the cabin in flight or on the ground.

4.2.2 Syllabus

(1) General

Identify the possible sources of fumes and smoke in the cabin.

- (2) Flight crew responsibilities
 - (a) List the flight crew communication procedures associated with smoke/fumes in the cabin including how to notify the pilot-in-command of the situation and what information is required.
 - (b) Describe the procedures for dealing with smoke/fumes in the cabin including locating the source, notifying the pilot-in-command, flight crew coordination, ensuring passengers’ breathing comfort, preparation for rapid disembarkation or evacuation.
 - (c) Describe the authority of the pilot-in-command to relocate passengers if smoke/fumes are present in the cabin and when this decision may be made.

4.3 Rapid decompressions and decompression problems

4.3.1 Training objective

The cabin crew member will be able to recognize the types of decompressions, cabin crew responsibilities and the established procedures for dealing with decompressions.

4.3.2 Syllabus

(1) General

- (a) Identify the causes of each type of decompression (pressurisation loss) ie. fuselage failure (rapid).
- (b) Describe the signs and physiological effects of each type of pressurisation loss.
- (c) Describe the effects of oxygen deficiency on human performance and identify the importance in recognising these signs and symptoms in other flight crew members.
- (d) Describe the effect of decompressions on any objects, persons in the immediate area.
- (e) Describe the likely aircraft attitude (slow or rapid descent) in case of pressurisation loss, what is meant by safe altitude and the importance of reaching a safe altitude quickly.

- (f) Identify the likely cabin conditions in all decompressions and the ways cabin crew members can ensure safety for themselves and passengers.
- (2) Cabin crew responsibilities
 - (a) Describe the flight crew and passenger communication procedures for each type of decompression.
 - (b) Identify the immediate actions cabin crew members must take in the event of decompression.
 - (c) Describe the flight crew communication procedures ie. signal for beginning a post-decompression walkaround, who is responsible for giving this signal and when it will be given.
 - (d) List the cabin flight crew member duties in a post-decompression walkaround and safety priorities.
 - (e) Identify the importance of flight crew coordination including passenger relocation during decompressions and methods of achieving this coordination.

4.4 Evacuations

4.4.1 Training objective

The cabin crew member will be able to identify the types of evacuations, cabin crew responsibilities and procedures relating to the different types of evacuation situations.

4.4.2 Syllabus

- (1) General
 - (a) Identify the types of occurrences which may require evacuation or rapid disembarkation, who is responsible for this decision and the factors to be considered when making this decision.
 - (b) Describe the operator's experience with accidents/ incidents involving rapid disembarkments and evacuation.
 - (c) Outline factors affecting survivability in evacuation such as fuselage break-up, smoke, fire etc.
 - (d) Describe the flotation characteristics of helicopters in the fleet. Identify the factors which could adversely affect helicopter flotation in water landings ie. structural damage, weight, centre of gravity, outside conditions.
 - (e) Describe the different attitudes possible as a result of accidents/incidents ie. gear collapse, shift in centre of gravity. Include the effect of different aircraft attitudes on exit usability.
 - (f) Describe the effect of environmental conditions in evacuations ie. strong winds, terrain, snow/ice.
 - (g) Identify the importance of time in evacuations and how time affects survivability in different accident situations.
 - (h) Describe the type of assistance which may be available at the various heliports in the operator's route system. Include ways cabin crew members can manage the evacuation to coordinate their actions with the ground rescue personnel.
- (2) Cabin crew responsibilities
 - (a) Identify the responsibility of cabin crew members to assist passengers and fellow flight crew members in an evacuation and any limitation to this responsibility. Outline the conditions when cabin crew members should evacuate themselves.
 - (b) Describe ways to assist incapacitated passengers and fellow flight crew members in evacuations.
 - (c) Describe the importance of flight crew communication in an evacuation and the established communication signals for evacu-ations. Include who is responsible for activating evacuation signals.
 - (d) Identify when cabin crew members have the authority and the responsibility to initiate an evacuation.

- (e) Identify the briefings required between cockpit crew, cabin crew and passengers in an emergency situation which may require an evacuation. Include the following information in the description:
 - (i) Who is responsible to conduct briefing?
 - (ii) When and where to conduct the briefing?
 - (iii) What information is required?
 - (iv) How to conduct the briefing including time management?
 - (f) Describe the different types of passenger behaviour (passive, aggressive and hysteric) and identify effective ways of managing passenger behaviour in evacuations.
 - (g) Identify the responsibility of cabin crew members to provide leadership in an evacuation and list ways this may be achieved.
 - (h) Define an Able-Bodied-Person (ABP). Describe the types of persons a cabin crew member would choose for an ABP, the assistance they could provide and the special briefing instructions.
 - (i) Identify the responsibility of cabin crew members to assess conditions prior to opening any exit.
- (3) Evacuation procedures
- (a) Describe the established evacuation procedures for each of the following types of evacuation:
 - (i) Land evacuation – prepared and unprepared;
 - (ii) tidal flat;
 - (iii) ditching;
 - (iv) inadvertent water landing;
 - (v) evacuation with PTV mated to aircraft; and
 - (vi) evacuation at a heliport.
 - (b) Define brace position. Describe the effect of seat pitch on preferred brace positions. Identify the brace positions for cabin crew members in forward or aft-facing seats, passengers (seat orientation as appropriate), including pregnant passengers, handicapped passengers and children and infants. Describe the effectiveness of each brace position and the importance of assuming the preferred brace position to minimize injury.
 - (c) Identify the signal for assuming the brace position in different evacuation situations, when it is given, who is responsible for giving it and the cabin crew responsibilities when the brace signal has been given. Identify when cabin crew members should assume the brace position if no signal has been given.
 - (d) Identify the shouted commands for each type of evacuation and describe the rationale behind each of the commands. Describe ways to increase the effectiveness of commands ie. voice tone, pace, volume, diction, body language, phraseology (commands in unison).
 - (e) Identify the evacuation procedures for each type of exit i.e. doors, windows, hatches, ventral exits, tailcones.
 - (f) Describe the procedures for using evacuation aids ie. slides, ramps, ropes or any other evacuation aid that is provided on the operator's helicopters. Include instructions on operation, use and instructions to passengers for using these.
 - (g) Identify the inflation times for the different evacuation aids ie. slides, ramps, slide/rafts. Describe how to recognize if an evacuation device is fully inflated.
 - (h) Describe alternate procedures if initial inflation fails and if the inflation fails during the course of the evacuation.
 - (i) Describe the preferred techniques for special attention passengers using evacuation slides ie. elderly, handicapped, passengers with guide animals.
 - (j) Identify how cabin crew members can manage evacuations in adverse conditions ie. heavy smoke, darkness.

- (k) Identify the importance of checking the cabin and cockpit, lavatories, after all passengers have been evacuated and describe how and under what conditions this should be accomplished.
 - (l) Identify the cabin crew responsibilities for removal of equipment when they evacuate the helicopter and under what conditions this should be accomplished.
- (4) Post-evacuation
- (a) Describe the responsibilities of cabin crew members after an evacuation ie. grouping passengers, assisting with first aid.
 - (b) Identify the importance of post-crash procedures to increase survivability in each of the survival situations. Include the following:
 - (i) First aid;
 - (ii) survival priorities;
 - (iii) hazards inherent in different environments;
 - (iv) survival skills for different environments based on helicopter and equipment and supplies carried;
 - (v) survival equipment; and
 - (vi) signalling and recovery techniques.
 - (c) Identify the on board equipment and supplies which cabin crew members could remove from a helicopter after an evacuation that would enhance survivability.
 - (d) Describe the process of accident investigation and describe the official groups tasked with accident investigation, internationally and nationally. Identify their mandate and their role in aviation safety.
- (5) Accident/Incident review
- (a) Describe the operator's accidents/incidents and accidents of other operators.
 - (b) List the factors which had a positive and a negative effect on survivability.

Note: It is acceptable to use the accident/incident data from other operators when teaching points can be universally applied.

5. Equipment overview

5.1 Training objective

The cabin crew member will be able to identify the location of each piece of safety and emergency equipment on board the operator's helicopters.

5.2 Syllabus

- (1) General
- (a) Review the location of each piece of safety and emergency equipment the operator has available on board each helicopter.
 - (b) Describe each piece of safety and emergency equipment the operator has available on board each helicopter on the following points:
 - (i) General description;
 - (ii) uses;
 - (iii) locations;
 - (iv) pre-flight serviceability check;
 - (v) removal from storage;
 - (vi) how to operate;
 - (vii) conditions for operation;
 - (viii) operational limitations;
 - (ix) operation under adverse conditions;
 - (x) precautions for use; and
 - (xi) care after use.

6. Helicopter specific

6.1 Galleys

6.1.1 Training objectives

The cabin crew member will be able to identify the procedures relating to the use of galleys, if applicable.

6.1.2 Syllabus

(1) General

- (a) Identify the potential hazards of spills and leaks in galleys and describe the procedures for dealing with them.
- (b) Describe what is meant by “water shut-off valves” in the galley and identify the responsibility of cabin crew members regarding these.
- (c) Identify the cabin crew procedures for dealing with any electrical malfunctions in the galley.
- (d) Where galleys are located on the lower deck, include the following:
 - (i) Policies and procedures relating to lower deck galleys;
 - (ii) maximum number of persons allowed in the lower deck galley;
 - (iii) communication procedures with lower galley cabin crew member; and
 - (iv) escape routes from the lower deck galley.
- (e) Identify the procedures relating to lifts ie. cart-lifts/dumb waiter, how and when they are to be operated, safety features, alternate procedures if lift becomes unserviceable.

6.2 Lighting system

6.2.1 Training objective

The cabin crew member will be able to identify the different components of the interior and exterior lighting systems and be able to use them effectively in any situation.

6.2.2 Syllabus

(1) General

- (a) Describe the components of the interior and exterior emergency lighting systems including portable components.
- (b) Describe the duration of components of the emergency lighting system.
- (c) Identify the responsibilities for activating components of the lighting system in normal and emergency situations.
- (d) Describe the alternate procedures for use in case of system failure.

6.3 Water and waste systems

6.3.1 Training objective

The cabin crew member will be able to implement the correct procedures relating to these systems.

6.3.2 Syllabus

(1) General

- (a) Identify the potential threat to flight safety in case of large leaks of either the water or the waste system.
- (b) Describe the cabin crew responsibilities for the operation/ malfunctions of the water and waste system.
- (c) Describe the shut-off valves, importance, location, operation and identification.

6.4 Oxygen systems

6.4.1 Training objective

The cabin crew member will be able to recognize the components of the fixed oxygen systems and be able to use the systems effectively in any on board situation.

6.4.2 Syllabus

(1) General

- (a) Describe the components of the oxygen system on board the helicopter, including cockpit, cabin sources and galleys.
- (b) Describe when each of the oxygen system components is used. Include description of use for first aid, decompression and supplemental purposes.

- (c) Identify the location of the components of the oxygen system including the location of O₂ masks and spares.
- (d) Identify alternate procedures to access oxygen mask when the system fails.
- (e) Describe the flight crew communication procedures required to activate the oxygen system.

6.5 Heating and ventilation systems

6.5.1 Training objective

The cabin crew member will be able to identify the components of the heating and ventilation systems and be able to implement correct procedures relating to these systems.

6.5.2 Syllabus

- (1) General
 - (a) Identify the location of the heating and exhaust vents which cabin crew members need to be aware of.
 - (b) Describe any flight crew communication and flight crew coordination procedures when using the heating and ventilation system.
 - (c) Identify conditions that may occur in the cabin associated with the system ie. condensation, glycol fumes and residual oil smoke.

6.6 Exits

6.6.1 Training objective

The cabin crew member will be able to identify the features of different types of exits and be able to effectively use them in any on board situation.

6.6.2 Syllabus

- (1) General
 - (a) Identify safety precautions associated with exit operation. Include potential hazards, eg. inadvertent slide deployment, injury to flight crew and ground personnel, etc.
 - (b) Identify the MEL relief given to operators when a door or slide is inoperative. Outline the conditions for this relief to be granted and the procedures which must be followed.
- (2) Normal operation
 - (a) Describe the procedures for operating the exit in normal mode including arming/disarming and opening/closing.
 - (b) Identify the precautions associated with using this exit in normal mode/situations.
 - (c) Describe the flight crew communication and coordination procedures, including any established signals associated with exit operation in normal situations. Identify who is responsible for ensuring that this communication occurs and the importance of this communication for flight safety.
- (3) Abnormal operation (non-routine)
 - (a) Describe the procedures for abnormal/non-routine operation of this exit, including who is responsible for the exit operation, flight crew communication and flight crew coordination procedures.
 - (b) Identify any precautions for abnormal/non-routine operation of this exit.
- (4) Emergency operation
 - (a) Describe the procedures for operating the exit in emergency mode.
 - (b) Identify the precautions for using this exit in emergency situations.
 - (c) Describe any alternate procedures for use of this exit in the event it becomes unserviceable.
 - (d) Identify the visual indicators that verify the off-wing slide, ramp is inflated.
 - (e) Describe the procedures for operating the airstairs in normal, abnormal and emergency situations. Identify the cabin crew member responsibility for airstair operation.
 - (f) Identify the precautions relating to use of the airstairs.
 - (g) Describe the flight crew communication and the coordination procedures whenever the airstairs are being used.

6.7 Unique features

6.7.1 Training objective

The cabin crew member will be able to recognize the unique features of this helicopter type or differences within the type as a result of interior configuration or manufacturer series differences.

6.7.2 Syllabus

- (1) General
 - (a) Identify any features, procedures and/or equipment unique or different to each helicopter in the operator's fleet eg. electrical outlets, main deck cargo compartment fire/smoke detection systems.
 - (b) Describe each of the differences, their impact on the operator's standard operating procedures and the importance to flight safety of cabin crew members being familiar with them.
 - (c) Identify the function of circuit breakers in electrical panels and describe the procedures for tripped circuit breakers including reset and cabin crew communication procedures. Describe the potential hazards to flight safety if circuit breaker procedures are not followed.

7. Drills

7.1 Passenger briefing drills

7.1.1 Equipment criteria

Demonstration equipment representative of all of the equipment used on the helicopters in the operator's fleet.

7.1.2 Performance criteria

Each cabin crew member will perform each of the following:

- (1) Pre-flight safety briefing to a special attention passenger (ie. blind, physically disabled, unaccompanied minor);
- (2) individual briefing to an ABP (ie. exit operation, crowd control, assisting a special attention passenger, assistance on the ground, life raft removal and launching); and
- (3) perform a full passenger pre-flight safety demonstration (ie. signs, seat belts, exits, oxygen, life jacket, floor level lighting, safety features card etc.)

7.1.3 Evaluation criteria

Cabin crew member performance will be observed, rated and debriefed according to –

- (1) completeness of briefing content (ie. all relevant points included);
- (2) effective usage of communication techniques (ie. clarity, comprehension, absence of jargon for special attention and ABP briefing);
- (3) correctly modified in accordance with requirements of the individual to whom briefing is being delivered;
- (4) proper usage of eye contact body language;
- (5) correct usage and simulation of the operation of each piece of demonstration equipment;
- (6) synchronizes demonstrations with announcement;
- (7) displays confidence and leadership;
- (8) displays openness and ability to answer questions; and
- (9) verifies that briefing points were understood.

7.2 Aircraft operation drills for each aircraft type

7.2.1 Equipment criteria

- (1) Each drill will be performed using the appropriate helicopters or an approved training device.
- (2) Individual helicopter exits may be substituted by an approved equivalent and as authorized in the training program. Exits equipped with slides must include slide attached or slide drag simulation for emergency mode operations.
- (3) Floor level exits for which operations are identical under both normal and emergency conditions and which are a routine cabin crew member responsibility to open under normal conditions may be excluded from the drills specified under 7.2.2.

7.2.2 Performance criteria

- (1) Each cabin crew member will operate each floor level exit type, for each helicopter type in the emergency mode that was not operated in the conduct of the drills required in 7.3.3 and perform the following:
 - (a) Recognise the signal for and/or the conditions under which the exit is to be opened in the emergency mode;
 - (b) verify the exit is in the correct mode;
 - (c) assess conditions outside the exit to determine exit usability (ie. clear of obstruction, fire, aircraft attitude);
 - (d) position escape device;
 - (e) open the exit in the emergency mode;
 - (f) secure exit in the fully open position;
 - (g) pull the manual inflation handle(s) and verify deployment inflation of ramp, slide);
 - (h) assume and maintain appropriate protective body and hand positions; and
- (i) physically identify release handle(s) (ie. slide disconnect, ventral stairs, etc).
- (2) Each cabin crew member will operate each cabin window or hatch exit type for each helicopter type that was not operated in the drills required in 7.3.3 and perform the following:
 - (a) Recognise the signal for and/or the conditions under which the exit is to be opened;
 - (b) assess conditions outside the exit to determine exit usability (ie. clear of obstruction, fire, aircraft attitude);
 - (c) open and correctly stow the exit;
 - (d) verbally describe correct exit placement following removal, if the training procedure differs from the operational procedure;
 - (e) pull the manual inflation handle(s) and verify deployment, inflation of ramp, slide;
 - (f) assume and maintain appropriate protective body and hand positions;
 - (g) physically identify location of the escape tapes or escape ropes; and
 - (h) physically identify release handle(s) (ie. slide disconnect, tailcone jettison etc.)

7.2.3 Evaluation criteria

Cabin crew member performance will be observed, rated and debriefed according to the following:

- (1) Acknowledgment and timely responses to signals;
- (2) assessment of the conditions outside the exit to determine exit usability (ie. clear of obstruction, fire, aircraft attitude);
- (3) correct usage of exit operating mechanisms including hand and body position;
- (4) usage of proper terminologies and procedures;
- (5) correctly positions escape device;
- (6) secures exit in the fully opened position or ensures correct stowage position of exit door, window or hatch;
- (7) pulls manual inflation handle (s) and verifies deployment and inflation of evacuation slide, ramp;
- (8) assumes and maintains appropriate protective hand and body positions;
- (9) correctly identifies release handle(s) (ie. slide disconnect, tailcone jettison, ventral stairs); and
- (10) correctly applies procedures (ie. positioning of seatbacks, armrest, tray tables).

7.3 Evacuation drills

7.3.1 General

- (1) Evacuations are emergency situations which cabin crew members must effectively manage using their knowledge of procedures and the resources available to them. Skills are developed and maintained through practice.
- (2) It is recognized that on helicopters with more than one cabin crew member, an evacuation will likely involve multiple exits and cabin crew members. Therefore, where a drill is performed on a

helicopter with more than one cabin crew member, the drill scenario will involve a “typical” number of cabin crew members. Where a cabin simulator is used to conduct the drills, the number of cabin crew members who could participate at any time, will be appropriate to the cabin simulator configuration.

- (3) Each participant will perform the designated evacuation responsibilities for the assigned position. Where a double cabin crew member seat is available and would normally be occupied by two cabin crew members, the drill will be conducted to reflect this reality.
- (4) A cabin crew member who is qualified exclusively on helicopters operating with one cabin crew member and who is being qualified on helicopters with more than one cabin crew member, must perform at least one drill with additional cabin crew members.

7.3.2 Simulation scenarios

- (1) An evacuation drill is a training and evaluation scenario which must portray an operational flight and include abnormal and emergency occurrences and interaction amongst cabin crew members (if applicable), other cabin crew members and passengers.
- (2) A drill scenario should not incorporate excessive or multiple unrelated variables that would overload a cabin crew member nor should it be limited so that there is reduced value to the exercise. The variables should differ in sequence from one drill to the next and can include, but are not limited to, the following:
 - (a) Unserviceable exits;
 - (b) inflation devices that fail or only partially inflate;
 - (c) aircraft attitude which will necessitate a decision to use the exit or redirect passengers;
 - (d) poor visibility (ie. darkness, smoke);
 - (e) incapacitated flight crew members;
 - (f) exits which become unusable during the evacuation;
 - (g) special needs passengers (ie. elderly, handicapped);
 - (h) passengers in panic (ie. positive, negative, false leadership);
 - (i) failure of helicopter emergency systems (ie. lighting, evacuation signal, communication);
 - (j) decompression; and
 - (k) exits which require the use of non-standard “commands” (ie. ramp with slide).

7.3.3 Unprepared land and unprepared water evacuation drill performance criteria

- (1) Each cabin crew member will perform at least one land and one unprepared water evacuation drill that incorporates the procedures pertinent to a specific exit and perform the following; or
- (2) provided the operator establishes and maintains a method to record the type of drill performed by each cabin crew member and the drill types are alternated annually, each cabin crew member will perform at least one land or one unprepared water evacuation drill that incorporates the procedures pertinent to a specific exit and perform the following:
 - (a) Secure themselves in a cabin crew member seat;
 - (b) recognise that an emergency situation is developing and react appropriately to the drill scenario;
 - (c) apply all applicable commands;
 - (d) recognise when and how to initiate the evacuation, (ie. commands, evacuation horn);
 - (e) activate emergency lights, evacuation horn;
 - (f) locate and don life jacket and command passengers as appropriate;
 - (g) assess conditions inside and outside the exit to determine exit usability throughout the evacuation;
 - (h) prepare and open the exit;
 - (i) secure exit in fully open position or ensure correct stowage;
 - (j) pull inflation handle(s) and verify deployment, inflation of ramp, slide;
 - (k) assume appropriate protective position;

- (l) initiate passenger evacuation;
- (m) final cabin and cockpit checks, and remove required emergency equipment;
- (n) evacuate helicopter/trainer correctly;
- (o) physically identify location of escape tapes or escape ropes; and
- (p) physically identify release handle(s) (ie. slide disconnect, ventral stairs, tailcone jettison etc.)

7.3.4 Evaluation criteria

Cabin crew member performance will be observed, rated and debriefed according to the following:

- (1) Correct usage of the seat mechanism, restraint system and brace position as appropriate for seat direction and location;
- (2) correct and timely reaction to emergency situations;
- (3) consistent usage of appropriate terminologies (ie. commands, ABP briefings) with clear, positive authoritative communication techniques, as appropriate for drill scenario;
- (4) activates emergency lights, evacuation horn;
- (5) selects appropriate exit for the evacuation scenario and the helicopter type;
- (6) assessment of the conditions inside and outside the exit to determine exit usability throughout evacuation (ie. clear of obstruction, fire, aircraft attitude);
- (7) preparation and correct operation of exit;
- (8) secures exit in the fully open position or ensures correct stowage;
- (9) pulls inflation handle(s) and verifies deployment, inflation of slide, ramp;
- (10) assumes and maintains appropriate protective body and hand positions;
- (11) effective usage of able-bodied persons for special needs passengers (ie assisting outside helicopter and directing people away from the helicopter or onto flotation devices, crowd control, etc);
- (12) adequacy of cabin checks, removal of equipment and additional supplies as scenario and operator procedures dictate;
- (13) correctly identifies release handle (s) (ie. slide disconnect, tailcone jettison, ventral stairs);
- (14) correct application of procedures as related to scenario; and
- (15) consequences of errors.

7.3.5 Crew prepared evacuation drill performance criteria

Each cabin crew member must participate in at least one prepared land evacuation drill or at least one ditching evacuation drill and perform the following:

- (1) Recognize the in-flight emergency signal from the cockpit and react according to procedures;
- (2) prepare passengers, cabin and self according to procedures and scenario;
- (3) select and brief able-bodied passengers to assist as required, opening non-crewed exits, crowd control, buddy-up with special needs passengers, assisting outside helicopter and directing people away from the helicopter or onto flotation devices;
- (4) recognize the emergency brace and evacuation signals and react accordingly;
- (5) activate emergency lights, evacuation horn;
- (6) prepare and operate exits;
- (7) evacuate passengers;
- (8) final cabin and cockpit checks, remove required emergency equipment; and
- (9) evacuate helicopter/trainer.

7.3.6 Evaluation criteria

Cabin crew member performance will be observed, rated and debriefed according to the contents of 7.3.4 and the following:

- (1) Correct application of emergency landing preparation procedures;
- (2) awareness of and appropriate response to passenger behaviour;
- (3) communication acknowledgement;
- (4) accuracy in briefing of ABPS;

- (5) debrief will include a discussion with all participants describing, in general terms, procedures and responsibilities which must be completed following and as appropriate to evacuation scenarios (ie. flotation devices, equipment, location, movement of passengers to a safe area, protection from the elements, first aid, etc.)

7.4 Life raft drill

7.4.1 Equipment criteria

Life raft drill must be conducted using life saving equipment that is representative of that which is installed on each helicopter type with respect to weight, dimensions, appearance, features and operation.

7.4.2 Performance criteria

- (1) Each cabin crew member will participate in a life raft drill once every third annual training year and perform the following:
 - (a) Access the raft compartment and experience the difficulty associated with moving the weight of a packaged life raft within a space representative of the aircraft aisle;
 - (b) examine all features of a fully inflated raft;
 - (c) board raft(s), assist persons into raft;
 - (d) access the inflation lanyard;
 - (e) access the slide, raft quick release mechanism while verbally describing the procedure to release the life raft from the helicopter; and
 - (f) examine the life raft survival kit and components.
- (2) Participate as a cabin crew member or a passenger in the following:
 - (a) Launching, inflating, and disconnecting raft(s) either actual or by video;
 - (b) righting overturned rafts;
 - (c) effective raft management, (ie. distribution of passengers, deploying sea anchor, etc);
 - (d) erecting the raft canopy;
 - (e) distribution of duties to passengers;
 - (f) discuss the hazards associated with moving a packaged life raft through the cabin to an exit (ie. inadvertent inflation, passenger movement and panic); and
 - (g) water survival principles, a review of the operations of survival kit components including raft maintenance.

7.5 Life jacket drill

7.5.1 Equipment criteria

Life jackets used for this drill must be representative of those most commonly carried on the helicopter.

7.5.2 Performance criteria

Each cabin crew member must perform the following:

- (1) Observe removal of life jacket from closed pouch;
- (2) don life jacket;
- (3) locate and review operation of inflation toggles;
- (4) partially inflate one chamber of life vest orally;
- (5) practice deflation technique;
- (6) locate and review light activation;
- (7) locate whistle; and
- (8) fit life jacket.

7.6 Helicopter slide drill

7.6.1 Equipment criteria

- (1) The evacuation slide must be representative of the type installed in the helicopter with respect to the following categories:
 - (a) Inflatable, double lane slides;
 - (b) inflatable slide and ramp combination;
 - (c) inflatable, single lane slides.
- (2) Non-inflatable slides must be representative of the type installed in the helicopter.

7.6.2 Performance criteria

Each cabin crew member will perform a helicopter slide drill according to the following:

- (1) Inflatable evacuation slide
 - (a) Slide down an inflatable slide from each of the categories; or
 - (b) slide down an inflatable slide from one of the categories, and for each other slide category, view a video which depicts slide, ramp activation and inflation, both externally from a side angle and a slide base angle and internally from the cabin crew member protected position, including slide inflation sound, and slide disconnect sequence; or
 - (c) for each slide category view a video which depicts: slide, ramp activation and inflation, both externally from a side angle and a slide base angle and internally from the cabin crew member protected position, including slide inflation sound and slide disconnect sequence.
- (2) Non inflatable evacuation slide

Where the evacuation slide is not door mounted, each cabin crew member must retrieve the slide(s) from its stowed location and attach the evacuation slide clips to the appropriate "D" rings on door frames.

7.7 Fire fighting drills

7.7.1 General

- (1) Drill scenarios will provide each cabin crew member with the opportunity to merge procedural knowledge with practical skills. Their ability to successfully react to different fire situations will enhance their level of confidence and their ability to deal with fires in flight.
- (2) Cabin fire fighting drills may include class A, B, C fires in the following locations:
 - (a) cabin area (ie. under seat, overhead bin, closet);
 - (b) galley area (ie. garbage bin, upper electrical panel, oven);
 - (c) confined area (ie. waste bin, lavatory); and
 - (d) hidden (ie. behind panels).

7.7.2 Equipment criteria

- (1) Fire fighting drills will be conducted using furnishings representative of those found on the operator's helicopters as appropriate to the drill scenario (ie. such as seats, galley units, panels, waste bins, etc);
- (2) Fire fighting equipment and the brackets used for restraint must be representative to those installed in the helicopter with respect to weight, dimensions, controls, types and operations. Fire extinguishers used for live fire fighting must be charged with the appropriate agent or with an environmentally friendly agent. Protective Breathing Equipment (PBE) consisting of portable oxygen bottle and full face mask must be charged with oxygen. Self contained PBE may be substituted with a training smoke hood which is not operational.

7.7.3 Live fire fighting

Each cabin crew member must demonstrate the effectiveness of a fire extinguisher correctly applied to extinguish an actual fire once every third annual training year, while wearing PBE.

7.7.4 Cabin fire fighting drill performance criteria

Each cabin crew member must participate in a fire fighting drill in a cabin environment involving at least one cabin crew member and a passenger(s) and perform the following:

- (1) Recognise that there is a potential fire situation (ie. smoke detector signal or unusual fumes, odours etc.);
- (2) locate the source of fire;
- (3) apply communication and coordination procedures;
- (4) select, remove and operate the nearest appropriate fire extinguisher and other fire fighting equipment;
- (5) control of passengers; and
- (6) monitor for re-ignition, and apply post-fire follow-up procedures.

7.7.5 Evaluation criteria

Cabin crew member performance will be observed, rated and debriefed according to the following:

- (1) Recognition or identification of the problem;
- (2) correctly locates the source of the fire (ie. tactile search, use of crash axe, etc);
- (3) effective communication/coordination procedures throughout the drill (ie. notifying fellow flight crew members of the situation, providing clear, concise and consistent information to the pilot-in-command, advice and assistance to passengers);
- (4) response in a timely manner;
- (5) correct use of fire fighting equipment consistent with the type of fire, location of the fire and maximum effective position of the fire extinguisher;
- (6) undertake further action as required; and
- (7) consequences of error.

7.7.6 Equipment practice

Each cabin crew member who does not operate the following equipment in the drill in 7.7.4 must demonstrate the ability to use fire fighting equipment and perform the following:

- (1) Remove from stowage, don and activate PBE and practice communication;
- (2) remove from stowage and operate each type of fire extinguisher (uncharged) and associated attachments (ie. extinguisher fitted with hose attachment, extension (wand), etc.);
- (3) don each piece of protective clothing; and
- (4) initiate fire fighting procedures involving at least one cabin crew member and a passenger(s).

7.7.7 Fire/Class B Main deck (Combi configuration)

Each cabin crew member will perform the drills identified in Technical Directive (to be inserted when published).

7.8 Pilot incapacitation drill

7.8.1 Training objective

The cabin crew member will apply the procedures relating to an incapacitated pilot.

7.8.2 Syllabus

- (1) Procedures

For each helicopter where the operation of the pilot seats is significantly different, each cabin crew member will –

- (a) pull the pilot away from the flight controls and correctly fasten and lock the restraint system;
- (b) position the pilot seat using the controls, ie. horizontal, vertical, recline; and
- (c) apply flight crew coordination and flight crew communication procedures to assist the remaining cockpit crew.

Notes on cabin crew training standard syllabus

1. ***Where helicopters have no cabin crew members – as in the case of corporate or charter flights – and the pilot/co-pilot is responsible for the safety of passengers, the training standard syllabus has been amended to include two additional columns (PI) and (PR) which refer to “Pilot initial” and “Pilot recurrent”. See Table 2 for a summary of training syllabus.***
2. ***Where an “X” is shown instead of a “.” provision is made for optional or guidance inclusion.***

127.03.14 REFRESHER TRAINING

1. Refresher training

An operator must ensure that refresher training is conducted by suitably qualified persons and, for each cabin crew member, includes at least the following:

- (1) Emergency procedures including pilot incapacitation;
- (2) evacuation procedures including crowd control techniques;
- (3) the operation and actual opening of all normal and emergency exits for passenger evacuation in a helicopter or representative training device;
- (4) demonstration of the operation of all other exits; and
- (5) the location and handling of emergency equipment, including oxygen systems, and the donning of life jackets, portable oxygen and protective breathing equipment.

127.03.15 CHECKING

1. Checking

An operator must ensure that each cabin crew member undergoes checks as follows:

- (1) Initial training – The subjects referred to in CAR 64.02.2, as applicable;
- (2) Type and differences training – The subjects listed in TS 127.03.11; and
- (3) Recurrent training – The subjects listed in TS 127.03.13.

127.04.2 OPERATIONS MANUAL

1. Structure of operations manual

- (1) An operator must ensure that the main structure of the operations manual is as follows:

Part 1: General

This part must comprise all non type-related operational policies, instructions and procedures needed for a safe operation and must comply with all relevant CARs.

Part 2: Helicopter operating matters

This part must comprise all type-related instructions and procedures needed for a safe operation. It must take account of the different types of helicopters or variants used by the operator.

Part 3: Route and heliport instructions and information

This part must comprise all instructions and information needed for the area of operation.

Part 4: Training

This part must comprise all training instructions for personnel required for a safe operation.

- (2) An operator must ensure that the contents of the operations manual are in accordance with paragraph 2 of this technical standard, and relevant to the area and type of operation.
- (3) An operator must ensure that the detailed structure of the operations manual is approved by the Director.

2. Contents of operations manual

2.1 PART 1: General

2.1.1 Administration and control of operations manual

- (1) Introduction
 - (a) A statement that the manual complies with all applicable CAR and with the terms and conditions of the applicable operating certificate.
 - (b) A statement that the manual contains operational instructions that are to be complied with by the relevant personnel.
 - (c) A list and brief description of the various parts, their contents, applicability and use.
 - (d) Explanations and definitions of terms and words needed for the use of the manual.
- (2) System of amendment and revision
 - (a) Who is responsible for the issuance and insertion of amendments and revisions.
 - (b) A record of amendments and revisions with insertion dates and effective dates.
 - (c) A statement that handwritten amendments and revisions are not permitted except in situations requiring immediate amendment or revision in the interests of aviation safety.
 - (d) A description of the system for the annotation of pages and their effective dates.
 - (e) A list of effective pages.
 - (f) Annotation of changes (on text pages and, as far as practicable, on charts and diagrams).
 - (g) Temporary revisions.
 - (h) A description of the distribution system for the manuals, amendments and revisions.

2.1.2 Organisation and responsibilities

- (1) Organisational structure

A description of the organisational structure including the general organogram and operations department organogram. The organogram must depict the relationship between the Operations Department and the other Departments of the organisation. In particular, the subordination and reporting lines of all Divisions, Departments etc, which pertain to the safety of flight operations, must be shown.

(2) Nominated postholders

The name of each nominated postholder responsible for flight operations, the maintenance system, flight crew training and ground operations. A description of their function and responsibilities must be included.

(3) Responsibilities and duties of operations management personnel

A description of the duties, responsibilities and authority of operations management personnel pertaining to the safety of flight operations and the compliance with the applicable CARs.

(4) Authority, duties and responsibilities of the pilot-in-command

A statement defining the authority, duties and responsibilities of the pilot-in-command.

(5) Duties and responsibilities of flight crew members other than the pilot-in-command.

A statement defining the duties and responsibilities of flight crew members other than the pilot-in-command.

2.1.3 Operational control and supervision

(1) Supervision of the operation by the operator

A description of the system for supervision of the operation by the operator. This must show how the safety of flight operations and the qualifications of personnel are supervised. In particular, the procedures related to the following items must be described:

(a) Licence and qualification validity;

(b) competence of operations personnel; and

(c) control, analysis and storage of records, flight documents, additional information and data.

(2) System of promulgation of additional operational instructions and information

A description of any system for promulgating information which may be of an operational nature but is supplementary to that in the operations manual. The applicability of this information and the responsibilities for its promulgation must be included.

(3) Operational control

A description of the procedures and responsibilities necessary to exercise operational control with respect to flight safety.

2.1.4 Quality control system

(1) Purpose of the Quality System

The quality system should enable the operator to monitor compliance with the CAR and CATS, the operations manual, the operator's maintenance management policy, and any other standards specified by that operator or the Director to ensure airworthy aircraft and safe operations.

(2) Requirements

(a) The operator shall establish a quality system and designate a quality manager to give effect to the requirements of paragraph (1) above. Compliance monitoring must include a system of reporting back to the accountable manager, to ensure corrective action as necessary.

(b) The quality system must include a quality assurance programme that contains procedures, designed to verify that all operations are being conducted in accordance with all applicable requirements, standards, and procedures.

(c) The quality system and the quality manager must be acceptable to the Director.

(d) The quality system must be described in relevant documentation.

(e) Notwithstanding sub-paragraph (a) above, the Director may accept the nomination of two quality managers, one for flight operations and one for maintenance, provided the operator

has designated one single quality management unit to ensure that the quality system is applied uniformly throughout the entire operation.

(3) General

In order to show compliance with paragraphs (1) and (2) above, an operator should establish his quality system in accordance with the instructions and information contained in the paragraphs below.

(4) Definitions

The terms, used in the context of this requirement for an operator's quality system, have the following meaning:

(a) *Inspection:*

An inspection is the act of observing a particular event or action, to ensure that correct procedures and requirements are followed during the accomplishment of that event or action. The primary purpose of an inspection is to verify that established standards are followed during the observed event or action.

(b) *Audit:*

An audit is a methodical, planned review used to determine how a business is being conducted, and compares the results with how that business should have been conducted according to regulations and established procedures.

(c) *Accountable Manager:*

The accountable manager is the person, acceptable to the Director,, who has corporate authority for ensuring that all operations and maintenance activities can be financed and carried out to a standard required by the Director, and any additional requirements defined by the operator.

The accountable manager is an essential part of the AOC-holder's management organisation. The term 'accountable manager' is intended to mean the Chief Executive Officer / President / Managing Director / Director-General / General Manager, or similar designations, of the operator's organisation, who by virtue of his or her position has overall responsibility (including financial) for managing the organisation.

The accountable manager will have overall responsibility for the AOC-holder's quality system, including the frequency, format and structure of the internal management evaluation activities, as prescribed in sub-paragraph (9)(h) below.

(d) *Quality Assurance:*

Quality assurance means all those planned and systematic actions necessary to provide adequate confidence that operational and maintenance practices satisfy prescribed requirements.

(e) *Quality Manager:*

The quality manager is the manager, acceptable to the Director, responsible for the management of the quality system, the monitoring function and for requesting corrective action.

(5) Quality Policy

An operator shall establish a formal, written quality policy statement, constituting a commitment by the accountable manager as to what the quality system is intended to achieve. The quality policy should reflect the achievement and continued compliance with the CAR, together with any additional standards specified by the operator.

(6) Quality Manager

(a) The function of the quality manager, to monitor compliance with-, and the adequacy of, procedures required to ensure safe operational practices and airworthy aircraft, as required by the CAR, may be carried out by more than one person by means of different, but complementary, quality assurance programmes.

- (b) The primary role of the quality manager is to verify, by monitoring activity in the fields of flight operations, maintenance, crew training and ground operations, that the standards required by the Director, and any additional requirements defined by the operator, are being carried out under the supervision of the relevant nominated post holder.
- (c) The quality manager should be responsible for ensuring that the quality assurance programme is properly established, implemented and maintained.
- (d) The quality manager should—
 - (i) be suitably qualified and experienced;
 - (ii) have direct access to the accountable manager;
 - (iii) preferably not be one of the nominated post holders; and
 - (iv) have access to all parts of the operator's and, as necessary, any sub-contractor's organisation. In the case of small/very small operators (see paragraph (10) below), the posts of the accountable manager and the quality manager may be combined. However, in such event, independent personnel should conduct quality audits.

(7) Quality System

- (a) The operator's quality system should ensure compliance with, and adequacy of operational and maintenance activities requirements, standards, and operational procedures.
- (b) The operator should specify the basic structure of the quality system applicable to the operation.
- (c) The quality system should be structured according to the size and complexity of the operation to be monitored (see also paragraph (11) below).
- (d) As a minimum, the quality system should address the following:
 - (i) The provisions of the CAR.
 - (ii) The operator's additional standards and operating procedures.
 - (iii) The operator's quality policy.
 - (iv) The operator's organisational structure.
 - (v) Responsibility for the development, establishment and management of the quality system.
 - (vi) Documentation, including manuals, reports, and records.
 - (vii) Quality procedures.
 - (viii) Quality assurance programme.
 - (ix) Schedule of the monitoring process.
 - (x) Audit procedures.
 - (xi) Reporting procedures.
 - (xii) Follow-up and corrective action procedures.
 - (xiii) Recording system.
 - (xiv) The training syllabus.
 - (xv) Document control.

(8) Quality Assurance Programme.

The quality assurance programme should include all planned and systematic actions necessary to provide confidence that all operations and maintenance are conducted in accordance with all applicable requirements, standards, and operational procedures. When establishing a quality assurance programme, consideration should, at least, be given to the sub-paragraphs (a) to (j) below:

(a) *Quality Inspection.*

The primary purpose of a quality inspection is to observe a particular event/action/document, etc., in order to verify whether established operational procedures and requirements are followed during the accomplishment of that event and whether the required standard is achieved. Typical subject areas for quality inspections are:

- (i) Actual flight operations.

- (ii) Ground de-icing/anti-icing.
 - (iii) Flight support services.
 - (iv) Load control.
 - (v) Maintenance.
 - (vi) Technical standards.
 - (vii) Training standards
- (b) *Audit.*
- (i) An audit is a systematic and independent comparison of the way in which an operation is being conducted against the way in which the published operational procedures say it should be conducted.
Audits should include at least the following quality procedures and processes:
 - (Aa) A statement explaining the scope of the audit.
 - (Ab) Planning and preparation.
 - (Ac) Gathering and recording evidence.
 - (Ad) Analysis of the evidence.
 - (ii) Techniques which contribute to an effective audit are:
 - (Aa) Interviews or discussions with personnel.
 - (Ab) A review of published documents.
 - (Ac) The examination of an adequate sample of records.
 - (Ad) The witnessing of the activities which make up the operation.
 - (Ae) The preservation of documents and the recording of observations.
- (c) *Auditors*
- (i) Auditors should preferably not have any day-to-day involvement in the area of the operation and/or maintenance activity which is to be audited. An operator may, in addition to using the services of full-time dedicated personnel belonging to a separate quality department, undertake the monitoring of specific areas or activities by the use of part-time auditors.
 - (ii) An operator whose structure and size does not justify the establishment of full-time auditors may undertake the audit function by the use of part-time personnel from within his own organisation or from an external source under the terms of an agreement acceptable to the Director. In all cases, the operator should develop suitable procedures to ensure that persons directly responsible for the activities to be audited are not selected as part of the auditing team.
 - (iii) Where external auditors are used, it is essential that any external specialist is familiar with the type of operation or maintenance conducted by the operator.
 - (iv) The operator's quality assurance programme should identify the persons within the company who have the experience, responsibility and authority to—
 - (aa) perform quality inspections and audits as part of ongoing quality assurance;
 - (bb) identify and record any concerns or findings, and the evidence necessary to substantiate such concerns or findings;
 - (cc) initiate or recommend solutions to concerns or findings through designated reporting channels;
 - (dd) verify the implementation of solutions within specific timescales; and
 - (ee) report directly to the quality manager.
- (d) *Audit Scope.*
- Operators are required to monitor compliance with the operational procedures they have designed to ensure safe operations, airworthy aircraft, and the serviceability of both operational and safety equipment. In doing, they should as a minimum, and where appropriate, monitor the following:
- (i) The organisation.

- (ii) Plans and company objectives.
- (iii) Operational procedures.
- (iv) Flight safety.
- (v) Operator certification (AOC/Operations Specification).
- (vi) Supervision within the organisation.
- (vii) Aircraft performance.
- (viii) All-weather operations.
- (ix) Communications and navigational equipment and practices.
- (x) Mass, balance and aircraft loading.
- (xi) Instruments and safety equipment.
- (xii) Manuals, logs, and records.
- (xiii) Aircraft maintenance/operations interface.
- (xiv) Use of the MEL.
- (xv) Maintenance programmes and continued airworthiness.
- (xvi) Airworthiness directives management.
- (xvii) Maintenance accomplishment.
- (xviii) Defect deferral.
- (xix) Flight crew.
- (xx) Cabin crew.
- (xxi) Dangerous goods.
- (xxii) Security.
- (xxiii) Training.

(e) *Audit Scheduling.*

A quality assurance programme should include a defined audit schedule and a periodic review-cycle, area by area. The schedule should be flexible, and allow unscheduled audits when trends are identified. Follow-up audits should be scheduled when necessary to verify that corrective action was carried out and that it was effective. An operator should establish a schedule of audits to be completed during a specified calendar period. All aspects of the operation should be reviewed within every period of 12 months in accordance with the programme unless an extension to the audit period is accepted as explained below:

- (i) An operator may increase the frequency of audits at his or her discretion but should not decrease the frequency without the agreement of the Director.. It is considered unlikely that an interval between audits greater than 24 months would be acceptable.
- (ii) When an operator defines the audit schedule, significant changes to the management, organisation, operation, or technologies should be considered, as well as changes to the regulatory requirements.

(f) *Monitoring.*

- (i) The aim of monitoring within the quality system is primarily to investigate and judge its effectiveness and thereby to ensure that defined policy and operational, and maintenance standards are continuously complied with. Monitoring activity is based upon quality inspections, audits, corrective action and follow-up.
- (ii) The operator should establish and publish a quality procedure to monitor regulatory compliance on a continuing basis. This monitoring activity should be aimed at eliminating the causes of unsatisfactory performance. Any non-compliance identified as a result of monitoring should be communicated to the manager responsible for taking corrective action or, if appropriate, the accountable manager. Such non-compliance should be recorded, for the purpose of further investigation, in order to determine the cause and to enable the recommendation of appropriate corrective action.

- (iii) The quality assurance programme should include procedures to ensure that corrective actions are taken in response to findings. These quality procedures should monitor such actions to verify their effectiveness and having been completed.
 - (iv) Organisational responsibility and accountability for the implementation of corrective action resides with the department cited in the report identifying the finding.
 - (v) The accountable manager will have the ultimate responsibility for resourcing the corrective action and ensuring, through the quality manager, that the corrective action has re-established compliance with the standard required by the Director, and any additional requirements defined by the operator.
- (g) *Corrective Action.*
- (i) Subsequent to the quality inspection/audit, the operator should establish:
 - (aa) the seriousness of any findings and any need for immediate corrective action;
 - (bb) the origin of the finding;
 - (cc) which corrective actions are required to ensure that the non-compliance does not recur;
 - (dd) a schedule for corrective action;
 - (ee) the identification of individuals or departments responsible for implementing corrective action; and
 - (ff) allocation of resources by the accountable manager, where appropriate.
 - (ii) The quality manager should—
 - (aa) verify that corrective action is taken by the manager responsible in response to any finding of non-compliance;
 - (bb) verify that corrective action includes the elements outlined in paragraph (8)(g)(i) above;
 - (cc) monitor the implementation and completion of corrective action;
 - (dd) provide management with an independent assessment of corrective action, implementation and completion; and
 - (ee) evaluate the effectiveness of corrective action through the follow-up process.
- (h) *Management Evaluation.*
- A management evaluation is a comprehensive, systematic, documented review by the management of the quality system, operational policies and procedures, and should consider the following:
- (i) The results of quality inspections, audits and any other indicators.
 - (ii) The overall effectiveness of the management organisation in achieving stated objectives.
 - (iii) A management evaluation should identify and correct trends, and prevent, where possible, future non-conformities. Conclusions and recommendations made as a result of an evaluation should be submitted in writing to the responsible manager for action. The responsible manager should be an individual who has the authority to resolve issues and take action.
 - (iv) The accountable manager should decide upon the frequency, format, and structure of internal management evaluation activities.
- (i) *Recording.*
- The operator should maintain accurate, complete, and readily accessible records documenting the results of the quality assurance programme. Records are essential data to enable an operator to analyse and determine the root causes of non-conformity, so that areas of non-compliance can be identified and addressed. The following records should be retained for a period of at least five years:
- (i) Audit Schedules.
 - (ii) Quality Inspection and Audit Reports.

- (iii) Responses to findings.
 - (iv) Corrective-action reports.
 - (v) Follow-up and closure reports.
 - (vi) Management Evaluation Reports.
- (j) *Quality Assurance Responsibility for Sub-Contractors.*

Operators may decide to sub-contract out certain activities to external agencies for the provision of services related to areas such as:

- (i) Ground de-icing/anti-icing.
- (ii) Maintenance.
- (iii) Ground handling.
- (iv) Flight support (including performance calculations, flight planning, navigation database, and despatch).
- (v) Training.
- (vi) Manual preparation.

The ultimate responsibility for the product or service provided by the sub-contractor always remains with the operator. A written agreement should exist between the operator and the sub-contractor, clearly defining the safety-related services and quality to be provided. The sub-contractor's safety-related activities relevant to the agreement should be included in the operator's quality assurance programme. The operator should ensure that the sub-contractor has the necessary authorisation/approval, when required, and commands the resources and competence to undertake the task. If the operator requires the sub-contractor to conduct an activity that exceeds the sub-contractor's authorisation/approval, the operator is responsible for ensuring that the sub-contractor's quality assurance takes account of such additional requirements.

(8) *Quality System Training.*

- (a) An operator should establish effective, well-planned, and resourced quality-related briefings for all personnel. Those responsible for managing the quality system should receive training covering—
 - (i) an introduction to the concept of the quality system;
 - (ii) quality management;
 - (iii) the concept of quality assurance;
 - (iv) quality manuals;
 - (v) audit techniques;
 - (vi) reporting and recording; and
 - (vii) the way in which the quality system will function in the organisation.
- (b) Time should be provided to train every individual involved in quality management and for briefing the remainder of the employees. The allocation of time and resources should be governed by the size and complexity of the operation concerned.
- (c) Quality management courses are available from the various national or international standards institutions, and an operator should consider whether to offer such courses to those likely to be involved in the management of quality systems. Operators with sufficient appropriately qualified staff should consider whether to carry out in-house training.

(10) *Quality System for Organisations with 20 or less Full -Time Employees.*

- (a) The requirement to establish and document a quality system and to employ a quality manager applies to all operators. References to large and small operators elsewhere in the requirements are governed by aircraft capacity and by mass. Such terminology is not relevant when considering the scale of an operation and the quality system required. Therefore, in the context of quality systems, operators should be categorised according to the number of full-time employees.

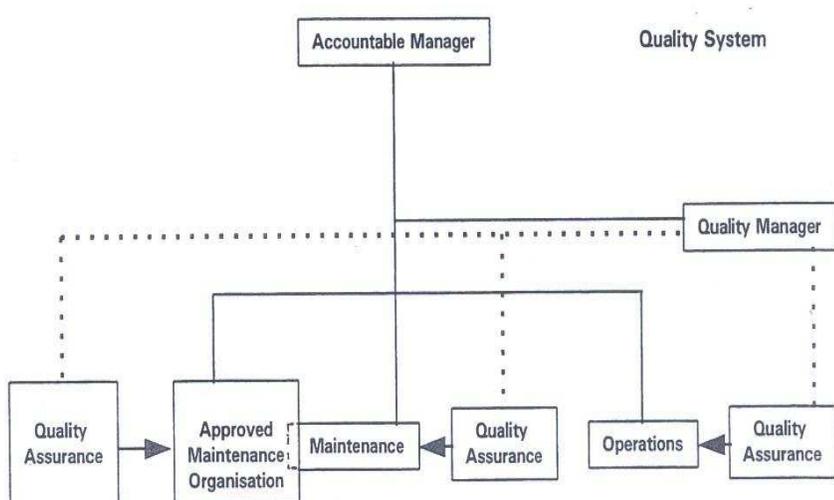
- (b). Operators who employ five or less full-time staff are considered to be **‘very small’**, while those employing between six and twenty full-time employees are regarded as **‘small’**.
- (c) Complex quality systems could be inappropriate for small or very small operators and the clerical effort required to draw up manuals and quality procedures for a complex system may stretch their resources. It is therefore accepted that such operators should tailor their quality systems to suit the size and complexity of their operation and allocate resources accordingly.
- (d) For small and very small operators it may be appropriate to develop a quality assurance programme that employs a checklist. The checklist should have a supporting schedule that requires completion of all checklist items within a specified timescale, together with a statement acknowledging completion of a periodic review by top management. An occasional independent overview of the checklist content and achievement of the quality assurance should be undertaken.
- (e) The small operator may decide to use internal or external auditors or a combination of the two. In these circumstances it would be acceptable for external specialists and/or qualified organisations to perform the quality audits on behalf of the quality manager.
- (f) If the independent quality audit function is being conducted by external auditors, the audit schedule should be shown in the relevant documentation.

Whatever arrangements are made, the operator retains the ultimate responsibility for the quality system, and especially the completion and follow-up of corrective actions.

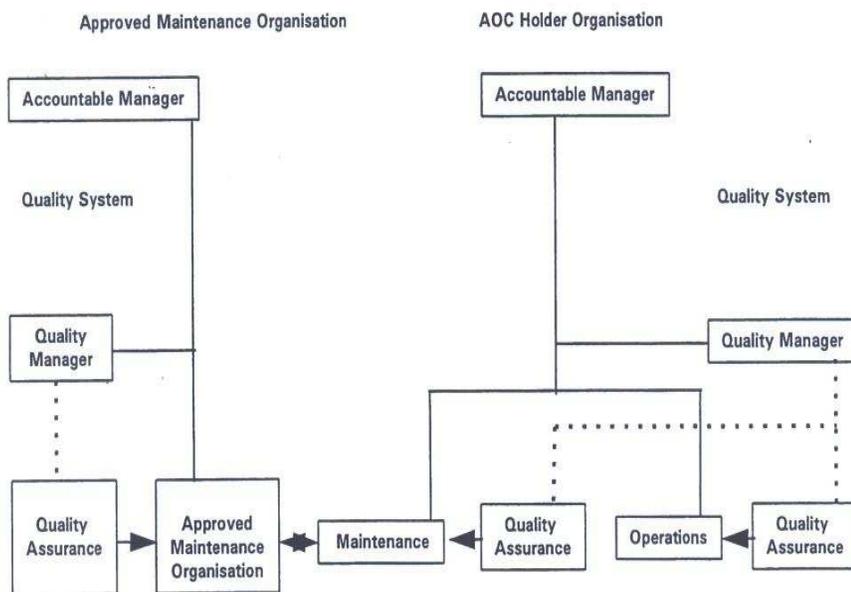
(11) Example organograms

The following diagrams illustrate two typical examples of quality organisations:

- (a) Quality system within the AOC holder’s organisation when the AOC holder also holds a Part 145 approval:



- (b) Quality systems related to an AOC holder’s organisation where aircraft maintenance is contracted out to a PART 145 approved organisation which is not integrated with the AOC holder:



References/source documents:

- A FAA "AIR CARRIER INTERNAL EVALUATION PROGRAMS"
- B JAR-OPS 1.035
- C CAA FLIGHT OPERATIONS PART 121 AUDIT CHECKLIST
- D SAA OPS MANUAL

2.1.5 Flight crew composition

(1) Flight crew composition

An explanation of the method for determining flight crew compositions taking account of the following:

- (a) The type of helicopter being used;
 - (b) the area and type of operation being undertaken;
 - (c) the phase of the flight;
 - (d) the minimum flight crew requirement and flight duty period planned;
 - (e) experience (total and on type), recency and qualification of the flight crew members; and
 - (f) the designation of the pilot-in-command and, if necessitated by the duration of the flight, the procedures for the relief of the pilot-in-command or other members of the flight crew.
- (2) Designation of the pilot-in-command The rules applicable to the designation of the pilot-in-command.
- (3) Flight crew incapacitation Instructions on the succession of command in the event of flight crew incapacitation.

2.1.6 Qualification requirements

- (1) A description of the required licence, rating(s), qualification/competency (e.g. for routes and heliports), experience, training, checking and recency for operations personnel to conduct their duties. Consideration must be given to the helicopter type, kind of operation and composition of the flight crew.
- (2) Cockpit crew
 - (a) Pilot-in-command
 - (b) Co-pilot

- (c) Pilot under supervision
- (d) Operation on more than one type or variant.
- (3) Cabin crew
 - (a) Senior cabin crew member
 - (b) Cabin crew member
 - (i) Required cabin crew member
 - (ii) Additional cabin crew member and cabin crew member during familiarisation flights.
 - (c) Operation on more than one type or variant.
- (4) Training, checking and supervision personnel
 - (a) For cockpit crew
 - (b) For cabin crew.
- (5) Other operations personnel.

2.1.7 Flight crew health precautions

- (1) Flight crew health precautions

The relevant regulations and guidance to flight crew members concerning health including –

 - (a) alcohol and other intoxicating liquor;
 - (b) narcotics;
 - (c) drugs;
 - (d) sleeping tablets;
 - (e) pharmaceutical preparations;
 - (f) immunisation;
 - (g) scuba diving;
 - (h) blood donation;
 - (i) meal precautions prior to and during flight;
 - (j) sleep and rest; and
 - (k) surgical operations.

Note: See *Document SA-CATS-MR*.

2.1.8 Flight time limitations

- (1) Flight time and duty period limitations and rest requirements

A description of the flight time and duty period limitations and rest requirements prescribed in TS 127.02.9 as applicable to the operation.
- (2) Exceedances of flight time and duty period limitations and/or reductions of rest periods

Conditions under which flight time and duty period may be exceeded or rest periods may be reduced and the procedures used to report these modifications.

2.1.9 Operating procedures

- (1) Flight preparation instructions

As applicable to the operation:

 - (a) Minimum flight altitudes

A description of the method of determination and application of minimum altitudes including –

 - (i) a procedure to establish the minimum altitudes/flight levels for VFR flights; and
 - (ii) a procedure to establish the minimum altitudes/ flight levels for IFR flights.
 - (b) Criteria for determining the usability of heliports
 - (c) Methods for the determination of heliport operating minima

The method for establishing heliport operating minima for IFR flights in accordance with TS 127.07.7. Reference must be made to procedures for the determination of the visibility and/or runway visual range and for the applicability of the actual visibility observed by the pilots, the reported visibility and the reported runway visual range.

- (d) En route operating minima for VFR flights or VFR portions of a flight and, where single-engine helicopters are used, instructions for route selection with respect to the availability of surfaces which permit a safe forced landing.
 - (e) Presentation and application of heliport and en route operating minima
 - (f) Interpretation of meteorological information
Explanatory material on the decoding of MET forecasts and MET reports relevant to the area of operations, including the interpretation of conditional expressions.
 - (g) Determination of the quantities of fuel, oil and water methanol carried
The methods by which the quantities of fuel, oil and water methanol to be carried, are determined and monitored in flight. This section must also include instructions on the measurement and distribution of the fluid carried on board. Such instructions must take account of all circumstances likely to be encountered on the flight, including the possibility of in-flight replanning and of failure of one or more of the helicopter's power plants. The system for maintaining fuel and oil records must also be described.
 - (h) Mass and centre of gravity
The general principles of mass and centre of gravity including:
 - (i) Definitions;
 - (ii) methods, procedures and responsibilities for preparation and acceptance of mass and centre of gravity calculations;
 - (iii) the policy for using either standard and/or actual masses;
 - (iv) the method for determining the applicable passenger, baggage and cargo mass;
 - (v) the applicable passenger and baggage masses for various types of operations and helicopter type;
 - (vi) general instruction and information necessary for verification of the various types of mass and balance documentation in use;
 - (vii) last minute changes procedures;
 - (viii) specific gravity of fuel, oil and water methanol; and
 - (ix) seating policy/procedures.
 - (i) ATS flight plan
Procedures and responsibilities for the preparation and submission of the air traffic service flight plan. Factors to be considered include the means of submission for both individual and repetitive flight plans.
 - (j) Operational flight plan
Procedures and responsibilities for the preparation and acceptance of the operational flight plan. The use of the operational flight plan must be described including samples of the operational flight plan formats in use.
 - (k) Operator's flight folio
The responsibilities and the use of the operator's flight folio must be described, including samples of the format used.
A technical log may be used in place of a flight folio, if it contains the required information.
- (1) List of documents, forms and additional information to be carried.
 - (2) Ground handling instructions
 - (a) Fuelling procedures
A description of fuelling procedures, including –
 - (i) safety precautions during refuelling and defuelling including when an APU is in operation or when a turbine engine is running and the prop-brakes are on;

- (ii) refuelling and defuelling when passengers are embarking, on board or disembarking; and
 - (iii) precautions to be taken to avoid mixing fuels.
 - (b) Helicopter, passengers and cargo handling procedures related to safety

A description of the handling procedures to be used when allocating seats and embarking and disembarking passengers and when loading and unloading the helicopter. Further procedures, aimed at achieving safety whilst the helicopter is on the heliport, must also be given. Handling procedures must include –

 - (i) disembarking of persons;
 - (ii) sick passengers and persons with reduced mobility;
 - (iii) transportation of inadmissible passengers, deportees or persons in custody;
 - (iv) permissible size and weight of hand baggage;
 - (v) loading and securing of items in the helicopter;
 - (vi) special loads and classification of load compartments;
 - (vii) positioning of ground equipment;
 - (viii) operation of helicopter doors;
 - (ix) safety on the heliport, including fire prevention, blast and suction areas;
 - (x) start-up, ramp departure and arrival procedures;
 - (xi) servicing of helicopters;
 - (xii) documents and forms for helicopter handling; and
 - (xiii) multiple occupancy of helicopter seats.
 - (c) Procedures for the refusal of embarkation and for disembarkation

Procedures to ensure that persons who appear to be intoxicated or who demonstrate by manner or physical indications that they are under the influence of drugs, except medical patients under proper care, are refused embarkation.
 - (d) De-icing and anti-icing on the ground

A description of the de-icing and anti-icing policy and procedures for helicopters on the ground. These must include descriptions of the types and effects of icing and other contaminants on helicopters whilst stationary during ground movements and during take-off. In addition, a description of the fluid types used must be given including –

 - (i) proprietary or commercial names;
 - (ii) characteristics;
 - (iii) effects on helicopter performance;
 - (iv) hold-over times; and
 - (v) precautions during usage.
- (2) Flight procedures
- (a) VFR/IFR policy

A description of the policy for allowing flights to be made under VFR, or of requiring flights to be made under IFR, or of changing from one to the other.
 - (b) Navigation procedures

A description of all navigation procedures relevant to the type(s) and area(s) of operation. Consideration must be given to –

 - (i) standard navigation procedures including policy for carrying out independent cross-checks of keyboard entries where these affect the flight path to be followed by the helicopter;
 - (ii) Polar navigation and navigation in other designated areas;
 - (iii) RNAV;
 - (iv) in-flight replanning; and
 - (v) procedures in the event of system degradation.
 - (c) Altimeter setting procedures

- (d) Altitude alerting system procedures
- (e) Ground proximity warning system procedures
- (f) Policy and procedures for the use of TCAS/ACAS
- (g) Policy and procedures for in-flight fuel management
- (h) Adverse and potentially hazardous atmospheric conditions
Procedures for operating in, and/or avoiding, potentially hazardous atmospheric conditions including –
 - (i) thunderstorms;
 - (ii) icing conditions;
 - (iii) turbulence;
 - (iv) windshear;
 - (v) heavy precipitation;
 - (vi) sand storms;
 - (vii) mountain waves; and
 - (viii) significant temperature inversions.
 - (i) Wake turbulence
Wake turbulence separation criteria, taking into account helicopter types, wind conditions and runway location.
- (j) Flight crew members at their stations
The requirements for flight crew members to occupy their assigned stations or seats during the different phases of flight or whenever deemed necessary in the interests of aviation safety.
- (k) Use of safety belts for flight crew and passengers
The requirements for flight crew members and passengers to use safety belts and/or harnesses during the different phases of flight or whenever deemed necessary in the interests of aviation safety.
- (l) Admission to cockpit
The conditions for the admission to the cockpit of persons other than the flight crew.
- (m) Use of vacant flight crew seats
The conditions and procedures for the use of vacant flight crew seats.
- (n) Incapacitation of flight crew members
Procedures to be followed in the event of incapacitation of flight crew members in flight. Examples of the types of incapacitation and the means for recognising them, must be included.
- (o) Cabin safety requirements
Procedures covering:
 - (i) Cabin preparation for flight, in-flight requirements and preparation for landing including procedures for securing cabin and galleys;
 - (ii) procedures to ensure that passengers are seated where, in the event that an emergency evacuation is required, they may best assist and not hinder evacuation from the helicopter;
 - (iii) Procedures to be followed during passenger embarkation and disembarkation;
 - (iv) procedures in the event of fuelling with passengers on board or embarking and disembarking; and
 - (v) smoking on board.
- (p) Passenger briefing procedures
The contents, means and timing of passenger briefing in accordance with CAR 91.07.19.
- (q) Procedures for helicopters operated whenever required cosmic or solar radiation detection equipment is carried.

- (r) Procedures for the use of cosmic or solar radiation detection equipment and for recording its readings including actions to be taken in the event that limit values specified in the operations manual are exceeded. In addition, the procedures, including ATS procedures, to be followed in the event that a decision to descend or re-route is taken.
- (3) All weather operations
- (4) Use of the minimum equipment and configuration deviation list(s)
- (5) Non revenue flights
Procedures and limitations for –
 - (a) training flights;
 - (b) test flights;
 - (c) delivery flights;
 - (d) ferry flights;
 - (e) demonstration flights; and
 - (f) positioning flights,
including the kind of persons who may be carried on such flights.
- (6) Oxygen requirements
 - (a) An explanation of the conditions under which oxygen must be provided and used.
 - (b) The oxygen requirements specified for –
 - (i) cockpit crew;
 - (ii) cabin crew; and
 - (iii) passengers.

2.1.10 Dangerous goods and weapons

- (1) Information, instructions and general guidance on the conveyance of dangerous goods including –
 - (a) operator's policy on the conveyance of dangerous goods;
 - (b) guidance on the requirements for acceptance, labelling, handling, stowage and segregation of dangerous goods;
 - (c) procedures for responding to emergency situations involving dangerous goods;
 - (d) duties of all personnel involved as referred to in Part 92; and
 - (e) instructions on the carriage of the operator's employees.
- (2) The conditions under which weapons, munitions of war and sporting weapons may be carried.

2.1.11 Security

- (1) Security instructions and guidance of a non-confidential nature which must include the authority and responsibilities of operations personnel. Policies and procedures for handling and reporting crime on board such as unlawful interference, sabotage, bomb threats, and hijacking must also be included.
- (2) A description of preventative security measures and training.

Note: Parts of the security instructions and guidance may be kept confidential.

2.1.12 Handling of aviation accidents and incidents

Procedures for the handling, notifying and reporting of aviation accidents and incidents. This section must include –

- (1) definitions of aviation accidents and incidents and the relevant responsibilities of all persons involved;

- (2) the description of which operator departments, authorities or other institutions have to be notified by which means and in which sequence in case of an aviation accident;
- (3) special notification requirements in the event of an aviation accident or incident when dangerous goods are being carried;
- (4) a description of the requirements to report specific aviation accidents and incidents;
- (5) the forms used for reporting and the procedure for submitting them to the relevant authority must also be included; and
- (6) if the operator develops additional safety related reporting procedures for its own internal use, a description of the applicability and related forms to be used.

2.1.13 Rules of the air

Rules of the air including –

- (1) visual and instrument flight rules;
- (2) territorial application of the rules of the air;
- (3) communication procedures including COM-failure procedures;
- (4) information and instructions relating to the interception of civil helicopters;
- (5) the circumstances in which a radio listening watch is to be maintained;
- (6) signals;
- (7) time system used in operation;
- (8) ATC clearances, adherence to flight plan and position reports;
- (9) visual signals used to warn an unauthorised helicopter flying in or about to enter a restricted, prohibited or danger area;
- (10) procedures for pilots observing an aviation accident or receiving a distress transmission;
- (11) the ground/air visual codes for use by survivors, description and use of signal aids; and
- (12) distress and urgency signals.

2.2 PART 2: Helicopter operating matters – type related

Taking account of the differences between types, and variants of types, under the following headings:

2.2.1 General information and units of measurement

General information (e.g. helicopter dimensions), including a description of the units of measurement used for the operation of the helicopter type concerned and conversion tables.

2.2.2 Limitations

A description of the certified limitations and the applicable operational limitations including –

- (1) certification status;
- (2) passenger seating configuration for each helicopter type including a pictorial presentation;
- (3) types of operation that are approved (e.g. IFR/VFR, CAT II/III, flights in known icing conditions, etc);
- (4) flight crew composition;
- (5) mass and centre of gravity;
- (6) speed limitations;
- (7) flight envelope(s);
- (8) wind limits;
- (9) performance limitations for applicable configurations;
- (10) airframe contamination; and

(11) system limitations.

2.2.3 Normal procedures

The normal procedures and duties assigned to the flight crew, the appropriate check-lists, the system for use of the check-lists and a statement covering the necessary coordination procedures between cockpit crew and cabin crew. The following normal procedures and duties must be included:

- (a) Pre-flight;
- (b) pre-departure;
- (c) altimeter setting and checking;
- (d) taxi, take-off and climb;
- (e) noise abatement;
- (f) cruise and descent;
- (g) approach, landing preparation and briefing;
- (h) VFR approach;
- (i) instrument approach;
- (j) visual approach and circling;
- (k) missed approach;
- (l) normal landing; and
- (m) post landing.

2.2.4 Abnormal and emergency procedures

The abnormal and emergency procedures and duties assigned to the flight crew, the appropriate check-lists, the system for use of the check-lists and a statement covering the necessary coordination procedures between flight crew and cabin crew. The following abnormal and emergency procedures and duties must be included:

- (a) Flight crew incapacitation;
- (b) fire and smoke drills;
- (c) exceeding structural limits such as overweight landing;
- (d) lightning strikes;
- (e) distress communications and alerting ATC to emergencies;
- (f) engine failure;
- (g) system failures;
- (h) guidance for diversion in case of serious technical failure;
- (i) ground proximity warning;
- (j) TCAS warning;
- (k) windshear; and
- (l) emergency landing/ditching.

2.2.5 Performance

- (1) Performance data must be provided in a form in which it can be used without difficulty.
- (2) Supplementary data covering flights in icing conditions
Any certificated performance related to an allowable configuration, or configuration deviation, such as anti-skid inoperative, must be included.
- (3) If performance data, as required for the appropriate performance class, is not available in the approved AFM, then other data acceptable to the Director must be included. Alternatively, the operations manual may contain cross-reference to the approved data contained in the AFM where such data is not likely to be used often or in an emergency.

- (4) Additional performance data
 - (a) Effect of equipment on level flight (fuel consumption, speed and range):
 - (i) Hoist installation;
 - (ii) sliding doors –
 - open; and
 - closed;
 - (iii) ski installation;
 - (iv) float installation;
 - (v) emergency float installation; and
 - (vi) sand filter installation;
 - (b) flights conducted under the provisions of the CDL.

2.2.6 Flight planning

- (1) Data and instructions necessary for pre-flight and in-flight planning including factors such as speed schedules and power settings. Where applicable, procedures for engine(s)-out operations. Flights to isolated heliports must be included.
- (2) The method for calculating fuel needed for the various stages of flight in accordance with TS 127.07.10.

2.2.7 Mass and balance

Instructions and data for the calculation of the mass and balance including –

- (a) calculation system (e.g. index system);
- (b) information and instructions for completion of mass and balance documentation, including manual and computer generated types;
- (c) limiting masses and centre of gravity of the various versions; and
- (d) dry operating mass and corresponding centre of gravity or index.

2.2.8 Loading

Procedures and provisions for loading and securing the load in the helicopter.

2.2.9 Configuration deviation list

The Configuration Deviation List(s) (CDL), if provided by the manufacturer, taking account of the helicopter types and variants operated including procedures to be followed when a helicopter is being despatched under the terms of its CDL.

2.2.10 Minimum equipment list

The Minimum Equipment List (MEL) taking account of the helicopter types and variants operated and the type(s)/area(s) of operation.

2.2.11 Survival and emergency equipment including oxygen

- (1) A list of the survival equipment to be carried for the routes to be flown and the procedures for checking the serviceability of this equipment prior to take-off. Instructions regarding the location, accessibility and use of survival and emergency equipment and its associated check lists(s) must also be included.

- (2) The procedure for determining the amount of oxygen required and the quantity that is available. The flight profile and number of occupants must be considered. The information provided must be in a form in which it can be used without difficulty.

2.2.12 Emergency evacuation procedures

- (1) Instructions for preparation for emergency evacuation including flight crew coordination and emergency station assignment.
- (2) Emergency evacuation procedures
A description of the duties of all members of the flight crew for the rapid evacuation of a helicopter and the handling of the passengers in the event of a forced landing, ditching or other emergency.

2.2.13 Helicopter systems

A description of the helicopter systems, related controls and indications and operating instructions.

2.3 PART 3: Route and heliport instructions and information

Instructions and information relating to communications, navigation and heliports including minimum flight levels and altitudes for each route to be flown and operating minima for each heliport planned to be used, including –

- (a) minimum flight level/altitude;
- (b) operating minima for departure, destination and alternate heliports;
- (c) communication facilities and navigation aids;
- (d) runway data and heliport facilities;
- (e) approach, missed approach and departure procedures including noise abatement procedures;
- (f) COM-failure procedures;
- (g) search and rescue facilities in the area over which the helicopter is to be flown;
- (h) a description of the aeronautical charts that must be carried on board in relation to the type of flight and the route to be flown, including the method to check their validity;
- (i) availability of aeronautical information and MET services;
- (j) *en route* COM/NAV procedures including holding; and
- (k) heliport categorisation for flight crew competence qualification.

2.4 PART 4: Training

- (1) Training syllabi and checking programmes for all operations personnel assigned to operational duties in connection with the preparation and/or conduct of a flight.
- (2) Training syllabi and checking programmes must include:
 - (a) For cockpit crew:
 - (i) All relevant items prescribed in Part 61 and Subpart 3;
 - (b) For cabin crew:
 - (i) All relevant items prescribed in Part 64 and Subpart 3;
 - (c) For operations personnel concerned, including flight crew members:
 - (i) All relevant items prescribed in Part 92; and
 - (ii) all relevant items regarding operator security.
 - (d) For operations personnel other than flight crew members (e.g. dispatcher, handling personnel etc.):
 - (i) All other relevant items pertaining to their duties.
- (3) Procedures

- (a) Procedures for training and checking.
 - (b) Procedures to be applied in the event that personnel do not achieve or maintain the required standards.
 - (c) Procedures to ensure that abnormal or emergency situations requiring the application of part or all of abnormal or emergency procedures and simulation of IMC by artificial means, are not simulated during commercial flights.
- (4) Description of documentation to be stored and storage periods.

127.04.4 RECORDS OF EMERGENCY AND SURVIVAL EQUIPMENT

1. Emergency and survival equipment list

The minimum information to be contained in an emergency and survival equipment list, is prescribed in CAR 91.01.5.

127.04.6 LOAD AND TRIM SHEET

1. Load and trim sheet

- (1) The load and trim sheet must contain the following information:
 - (a) The helicopter registration and type;
 - (b) the flight identification number and date;
 - (c) the identity of the pilot-in-command;
 - (d) the identity of the person who prepared the document;
 - (e) the dry operating mass and the corresponding CG of the helicopter;
 - (f) the mass of the fuel at take-off and the mass of trip fuel;
 - (g) the mass of consumables other than fuel;
 - (h) the components of the load including passengers, baggage, freight and ballast;
 - (i) the take-off mass, landing mass and zero fuel mass;
 - (j) the load distribution;
 - (k) the applicable helicopter CG positions; and
 - (l) the limiting mass and CG values.
- (2) The person superintending the loading of a helicopter must certify that the load distribution is in accordance with the requirements prescribed in the operations manual or flight manual and that the maximum certificated mass has not been exceeded.
- (3) The load and trim sheet must be signed by the pilot-in-command unless the load and trim sheet is sent to the helicopter by electronic data transfer.
- (4) Electronic data transfer
When the load and trim sheet is sent to the helicopter by electronic data transfer, a copy of the final load and trim sheet, as accepted by the pilot-in-command, must be available on the ground.
- (5) An example of a load and trim sheet is contained in the SACAA website.

127.06.6 DUTIES OF HOLDER OF OPERATING CERTIFICATE

1. Notification

Before change is effected to an operating certificate, the holder of the operating certificate must notify the Director in the following manner:

- (a) The notification must be made in the form contained in the SACAA website; and
- (b) be accompanied by a certified true copy of the air service licence held by the holder and the operating certificate concerned.

127.07.10 FUEL POLICY

1. Contingency fuel

At the planning stage, not all factors which could have an influence on the fuel consumption to the destination heliport can be foreseen. Therefore, contingency fuel is carried to compensate for items such as –

- (a) deviations of an individual helicopter from the expected fuel consumption data;
- (b) deviations from forecast meteorological conditions; and
- (c) deviations from planned routings and/or cruising levels/altitudes.

127.07.18 CARRY-ON BAGGAGE

1. Procedures for stowing of carry-on baggage

Procedures established by an operator to ensure that carry-on baggage is adequately and securely stowed must take account of the following:

- (a) Each item carried in a cabin must be stowed only in a location that is capable of restraining it;
- (b) mass limitations placarded on or adjacent to stowages must not be exceeded;
- (c) underseat stowages must not be used unless the seat is equipped with a restraint bar and the baggage is of such size that it may adequately be restrained by this equipment;
- (d) items must not be stowed in toilets or against bulkheads that are incapable of restraining articles against movement forwards, sideways or upwards and unless the bulkheads carry a placard specifying the greatest mass that may be placed there;
- (e) baggage and cargo placed in lockers must not be of such size that they prevent latched doors from being closed securely;
- (f) baggage and cargo must not be placed where it can impede access to emergency equipment; and
- (g) checks must be made before take-off, before landing, and whenever the pilot-in-command illuminates the fasten seat belts sign (or otherwise so orders) to ensure that baggage is stowed where it cannot impede evacuation from the helicopter or cause injury by falling (or other movement) as may be appropriate to the phase of flight.

TABLES

Table 1: Maximum flight duty period: Helicopters

Local time of start	Single pilot		Two pilots	
	Maximum length flying duty	Maximum offlying time	Maximum length flying duty	Maximum offlying time
0500 – 1659	10	7	12	8
1700 – 0459	9	6	12	7

Table 2: Cabin crew training syllabus

	PI	PR	Initial	Re-current	Requal	A/C type
AVIATION – GENERAL						
REGULATORY OVERVIEW						
Regulatory overview			•			
Legislation	•		•	•	•	

AVIATION TERMINOLOGY						
Terminology			•			
Terms of reference			•			
THEORY OF FLIGHT						
General helicopter description			•			
Aerodynamics of flight			•			
Meteorology			•			
Air traffic control			•			
PHYSIOLOGY OF FLIGHT						
General			•	•	•	
Effects of altitude			•	•	•	
COCKPIT OBSERVATION FLIGHT						
General	N/A	N/A	•	•	•	•
ROLES AND RESPONSIBILITIES						
OPERATOR						
Operating requirements			•		•	
Operations Manual	•	•	•	•	•	
CABIN CREW MEMBERS						
General	•		•	•	•	
CAA INSPECTORS						
General			•			
SAFETY PROCEDURES						
FLIGHT CREW COORDINATION						
General			•		•	
Flight crew coordination			•	•	•	
COMMUNICATIONS						
General			•	•	•	
Communication			•	•	•	
Passenger announcements	•		•			
SURFACE CONTAMINATION						
General			•	X	•	
Cabin crew member responsibilities			•	X	•	
De-icing/anti-icing			•	X	•	
BRIEFINGS						
Cabin crew briefings			•	•	•	
Passenger briefings	•	•	•	•	•	
SAFETY CHECKS						
General	•	•	•	•	•	
PASSENGER HANDLING						

General			•	•	•	
Passenger boarding	•	•	•	•	•	
PASSENGER AND CABIN CREW MEMBER SEATS AND RESTRAINTS						
Passenger seating	•	•	•	•	•	•
Cabin crew seating			•	•	•	•
CABIN BAGGAGE						
Passenger carry-on baggage	•	•	•	•	•	
Flight crew carry-on baggage			•	•	•	•
ELECTRONIC DEVICES						
General	•	•	•	•	•	
SERVICE TO PASSENGERS ON THE GROUND						
General			•			
Cabin crew member responsibilities			•	•	•	
FUELLING WITH PASSENGERS ON BOARD						
General	•	•	•	•	•	
Cabin crew member responsibilities			•	•	•	
PRE-TAKE OFF AND PRE-LANDING						
Cabin preparation	•		•		•	
Cabin crew member responsibilities	•	•	•	•	•	
Abnormal situations	•	•	•	•	•	
PROPELLER ABNORMALITIES						
General			•	•	•	•
HELIPORT SAFETY						
Hazards on heliports			•	•	•	
Cabin crew member responsibilities			•	•	•	
Helicopter operators			•	•	•	
TURBULENCE						
General			•	•	•	
Cabin crew member responsibilities			•	•	•	
CREW MEMBER INCAPACITATION						
General			•	•	•	
Pilot incapacitation	•		•	•	•	
Cabin crew incapacitation			•	•	•	
COCKPIT PROTOCOL						
General			•		•	
FUEL DUMPING						

General			•		•	
POST-FLIGHT DUTIES						
Documentation			•	•	•	
Communication			•	•	•	
OXYGEN ADMINISTRATION						
General	•		•		•	
Procedures	•		•		•	
EMERGENCY PROCEDURES						
FIRE FIGHTING						
General	•	•	•	•	•	
Cabin crew member responsibilities	•	•	•	•	•	
Procedures – cabin	•		•	•	•	
Procedures – external	•	•	•	•	•	
SMOKE/FUMES IN THE CABIN						
General	•	•	•	•	•	
Cabin crew member responsibilities	•	•	•	•	•	
RAPID DECOMPRESSIONS AND PRESSURISATION PROBLEMS						
General	•	•	•	•	•	
Cabin crew member responsibilities	•	•	•	•	•	
EVACUATIONS						
General	•	•	•	•	•	
Cabin crew member responsibilities	•	•	•	•	•	
Evacuation procedures	•	•	•	•	•	
Post-evacuation	•	•	•	•	•	
Accident/Incident review	•	•	•			
EMERGENCY EQUIPMENT						
EQUIPMENT OVERVIEW						
General			•		•	•
HELICOPTER SPECIFIC						
PHYSICAL DESCRIPTION						
General			•			•
Exterior description			•			•
Interior description			•		•	•
GALLEYS						
General			•	•		•
COMMUNICATION SYSTEMS						
General			•			•
Interphone			•		•	•
Public address system			•		•	•

Passenger call system			•		•	•
Entertainment system			•		•	•
Automatic announcement system			•		•	•
LIGHTING SYSTEMS						
General			•	•	•	•
WATER AND WASTE SYSTEMS						
General			•	•	•	•
OXYGEN SYSTEMS						
General			•	•	•	•
HEATING AND VENTILATION SYSTEMS						
General			•	•	•	•
EXITS						
General			•	•	•	•
Normal operation			•	•	•	•
Abnormal operation			•	•	•	•
Emergency operation			•	•	•	•
Airstairs			•	•	•	•
UNIQUE FEATURES						
General			•	•	•	•
DRILLS						
PUBLIC ADDRESS SYSTEM AND INTERPHONE SYSTEM DRILLS						
Introduction	•		•		•	
Equipment criteria	•		•		•	
Performance criteria	•		•		•	
Evaluation criteria	•		•		•	
PASSENGER BRIEFING DRILL						
Equipment criteria	•		•	•	•	
Performance criteria	•		•	•	•	
Evaluation criteria	•		•	•	•	
HELICOPTER EXIT OPERATION DRILLS						
Equipment criteria	•		•	•	•	
Normal door operation performance criteria	•		•	•	•	
Emergency door operation performance criteria	•		•	•		
Cabin window exit operation	•		•	•		
Evaluation criteria	•		•	•	•	
Airstair operation performance criteria	•		•	•	•	

EVACUATION DRILLS						
General	•		•	•		
Simulation scenarios	•		•	•		
Unprepared land/unprepared water evacuation	•		•	•		
Evaluation criteria	•		•	•		
Cabin crew prepared land/ditching evacuation drills	•		•	•		
Evaluation criteria	•		•	•		
RAFT DRILL (WET OR DRY)						
Equipment criteria	X		•	•	•	
Performance criteria	X		•	•	•	
LIFE JACKET DRILL						
Equipment criteria	•		•	•		
Performance criteria	•		•	•		
HELICOPTER SLIDE DRILL						
Equipment criteria			•	•		•
Performance criteria			•	•		•
FIRE FIGHTING DRILLS						
General	•	•	•	•		
Equipment criteria	•	•	•	•		
Equipment practice performance criteria	•	•	•	•		
Live fire fighting performance criteria	•	•	•	•		
Fire fighting/Cabin performance criteria	•	•	•	•	•	
Evaluation criteria	•	•	•	•	•	
Fires/Class B main deck cargo compartment	N/A	N/A	•	•	•	•
OXYGEN ADMINISTRATION DRILL						
Equipment criteria	X	X	•		•	
Portable oxygen bottle performance criteria	X	X	•		•	
Fixed first aid oxygen performance criteria	X	X	•		•	•
PRE-FLIGHT CHECK						
Equipment criteria	•	•	•	•	•	•
Performance criteria	•	•	•	•	•	•
Evaluation criteria	•	•	•	•	•	
PRE-TAKE OFF CHECK						
Equipment criteria	•	•	•			

Performance criteria			•	•	•	
Evaluation criteria			•	•	•	•
PRE-LANDING CHECK						
Equipment criteria			•	•	•	
Performance criteria			•	•	•	
Evaluation criteria			•	•	•	
POST-LANDING CHECK						
Equipment criteria			•	•	•	
Performance criteria			•	•	•	
Evaluation criteria			•	•	•	
PILOT INCAPACITATION DRILL						
Procedures	•	•	•	•	•	

SA-CATS 133

Helicopter external-load operations

List of technical standards

133.03.5 MARKINGS AND PLACARDS

1. Markings and placards

133.03.5 MARKINGS AND PLACARDS

1. Markings and placards

The owner or operator of a helicopter must ensure that the following markings and placards are displayed in the helicopter –

- (1) a placard displayed in the cockpit or cabin, stating the class of helicopter-load combination for which the helicopter has been approved and the occupancy limitation prescribed in CAR 133.03.3(a); and
- (2) a placard, marking or instruction, displayed next to the external-load attaching means, stating the maximum external load prescribed as an operating limitation in CAR 133.03.3(c).

SA-CATS 135

Air transport operations – carriage of less than 20 passengers or cargo

List of technical standards

135.02.2 MINIMUM REQUIREMENTS FOR ASSIGNMENT AS PILOT-IN-COMMAND

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2. Operating experience

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3. Operator's schemes and their approval
4. General principles of control of flight, duty and rest time
5. Responsibilities of flight crew members
6. Standard provisions required for an operator's scheme
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8. Rest period
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2. Approval of contracted training services
3. Equipment, facilities and personnel of a training programme
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6. Training records

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135.03.6 CHECKING OF FLIGHT CREW MEMBERS

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2. Contents of operations manual

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4. Inspections of flight recorders
5. Flight recorders specifications
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3. Enhanced vision systems
4. HUD and EVS approval

135.07.30 OPERATIONS WITH ELECTRONIC FLIGHT BAGS

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2. Airworthiness approval
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135.07.32 CARRY-ON BAGGAGE

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135.10.2 COMPONENTS OF SAFETY MANAGEMENT SYSTEM

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3. QMS policy
4. Structure
5. Process requirements
6. Documentation
7. Quality manager
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135.02.2 MINIMUM REQUIREMENTS FOR ASSIGNMENT AS PILOT-IN-COMMAND

1. Flight time experience

No person shall act as the pilot-in-command (PIC) of a passenger-carrying aeroplane with a maximum certificated seating configuration of 10 or more passengers unless –

- (a) in the case of an IFR flight, the person has acquired at least 500 hours of flight time; and
- (b) in the case of a VFR flight at night, the person has acquired not less than 350 hours of flight time.

2. Operating experience

- (1) An operator of an aeroplane shall establish procedures to ensure a pilot is not assigned as the PIC following conversion to a new type of aeroplane or upgrading to the PIC position on the same or a different aeroplane unless adequate in-flight orientation and familiarisation has taken place.
- (2) The procedures specified in paragraph (1) shall include a line induction programme during which a PIC on a new type of aeroplane or recently upgraded PIC shall, under the supervision of a PIC qualified to conduct line induction training and designated by the operator, acquire operational flight time comprised of a minimum number of sectors and/or hours of flight time. The minimum number of sector/flight hours shall be published in the operations manual. *Note – Operational flight time means flight time acquired in addition to any training time.*
- (3) A pilot shall not be authorised to operate as an unrestricted PIC until the operator is satisfied that such pilot is capable of operating safely without supervision and the pilot's training records have been annotated accordingly.
- (4) Following the line induction programme, the operator shall consider mitigating the risks associated with low experience levels through the implementation of some or all of the following –
 - (a) limiting the authorised radius of action of the aeroplane;
 - (b) imposing higher route and aerodrome operating minima;
 - (d) increased operational oversight;
 - (e) ensure the ability to communicate with the operator as required;
 - (f) crewing with an experienced second-in-command (for two crew operations); or
 - (g) additional line training.

135.02.9 FLIGHT TIME AND DUTY PERIOD SCHEME

Note – CAR 135.02.9 requires each operator to establish a scheme for the administration of flight time and duty periods. Operators are reminded that they bear sole responsibility for such schemes being in full compliance with any Acts, Laws and Regulations that are external to the South African Civil Aviation Regulations, notwithstanding any approvals given by the SACAA.

1. General

Time spent on flight watch or home reserve may also be deemed to be part of a rest period as provided in section 8(2)(e) of this technical standard.

2. Maximum flight time

- (1) An operator may not allow nor may a flight crew member exceed the following maximum flight times –

- (a) 10 hours during any duty period of which a maximum of eight hours may be consecutive, except that single-pilot night VFR or IFR operations in an aeroplane without a serviceable autopilot are restricted to 8 hours in a duty period;
 - (b) during the preceding seven days –
 - (i) for a single-pilot operation, 35 hours;
 - (ii) for a multi-pilot operation, 40 hours; and
 - (iii) for mixed single- and multi-pilot operations, 37.5 hours;
 - (c) during the preceding thirty days –
 - (i) for a single-pilot operation, 100 hours;
 - (ii) for a multi-pilot operation, 120 hours; and
 - (iii) for mixed single- and multi-pilot operations, 110 hours;
 - (d) 300 during the preceding 90 days; or
 - (e) 1000 hours during the preceding 365 days.
- (2) If a flight crew member expects his or her projected cumulative flight hours for a particular operation to exceed the appropriate limit, the flight crew member shall inform the operator accordingly.

3. Operators' schemes and their approval

- (1) An operator shall submit a proposed scheme for the regulation of flight time and duty periods and minimum rest periods to the Director for approval.
- (2) Any deviation from the approved scheme shall be submitted to the Director for consideration.

4. General principles of control of flight, duty and rest time

- (1) The prime objective of any scheme of flight time and duty limitations is to ensure that flight crew members are adequately rested at the beginning of each flight duty period (FDP). Aeroplane operators will therefore need to take account of inter-related planning constraints on –
 - (a) individual duty and rest periods;
 - (b) the length of cycles of duty and the associated periods of rest; and
 - (c) cumulative duty hours within specific periods.
- (2) Duties shall be scheduled within the limits of the operator's scheme. To allow for unforeseeable delays the pilot-in-command (PIC) may, within prescribed conditions, use his or her discretion to exceed the limits on the day. Nevertheless, flight schedules shall be realistic and the planning of duties shall be designed to avoid as far as possible exceeding the flight time and duty limits.
- (3) Other general considerations in the sensible planning of duties are –
 - (a) the need to construct consecutive work patterns which will avoid as far as possible such undesirable rostering practices as alternating day/night duties and the positioning of flight crews in a manner likely to result in a serious disruption of established sleep/work patterns;
 - (b) the need, particularly where flights are carried out on a programmed basis, to allow a reasonable period for the pre-flight notification of duty to flight crews, other than those on standby duty; and

- (c) the need to plan time off and also to ensure that flight crews are notified of their allocation well in advance.

5. Responsibilities of flight crew members

It is the responsibility of all flight crew members to make optimum use of the opportunities and facilities for rest provided by the operator and to plan and use their rest periods properly so as to minimise the risk of fatigue.

6. Standard provisions required for an operator's scheme

- (1) The standard provisions which the Director regards as the basis for an acceptable scheme of flight time and duty limitations and which, if included in an operator's scheme, will facilitate approval by the Director are contained in sections 7 to 13 below.
- (2) Although operators are expected to plan their schemes in accordance with the requirements, it is however, recognised that the standard provisions will not necessarily be completely adaptable to every kind of operation. In exceptional circumstances therefore, operators may apply to have variations from the standard provisions included in their schemes. However, such variations should be kept to a minimum and approval will only be granted where an operator can show that these proposed provisions will ensure an equivalent level of protection against fatigue.

7. Limitations of single flight duty periods – flight deck crew

Note – The tables referred to in this section may be found in section 12 of this technical standard.

7.1 Maximum rostered flight duty periods

The maximum rostered FDP (in hours) shall be in accordance with Table 1, or Table 2 or 3, or Table 4 or 5. Rostering limits in the tables may be extended by in-flight relief or split duty under the terms of sections 7.2 and 7.3. On the day, the PIC may at his or her discretion further extend the FDP actually worked in accordance with section 7.6.

- (1) Maximum FDP – Two pilot crews

Table 2 applies when the FDP starts at a place where the flight crew member is acclimatised to local time and Table 3 applies to other times. To be considered acclimatised for the purpose of this technical standard, a flight crew member shall be allowed three consecutive local nights free of duty within a local time zone band which is two hours wide. He or she will thereafter be considered to remain acclimatised to that same time zone band until he or she ends a duty period at a place where local time falls outside this time zone band.

- (2) Maximum FDP – Two pilots plus additional flight crew member

Table 4 applies when the FDP starts at a place where the flight crew member is acclimatised to local time, and Table 5 applies at other times. To be considered acclimatised for the purposes of this technical standard, a flight crew member shall be allowed three consecutive local nights free of duty within a local time zone band which is two hours wide. He or she will thereafter be considered to remain acclimatised to that same time zone band until he or she ends a duty period at a place where local time falls outside this time zone band.

- (3) Limits on two flight crew long range operations

- (a) When an aeroplane flight deck crew comprises only two pilots, the allowable FDP is calculated as follows. A sector scheduled for more than 7 hours is considered as a multi-sector flight, as below –

Scheduled sector times	Sectors	
	Acclimatised to local time	Not acclimatised to local time
Sector length over 7 hrs but not more than 9 hrs	2	4
Sector length over 9 hrs but not more than 11 hrs	3	4
Sector length over 11 hrs	4	Not applicable

- (b) Table 2 is then entered with the start time of the flight duty period and the ‘modified’ number of sectors, to determine the allowable FDP.
- (c) When an additional, current, type rated pilot is a flight crew member, then these limits do not apply and the permissible FDP is determined by entering Table 2 or 3 with time of start and the actual sectors planned.

7.2 Extension of flight duty period by in-flight relief

- (1) When any additional flight crew member is carried to provide in-flight relief for the purpose of extending a FDP, he or she shall hold qualifications which will meet the requirements of the operational duty for which he or she is required as a relief.
- (2) When in-flight relief is provided, there shall be available, for the flight crew member who is resting, a comfortable reclining seat or bunk separated and screened from the flight deck and passengers.
- (3) A total of in-flight rest of less than three hours will not count towards extension of an FDP, but where the total of in-flight rest (which need not be consecutive) is three hours or more, the rostered FDP may be extended beyond that permitted in Tables 2 and 3 or 4 and 5 by:
 - (a) If rest is taken in a bunk, a period equal to one half of the total of rest taken, provided that the maximum FDP permissible is 18 hrs; and
 - (b) if rest is taken in a seat, a period equal to one third of the total of rest taken, provided that the maximum FDP permissible is 15 hrs.
- (4) The maximum extension allowable is equivalent to that applying to the basic flight crew member with the least rest.
- (5) Where a flight crew member undertakes a period of in-flight relief and after its completion is wholly free of duty for the remainder of the flight, that part of the flight following completion of duty may be classed as positioning and be subject to the controls on positioning detailed in section 7.4.

7.3 Extension of flight duty period by split duty

When a FDP consists of two or more flight duties separated by less than a minimum rest period, then the FDP may be extended beyond that permitted in the tables by the amounts indicated below –

Consecutive hours rest	Maximum extension of the FDP
Less than 3	Nil
3 – 10	Period equal to half of the consecutive hours rest taken

The rest period shall not include the time required for immediate post-flight and pre-flight duties. When the rest period is not more than six hours it will be sufficient if a quiet and comfortable place is available, not open to the public, but if the rest period is more than six consecutive hours, then a bed shall be provided.

7.4 Positioning

All time spent on positioning as required by the operator is classed as duty, but positioning as a passenger does not count as a sector when assessing the maximum permissible FDP. Positioning, as required by the operator, which immediately precedes a FDP, is included as part of the FDP for the purpose of section 7.1.

7.5 Travelling time

- (1) Travelling time other than that time spent on positioning may not be classed as duty time and may not be included in cumulative totals of duty hours.

Note – Travelling time from home to departure aerodrome can become an important factor if long distances are involved. If the journey time from home to the normal departure aerodrome is lengthy, flight crew members should make arrangements for accommodation nearer to their bases to ensure adequate pre-flight rest.

- (2) Where travelling time between the aerodrome and sleeping accommodation provided by the operator exceeds thirty minutes each way, the rest period shall be increased by the amount of the excess, or such lesser time as is consistent with a minimum of ten hours at the sleeping accommodation.
- (3) When flight crew members are required to travel from their home to an aerodrome other than the one from which they normally operate, the assumed travelling time from the normal aerodrome to the other aerodrome is classed as positioning and is subject to the controls of positioning detailed in section 7.4.

7.6 Pilot-in-command’s discretion to extend a flight duty period

Note – It is important to note that the PIC discretion shall take into consideration whether or not a “...crew member is suffering from or, having regard to the circumstances of the flight to be undertaken, is likely to suffer from fatigue which may endanger the safety of the aeroplane or its flight crew members and passengers...” as specified in CAR 135.02.9(2)(b).

- (1) A PIC may, at his or her discretion, extend a FDP beyond the maximum normally permitted, provided he or she is satisfied that the flight can safely be made. In these circumstances the maximum normally permitted is calculated according to what actually happens, not on what was planned to happen. The operator’s scheme shall include guidance to PICs on the limits within which discretion to extend a FDP may be exercised. An extension of three hours beyond the maximum normally permitted should be regarded as the maximum, except in cases of emergency.

- (2) Whenever a PIC so exercises his or her discretion, he or she shall report it to the operator and, should the maximum normally permitted be exceeded by more than two hours, both the PIC and the operator shall submit a written PIC's discretion report – extension of flight duty period, to the Director within thirty days.

Notes –

1. *Discretion reports either concerning extension of a FDP in excess of two hours or reduction of a rest period shall be submitted to the Director. Those reports will be used by the Director when assessing the realism of particular schedules. The information required to be submitted and an example of the form may be obtained from the SACAA.*
2. *An emergency in respect of an extension of a FDP is a situation which in the judgment of the PIC presents serious risk to health or safety.*

7.7 Delayed reporting time

When flight crew members are informed of a delay before leaving their place of rest the FDP starts at the new reporting time or four hours after the original reporting time, whichever is the earlier. The maximum FDP is based on the original reporting time. This subsection does not apply if flight crew members are given ten hours or more notice of a new reporting time.

8. Rest periods

- (1) It is the responsibility of the operator to notify flight crew members of a FDP and not to schedule them for duty other than flight watch or home reserve, so that adequate and, within reason, uninterrupted pre-flight rest can be obtained by the flight crew before the commencement of the next flight duty period. Away from base the operator shall provide the opportunity and facilities for the flight crew to obtain adequate pre-flight rest. It is the operator's responsibility to ensure that rest accommodation is satisfactory. When operations are carried out at such short notice that it is impracticable for an operator to ensure that rest accommodation is satisfactory, it will be the PIC's responsibility to obtain satisfactory accommodation.
- (2) The following rest period requirements shall be followed –
 - (a) each flight duty period, as well as flight watch and home reserve, shall be preceded by a rest period of at least –
 - (i) nine consecutive hours including a local night;
 - (ii) ten consecutive hours; or
 - (iii) if the preceding FDP, adjusted for split duty, exceeds eleven hours, an additional rest period shall be provided for in the operator's scheme to the satisfaction of the Director;
 - (b) where a flight crew member has completed two consecutive flight duty periods, the aggregate of which exceeds eight hours flight time or eleven hours flight duty time (extensions by in-flight relief or split-duty disregarded), and the intervening rest period has been less than twelve consecutive hours embracing the hours between 22h00 and 06h00 local time, he or she shall have a rest period of at least twelve consecutive hours embracing the hours between 22h00 and 06h00 local time or so much longer as to embrace these hours prior to commencing any further duties, but not necessarily longer than twenty-four

consecutive hours; provided that this requirement does not apply in respect of consecutive flight watch and home reserve duties;

- (c) following fifty hours of duty of any nature associated with his or her employment, except flight watch and home reserve duty, a flight crew member shall have a rest period of not less than twenty-four consecutive hours before commencing further duties;
- (d) when a flight crew member has completed a FDP in excess of eighteen hours, he or she shall receive a rest period of at least eighteen hours including a local night before he or she commences any further duties; and
- (e) time spent on flight watch and home reserve duty prior to a FDP shall not be counted when determining the limitations associated with the flight duty period.

(3) Pilot-in-command's discretion to reduce a rest period

A PIC may, at his or her discretion, reduce a rest period to below the minimum required by section 8(2) and 12(2)(b). The exercise of such discretion shall be considered exceptional and should not be used to reduce successive rest periods. A rest period shall be long enough to allow flight crew members at least eight hours rest at the accommodation where the rest is taken. If a rest period is reduced, the PIC shall submit a report to his or her employer and if the reduction exceeds two hours, a written report shall be submitted to the Director within thirty days. (See note 1 to section 7.6(2)).

(4) For the purpose of calculating the minimum rest period before commencement of flight duty, the required post-flight duties on completion of the previous FDP is added to such FDP.

9. Duty periods

(1) The following limits apply –

Duty	Maximum duration
Flight watch	No limit*
Home reserve	No limit*
Positioning	No maximum**
Standby	Maximum 12 hours (not necessarily consecutive) in any 24 hour period
Standby + FDP	20 hours

* However, the provisions of paragraph (2) apply.

** However, the provisions of section 7.4 apply.

(2) For the purpose of calculating duty time, the following applies –

- (a) for the calculation of accumulated duty time in terms of section 11, flight watch and home reserve is credited on the basis of eight hours for every period of twenty-four or fewer consecutive hours or on a one-for-one basis, whichever is the lesser;
- (b) standby duty time shall count fully as duty time for the calculation of accumulated duty time in terms of sections 8(2)(c) and (d) and 11; and

(c) see section 7.4 in respect of positioning time.

10. Days off

Flight crew members shall –

- (1) not work more than seven consecutive days between days off; and
- (2) have two consecutive days off in any consecutive fourteen days; and
- (3) have a minimum of six days off in any consecutive four weeks at the aerodrome from which they normally operate; and
- (4) have an average of at least eight days off in each consecutive four week period, averaged over three such periods.

11. Cumulative duty hours

The average weekly total of duty hours may not exceed sixty hours over seven days or fifty hours averaged over any four consecutive weeks. All types of duty, flight duty, split duty, stand-by and positioning is counted in full for this purpose. Any period of seven or more consecutive days within which the flight crew member is employed on duty other than flight duty, flight watch or home reserve, standby or positioning is not included in calculating the above average weekly total of duty hours.

12. Tables

Table 1: Maximum flight duty period: Single-pilot crews – aeroplanes certified for single-pilot operations

Local time of start	Sectors				
	Up to 4	5	6	7	8 or more
0500 – 0659	10	9¼	8½	8	8
0700 – 1359	11	10¼	9½	8¾	8
1400 – 2059	10	9¼	8½	8	8
2100 – 0459	9	8¼	8	8	8

Note – Pilots engaged in repetitive short flights, with an average eight or more take-offs and landings per hour, shall have a break of at least thirty minutes within any continuous period of three hours away from the aircraft; however for the purpose of this technical standard each such series of repetitive flights shall be counted as a single sector.

Table 2: Maximum flight duty period: Two pilot crews – aeroplanes: Acclimatised to local time

Local time of start	Sectors							
	1	2	3	4	5	6	7	8 or more
0500 – 0659	13	12¼	11½	10¾	10	9¼	9	9
0700 – 1359	14	13¼	12½	11¾	11	10¼	9½	9
1400 – 2059	13	12¼	11½	10¾	10	9¼	9	9
2100 – 0459	12	11¼	10½	9¾	9	9	9	9

2200 – 0459	11	10¼	9½	9	9	9	9	9
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Table 3: Maximum flight duty period: Two pilot crews – aeroplanes: Not acclimatised to local time

Length of preceding rest (hours)	Sectors						
	1	2	3	4	5	6	7 or more
Up to 18 or over 30	13	12¼	11½	10¾	10	9¼	9
Between 18 and 30	12	11¼	10½	9¾	9	9	9

Note – The reason that available duty times are less following rest periods inside 18 – 30 hours is the aeromedical advice that the quality of rest is less due to the disturbance of the body’s natural rhythm.

Table 4: Maximum flight duty period: Basic crew consisting of three flight crew members – aeroplanes certified for three crew members: Acclimatised to local time

Local time of start	Sectors							
	1	2	3	4	5	6	7	8 or more
0500 – 0659	13	12¼	11½	10¾	10	9¼	9	9
0700 – 1359	14	13¼	12½	11¾	11	10¼	9½	9
1400 – 2059	13	12¼	11½	10¾	10	9¼	9	9
2100 – 2159	12	11¼	10½	9¾	9	9	9	9
2200 – 0459	11	10¼	9½	9	9	9	9	9

Table 5: Maximum flight duty period: Basic crew consisting of three flight crew members – aeroplanes certified for three flight crew members: Not acclimatised to local time

Length of preceding rest (hours)	Sectors						
	1	2	3	4	5	6	7 or more
Up to 18 or over 30	13	12¼	11½	10¾	10	9¼	9
Between 18 and 30	12	11¼	10½	9¾	9	9	9

Note – The reason that available duty times are less following rest periods inside 18 – 30 hours is the aeromedical advice that the quality of rest is less due to the disturbance of the body’s natural rhythm.

13. Records to be maintained

- (1) An operator shall retain flight crew member flight time and duty period records as provided in CAR 135.04.6.
- (2) An operator shall retain all PIC discretion reports of extended flight duty periods and reduced rest periods for a period of at least six months.

135.03.1 AIR SERVICE OPERATOR APPROVED TRAINING PROGRAMME

1. Applicability of training

- (1) For the purposes of this section –

- (a) **“the operator”** means the operator employing a pilot whose training was conducted by another operator; and
 - (b) **“the other operator”** means the operator who conducted the training on the pilot.
- (2) Except as provided in paragraphs (3) and (4), each person employed by an operator and required to receive the training specified in this Subpart shall take such training from that operator or a contracted organisation, as provided in section 2 of this technical standard.
- (3) The initial and recurrent ground training requirements specified in Subpart 3 for a pilot on an aeroplane type certificated for a maximum mass of 5 700 kg or less shall be deemed to be completed by the operator if completed as part of another South African operator’s approved training programme: Provided that the other operator operates the same aeroplane type and, prior to conducting a commercial air transport operation, –
- (a) in the event the operator’s aeroplanes are different models than those upon which the other operator’s ground training was based, the operator ensures such pilot receives additional training covering any differences between the models, including, at least, systems differences, engine/airframe limitations, performance considerations and operating characteristics;
 - (b) in the event the operator’s aeroplanes are equipped with different ancillary equipment than those upon which the other operator’s ground training was based or not given, such as navigational aids, auto flight system, flight director/flight management system (FMS), airborne collision avoidance system (ACAS), terrain awareness and warning system (TAWS), weather radar, etc, the operator shall provide training on such equipment; and
 - (c) the operator establishes, through the administration of a technical ground examination, that the pilot has adequate knowledge of the different models of aeroplanes and equipment noted in subparagraphs (a) and (b) above.
- (4) The initial and recurrent flight training requirements specified in Subpart 3 for a pilot on an aeroplane type certificated for a maximum mass of 5 700 kg or less shall be deemed to be completed by the operator if completed as part of another South African operator’s approved training programme: Provided that such training included at least the number of flight hours as that approved for the operator and, prior to conducting a commercial air transport operation, –
- (a) the operator ensures such pilot receives flight training on any differences that may exist between the operator’s model of aeroplane and that on which the original training took place, including, at least, safety equipment, systems, engine/airframe, performance and operating characteristics differences;
 - (b) the operator ensures such pilot receives flight training in the use of any equipment installed in its aeroplanes that was not installed in the other operator’s aeroplane on which the training took place, such as navigational aids, auto flight system, flight director/FMS, ACAS, TAWS, weather radar, etc, in each aeroplane he or she is to fly or an approved flight simulation training device (FSTD); and
 - (c) the operator ensures such pilot receives flight training and becomes proficient in the use of the operator’s SOPs in each aeroplane he or she is to fly or an approved full flight simulator (FFS) of the type to be flown.

Notes –

1. *An operator may not have to complete the training on each aeroplane type if training credits have been approved as provided in sub-subsection 1.4.1 (4) of technical standard 135.03.3.*
 2. *In the event additional training is required as a result of this technical standard, the operator shall conduct a proficiency check on the pilot following such training to ensure the pilot is familiar with any aeroplane differences and is competent in the use of all aeroplane equipment and the operator's SOPs.*
- (5) An operator accepting the training of another operator shall maintain on its training file for such pilot, detailed records of the other operator's and its own training, including at least –
- (a) the name of the organisation conducting the training, if other than the operator;
 - (b) the name of the person having conducted the training and, in the case of flight training, his or her licence number;
 - (c) the location where the training was completed;
 - (d) the date the training was completed;
 - (e) the type, model and registration of the aeroplane on which the flight training or any proficiency check was completed;
 - (f) copies of ground examinations or other approved means of demonstrating adequate knowledge of the aeroplane and its equipment;
 - (g) copies of any proficiency checks completed on the pilot; and
 - (h) verification by the operator that the training was successfully completed.
- (6) The operator shall publish procedures in its operations manual to ensure that for each case in which another operator's training is to be accepted, the operator has –
- (a) identified what differences exist, if any, between its aeroplanes and those used by the other operator for the training and that such differences have been incorporated into its training programme; and
 - (b) determined whether or not the SOPs used for the other operator's training are the same as those used by the operator.

2. Approval of contracted training services

An operator may contract any required training to another organisation provided –

- (a) the arrangement is clearly provided for in the approved training programme;
- (b) the contracted training organisation is the holder of a valid ATO certificate issued in terms of Part 141 or has been otherwise issued approval to conduct training by the Director;
- (c) the contracted training organisation uses the manuals and publications approved for use by the operator (standard operating procedures (SOPs), aircraft flight manual (AFM), aircraft operating manual (AOM), if applicable, operator's operations manual, etc.);
- (d) the operator ensures that the training is conducted in accordance with the approved programme;

- (e) where aeroplane type training is conducted the training is provided on the same type and model aeroplane operated by the operator unless appropriate differences training is provided and described in the approved training programme; and
- (f) the operator remains responsible to ensure the training records approved in the operator's training programme are completed by the contracted ATO and maintained in the trainee's file at the base of the operator.

3. Equipment, facilities and personnel of a training programme

An operator shall ensure that its training equipment and facilities and personnel are adequate for their intended purpose.

- (a) Equipment – While no specific standards are published for the training equipment used as teaching aids, a benchmark is whether or not the information being presented is done so through the use of adequate training aids so as to make the material understandable to the trainee. Equipment will be assessed against state of the art training aids with reasonable consideration given to the scope and size of the operator.
- (b) Facilities – Training facilities, like equipment, are assessed for their suitability by a comparison with state of the art training facilities giving due consideration to the scope and size of the operator. Facilities normally must be such that the trainee will not be distracted from the course material or training aids being displayed and provide an environment conducive to learning. Control over lighting, noise, temperature, location, orientation and general comfort of learning stations and where needed, sound enhancement or amplification must be favourable to a learning environment.

Note – While no hard benchmarks are imposed for the acceptability of an operator's training equipment and facilities, it will follow that the training times proposed will be assessed in light of the operator's ability to effectively transfer the required information which will in turn depend upon the equipment and/or facilities at the disposal of the training personnel.

- (c) Personnel – The qualifications of training and checking personnel as specified in section 4 of this TS shall be documented by the operator.

4. Use of FFS for training and checking

- (1) It is anticipated that in the delivery of its flight training programme an operator will make every reasonable effort to use the most updated FSTDs where such are available to the operator.
- (2) Except as provided in paragraphs (4) and (5), the use of a full flight simulator (FFS) of the type to be flown is mandatory for initial and recurrent training and checking on aeroplanes of a maximum certificated mass (MCM) exceeding 15 000 kg for the following exercises –
 - (a) engine failure at V1 *;
 - (b) low and high speed rejected take-offs;
 - (c) low visibility operations (LVTO, CAT II/III), if applicable *;
 - (d) asymmetric flap and spoiler deployments;
 - (e) uncommanded/runaway flap and spoiler deployments;
 - (f) jammed or inoperative pitch trim (occurring at both high and low speed) ;
 - (g) jammed or inoperative primary flight controls;
 - (h) upset attitude recovery;

- (i) uncommanded/runaway auto-flight system control inputs (pitch, roll and yaw);
- (j) erroneous pitot-static and gyro instrument indications;
- (k) ACAS TAs/RAs *;
- (l) TAWS events *;
- (m) windshear on final approach and after take-off *;
- (n) turbulence penetration and updraft/downdraft;
- (o) hydraulic failures (effects on controls, etc);
- (p) engine fire;
- (q) electrical failures (effects on systems);
- (r) APU fire;
- (s) electrical fire;
- (t) wheel well fire;
- (u) smoke in the cockpit;
- (v) asymmetric flaps (zero flaps for some aeroplanes);
- (w) maximum crosswind during T/O, landing and approaches *; and
- (x) take-off over/under rotation.

Notes –

1. *All exercises shall be completed to a satisfactory level during an initial training course.*
 2. *Exercises with an asterisk shall be satisfactorily demonstrated at least every twelve months.*
 3. *Exercises without an asterisk shall be satisfactorily demonstrated at least every 24 months.*
 4. *An operator approved for aeroplane grouping as provided in technical standard 135.03.6(5) of Document SA-CATS 135 shall alternate the training between the aeroplanes within the group.*
- (3) The remainder of the training and checking programme may be accomplished in the aeroplane.
 - (4) The Director may require a FFS to be used as part or all of the training programme of any aeroplane type or variant where such aeroplane is unusually complex by design or in flying characteristics as compared to an aeroplane of a similar MCM, such that training to address the specific unusual design and/or flying characteristic of the aeroplane cannot properly and safely be carried out without using a FFS.
 - (5) The Director may permit aeroplane-only training: Provided –
 - (a) there is no suitable simulator available anywhere;
 - (b) the FFS is, by virtue of its certification or serviceability, restricted in its training and checking credits; or

- (c) the operator or ATO requests an exemption based upon exceptional circumstances.
- (6) Reference to a FFS in this technical standard means a FFS of a level required to accomplish the training programme approved for the operator.

5. Qualifications of training and checking personnel

Notes –

- 1. *Unless otherwise specified, reference to an aeroplane type shall be taken to mean type or variant of that type of aeroplane where applicable.*
- 2. *Other than regaining qualification training as noted, reference to training and or checking shall be taken to mean initial, upgrade or recurrent training.*

(1) Qualifications of all training personnel

An operator shall select its training personnel based on them having a satisfactory practical and theoretical knowledge of –

- (i) the subject the instructor is to teach;
- (ii) the aeroplane type the instructor is to teach on, if applicable;
- (iii) the basic principles of learning and techniques of instruction;
- (iv) preparation and use of lesson plans;
- (v) the administrative procedures with respect to the established trainee progress forms;
- (vi) briefing and debriefing techniques relative to the training given;
- (vii) all associated training devices including applicable FSTDs to be used, if applicable; and
- (viii) the procedures established in the training programme for the administration, conduct, review and correction of, as applicable, –
 - (aa) required examinations or other approved methods of establishing comprehension; and
 - (bb) skills tests, proficiency or other competency checks.

(2) Qualifications of a ground instructor

Each ground training instructor shall have met the requirements of section 4(1) of this TS and –

- (i) unless he or she is or has been the holder of an instructor rating as provided in these Regulations, have received training on –
 - (aa) the fundamental principles of the teaching/learning process;
 - (bb) teaching methods and procedures;
 - (cc) the instructor/student relationship;
 - (dd) learning impediments;

- (ee) human factors relating to the effects of stress and hazardous attitudes;
- (ff) the objectives and standards of the operator's training programme;
- (gg) the effective use of training devices used in the programme;
- (hh) CAR and CATS relating to training requirements; and
- (ii) the system of record keeping approved to be used in conjunction with the training programme; and
- (ii) if conducting aeroplane type training, have successfully completed the initial and recurrent technical training and testing as applicable for each type of aeroplane or have received training in, or have experience with, the aeroplane system or systems to be taught;
- (iii) if conducting aeroplane type training, have a sound knowledge of the SOPs or AOM, as applicable, AFM, manuals for special equipment_training and the operator's operations and training manuals, as applicable;
- (iv) if conducting training relating to special operations or non-aeroplane specific courses, shall have completed the associated training and testing and be certified by the person responsible for training as competent to teach such subject(s); and
- (v) where the type of training includes interfacing with other crew members, an appropriate level of knowledge of the functional manuals assigned to such other crew members.

(3) Qualifications of a flight training pilot

- (a) Each flight training pilot who is to conduct training in the aeroplane or both the aeroplane and a FSTD shall have met the requirements of section 4(1) of this TS and –
 - (i) hold the following licences, ratings and certificates –
 - (aa) a valid flight instructor rating;
 - (bb) a valid medical certificate; and
 - (cc) for aeroplanes with an MCM of greater than 5 700 kg, a valid ATPL and a type rating for the type of aeroplane on which training will be given; or
 - (dd) for aeroplanes with an MCM equal to or less than 5 700 kg, a valid CPL and –
 - (A) if the aeroplane training includes instrument flight training, a valid instrument rating; and
 - (B) a type rating for the type of aeroplane on which training will be given, if applicable;
 - (ii) be currently qualified for line flying on the type of aeroplane;

- (iii) be qualified to perform PF and PNF duties while occupying either flight crew member seat;
 - (iv) know the content of the AFM, SOPs or AOM, if applicable, special equipment manuals, as appropriate, operator's operations and training manuals as applicable to the aeroplane type; and
 - (v) know the relevant provisions of the South African and where international operations are involved, the foreign regulations.
- (b) Each flight training pilot who is to conduct training only in a FSTD shall meet the requirements of paragraph (3)(a) of this section, with the exception of subparagraph (a)(i)(bb), in which case he or she shall either hold or have held an ATPL, and subparagraphs (a)(ii) and (iii), and, in addition –
- (i) have successfully completed the operator's ground and flight training programme for the type of aeroplane;
 - (ii) have successfully completed within the past 12 months a PPC in the FFS or aeroplane for that type;
 - (iii) shall maintain familiarity with the operator's SOPs, in particular changes to the SOPs; and
 - (iv) have received instruction from, and demonstrated the ability to operate the FSTD to a suitably qualified instructor.

(4) Qualifications of pilot checking personnel

Each person authorised to conduct pilot PPCs shall –

- (i) in the case of a PPC conducted by a flight training pilot qualified on the aeroplane or the aeroplane and the FFS –
 - (aa) have met all the qualification requirements specified in sections 4(1) and 4(3)(a) of this TS;
 - (bb) for PPCs involving an initial issue or revalidation of an instrument rating or an initial issue of a multi-engine piston class rating or turbine rating, be the holder of a DFE authority issued by the Director appropriate to the aeroplane in which such PPC is to be conducted and for all other PPCs, be an approved current Grade I or Grade II flight instructor qualified on that aeroplane;
 - (cc) have been monitored in the preceding 12 months conducting a PPC, in at least one of the aeroplane types for which the authority is being sought –
 - (A) for DFEs, by a SACAA inspector or, in exceptional circumstances, another DFE approved by the Director; and
 - (B) for flight instructors, by a DFE;
 - (dd) hold a valid medical certificate;

- (ee) have completed the operator's training programme and be qualified as a line captain; and
- (ff) be qualified to perform PF and PNF duties while occupying either flight crew member seat;
- (ii) in the case of a PPC conducted by a FFS-only qualified flight training pilot, have met all the qualification requirements specified in sections 4(1), 4(3)(b) and 4(4)(a)(i) (with the exception of subparagraphs (a)(i)(aa) and (ee)) above;
- (iii) in the case of line checks –
 - (aa) have met the qualification requirements specified in sections 4(3)(a) and 4(4)(a)(i) of this TS;
 - (bb) have completed the operator's training programme and be qualified as a line captain on the aircraft type on which the check will be given;
 - (cc) be qualified to perform PF and PNF duties while occupying either flight crew member seat; and
 - (ee) be authorised by the operator to conduct line checks as specified in such certification.

Note – The operator shall retain a copy of all authorisations in the pilot's training record.

(5) Training for other than crew members

Training for ground personnel whose function is essential to the safety of flight operations shall be conducted by a competent person assigned by the manager responsible for the department to which such ground personnel are assigned. Specific qualifications for such instructors shall be published in the operator's operations manual.

6. Training records

- (1) Every operator shall, for each person who is required to receive training in terms of Subpart 3, establish and maintain a record of –
 - (a) the person's name and, where applicable, licence number, type and ratings;
 - (b) if applicable, the person's medical category and the expiry date of that category;
 - (c) for pilots, the latest date any training for an initial type rating or for regaining qualification, as contemplated in sub-subsection 1.5.2(3) of technical standard 135.03.3 of Document SA-CATS 135, was completed, whether or not such training was completed while in the employ of the operator.
 - (d) the dates on which the person, while in the operator's employ, successfully completed any training, proficiency check or examination required in terms of Subpart 3 or obtained any qualification required in terms of this Part, Part 61 or Part 64, as applicable;
 - (e) information relating to any failure of the person, while in the operator's employ, to successfully complete any training, proficiency check or examination required in terms of Subpart 3, or to obtain any qualification required in terms of Part 61, 63 or 64 or this TS; and
 - (f) the type of aircraft or flight training device used for any training, proficiency check, line check or qualification required under this Subpart.

- (2) An operator shall retain a copy of the most recent written examination completed by each person for each subject for which an examination is required.

135.03.2 APPROVAL OF TRAINING PROGRAMME

1. Approval process of an operator training programme

- (1) The procedures contained in this TS have been established for the initial approval of an operator's training programme or the introduction of new equipment. The subsequent approvals of training programme amendments will normally be a one-phase process consisting of final approval.
- (2) Unless the training programme is contained in the company operations manual, each operator shall submit two complete copies of its proposed training programme along with a list of effective pages to the Director for review and approval.
- (3) Where in the opinion of the Director the proposed programme has been presented in sufficient detail to enable him or her to make a preliminary evaluation and determine the programme meets the requirements of these technical standards, an initial approval of the training programme will be given. One copy of the programme will be returned along with a copy of the list of effective pages which will bear an initial approval stamp. The operator is then authorised to present the programme.
- (4) Where insufficient detail has been provided the Director may return the training programme either in whole or in part for further development.
- (5) The initial approval referred to in paragraph (2) will normally be given for an initial period of one year during which time the programme will be monitored in sufficient depth to enable a final decision to be made with respect to the effectiveness of the programme in terms of meeting the established training goals.
- (6) When the Director is satisfied that the training programme meets the requirements of this technical standard, a final approval will be issued.
- (7) After the initial approval has been received but before the final approval has been issued, each operator is required to advise the Director within seven days of the intention to present the training programme. Unless otherwise advised, the operator shall make accommodation for an inspector to attend.

135.03.3 FLIGHT CREW MEMBER TRAINING

1. Definitions

For the purposes of this Technical Standard the following terms shall have the following meaning –

“aeroplane type training” means initial aeroplane type training;

“company/operator induction training” means company-specific generic training covering a number of subjects as prescribed by regulation. Certain subjects may be presented only as a generic, introductory overview where an operator determines it would be more appropriate to provide amplified training in connection with a specific aeroplane type or operational environment;

“cabin safety, emergency equipment and security training” means training given to an aeroplane crew member to familiarize them with the location, inspection, testing and use of all emergency equipment required to be carried on board an aeroplane and includes specific training required to ensure passenger safety;

“crew resource management training” means training including the principles of human factors designed to ensure the individual and collective efforts of all crew members on board an aeroplane are coordinated for maximum effectiveness;

“differences training” means training required to ensure a flight crew member is proficient on similar aeroplane types or variants having significant differences in terms of equipment, configuration or operation;

“familiarisation training” means training required to ensure a flight crew member is proficient on similar aeroplane types or variants having only minor differences in terms of equipment, configuration, or operation;

“initial training” means the training required for a pilot to obtain a new type rating;

“line induction training” means training provided a flight crew member in the form of approved supervised flying during line operations;

“regaining competency” means the training and where specified, the check required when a person exceeds the currency criteria of any qualification required by this Part and is designed to return such person to a satisfactory level of competence;

“upgrade training” means training provided to advance a flight crew member from one flight crew position to a higher flight crew position; and

Note – Refer to the technical guidance material (TGM) for course content for all of the following training programme elements.

2. Required Training for all Operators

2.1 Company Induction

- (1) Company induction is required only upon initial employment for all flight crew members except where changes in the company are sufficient enough that the Director may require supplemental training for existing flight crew members.
- (2) The programme shall ensure that persons involved in flight operations are aware of their responsibilities, know company reporting relationships and are competent to fulfill their assigned duties as related to flight operations.

2.2 Crew resource management training

- (1) An operator shall ensure a flight crew member has received crew resource management (CRM) training including human factors, risk analysis and error and threat management training –
 - (a) upon initial appointment to the operator unless such person has, within the preceding 12 months, received CRM training from another approved training_organisation. In such cases, the operator shall provide the flight crew member with training in those elements of CRM that are company-specific; and
 - (b) on a recurrent basis every 12 months thereafter.
- (2) CRM training shall include at least classroom lectures and practical exercises. The use of group discussions as forums to problem solving or accident reviews to analyse the human factors breakdown as possible contributing or causal factors contributes significantly to CRM training.
- (3) An operator may use a course provided by another operator, if that course has been approved by the Director and the training agreement between the operator and the service provider complies with the requirements as prescribed in TS 135.03.2 2.

2.3 Cabin safety, emergency equipment and security training

- (1) An operator shall ensure that each flight crew member undergoes training and checking on the location and use of all emergency and safety equipment carried on board the operator's aeroplanes and emergency evacuation training –
 - (a) upon initial employment by the operator and for each aeroplane type to which the flight crew member is assigned that may employ different equipment or procedures unless such person has, within the preceding 12 months, received such training from another approved training source. In such cases, the operator shall provide the flight crew member with training in those elements of cabin safety, emergency equipment and security procedures that are company-specific; and
 - (b) on a recurrent basis every 12 months thereafter, consisting of items from the initial programme that may have changed since the last training session.
- (2) Training devices approved to simulate flight operating emergency conditions, static aeroplanes, ground demonstrations, classroom lectures where adequate visual aids are provided, films or other devices may be used for training: Provided the method used ensures that each crew member is adequately trained in the operation or use of all emergency equipment.
- (3) Each flight crew member shall be trained in the operator's security policies and procedures and, in particular, the procedures associated with hijacking, bomb threats and unlawful interference.

2.4 Aeroplane type initial and recurrent ground and flight training

2.4.1 General

- (1) An operator shall provide each flight crew member with ground and flight training on each aeroplane type to be flown as follows –
 - (a) upon initial appointment of the flight crew member by the operator to an aeroplane for which the flight crew member does not have that type rating or has a newly acquired type rating but no experience on that type; and
 - (b) on a recurrent basis every 12 months thereafter, unless otherwise approved by the Director based on training credits for similar aeroplane types as provided in paragraph (4).
- (2) A flight crew member joining an operator with a type rating and experience on the aeroplane to be operated with that operator, shall undergo the operator's recurrent ground and flight training programme, including sufficient training to ensure he or she is familiar with the operator's aeroplanes and standard operating procedures. A proficiency check shall be completed following such training.

Note – For the purposes of this TS, a pilot is deemed to have “experience” if such pilot has accumulated at least 25 hours on the type of aeroplane.

- (3) An operator need not administer a complete initial type training programme to a pilot coming to the operator with a newly acquired type rating and no experience on that type: Provided –
 - (a) the operator provides the following ground training to the pilot prior to conducting a commercial air transport operation –
 - (i) in the event the operator's aeroplanes are different models than those upon which the pilot's ground training was based, the operator ensures such pilot receives additional training covering any differences between the models, including, at least,

safety equipment, systems differences, engine/airframe limitations, performance considerations and operating characteristics;

- (ii) in the event the operator's aeroplanes are equipped with different ancillary equipment than those upon which the pilot's ground training was based or not given, such as navigational aids, auto flight system, flight director/flight management system (FMS), airborne collision avoidance system (ACAS), terrain awareness and warning system (TAWS), weather radar, etc, the operator shall provide training on such equipment; and
 - (ii) the operator establishes that the pilot has adequate knowledge of the different models of aeroplanes and equipment noted in sub-subparagraphs (i) and (ii) above;
- (b) the operator provides the following flight training to the pilot prior to conducting a commercial air transport operation –
- (i) flight training on any differences that may exist between the operator's model of aeroplane and that on which the initial training took place, including, at least, systems, engine/airframe, performance and operating characteristics differences;
 - (ii) flight training in the use of any equipment installed in the operator's aeroplanes that was not installed in the aeroplane on which the initial training took place, such as navigational aids, auto flight system, flight director/FMS, ACAS, TAWS, weather radar, etc, in the aeroplane or an approved flight simulation training device (FSTD); and
 - (iii) sufficient flight training in the aeroplane or an approved full flight simulator (FFS) of the type to be flown to ensure the pilot becomes proficient in the use of the operator's SOPs;

Notes –

1. *An operator may not have to complete the training on each aeroplane type if training credits have been approved as provided in paragraph (4) of this sub-subsection.*
 2. *In the event additional training is required as a result of this technical standard, the operator shall conduct a proficiency check on the pilot following such training to ensure the pilot is familiar with any aeroplane differences and is competent in the use of all aeroplane equipment and the operator's SOPs.*
- (c) the operator shall maintain on its training file for each pilot arriving with a newly acquired type rating, detailed records of the initial training received and its own training, including at least –
- (i) the name of the organisation having conducted the training, if other than the operator;
 - (ii) the name of the person having conducted the training and, in the case of flight training, his or her licence number;
 - (iii) the location where the training was completed;

- (iv) the date the training was completed;
 - (v) the type, model and registration of the aeroplane on which the flight training or any proficiency check was completed;
 - (vi) copies of ground examinations or other approved means of demonstrating adequate knowledge of the aeroplane and its equipment;
 - (vii) a copy of the pilot's type rating skills test; and
 - (viii) verification by the operator that the training was successfully completed;
- (d) the operator shall publish procedures in its operations manual to ensure that for each case in which a pilot claims credit for a newly acquired type rating, the operator has –
- (i) verified the veracity of the type rating endorsement;
 - (ii) identified what differences exist, if any, between its aeroplanes and those used for the initial training and that such differences have been incorporated into its training programme; and
 - (iii) determined whether or not the SOPs used for the initial training are the same as those used by the operator; and
- (e) the pilot undergoes the full line induction training programme as specified in subsection 2.1 of this TS.
- (4) An operator may be permitted training credits for different types or variants of aeroplanes based on the demonstrated similarities between the aeroplanes, hereinafter referred to as "aeroplane grouping". Notwithstanding approved aeroplane grouping, the initial training shall be completed on each type of aeroplane operated and the subsequent training shall be accomplished on a rotating basis between the aeroplanes involved. For the purposes of this TS and regulation 135.03.7(1)(d), recurrent training completed on one aeroplane type shall be deemed to have been completed on all aeroplane types for which aeroplane grouping has been approved.

2.4.2 Ground Training

- (1) Initial aeroplane type ground training shall consist of a detailed programme covering at least –
- (a) all of the aeroplane's systems and their associated limitations, if any;
 - (b) the aeroplane's normal, abnormal and emergency procedures;
 - (c) the mass and balance and performance data and calculations; and
 - (d) the aeroplane's emergency equipment.

Note – Initial ground training involving emergency equipment may be restricted to the identification of what equipment is on board the aeroplane and its location. Emergency equipment use and practical demonstration requirements are covered under subsection 2.3.

- (2) Recurrent ground training shall consist of a review of such of the subjects outlined in an initial training programme that would ensure critical information is reviewed timeously, including any changes to the aeroplane or operating procedures that occurred since any previous training.

- (3) Comprehension examinations shall be administered and successfully completed by the trainee following any ground training and prior to advancing to the next phase of learning.

2.4.3 Flight Training

Note – For the purposes of this TS, “zero flight time training” means that training on an actual aeroplane is not required.

- (1) The operator shall specify the training syllabi and proposed training times in its operations manual.
 (2) Refer to TS 135.03.1 paragraph 3 for the requirements for mandatory FSTD use.
 (3) The training times allocated to initial and recurrent flight training shall not be less than –

- (a) for initial flight training –

Notes –

1. *The initial training times in the following table are based on a complete type-rating course as well as training required by these Regulations and may be reduced to not less than ½ of the minimum time based on pilot experience, subject to the Director’s prior approval.*
2. *Refer to sub-subsection 2.4.1(3) of this TS for initial training requirements for a pilot who comes to the operator with a newly acquired type rating and no experience on that type.*

Certificated Passenger Seating Capacity/MCM	Flight Training (PF Hours) ¹			
	Simulator and Aircraft		Level D ² (simulator only)	Level E ² (aeroplane only)
	Level A, B or C ²	Aircraft		
Single-engine	4.0	1.0 ³	4.0	4.0
Multi-engine <10 pax	6.0	1.5 ³	6.0	6.0
Multi-engine ≥10 - <20 pax MCM ≤8 618 kg and cargo-only MCM ≤8 618 kg	10.0	2.0 ³	10.0	10.0
Multi-engine ≥10 - <20 pax MCM >8 618 kg	10.0	2.0 ³	12.0	12.0

- (b) for recurrent flight training –

Maximum Certified Mass	Flight Training (PF Hours) ¹ (except as approved in an advanced qualification programme)			
	Simulator and Aircraft		Level D ² (simulator only)	Level E ² (aeroplane only)
	Level A, B or C ²	Aircraft		

Single-engine	1.5 ⁴	1.0 ³	1.5 ⁴	1.5 ⁴
Multi-engine ≤15 000 kg	2.0	1.0 ³	2.0	2.0
Multi-engine >15 000 kg	4.0	1.5 ³	4.0	4.0

Notes (applicable to both tables) –

1. *Flight training times in the tables are expected to be flight times (block to block). 15 minutes is factored into the ground time for each flight. Time spent in excess of 15 minutes on the ground is to be added to the air time spent in training for aeroplane-only training. Recurrent flight training is an annual requirement. Pilots shall complete an equal amount of pilot not flying (PNF) time in addition to the pilot flying (PF) times given in the tables.*
2. *The times specified refer to the level of the training programme approved in accordance with sub-subsection 2.4.3(4)(a) of this TS. FSTDs approved as part of such training programmes include –*
 - (1) *Level A Full Flight Simulator (FFS) – a synthetic training device that has a motion and visual system that permits completion of a visual training programme and PPC. However, the sophistication of the device is such that there is also a requirement to complete airborne training and an airborne PPC following initial training. Recurrent training and PPCs may be conducted wholly in a Level A device, if approved by the Director;*
 - (2) *Level B FFS – a synthetic training device that has a higher fidelity visual and motion system than that of a Level A device. The system allows the device to accurately replicate aircraft handling when within ground effect and permits accurate depth perception and visual cues to assess sink rate. As a result, it has “landing credits” attached to it. All recurrent training and 90 day currency requirements may be completed in a Level B or higher synthetic training device; and*
 - (3) *Level C and D FFS – synthetic training devices that have a much higher level of fidelity in their visual and motion systems compared to Level B simulators. Zero flight time training may be authorised for programmes utilising a Level D FFS.*
3. *May be reduced to that time necessary to complete the following: Provided all other training has been completed in a FFS –*
 - (1) *one normal and one balked landing;*
 - (2) *one take-off with engine failure after the gear is up (except single-engine aeroplanes);*
 - (3) *one full stop landing with simulated engine failure (except single-engine aeroplanes); and*
 - (4) *one other landing of any type (flapless, from an IFR approach, etc).*

4. *For VFR-only operations, the flight time may be reduced by one hour.*

- (4) Initial and recurrent flight training for flight crew members
- (a) Flight training for flight crew members shall be carried out in accordance with one of the following types of training programmes for each aeroplane type operated by the operator –
- (i) level A training programme;
 - (ii) level B training programme;
 - (iii) level C training programme;
 - (iv) level D training programme; or
 - (v) level E aeroplane-only flight training programme,
- as described in sub-subsections 2.4.3(8) through (12) of this TS.
- (b) Where an operator utilises an FSTD other than those included in the flight training programmes specified in subparagraph (a), the Director shall make a determination with respect to the training and checking credits allowed for such FSTD on a case-by-case basis.
- (5) Recurrent training for all flight crew members shall meet the following requirements –
- (a) all items identified in the initial training syllabus shall be covered over a defined period of time (through a cycle); and
 - (b) a briefing shall be provided on changes that have occurred to the aeroplane or its operation since the flight crew member's last training.
- (6) Each operator shall publish a flight training syllabus containing all items and manoeuvres outlined in the applicable training programme unless the training is contracted out, in which case the training syllabus of the contracted agency shall be published and available to the operator's flight crew members.
- (7) The flight training syllabus referred to in paragraph (6) shall incorporate training sequences that reflect –
- (a) the type of operation, whether VFR, IFR or both;
 - (b) the type of aeroplane and the equipment carried on board; and
 - (c) the flight regime in which operated.
- (8) Level A aeroplane type training programme
- (a) A Level A training programme shall provide for flight training using a combination of an approved Level A FFS of the type of aeroplane to be operated and the aeroplane. The operator is permitted to conduct most of the training elements of an initial and recurrent training programme in that simulator. Flight training in an aeroplane shall be carried out for general handling and landing manoeuvres following training as specified in subparagraph (c) below.

- (b) Flight training shall include and be in accordance with all flight profiles published by the manufacturer, when such profiles are published, including training in normal, abnormal and emergency operation of the aeroplane systems and components using the FFS. For operators of aeroplanes for which standard operating procedures (SOPs) are required, the training shall be given using such SOPs.
- (c) In addition to the training in a Level A FFS following initial training and, if required, recurrent training, at least 3 take-offs and landings and the following items and manoeuvres shall be completed in the aeroplane –
 - (i) interior and exterior aeroplane pre-flight checks;
 - (ii) ground handling for pilots-in-command only, unless the aeroplane provides full steering capability from the second-in-command (SIC) flight crew stations and company procedures permit the SIC to conduct taxi operations;
 - (iii) normal take-off, visual circuit, where possible, and landing;
 - (iv) a full circling approach off an instrument approach to circling minima where the flight crew member is authorised to perform circling manoeuvres;
 - (v) a simulated engine failure procedure after take-off (at safe altitude and airspeed);
 - (vi) a normal missed approach;
 - (vii) a simulated engine inoperative landing; and
 - (viii) any other manoeuvre for which the simulator was not given training credits.
- (d) If a Level A flight simulator has differences in performance, systems or cockpit layout and configuration from the operator's aeroplane, additional training on these differences shall be provided either in the aeroplane or a training device that is representative of the operator's actual aeroplanes and is approved for use by the Director.

(9) Level B aeroplane type training programme

- (a) A Level B training programme shall provide for flight training using an approved Level B FFS of the type of aeroplane to be operated. Additionally, initial flight training in an aeroplane shall be carried out for ground handling, landing manoeuvres and any other manoeuvre for which the Level B FFS has not been given a training and checking credit and shall include, as a minimum, interior and exterior aeroplane pre-flight checks. Flight training in the aeroplane following recurrent FFS training need not be completed.
- (b) In addition to the training required in a Level A training programme, training in an approved Level B FFS shall include recovery from turbulence and windshear on take-off and approach.
- (c) If a Level B flight simulator has differences in performance, systems or cockpit layout and configuration from the operator's aeroplane, additional training on these differences shall be provided either in the aeroplane or a training device that is representative of the operator's actual aeroplane and is approved for use by the Director.

(10) Level C aeroplane type training programme

- (a) A Level C training programme shall provide for flight training using an approved Level C FFS of the type of aeroplane to be operated. Except as provided in subparagraph (b), initial

flight training in an aeroplane shall be carried out for ground handling, landing manoeuvres and any other manoeuvre for which the Level C FFS has not been given a training and checking credit and shall include, as a minimum, interior and exterior aeroplane pre-flight checks. Flight training in the aeroplane following recurrent FFS training need not be completed.

- (b) Zero flight time training for candidates undergoing initial training with at least second-in-command experience on a similar aeroplane with the same operator or has otherwise had verifiable line currency as at least a second-in-command on a similar aeroplane within the previous two years is permitted.

Note – For the purpose of this provision, "similar aeroplane" means both aeroplanes are operated in terms of Part 135 and are within the following categories –

1. *turbo-jet to turbo-jet;*
2. *turbo-prop to turbo-prop; and*
3. *reciprocating to reciprocating.*

- (d) If a Level C flight simulator has differences in performance, systems or cockpit layout and configuration from the operator's aeroplane, additional training on these differences shall be provided either in the aeroplane or a training device that is representative of the operator's actual aeroplanes and is approved for use by the Director.

(11) Level D aeroplane type training programme

- (a) A Level D training programme using an approved Level D FFS of the type of aeroplane to be operated permits zero flight time training.
- (b) If a Level D flight simulator has differences in performance, systems or cockpit layout and configuration from the operator's aeroplane, additional training on these differences shall be provided either in the aeroplane or a training device that is representative of the operator's actual aeroplane and is approved for use by the Director.

(12) Level E aeroplane-only flight training programme

- (a) An aeroplane-only flight training programme will only be approved in accordance with the simulator-use policy specified in section 3 of TS 135.03.1 of Document SA-CATS 135.
- (b) Any simulated failure of aeroplane systems shall only take place under operating conditions which do not jeopardise safety of flight and never with passengers on board.
- (c) The training programme shall include and be in accordance with all flight profiles published by the manufacturer, when such profiles are published, including SOPs for normal, abnormal and emergency operation of the aeroplane systems and components.

2.5 Regaining recency training for pilots

The following training shall be completed by pilots who have not maintained, for a period between 90 and 180 days, their recency qualifications as specified in CAR 91.02.4 –

- (a) a briefing on changes that have occurred to the aeroplane or its operation since the pilot's last flight; and
- (b) training in an aeroplane or FFS that includes not less than 3 take-offs and landings and, for multi-engine aeroplanes, an engine failure on take-off, an engine failure on the missed approach and an engine-out landing.

Note – The engine-out training exercises shall be simulated in the aeroplane.

2.6 Regaining qualification training for pilots

- (1) Where a pilot's PPC or competency check (CC) on a specific aeroplane type has expired for less than 6 months, the following shall be completed –
 - (a) all the requirements specified in sub-subsection 2.5 of this TS, as applicable; and
 - (b) any recurrent training that may have come due during the absence from flying duties on that aeroplane type.
- (2) Where the PPC or CC on a specific aeroplane type has expired from between 6 and 24 months, inclusive, the following shall be completed to regain qualification –
 - (a) all the requirements of sub-subsection 2.6(1) of this TS; and
 - (b) a technical ground training course consisting of an aeroplane system review on that aeroplane type.
- (3) A pilot whose PPC has expired by more than 24 months but less than 60 months shall complete aeroplane ground technical training and an examination. In addition, the operator shall provide sufficient flight training to ensure the pilot is proficient on the aeroplane, followed by a PPC. In developing the training programme, the operator shall take cognisance of at least –
 - (a) the time since the pilot last flew the aeroplane type; and
 - (b) the experience of the pilot on that type and/or similar aeroplanes.

Note – In each instance of a pilot regaining qualification under paragraph (3), the operator shall submit its proposed flight training programme, including the number of flying hours planned, along with substantiation for arriving at that figure, to the Director for approval prior to conducting the training. The Director shall, within 48 hours, approve, approve with conditions or not approve the programme. Alternatively, the operator may publish in its operations manual several training programmes catering to a variety of scenarios of pilot experience.

- (4) A pilot whose PPC has expired by 60 months or more shall complete the full initial aeroplane type training programme.

3. Required Training for Operators – As Applicable to the Operation

3.1 Line induction training

- (1) An operator shall ensure that, following completion of initial type rating or upgrade training, each flight crew member appointed by it to operate large aeroplanes completes line induction training.

The flight crew member shall serve in the capacity to be served with the operator over routes typical of those over which the flight crew will be expected to fly for the operator. Those items that cannot be covered as a natural occurrence during the line flying operations shall be covered by briefing or other discussion.

(2) Line induction for flight crew members sectors/hours requirements

- (a) For the purposes of this TS, the aeroplane groups are –
 - (i) reciprocating engine;
 - (ii) turbo-propeller engine; or
 - (iii) turbo-jet engine.
- (b) Initial line induction is required for crew members who have not qualified and served in the same capacity on the same group of aeroplanes.
- (c) Transition line induction is authorised for crew members who have qualified and served in the same capacity on the same group of aeroplanes.
- (d) During line induction, a flight crew member shall be given the minimum flight times and sectors in accordance with this TS while performing the duties appropriate to the crew station. Line induction training is calculated by a combination of flight hours and flight sectors. A flight sector is considered as any flight consisting of a take off, *en route* segment of not less than 50 nautical miles and an approach and landing. The required number of flying hours and sectors may be completed during proving or ferry flights or during normal line operations and apply to the PIC and the SIC.
- (e) Initial line induction shall be conducted under the supervision of a flight training pilot during which time the PIC and SIC shall perform their duties in their respective position, with the training pilot occupying the opposite pilot operating position.
- (f) Initial or upgrade line induction requires that the PIC and SIC receive not less than 4 flight sectors, 2 sectors of which are to be performed as PF and 2 sectors as PNF;
- (g) Initial or upgrade line induction requires that each flight crew member receives the following minimum number of flight hours –
 - (i) in the case of large aeroplanes with reciprocating engines –
 - (aa) 10 hours; and
 - (bb) after completing the 4 mandatory sectors, the remaining time may be reduced by 1 hour for each additional sector flown to a maximum reduction of 5 hours;
 - (ii) in the case of large aeroplanes with turbo-propeller engines –
 - (aa) 15 hours; and

- (bb) after completing the 4 mandatory sectors, the remaining time may be reduced by 1 hour for each additional sector flown to a maximum reduction of 7.5 hours; and
- (iii) in the case of large aeroplanes with turbo-jet engines –
 - (aa) 25 hours; and
 - (bb) no reduction of the original time requirement shall be permitted.
- (h) Transition line induction requires that each flight crew member receives, in the case of the PIC and SIC, not less than 3 flight sectors of which at least 1 sector is to be performed as PF and 1 sector as PNF.
- (i) Transition line induction requires that each flight crew member receives the following minimum number of flight hours –
 - (i) in the case of aeroplanes with reciprocating engines –
 - (aa) 10 hours; and
 - (bb) after completing the 3 mandatory sectors, the remaining time may be reduced by 1 hour for each additional sector flown to a maximum reduction of 5 hours;
 - (ii) in the case of aeroplanes with turbo-propeller engines –
 - (aa) 15 hours; and
 - (bb) after completing the 3 mandatory sectors, the remaining time may be reduced by 1 hour for each additional sector flown to a maximum reduction of 7.5 hours; and
 - (iii) in the case of aeroplanes with turbo-jet engines –
 - (aa) 20 hours; and
 - (bb) after completing the 3 mandatory sectors, the remaining time may be reduced by 1 hour for each additional sector flown to a maximum reduction of 10 hours.

3.2 Differences and familiarisation training

- (1) Where the operator intends to assign a flight crew member to variant types of aeroplanes or different types with very similar characteristics, the operator shall, using technical standard 61.13 in Document SA-CATS 61 for guidance, determine whether the pilot must be provided differences or familiarisation training.
- (2) Where significant differences exist within the operator's fleet of aeroplanes, or variants of aeroplanes, or between the aeroplanes operated and the training device approved for use, the aeroplane type technical and flight training syllabus shall contain such differences training.

- (3) Where only minor differences exist within the operator's fleet of aeroplanes, or variants of aeroplanes, or between the aeroplanes operated and the training device approved for use, the aeroplane familiarisation training appropriate to the differences shall be given and recorded in the crew member's training file.
- (4) Differences and familiarisation training shall include, as a minimum, a knowledge examination following the ground training. The requirement for a skills test will be determined by the Director based upon an assessment of the degree of the differences.

3.3 Upgrade training

- (1) Where an operator wishes to appoint the following persons as a PIC on an aeroplane type, such person shall undergo upgrade training –
 - (a) an SIC who is currently proficient as an SIC on the type of aeroplane;
 - (b) an SIC who is not qualified on the type of aeroplane; or
 - (c) an SIC who is qualified on the aeroplane type and has acted as PIC on another aeroplane type.
- (2) Where an SIC holds a type rating on the aeroplane and whose SIC proficiency on that aeroplane has expired within the preceding 24 months, such SIC shall complete a technical ground training course consisting of an aeroplane system review on that aeroplane type prior to or as part of the upgrade training programme.
- (3) Prior to or included in the training required by paragraph (1) above, pilots who have not held a valid SIC PPC on the aeroplane type for a period greater than 24 months shall be given a complete initial aeroplane type training course: Provided that a reduction in the ground training and minimum flight hours required may be granted by the Director based on the experience of the flight crew member on that aeroplane type.

3.4 Pilot qualification to operate in either pilot seat

- (1) A pilot whose duties also require him or her to carry out the duties of PF and PNF from both flight crew stations shall complete additional training and become competent to operate from both seats.
- (2) The training required by paragraph (1) shall be completed upon initial assignment and every 12 months thereafter unless the pilot has completed all of the training elements specified in the training programme during normal line operations within the preceding 12 month period prior to operating from a seat for which he or she is not qualified.
- (3) A record of the training completed and/or operational means of qualifying to act from either flight crew station shall be maintained in the pilot's training file.

3.5 Area, route and aerodrome familiarisation training

An operator shall provide adequate material to enable a PIC to familiarise him or herself with such areas, routes and aerodromes as that person is likely to use and shall ensure such material is kept up-to-date.

3.6 Airborne collision avoidance system (ACAS) training

- (1) ACAS training is applicable to at least the PIC where the aeroplane is required to be operated with an approved, serviceable ACAS and shall be completed –
 - (a) prior to initial operational use of the ACAS; and
 - (b) as part of the aeroplane recurrent ground and flight training programme as specified in paragraph (6) of this TS.
- (2) An ACAS training programme shall ensure that on completion the pilot is able to demonstrate proficiency in the following –
 - (a) knowledge of ACAS concepts, systems and procedures specific to the type of equipment used by the operator; and
 - (b) cognitive, procedural, and motor skills necessary to properly respond to ACAS advisories.
- (3) A pilot must complete ACAS initial training in respect of each aeroplane type for which he or she is rated in which is carried ACAS equipment.
- (4) ACAS initial training may be provided as a stand-alone module of ground and flight training or may be integrated with other initial, transition or upgrade ground and flight training programmes.
- (5) An operator shall certify in the pilot's file that the ACAS training has been accomplished to a satisfactory standard.
- (6) ACAS renewal training
 - (a) ACAS renewal training –
 - (i) shall be integrated with the annual recurrent flight training programme;_and
 - (ii) recurrent ground training shall be provided on an as-required basis if any significant issues have been identified as a result of line operating experience, system changes, procedural changes or new aircraft display systems have been introduced.
 - (b) Routine ACAS operations shall be included in all evaluation environments and training pilots should include ACAS as a routine discussion item.
 - (c) An ACAS instructor is deemed to have completed ACAS renewal training when the instructor conducts ACAS initial training or ACAS renewal training.
- (7) ACAS training programme requirements
 - (a) Each ACAS curriculum shall ensure the equipment manufacturer's recommended training and testing requirements are carried out in the manner prescribed by such manufacturer.
 - (b) In any case a pilot's ability to demonstrate system and procedural concepts shall be included in the initial, recurrent and where applicable, the regaining competency training.

3.7 Reduced Vertical Separation Minima (RVSM) training

- (1) No pilot may operate in RVSM airspace unless such pilot has received initial training from an approved training organisation or through an operator's approved training programme with respect

to operating in RVSM airspace and, for pilots who have not operated in RVSM airspace in the preceding 12 months, recurrent training.

- (2) For a flight crew member to qualify for operations in RVSM airspace, he or she shall be proficient in the following areas –
- (a) knowledge of the floor, ceiling and horizontal boundaries of the RVSM airspace to be operated in;
 - (b) rules on exclusion of non-RVSM compliant aircraft;
 - (c) pilot procedures with respect to –
 - (i) pre-flight and in-flight altimeter checks;
 - (ii) use of the automatic altitude control system;
 - (iii) minimum equipment list (MEL) items applicable to RVSM operations;
 - (iv) special procedures for in-flight contingencies;
 - (v) weather deviation procedures;
 - (vi) track offset procedures for wake turbulence and inconsequential collision avoidance systems alerts; and
 - (vii) climb and descent procedures and pilot level-off call;
 - (d) procedures for flight of non-RVSM compliant aircraft for maintenance, humanitarian or delivery flights; and
 - (e) use of ACAS/TCAS.

3.8 Training for low visibility operations

- (1) General
- (a) Low visibility operations (LVO) are comprised of lower-than-normal visibility minima take-off (LVTO) and lower-than-normal weather and visibility minima approach operations (Category II and III (CAT II/III) approaches).
 - (b) An operator must ensure that flight crew member training programmes for LVO include structured courses of ground, simulator and flight training. The training is aeroplane-specific; however, credits may be given from one aeroplane type to another based on the similarities between the types. The operator may abbreviate the course content as prescribed by subparagraphs (d), (e) and (f) below provided the content of the abbreviated course is acceptable to the Director.
 - (c) Flight crew members with no CAT II or III experience must complete the full training programme prescribed in paragraphs (2), (3) and (4) below.
 - (d) Flight crew members with CAT II or III experience with another owner or operator may undertake an abbreviated ground training course but shall complete the flight training, check and line flying under supervision.
 - (e) Flight crew members with CAT II or III experience with the owner or operator may undertake an abbreviated ground, simulator and/or flight training course, which shall include at least the requirements of paragraphs (5)(a) or (b), as appropriate, of this subsection.

(2) Ground training

An operator shall provide a ground training programme commensurate with its approvals. Such training shall be given to flight crew members upon their initial introduction to LVTO or CAT II/III operations and thereafter as required to introduce new policies, procedures or equipment associated with LVO.

(3) Flight training

(a) An operator shall use an approved simulation training device (FSTD) for the training and checking of flight crew members in LVO.

(b) An operator must ensure that each flight crew member is trained to carry out his or her duties and instructed on the coordination required with other flight crew members.

(4) Conversion training requirements to conduct low-visibility take-off and Cat II and III operations

An operator must ensure that each flight crew member completes the following low visibility procedures training if converting to a new type or variant of aircraft in which LVTO and CAT II and III operations will be conducted. The flight crew member experience requirements to undertake an abbreviated course are prescribed in paragraphs (1)(d) and (e) above.

(a) Ground training –

The appropriate requirements prescribed in paragraph (2) above shall be completed, taking into account the flight crew member's LVTO and CAT II and III training and experience.

(b) FSTD training –

(i) a minimum of 8 LVTO departures and CAT II/III approaches in a simulator approved for the purpose;

(ii) a minimum of 5 landings following CAT II/III approaches of which at least 2 shall be with an engine out;

(iii) a minimum of 3 missed approaches initiated at various stages of the approach, during which at least one engine failure shall be introduced; and

(iv) appropriate additional training if any special equipment is required such as head-up displays or enhanced vision equipment.

(5) Line flying under supervision

An operator must ensure that each flight crew member undergoes the following line flying under supervision –

- (a) for CAT II when a manual landing is required, a minimum of 3 landings from autopilot disconnect; and
- (b) for CAT III, a minimum of 3 autolands except that only 1 autoland is required when the training required in paragraph (3) or (4), as applicable, has been carried out in a full flight simulator usable for zero flight time training.

(6) Type and command experience

- (a) The following additional requirements are applicable to pilots-in-command who are new to the aircraft type –
 - (i) 50 hours or 20 sectors, whichever is later, as pilot-in-command on the type before performing any CAT II or III operations; and
 - (ii) 100 m must be added to the applicable CAT II or III RVR minima unless he or she has previously qualified for CAT II or III operations with another owner or operator until attaining 100 hours or 40 sectors, whichever is later, as pilot-in-command on the type.
- (b) The Director may authorise a reduction in the above command experience requirements for flight crew members who have CAT II or III command experience.

(7) LVTO

- (a) An operator must ensure that prior to authorisation to conduct take-offs with RVR below 400 m the following training is carried out –
 - (i) normal take-off in minimum authorised conditions or RVR conditions;
 - (ii) take-off in minimum authorised conditions or RVR conditions with an engine failure between V1 and V2 or as soon as safety considerations permit; and
 - (iii) take-off in minimum authorised conditions or RVR conditions with an engine failure before V1 resulting in a rejected take-off.
- (b) An operator shall ensure that the training required by paragraph (3) or (4) above, as appropriate, above is carried out in an approved simulator. This training shall include the use of any special procedures and equipment.
- (c) An operator must ensure that a flight crew member has completed a check before conducting low visibility take-offs with an RVR of less than 400 m.

(8) LVO recurrent training and checking

- (a) An operator must ensure that, in conjunction with the normal recurrent training and PPCs, a pilot's knowledge and ability to perform the tasks associated with the particular category of operation, including LVTO, for which he or she is authorised, is checked. The required number of approaches to be conducted during such recurrent training is to be a minimum of two, one of which is to be a missed approach and at least one low visibility take-off to the lowest applicable minima. The

period of validity for this check shall be the same as the recurrent training approved for the operator.

- (b) For LVO training and checking, an operator shall use an approved flight simulator.
- (c) An operator must ensure that, for CAT III operations on aeroplanes with a fail passive flight control system, a missed approach is completed at least once every 18 months as the result of an autopilot failure at or below decision height when the last reported RVR was 300 m or less.

(9) LVTO and CAT II or III recency requirements

- (a) An operator must ensure that, in order for pilots to maintain a CAT II or III qualification, they have conducted a minimum of 3 approaches and landings using approved CAT II or III procedures during the previous six month period, at least one of which must be conducted in the aircraft.
- (b) Recency for LVTO is maintained by retaining the CAT II or III qualification prescribed in subparagraph (a) above.
- (c) An operator may not substitute this recency requirement for recurrent training.

3.9 Single-engine IFR and night VFR training

- (1) An operator shall provide initial and recurrent training to ensure its pilots are able to safely conduct operations in single-engine aeroplanes in flight under the instrument flight rules (IFR) and at night. Such training shall be completed on each aeroplane type flown unless the Director permits a reduction in training based on similarities between the aeroplane types flown.
- (2) The training required by paragraph (1) shall be completed –
 - (a) prior to initial assignment on a single-engine aeroplane carrying passengers, cargo or both under IFR or at night; and
 - (b) every 12 months thereafter.
- (3) Table 1 prescribes the minimum conversion and recurrent training to be accomplished on single-engine aeroplanes authorised to be operated under IFR or at night.

**TABLE 1
Minimum Training Time Requirements**

Type of Operation	INITIAL		RECURRENT	
	Aeroplane-only	Simulator-only	Aeroplane-only	Simulator-only
Passenger carriage	4.0	4.0	1.0	N/A
Cargo-only carriage	2.0	N/A	1.0	N/A

Notes –

1. *Written exams are mandatory at completion of both Initial and recurrent ground training.*
 2. *Synthetic training device and aeroplane times are pilot flying (PF) times only.*
 3. *The Director will determine on a case by case basis what combination of aeroplane/simulator training totalling 4 hours is to be accomplished based on the simulator's approved capabilities.*
 4. *Notwithstanding the above training times, all training shall be to an acceptable standard.*
- (4) Where an approved synthetic training device is available within the Republic for a specific aeroplane type, the simulator training published in Table 1 shall be accomplished in such device, including all emergency procedures that cannot be safely practised in the aeroplane. Where no such approved synthetic training device is reasonably available, the Director may approve an aeroplane-only flight training programme where he or she is of the opinion that safety will not be jeopardised.

3.10 IFR or night VFR without a second-in-command (single-pilot IFR)

An owner or operator may not conduct single-pilot flight under IFR or at night unless the PIC, within the preceding 12 months, has completed the following single-pilot training in the aeroplane, a FSTD or a combination of aeroplane and FSTD –

- (a) if flight under IFR is to be undertaken, the following training under simulated or actual IMC –
 - (i) at least two instrument departures, one of which shall be with an engine out;
 - (ii) a minimum of five approaches consisting of at least one precision and one non-precision approach;
 - (iii) at least one missed approach during which an engine failure is introduced;
 - (iv) at least one engine-out approach; and
 - (v) at least three landings from approaches, one of which shall be with an engine out; and
- (b) if night flight is to be undertaken, five take-offs and landings at night.

Notes –

1. *Only a FSTD that is representative of the aircraft to be flown, including navigation systems and cockpit layout, shall be approved for use.*
2. *Training shall include use of the autopilot with and without the introduction of abnormal and emergency conditions.*
3. *Any engine-out training done in the aircraft must be simulated.*
4. *Single engine aircraft are not subject to the engine-out training requirements.*

3.11 Dangerous goods

- (1) An operator authorised to transport dangerous goods shall complete the training specified in CAR 92.00.8 and publish such training in its operations manual.
- (2) An operator not authorised to transport dangerous goods shall complete dangerous goods awareness training for operations personnel and other employees likely to come into contact with passengers or their baggage or personal effects –
 - (a) upon initial employment; and
 - (b) every 24 months thereafter.

3.12 Other courses of training as deemed appropriate by the Director

- (1) An operator authorised to conduct the following specialised operations, or any other, shall provide training in the equipment and procedures associated with such approvals –
 - (a) extended range twin-engine operations (ETOPS);
 - (b) all weather operations;
 - (c) GNSS;
 - (d) RNAV;
 - (e) land and hold short operations; and
 - (f) simultaneous operations on parallel or near-parallel instrument runways – ILS/precision runway monitor (PRM) and localizer type directional aid (LDA)/PRM - simultaneous offset instrument approaches (SOIA) training.
- (3) Other courses that may be considered necessary to ensure safety of flight operations may include but not be limited to –
 - (a) MEL training;
 - (b) high altitude training;
 - (c) operations in ground icing conditions, if applicable;
 - (d) one-engine Inoperative ferry flight training;
 - (e) CFIT;
 - (f) low-energy awareness training; and
 - (g) other relevant subjects identified from time to time.

135.03.4 EMPLOYEE AND SERVICE AGENT TRAINING

1. Flight followers

- (1) The operator shall establish and maintain an approved ground training programme for flight followers in its employ whether on a full-time or part-time basis or otherwise engaged under the provisions of contractual services approved by the Director for that operator.
- (2) Each training programme shall be developed, published and approved as provided in this Subpart.
- (3) Each training curriculum shall be appropriate to the employee's duties and in consideration of the type and complexity of the operational control system approved for the operator.

2. Security training for ground personnel

- (1) An operator shall provide security training for the purpose of heightening overall security awareness among the ground operating personnel whose function is essential to flight operations. Ground personnel considered significant to aeroplane operations would include but not be limited to –
 - (a) personnel designated as dangerous goods packing, shipping or loading of dangerous materials;
 - (b) service counter personnel;
 - (c) personnel designated as cargo, mail or baggage handlers;
 - (d) catering personnel;
 - (d) service personnel whose function would require coming into contact with or have access to an aircraft or its loading or service bays;
 - (e) maintenance personnel; or
 - (f) personnel who man stores handling anything that is designated for, or is likely to be placed on an aeroplane.
- (2) The training required by paragraph (1) must be designed to acquaint appropriate employees with preventive measures and techniques in relation to passengers, baggage, cargo, mail, equipment, stores and supplies intended for carriage on an aeroplane so that they contribute to the prevention of acts of sabotage or other forms of unlawful interference.

135.03.5 CHECKING OF FLIGHT CREW MEMBERS

- (1) Except as provided in paragraphs (3) and (5), each flight crew member shall successfully demonstrate his or her proficiency to a DFE or authorised person by undergoing a pilot proficiency check (PPC) on each type of aeroplane operated –
 - (a) upon completion of initial type rating flight training;
 - (b) every six months following initial type rating flight training; and
 - (c) upon completion of upgrade training.
- (2) The PPC referred to in paragraph (1) shall be completed as prescribed in Schedule One or Two of this technical standard (TS) as applicable to the type of aeroplane operated and the operations conducted (IFR/VFR).
- (3) In the case of flight crew members operating single-engine aeroplanes under visual flight rules-only, each pilot shall, upon completion of initial flight training and every six months thereafter, successfully demonstrate his or her competency by undergoing a competency check (CC) conducted by a pilot designated by the operator on each type of aeroplane operated, unless checking credits have been approved as provided in paragraph (5).

- (4) In addition, each flight crew member of a large aeroplane shall successfully complete a line check following initial or upgrade line induction training and annually thereafter. Such line check shall be completed by a company check pilot and the results of the check recorded in the crew member's training records. A line check shall consist of an assessment of the flight crew member's ability to conduct safe operations over a representative route of the operator's route structure.
- (5) An operator may be permitted checking credits for different types or variants of aeroplanes based on the demonstrated similarities between the aeroplanes, hereinafter referred to as aeroplane grouping. Notwithstanding approved aeroplane grouping, the initial PPC or competency check shall be completed on each type of aeroplane operated and the subsequent PPCs or competency checks shall be accomplished on a rotating basis between the aeroplanes involved. For the purposes of this TS and CAR 135.03.6(3)(a), a recurrent PPC or CC completed on one aeroplane type shall be deemed to have been completed on all aeroplane types for which aeroplane grouping has been approved.
- (6) A record of each check completed as required by this TS shall be retained on the flight crew member's training record.
- (7) Any two PPCs that are similar in nature and occur within 4 months of each other shall not alone satisfy the requirements of paragraphs (1)(b) and (3) above.

SCHEDULE 1

PPC Criteria Using Full Flight Simulators

1. Pre-flight Phase

- (1) Flight planning and equipment examinations are not mandatory when there are, in the training records, written examinations from initial or annual training for which the validity period has not expired.
- (2) Flight planning shall include a practical examination on the crew's knowledge of operator's approved Standard Operating Procedures and the Aircraft Flight Manual including aeroplane and runway performance charts, and weight and balance procedures.
- (3) The equipment examination shall consist of a display of practical knowledge of the airframe, engine, major components and systems including the normal, abnormal and emergency operating procedures and limitations relating thereto.

2. Flight Phase

- (1) Taxiing –
 - (a) the use of the taxiing check list; and
 - (b) taxiing in compliance with clearances and instructions issued by the person conducting the PPC;
 - (c) where a SIC is undergoing the PPC, outlined above to the extent practicable from the SIC position.

- (2) Engine Checks –

Engine checks shall be conducted as appropriate to the aeroplane type.

- (3) Take-off
 - (a) one normal take-off to be performed in accordance with the Aircraft Flight Manual;
 - (b) an instrument take-off in the minimum visibility approved for the operator;
 - (c) a take-off in a minimum of a 10 kt crosswind component;
Note – Any or all of the above take-offs may be combined.
 - (d) a take off with failure of an engine at a speed greater than V1 and at an altitude of less than 50 feet AGL; or at a speed as close as possible to, but greater than V1 when V1 and V2, or V1 and Vr are identical, such engine to be the critical engine if the aeroplane concerned has a critical engine; and
 - (e) a rejected take-off from a speed not less than 90% of the calculated V1 or as appropriate to the aeroplane type.

- (4) Instrument Procedures –

Instrument procedures shall consist of IFR pre-flight preparations, terminal and *en route* procedures, arrival and departure procedures, system malfunctions and where applicable, the proper programming and use of flight management systems, as applicable –

- (a) an area departure and an area arrival procedure shall be performed where the crew –
 - (i) adheres to air traffic control clearances and instructions; and

- (ii) properly uses the available navigation equipment and facilities;
- (b) a holding procedure;
- (c) at least two instrument approaches performed in accordance with procedures and limitations in the AIP or in the equivalent foreign publication, or approved company approach procedure for the facility used. One of the approaches shall be a precision approach, and one a non precision approach; and
- (d) one approach and manoeuvre to land using a scene approved for circling where the operator is authorised for approaches at the published circling minima, and is required during initial qualification check and annually thereafter.

(5) Manoeuvres –

Manoeuvres for initial PPC type rating should be as published by the manufacturer in the aeroplane profiles section. For a recurrent PPC, flight profiles may be selected as deemed appropriate by the examiner but in any case the selected profiles must be demonstrated in accordance with the manufacturer's profiles. At least the following flight manoeuvres shall be demonstrated –

- (a) at least one steep turn in each direction with a bank angle of 45° and a change in heading of at least 180° but not more than 360°;
- (b) approaches to stalls –

Note – For the purpose of this manoeuvre the required approach to a stall is reached when there is a perceptible buffet or other alert to an impending stall.

 - (i) the following approaches to stall configurations are required for initial and upgrade PPCs –
 - (aa) one in the take-off configuration, except where a zero-flap take-off configuration is normally used in that model and type of aeroplane. In such case one stall should be demonstrated with the aeroplane configured for normal manoeuvring;
 - (bb) one in a clean configuration; and
 - (cc) one in a landing configuration; and
 - (ii) on the approach to a stall demonstrated in the manoeuvring configuration the aeroplane shall be placed into a turn with a bank angle of between 15° and 30°.

Note – Steep turns and approach to stalls are not required if the PPC is conducted via either a LOFT scenario, a scripted PPC or on a fly-by-wire aeroplane, and –

- (1) *for an initial PPC on aeroplane type, steep turns and approach to stalls have been satisfactorily demonstrated during initial training; and*
- (2) *for a semi-annual or an annual PPC if –*
 - (a) *steep turns and approach to stalls are required in the applicable annual training syllabus and they have been satisfactorily demonstrated during this training; or*
 - (b) *steep turns and approach to stalls are not required in the applicable annual training syllabus.*

(6) Landings and Approaches to Landings –

- (a) one normal landing;
- (b) one landing from an approach in Instrument Meteorological Conditions (IMC) not greater than the minimum recommended for the approach;
- (c) one crosswind landing with a minimum of a 10 kt crosswind component;
- (d) one landing and manoeuvre to that landing with, depending on aeroplane type, an engine failure as follows –
 - (i) for a two engine aeroplane, failure of one engine;
 - (ii) for a three engine aeroplane, failure of the centre engine combined with the failure of one outboard engine for the PIC, and failure of one outboard engine only for other than the PIC;
 - (iii) for a four engine aeroplane, failure of two engines on the same side for the PIC and failure of one outboard engine only for other than the PIC.

Note – For three and four engine aeroplanes, the pilot-in-command is required to perform a two engine inoperative procedure during the initial qualification check and annually thereafter.

- (e) one rejected landing and one missed approach. For the purposes of the rejected landing the landing shall be rejected at a height of approximately 50 feet when the aeroplane is approximately over the runway threshold. The rejected landing may be combined with a missed approach;
 - (f) Category II or Category III approaches during the initial qualification flight and annually thereafter as follows –
 - (i) where CAT II approaches are authorised in the air operator certificate, the following is required:
 - (aa) for a PIC initial qualification –
 - (A) one CAT II ILS approach during which a practical emergency is introduced aimed at assessing crew co-ordination in decision making and the resultant missed approach; and
 - (B) a second CAT II ILS approach to a landing in CAT II weather minima;
 - (bb) for a PIC requalification on CAT II approaches, at least one CAT II ILS approach to a landing annually; and
 - (ii) where both CAT II and CAT III approaches are authorised in the air operator certificate, the following is required:
 - (aa) for a PIC initial qualification –
 - (A) one CAT II ILS approach during which a practical emergency is introduced aimed at assessing crew co-ordination in decision making and the resultant missed approach; and
 - (B) a CAT III ILS approach conducted to a landing in CAT III weather minima; and
- Note – For a pilot-in-command requalification on CAT II and CAT III approaches, successive 6 month PPCs in an approved simulator will alternate CAT II and CAT III renewal checks.*

(g) one landing without the use of an auto-land system.

Note – Any of the landings and approaches to landings specified in this section may be combined. A minimum of two landings are required.

(7) Normal Procedures –

The crew shall demonstrate use of as many of the operator's approved SOPs and normal procedures as are necessary to confirm that the crew has the knowledge and ability to properly use installed equipment (auto-pilot and hand-flown manoeuvres as appropriate).

(8) Abnormal and Emergency Procedures –

- (a) the crew shall demonstrate use of as many of the operator's approved SOPs and abnormal and emergency procedures for as many of the situations as are necessary to confirm that the crew has an adequate knowledge and ability to perform these procedures;
- (b) system malfunctions shall consist of a selection adequate to determine that the crew has satisfactory knowledge and ability to safely handle malfunctions; and
- (c) at least two simulated engine failures, excluding failures on the runway followed by a rejected take-off, at any time during the check.

(9) Airborne Manoeuvres –

Where the PPC is conducted following initial training in a level A or B training programme, the following flight checking is required within 30 days after the PPC in a synthetic training device and may be run concurrent with the flight training requirements on the aeroplane type in the applicable training programme

- (a) interior and exterior aeroplane pre-flight checks;
- (b) ground handling for pilots-in-command;
- (c) normal take-off, visual circuit (where possible) and landing;
- (d) a simulated engine failure procedure after take-off (at safe altitude and airspeed);
- (e) a simulated engine inoperative landing; and
- (f) a normal missed approach.

SCHEDULE 2

PPC Criteria Using the Aeroplane Only

1. Pre-flight Phase

(1) Flight Planning and Equipment Examination –

- (a) flight planning and equipment examinations are not mandatory when there are, in the training records, written examinations from initial or annual training for which the validity period has not expired;
- (b) flight planning shall include a practical examination on the pilot's knowledge of standard operating procedures and the Aircraft Flight Manual including performance charts, loading, weight and balance and Flight Manual Supplements; and
- (c) the equipment examination shall show a practical knowledge of the airframe, engine, major components and systems including the normal, abnormal and emergency operating procedures and limitations relating thereto.

(2) Aeroplane Inspection

A pre-flight aeroplane inspection that includes –

- (a) a visual inspection of the exterior and interior of the aeroplane, locating each item to be inspected and explaining the purpose of the inspection;
- (b) the proper use of the pre-start, start and pre-taxi check lists; and
- (c) checks of the appropriate radio communications, navigation and electronic equipment and selection of the appropriate communications and navigation frequencies prior to flight.

2. Flight Phase

(1) Taxiing

- (a) taxiing procedures;

- (b) a taxiing check including –
 - (i) the use of the taxiing check list; and
 - (ii) taxiing in compliance with clearances and instructions issued by the appropriate air traffic control unit or by the person conducting the PPC; and
 - (iii) where a SIC is undergoing the PPC, the taxiing check outlined above to the extent practicable from the SIC position.

(2) Engine Checks

Engine checks shall be conducted as appropriate to the aeroplane type.

(3) Take-off

- (a) one normal take-off to be performed in accordance with the Aircraft Flight Manual or where the aeroplane is a turbo-jet, a noise abatement take-off performed in accordance with the Aircraft Flight Manual (where applicable) and the IAIP;
- (b) an instrument take-off performed in the same manner as the normal take-off except that instrument flight rules are simulated at or before reaching an altitude of 200 feet above the airport elevation;
- (c) where practicable under existing meteorological, airport or airport traffic conditions, one crosswind take-off performed in accordance with the aeroplane operating manual where applicable;

Note – Any or all of the above take-offs may be combined.

- (d) a simulated engine failure after take-off (at a safe altitude and airspeed) appropriate to the aeroplane type under the prevailing conditions; and
- (e) a rejected take-off explained by the candidate prior to the flight.

(4) Instrument Procedures

Instrument procedures shall consist of IFR pre-flight preparation, departure and *en route* procedures, terminal procedures and system malfunction –

- (a) an area departure and an area arrival procedure shall be performed where the pilot –
 - (i) adheres to actual or simulated air traffic control clearances and instructions; and
 - (ii) properly uses the available navigation facilities;
- (b) a holding procedure;
- (c) at least two instrument approaches performed in accordance with procedures and limitations in the IAIP or the equivalent foreign publication, or approved company approach procedure

for the approach facility used. Where practicable one of the approaches shall be a precision approach and one a non-precision approach;

- (d) a circling approach, where the operator is authorised for circling minima below ceiling 1000 feet and 3 miles ground visibility, except where local conditions beyond the control of the pilot prevent a circling approach from being performed.

(5) In Flight Manoeuvres –

- (a) at least one steep turn in each direction with a bank angle of 45° and a change in heading of at least 180° but not more than 360°; and
- (b) approaches to stalls –

Note – For the purpose of this manoeuvre the required approach to a stall is reached when there is a perceptible buffet or other alert to an impending stall.

The following approaches to stall configurations are required for initial and upgrade PPCs –

- (i) one in the take-off configuration, except where a zero-flap take-off configuration is normally used in that model and type of aeroplane. In such case one stall should be demonstrated with the aeroplane configured for normal manoeuvring;
- (ii) one in a clean configuration; and
- (iii) one in a landing configuration.

On the approach to a stall demonstrated in the manoeuvring configuration the aeroplane shall be placed into a turn with a bank angle of between 15° and 30°;

For the purpose of this manoeuvre the required recovery from a stall is initiated when there is a perceptible buffet or other alert of an impending stall entry.

When performed in an aeroplane the approach to stalls shall be conducted at an altitude of at least 5000 feet AGL and if conducted above cloud at an altitude of at least 2000 feet above the cloud tops.

(6) Landings and Approaches to Landings –

- (a) one normal landing which shall, where practicable, be conducted without external or internal glideslope information;
- (b) one landing from an instrument approach, and where prevailing conditions prevent an actual landing, an approach to a point where a landing could have been made;
- (c) one cross wind landing where practicable under existing meteorological, airport and airport traffic conditions;
- (d) one landing and manoeuvring to that landing with a simulated failure of 50 percent of the available engines which shall be on one side of the aeroplane for the PIC and on outboard engine only for other than the PIC. Where the aeroplane type is a three engine aeroplane, the loss of power shall be an outboard engine and the centre engine for the PIC and on outboard engine for other than the PIC. For three- and four-engine aeroplanes the PIC is required to

perform a two-engine_inoperative procedure during initial qualification check and annually thereafter; and

- (e) one landing under simulated circling approach conditions except that where prevailing conditions prevent a landing, an approach to a point where a landing could have been made.

Note – Any of the landings and approaches to landings specified in this section may be combined. A minimum of two landings are required.

(7) Normal Procedures

The crew shall demonstrate use of as many of the operator's approved Standard Operating Procedures, and normal procedures as are necessary to confirm that the crew has the knowledge and ability to properly use installed equipment, (auto-pilot and hand flown manoeuvres as appropriate).

(8) Abnormal and Emergency Procedures –

- (a) the crew shall demonstrate use of as many of the operator's approved Standard Operating Procedures and abnormal and emergency procedures for as many of the emergency situations as is necessary to confirm that the crew has an adequate knowledge and ability to perform these procedures.
- (b) system malfunctions shall consist of a selection adequate to determine that the crew has satisfactory knowledge and ability to safely handle malfunctions.
- (c) at least two simulated engine failures any time during the check shall be introduced.

135.04.2 OPERATIONS MANUAL

1. Structure of operations manual

- (1) An operator's operations manual (OM) may consist of one manual or, due to the size and complexity of the operation, may consist of several manuals, in which case the operator has established an operations manual system. For the purposes of this technical standard (TS), the term "operations manual" includes an "operations manual system" if that is what the operator has established.
- (2) An operator must ensure that the main structure of the operations manual is as follows –

Part 1: General

This part must comprise all non type-related operational policies, instructions and procedures needed for a safe operation and must comply with all relevant CAR.

Part 2: Aeroplane operating matters

This part must comprise all type-related instructions and procedures needed for a safe operation. It must take account of the different types of aeroplanes or variants used by the operator.

Part 3: Route and aerodrome instructions and information

This part must comprise all instructions and information needed for the area of operation.

Part 4: Training

This part must comprise all training instructions for personnel required for a safe operation.

- (3) An operator must ensure that the contents of the operations manual are in accordance with section 2 of this TS and relevant to the area and type of operation and that each manual in the system of manuals, if applicable, contains at least the following introductory layout –
 - (a) title page;
 - (b) table of contents;
 - (c) record of amendments page; and
 - (d) list of effective pages.
- (4) An operator must ensure that the detailed structure of the operations manual is approved by the Director.

2. CONTENTS OF OPERATIONS MANUAL

2.1 PART 1: GENERAL

2.1.1 Administration and control of operations manual

- (1) An operations manual shall contain certain statements and provisions for the(a) a statement that the manual is intended to comply with:
 - (i) all applicable acts, regulations and associated technical standards;
 - (ii) the terms and conditions of the applicable operating certificate; and
 - (iii) the authorizations, conditions and limitations of the operations specifications associated with the AOC
- (b) a statement that, where any person is confronted with an operational situation not contemplated by the operations manual, such person will be expected to act in accordance with his or her most conservative discretion. Furthermore, where any part of the manual is considered to be repugnant to any provision referred to in sub-paragraph (a), such person shall comply with the respective legal statute and report the discrepancy to the responsible person by the quickest means possible;
- (c) a statement that the manual contains operational instructions that are to be complied with by the relevant personnel;
- (d) a list and brief description of the various parts, their contents, applicability and use (table of contents);
- (e) explanations and definitions of terms and words needed for the use of the manual;
- (f) where a manual system is in use by the operator, provisions for the issuance of each component in separate parts corresponding to specific aspects of the operation; and
- (g) a brief description, by whatever means, of the operator's manual system that lists all operational and technical manuals developed or adopted by the operator for the purpose of

ensuring operations personnel have been provided all information necessary for the performance of their duties. The means by which the description is provided shall indicate which manuals, or parts thereof, of the manual system will be available on board an aeroplane during flight time.

(2) System of amendment and revision –

- (a) who is responsible for the issuance and insertion of amendments and revisions;
- (b) a record of amendments and revisions with insertion dates and effective dates;
- (c) in the interests of aviation safety, a statement that provides for the rapid dissemination of operational information with a system of priorities governing the implementation process. Handwritten amendments and revisions are not permitted except in situations requiring immediate amendment or revision in the interests of aviation safety;
- (d) a description of the system for the annotation of pages and their effective dates;
- (e) a list of effective pages;
- (f) annotation of changes (on text pages and, as far as practicable, on charts and diagrams);
- (g) temporary revisions; and
- (h) a description of the distribution system for the manuals, amendments and revisions.

2.1.2 Organisation and responsibilities

(1) Organisational structure

- (a) For the purposes of this technical standard, the term “functional area” refers to a specific aspect of the operator’s business, such as flight operations or maintenance, for which a person would normally be assigned the responsibility for its operation. In larger companies a functional area would be termed “division” or “department”.
- (b) A description of the organisational structure through the use of one or more organograms. The organogram(s) must depict the relationship between all functional areas related to the safety of operations (eg. flight operations, maintenance, training, quality, safety and security), including their relationship to the chief executive officer. In particular, the subordination and reporting lines between the various post-holders shall be shown.

(2) Post-holders

The name, functions and responsibilities of each post-holder shall be listed.

(3) Responsibilities and duties of designated personnel

A description of the specific responsibilities and duties delegated by a post-holder to certain personnel within a functional area..

(4) Authority, duties and responsibilities of the pilot-in-command (PIC)

A statement defining the authority, duties and responsibilities of the PIC.

(5) Duties and responsibilities of crew members other than the PIC

A statement defining the duties and responsibilities of crew members other than the PIC.

2.1.3 Operational control and supervision

(1) Supervision of the operation by the operator

A description of the system for supervision of the operation by the operator. This must show how the safety of flight operations and the qualifications of personnel are supervised. In particular, the procedures related to the following items must be described –

- (a) licence and qualification validity;
- (b) competence of operations personnel; and
- (c) control, analysis and storage of records, flight documents, additional information and data.

(2) System of promulgation of additional operational instructions and information

A description of any system for promulgating information which may be of an operational nature but is supplementary to that in the operations manual. The applicability of this information and the responsibilities for its promulgation must be included.

(3) Operational control

A description of the procedures and responsibilities necessary to exercise operational control with respect to flight safety.

2.1.4 Safety management system (SMS)

A description of the organisation of, roles and responsibilities of the personnel employed in, and policies and procedures associated with the safety management system. The description of the SMS may be contained in a separate manual depending upon the size and complexity of the operator.

2.1.5 Quality management system (QMS)

A description of the organisation of, roles and responsibilities of the personnel employed in, and policies and procedures associated with the QMS, which is normally integrated with the SMS. The description of the QMS may be contained in the SMS manual or a quality management manual (QMM) depending upon the size and complexity of the operator.

2.1.6 Flight crew composition

(1) Flight crew composition

An explanation of the method for determining flight crew compositions taking account of the following =

- (a) the type of aeroplane being used;
- (b) the area and type of operation being undertaken;
- (c) the phase of the flight;
- (d) the minimum flight crew requirement;
- (e) minimum flight time experience requirements, recency and qualification of the flight crew members; and

- (f) the designation of the PIC and, if necessitated by the duration of the flight, the procedures for the relief of the PIC or other members of the flight crew.

(2) Designation of the PIC

The method for designating one PIC for each flight.

(3) Flight crew incapacitation

Instructions on the succession of command in the event of flight crew incapacitation.

2.1.7 Qualification requirements

- (1) A description of the required licence, rating(s), qualification/competency (e.g. for routes and aerodromes), experience, training, checking and recency for operations personnel to conduct their duties. Consideration must be given to the aeroplane type, kind of operation and composition of the flight crew.

(2) Flight deck crew

- (a) Pilot-in-command;
- (b) Second-in-command, if applicable;
- (c) Pilot under supervision;
- (d) Cruise relief pilot, if applicable; and
- (e) Operation on more than one type or variant.

(3) Training, checking and supervision personnel

- (a) For flight deck crew
- (b) Other operations personnel.

2.1.8 Flight crew health precautions

Guidance to flight crew members concerning health including –

- (a) alcohol and other intoxicating liquor;
- (b) narcotics;
- (c) drugs;
- (d) sleeping tablets;
- (e) pharmaceutical preparations;
- (f) immunisation;
- (g) meal precautions prior to and during flight;
- (h) sleep and rest; and
- (i) surgical operations.

2.1.9 Flight time and duty period limitations

- (1) Flight time and duty period limitations and rest requirements

A description of the operator's approved flight time and duty period programme .

- (2) Provisions for exceeding flight time and duty period limitations and/or reductions of rest periods

Conditions under which flight time and duty periods may be exceeded or rest periods may be reduced and the procedures used to report these modifications.

2.1.10 Operating procedures

- (1) Flight preparation instructions

As applicable to the operation =

- (a) a description of the method of determination and application of minimum altitudes including –
 - (i) a procedure to establish the minimum altitudes/flight levels for VFR flights; and
 - (ii) a procedure to establish the minimum altitudes/flight levels for IFR flights;
- (b) criteria for determining the usability of aerodromes;
- (c) the method for establishing aerodrome operating minima for IFR flights in accordance with TS 91.07.5 of document SA-CATS 91. Reference must be made to procedures for the determination of the visibility and/or runway visual range and for the applicability of the actual visibility.
- (d) *en route* operating minima for IFR and VFR flights or VFR portions of a flight;
- (e) presentation and application of aerodrome and *en route* operating minima, including the increase of aerodrome operating minima in case of degradation of approach or aerodrome facilities;
- (f) interpretation of meteorological information, including explanatory material on the decoding of MET forecasts and MET reports relevant to the area of operations, including the interpretation of conditional expressions;
- (g) the methods by which the quantities of fuel, oil and water methanol to be carried, are determined and monitored in flight. This section must also include instructions on the measurement and distribution of the fluid carried on board. Such instructions must take account of all circumstances likely to be encountered on the flight, including the possibility of in-flight replanning and of failure of one or more of the aeroplane's power plants or loss of pressurisation. The system for maintaining fuel and oil records must also be described;
- (h) the general principles of mass and centre of gravity including –
 - (i) definitions;
 - (ii) methods, procedures and responsibilities for preparation and acceptance of mass and centre of gravity calculations;
 - (iii) the policy for using either standard and/or actual masses;
 - (iv) the method for determining the applicable passenger, baggage and cargo mass;

- (v) the applicable passenger and baggage masses for various types of operations and aeroplane type;
- (vi) general instruction and information necessary for verification of the various types of mass and balance documentation in use;
- (vii) last minute changes procedures;
- (viii) specific gravity of fuel, oil and water methanol; and
- (ix) seating policy/procedures;
- (i) procedures and responsibilities for the preparation and submission of the air traffic service flight plan. Factors to be considered include the means of submission for both individual and repetitive flight plans;
- (j) procedures and responsibilities for the preparation and acceptance of the operational flight plan. The content and use of the operational flight plan must be described
- (k) the responsibilities and the use of the operator's flight folio must be described. A technical log may be used in place of a flight folio, if it contains the required information; and
- (l) list of documents, forms and additional information to be carried.

(2) Ground handling instructions

As applicable to the operation –

- (a) a description of fuelling procedures, including –
 - (i) safety precautions during refuelling and defuelling including when an APU is in operation or when a turbine engine is running and the prop-brakes are on;
 - (ii) refuelling and defuelling when passengers are embarking, on board or disembarking ; and
 - (iii) precautions to be taken to avoid mixing fuels;
- (b) a description of the handling procedures to be used when allocating seats and embarking and disembarking passengers and when loading and unloading the aeroplane. Further procedures, aimed at achieving safety whilst the aeroplane is on the apron, must also be given. Handling procedures must include –
 - (i) disembarking of persons;
 - (ii) sick passengers and persons with reduced mobility;
 - (iii) transportation of inadmissible passengers, deportees or persons in custody;
 - (iv) permissible size and weight of hand baggage;
 - (v) loading and securing of items in the aeroplane;
 - (vi) special loads and classification of load compartments;
 - (vii) positioning of ground equipment;
 - (viii) operation of aeroplane doors;

- (ix) safety on the apron, including fire prevention, blast and suction areas;
 - (x) start-up, apron departure and arrival procedures;
 - (xi) servicing of aeroplanes;
 - (xii) documents and forms for aeroplane handling; and
 - (xiii) multiple occupancy of aeroplane seats;
- (c) procedures to ensure that persons who appear to be intoxicated or who demonstrate by manner or physical indications that they are under the influence of drugs, except medical patients under proper care, are refused embarkation;
- (d) a description of the de-icing and anti-icing policy and procedures for aeroplanes on the ground. These must include descriptions of the types and effects of icing and other contaminants on aeroplanes whilst stationary during ground movements and during take-off. In addition, a description of the fluid types used must be given including –
- (i) proprietary or commercial names;
 - (ii) characteristics;
 - (iii) effects on aeroplane performance;
 - (iv) hold-over times; and
 - (v) precautions during usage.

(3) Flight procedures

As applicable to the operation –

- (a) a description of the policy for allowing flights to be made under VFR, or of requiring flights to be made under IFR, or of changing from one to the other;
- (b) a description of all navigation procedures relevant to the type(s) and area(s) of operation and equipment required to operate therein. Consideration shall be given to –
 - (i) standard navigation procedures including policy for carrying out independent cross-checks of navigation data entries;
 - (ii) RVSM as contemplated in Technical Standard 91.04.34 in Document SA-CATS 91;
 - (iii) RNP, MNPS and POLAR navigation and navigation in other designated areas,
 - (iv) RNAV;
 - (v) in-flight replanning; and
 - (vi) procedures in the event of system degradation;
- (c) circumstances in which a radio listening watch is maintained;
- (d) instructions on –
 - (i) the use of normal checklists and the timing of such use;

- (ii) departure contingency procedures;
- (iii) altimeter setting procedures;
- (iv) altitude alerting system procedures;
- (v) stabilised approach procedure and the limitation on high rates of descent near the surface;
- (vi) the conduct of instrument approaches and the conditions required to commence or to continue an instrument approach;
- (vii) CRM procedures at night or in IMC;
- (e) TAWS procedures;
- (f) policy and procedures for the use of ACAS;
- (g) policy and procedures for in-flight fuel management;
- (h) procedures for reporting, operating in and/or avoiding potentially hazardous atmospheric conditions including –
 - (i) thunderstorms;
 - (ii) icing conditions;
 - (iii) turbulence;
 - (iv) windshear;
 - (v) jetstreams;
 - (vi) volcanic ash clouds;
 - (vii) heavy precipitation;
 - (viii) sand storms;
 - (ix) mountain waves; and
 - (x) significant temperature inversions;
- (i) wake turbulence separation criteria, taking into account aeroplane types, wind conditions and runway location;
- (j) procedures in the event that a decision to descend is taken while *en route*, covering –
 - (i) the necessity of giving the appropriate ATS unit prior warning of the situation and of obtaining a provisional descent clearance; and
 - (ii) the action to be taken in the event that communication with the ATS unit cannot be established or is interrupted.
- (k) the requirements for flight crew members to occupy their assigned stations or seats during the different phases of flight or whenever deemed necessary in the interests of aviation safety;

- (l) the requirements for flight crew members and passengers to use safety belts and/or harnesses during the different phases of flight or whenever deemed necessary in the interests of aviation safety;
 - (m) the conditions for the admission to the flight deck of persons other than the flight crew;
 - (n) the conditions and procedures for the use of vacant flight crew seats;
 - (o) procedures to be followed in the event of incapacitation of flight crew members in flight. Examples of the types of incapacitation and the means for recognising them, must be included;
 - (p) procedures covering –
 - (i) cabin preparation for flight, in-flight requirements and preparation for landing including procedures for securing cabin and galleys;
 - (ii) procedures to ensure that passengers are seated where, in the event that an emergency evacuation is required, they may best assist and not hinder evacuation from the aeroplane;
 - (iii) procedures to be followed during passenger embarkation and disembarkation;
 - (iv) procedures in the event of fuelling with passengers on board or embarking and disembarking; and
 - (v) smoking on board;
 - (q) the contents, means and timing of passenger briefing in accordance with CAR 91.07.20;
 - (r) lists of the survival and emergency equipment required for each route or area of operation and the procedures to ensure such equipment has been inspected and/or is functioning properly prior to departure;
 - (s) information and instructions relating to the interception of civil aircraft including –
 - (i) procedures for pilots-in-command of intercepted aircraft; and
 - (ii) visual signals for use by intercepting and intercepted aircraft; and
 - (t) if applicable to the aeroplane being operated, procedures for the use of required cosmic or solar radiation detection equipment and for recording its readings including actions to be taken in the event that limit values specified in the operations manual are exceeded.
- (4) All weather operations
 - (5) ETOPS procedures, including engine failure procedures and the nomination of alternate aerodromes
 - (6) Use of the minimum equipment and configuration deviation list(s)
 - (7) Development and use of standard operating procedures (SOPs) whether stand alone or as part of an aeroplane operating manual (AOM)
 - (8) With respect to non-revenue flights, procedures and limitations for –
 - (a) training flights;

- (b) test flights;
 - (c) delivery flights;
 - (d) ferry flights;
 - (e) demonstration flights; and
 - (f) positioning flights,
- including the kind of persons who may be carried on such flights.

(9) Oxygen requirements

- (a) An explanation of the conditions under which oxygen must be provided and used.
- (b) The oxygen requirements specified for –
 - (i) flight deck crew; and
 - (ii) passengers.

2.1.11 Dangerous goods and weapons

- (1) If applicable, information, instructions and general guidance on the conveyance of dangerous goods including –
 - (a) operator's policy on the conveyance of dangerous goods;
 - (b) guidance on the requirements for acceptance, labelling, handling, stowage and segregation of dangerous goods;
 - (c) procedures for responding to emergency situations involving dangerous goods;
 - (d) duties of all personnel involved in the conveyance of dangerous goods as referred to in a Part 92; and
 - (e) instructions on the carriage of the operator's employees.
- (2) The conditions under which weapons, munitions of war and sporting weapons may be carried.
- (3) For operators not authorised to convey dangerous goods, policies and procedures to create an awareness of dangerous goods.

2.1.12 Security

- (1) Security instructions and guidance of a non-confidential nature which must include the authority and responsibilities of operations personnel. Policies and procedures for handling and reporting crime on board such as unlawful interference, sabotage, bomb threats and hijacking must also be included.
- (2) An operator shall publish an on-board means of establishing and communicating discrete signals between crew members as a defense against air piracy without providing specific information with respect to the actual discrete communications.
- (3) A description of preventative security measures and training.

Note – Parts of the security instructions and guidance may be kept confidential.

2.1.13 Handling of aviation accidents and incidents

Procedures for the handling, notifying and reporting of aviation accidents and incidents. This section must include –

- (a) definitions of aviation accidents and incidents and the relevant responsibilities of all persons involved;
- (b) the description of which operator departments, authorities or other institutions have to be notified by which means and in which sequence in case of an aviation accident;
- (c) special notification requirements in the event of an aviation accident or incident when dangerous goods are being carried;
- (d) a description of the requirements to report specific aviation accidents and incidents;
- (e) the forms used for reporting and the procedure for submitting them to the relevant authority must also be included; and
- (f) if the operator develops additional safety related reporting procedures for its own internal use, a description of the applicability and related forms to be used.

2.2 PART 2: AEROPLANE OPERATING MATTERS – TYPE RELATED

Taking account of the differences between types and variants of types under the following headings –

2.2.1 General information and units of measurement

General information (e.g. aeroplane dimensions), including a description of the units of measurement used for the operation of the aeroplane type concerned and conversion tables.

2.2.2 Limitations

A description of the certified limitations and the applicable operational limitations including –

- (a) certification status;
- (b) passenger seating configuration for each aeroplane type including a pictorial presentation;
- (c) types of operation that are approved (e.g. IFR/VFR, CAT II/III, flights in known icing conditions, etc);
- (d) flight crew composition;
- (e) mass and centre of gravity;
- (f) speed limitations;
- (g) flight envelope(s);
- (h) wind limits including operations on contaminated runways;
- (i) performance limitations for applicable configurations;
- (j) runway slope;

- (k) limitations on wet or contaminated runways;
- (l) airframe contamination; and
- (m) system limitations.

2.2.3 Normal procedures

The normal procedures and duties assigned to the flight crew and the appropriate check-lists and the system for use of the checklists. The following normal procedures and duties must be included –

- (a) pre-flight;
- (b) pre-departure;
- (c) altimeter setting and checking;
- (d) taxi, take-off and climb;
- (e) noise abatement;
- (f) cruise and descent;
- (g) approach, landing preparation and briefing;
- (h) VFR/VMC approach;
- (i) instrument approach;
- (j) visual approach and circling;
- (k) missed approach;
- (l) normal landing;
- (m) post landing; and
- (n) operation on wet and contaminated runways.

2.2.4 Abnormal, emergency and supplementary procedures

The abnormal, emergency and supplementary procedures and duties assigned to crew members, the appropriate check-lists and the system for use of the check-lists. The following abnormal and emergency procedures and duties shall, if applicable, be included –

- (a) flight crew incapacitation;
- (b) fire and smoke drills;
- (c) unpressurised and partially pressurised flight;
- (d) exceeding structural limits such as overweight landing;
- (e) exceeding cosmic radiation limits;
- (f) lightning strikes;
- (g) distress communications and alerting ATC to emergencies;

- (h) engine failure;
- (i) system failures;
- (j) guidance for diversion in case of serious technical failure;
- (k) ground proximity warning;
- (l) ACAS warning;
- (m) windshear;
- (n) emergency landing/ditching; and
- (o) emergency evacuation.

2.2.5 Performance

- (1) Performance data must be provided in a form in which it can be used without difficulty.
- (2) Performance material which provides the necessary data for compliance with the performance requirements prescribed in Sub-part 8 of this Part must be included to allow the determination of –
 - (a) maximum crosswind and tailwind components and the reductions to be applied to these values having regard to gusts, low visibility, runway surface conditions, crew experience, abnormal or emergency circumstances or any other relevant operational factors;
 - (b) take-off climb limits – mass, altitude, temperature;
 - (c) take-off field length (dry, wet, contaminated);
 - (d) net flight path data for obstacle clearance calculation or, where applicable, take-off flight path;
 - (e) the gradient losses for banked climbouts;
 - (f) *en route* climb limits;
 - (g) approach climb limits;
 - (h) landing climb limits;
 - (i) landing field length (dry, wet, contaminated) including the effects of an in-flight failure of a system or device, if it affects the landing distance;
 - (j) brake energy limits; and
 - (k) speeds applicable for the various flight stages (also considering wet or contaminated runways).
- (3) Supplementary data covering flights in icing conditions, in consideration of –
 - (a) any certificated performance related to an allowable configuration, or configuration deviation, such as anti-skid inoperative, must be included; and
 - (b) if performance data, as required for the appropriate performance class, is not available in the approved AFM, then other data acceptable to the Director must be included.

Alternatively, the operations manual may contain cross-reference to the approved data contained in the AFM where such data is not likely to be used often or in an emergency.

- (4) Additional performance data, where applicable, including –
 - (a) all engine climb gradients;
 - (b) drift-down data;
 - (c) effect of de-icing/anti-icing fluids;
 - (d) flight with landing gear down;
 - (e) for aeroplanes with 3 or more engines, one engine inoperative ferry flights; and
 - (f) flights conducted under the provisions of the CDL.

2.2.6 Flight planning

- (1) Data and instructions necessary for pre-flight and in-flight planning, including factors such as speed schedules and power settings. Where applicable, procedures for engine(s)-out operations, ETOPS and flights to isolated aerodromes must be included.
- (2) The method for calculating fuel needed for the various stages of flight in accordance with TS 135.07.26.

2.2.7 Mass and balance

Instructions and data for the calculation of the mass and balance including –

- (a) calculation system (e.g. index system);
- (b) information and instructions for completion of mass and balance documentation, including manual and computer generated types;
- (c) limiting masses and centre of gravity of the various versions; and
- (d) dry operating mass and corresponding centre of gravity or index.

2.2.8 Loading

Procedures and provisions for loading and securing the load in the aeroplane.

2.2.9 Configuration deviation list (CDL)

The company approved procedures for the use of a CDL, if provided by the manufacturer, taking account of the aeroplane types and variants operated including procedures to be followed when an aeroplane is being dispatched under the terms of its CDL.

2.2.10 Minimum equipment list (MEL)

The company procedures for the use of an approved MEL taking account of the aeroplane types and variants operated and the type(s)/area(s) of operation.

2.2.11 Survival and emergency equipment including oxygen

- (1) A list of the survival equipment to be carried for the routes to be flown and the procedures for checking the serviceability of this equipment prior to take-off. Instructions regarding the location, accessibility and use of survival and emergency equipment and its associated check lists(s) must also be included.
- (2) The procedure for determining the amount of oxygen required and the quantity that is available. The flight profile, number of occupants and possible cabin decompression must be considered. The information provided must be in a form in which it can be used without difficulty.

2.2.12 Emergency evacuation procedures

- (1) Instructions for preparation for emergency evacuation including flight crew coordination and emergency station assignment.
- (2) A description of the duties of all members of the flight crew for the rapid evacuation of an aeroplane and the handling of the passengers in the event of a forced landing, rejected take-off, ditching or other emergency.

2.2.13 Aeroplane systems

A description of the aeroplane systems, related controls and indications and operating instructions.

2.3 PART 3: ROUTE AND AERODROME INSTRUCTIONS AND INFORMATION

Instructions and information relating to communications, navigation and aerodromes including minimum flight levels and altitudes for each route to be flown and operating minima for each aerodrome planned to be used, including –

- (a) minimum flight level/altitude;
- (b) operating minima for departure, destination and alternate aerodromes;
- (c) communication facilities and navigation aids;
- (d) runway data and aerodrome facilities;
- (e) approach, missed approach and departure procedures including noise abatement procedures;
- (f) COM-failure procedures;
- (g) search and rescue facilities in the area over which the aeroplane is to be flown;
- (h) a description of the aeronautical charts that must be carried on board in relation to the type of flight and the route to be flown, including the method to check their validity;
- (i) availability of aeronautical information and MET services; and
- (j) *en route* COM/NAV procedures including holding.

2.4 PART 4: TRAINING

- (1) Training syllabi and checking programmes for all flight crew members and operations personnel other than flight crew members who are assigned to duties in connection with the preparation and/or conduct of a flight.
- (2) Training syllabi and checking programmes shall include –
 - (a) for flight crew members, all relevant items prescribed in Part 61 and Subpart 3 of this Part; and
 - (b) for operations personnel other than flight crew members, all relevant items pertaining to their duties as specified in Subpart 3 of this Part.
- (3) Procedures –
 - (a) for training and checking;
 - (b) to be applied in the event that personnel do not achieve or maintain the required standards; and
 - (c) to ensure that abnormal or emergency situations requiring the application of part or all of abnormal or emergency procedures and simulation of IMC by artificial means, are not simulated during commercial flights.
- (4) Description of documentation to be stored and storage periods.

135.04.3 STANDARD OPERATING PROCEDURES

1. Standard operating procedures contents

- (1) SOPs shall contain the detailed procedures to be followed by flight crew members in the conduct of aeroplane normal, abnormal or emergency operations with particular emphasis on the interaction between crew members (crew resource management). SOPs shall not be contrary to any information or procedure included in the aeroplane flight manual (AFM). Required information, if contained in another publication carried on board the aeroplane during flight, need not be repeated in the SOP. The SOP shall include, as a minimum, the following as applicable to the operation –
 - (a) normal procedures, including –
 - (i) communications procedures;
 - (ii) crew coordination;
 - (iii) use of check lists;
 - (iv) standard briefings;
 - (v) standard calls;
 - (vi) ramp/gate procedures;
 - (vii) battery/APU engine starts;
 - (viii) taxi;
 - (ix) rejected take-off;
 - (x) take-off and climb;

- (xi) cruise;
 - (xii) descent;
 - (xiii) instrument procedures, including holdings, approaches in IMC, visual, VFR and circling;
 - (xiv) landing;
 - (xv) missed approaches and balked landings procedures;
 - (xvi) stall recovery;
 - (xvii) fuelling with passengers onboard, if not provided elsewhere in the company operations manual system;
 - (xviii) use of onboard navigation and alerting aids; and
 - (xix) mass and balance control procedures;
- (b) abnormal and emergency procedures, as applicable to the aeroplane type, including –
- (i) planned and unplanned;
 - (ii) pilot incapacitation;
 - (iii) two-challenge rule;
 - (iv) bomb threat and hijacking;
 - (v) engine fire/failure/shutdown;
 - (vi) systems failures;
 - (vii) propeller over speed;
 - (viii) fire, internal/external;
 - (ix) smoke removal;
 - (x) rapid decompression;
 - (xi) flapless approach and landing;
 - (xii) any inadvertent encounter with moderated to severe in-flight icing;
- (c) diagrams or other form of describing –
- (i) normal take-off;
 - (ii) engine out take-off;
 - (iii) precision approach, all engines operating;
 - (iv) precision approach, engine out;
 - (v) non-precision approach, all engines operating;
 - (vi) non-precision approach, engine out;
 - (vii) go-around, all engines operating;
 - (viii) go-around, engine out;
 - (ix) VFR circuits;
 - (x) partial flaps/slats approach; and
 - (xi) flapless approach.
- (2) The operator shall submit its SOPs and any amendments thereto to the Director for technical evaluation.

2. Aeroplane operating manual

- (1) An operator wishing to use an aeroplane operating manual (AOM) shall design it with human factors principles in mind. Where there are significant differences in equipment and procedures between aeroplanes of the same type operated, the AOM shall show the registration mark of the aeroplane to which it is applicable. At least the following information for each type of aeroplane operated shall be included –
 - (a) table of contents;
 - (b) list of effective pages;
 - (c) amending procedure;
 - (d) preamble;
 - (e) the checklists and SOPs to be used by the flight crew members;
 - (f) such details of the aeroplane's systems from the aircraft flight manual (AFM) as may be required for the purposes of the AOM; and
 - (g) the aeroplane performance data and limitations specified in the AFM. Such information shall be clearly identified as AFM data.
- (2) The operator shall submit its AOM and any amendments thereto to the Director for technical evaluation.
- (3) An operator using an AOM need not carry an AFM if sufficient information from the AFM to safely operate the aeroplane is contained in the AOM or is otherwise available to the flight crew during flight time.

135.04.5 OPERATIONAL FLIGHT PLAN

1. Types of operational flight plans

Although each flight must be released in accordance with the provisions of an OFP/flight release, the actual OFP should be appropriate to the type of flight being undertaken. An operator must publish in its operations manual a description, whether computer or manually generated, of the different OFPs used by the operator and include instructions as to the preparation, acceptance, flight and ground management of the OFP and the procedures for retention.

- (2) The contents of an OFP are based on the different types of flights undertaken by operators under this Part, each of which have varying needs with respect to flight planning for revenue flight operations. Accordingly –
- (a) a full OFP as specified in section 2(1) is required for –
 - (i) all international flight operations; and
 - (ii) IFR operations;
 - (b) an OFP consisting of at least those items indicated by a single asterisk in section 2(1) is required for day or night VFR operations using –
 - (i) multi-engine aeroplanes; and
 - (ii) single-engine aeroplanes with a maximum certificated passenger seating in excess of 9;
 - (c) an OFP consisting of at least those items listed in section 2(2) may, in lieu of the OFP prescribed in paragraph (2)(a) or (2)(b), as applicable, be used by an operator conducting a series of flights, that meet the following criteria –
 - (i) the series of flights shall not result in flight time longer than 90 minutes in total;
 - (ii) no individual sector shall be longer than 30 minutes; and
 - (iii) the time spent on the ground at each *en route* stop shall not exceed 30 minutes; and
 - (d) an informal OFP, being either an ATC flight plan or equivalent record left with the operator for flight following, is required for day or night VFR operations using single-engine aeroplanes with a maximum certificated passenger seating of 9 or less.

2. Operational flight plans

- (1) The minimum required content of an OFP is as follows but each field shall be considered as applicable to the type of flight, the type of aeroplane and the type of operational control system (OCS) to which the OFP applies –

Note – Asterisks by an item indicate information required for the OFP specified in section 1(2)(c) of this TS.

- (a)*operator's name;
- (b)*date and ETD at points of departure and ETA at destinations;
- (c)*aeroplane registration or aeroplane tail number, as applicable;
- (d)*aeroplane type and model or variant, as applicable;
- (e) flight number, as applicable;

- (f)* flight crew members' names and, unless recorded elsewhere, assigned position;
- (g)* flight operations officer's name if flight is not pilot self-dispatch;
- (h)* number of passengers on board, as amended by final load figures, unless recorded elsewhere;
- (i)* departure aerodrome;
- (j)* destination aerodrome;
- (k) alternate aerodrome, as applicable, including *en route* alternates where required;
- (l) routing to destination by successive navigational way points, including associated tracks and distances for each;
- (m) routing to alternate aerodrome, including associated tracks and distances, if applicable;
- (n) specification of any way points *en route* to satisfy special operations requirements (ETOPS, etc.);
- (o) planned cruise altitudes to destination and alternate, as applicable, and minimum safe altitudes along planned routes;
- (p) planned cruise indicated air speed or mach number, as applicable, true air speed and ground speed or wind component during cruise;
- (q) winds at planned cruise altitude (expressed in terms of direction/velocity or as a component/drift angle);
- (r)* estimated time *en route* (if broken down into way point time components, a total shall be specified);
- (s) time from destination to alternate, as applicable;
- (t) distance to destination (if broken down into way point distance components, a total shall be specified);
- (u) distance from destination to alternate, as applicable;
- (v) fuel burn *en route* and from destination to alternate;
- (w) record of in-flight fuel checks completed in accordance with regulation 135.07.26(4);
- (x)* fuel computation breakdown required for the type of flight plan for, as applicable, –
 - (i) taxi;
 - (ii)* destination;
 - (iii) alternate;
 - (iv) holding reserve;
 - (v) *en route* reserve, as applicable;

- (vi)* contingency fuel, as applicable; and
 - (vii)* the fuel on board when starting engines (entered by flight crew), unless recorded elsewhere; and
- (y)* mass and balance showing –
- (i)* total planned fuel on board;
 - (ii) zero fuel weight; and
 - (iii)* planned maximum take-off weight and C of G location or trim position, as applicable.
- (2) The minimum required content of an OFP used for a series of flights as prescribed in section 1(2)(c) is as follows –
- (a) operator's name;
 - (b) date;
 - (c) aeroplane registration or aeroplane tail number, as applicable;
 - (d) aeroplane type and model or variant, as applicable;
 - (e) flight crew members' names and, unless recorded elsewhere, assigned position;
 - (f) number of passengers on board for each sector, unless recorded elsewhere;
 - (g) departure aerodrome;
 - (h) *en route* stops;
 - (i) final destination aerodrome;
 - (j) alternate aerodrome (only one needs be specified for the entire series of flights);
 - (k) total estimated time *en route*;
 - (l) time from final destination to alternate;
 - (m) sector safe altitude for each IFR sector, if applicable;
 - (n) total fuel required for the entire series of flights based on fuel required –
 - (i) for all taxiing;
 - (ii) to reach each *en route* stop and final destination;
 - (iii) to the alternate, if applicable;
 - (iv) for holding reserve, if applicable;
 - (v) for *en route* reserve, as applicable; and
 - (vi) for contingency fuel, as applicable; and

- (n) the fuel on board when starting engines (entered by flight crew), unless recorded elsewhere.
- (3) The format of a full OFP shall allow the crew to record the fuel state and the progress of the flight relative to the plan. The OFP may be computer-generated or produced manually, working from charts and tables, by the flight crew. When an OFP is prepared manually, an approved form displaying the requisite information and providing the necessary space to make flight following entries as the flight progresses shall be used.
- (4) The operator shall specify in its company operations manual how formal acceptance of the OFP by the PIC shall be recorded. Such acceptance procedure shall signify that the PIC is satisfied the OFP is suitable for use and meets regulatory requirements.

135.04.8 TRAINING RECORDS

1. Training records

- (1) Every operator shall, for each person who is required to receive training in terms of Sub Part 3, establish and maintain a record of –
 - (a) the person's name and, where applicable, personnel licence number, type and ratings or validation of foreign licence, if applicable;
 - (b) if applicable, the person's medical category and the expiry date of that category;
 - (c) the dates on which the person, while in the operator's employ, successfully completed any training, pilot proficiency check (PPC) or competency check (CC), examination or other crew member skills test required in terms of Subpart 3 or obtained any qualification required in terms of Part 61 or this TS;
 - (d) the report of any check or skills test completed;
 - (e) information relating to any failure of the person, while in the operator's employ, to successfully complete any training, PPC or examination required in terms of Subpart 3 or to obtain any qualification required in terms of Part 61 or this TS;
 - (f) the type of aircraft or flight training equipment used for any training, PPC, line check or qualification required under this Subpart; and
 - (g) any certificate required to be kept in terms of Subpart 3.
- (2) An operator shall maintain a system for recording the qualifications and training of instructional and examining staff, as appropriate.
- (3) An operator shall retain a copy of the most recent written examination completed by each person for each type of aircraft, where applicable, for which the person has a qualification.

- (4) An operator shall retain the records referred to in paragraphs (1)(c) and (d) and a record of each PPC for at least three years.
- (5) An operator shall retain any certificate referred to in paragraph (1)(g) for at least 90 days beyond the duration of its validity period.

135.04.9 LOAD AND TRIM SHEET

1. Load and trim sheet

- (1) The load and trim sheet must contain the following information –
 - (a) the aeroplane registration and type;
 - (b) the flight identification number and date;
 - (c) the identity of the pilot-in-command;
 - (d) the identity of the person who prepared the document;
 - (e) the dry operating mass and the corresponding CG of the aeroplane;
 - (f) the mass of the fuel at take-off and the mass of trip fuel;
 - (g) the mass of consumables other than fuel;
 - (h) the components of the load including passengers, baggage, freight and ballast;
 - (i) the take-off mass, landing mass and zero fuel mass;
 - (j) the load distribution;
 - (k) the applicable aeroplane CG positions; and
 - (l) the limiting mass and CG values.
- (2) The person superintending the loading of an aeroplane must certify that the load distribution is in accordance with the requirements prescribed in the operations manual or flight manual and that the maximum certificated mass has not been exceeded.
- (3) The load and trim sheet must be signed by the pilot-in-command (PIC) prior to departure unless the load and trim sheet is sent to the aeroplane by electronic data transfer, in which case the PIC shall ensure it has been reviewed and he or she is satisfied the flight is safe for departure. The means by which the PIC certifies acceptance of the load and trim sheet shall be published in the company operations manual.
- (4) A copy of the final load and trim sheet, as accepted by the pilot-in-command, must be available at a location on the ground as determined by the operator.

135.05.9 FLIGHT RECORDERS

1. Flight recorders - General

- (1) Flight recorders comprise four systems –

- (a) a flight data recorder (FDR);
 - (b) a cockpit voice recorder (CVR);
 - (c) an airborne image recorder (AIR); and
 - (d) a data link recorder (DLR).
- (2) Lightweight flight recorders comprise four systems –
- (a) an aircraft data recording system (ADRS);
 - (b) a cockpit audio recording system (CARS);
 - (c) an airborne image recording system (AIRS); and
 - (d) a data link recording system (DLRS).

Note – Image and data link information may be recorded on either the CVR, FDR, CARS or the ADRS.

2. Flight recorder installation

Each flight recorder installed in the aeroplanes specified in this technical standard shall, in accordance with the requirements of the manufacturer or organisation responsible for its installation, as applicable, be located and installed in such a manner that maximum practicable protection is provided, in order that, in the event of an accident or incident, the recorded data may be recovered in a preserved and intelligible state.

3. Crashworthiness and fire protection specifications

- (1) FDR, CVR, AIRS and DLRS performance requirements and industry crashworthiness and fire protection specifications are as contained in the EUROCAE ED-112, Minimum Operational Performance Specification (MOPS) for Crash Protected Airborne Recorder Systems, or equivalent documents.
- (2) ADRS and CARS performance requirements and industry crashworthiness and fire protection specifications are as contained in the EUROCAE ED-155, Minimum Operational Performance Specification (MOPS) for Lightweight Flight Recorder Systems, or equivalent documents.

4. Inspections of flight recorders

- (1) Prior to the first flight of the day, the built-in test features on the flight deck for the CVR, FDR and Flight Data Acquisition Unit (FDAU), when installed, shall be monitored.
- (2) Annual inspections shall be carried out as follows –
 - (a) the read-out of the recorded data from the FDR and CVR should confirm that the recorder operates correctly for the nominal duration of the recording;
 - (b) the analysis of the FDR should evaluate the quality of the recorded data to determine whether the bit error rate is within acceptable limits and to determine the nature and distribution of the errors;
 - (c) a complete flight from the FDR should be examined in engineering units to evaluate the validity of all recorded parameters. Particular attention should be given to parameters from

sensors dedicated to the FDR. Parameters taken from the aircraft's electrical bus system need not be checked if their serviceability can be detected by other aircraft systems;

- (d) the read-out facility should have the necessary software to accurately convert the recorded values to engineering units and to determine the status of discrete signals;
 - (e) an annual examination of the recorded signal on the CVR should be carried out by re-play of the CVR recording. While installed in the aircraft, the CVR should record test signals from each aircraft source and from relevant external sources to ensure that all required signals meet intelligibility standards; and
 - (f) where practicable, during the annual examination, a sample of in-flight recordings of the CVR should be examined for evidence that the intelligibility of the signal is acceptable.
- (3) The results of the annual inspections shall be recorded and retained for a period of five years calculated from the date of such check.
 - (4) Flight recorder systems should be considered unserviceable if there is a significant period of poor quality data, unintelligible signals or if one or more of the mandatory parameters is not recorded correctly.
 - (5) When requested, a report of the annual inspection should be made available to the Director for monitoring purposes.
 - (6) Calibration of the FDR-system –
 - (a) the FDR-system shall be recalibrated at least every five years to determine any discrepancies in the engineering conversion routines for the mandatory parameters and to ensure that parameters are being recorded within the calibration tolerances; and
 - (b) when the parameters of altitude and airspeed are provided by sensors that are dedicated to the FDR system, a recalibration shall be performed as recommended by the sensor manufacturer or at least every two years.

5. Flight recorder specifications

All digital flight recorders shall comply with one of the following specifications as applicable –

- (a) ARINC 542A;
- (b) ARINC 573-717;
- (c) ARINC 717; or
- (d) ICAO Annex 6, Part I, Appendix 7.

6. Combination recorders

- (1) All aeroplanes of a maximum certificated take-off mass of over 15 000 kg for which the type certificate is first issued on or after 1 January 2016 and which are required to be equipped with both a CVR and an FDR, shall be equipped with two combination recorders (FDR/CVR).
- (2) Aeroplanes fitted with combination flight data and aural recorders shall, as far as practicable, locate one recorder close to the cockpit and the other as far aft as possible.

7. Airborne image recorder

(1) Airborne image recorders (AIR) are classified as follows –

- (a) a Class A AIR captures the general cockpit area in order to provide data supplemental to conventional flight recorders;

Note — To respect crew privacy, the cockpit area view may be designed as far as practical to exclude the head and shoulders of crew members whilst seated in their normal operating position.

- (b) a Class B AIR captures data link message displays; and

- (c) a Class C AIR captures instruments and control panels.

Note.— A Class C AIR may be considered as a means for recording flight data where it is not practical or is prohibitively expensive to record on an FDR or where an FDR is not required.

(2) For aeroplanes equipped with an AIR, the AIR shall start to record prior to the aeroplane moving under its own power and record continuously until the termination of the flight when the aeroplane is no longer capable of moving under its own power. In addition, depending on the availability of electrical power, the AIR must start to record as early as possible during the cockpit checks prior to engine start at the beginning of the flight until the cockpit checks immediately following engine shutdown at the end of the flight.

8. Aircraft data recording systems

(1) Operators of aircraft using aircraft data recording systems (ADRS) shall ensure the ADRS is capable of recording, as appropriate to the aeroplane, at least the essential (E) parameters in the following table –

PARAMETERS FOR AIRCRAFT DATA RECORDER SYSTEMS

Serial number	Parameter Category	and Minimum recording range	Maximum recording interval (seconds)	Minimum recording accuracy	Minimum recording resolution	Remarks
1	Heading (magnetic or true) R*	±180 degrees	1	±2 degrees	0.5 degree	* If not available, record rates
2	Pitch attitude E*	±90 degrees	0.25	±2 degrees	0.5 degree	* If not available, record rates
3	Roll attitude E*	±180 degrees	0.25	±2 degrees	0.5 degree	* If not available, record rates
4	Yaw rate	±300 degrees	0.25	±1% + drift of	2 degrees	*Essential

	E*			360°/hr		if no heading available
5	Pitch rate E*	±300 degrees	0.25	±1% + drift of 360°/hr	2 degrees	*Essential if no pitch attitude available
6	Roll rate E*	±300 degrees	0.25	±1% + drift of 360°/hr	2 degrees	*Essential if no roll attitude available
7	Positioning system : latitude/longitude E	Latitude:±90 degrees Longitude:±180 degrees	2 (1 if available)	As installed (0.00015 degree recommended)	0.00005 degree	
8	Positioning system : estimated error E*	Available range	2 (1 if available)	As installed	As installed	*If available
9	Positioning system : altitude E	-300 m (-1 000 ft) to maximum certificated altitude of aircraft + 1 500 m (5 000 ft)	2 (1 if available)	As installed (±50 ft (±15 m) recommended)	5 ft (1.5 m)	
10	Positioning system : time* E	24 hrs	1	±.5 second	0.1 second	* UTC time preferred where available
11	Positioning system : ground speed E	0 – 1 000 kt	2 (1 if available)	As installed (±5 kt recommended)	1 kt	
12	Positioning system : channel E	0 – 360 degrees	2 (1 if available)	As installed (±2 degrees recommended)	0.5 degree	
13	Normal acceleration E	-3 g to +6 g	0.25 (0.125 if available)	As installed (± 0.09 g excluding a datum error of ±0.45 g recommended)	0.004g	
14	Longitudinal acceleration E	±1 g	0.25 (0.125 if available)	As installed (±0.015 g excluding a	0.004g	

				datum error of ±0.05 g recommended)		
15	Lateral acceleration E	±1 g	0.25 (0.125 if available)	As installed (±0.015 g excluding a datum error of ±0.05 g recommended)	0.004g	
16	External static pressure (or pressure altitude) R	34.4 mb (3.44 in-Hg) to 310.2 mb (31.02 in- Hg) or available sensor range	1	As installed (±1 mb (0.1 in- Hg) or ±100 ft (±30 m) to ±700 ft (±210 m) recommended)	0.1 mb (0.01 in- Hg) or 5 ft (1.5 m)	
17	Outside air temperature (or total air temperature) R	-50° to +90°C or available sensor range	2	As installed (±2°C recommended)	1°C	
18	Indicated air speed R	As the installed pilot display measuring system or available sensor range	1	As installed (±3 % recommended)	1 kt (0.5 kt recommended)	
19	Engine RPM R	Full range including overspeed condition	Each engine each second	As installed	0.2% of full range	
20	Engine oil pressure R	Full range	Each engine each second	As installed (5% of full range recommended)	2% of full range	
21	Engine oil temperature R	Full range	Each engine each second	As installed (5% of full range recommended)	2% of full range	
22	Fuel flow or pressure R	Full range	Each engine each second	As installed	2% of full range	

23	Manifold pressure R	Full range	Each engine each second	As installed	0.2% of full range	
24	Engine thrust/power/torque parameters required to determine propulsive thrust/power* R	Full range	Each engine each second	As installed	0.2% of full range	* Sufficient parameters e.g. EPR/N1 or torque/Np as appropriate to the particular engine shall be recorded to determine power in both normal and reverse thrust. A margin for possible overspeed should be provided.
25	Engine gas speed generator (Ng) R	0 – 150%	Each engine each second	As installed	0.2% of full range	
26	Free power turbine speed (Nf) R	0 – 150%	Each engine each second	As installed	0.2% of full range	
27	Coolant temperature R	Full range	1	As installed (±5° C recommended)	1°C	
28	Main voltage R	Full range	Each engine each second	As installed	1 Volt	
29	Cylinder head temperature R	Full range	Each engine each second	As installed	2% of full range	

30	Flaps position R	Full range or each discrete position	2	As installed	0.5 degree	
31	Primary flight control surface position R	Full range	0.25	As installed	0.2% of full range	
32	Fuel quantity R	Full range	4	As installed	1% of full range	
33	Exhaust gas temperature R	Full range	Each engine each second	As installed	2% of full range	
34	Emergency voltage R	Full range	Each engine each second	As installed	1 Volt	
35	Trim surface position R	Full range or each discrete position	1	As installed	0.3% of full range	
36	Landing gear position R	Each discrete position*	1	Each gear every two seconds		* Where available, record up- and-locked and down- and-locked position
37	Novel/unique aircraft features R	As required	As required	As required	As required	

(2) Documentation concerning parameter allocation, conversion equations, periodic calibration and other serviceability/maintenance information shall be maintained by the operator. The documentation needs to be sufficient to ensure that accident investigation authorities have the necessary information to read out the data in engineering units.

(3) The documentation referred to in paragraph (2) shall be in electronic format where possible and take account of industry standards.

Note.— Industry specification for documentation concerning flight recorder parameters may be found in the ARINC 647A, Flight Recorder Electronic Documentation, or equivalent document.

135.05.10 FLIGHT DATA RECORDERS

1. Aeroplanes for which flight data recorders are required

An operator shall ensure any aeroplane operated in a commercial air transport operation is equipped with a flight data recorder (FDR) in accordance with the following table –

CRITERIA FOR FDR REQUIREMENTS

Group	Initial C of A or Type Certificate ¹	Maximum Mass (kg)	Propulsion System	FDR T.A.A. A+H ²	FDR TYPE 1	FDR TYPE 1A	FDR TYPE II	Class C AIR	ADRS
1	C of A on or after 1 January 1989	>27 000	All		X				
2	C of A on or after 1 January 1989	>5 700 to ≤27 000	All				X		
3	C of A on or after 1 January 1987 to before 1 January 1989 ³	>5 700	Turbine	X					
4	TC after 30 September 1969 and C of A on or after 1 January 1987 to before 1 January 1989	>27 000	Turbine				X		
5	C of A before 1 January 1987	>5 700	Turbine	X					
6	C of A after 1 January 2005	>5 700	All			X			
7	C of A on or after 1 January 2016	≤5 700	Turbine				X ⁴	X ⁴	X ⁴

Notes

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1. Based on date of initial issue, not the date of certification of particular aeroplane variants or derivative models.

2. *FDR T.A.A.A+H means a FDR that records time, altitude, airspeed, normal acceleration and heading.*
3. *Except for aeroplanes covered under Group 4.*
4. *The recording system may be any one of these.*

2. FDR Parameters

- (1) A Type IA FDR shall be capable of recording, as appropriate to the aeroplane, at least the 78 parameters in the table in paragraph (10).
- (2) A Type I FDR shall be capable of recording, as appropriate to the aeroplane, at least the first 32 parameters in the table in paragraph (10).
- (3) Type II and IIA FDRs shall be capable of recording, as appropriate to the aeroplane, at least the first 16 parameters in the table in paragraph (10). In addition, a Type IIA FDR shall retain sufficient information from the preceding take-off for calibration purposes.
- (4) The parameters that satisfy the requirements for FDRs are listed in the paragraphs below. The number of parameters to be recorded shall depend on aeroplane complexity. The parameters without an asterisk (*) are mandatory parameters which shall be recorded regardless of aeroplane complexity. In addition, the parameters designated by an asterisk (*) shall be recorded if an information data source for the parameter is used by aeroplane systems or the flight crew to operate the aeroplane. However, other parameters may be substituted with due regard to the aeroplane type and the characteristics of the recording equipment.
- (5) The following parameters satisfy the requirements for flight path and speed –
 - (a) pressure altitude;
 - (b) indicated airspeed or calibrated airspeed;
 - (c) air-ground status and each landing gear air-ground sensor when practicable;
 - (d) total or outside air temperature;
 - (e) heading (primary flight crew reference);
 - (f) normal acceleration;
 - (g) lateral acceleration;
 - (h) longitudinal acceleration (body axis);
 - (i) time or relative time count;
 - (j) navigation data* (drift angle, wind speed, wind direction, latitude/longitude, groundspeed*);
and
 - (k) radio altitude*.
- (6) The following parameters satisfy the requirements for attitude –
 - (a) pitch attitude;

- (b) roll attitude;
 - (c) yaw or sideslip angle*; and
 - (d) angle of attack*.
- (7) The following parameters satisfy the requirements for engine power –
- (a) engine thrust/power (propulsive thrust/power on each engine, cockpit thrust/power lever position);
 - (b) thrust reverse status*;
 - (c) engine thrust command*;
 - (d) engine thrust target*;
 - (e) engine bleed valve position*; and
 - (f) additional engine parameters* (EPR, N1, indicated vibration level, N2, EGT, TLA, fuel flow, fuel cut-off lever position, N3).
- (8) The following parameters satisfy the requirements for configuration –
- (a) pitch trim surface position;
 - (b) flaps* (trailing edge flap position, cockpit control selection);
 - (c) slats* (leading edge flap (slat) position, cockpit control selection);
 - (d) landing gear* (landing gear, gear selector position);
 - (e) yaw trim surface position*;
 - (f) roll trim surface position*;
 - (g) cockpit trim control input position pitch*;
 - (h) cockpit trim control input position roll*;
 - (i) cockpit trim control input position yaw*;
 - (j) ground spoiler and speed brake* (ground spoiler position, ground spoiler selection, speed brake position, speed brake selection);
 - (k) de-icing and/or anti-icing systems selection*;
 - (l) hydraulic pressure (each system)*;
 - (m) fuel quantity in CG trim tank*;
 - (n) AC electrical bus status*;
 - (o) DC electrical bus status*;
 - (p) APU bleed valve position*; and
 - (q) computed centre of gravity*.

- (9) The following parameters satisfy the requirements for operation –
- (a) warnings;
 - (b) primary flight control surface and primary flight control pilot input (pitch axis, roll axis, yaw axis);
 - (c) marker beacon passage;
 - (d) each navigation receiver frequency selection;
 - (e) manual radio transmission keying and CVR/FDR synchronization reference;
 - (f) autopilot/autothrottle/AFCS mode and engagement status*;
 - (g) selected barometric setting* (pilot, first officer);
 - (h) selected altitude (all pilot selectable modes of operation)*;
 - (i) selected speed (all pilot selectable modes of operation)*;
 - (j) selected mach (all pilot selectable modes of operation)*;
 - (k) selected vertical speed (all pilot selectable modes of operation)*;
 - (l) selected heading (all pilot selectable modes of operation)*;
 - (m) selected flight path (all pilot selectable modes of operation)* (course/DSTRK, path angle);
 - (n) selected decision height*;
 - (o) EFIS display format* (pilot, first officer);
 - (p) multi-function/engine/alerts display format*;
 - (q) GPWS/TAWS/GCAS status* (selection of terrain display mode including pop-up display status, terrain alerts, both cautions and warnings and advisories, on/off switch position);
 - (r) low pressure warning* (hydraulic pressure, pneumatic pressure);
 - (s) computer failure*;
 - (t) loss of cabin pressure*;
 - (u) TCAS/ACAS (traffic alert and collision avoidance system/airborne collision avoidance system)*;
 - (v) ice detection*;
 - (w) engine warning each engine vibration*;
 - (x) engine warning each engine over temperature*;
 - (y) engine warning each engine oil pressure low*;
 - (z) engine warning each engine over speed*;
 - (aa) wind shear warning*;

- (bb) operational stall protection, stick shaker and pusher activation*;
- (cc) all cockpit flight control input forces* (control wheel, control column, rudder pedal cockpit input forces);
- (dd) vertical deviation* (ILS glide path, MLS elevation, GNSS approach path);
- (ee) horizontal deviation* (ILS localizer, MLS azimuth, GNSS approach path);
- (ff) DME 1 and 2 distances*;
- (gg) primary navigation system reference* (GNSS, INS, VOR/DME, MLS, Loran C, ILS);
- (hh) brakes* (left and right brake pressure, left and right brake pedal position);
- (ii) date*;
- (jj) event marker*;
- (kk) head-up display in use*; and
- (ll) para visual display on*.

(10) The measurement range, recording interval and accuracy of parameters on installed FDR equipment shall meet the specifications in the following table –

PARAMETERS FOR AEROPLANE FLIGHT DATA RECORDERS					
Serial number	Parameter	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR read-out)	Recording resolution (Note 1)
1	Time (UTC when available, otherwise relative time count or GPS time sync)	24 hours	4	± 0.125% per hour	1 second
2	Pressure altitude	–1 000 ft (–300 m) to maximum certificated altitude of aircraft +5 000 ft (+1 500 m)	1	± 100 ft to ± 700 ft (±30 m to ± 200 m)	5 ft (1.5 m)
3	Indicated airspeed or calibrated	50 kt to max V _{so} (Note 2)	1	± 5% ± 3%	1 kt (0.5 kt recommended)

	airspeed	V _{so} to 1.2 V _D (Note 3)			
4	Heading (primary flight crew reference)	360°	1	± 2°	0.5°
5	Normal acceleration (Note 4)	– 3 g to + 6 g	0.125	± 1% of maximum range excluding datum error of ± 5%	0.004 g
6	Pitch attitude	± 75° or usable range whichever is greater	1 (0.25 Note 1)	± 2°	0.5°
7	Roll attitude	± 180°	1 (0.25 Note 1)	± 2°	0.5°
8	Radio transmission keying	On-off (one discrete)	1		
9	Power on each engine (Note 5)	Full range	1 (per engine)	± 2°	0.2% of full range or the resolution required to operate the aircraft
10*	Trailing edge flap and cockpit control section	Full range on each discrete position	2	± 5% or as pilot's indicator	0.5% of full range or the resolution required to operate the aircraft
11*	Leading edge flap and cockpit control section	Full range on each discrete position	2	± 5% or as pilot's indicator	0.5% of full range or the resolution required to operate the aircraft
12*	Thrust reverser position	Stowed, in transit, and reverse	1 (per engine)		

13*	Ground spoiler/speed brake selection (selection and position)	Full range or each discrete position	1	± 2% unless higher accuracy uniquely required	0.2% of full range
14	Outside air temperature	Sensor range	2	± 2°C	0.3°C
15*	Autopilot/auto throttle/AFCS mode and engagement status	A suitable combination of discretes	1		
16	Longitudinal acceleration (Note 4)	± 1 g	0.25	± 0.015 g excluding a datum error of ± 0.05 g	0.004 g
Note: The preceding 16 parameters satisfy the requirements for a Type II FDR					
17	Lateral acceleration (Note 4)	± 1 g	0.25	± 0.015 g excluding a datum error of ± 0.05 g	0.004 g
18	Pilot input and/or control surface position – primary controls (pitch, roll, yaw) (Notes 6 and 7)	Full range	1 (0.25 Note 1)	± 2° unless higher accuracy uniquely required.	0.2% of full range or as installed
19	Pitch trim position	Full range	1	± 3% unless higher accuracy uniquely required	0.3% of full range or as installed
20*	Radio altitude	– 20 ft to 2 500 ft (–6 m to 750 m)	1	± 2 ft (±0.6 m) or ± 3% whichever is greater below 500 ft (150 m) and ±	1 ft (0.3 m) below 500 ft (150 m); 1 ft (0.3 m)/0.5% of full range above 500 ft (150 m)

				5% above 500 ft (150 m)	
21*	Vertical beam deviation (ILS/GPS/GLS glide path, MLS elevation, IRNAV/IAN vertical deviation)	Signal range	1	± 3%	0.3% of full range
22*	Horizontal beam deviation (ILS/GPS/GLS localizer, MLS azimuth, IRNAV/IAN lateral deviation)	Signal range	1	± 3%	0.3% of full range
23	Marker beacon passage	Discrete	1		
24	Master warning	Discrete	1		
25	Each NAV receiver frequency selection (Note 8)	Full range	4	As installed	
26*	DME 1 and 2 distance (includes distance to runway threshold (GLS) and distance to missed approach point (IRNAV/IAN)) (Notes 8 and 9)	0 – 200 NM (0 – 370 km)	4	As installed	1 NM (1852 m)
27	Air/ground status	Discrete	1		
28*	GPWS/TAWS/GCAS status (selection of terrain display mode including pop-up display status and terrain alerts, both cautions and warnings, and advisories and on/off switch position)	Discrete	1		
29*	Angle of attack	Full range	0.5	As installed	0.3% of full range
30*	Hydraulics, each system (low	Discrete	2		0.5% of full range

	pressure)				
31*	Navigation data (latitude/longitude, ground speed and drift angle) (Note 10)	As installed	1	As installed	
32*	Landing gear or gear selector position	Discrete	4	As installed	
Note : The preceding 32 parameters satisfy the requirements for a Type I FDR					
33*	Groundspeed	As installed	1	Data should be obtained from the most accurate system	1 kt
34	Brakes (left and right brake pressure, left and right brake pedal position)	(Maximum metered brake range, discrettes or full range)	1	± 5%	2% of full range
35*	Additional engine parameters (EPR, N1, indicated vibration level, N2, EGT, fuel flow, fuel cut-off lever position, N3)	As installed	Each engine each second	As installed	2% of full range
36*	TCAS/ACAS (traffic alert and collision avoidance system)	Discrettes	1	As installed	
37*	Windshear warning	Discrete	1	As installed	
38*	Selected barometric setting (pilot, co-pilot)	As installed	64	As installed	0.1 mb (0.01 in-Hg)
39*	Selected altitude (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
40*	Selected speed (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
41*	Selected Mach (all	As installed	1	As	Sufficient to

	pilot selectable modes of operation)			installed	determine crew selection
42*	Selected vertical speed (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
43*	Selected heading (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
44*	Selected flight path (all pilot selectable modes of operation) (course/DSTRK, path angle, final approach path (IRNAV/IAN))		1	As installed	
45*	Selected decision height	As installed	64	As installed	Sufficient to determine crew selection
46*	EFIS display format (pilot, co-pilot)	Discrete(s)	4	As installed	
47*	Multi-function/engine/alerts display format	Discrete(s)	4	As installed	
48*	AC electrical bus status	Discrete(s)	4	As installed	
49*	DC electrical bus status	Discrete(s)	4	As installed	
50*	Engine bleed valve position	Discrete(s)	4	As installed	
51*	APU bleed valve position	Discrete(s)	4	As installed	
52*	Computer failure	Discrete(s)	4	As installed	
53*	Engine thrust command	As installed	2	As installed	
54*	Engine thrust target	As installed	4	As installed	2% of full range
55*	Computed centre of gravity	As installed	64	As installed	1% of full range
56*	Fuel quantity in CG	As installed	64	As	1% of full

	trim tank			installed	range
57*	Head up display in use	As installed	4	As installed	
58*	Para visual display on/off	As installed	1	As installed	
59*	Operational stall protection, stick shaker and pusher activation	As installed	1	As installed	
60*	Primary navigation system reference (GNSS, INS, VOR/DME, MLS, Loran C, localizer glideslope)	As installed	4	As installed	
61*	Ice detection	As installed	4	As installed	
62*	Engine warning each engine vibration	As installed	1	As installed	
63*	Engine warning each engine over temperature	As installed	1	As installed	
64*	Engine warning each engine oil pressure low	As installed	1	As installed	
65*	Engine warning each engine over speed	As installed	1	As installed	
66*	Yaw trim surface position	Full range	2	±3% unless higher accuracy uniquely required	0.3% of full range
67*	Roll trim surface position	Full range	2	±3% unless higher accuracy uniquely required	0.3% of full range
68*	Yaw or sideslip angle	Full range	1	± 5%	0.5°
69*	De-icing and/or anti-	Discrete(s)	4	± 5%	

	icing systems selection				
70*	Hydraulic pressure (each system)	Full range	2	± 5%	100 psi
71*	Loss of cabin pressure	Discrete	1	± 5%	
72*	Cockpit trim control input position - Pitch	Full range	1	± 5%	0.2% of full range or as installed
73*	Cockpit trim control input position - Roll	Full range	1	± 5%	0.2% of full range or as installed
74*	Cockpit trim control input position - Yaw	Full range	1	± 5%	0.2% of full range or as installed
75*	All cockpit flight control input forces (control wheel, control column, rudder pedal)	Full range (± 311 N (± 70 lbf), ± 378 N (± 85 lbf), ± 734 N (± 165 lbf))	1	± 5%	0.2% of full range or as installed
76*	Event marker	Discrete	1		
77*	Date	365 days	64		
78*	ANP or EPE or EPU	As installed	4	As installed	

Note : The preceding 78 parameters satisfy the requirements for a Type IA FDR

Notes –

1. *Applicable to aeroplanes for which a type certificate is first issued on or after 1 January 2016.*
2. *V_{SO} means stalling speed or minimum steady flight speed in the landing configuration.*
3. *V_D means design diving speed.*
4. *All aeroplanes which are required to record normal acceleration, lateral acceleration and longitudinal acceleration for which a type certificate is first issued on or after 1 January 2016 and which are required to be fitted with an FDR shall record those parameters at a maximum sampling and recording interval of 0.0625 seconds.*
5. *Record sufficient inputs to determine power.*
6. *For aeroplanes with control systems in which movement of a control surface will back drive the pilot's control, "or" applies. For aeroplanes with non-mechanical control systems in which movement of a control surface will not back drive the pilot's control, "and" applies. In aeroplanes with split surfaces, a suitable combination of inputs is acceptable in lieu of recording each surface separately. In aeroplanes with independent pilot input on primary controls, each pilot input on primary controls needs to be recorded separately.*

7. All aeroplanes which are required to record pilot input and/or control surface position primary controls (pitch, roll, yaw) for which a type certificate is first issued on or after 1 January 2016 and which are required to be fitted with an FDR shall record those parameters at a maximum sampling and recording interval of 0.125 seconds.
8. If signal available in digital form.
9. Recording of latitude and longitude from INS or other navigation system is a preferred alternative.
10. If signals readily available.

135.05.11 COCKPIT VOICE RECORDERS

1. Aeroplanes for which voice or aural recorders are required

Notes —

1. CVR performance requirements are as contained in the EUROCAE ED-112, Minimum Operational Performance Specification (MOPS) document for Flight Recorder Systems of the European Organization for Civil Aviation Equipment (EUROCAE) for Crash Protected Airborne Recorder Systems, or equivalent documents.
2. CARS performance requirements are as contained in the EUROCAE ED-155, MOPS for Lightweight Flight Recorder Systems, or equivalent documents.

An operator shall ensure any aeroplane operated in a commercial air transport operation is equipped with a CVR or CARS capable of recording the aural environment of the flight deck during flight time in accordance with the following table –

CRITERIA FOR CVR REQUIREMENTS

Group ¹	Initial C of A or Type Certificate ²	Maximum Mass (kg)	Propulsion System	Recording retained for the last 30 minutes of operation	Recording retained for the last 2 hours of operation
1	C of A on or after 1 January 1987	>5 700	All	X	
2	C of A before 1 January 1987 and TC after 30 September 1969	>27 000	Turbine	X	
3	C of A on or after 2003	>5 700	All		X
4	C of A on or after 1 January 2016	All	Turbine		X

Notes –

1. Group 1, 2 and 3 recorders shall be CVRs. Group 4 shall be either a CVR or a CARS.
2. Based on the initial date of issue not that for a variant.

2. CVR specifications

- (1) Any recorder required to be installed shall have an independent power source with the capability of automatically engaging and providing ten minutes of operation whenever aircraft power to the recorder ceases, either by normal shutdown or by any other loss of power to the recorder.
- (2) For all aeroplanes for which the type certificate is first issued on or after 1 January 2016 and which are required to be fitted with a CVR, the CVR shall be provided with an independent power source that shall power exclusively the CVR and the cockpit area microphone components. In installations where two CVRs are fitted in aeroplanes, the forward CVR shall be provided with an independent power source.

Note.— When the CVR function is combined with other recording functions within the same unit, powering the other functions is allowed.

- (3) For all aeroplanes for which the individual certificate of airworthiness is first issued on or after 1 January 2016 and which are required to be fitted with a CVR, the CVR shall be provided with an independent power source. In installations where two CVRs are fitted in aeroplanes, the forward CVR shall be provided with an independent power source.
- (4) The CVR shall record on four separate channels, or more, at least the following –
 - (a) voice communication transmitted from or received in the aeroplane by radio;
 - (b) aural environment on the flight deck;
 - (c) voice communication of flight crew members on the flight deck using the aeroplane's interphone system, if installed;
 - (d) voice or audio signals identifying navigation or approach aids introduced in the headset or speaker; and
 - (e) voice communication of flight crew members using the passenger address system, if installed
- (5) The CARS shall record on two separate channels, or more, at least the following –
 - (a) voice communication transmitted from or received in the aeroplane by radio;
 - (b) aural environment on the flight deck; and

- (c) voice communication of flight crew members on the flight deck using the aeroplane's interphone system, if installed.
- (6) The CVR shall be capable of recording on at least four channels simultaneously. On a tape-based CVR, to ensure accurate time correlation between channels, the CVR is to record in an in-line format. If a bi-directional configuration is used, the in-line format and channel allocation shall be retained in both directions.
- (7) The preferred track channel allocation is shall be as follows –
 - (a) Channel 1 — co-pilot headphones and live boom microphone;
 - (b) Channel 2 — pilot headphones and live boom microphone;
 - (c) Channel 3 — area microphone; and
 - (d) Channel 4 — time reference plus the third and fourth crew members' headphone and live microphone, if applicable.

Notes —

- 1. *Channel 1 is to be located closest to the base of the recording head.*
- 2. *The preferred channel allocation presumes use of current conventional magnetic tape transport mechanisms and is specified because the outer edges of the tape have a higher risk of damage than the middle. It is not intended to preclude use of alternative recording media where such constraints may not apply.*

135.05.12 FLIGHT RECORDERS UTILISING DATA LINK TECHNOLOGY

1. Data link recorders – General

Notes —

- 1. *Data link communications are currently conducted by either ATN-based or FANS 1/A-equipped aircraft.*
- 2. *A Class B AIR could be a means for recording data link communications applications messages to and from the aeroplanes where it is not practical or is prohibitively expensive to record those data link communications applications messages on FDR or CVR.*
- 3. *Data link recorders performance requirements are as contained in the EUROCAE ED-112, Minimum Operational Performance Specifications (MOPS) for Crash Protected Airborne Recorder Systems, or equivalent documents.*

- (1) The minimum recording duration of a data link recorder shall be equal to the duration of the CVR.

- (2) Data link recording shall be able to be correlated to the recorded cockpit audio.
- (3) Where the aircraft flight path is authorized or controlled through the use of data link messages, all data link messages, both uplinks (to the aircraft) and downlinks (from the aircraft), shall be recorded on the aircraft. As far as practicable, the time the messages were displayed to the flight crew and the time of the responses shall be recorded.

Note — Sufficient information to derive the content of the data link communications_message and the time the messages were displayed to the flight crew is needed to determine an accurate sequence of events on board the aircraft.

- (4) Messages applying to the applications listed below shall be recorded. Applications without the asterisk (*) are mandatory applications which shall be recorded regardless of the system complexity. Applications with an (*) shall be recorded only as far as is practicable given the architecture of the system –
 - (a) data link initiation capability;
 - (b) controller – pilot data link communications;
 - (c) data link – flight information services;
 - (d) automatic dependent surveillance – contract;
 - (e) automatic dependent surveillance – broadcast*; and
 - (f) aeronautical operational control*.

135.05.19 FIRST AID KITS

1. Standard first aid kits

- (1) The following medical supplies shall, as a minimum, be included in the current first aid kit for each aeroplane –
 - (a) bandage (unspecified);
 - (b) burns dressings (unspecified);
 - (c) wound dressings, large and small;
 - (d) adhesive tape, safety pins and scissors;
 - (e) small adhesive dressings;
 - (f) antiseptic wound cleaner;
 - (g) adhesive wound closures;
 - (h) adhesive tape;
 - (i) disposable resuscitation aid;
 - (j) temperature reading device (non-mercury);

- (k) simple analgesic, e.g. paracetamol (see Note);
- (l) nasal decongestant (see Note);
- (m) gastrointestinal antacid (see Note);
- (n) disposable gloves;
- (o) first aid handbook; and
- (p) a list of contents.

Note – The operator shall ensure that only Schedule 0 medication is included in the first aid kits. The Department of Health has issued exclusions to previously accepted Schedule 0 medications. Operators must consult a qualified pharmacist if they intend to include Schedule 0 medications in their first aid kit.

- (2) Unless the standard first aid kit is clearly visible, its location must be indicated by a placard or sign. Appropriate symbols may be used to supplement the placard or sign.

135.06.2 APPLICATION FOR THE ISSUANCE OR AMENDMENT OF AN AIR OPERATOR CERTIFICATE AND OPERATIONS SPECIFICATIONS

1. Application for air operator certificate

- (1) The form and manner referred to in CAR 135.06.2 in which application is made for the issuance or amendment of an air operator certificate (AOC) or operations specifications is referred to in this TS as the certification process. This process is designed to address the following certification actions –
 - (a) initial certification of an operator in terms of this Part;
 - (b) revision to any existing AOC or operations specification (OpSpec) issued in terms of this Part;
 - (c) corrective certification action of an existing AOC or OpSpec where deficiencies have been discovered through the continuing safety oversight program, or where appropriate; or
 - (d) any other certification action requested by an operator, operating or desiring to operate in terms of this Part.
- (2) To assist in the processes, technical guidance material (TGM), outlining the means of meeting the certification requirements, has been developed. This guidance material and personal consultation is obtainable from SACAA.
- (3) The process used to accomplish any certification activity entails the applicant successfully completing the five phases of certification. An application may not progress where any phase is not completed satisfactorily. On this issue an applicant is cautioned of the need to review the deficiencies as prescribed in CAR 135.06.3(3). The five phases of certification are comprised of –
 - (a) the pre-application phase;
 - (b) the formal application phase;
 - (c) the documentation review phase;

- (d) the demonstration and inspection phase; and
- (e) the certification phase.

Note – The certification TGM provides the details of each phase.

- (4) As part of the certification process an applicant shall complete and submit the following as a minimum –
 - (a) for operators of an international commercial operation, a statement of compliance (SOC) document, as specified in sub-regulation (6), which is the means by which the operator ensures him or herself and the Director that the company will comply with all applicable regulatory requirements;

Note – See paragraph (6) for more information on the SOC.

- (b) a number of application forms, depending upon the type of authority being applied for, which are intended to provide evidence of qualification for the specific authorities requested. The number and type of forms required vary with the size, scope and complexity of the proposed operation and are at the discretion of the certification officer; however, all will be made available to the applicant;
 - (c) copies of all required manuals; and
 - (d) payment of the application fee required by CAR 135.06.2(1) shall be non-refundable unless otherwise approved by the Director.
- (5) The applicant must submit to any inquiry or investigation, referred to in CAR 135.06.3(1), as deemed necessary in support of the application and to the certification audit referred to in CAR 135.06.5(1).
- (6) With respect to the SOC, for each operator or applicant, –
 - (a) a SOC is required when applying for international authority;
 - (b) the SOC shall be in the form of a complete listing of all parts of the regulations, including technical standards, as applicable to the operation the applicant is proposing, with space for the applicant to show how each regulation applicable to him or her has been met through specific reference to the operator's operations, maintenance or other required manuals;
 - (c) the SOC shall be updated by operators to reflect amended regulatory requirements or if the references showing the means of compliance in the SOC change as a result of amendments to the operator's manuals; and
 - (d) the Director may require the completion of a SOC by any operator at any time deemed necessary in the interest of public safety.

2. Required management positions

- (1) An operator shall employ its chief executive officer and person responsible for flight operations on a full time basis to ensure proper control and supervision of its personnel and operation. An operator may employ on a full time basis or contract the remaining managers as listed in CAR 135.06.2(6); however, if contracted, they shall devote sufficient time to the operator to ensure they can adequately discharge their duties. The operator shall designate the functions to be fulfilled by each of its managers. Section 4 of this TS states the minimum qualifications and responsibilities of the incumbents. The responsibilities listed in section 4 for the incumbent of any position may be assigned to another position as provided in paragraph (3).
- (2) The application forms for the required managerial positions will be reviewed to ensure the minimum qualifications are met. The assessment process may involve the use of quizzes or

interviews to establish the suitability of each nominee. Where a nominee is known within SACAA, the Director may approve such nominee without the need for further assessment.

- (3) An operator may use whatever title deemed necessary for its managers and may assign some of the responsibilities for a given position to another person or persons or the responsibilities of more than one position to one person; however, all the responsibilities noted in section 4 shall be assigned to a nominated manager and such assignment clearly identified in the operations manual. Furthermore, every person assigned any responsibility associated with a required position shall also meet the qualification requirements associated with the responsibilities assigned.
- (4) An operator shall develop a method of ensuring that, in the absence of a responsible manager for any reason, all the responsibilities of that manager are assigned to another individual. Such individual shall meet the qualifications required for the responsibilities assigned except that the knowledge requirements may be demonstrated to the operator rather than the Director. Any assignment issued for a period greater than 30 days must be acceptable to the Director.

3. Approved positions, minimum qualifications and responsibilities.

(1) Chief Executive Officer (CEO)

(a) Qualifications

The CEO shall not have had any conviction or administrative sanction under the Act or these Regulations which, in the view of the Director, was sufficiently serious to render such person not fit and proper to exercise the responsibilities of such position.

(b) Responsibilities

The CEO shall –

- (i) have full authority for all human resources;
- (ii) have authority for major financial decisions;
- (iii) have direct responsibility for the conduct of the company's affairs; and
- (iv) have final responsibility for all safety and security issues.

(2) Person Responsible for Flight Operations (PRFO)

(a) Qualifications

The PRFO shall, as a minimum, –

- (i) demonstrate adequate knowledge of the operation of the operator's aeroplanes;
- (ii) have acceptable oversight experience in a flight operations department or acceptable alternative experience;

- (iii) demonstrate knowledge to the Director of the content of the operations manual, the operator's air operator certificate and operations specifications, as well as those provisions of the regulations and technical standards necessary to carry out his or her duties and responsibilities to ensure safety; and
- (iv) not have had any conviction or administrative sanction under the Act or these Regulations which, in the view of the Director, was sufficiently serious to render such person not fit and proper to exercise the responsibilities of such position.

(b) Responsibilities

The PRFO is responsible for safe flight operations, in particular –

- (i) the control of operations and operational standards of all aeroplanes operated;
- (ii) the identification of operations coordination functions which impact on operational control (eg. maintenance, crew scheduling, load control, equipment scheduling);
- (iii) the supervision, organization, manning and efficiency of the following –
 - (aa) flight operations;
 - (bb) cabin safety;
 - (cc) crew scheduling and rostering; and
 - (dd) training programmes;
- (iv) the timely resolution of safety issues;
- (v) the contents of the operator's operations manual;
- (vi) the supervision of and the production and amendment of the operations manual;
- (vii) liaison with the regulatory authority on all matters concerning flight operations, including any variations to the operator's AOC;
- (viii) liaison with any external agencies which may affect the operator's operations;
- (ix) ensuring that the operator's operations are conducted in accordance with current regulations, standards and the operator's policy;
- (x) ensuring that crew scheduling complies with flight and duty time regulations and that all crew members are kept informed of any changes to the regulations and standards;
- (xi) the receipt and actioning of any aeronautical information affecting the safety of flight;

- (xii) the dissemination of aeroplane safety information, both internal and external, in conjunction with the safety management system;
- (xiii) the qualifications of flight crews;
- (xiv) the processing and actioning of any flight crew reports;
- (xv) the supervision of flight crews;
- (xvi) developing standard operating procedures and/or an aeroplane operating manual;
- (xvii) developing and/or implementing all required approved training programmes for the operator's flight crews;
- (xviii) issuing directives and notices to the flight crews as required;
- (xix) the operational suitability and requirements of all aerodromes and routes served by the operator;
- (xx) ensuring the flight documents required by CAR 135.04.1 are retained for the period specified therein; and
- (xxi) the maintenance of a current operations library.

(3) Person Responsible for Aircraft (PRA)

(a) Qualifications

The PRA shall, as a minimum, –

- (i) have or have held an aircraft maintenance engineer (AME) licence, issued in terms of Part 66, or –
 - (aa) at least have training and experience that may qualify the individual to obtain an AME licence;
 - (bb) hold or have held a pilot licence and ratings appropriate to the aeroplanes being operated or demonstrate adequate knowledge of the maintenance of such aeroplanes; or
 - (cc) hold an engineering degree in aeronautics, electrical, mechanical or avionics or other studies relevant to aircraft maintenance with 5 years experience in the aviation domain after obtaining that qualification;
- (ii) have at least two years experience in an executive position within aviation, or at least as a Quality Manager within the aviation domain;
- (iii) have worked directly with the SACAA for at least one year and have not been the Quality Manager of the assigned maintenance organisation; and
- (iv) within the preceding 5 years, have not held a similar position at any different aviation-related organisation where the approval issued by the Director has been

suspended or cancelled by the Director or the Minister as a result of the organisation failing to comply with the requirements of the Act or the Regulations.

(b) Responsibilities

The PRA is responsible for safe aeroplane operations, in particular –

- (i) is responsible for all maintenance and inspection personnel and signing of Part D of the operations specifications;
- (ii) ensures that company aircraft are maintained in an airworthy condition;
- (iii) ensures that all inspections, repairs and component changes are accomplished in accordance with manufacturer's approved procedures;
- (iv) ensures compliance with maintenance procedures, airworthiness directives, service bulletins, service letters and the regulations;
- (v) ensures all maintenance technicians are trained and current on the types of aircraft for which approved;
- (vi) ensures that all maintenance technicians are certified and supervised according to the requirements specified in the regulations;
- (vii) the production and amendment of the policy and procedures manual or maintenance control manual, as appropriate;
- (viii) coordinates with maintenance contracting agencies when maintenance activities are being performed on company aircraft;
- (ix) provides the operations manager with the current airworthiness status of the aircraft and the forecast down times to facilitate maintenance scheduling and insure timely deferral or correction of aircraft discrepancies;
- (x) maintains a close liaison with manufacturer's representatives, parts supply houses, repair facilities and the SACAA;
- (xi) makes available to maintenance personnel the necessary overhaul manuals, service bulletins, service letters, airworthiness directives, applicable sections of the MCM/MPM and any other required technical data;
- (xii) maintains all necessary work records and logbooks, including certification in the aircraft permanent maintenance records that the aircraft is approved for return to service;
- (xiii) maintains the mass and balance records for all aircraft; and
- (xiv) completes all required reports and submits them to the operations manager for forwarding to the SACAA.

(5) Air Safety Officer (ASO)

(a) Qualifications

The ASO shall, as a minimum, have –

- (i) broad operational knowledge in the functions of the organisation or similar type of organisation;
- (ii) completed an approved safety management system (SMS) course in accordance with the syllabus prescribed in Technical Standard 135.10.2;
- (iii) at least 2 years of experience closely involved in the management of an aviation safety programme, SMS or quality assurance programme;

(b) Responsibilities

The ASO is responsible for the operator's SMS and in particular –

- (i) the establishment and maintenance of a reporting system to ensure the timely collection of information related to potential hazards, incidents and accidents that may adversely affect safety;
- (ii) the identification of latent hazards and carry out risk management analyses of those hazards;
- (iii) the investigation, analysis and identification of the root cause of all hazards or the contributing factors of incidents and accidents identified under the SMS to ensure the operator has adequate mitigation in place;
- (iv) the establishment and maintenance of a safety data system, either by electronic or by other means, to monitor and analyse trends in hazards, incidents and accidents;
- (v) the maintenance of a continuous monitoring system that evaluates the results of corrective actions with respect to hazards, incidents and accidents;
- (vi) the monitoring of the concerns of the civil aviation industry in respect of safety and their perceived effect on the operator;
- (vii) the co-ordination of the organisation's aviation safety programme and all related safety matters;
- (viii) co-operation with the training section with regard to safety training of flight, cabin and ground crews, as applicable;
- (ix) the supervision of aircraft handling regarding matters related to safety in co-operation with ground support services;
- (x) the investigation of all incidents and accidents involving the organisation's aircraft, equipment and property, including fire and emergency procedures, not undertaken in accordance with Part 12;
- (xi) the actioning and distribution of accident, incident and other occurrence reports;
- (xii) the co-ordination with security personnel to ensure all aspects of security regarding the organisation's aircraft;
- (xiii) the development and maintenance of a mandatory occurrence reporting scheme;

- (xiv) the establishment of an emergency plan in the event of an accident, which includes the actions to be followed by relevant personnel;
- (xv) in concert with the person responsible for quality, the maintenance of a quality assurance programme within the organisation; and
- (xvi) the realisation of other duties which include –
 - (aa) promulgation of flight safety bulletins to all staff within the organisation;
 - (bb) conducting meetings with all relevant personnel regarding safety matters;
 - (cc) maintenance of safety equipment;
 - (dd) safety audits; and
 - (ee) occupational health and safety.

(6) Quality Manager (QM)

(a) Qualifications

The QM shall, as a minimum, have –

- (i) standard 10 school level (Matric);
- (ii) certificate/s or diploma in quality management; and
- (iii) at least 5 years experience in implementation and maintenance of QM systems.

(b) Responsibilities

The QM is responsible for ensuring that the operator's quality assurance programme is properly established, implemented and maintained and in particular –

- (i) the monitoring of compliance with, and the adequacy of, the procedures required to ensure safe operational practices and airworthy aircraft;
- (ii) the monitoring of activity in flight operations, maintenance, crew training and ground operations, to ensure that the standards required by the Director, and any additional requirements defined by the operator, are being met; and
- (iii) any additional tasks that may be assigned with respect to the financial and non-operational efficiency aspects of the company.

(7) Security Manager (SM)

(a) Qualifications

The SM shall, as a minimum, have –

- (i) broad operational knowledge in the functions of the organisation or similar type of organisation;

- (ii) completed an approved aviation security course or other course related to aviation security; and
- (iii) at least 2 years of experience closely involved in the field of security.

(b) Responsibilities

The SM is responsible for ensuring that the operator's security programme is properly established, implemented and maintained and in particular –

- (i) the monitoring of compliance with, and the adequacy of, the procedures established to ensure the security of the operator's facilities, aircraft and personnel through an inspection/audit programme;
- (ii) the provision of training in all matters related to security either directly or through the operator's training department;
- (iii) the identification of threats to aviation security, notification to the appropriate authority of such threats and the development of countermeasures to combat those threats, if applicable; and
- (iv) liaising with aerodrome security personnel and other law enforcement authorities with respect to security matters.

135.06.3 APPLICATION, ADJUDICATION OF AND ISSUANCE OF AN AIR OPERATOR CERTIFICATE OR OPERATIONS SPECIFICATIONS

1. Document format and layout

All South African air operator certificates (AOCs) and associated operations specifications (OpSpecs) shall be in the form and layout prescribed by Appendix 6, to Annex 6, Part I of the ICAO Annexes.

2. Contents of an air operator certificate

Each AOC shall contain at least the following information –

- (a) the State of the Operator and the issuing authority;
- (b) the AOC number and its expiration or valid to date or other means to indicate its validity;
- (c) the operator's name, trading name (if different) and address of the principal place of business;
- (d) the date of issue and the name, signature and title of the authority's representative; and
- (e) the location, in a controlled document carried on board, where the contact details of operational management can be found.

Note – For the purposes of establishing a controlled document to provide the information required by subparagraph (e) an operator's operations manual is considered as the means of compliance: Provided the information is contained in a part of the operations manual required to be carried on board the operator's aeroplanes at all times.

3. Contents of an OpSpec

OpSpecs are issued in different parts and contain the following information as applicable to the authority being granted by the OpSpec –

- (a) telephone number;
- (b) AOC number;
- (c) business name of the operator including 'doing business as' (dba), where applicable;
- (d) date of issue of the OpSpec;
- (e) aeroplane makes, types and models to which the specification applies;
- (f) areas and types of operations approved; and
- (g) special limitations, authorisations and approvals.

Note – For more information with respect to the AOCs or associated OpSpecs an operator/applicant should contact the Certification Division of the South African Civil Aviation Authority.

135.06.9 DEMONSTRATION FLIGHTS

- (1) At least one successful demonstration flight shall be accomplished over a route typically operated by the operator in the following circumstances –

- (a) for applicants seeking an air operator certificate (AOC), prior to conducting commercial operations; and
 - (b) for existing AOC-holders operating propeller-driven aeroplanes, prior to the introduction of a turbojet or turbofan aeroplane.
- (2) The demonstration flight for an applicant seeking an AOC shall be accomplished using the aeroplane designated by the Director.
- (3) A demonstration flight may be required in the event an aeroplane type is added to an existing AOC.

Notes –

1. *Normally, the demonstration flight(s) will be accomplished using the most complex_type of aeroplane having the greatest maximum certificated mass to be operated unless the Director determines that, due to the size and complexity of the proposed operations, additional demonstrations are required using other aeroplane types*
2. *For the purposes of this TS, the complexity of the aeroplane is based on its method of propulsion, with the first named aeroplane being the least complex –*
 - (a) *reciprocating engine aeroplanes;*
 - (b) *turbo-propeller aeroplanes; and*
 - (c) *turbojet or turbofan aeroplanes.*
3. *Technical guidance in the conduct of demonstration flights may be found in SACAA document CA AOC-FO-015 Demonstration and Special Demonstration Flights.*

135.07.1 ROUTES AND AREAS OF OPERATION AND AERODROME FACILITIES

1. Destination Alternate Aerodrome Planning Minima

- (1) Except as provided in paragraph (2), an operator shall meet the applicable planning minima specified in the following table in order to select an aerodrome as a destination alternate, when required –

Approach and landing provisions	Ceiling	Visibility conditions
Aerodromes supporting instrument approach and landing operations, but not supporting straight-in approach and landing operations to at least two runway ends.	Applicable aerodrome operating minima plus an increment of 400 ft	Applicable aerodrome operating minima plus an increment of 1 500 m

Aerodromes supporting a straight-in instrument approach and landing operation to different suitable runways.	Applicable aerodrome operating minima plus an increment of 200 ft	Applicable aerodrome operating minima plus an increment of 800 m
Aerodromes supporting a minimum of two instrument approach and landing operations to different suitable runways, at least one shall be CAT II or III.	For CAT II operations at least 300 ft For CAT III operations at least 200 ft	For CAT II operations, a prevailing visibility corresponding to at least an RVR of 1 200 m For CAT III operations, a prevailing visibility corresponding to at least an RVR of 550 m

Note.— The term “different suitable runways” may denote either two or more separate runways or a single runway with a straight-in instrument approach and landing procedure to each end of the runway.

- (2) The criteria specified in paragraph (1) need not be complied with: Provided alternative selection criteria are submitted by the operator that are developed as a result of a safety risk assessment, based on the operator’s SMS programme, which provide a level of safety equivalent to that in paragraph (1) and are approved by the Director.

2. Extended Range Twin-Engine Operations

2.1 Application

- (1) Applications to the Director for an operations specification (OpSpec) to operate flights in terms of the ETOPS provisions shall be made in a manner acceptable to the Director and that meet the requirements of this TS. Specific certification information is contained in Document TGM CA-AOC-AC-013 ETOPS, available on the SACAA website, which provides an acceptable method of ensuring all certification requirements have been met.
- (2) Only turbine-powered aeroplanes shall be considered for approval to conduct ETOPS flights.

2.2 Aerodrome criteria

- (1) Adequate aerodrome

An adequate aerodrome is an aerodrome which the operator considers to be satisfactory, taking into account landing performance requirements at the expected landing weight and runway characteristics. In addition, it should be anticipated that, at the expected time of use, the aerodrome will be available and equipped with necessary ancillary services, such as ATS, sufficient lighting, communications, weather reporting, nav aids and emergency services.

(2) ETOPS *en route* alternate airport

An ETOPS *en route* alternate airport means an adequate airport that is listed in the operator's company operations manual and meets the planning minima specified in subsection 2.3.

2.3 Planning minima for an ETOPS *en route* alternate

To be suitable to be listed in the flight plan as an ETOPS *en route* alternate aerodrome, the following additional criteria must be met –

- (a) the availability of an ATC facility;
- (b) the availability of at least one letdown aid for an instrument approach; and
- (c) the appropriate weather reports or forecasts, or any combination thereof, indicate that, during a period commencing 1 hour before and ending 1 hour after the expected time of arrival at the aerodrome, crosswind landing limits will not be exceeded and the weather conditions will be at or above the planning minima prescribed in the table below, and in accordance with the operator's ETOPS approval.

Planning minima – ETOPS

Type of approach	Planning minima (ceiling and RVR/visibility required, if applicable) Aerodrome with		
	at least 2 separate approach procedures based on 2 separate aids serving 2 separate runways	at least 2 separate approach procedures based on 2 separate aids serving 1 runway	at least 1 approach procedure based on 1 aid serving 1 runway
Precision approach Cat II, III (ILS MLS)	Precision approach Cat I minima	Non-precision approach minima	
Precision approach Cat I (ILS MLS)	Non-precision approach minima	Circling minima or, if not available, non-precision approach minima plus 200 ft/1 000 m	
Non-precision approach	The lower of non-precision	The higher of circling minima or non-precision	

	approach minima plus 200 ft/1 000 m or circling	approach minima plus 200 ft/1 000 m
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Notes:

1. *“Tempo” and “Inter” conditions published in the forecast are not limiting unless these conditions are forecast to be below published planning minima. Where a condition is forecast as “Prob”, provided the probability percent factor is less than 40%, it is not limiting. However the PIC will be expected to exercise good aviation judgment in assessing the overall “Prob” conditions.*
2. *Runways on the same aerodrome are considered to be separate runways when –*
 - (a) *they are separate landing surfaces which may overlay or cross such that if one of the runways is blocked, it will not prevent the planned type of operations on the other runway; and*
 - (b) *each of the landing surfaces has a separate approach procedure based on a separate aid.*
3. *Only operators approved for Category II or III operations may use the planning minima applicable to Categories II and III in the table and then only if the aeroplane is certificated for a one engine inoperative Category II or III approach, as applicable.*
4. *The JAA Information Leaflet No. 20, IL20, may also be used by an operator to conduct an ETOPS operation, together with the ETOPS en route alternate weather criteria determined in this technical standard.*

135.07.5 SINGLE-ENGINE AEROPLANE IMC AND NIGHT OPERATIONS

1. Transportation of passengers or cargo in single-engine IMC and night operations

- (1) The following technical standard prescribes the criteria and provisions for operating single-engine aeroplanes in passenger-carrying and cargo-only operations under IMC or at night.
- (2) An operator approved in its operations specifications (OpSpecs) to conduct passenger-carrying operations under IMC or at night is also approved to conduct cargo-only operations. The OpSpecs shall clearly specify the extent of the approval.
- (3) An operator approved to conduct cargo-only operations under IMC or at night is not approved to conduct passenger-carrying operations unless authorised in its OpSpecs to do so.

2. Aeroplane requirements

2.1 Passenger-carrying operations

- (1) A single-engine aeroplane approved to carry passengers shall meet the requirements of this subsection.

- (2) The following requirements relate to the aeroplane engine and airframe combination –
 - (a) in addition to the instruments and equipment specified in Subpart 5, as applicable, the aeroplane must be powered by a turbine engine; and
 - (b) the turbine-engine type and model must have demonstrated a service reliability factor equivalent to .01/1000 or less mean time between failure (MTBF) established over 100,000 operational hours.
- (3) The engine and associated systems must be equipped with –
 - (a) an auto-ignition system, or alternatively, the operations manual referred to in CAR 135.04.2 must specify that continuous ignition shall be selected "ON" for take-off, landing and flight in heavy precipitation, notwithstanding the outside air temperature, or at such other time as deemed necessary by the Director;
 - (b) a chip detector system or other equivalent means to warn the pilot of excessive ferrous metal in the engine lubrication system in all regimes of flight; and
 - (c) a manual throttle which bypasses the governing section of the fuel control unit and permits continued unrestricted operation of the engine in the event of a fuel control unit failure.
- (4) The operator must establish and maintain an engine trend monitoring programme acceptable to the Director. Aeroplanes for which the individual certificate of airworthiness is first issued on or after 1 January 2005 shall have an automatic trend monitoring system.

2.2 Cargo-only operations

- (1) A single-engine aeroplane approved to carry cargo only shall meet the requirements of this subsection.
- (2) In addition to the instruments and equipment specified in Subpart 5 as applicable to IFR flight, the aeroplane shall be powered by –
 - (a) a turbine engine that meets the criteria prescribed by subsection 2.1 of this TS; or
 - (b) a piston engine that meets specific performance criteria and a preventative maintenance programme acceptable to the Director and be equipped with –
 - (i) a constant speed propeller equipped with an anti-icing or de-icing system; and
 - (ii) a fuel injection system.

2.3 Additional requirements for single-engine IMC or night operations

- (1) Where the aeroplane will be operated in IMC or night flight conditions without a second-in-command, the instruments and equipment required for single-pilot IFR, as specified in CAR 135.07.8, shall also be met.
- (2) The aeroplane must be of a design or have approved warning systems that will allow for the easy identification of engine or airframe icing.
- (3) The aeroplane shall only be dispatched in accordance with an approved minimum equipment list or configuration deviation list, as applicable.
- (4) The aeroplane shall be equipped with –
 - (a) two independent power generating sources, either of which is capable of sustaining essential flight instruments and electrical equipment including electrically operated de-icing or anti-icing systems;

- (b) two attitude indicators which are powered from independent sources in the event of a primary electrical failure so that at least one attitude indicator will continue to function;
 - (c) a radio altimeter;
 - (d) weather radar or storm warning scope;
 - (e) a certified area navigation system capable of being programmed with the positions of aerodromes and safe forced landing areas and instantly providing available track and distance information to such locations;
 - (f) a landing light that is independent of the landing gear and is capable of adequately illuminating the touchdown area in a night forced landing;
 - (g) an engine fire warning system; and
 - (h) a means to provide for at least one attempt at engine re-start.
- (5) The aeroplane must carry an emergency electrical supply of sufficient capacity and endurance following loss of all generated power to –
- (a) power essential electrical systems, including auto pilot, flight instruments and navigation systems, to allow for a descent at normal glide speed and configuration from the aeroplane's maximum certificated altitude to completion of a landing;
 - (b) lower the flaps and landing gear, if applicable;
 - (c) provide power to one pitot heater, which must serve an air speed indicator clearly visible to the pilot;
 - (d) provide for operation of the landing light specified in paragraph (6)(g);
 - (e) provide for one engine restart, if applicable; and
 - (f) provide for the operation of the radio altimeter.

3. Flight crew requirements

- (1) The PIC and, where the aeroplane includes a SIC, the SIC shall possess, as a minimum, the following current licences and ratings and have acquired at least the flight experience indicated in Table 1.
- (2) The flight crew shall include a SIC in the event the PIC does not meet the minimum total flight time specified in Table 1: Provided that the PIC's total flight time shall not be less than 500 hours.

TABLE 1
Minimum flight crew licences, ratings and flight experience to operate a single-engine aeroplane in IFR or night flight

Type	of	PIC	SIC (if applicable) ^{1 and 2}
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Operation	Licence	Min. Total Flight Time (hours)	Min Flight Time (hours)		Licence	Min. Total Flight Time (hours)
			IF	Night		
Passenger (with or without cargo) carriage	CPL/IFR	1000	100	100	CPL/IFR	200
Cargo only carriage	CPL/IFR	1000 including a minimum of 150 hrs as PIC	50	50	CPL/IFR	200

Notes –

1. Where the aeroplane type requires a type rating, each flight crew member shall have that type rating on his or her licence.
2. An SIC is required if the operator is approved for CAT II or III approaches.
- (3) The operator shall meet the training requirements specified in section 2, 2.9 of TS 135.03.3. The training programme shall be completed for each specific aeroplane type that the pilot flies and which is authorised to be operated in IMC or at night.
- (4) In addition to the training prescribed TS135.03.3, each person assigned to act as a flight crew member in single engine (SE) IMC or night flight shall undergo a pilot proficiency check (PPC), a portion of which shall be demonstrated in an approved synthetic training device, if available in the country, including all emergency procedures that cannot be safely demonstrated in the aeroplane. Where such device is not available in South Africa, the check shall be accomplished in an aeroplane in a manner acceptable to the Director.
- (5) The PPC referred to in paragraph (4) above shall be conducted by an authorised officer, DFE or Grade I or II flight instructor: Provided such person has, at least, accomplished the training required by this TS and a PPC on the aeroplane type.
- (6) Each person who successfully passes a PPC shall receive certification in his or her training records that authorises them to operate SE aeroplanes in IMC or at night while transporting passengers or cargo, as applicable.

4. Special procedures requirements

- (1) The operator shall publish in its operations manual special procedures for the conduct of single-engine operations while transporting passengers in IMC or at night and such procedures shall include at least the provisions specified in paragraphs (2) through (4).
- (2) A pilot shall operate the aeroplane as pilot flying for at least 50 flight hours under IFR and under the supervision of a PIC qualified on type prior to being authorised for solo flight in IMC: Provided that the operator shall not assign the pilot under supervision as the PIC for a flight until the 50 flight hours have been attained.

- (3) Flight planning shall be accomplished to ensure each potential *en route* alternate is assessed for its potential use as an emergency aerodrome.
- (4) Special procedures shall be developed for –
 - (a) primary and secondary actions, including passenger briefing, to be taken in the event of loss of the powerplant or other malfunctions that would necessitate an immediate emergency landing;
 - (b) immediate actions to be taken in the event of encountering moderate, heavy or severe icing conditions; and
 - (c) procedures for the quick and accurate diversion to an unplanned alternate including ATC and flight following procedures.
- (5) The Director may require additional procedures, restrictions or conditions in the interests of safety.

135.07.8 IFR OR NIGHT FLIGHT WITHOUT A SECOND-IN-COMMAND

1. General

This technical standard states the provision for the operation of an aeroplane with passengers on board in IFR flight without a second-in-command.

Note – The term “single-pilot IFR” will be used to denote a pilot authorised to fly in IMC or at night without a second-in-command.

2. Aeroplane/equipment requirements

In addition to the equipment required by Subpart 5 of this Part, an aeroplane involved in a single-pilot operation in IMC shall be equipped with –

- (a) an auto-pilot that is capable of operating the aeroplane controls to maintain flight and manoeuvre the aeroplane about the lateral and longitudinal axes;
- (b) a headset with a boom microphone or equivalent and a transmit button on the control column; and
- (c) a chart holder that is placed in an easily readable position and a means of illumination for the chart holder.

3. Pilot qualification, training and proficiency requirements.

- (1) The pilot shall have a the following experience –
 - (a) for operations under IFR or at night, have accumulated at least 50 hours flight time on the class of aeroplane, of which at least 10 hours shall be as PIC;
 - (b) for operations under IFR, have accumulated at least 25 hours flight time under IFR on the class of aeroplane, which may form part of the 50 hours flight time in subparagraph (a); and

- (c) for operations at night, have accumulated at least 15 hours flight time at night, which may form part of the 50 hours flight time in subparagraph (a).
- (2) A pilot shall complete the training requirements specified in subsection 2.10 of technical standard 135.03.3 and a single-pilot pilot proficiency check (PPC) prior to being assigned to single-pilot duties.
- (3) The PPC shall be in the aeroplane type or variant flown unless the operator has been approved for aircraft grouping for training and PPC purposes, in which case the sequencing of the PPCs shall be as provided in such approval and shall be conducted so as to include at least the following –
 - (a) knowledge of the regulatory and company operating procedures relating to single-pilot IFR;
 - (b) knowledge of the auto-pilot operations and limitations;
 - (c) performance of normal and emergency procedures as a single pilot without assistance;
 - (d) passenger briefings as required by this Subpart including emergency briefings and cabin preparation for emergency evacuation; and
 - (e) demonstration of the use of the auto-pilot during appropriate phases of flight.
- (4) Where a pilot successfully completes the PPC referred to in paragraph (2), the pilot's training records shall be endorsed for single-pilot IFR.

4. Special conditions and procedures.

- (1) All flights operated in IFR flight shall be restricted to the following altitudes/flight levels –
 - (a) in case of pressurised aeroplanes all flights shall be conducted at or below FL 250 unless the aeroplane manufacturer has established the conditions under which flight above such altitude may be undertaken without a second-in-command with respect to access to an emergency source of oxygen in the event an emergency descent is required and the pilot has trained for such an event at or near the highest altitude authorised for that aeroplane; and
 - (b) in the case of unpressurised aeroplanes, all flights shall be conducted at or below the altitude at which the pilot is not required by these regulations to be using continuous oxygen.
- (2) A pilot's single-pilot IFR proficiency may be transferred to another operator: Provided –
 - (a) the proficiency validity has not yet expired;
 - (b) the aeroplanes to be operated are of the same type and variant on which the current PPC was conducted;
 - (c) the pilot has received training to ensure the pilot is familiar and competent in all procedures used by the other operator; and
 - (d) the other operator is authorised in its operations specification to transport persons in aeroplanes in IMC without a second-in-command.

135.07.10 REFUELLING AND DEFUELLING WITH PASSENGERS ON BOARD

Aeroplanes may be fuelled with passengers embarking, disembarking or on board under the following conditions:

- (a) in order to ensure that crew members receive prompt notification of a situation threatening safety such as major fuel spill or a fire, a means is established for the ground crew supervising the fuelling to alert the qualified personnel on board the aeroplane that the passengers must be deplaned or evacuated as necessary;
- (b) the aeroplane engines are not running unless the aircraft incorporates a propeller brake and the brake is set;
- (c) during the fuelling process –
 - (i) aeroplane ground power generators or other electrical ground power supplies are not being connected or disconnected;
 - (ii) combustion heaters installed on the aeroplane (e.g. wing and tail surface heaters, integral cabin heaters) are not operated;
 - (iii) known high energy equipment such as High Frequency (HF) radios are not operated, unless in accordance with the aeroplane manufacturer's approved flight manual where the manual contains procedures for the use of this equipment during fuelling;
 - (iv) weather-mapping radar equipment in the aeroplane is not operated unless in accordance with the manufacturer's approved aeroplane flight manual where the manual contains procedures for use during fuelling;
 - (v) aeroplane batteries are not being removed or installed;
 - (vi) external battery chargers are not being connected, operated or disconnected;
 - (vii) aeroplane-borne APUs which have an efflux discharging into the zone are not started after filler caps are removed or fuelling connections are made;
 - (viii) if an auxiliary power unit is stopped for any reason during fuelling it shall not be restarted until the flow of fuel has ceased and there is no risk of igniting fuel vapours; however, the APU may be operated in accordance with the manufacturer's approved aeroplane flight manual if the manual contains procedures for starting the APU during fuelling;
 - (ix) electric tools or similar tools likely to produce sparks or arcs are not being used; and
 - (x) photographic equipment is not used within 3 m of the fuelling equipment or the fill or vent points of the aeroplane fuel systems;
- (d) fuelling is immediately suspended when there are lightning discharges within 8 km of the aerodrome;

- (e) the aeroplane is fuelled in accordance with manufacturer's procedures for that type of aeroplane;
- (f) the aeroplane emergency lighting system is armed or on, if applicable;
- (g) "No Smoking" signs on board the aeroplane are illuminated, if installed;
- (h) procedures are established to ensure that passengers do not smoke, operate portable electronic devices or otherwise produce sources of ignition;
- (i) at least the entry door through which the passengers embarked is designated as the evacuation exit during fuelling and is open;
- (j) the designated evacuation exits during fuelling are identified by aeroplane type and published in the operator's operations manual and are clear and available for immediate use by passengers and crew members should an evacuation be required;
- (k) the operator has procedures in place to ensure that there is a ready escape route from each designated evacuation exit during fuelling;
- (l) a member of the flight crew or a person designated by the operator who has received training in fuelling operations with passengers on board shall be in attendance and identified to the passengers as the person responsible for cabin safety during the fuelling procedures; and
- (m) if over-wing refuelling or defuelling with passengers on board is undertaken, an emergency exit shall be available for use in the event of an evacuation and such exit shall be opposite to where the refueling or defuelling is taking place.

135.07.13 OPERATIONAL CONTROL AND SUPERVISION OF FLIGHT OPERATIONS

1. Operational control and supervision

- (1) An operator shall exercise operational control over its flights through its operational control system (OCS).
- (2) The person responsible for flight operations shall have the ultimate decision-making authority in all matters affecting flight operations in general, and the OCS in particular, after consideration of any other factors that could impact on the execution of a flight such as financial, commercial or other non-operational considerations.
- (3) The operator is responsible for putting in place communication equipment and facilities as appropriate to the operator's flight following system and ensuring such equipment is serviceable during the period of time any company flight is in progress.
- (4) The pilot-in-command is responsible for the release of each flight and has the final authority as to the continuation, diversion or termination of a flight.

2. Definitions

"**flight follower**" means the person assigned the responsibility for flight following and such other duties as may be assigned;

"**flight following**" means the monitoring of a flight's progress, the provision of such operational information as may be requested by the PIC and the notification to appropriate operator and search-and-rescue authorities if the flight is overdue or missing. Meteorological information provided to the PIC by a flight follower shall not include analysis or interpretation by the flight follower unless such flight follower is a certified flight operations officer;

"**flight release**" means the agreement by the PIC, as witnessed by his or her signature, that the flight has been planned and is being released for flight in accordance with the provisions of the operations manual;

Note – For an enhanced OCS utilising a flight operations officer (FOO) and flight watch system, refer to subparagraph (a) under the definition of 'flight release' in technical standard 121.07.13 1(4) of Document SA-CATS 121.

"**flight monitoring**" means monitoring all factors and conditions that might affect the operational flight plan (OFP) and which may be the responsibility of the PIC or other person assigned by the person responsible for flight operations;

"**pilot self-dispatch**" means a flight where the PIC has been given authority from the operations manager to exercise operational control over such flights.

3. Approval of an operational control system

- (1) Each operator shall publish in its operations manual the details of its proposed OCS including pre- and post-flight procedures, flight following or flight monitoring, as applicable, and procedures to be followed in the event of missing or overdue flights and during emergency or abnormal situations. Upon approval of the operations manual, the OCS shall be deemed to have been approved by the Director.
- (2) An operator choosing, in order to meet its own operational needs, to dispatch its flights under an OCS that utilises a flight operations officer (FOO) for flight release and flight monitoring shall meet the requirements of a Type A operational control system as specified in technical standard 121.07.13 of Document SA-CATS 121.
- (3) The Director may require an operator to upgrade its OCS in order to satisfy the conditions for issue of certain operations specifications (OpSpecs).

4. Description of the required operational control system

The minimum requirements of an OCS under this Part are as follows –

(a) Responsibility and authority

Operational control is delegated to the PIC of a flight by the operations manager who retains responsibility for the day-to-day conduct of flight operations.

(b) Centres

Current information on the location of the operator's aeroplanes shall be maintained at the main base of operations or, where appropriate, at a sub-base of operations.

(c) Communications

The operator shall ensure that the flight crew has a means to communicate with the operator while on the ground.

(d) Personnel on duty

- (i) An operator shall ensure personnel qualified in accordance with CAR 135.02.7 are available during flight time as applicable to the OCS approved for use by the company.
- (ii) The operator shall clearly identify in its operations manual the duties and responsibilities of the persons responsible for flight following.
- (iii) The operator shall ensure that each flight follower is trained in accordance with the requirements of its approved training programme.

(e) Flight release

- (i) Flights operated under the operator's OCS are pilot self-dispatched and released in accordance with the operator's established procedures. Such procedures shall be published in the operator's operations manual.
- (ii) The person responsible for the development of the operational flight plan (OFP), shall receive training in every aspect of its preparation. The OFP shall meet the requirements of technical standard 135.04.5 and may be in any format at the operator's discretion but such format shall be standard and used by all flight crew.
- (iii) The signature or alternative means of signifying acceptance of the OFP by the PIC shall constitute a flight release and shall certify that –
 - (aa) the OFP has been prepared and accepted in accordance with the procedures specified in the operations manual; and
 - (bb) the flight is safe to proceed.

(f) Flight monitoring and flight following

- (i) An operator shall ensure that procedures are established as part of the OCS to enable it to determine if a flight is overdue or has had to divert.
- (ii) Where communications facilities permit, the PIC is expected to report departures and arrivals to the person assigned to the flight following of that flight. At the very least the PIC shall notify the operator upon arrival at the final destination of a particular flight or series of flights.
- (iii) The PIC, though solely responsible for flight monitoring, shall be supported by a flight following system containing the following elements –
 - (aa) a flight follower, qualified in accordance with Subpart 3 and knowledgeable in the operator's flight alerting procedures, on duty and able to respond to requests by the PIC for information related to the flight. Such information may include meteorological information without analysis or interpretation; and
 - (bb) the ability by the operator to have a means to follow the progress of each flight from its commencement to its termination, including any intermediate stops or diversions from the flight planned route.

Note – Use of air traffic services in determining the location of a flight is adequate.

5. Declaration and action in an emergency

- (1) In an emergency situation that requires immediate decision and action, the PIC shall take any action he or she deems necessary for the safety of the aeroplane and passengers.
- (2) Where the assigned flight follower or operations manager becomes aware of any emergency situation that could pose a hazard to a flight in progress, he or she shall make every effort to advise the PIC of such emergency by the quickest means available. Furthermore, he or she shall –
 - (a) remain available to the PIC of that flight on a continuous basis until –
 - (i) the threat of such emergency has passed;
 - (ii) the PIC has made a decision and acted upon it and it has been determined that the operator's assistance is no longer required; or
 - (iii) the flight is handed off to another competent person who is able to be of assistance;
 - (b) relay required messages through third parties as necessary to communicate with the flight; and
 - (c) notify the nearest air traffic services unit and appropriate authority of the emergency and request such assistance as may be necessary.
- (3) In the event an aeroplane becomes overdue or missing, the overdue or missing aeroplane procedures, as appropriate, shall be followed as prescribed in the operations manual. Such procedures shall include, as a minimum, reporting the overdue or missing aeroplane to an air traffic services unit, the appropriate authority and search and rescue authorities.
- (4) Whenever a PIC, flight follower or operations manager declares an emergency, he or she shall keep the appropriate ATC facility and dispatch centres fully informed as to the progress of the flight.

135.07.22 FUEL POLICY

1. Planning criteria for aeroplanes

- (1) An operator shall base the fuel policy, including calculation of the amount of fuel to be carried by an aeroplane, on the planning criteria specified in this TS.
- (2) If the operator's fuel policy is not based on planning as provided in paragraphs (3), (4) or (5), the amount shall be based on –
 - (a) taxi fuel, which must not be less than the amount, expected to be used prior to take-off. Local conditions at the departure aerodrome and APU consumption shall be taken into account;
 - (b) trip fuel, which must include –
 - (i) fuel for take-off and climb from aerodrome elevation to initial cruising level/altitude, taking into account the expected departure routing;
 - (ii) fuel from top of climb to top of descent, including any step climb/descent;
 - (iii) fuel from top of descent to the point where the approach is initiated, taking into account the expected arrival procedure; and
 - (iv) fuel for approach and landing at the destination aerodrome;

- (c) contingency fuel which shall, in addition to the factors noted in section 2 of this TS, be –
 - (i) the calculated result of a data-driven method using safety risk assessment based on a fuel consumption monitoring programme or advanced use of available *en route* alternates; or
 - (ii) 5 per cent of the planned trip fuel based on the consumption rate used to plan the trip fuel but in any case not lower than an amount to fly for 5 minutes at holding speed at 1 500 feet above the destination aerodrome in standard conditions;
- (d) alternate fuel, which must be sufficient for –
 - (i) if a destination alternate aerodrome is required –
 - (aa) a missed approach from applicable MDA/DH at the destination aerodrome to missed approach altitude, taking into account the complete missed approach procedure;
 - (bb) a climb from the missed approach altitude to cruising level/altitude;
 - (cc) the cruise from top of climb to top of descent;
 - (dd) descent from top of descent to the point where the approach is initiated, taking into account the expected arrival procedure; and
 - (ee) executing an approach and landing at the destination alternate aerodrome;
 - (ii) if two destination alternates are required, alternate fuel shall be sufficient to proceed to the alternate which requires the greater amount of alternate fuel allowing for the consumption specified in sub-subparagraph (i); or
 - (iii) if a destination alternate aerodrome is not required, as specified in CAR 135.07.1(4), an amount of fuel sufficient to enable the aeroplane to hold for 15 minutes at 1 500 ft above destination aerodrome elevation in standard conditions;
- (e) final reserve fuel, which shall be –
 - (i) for aeroplanes with reciprocating engines, fuel to fly for 45 minutes; or
 - (ii) for aeroplanes with turbine engines, fuel to fly for 30 minutes,

at holding speed at 1 500 feet above aerodrome elevation in standard conditions, calculated with the estimated mass on arrival at the alternate or the destination, when no alternate is required;
- (f) additional fuel, which shall be a supplementary amount of fuel required if the minimum fuel calculated in accordance with subparagraphs (c) and (d) above is not sufficient to permit the aeroplane –

- (i) following the possible failure of a power unit or loss of pressurisation, whichever requires the greater amount of fuel based on the assumption that such a failure occurs at the most critical point along the route, to –
 - (aa) descend as necessary and proceed to an adequate aerodrome;
 - (bb) hold there for 15 minutes at 1 500 feet above aerodrome elevation in standard conditions; and
 - (cc) make an approach landing, and
 - (ii) meet additional requirements not covered in subparagraph (f)(i); and
 - (g) discretionary fuel, which is at the discretion of the PIC.
- (3) If an operator's fuel policy includes replanning based on the use of a decision point while *en route*, the amount of fuel shall be the greater of subparagraph (a) or (b) below –
- (a) the sum of –
 - (i) taxi fuel as specified in paragraph (2)(a) above;
 - (ii) trip fuel to the destination aerodrome as specified in paragraph (2)(b) above, via the decision point;
 - (iii) contingency fuel equal to not less than 5% of the estimated fuel consumption from the decision point to the destination aerodrome;
 - (iv) alternate fuel, if a destination alternate is required, as specified in paragraph (2)(d) above;
 - (v) final reserve fuel as specified in paragraph (2)(e) above;
 - (vi) additional fuel as specified in paragraph (2)(f) above; and
 - (vii) extra fuel, if required by the PIC; or
 - (b) the sum of –
 - (i) taxi fuel as specified in paragraph (2)(a) above;
 - (ii) the estimated fuel consumption from the departure aerodrome to a suitable *en route* alternate, via the decision point;
 - (iii) contingency fuel equal to not less than 3% of the estimated fuel consumption from the departure aerodrome to the *en route* alternate;
 - (iv) final reserve fuel as specified in paragraph (2)(e) above;
 - (v) additional fuel as specified in paragraph (2)(f) above; and
 - (vi) discretionary fuel, if required by the PIC.
- (4) If an operator's fuel policy includes planning to a destination alternate where the distance between the destination aerodrome and the destination alternate is such that a flight can only be routed via a predetermined point to one of these aerodromes, the amount of fuel must be the greater of subparagraph (a) or (b) below –
- (a) the sum of –

- (i) taxi fuel as specified in paragraph (2)(a) above;
 - (ii) trip fuel from the departure aerodrome to the destination aerodrome, via the predetermined point;
 - (iii) contingency fuel calculated in accordance with paragraph (2)(c) above;
 - (iv) additional fuel as specified in paragraph (2)(f) above, if required, but not less than –
 - (aa) for aeroplanes with reciprocating engines, fuel to fly for 45 minutes plus 15% of the flight time planned to be spent at cruising level or two hours, whichever is less; or
 - (bb) for aeroplanes with turbine engines, fuel to fly for two hours at normal cruise consumption after arriving overhead the destination aerodrome, including final reserve fuel; and
 - (v) discretionary fuel, if required by the PIC; or
- (b) the sum of –
- (i) taxi fuel as specified in paragraph (2)(a) above;
 - (ii) trip fuel from the departure aerodrome to the alternate aerodrome, via the predetermined point;
 - (iii) contingency fuel calculated in accordance with paragraph (2)(c) above;
 - (iv) additional fuel as specified in paragraph (2)(f) above, if required, but not less than –
 - (aa) for aeroplanes with reciprocating engines, fuel to fly for 45 minutes; or
 - (bb) for aeroplanes with turbine engines, fuel to fly for 30 minutes at holding speed at 1 500 feet above aerodrome elevation in standard conditions, including final reserve fuel; and
 - (v) discretionary fuel, if required by the PIC.
- (5) If an operator's fuel policy includes planning to an isolated aerodrome for which a destination alternate is not required or does not exist as specified in CAR 135.07.1(2)(b), the amount of fuel at departure shall include –
- (a) taxi fuel as specified in paragraph (2)(a) above;
 - (b) trip fuel as specified in paragraph (2)(b) above;
 - (c) contingency fuel calculated in accordance with paragraph (2)(c) above;
 - (d) final reserve fuel as specified in paragraph (2)(e) above;
 - (e) additional fuel as specified in paragraph (2)(f) above, if required, but not less than –

- (i) for aeroplanes with reciprocating engines, fuel to fly for 45 minutes plus 15% of the flight time planned to be spent at cruising level, or two hours, whichever is the lesser; or
- (ii) for aeroplanes with turbine engines, fuel to fly for two hours at normal cruise consumption after arriving overhead the destination aerodrome; and
- (f) discretionary fuel, if required by the PIC.

2. Unforeseen circumstances

- (1) At the planning stage, not all factors which could have an influence on the fuel consumption to the destination aerodrome can be foreseen. Therefore, fuel is carried to compensate for unforeseen circumstances such as –
 - (a) deviations of an individual aeroplane from the expected fuel consumption data;
 - (b) deviations from forecast meteorological conditions; and
 - (c) deviations from planned routings and/or cruising levels/altitudes.
- (2) This fuel is to be included as part of the contingency fuel planning considerations.

135.07.27 INERTIAL NAVIGATION AND INERTIAL REFERENCE SYSTEMS

1. General

Inertial navigation may be authorised in an air operator's operations specifications (OpSpecs). For the holders of an OpSpec, inertial navigation may be used to satisfy the requirements for navigation in airspace where minimum navigation performance specifications apply. The inertial navigation system (INS) or inertial reference system (IRS) and its installation must be certified by the Director as meeting the airworthiness standards prescribed in Part 21.

Notes –

- 1. *Airworthiness requirements will be satisfied provided that –*
 - (a) the equipment has been installed to the manufacturer's requirements;*
 - (b) the installation is listed in the aircraft type certificate or has a supplemental type certificate for the specific aircraft type;*
 - (c) there is a flight manual supplement covering any system limitations; and*
 - (d) the system is included in the operator's maintenance programme.*
- 2. *Outside SA (for example, in Europe and over the North Atlantic) other State authorities might require navigation performance different to that required by these standards.*

2. Minimum performance for operational approval

- (1) An INS/IRS shall meet the following criteria for operational approval and shall be maintained to ensure performance in accordance with the criteria –

- (a) with a 95% probability the radial error rate is not to exceed 2 nm per hour for flights up to 10 hours duration; and
 - (b) with a 95% probability the cross-track error is not to exceed ± 20 nm and along track error is not to exceed ± 25 nm at the conclusion of a flight in excess of 10 hours.
- (2) The INS/IRS should have the capability for coupling to the aircraft's autopilot to provide steering guidance.
- (3) The navigation system should have the capability for updating the displayed present position.

3. Serviceability requirements

- (1) An INS/IRS may be considered as serviceable for navigation purposes until such time as its radial error exceeds $3 + 3t$ nm (t being the hours of operation in the navigation mode).
- (2) Maintenance corrective action must also be taken when an INS/IRS is consistently providing radial error rates in excess of 2 nm per hour and/or track and along track errors in excess of the tolerance given at subparagraph (1) on more than 5% of the sectors flown.

4. System performance monitoring

The operator is to monitor and record the performance of INS/IRS and may be required to provide details of the system accuracies and reliabilities from time to time.

5. Navigation criteria

Navigation using INS/IRS as the primary navigation means is permitted in accordance with the following conditions –

- (a) initial confidence check. The INS/IRS must be checked for reasonable navigation accuracy by comparison with ground-referenced radio navigation aids (which may include ATC radar) before proceeding outside the coverage of the short range radio navigation aids system;
- (b) maximum time –
 - (iii) single INS/IRS –
 - (aa) the maximum operating time since the last ground alignment is not to exceed 10 hours;
 - (bb) on flights of more than 5 hours, any route sector may be planned for navigation by INS/IRS within the appropriate time limits (given in (c) below) but contingency navigation procedures must be available in the event of an INS/IRS inflight unserviceability which would preclude the aircraft's operation on a subsequent route sector for which area navigation is specified; and

- (cc) INS/IRS may be used as a sole source of tracking information for continuous period not exceeding –
 - (A) 3 hours in controlled airspace other than oceanic control area (OCA); or
 - (B) 5 hours in OCA or outside controlled airspace (OCTA);
- (iv) two or more INS/IRS –
 - (aa) if, during a flight, 10 hours elapsed time since the last ground alignment will be exceeded, ground alignment is to be included in the pre-flight flight deck procedures prior to pushback/taxi for departure; and
 - (bb) INS/IRS may be used as the sole source of tracking information for continuous periods not exceeding –
 - (A) 5 hours in controlled airspace other than OCA; or
 - (B) 12 hours in OCA or OCTA;

Notes –

1. *Provided that the use of INS/IRS as the sole means of navigation does not exceed the time limit, the aircraft may be operated for longer periods using the INS/IRS with either manual or automatic updating.*
2. *The 5 hour limit on single INS/IRS ensures 99.74% (3 sigma) probability that loss of satisfactory navigation capability will not occur with equipment mean time between failures (MTBF) of approximately 1900 hours. If the demonstrated MTBF exceeds 2000 hours, the maximum time may be increased.*

- (c) updating inertial present position in flight is permitted in the following instances only –
 - (i) manually –
 - (dd) overhead a VOR beacon;
 - (ee) within 25 nm of a co-located VOR/DME beacon; or
 - (ff) over a visual fix when at a height not more than 5 000 ft above the feature.
 - (ii) automatically –
 - (dd) within 200 nautical miles of a DME site when the aircraft's track will pass within 140 nm of the site;
 - (ee) within 200 nm of both DME sites for a DME/DME Fix;
 - (ff) from a co-located VOR/DME beacon provided that updates from a receding beacon are not accepted when the beacon is more than 25 nm from the aircraft;

Notes:

1. *En route VOR and DME sites separated by not more than 500 metres are considered to be co-located.*
2. *DME slant range error correction might be necessary in some circumstances.*
3. *Updating a present position from a visual fix may not be planned for IFR flights.*
4. *A receding beacon is one from which the distance to the aircraft is increasing.*
5. *Updating in other circumstances (for example, over a NDB) will not provide sufficient accuracy to ensure that the INS/IRS operates within the prescribed tolerances for navigation.*
6. *Because INS/IRS are essentially accurate and reliable, and ground alignment is more accurate than in-flight updating, updating of present position is usually not warranted especially during the initial few hours of operation. However, INS/IRS errors generally increase with time and are not self-correcting. Unless the error is fairly significant (for example, more than 4 nm/hr along track or 2 nm/hr cross track) it may be preferable to retain the error rather than manually update.*

(d) Limitation on use. Wherever track guidance is provided by radio navigation aids, the PIC must ensure that the aircraft remains within the appropriate track-keeping tolerances of the radio navigation aids. INS/IRS is not to be used as a primary navigation reference during IFR flight below lowest safe altitude (LSALT); and

(e) Pre-flight and *en route* procedures. The following practices are required –

(i) new data entries are to be cross-checked between at least two flight crew members for accuracy and reasonableness, or, for single-pilot operations, an independent check (for example, of INS/IRS-computed tracks and distances against the flight plan) must be made;

(ii) as a minimum, position and tracking information is to be checked for reasonableness (confidence check) in the following cases:

(aa) prior to each compulsory reporting point;

(bb) at or prior to arrival at each *en route* way point during RNAV operation along RNAV routes;

(cc) at hourly intervals during area type operation off established RNAV routes; and

(dd) after insertion of new data.

6. Operating criteria

(1) For two or more INS/IRS installations –

(a) if one INS/IRS fails or can be determined to have exceeded a radial error of $3+3t$ nm, operations may continue on area navigation routes using the serviceable system(s) in accordance with the navigation criteria applicable to the number of INS/IRS units remaining serviceable;

(b) if –

- (i) the difference of pure inertial readouts between each pair of INS/IRS is less than $1.4 (3+3t)$ nm, no action is required;
- (ii) the difference of pure inertial readouts between any pair of INS/IRS exceeds $1.4 (3+3t)$ nm and it is possible to confirm that one INS/IRS has an excessive drift error, that system should be disregarded and/or isolated from the other systems) and the apparently serviceable system(s) should be used for navigation; and

Note – This check and its isolation action are unnecessary if a multiple INS/IRS installation is protected by a serviceability self-test algorithm.

- (iii) if neither condition (i) or (ii) can be satisfied, another means of navigation should be used, and the PIC must advise the appropriate ATS unit.

(2) For single INS/IRS installations, if the INS/IRS fails or exceeds the serviceability tolerance

–

- (a) the PIC must advise the appropriate ATS unit of INS/IRS failure;
- (b) another means of navigation is to be used; and
- (c) the aircraft is not to begin a route sector for which area navigation is specified unless it is equipped with an alternative, serviceable, approved area navigation system.

(3) Autopilot coupling to the INS/IRS should be used, whenever practicable, if this feature is available. If for any reason the aircraft is flown without autopilot coupling, the aircraft is to be flown within an indicated cross-track tolerance of ± 2 nm. In controlled airspace the ATS unit is to be advised if this tolerance is exceeded.

7. Navigation tolerances

- (1) The maximum drift rate expected from INS/IRS is 2 nm per hour (2 sigma probability). For the purposes of navigation and determining aircraft separation, the 3 sigma figure of 3 nm is allowed so that the maximum radial error with 3 sigma confidence equals $3+3t$ nm, where t equals the time in hours since the INS/IRS was switched into the navigation mode.
- (2) DME and other inputs can automatically influence the INS/IRS to improve the accuracy of its computed position. The pilot may also insert known position co-ordinates to update the INS/IRS. Therefore, if the system is updated with known position information the position error is reduced and the INS/IRS can be assumed to operate within the radial error tolerance of $3+3T$ nm where T is the time (hours elapsed since the last position update).
- (3) The accuracy of the data used for updating must be considered. The navigation aid positions used for updating inertial present position are accurate to within 0.1 nm. However, the aircraft in flight cannot be “fixed” to the same order of magnitude. The accuracy of the position fix is taken as ± 3 nm radial error.

- (4) Because the INS/IRS error, the navigation aid position accuracy and the position fix errors are independent of each other, the total radial error is determined by the root-sum-square method =

$$\text{Total error} = \sqrt{(3 + 3T)^2 + 0.1^2 + 3^2} \text{ nm}$$

- (5) The effect of navigation aid position accuracy on the total error is negligible, and so,

$$\begin{aligned} \text{Total error} &= \sqrt{(3 + 3T)^2 + 3^2} \text{ nm} \\ &= \sqrt{(1 + T)^2 + 1} \text{ nm} \end{aligned}$$

Substituting values for T at time of update, total

radial error =	4,2 nm
after 1 hour =	6,7 nm
after 2 hours =	9,5 nm
after 3 hours =	12,4 nm
after 4 hours =	15,3 nm
after 5 hours =	18,2 nm
after 6 hours =	21,2 nm

- (6) If two INS/IRS are installed and the aircraft is navigated by averaging, the inertial present position formula for the total radial error given in sub-paragraph (4) is modified by multiplying by =

$$\frac{1}{\sqrt{2}} = (= 0,7)$$

- (7) If three INS/IRS are installed and “triple mix” is used, the total radial error is further reduced. For simplicity for navigation and aircraft separation, the tolerances applicable to dual installations apply and the third system provides redundancy.

135.07.28 LOW VISIBILITY OPERATIONS

1. Low visibility operations – certification overview

- (1) Low visibility operations (LVO) are comprised of lower-than-normal visibility minima take-off (LVTO) and lower-than-normal weather and visibility minima approach operations (CAT II/III approaches). An applicant for an operations specification (OpSpec) authorising low visibility operations shall meet the certification criteria contained in this TS.

Note – To assist an operator in the certification process and establishing operational procedures for CAT II/III operations, SACAA has placed TGM CA AOC-AC-FO-011 Category II and III Operations on its website.

- (2) An operator shall only conduct LVO if –
- (a) the operator has the appropriate OpSpecs and its aeroplanes are certificated for LVO and are equipped in accordance with this Part or an equivalent regulation accepted by the Director;
 - (b) the operator has an approved training programme and the flight crews and supporting crews, as applicable, are trained and tested in LVO;
 - (c) the operator has established procedures to ensure LVO are conducted to the highest possible level of safety;
 - (d) a suitable system for recording approach or automatic-landing success and failure is established and maintained to monitor the overall safety of the operation;
 - (e) the ground-based equipment meets the LVO criteria for safe operation; and
 - (e) the low visibility operational zone is maintained in a sterile condition during LVO.

Note – Failure to meet any of the above criteria or the certification standards described herein is cause for LVO OpSpecs to be suspended.

- (3) The available approvals for LVTO operations are dependent upon the aircraft category and aerodrome equipment and may be –
- (a) RVR not lower than 75 m if using an approved lateral guidance system; and
 - (b) RVR not less than 150 m for Category A, B and C aeroplanes or RVR not less than 200 m for Category D and E aeroplanes if not using an approved lateral guidance system.
- (4) The categories referred to in paragraph (3) above are established on the basis of 1.3 times the stall speed of the aeroplanes in the landing configuration at maximum certificated landing mass and are as follows –
- (a) Category A – less than 91 knots indicated airspeed;
 - (b) Category B – 91 knots indicated airspeed or more, but less than 135 knots indicated airspeed;
 - (c) Category C – 135 knots indicated airspeed or more, but less than 141 knots indicated airspeed;
 - (d) Category D – 141 knots indicated airspeed or more, but less than 166 knots indicated airspeed; and
 - (e) Category E – 166 knots indicated airspeed or more, but less than 211 knots indicated airspeed.

Note – In the event of low-visibility procedures being in force, the Air Traffic and Navigation Services Company will report to the Director details of all aeroplanes attempting an approach, the

RVR visibility at the time, and the outcome of the approach attempt. This information will be used by the CAA in investigation of approaches attempted outside of the operator's equipment and PIC limitations or approval.

(5) CAT II/III limits may be found technical standard 91.07.5 of Document SA-CATS 91.

2. Low visibility operations – equipment requirements

- (1) The operator of an aeroplane shall include the minimum equipment which shall be serviceable at the commencement of a LVTO or a CAT II or III approach in its operations manual. Details of required equipment for CAT II/III may be found in TGM CA AOC-AC-FO-011 Category II and III Operations, Chapter 2 - Aircraft Requirements.
- (2) An operator shall establish procedures to ensure that the PIC satisfies him or herself that the status of the aeroplane and the relevant airborne systems thereof is appropriate for the specific operation to be conducted.

3. Low visibility operations – facilities requirements

- (1) The specific facilities required to ensure safe LVO involve both the aerodrome and the operator.
- (2) No PIC of an aeroplane shall use an aerodrome for LVO, unless the aerodrome is approved for such operations by the appropriate authority of the State in which the aerodrome is located.
- (3) The operator of an aeroplane intended to be used in LVO shall verify that low-visibility procedures have been established and are in force at the aerodromes where such operations are to be conducted.
- (4) Criteria for the approval of an aerodrome to allow LVO to be conducted are –
 - (a) for low visibility take-offs with RVR of ≥ 150 m (≥ 200 m for Category D and E aeroplanes) to < 400 m –
 - (i) multiple RVR sources;
 - (ii) runway high intensity edge lights spaced 60 m or less;
 - (iii) runway centreline lights spaced 15 m or less and marking;
 - (iv) runway electrical multi-looping (multi-circuit design); and
 - (v) a secondary power supply;
 - (b) for low visibility take-offs with RVR ≥ 75 m to < 150 m (< 200 m for Category D and E aeroplanes), in addition to those noted in sub-paragraph (a), a functioning lateral guidance system for take-off; and

Note – For an aerodrome to be approved for LVTO operations, additional criteria are applied based on guidance in ICAO Document 9476, Manual of Surface Movement Guidance and Control Systems, and Document 9365, All Weather Operations Manual. It is up to the operator to ensure an aerodrome is suitably qualified for LVO before using it.

- (c) for CAT II/III operations, refer to TGM CA AOC-AC-FO-011 Category II and III Operations, Chapter 4 - The Airport.
- (5) The requirements for the operator to conduct LVO are –

- (a) the establishment of procedures and instructions to be used for LVTO and Category II and III operations that will ensure-
 - (i) the PIC establishes that the status of the visual and non-visual facilities is sufficient prior to commencing a LVTO or a Category II and III approach; and
 - (ii) the PIC confirms with the air traffic service unit, before commencing a LVTO or a Category II and III approach, that appropriate low-visibility procedures are in force and the aircraft has been issued the appropriate clearances;
 - (iii) a 90 m visual segment is available from the cockpit at the start of the take-off run; and
 - (iv) the required RVR value has been achieved for all of the relevant RVR reporting points.
- (b) the flight deck crew members are properly qualified to carry out a low-visibility take-off or a Category II and III approach; and
- (c) the PIC ensures there are no MEL items or other aeroplane unserviceabilities that would disqualify the flight from attempting a LVO.

3. Low visibility operations – personnel requirements

- (1) Criteria for pilot qualifications and crew certification to allow CAT II/III operations to be conducted are covered in TGM CA AOC-AC-FO-011 Category II and III Operations, Chapter 3 - Operation of the Aircraft.
- (2) Each operator applying for authorisation to conduct LVO shall establish and maintain an initial and recurrent ground and flight training programme as specified in section 2, 2.8 of TS 135.03.3 that will ensure its flight crew are proficient in operating in such environment and shall publish its LVO training programme in its operations manual.
- (3) The flight deck crew qualification requirements are specific to the operator and the type of aeroplane operated and the operator shall ensure that each flight deck crew member completes a flight check (skills test) before conducting LVTO or Category II or III operations and that subsequent proficiency checks include LVO take-offs and approaches.

135.07.29 OPERATIONS WITH HEAD-UP DISPLAYS OR ENHANCED VISION SYSTEMS

1. Introduction

- (1) This TS provides guidance for the approval for use of head-up displays (HUD) and enhanced vision systems (EVS) intended for installation and operational use in aircraft engaged in commercial operations. HUD and EVS may be installed and operated to enhance situational awareness or to obtain an operational credit such as lower minima for take-off, approach or landing operations. HUD and EVS may be installed separately or together as part of a hybrid system. Use of these systems during instrument flight and any operational credit gained from their use requires approval from the Director.
- (2) No pilot may use a HUD or EVS in flight in IMC unless such pilot has received the training and checking specified in this TS.
- (3) No operator shall permit anyone to use a HUD or EVS in flight under IFR in an aircraft so equipped unless the aircraft has been approved for such flight as specified in this TS.

2. Head-up displays

- (1) HUD may be used for the following purposes –
 - (a) to supplement conventional flight deck instrumentation in the performance of_a particular task or operation. The primary cockpit instruments remain the primary means for manually controlling or manoeuvring the aircraft; and
 - (b) as a primary flight display –
 - (i) information presented by the HUD may be used by the pilot in lieu of scanning head-down displays. Operational approval of a HUD for such use allows the pilot to control the aircraft by reference to the HUD for approved ground or flight operations; and
 - (ii) information presented by the HUD may be used as a means to achieve additional navigation or control performance. Operational credits, in the form of lower minima, for HUD used for this purpose may be approved for a particular aircraft or automatic flight control system. Additional credit may also be allowed to conduct operations with HUD in situations where automated systems are otherwise used.
- (2) Ground training in the use of the HUD shall be accomplished at an approved training organisation (ATO) or as part of an approved training programme. The programme shall include, as a minimum, the following –
 - (a) an understanding of the HUD and symbology;
 - (b) HUD limitations and normal procedures, including maintenance and operational checks performed to ensure normal system function prior to use;
 - (c) failure modes of the HUD and the impact of the failure modes or limitations upon crew performance;
 - (d) consideration of the potential for loss of situational awareness due to "tunnel vision" (also known as cognitive tunnelling or attention tunnelling); and
 - (e) any effects that weather, such as low ceilings and visibilities, may have on the performance of a HUD.
- (3) Flight training of at least two hours shall be accomplished using an aircraft or flight_simulation training device (FSTD) equipped with the same type of HUD to be used in the aircraft. The training shall consist of normal, abnormal and emergency use of the equipment throughout all flight phases, a variety of take-off and approach conditions and shall include –
 - (a) pilot seat adjustment to attain and maintain appropriate viewing angles and verification of HUD operating modes;
 - (b) operations during critical flight events (ACAS TA/RA, upset and wind shear recovery, engine or system failure, etc);

- (c) crew coordination, monitoring and verbal call-out procedures for single HUD installations with head-down monitoring for pilot-not-equipped with HUD and head-up monitoring for pilot-equipped with HUD;
- (d) crew coordination, monitoring and verbal call-out procedures for dual HUD installations with use of the HUD by the pilot flying the aircraft and either head-up or head-down monitoring by the other pilot; and
- (e) use during low visibility operations, including taxi, take-off, instrument approach and landing in both day and night conditions. This training should include the transition from head-down to head-up and head-up to head-down operations.

3. Enhanced vision systems

- (1) Enhanced vision systems (EVS) allow the pilot to view an image of the external scene obscured by darkness or other visibility restrictions which –
 - (a) may improve situational awareness;
 - (b) may allow pilots to detect terrain or obstructions on the runway or taxiways;
 - (c) may provide visual cues to enable earlier runway alignment and a more stabilized approach; and
 - (d) may also be used to obtain approval to use reduced visibility minima when the images are presented into the pilot's external field of view on a HUD without significantly restricting that view.
- (2) For an operator who wishes to use EVS in IFR flight, EVS ground training shall be accomplished at an ATO or as part of an approved training programme. The programme shall include, as a minimum, the following –
 - (a) an understanding of the system characteristics and operational constraints;
 - (b) normal procedures, controls, modes and system adjustments;
 - (c) EVS limitations;
 - (d) failure modes of the EVS and the impact of the failure modes or limitations upon crew performance, in particular, for two-pilot operations; and
 - (e) any effects that weather, such as low ceilings and visibilities, may have on the performance of an EVS.
- (4) For an operator who wishes to use EVS in IFR flight, flight training shall be accomplished using an aircraft or FSTD equipped with the same type of EVS to be used in the aircraft. The training shall consist of normal, abnormal and emergency use of the equipment throughout all flight phases, a variety of approaches and take-off conditions and shall include –
 - (a) enhanced vision display during low visibility operations, including taxi, take-off, instrument approach and landing and system use for instrument approach procedures in both day and night conditions;
 - (b) crew coordination and monitoring procedures and pilot call-out responsibilities;
 - (c) transition from enhanced imagery to visual conditions during the runway visual acquisition; and

- (d) rejected landing due to loss of visual cues of the landing area, touchdown zone or rollout area.

4. HUD and EVS approval

- (1) An operator shall obtain operational and airworthiness approval for the use of a HUD or EVS in IFR flight.
- (2) For enhanced situational awareness, the installation and operational procedures shall ensure that EVS operations do not interfere with normal procedures or the operation or use of other aircraft systems.
- (3) HUD or EVS, as applicable, installed in aircraft in the State of Manufacture shall meet the airworthiness requirements of such State. Provided an owner or operator can submit evidence of meeting the requirements of the State of Manufacture, airworthiness approval for the use of the HUD or EVS, as applicable, in that aircraft shall be given.
- (4) Prior to installing a HUD or EVS, as applicable, as a retrofit, an owner or operator shall contact the SACAA to determine the airworthiness requirements associated with its approval for use.
- (5) An airworthiness approval issued to an operator for an aircraft shall be valid for any other aircraft of the same type operated by such operator: Provided the HUD or EVS equipment, as applicable, is the same in each aircraft.
- (6) An airworthiness approval issued to an aircraft type may be extended to other aircraft types: Provided the Director is of the opinion that the other aircraft types have sufficient commonality with the approved aircraft and the HUD or EVS equipment, as applicable, is the same in all the aircraft.
- (7) Pilots shall pass a knowledge test following the ground training and a skills test following the flight training, both of which shall be administered by the operator or an authorised person. Upon successful completion of the skills test, the operator shall record the candidate's qualification to operate with a HUD or EVS, as applicable, in his or her training records.
- (8) Annual recurrent training in the use of a HUD or EVS, as applicable, shall be accomplished.

135.07.30 OPERATIONS WITH ELECTRONIC FLIGHT BAGS

1. Introduction

- (1) This TS provides guidance for the approval for use of installed and portable electronic flight bags (EFB).
- (2) Installed EFBs may be incorporated during the aeroplane type design, by a change to the type design or added by a supplemental type certificate.
- (3) Portable EFBs are not considered to be part of the certified aeroplane configuration and do not require airworthiness approval.

Note – Refer to section 2 for additional information concerning portable EFBs.

2. Airworthiness approval

- (1) Portable EFBs that do not require airworthiness approval –

- (a) are generally commercial-off-the-shelf (COTS)-based computer systems used for aircraft operations (e.g. laptop, tablet PC);
- (b) are not attached to an aeroplane mounting device;
- (c) are considered to be a controlled portable electronic device (PED);

Note.— A controlled PED is a PED that is subject to administrative control by the company. This will include, inter alia, tracking the location of the devices to specific aeroplanes or persons and ensuring that no unauthorized changes are made to the hardware, software or databases. A controlled PED will also be subject to procedures to ensure that it is maintained to the latest amendment state.

- (d) may only connect to aircraft power through a certified power source;

Note— The EFB power source should be designed such that it may be deactivated at any time. Where there is no possibility for the flight crew to quickly remove or unplug the power to the EFB system, a clearly labelled and conspicuous means (e.g. on/off switch) should be provided. Circuit breakers are not to be used as switches; their use for this purpose is prohibited.

- (e) are normally without aeroplane data connectivity except under specific conditions; and

Notes — Data connectivity of the EFB to other aeroplane systems is not authorized except if the EFB system is connected to –

1. *a system completely isolated from the avionics/aeroplane systems (e.g., EFB system connected to a transmission medium that receives and transmits data for Aircraft Administrative Communications (AAC) purposes for usage on the ground only); and*
2. *a certified data link to receive data only from aeroplane systems, where the data link, through the certification process, has an approved security device to protect the aeroplane systems from receiving any data from the EFB system and from the installation or use of unauthorized applications and data. Through the certification process, this data link should also have been demonstrated to protect the installed aeroplane systems from adverse effects due to EFB system failures. Subject to the above provisions, there is no further evaluation required when connecting the EFB system to the aeroplane data link port.*

- (f) shall be secured during critical phases of flight.

- (2) Even though portable EFBs do not require an airworthiness approval as they are “non-installed equipment”, EMI demonstrations, batteries/power sources, data connectivity and rapid depressurization shall be assessed if the Director so determines.
- (3) For EFBs other than those addressed in paragraph (1), the entire EFB, or some elements of the EFB, shall require an airworthiness approval. Elements to be subject to airworthiness approval are determined upon analysis of their interface with aeroplane systems and equipment. These EFBs shall be included as part of the minimum equipment list (MEL), if applicable.
- (4) EFBs integrated into the aeroplane as part of its initial design or installed later as a retrofit in accordance with the requirements of the State of Manufacture shall be given approval: Provided the operator can submit evidence of having met the requirements of the State of Manufacture.

- (5) For aeroplanes without the evidence specified in paragraph (4), an operator shall contact the SACAA to determine the airworthiness requirements associated with its approval for use prior to installing an EFB as a retrofit.

3. Operational approval

- (1) An operator transitioning to a paperless flight deck (i.e., removal of charts, manuals, etc.) shall complete the requirements specified in paragraph's (2) to (6), inclusive, prior to operating with an EFB.
- (2) Operational approval is contingent on the operator completing ground training for personnel using the EFB system. The programme shall include, as a minimum, –
- (a) an overview of the system architecture;
 - (b) pre-flight checks of the system;
 - (c) limitations of the system;
 - (d) the use of each operational function on the EFB;
 - (e) restrictions on the use of the system, including when some or all of the EFB functions are not available;
 - (f) the conditions, including phases of flight, under which the EFB should not be used;
 - (g) procedures for cross-checking data entry and computed information;
 - (h) human performance considerations on the use of the EFB; and
 - (i) additional training for new applications, new features of current applications or changes to the hardware configuration.
- (3) EFB operations with no paper backup shall have a means of mitigation against the effects of a failure or malfunction of the EFB. Mitigation against EFB failure or impairment may be accomplished by a combination of –
- (a) system design;
 - (b) separate and backup power sources for the EFB;
 - (c) redundant EFB applications hosted on different EFB platforms;
 - (d) paper products carried by selected crew members;
 - (e) complete set of paper backups on the flight deck; and/or
 - (f) procedural means.
- (4) The operator shall assign responsibility for the administration and physical control of EFBs and the associated software; in particular, the activation of amendments to the hardware and software.
- (5) The operator shall ensure that the EFB is protected from unauthorized intervention.
- (6) The operator shall ensure that the EFB is maintained in accordance with the manufacturer's recommended programme. The operator shall establish procedures for action to be taken when an EFB is out of service unless provided for in a MEL.
- (7) Prior to use of a portable EFB, an assessment shall be made of how the device will be used on the flight deck. Safe stowage, crashworthiness, security and use under normal environmental conditions, including turbulence, shall be addressed by the operator.

- (8) Whether the EFB is portable or integrated with the aeroplane, the operator shall carry out an assessment of the human-machine interface and aspects of crew coordination when using the EFB. Whenever possible the EFB/user interface should be consistent with, but not necessarily identical to, the flight deck design philosophy. The assessment should include –
- (a) general considerations including flight crew member workload, integration of the EFB into the flight deck, display and lighting issues, system shutdown and system failures;
 - (b) physical placement issues, including stowage area, use of unsecured EFBs, design and placement of the mounting cradle;
 - (d) consideration of possible interference with aeroplane controls, outside vision, view of other flight deck displays, oxygen mask access, egress, crew cooling and speaker sound;
 - (e) software considerations, including ease of access to common and time-critical system functions, consistency of symbols, terms and abbreviations, legibility of text, system responsiveness, use of colour, display of system status, error messages, management of multiple applications and use of active regions;
 - (f) hardware considerations, including controls and input devices and flight crew accessibility to these devices; and
 - (g) application-specific considerations, including organization and appearance of information, system detection of data entry errors and user interaction with applications.
- (9) If an EFB generates information similar to that provided by existing flight deck systems, procedures should clearly identify –
- (a) which information source will be primary;
 - (b) which source will be used for back-up information;
 - (c) under what conditions the back-up source will be used; and
 - (d) what actions will be taken when information provided by an EFB does not agree with that from other flight deck sources or, if more than one EFB is used, when one EFB disagrees with another.
- (10) Upon receiving airworthiness approval and meeting the requirements of paragraph's (2) to (9), inclusive, the operator shall undergo a six-month self-evaluation period during which paper backups of the materials on the EFB shall be carried. The back-up paper materials shall be readily available to the flight crew members during flight time.
- (11) If, following the six-month evaluation period, the operator is satisfied that the equipment and procedures are adequate and the crew members, maintenance personnel and other persons involved in the use of the EFB are sufficiently trained and knowledgeable, the operator shall submit a request to the SACAA seeking approval to use the EFB.
- (12) The SACAA assessment of an application to use EFBs will be based upon –
- (a) confirmation that the requirements of paragraphs (2) to (9), inclusive, have been met;
 - (b) a demonstration of system reliability and that information provided will not be inaccurate or misleading;

- (c) that the operator has established a means to carry out quality assurance approval of data content prior to installation on the EFB; and
 - (d) satisfactory completion of a demonstration flight using the EFB.
- (13) The authorisation to use EFBs shall contain any restrictions or limitations that the Director deems necessary in the interests of safety.
- (5) If the EFB provides electronic displays that replace paper products formerly required for safe flight operations or is a source for other required information or displays, operations of the EFB should be described in the operations manual.

135.07.32 CARRY-ON BAGGAGE

Procedures for stowing of carry-on baggage

Procedures established by an operator to ensure that carry-on baggage is adequately and securely stowed shall take account of the following –

- (a) each item carried in a cabin must be stowed only in a location that is capable of restraining it;
- (b) mass limitations placarded on or adjacent to stowages shall not be exceeded;
- (c) underseat stowage areas shall not be used unless the seat is equipped with a restraint bar and the baggage is of such size that it may adequately be restrained by this equipment;
- (d) items shall not be stowed in toilets or against bulkheads that are incapable of restraining articles against movement forwards, sideways or upwards and unless the bulkheads carry a placard specifying the greatest mass that may be placed there;
- (e) baggage placed in lockers shall not be of such size that they prevent latched doors from being closed securely;
- (f) baggage shall not be placed where it will impede access to emergency equipment; and
- (g) checks shall be made before take-off, before landing and whenever the PIC illuminates the fasten seat belts sign, or otherwise so orders, to ensure that baggage is stowed where it cannot impede evacuation from the aircraft or cause injury by falling, or other movement, as may be appropriate to the phase of flight.
- (h) all baggage which is required to be brought into the cabin area shall be –
 - (i) of a size as established by the operator but shall not exceed the dimensions 56cm x 36cm x 23cm; and
 - (ii) of a weight as established by the operator but shall not exceed 7kg per item.

135.07.36 BRIEFING OF PASSENGERS

1. Standard safety briefing

The standard safety briefing shall consist of an oral briefing provided by a crew member designated by the operator or by audio or audio-visual means in at least the English language or as required by the

Director, which includes the following information as applicable to the aeroplane, equipment and operation –

Note – The following briefing points presume the aeroplane is equipped with a PA system. Provided that the information is conveyed to each passenger at some point to cover each phase of flight, the associated information need not be communicated at the phase of flight indicated.

- (a) prior to take-off –
 - (i) when, where, why and how carry-on baggage is required to be stowed;
 - (ii) the fastening, unfastening, adjusting and general use of safety belts or safety harnesses;
 - (iii) when seat backs must be secured in the upright position and tray tables must be stowed;
 - (iv) the location and operation of emergency exits;
 - (v) the floor proximity emergency escape path lighting system if applicable;
 - (vi) the location, purpose of, and advisability of reading the safety features card;
 - (vii) the regulatory prohibition on smoking on board the aeroplane at any time;
 - (viii) the location of any emergency equipment the passenger may have a need for in an emergency situation such as the ELT, fire extinguisher, survival equipment, including the means to access it if in a locked compartment, first aid kits and life rafts;
 - (ix) the use of passenger operated portable electronic devices;
 - (x) on pressurized aeroplanes, the location and operation of the fixed passenger oxygen system, including the location and presentation of the masks; the actions to be performed by the passenger in order to obtain the mask, activate the flow of oxygen and correctly don and secure the mask. This briefing may be completed after take-off but prior to reaching 25 000 feet; and
 - (xi) when carried on board, the location, use of and when to inflate life jackets, including how to remove them from stowage/packaging, and a demonstration of the method of donning and inflation. This briefing may be completed after take-off but prior to the overwater portion of the flight;
- (b) after take-off –
 - (i) that smoking is prohibited; and
 - (ii) the advisability of using safety-belts or safety harnesses during flight;
- (c) in-flight when the 'Fasten Seat Belt' sign has been turned on or other advice of the need to fasten safety harnesses for reasons of turbulence –
- (d) prior to landing –
 - (i) carry on baggage stowage requirements;
 - (ii) correct seat back and chair table positioning;
 - (iii) on flights scheduled for four hours duration or more, the location of emergency exits; and
 - (iv) the seat belt requirement; and
- (e) after landing, prior to gate arrival –
 - (i) the need to remain seated with their seat belt fastened until the aeroplane comes to a full stop at the point of deplaning; and
 - (ii) the manner in which they will be assisted or guided to the safest direction and most hazard-free route for passenger movement away from the aeroplane following disembarkment.

Note – The safety message of the briefing may not be diluted by the inclusion of any service information, advertising or non-related comments that would affect the integrity of the safety briefing.

2. Individual safety briefing

The individual safety briefing shall include, as applicable to the situation –

- (a) any information contained in the standard safety briefing and the safety features card that the passenger would not be able to receive during the normal conduct of that safety briefing; and
- (b) additional information to the needs of that person as follows –
 - (i) the most appropriate brace position for that passenger in consideration of his/her condition, injury, stature and/or seat orientation and pitch;
 - (ii) the location to place any service animal that accompanies the passenger;
 - (iii) for a mobility-restricted passenger who needs assistance in moving expeditiously to an exit during an emergency –
 - (aa) a determination of what assistance the person would require to get to an exit;
 - (bb) the route to the most appropriate exit;
 - (cc) the most appropriate time to begin moving to that exit; and
 - (dd) a determination of the most appropriate manner of assisting the passenger;
 - (iv) for a visually impaired person –
 - (aa) detailed information of and facilitating a tactile familiarization with the equipment that he/she may be required to use;
 - (bb) advising the person where to stow his/her cane if applicable;
 - (cc) the number of rows of seats between his/her seat and his/her closest exit and alternate exit;
 - (dd) an explanation of the features of the exits; and
 - (ee) if requested, a tactile familiarization of the exit;
 - (v) for a comprehension-restricted person: while using the safety features card, pointing out the emergency exits and alternate exits to use and any equipment that he/she may be required to use;
 - (vi) for persons with a hearing impairment –
 - (aa) while using the safety features card, point out the emergency exits and alternate exits to use and any other equipment that the person may be required to use; and
 - (bb) communicating detailed information by pointing, face-to-face communication permitting speech reading, pen and paper, through an interpreter or through their attendant;
 - (vii) for a passenger who is responsible for another person on board, information pertinent to the needs of the other person, as applicable –
 - (aa) in the case of an infant –
 - (A) seat belt instructions;
 - (B) method of holding infant for take-off and landing;
 - (C) instructions pertaining to the use of a child restraint system;
 - (D) oxygen mask donning instructions;
 - (E) recommended brace position; and
 - (F) location and use of life preservers, as required.
 - (bb) in the case of any other person –
 - (A) oxygen mask-donning instructions;
 - (B) instructions pertaining to the use of a child restraint system;and
 - (C) evacuation responsibilities; and

- (viii) for an unaccompanied minor, instructions to pay close attention to the normal safety briefing and to follow all instructions. A passenger that has been provided with an individual safety briefing need not be re-briefed following a change in crew if the crew member that provided the individual safety briefing has advised a member of the new crew of the contents of that briefing, including any information respecting the special needs of that passenger. A passenger may decline an individual safety briefing.

3. Passenger preparation for emergency landing

The emergency briefing provided in the event of an emergency where time and circumstances permit shall consist of instructions pertaining to –

- (a) safety belts/safety harnesses;
- (b) seat backs and chair tables;
- (c) carry-on baggage;
- (d) safety features cards;
- (e) brace position (how to brace, when to assume position, how long to remain);
- (f) if applicable, life preservers;
- (g) location of exits;
- (h) if applicable, evacuation procedures for an occupant of a child restraint system; and
- (i) the removal of any other item that may cause harm to passengers during evacuation; i.e. sharp objects, high heeled shoes, pencils, etc.

135.07.37 SAFETY FEATURES CARD

The safety features card shall contain the following information as applicable to the aeroplane and equipment carried –

- (a) general safety information including –
 - (i) smoking is prohibited on board the aeroplane;
 - (ii) each type of safety belt or safety harness installed for passenger use, including when to use, and how to fasten, tighten and release;
 - (iii) where carry-on baggage must be stowed for take-off and landing and any other related requirements and restrictions pertinent to that particular aeroplane; and
 - (iv) correct positioning of seat backs and chair tables for take-off and landing;
- (b) emergency procedures and equipment including –
 - (i) fixed passenger oxygen system showing –
 - (aa) mask location and presentation; the actions to be performed by the seated passenger in order to obtain the mask, activate the flow of oxygen and correctly don and secure the mask; and
 - (bb) priority for persons assisting others with oxygen;
 - (ii) for aeroplanes where flight attendants are not required –
 - (aa) location of first aid kits;
 - (bb) location of fire extinguishers that would be accessible to the passengers;
 - (cc) location of ELTs; and
 - (dd) location of survival equipment and if the stowage compartment is locked, the means of access or location of the key;
 - (iii) passenger brace position for impact, as appropriate for each type of seat and restraint system installed for passenger use; including the brace position for an adult holding an infant;

- (iv) the location, operation and method of using each emergency exit type on the aeroplane, including identification of those emergency exits known to be rendered unusable in a ditching or because of the aeroplane configuration such as a combi configuration;
- (v) the safest direction and most hazard-free escape route for passenger movement away from the aeroplane following evacuation;
- (vi) the attitude of the aeroplane while floating;
- (vii) location of life jackets or equivalent individual flotation devices and correct procedures for removal from stowage/packaging; donning and use of the life jacket or equivalent individual flotation device for adult, child and infant users, including when to inflate;
- (viii) location and use of life rafts;
- (ix) location, removal and use of flotation devices; and
- (x) the form, function, colour and location of any floor proximity emergency escape path lighting system that is installed; and

Note – An operator may, if the safety features card provided by the aeroplane’s manufacturer does not depict some or all of the information required by this subparagraph, convey the missing information to the passengers by means of an oral briefing.

- (c) the safety features card shall be applicable to the aeroplane being operated and shall contain only safety information that is –
 - (i) accurate for the aeroplane type and configuration in which it is carried and in respect of the equipment carried;
 - (ii) presented with clear separation between each instructional procedure. All actions required to complete a multi-action procedure to be presented in correct sequence and the sequence of actions to be clearly identified; and
 - (iii) depicted in a clear and distinct manner.

135.08.1 GENERAL REQUIREMENTS

1. Performance data

(1) Operations Using Other than Approved Performance Data - Contaminated Runway

An operator may elect to use performance data from a source other than the aeroplane flight manual when operating an aeroplane to or from a contaminated runway: Provided –

- (a) the aeroplane shall be operated in accordance with a contaminated runway operations supplement to the flight manual that has been prepared or approved by the aeroplane manufacturer;
- (b) take-off mass limitations may be based on an engine-out condition using a 15-foot screen height, provided the area to be used for first segment climb contains no obstacles taller than 15 feet;
- (c) where the manufacturer permits, stopping distance calculations may include credit for reverse thrust on the operative engine;
- (d) operation at reduced thrust settings shall not be permitted and V_{mc} shall be based on full-rated thrust;
- (e) the approved operations manual shall set out procedures for operations using contaminated runways; and
- (f) pilot and, where applicable, flight operations officer ground training shall address contaminated runway operations.

(2) Operations Using Other than Approved Performance Data – Reciprocating-Engine Aeroplanes in Cargo-only Operations

An operator may elect to use performance data from a source other than the aeroplane flight manual when operating a reciprocating-engine aeroplane during cargo-only operations from or to unprepared surfaces: Provided –

- (a) the operator's approved operations manual sets out the programme for operations involving unprepared surfaces. The programme shall include –
 - (i) pilot-in-command training, checking and experience requirements, which shall include –
 - (aa) at least 100 hours on type;
 - (bb) completion of a course of ground and flight training covering topics such as take-off and landing surface characteristics, obstacle assessment and interpretation of pertinent aeroplane data;
 - (cc) completion of at least 25 hours of line induction involving unprepared surface operations; and
 - (dd) passing a line check covering unprepared surface operations;
 - (b) procedures for company operational approval for unprepared surface operations; and
 - (c) procedures for assessing and operating from/to unprepared surfaces and unfamiliar approach and departure routes.

2. Take-off mass limitations - accelerate-stop distance

An operator may operate a reciprocating-engine aeroplane where the accelerate-stop distance required exceeds the accelerate-stop distance available: Provided the operator restricts the aeroplane to no more than 9 passenger seats being occupied.

3. Net take-off flight path - visual obstacle avoidance

An operator may conduct a departure of an aeroplane without determining net take-off flight path for a reciprocating-engine aeroplane when visual obstacle avoidance is possible: Provided the following conditions are met –

- (1) Obstacle Assessment –
 - (a) the operator shall obtain the best available data concerning obstacles in the proposed take-off path. Transient obstacles (such as construction equipment or moored watercraft, etc.) shall be considered when they are estimated to lie within 300 feet of the centreline of the proposed take-off path; and
 - (b) where the precise height, bearing and distance of an object is not known (such as objects depicted on a topographical map), the operator shall use a reasonable estimate for performance calculations. Calculations shall clearly indicate where estimated information is used;
- (2) Departure Planning –
 - (a) the person responsible for operations or his/her delegate shall establish a company engine-out departure plan using procedures set out in the approved operations manual, including at least the following –
 - (i) obstacle assessment;
 - (ii) aeroplane performance, including turn radii; and
 - (iii) visual reference points to be used during the departure route;
 - (b) prior to commencing a take-off, the PIC shall, in consideration of the current winds, density altitude and aeroplane mass, satisfy himself or herself that the departure plan to be followed

in the event of an engine failure on take-off avoids all obstacles in the departure path by either 35 feet vertically or 300 feet horizontally;

(c) in considering visual contact with the controlling obstacles during the departure phase, an operator shall establish to the satisfaction of the Director that, taking into account flight deck angle and alterations in the field of view during turns, the flight crew will be able to maintain continuous visual contact with all significant obstacles located within the departure route; and

(d) the operator shall retain the departure plan for audit purposes.

135.10.2 COMPONENTS OF SAFETY MANAGEMENT SYSTEM

1. Safety management system training programme

Any individual who meets the training requirements set out in this Technical standard, is deemed to have fulfilled the requirements of CAR 135.06.2 (5).

1.1 Air Service Safety Officer Training Programme

The training programme shall include the at least the learning content reflected below. The training shall ensure an understanding of the concepts listed as well as the ability to implement and maintain them.

Skill	Learning content
Strategic Safety Management	<ol style="list-style-type: none"> 1. The science and philosophy of strategic management. 2. Models of strategic management 3. The factors affecting strategic management 4. Setting of strategic safety objectives and performance targets 5. Development of safety cases or preliminary hazard analysis 6. Aviation safety planning in support of the corporate business plan 7. Monthly and annual aviation safety reporting

Safety Management	<ol style="list-style-type: none"> 1. Safety concepts, science and philosophy. 2. The history of safety. 3. Safety principles and practices 4. Aviation safety management system 5. Integration within disciplines (flight safety, cabin safety, ground safety, technical safety and emergency response disciplines), 6. Role and functions of the stakeholders 7. Behaviour based safety. 8. Safety compliance and application of requirements 9. Safety manager functions in an organization 10. Safety as a management function 11. Measurement of effectiveness 12. Contractor safety program management 13. Conformance monitoring 14. Development of safety policies, procedures and practices in line with regulations 15. Identify, develop and maintain a risk assessment system Develop risk profile, interpret risk data, producing and presenting recommendations 16. Define and describe safety risk methodology 17. Development of safety performance indicators and targets. 18. Change management. 19. Safety Communication
Skill	Learning content
Safety Legislation	<ol style="list-style-type: none"> 1. Applicable aviation acts and regulations as well as safety acts and regulations
Safety Structure, Responsibilities and Accountability	<ol style="list-style-type: none"> 1. Safety responsibilities and accountability of the various positions within the Organizational structure 2. Developing and implementing an effective aviation safety organizational structure 3. Defining safety responsibilities and accountability Measuring the effectiveness of the safety organization
Auditing	<ol style="list-style-type: none"> 1. Role of safety officer in auditing (mainly contractors) 2. Developing, producing and monitoring an audit schedule 3. Audit planning and preparation 4. Conducting audits 5. Implementation of effective corrective measures including monitoring of its success

<p>Safety Management</p> <p>Risk</p>	<ol style="list-style-type: none"> 1. Risk management models 2. Identification of hazards and its consequences. 3. Identification of the risk of consequences in terms of likelihood (probability) and severity (impact) 4. Assessing risk and loss exposures and prioritization 5. Methods for risk control (Mitigation) and prevention strategies 6. Defining Safety hazards 7. Analysing hazard information from all sources available 8. Determine the probability, frequency and severity of risk occurrence 9. Defences (counter measures) and their role.
<p>Accident / Incident Investigation</p>	<ol style="list-style-type: none"> 1. Concepts covered by Annex 13 2. Accident / incident (occurrence) reporting and its role in the safety management system 3. Investigation of occurrences not required to be investigated by the Accident and Investigation Authority.
<p>Safety Awareness</p>	<ol style="list-style-type: none"> 1. Defining requirements for safety awareness (who, what, when, how) 2. Means for improving awareness. 3. Identification of media and means available 4. Planning for delivery of a safety awareness project

Skill	Learning content
Safety Research	<ol style="list-style-type: none"> 1. Process of safety research 2. Sources of information for application in safety research 3. Questionnaires and data management techniques. 4. Information analysis
Aviation Safety Management Information	<ol style="list-style-type: none"> 1. Development of aviation safety management information system (Library/database) 2. Safety reporting and presentation of safety information
Communication	<ol style="list-style-type: none"> 1. Written: Report writing and presentation 2. Verbal: Motivation, negotiation and logical presentation
Aviation Safety Administration	<ol style="list-style-type: none"> 1. safety administration system (document and system management)
Financial Management	<ol style="list-style-type: none"> 1. Fundamentals of financial management 2. Formulation of budget 3. Budget monitoring 4. Cost benefit of safety implementation (ALARP).
Project Management	<ol style="list-style-type: none"> 1. Basic project management skills 2. Organization and coordination of resources.
Emergency Response Planning	<ol style="list-style-type: none"> 1. The concept of emergency response The concept of emergency response planning 2. Emergency response principles and practices 3. The role, functions and responsibilities of the different role players in emergency response 4. The role and functions of the different centres in emergency response 5. Design and management of emergency response exercises 6. Development and implementation of emergency response procedures

1.2 Safety Management System training programme

An operator shall provide safety management system training in accordance with the operator's SACAA approved induction training program for all staff who interact with the SMS. Content of the training program shall at least include the components which affect the scope of their assigned duties as specified

1.3 Organizations entitled to provide air service safety officer training:

- (a) Aviation Training Organizations approved by the SACAA in terms of Part 141 of the CAR with SMS included as part of their scope of training.
- (b) International Training Organizations acceptable to the SACAA, e.g. ICAO and IATA, etc.
- (c) An operator with an approved training programme.

- (d) Any other accredited or accepted training course acceptable to the Director.

1.4 SMS Instructor qualification requirements:

SMS instructors for air service safety officer training must comply with the following. They must have:

- (a) successfully obtained a Train the Trainer qualification acceptable to the Director;
- (b) completed an approved SMS course in accordance with the syllabus prescribed in technical standard 135.10.2;
- (c) at least 2 years relevant industry experience with emphasis on aviation safety

1.5 Recognition of prior learning:

Recognition of prior learning for specific components of the learning content may be credited by the Director provided the candidate can demonstrate satisfactory knowledge and/or skills associated with the skills area.

1.6 Required Pass Mark:

A pass mark of 70% is required.

1.7 SMS Recurrent Training

SMS recurrent training is required to be completed when material changes had been effected to the safety management system or when new safety developments must be incorporated.

135.10.4 ESTABLISHMENT AND STRUCTURE OF SAFETY MANAGEMENT SYSTEM

1. General

- (1) While it is accepted that the operator's safety management system (SMS) will be developed in view of the scope and size of the operator, every SMS must be capable of delivering at least the following safety services –
 - (a) an organisational structure that clearly defines the lines of authority throughout the company and all departments to the chief executive officer of the company, identifying in particular, the air safety officer;
 - (b) an effective and timely method of identifying and reporting safety hazards based upon a combination of proactive, reactive and predictive methods of safety data collection;
 - (c) a mechanism for the timely resolution of safety issues on both a short and long term basis and where safety issues are proven to be systemic, an effective way of precluding the likelihood of recurrence;
 - (d) a quality management system designed to monitor on a continuous basis the operational and safety programmes being implemented and make critical assessment as to the effectiveness of such programmes; and
 - (e) where the operator operates aeroplanes weighing in excess of 27 000 kg, such operator shall establish and maintain a flight data analysis programme as part of its safety management system. Where the operator contracts the flight data analysis programme to a

third party such operator remains accountable to the Director for the maintenance of the programme;

Note – Legal guidance for the protection of information from safety data collection and processing systems is contained in ICAO Annex 13, Attachment E.

- (f) safety risk management is a critical part of the safety process and must be expressed in a measurable way by using the following process:
 - (i) the operator shall develop and maintain a formal process for effectively collecting, recording, acting on and generating feedback about hazards in operations, based on a combination of reactive, proactive and predictive methods of safety data collection;

Note – Reactive methods refer to methods of identifying hazards that are based on the investigation of occurrences. Proactive methods aim to use any other information within the organisation for the identification of potential hazards. Predictive methods rely on data that is collected within the organisation that could be used effectively to predict the existence of hazards, usually done by trend analysis.
 - (ii) the operator shall develop and maintain a formal risk management process that ensures analysis (in terms of probability and severity of occurrence), assessment (in terms of tolerability or acceptability) and control (in terms of mitigation) of risks to an acceptable level. The following matrixes should be used for purposes of analysing and assessing risk –

Risk Severity Matrix

Risk Severity definition	Description: Consequence (can lead to)...	Examples of what to look out for...
Category A Catastrophic	One or multiple deaths & complete loss/ destruction of equipment	A major accident.
Category B Hazardous	Serious injuries/Major Damage to equipment	Large reduction in safety margins, physical distress or workload such that the operators cannot be relied upon to perform their tasks accurately or completely.
Category C Major	Minor injuries/ Minor equipment damage	A significant reduction in safety margins, a reduction in the ability of the operators to cope with adverse operating conditions as a result of increase in workload, or as a result of conditions impairing their efficiency.
Category D Minor	Incidents	Operating limitations are breached. Procedures are not used correctly.
Category E Negligible	Negligible/Inconvenience	Few consequences. No safety consequences. Nuisance.

Risk Probability Matrix

Likelihood/ Probability	Description	Examples of what to look out for
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Category		
1	Extremely improbable (Rare)	Almost inconceivable that the event will occur.
2	Improbable (Seldom)	Very unlikely that the event will occur. It is not known that it has ever occurred before.
3	Remote (Unlikely)	Unlikely but could possibly occur. Has occurred rarely.
4	Occasional	Likely to occur sometimes. Has occurred infrequently.
5	Frequent	Likely to occur many times/regularly. Has occurred frequently/regularly.

RISK PROBABILITY	RISK SEVERITY				
	Catastrophic A	Hazardous B	Major C	Minor D	Negligible E
5	5A	5B	5C	5D	5E
4	4A	4B	4C	4D	4E
3	3A	3B	3C	3D	3E
2	2A	2B	2C	2D	2E
1	1A	1B	1C	1D	1E

Risk assessment Index	Suggested Criteria
5A, 5B, 5C, 4A, 4B, 4C, 3A, 3B, 2A	Unacceptable under the existing circumstances. Risk mitigation critical.
5D, 4D, 3C, 3D, 2B, 2C, 1A,	Risk mitigation required. It might require
1 B	Management decision.
5E, 4E, 3E, 2D, 2E, 1C, 1D, 1E	Acceptable

- (iii) alternative matrices or means of analyzing, assessing and controlling risk may be implemented by the operator with the approval of the Director; and
- (iv) all safety information reported to the Director shall be in the categories specified in the above matrixes.

2. Qualifications of key SMS personnel

Where additional staff is required as part of the SMS, the selection criteria for these safety personnel shall be based upon the following qualifications and attributes –

- (a) broad operational knowledge and experience in the functions of the organisation;
- (b) sound knowledge of safety management principles and practices, including theoretical training and theoretical experience;

- (c) at least 2 years of experience in aviation safety;
- (d) good written and verbal communication skills;
- (e) well-developed interpersonal skills;
- (f) computer literacy;
- (g) the ability to relate at all levels, both inside and outside the organisation;
- (h) organisational skills;
- (i) capable of working unsupervised;
- (j) good analytical skills;
- (k) leadership skills and authoritative approach;
- (l) worthy of respect among peers and management; and
- (m) project management skills.

3. Goals of the SMS

The primary goals of an SMS shall be –

- (a) to achieve a level of safety acceptable to the Director; and
- (b) to strive to make continuous improvements to the safety status of the company.

135.10.8 REQUIREMENTS FOR QUALITY MANAGEMENT SYSTEM

1. Definitions

The terms used in this TS have the following meaning –

- (a) “**quality manager**” means the manager responsible for the implementation, management and monitoring of the quality system and for requesting corrective action;
- (b) “**audit**” means a methodical, planned review used to determine how a business is being conducted and compares the results with how that business should have been conducted according to regulations and established procedures;
- (c) “**inspection**” means the act of observing a particular event or action, to ensure that correct procedures and requirements are followed during the accomplishment of that event or action. The primary purpose of an inspection is to verify that established standards are followed during the observed event or action; and
- (d) “**quality assurance**” (QA) means all those planned and systematic actions necessary to provide adequate confidence that operational and maintenance practices satisfy prescribed requirements.

2. Quality management system (QMS) requirements

The QMS shall –

- (a) ensure the adequacy of operational and maintenance activities in maintaining compliance with requirements, standards and operational procedures;
- (b) specify the basic structure of the quality system applicable to the operation and be structured according to the size and complexity of the operation to be monitored; and
- (c) as a minimum, include the following –
 - (i) objectives of the QA programme, which shall be:
 - (aa) written;

- (bb) specific, measureable, attainable, realistic and time-based; and performance shall be measured and tracked;

Note – The QA objectives are not simply related to safety goals but are also part of the strategic and business objectives of the organization; for example, improve the turn around time of the aircraft to 20 minutes on domestic flights without deviations from the standards.

- (ii) how the organization intends meeting the provisions of the CAR;
- (iii) how the operator will meet additional standards and operating procedures;
- (iv) drawing up a quality policy statement;
- (v) documentation, including manuals, reports, statistics and records required in support of the QA programme and how they are to be controlled;
- (vi) quality processes and procedures to be employed in support of the QA programme;
- (vii) monitoring process;
- (viii) the procedures to be utilised in effecting the QA programme, including –
 - (aa) audit procedures;
 - (bb) reporting procedures; and
 - (cc) corrective action and verification procedures;
- (ix) a system of record keeping; and
- (x) a training syllabus.

3. QMS policy

An air operator shall establish a formal, written quality policy statement, constituting a commitment by the chief executive officer as to what the quality system is intended to achieve. The quality policy shall –

- (a) reflect the commitment to the goal of achieving and continuing with compliance with regulatory requirements together with any additional standards specified by the operator; and
- (b) reflect the chief executive officer's commitment to –
 - (i) appoint resources to manage the system;
 - (ii) ensure the structure required to meet the goals is established and maintained;
 - (iii) establish measurable objectives; and
 - (iv) ensure continual improvement in the QMS.

4. Structure

- (1) The chief executive officer shall appoint an accountable QM to manage the system and who meets the experience and qualifications requirements specified in CAR 135.06.2(5).
- (2) The QM shall have direct link to the chief executive officer to discuss QMS matters when required.

(3) The roles and responsibilities of the QM and all other role players within the QMS shall be defined in

(4) QA audit responsibilities shall be performed and reported independent from all other line functions within the organization, except as provided for in paragraph 7 below.

(5) The structure of the organisation may vary with the size and complexity of the operator but in all cases, the QMS should be developed so as to properly interface internally and with external agencies or service providers with which the company engages

5. Process requirements

(1) As processes are the means by which the QA goals are meant to be attained, they must be documented, whether written as procedures or mapped in flow chart format, for every significant activity and task within the organization

(2) The inputs, sequential steps and outputs must be shown, and where multiple individuals are involved, responsible for each output-

(3) Processes shall list –

(a) the references that must be consulted in using the process;

(b) the records that must be completed as evidence of the process having been followed; and

(c) the minimum retention periods for these documents as specified in the document and records control procedures.

(4) Processes which fall into the following categories of quality control must be:

(a) key/core business processes critical to the company's reason for existence. E.g. flight operations, ground operations, maintenance, safety management, etc;

(b) support processes that are developed in support of the core processes, e.g. recruitment, procurement, etc; and

(c) quality processes, like auditing, management review of the system, document control, records control, measurement of objectives, measurement of the ability of processes to achieve their intended results, customer satisfaction measurement, data analysis corrective action and preventive action.

6. Documentation

(1) Except as provided in paragraph (3), the QMS must be supported by a quality management manual (QMM) either as a part of the operations manual system or a stand-alone document, the contents of which shall include –

(a) the system of amendment and revision –

(i) the procedure for amending the manual, including temporary revisions;

- (ii) who is responsible for the issuance and insertion of amendments and revisions;
 - (iii) a record of amendments and revisions with insertion dates and effective dates;
 - (iv) a description of the system for the annotation of pages and their effective dates;
 - (v) a list of effective pages; and
 - (vi) a description of the distribution system for the manual, amendments and revisions.
- (b) the company's policy statement;
 - (c) the company's structure;
 - (d) the company's objectives;
 - (e) the roles, duties and responsibilities of the company's key personnel, including the chief executive officer and QM. Where there is more than one QM, the mandate and specific functions of each and the interrelationship between them must be clearly identified; and
 - (f) the procedures/processes whether written or mapped (some companies include only high level cross-departmental processes in the QMM and others include all processes in their QMM – they would end up with a series of manuals). Detailed manuals are normally the responsibility of the line_managers but they still form part of the QMS and will fit into the QMS to meet requirements.
- (2) In addition, the following documentation, usually residing in the QMM, shall be prepared and used within the QMS –
 - (a) forms and checklists that have to be used in the execution of the processes;
 - (b) a list of records used in the system;
 - (c) a list of forms used in the system;
 - (d) a list of registers or software systems in use as support to the system; and
 - (e) a list of external documents that impact on the system (called references).

7. Quality Manager

- (1) In the case of small and very small operators, the post of the QM may be combined or outsourced subject to the approval of the Director. However, in such event, independent personnel should conduct the quality inspections and audits.
- (2) The specific duties and responsibilities of the QM will vary in relation to the size and complexity of the company but shall be identified in the QMM or other manual, if a separate QMM is not produced.

8. Quality Management System

- (1) A QMS shall include a quality assurance programme that includes all planned and systematic actions necessary to provide confidence that all operations and maintenance are conducted in accordance with all applicable requirements, standards and operational procedures. A quality assurance programme, should at least include the following:

- (a) Inspections

The primary purpose of a quality inspection is to observe a particular event/action/document, etc., in order to verify whether established operational procedures and requirements are followed during the accomplishment of that event and whether the required standard is achieved. To the extent conducted by the operator, quality inspections shall include –

- (i) flight operations;
 - (ii) ground de-icing/anti-icing;
 - (iii) flight support services;
 - (iv) load control;
 - (v) maintenance;
 - (vi) technical standards; and
 - (vii) training standard;
- (b) Audits
- (i) Audits shall include quality procedures and processes covering at least the following –
 - (aa) a statement explaining the scope of the audit;
 - (bb) planning and preparation;
 - (cc) gathering and recording evidence; and
 - (dd) analysis of the evidence; and
 - (ii) Audit techniques shall include –
 - (aa) interviews or discussions with personnel;
 - (bb) a review of published documents;
 - (cc) the examination of an adequate sample of records;
 - (dd) the witnessing of the activities which make up the operation; and
 - (ee) the preservation of documents and the recording of observations;
- (c) Auditors
- (i) Auditors should not have any day-to-day involvement in the area of the operation and/or maintenance activity which is to be audited. An operator may, in addition to using the services of full-time dedicated personnel belonging to a separate quality department, undertake the monitoring of specific areas or activities by the use of part-time or external auditors;
 - (ii) An operator whose structure and size does not justify the establishment of full-time auditors may undertake the audit function by the use of part-time personnel from within his or her own organisation or from an external source under the terms of an agreement acceptable to the Director. In all cases, the operator should develop suitable procedures to ensure that persons directly responsible for the activities to be audited are not selected as part of the auditing team;
 - (iii) Where external auditors are used, it is essential that any external specialist is familiar with the type of operation or maintenance conducted by the operator;
 - (iv) The operator's quality assurance programme shall identify the experience levels of persons within the company responsible and authorised to —
 - (aa) perform quality inspections and audits as part of ongoing quality assurance;
 - (bb) identify and record any concerns or findings, and the evidence necessary to substantiate such concerns or findings;

- (cc) initiate or recommend solutions to concerns or findings through designated reporting channels;
- (dd) verify the implementation of solutions within specific timescales; and
- (ee) report directly to the QM.

(d) Audit Scope

Operators are required to monitor compliance with the operational procedures they have designed to ensure safe operations, airworthy aircraft, and the serviceability of both operational and safety equipment. In so doing, they should as a minimum and where appropriate, monitor the following –

- (i) the organisation;
- (ii) plans and company objectives;
- (iii) operational procedures;
- (iv) flight safety;
- (v) operator certification (AOC/Operations Specifications);
- (vi) supervision within the organisation;
- (vii) aircraft performance;
- (viii) all-weather operations;
- (ix) communications and navigational equipment and practices;
- (x) mass, balance and aircraft loading;
- (xi) instruments and safety equipment;
- (xii) manuals, logs and records;
- (xiii) aircraft maintenance/operations interface;
- (xiv) use of the MEL;
- (xv) maintenance programmes and continued airworthiness;
- (xvi) airworthiness directives management;
- (xvii) maintenance accomplishment;
- (xviii) defect deferral;
- (xix) flight crew;
- (xx) operational control personnel;
- (xxi) dangerous goods;
- (xxii) security;
- (xxiii) training; and
- (xxiv) safety management system.

(e) Audit Scheduling

A quality assurance programme shall include a defined audit schedule and a periodic review-cycle, area by area, with consideration being given to the following factors –

- (i) the schedule should be flexible and allow unscheduled audits when trends are identified. An operator should establish a schedule of audits to be completed during a specified calendar period. All aspects of the operation shall be reviewed within every period of 12 months in accordance with the programme unless an extension to the audit period is accepted by the Director;
 - (ii) an operator may increase the frequency of audits at his or her discretion but shall not decrease the frequency unless accepted by the Director. It is considered unlikely that an interval between audits greater than 24 months would be acceptable;
 - (iii) follow-up audits should be scheduled when necessary to verify that corrective action was carried out and that it was effective; and
 - (iv) the operator's defined audit schedule can be affected by significant changes to the management, organisation, operation or technologies, as well as changes to the regulatory requirements, resulting in the requirement for an ad hoc audit.
- (f) Monitoring
- (i) The aim of monitoring within the quality system is to investigate and judge its effectiveness and thereby to ensure that defined policy and operational and maintenance standards are continuously complied with. Monitoring activity is based upon quality inspections, audits, corrective action and follow-up; and
 - (ii) The operator shall establish and publish a procedure to monitor regulatory compliance on a continuing basis. This monitoring activity shall be aimed at eliminating the causes of unsatisfactory performance.
- (g) Corrective Action

The quality assurance programme shall include procedures to ensure that corrective actions are taken in response to findings. These quality procedures should result in the monitoring of such actions to verify their effectiveness as having been rectified. The procedures and responsibilities associated with a corrective action programme are –

- (i) subsequent to the quality inspection/audit, the operator shall establish –
 - (aa) the seriousness of any findings and any need for immediate corrective action;
 - (bb) the origin of the finding;
 - (cc) which corrective actions are required to ensure that the non-compliance does not recur;
 - (dd) a schedule for corrective action;
 - (ee) the identification of individuals or departments responsible for implementing corrective action; and
 - (ff) allocation of resources by the chief executive officer, where appropriate; and
- (ii) the QM shall –
 - (aa) verify that corrective action is taken by the manager responsible in response to any finding of non-compliance;
 - (bb) verify that corrective action includes the elements outlined in paragraph (1)(g)(i) above;
 - (cc) monitor the implementation and completion of corrective action;

- (dd) provide management with an independent assessment of corrective action, implementation and completion; and
- (ee) evaluate the effectiveness of corrective action through the follow-up process;

(h) Follow-up

Follow-up is a mandatory part of the QA process to ensure that each finding of non-compliance has been resolved satisfactorily and that the resultant solution is effectively implemented, such that a re-occurrence of the situation leading to the non-compliance is not or is highly unlikely to recur. Follow-up requires at least an inspection of the area identified as being non-compliant but may require a more in-depth audit to ensure a satisfactory resolution of the issue.

(i) Management Evaluation

Management evaluation is a comprehensive, systematic, documented review by the management of the quality system, operational policies and procedures and should include the following –

- (i) the results of quality inspections, audits and any other indicators;
- (ii) the overall effectiveness of the management organisation in achieving stated objectives;
- (iii) Consideration of conclusions and recommendations made as a result of an evaluation submitted in writing to the responsible manager for action; and
- (iv) The frequency, format and structure of internal management evaluation activities;

(j) Records

The operator shall maintain accurate, complete and readily accessible records documenting the results of the quality assurance programme. The following records shall be retained for a period of at least five years –

- (i) audit schedules;
- (ii) quality inspection and audit reports;
- (iii) responses to findings;
- (iv) corrective-action reports;
- (v) follow-up and closure reports; and
- (vi) management evaluation reports.

- (2) Where an operator decides to sub-contract out operationally-significant activities to external agencies for the provision of services, the QA programme must include an examination of such sub-contractors to ensure that the standard of service and product provided, meets with regulatory standards while safety must be ensured.
- (3) Operators operating five (5) or less aircraft of the same type category or three (3) or less aircraft of different type categories, may consider the following when establishing a QA programme, provided that the Director may require operators to implement a more advanced QA programme, based on routes and/or frequency operated –

- (a) Operators would tailor their quality systems to suit the size and complexity of their operation and allocate resources accordingly.
 - (b) it may be appropriate to develop a quality assurance programme that employs a checklist. The checklist should have a supporting schedule that requires completion of all checklist items within a specified timescale, together with a statement acknowledging completion of a periodic review by top management. An occasional independent review of the checklist content and achievement of the quality assurance should be undertaken; and
 - (c) the operator may decide to use internal or external auditors or a combination of the two. In these circumstances it would be acceptable for external specialists and/or qualified organisations to perform the quality audits on behalf of the quality manager. If the independent quality audit function is being conducted by external auditors, the audit schedule should be shown in the relevant documentation.
- (4) A QA programme shall include a training programme that provides the following –
- (a) for those responsible for managing the quality system, receive training covering at least –
 - (i) an introduction to the concept of the quality system;
 - (ii) quality management;
 - (iii) the concept of quality assurance;
 - (iv) quality manuals;
 - (v) audit techniques;
 - (vi) reporting and recording; and
 - (vii) the way in which the quality system will function in the organisation;
 - (b) for those involved in the inspection or audit functions, training covering at least –
 - (i) an introduction to the concept of the quality system;
 - (ii) the concept of quality assurance;
 - (iii) reporting and recording; and
 - (iv) audit techniques; and
 - (c) a briefing to the remainder of the employees consisting of background information about the QA programme and their role in maximizing safety and efficiency in the organisation. The allocation of time and resources should be governed by the size and complexity of the operation concerned.

List of technical standards

137.03.2 MAXIMUM CERTIFICATED MASS

1. Requirements for take-off at a mass greater than the maximum certificated mass
2. Third party risk

137.03.3 TAKE-OFF DISTANCE AND FLIGHT PATH

1. Third party risk

137.03.4 TAKE-OFF FLIGHT PATH

1. Third party risk

FIGURES

Figure 1: Maximum percentage mass increase

Figure 2: Third party risk

137.03.2 MAXIMUM CERTIFICATED MASS

1. Requirements for take-off at a mass greater than the maximum certificated mass

- (1) The pilot must execute the following procedures:
 - (a) Finding the MCM in the aeroplane flight manual and the original aeroplane limit load factor;
 - (b) entering the graph at the original aeroplane load limit factor on the horizontal axis of Figure 1, going vertically up to the reference line and then horizontally to the vertical axis to read the maximum recommended percentage mass increase; and
 - (c) increasing the original MCM by this percentage to find the new maximum take-off mass.
- (2) When considering whether to operate up to this new maximum take-off mass, the pilot must take the following factors into account:
 - (a) The pressure altitude of the aerodrome;
 - (b) the ambient temperature at the aerodrome;
 - (c) the runway surface type and condition;
 - (d) the runway slope in the direction of take-off;
 - (e) the headwind or tailwind component in the direction of the take-off; and
 - (f) any other factors that may affect the performance of the operation.

2. Third party risk

A third party risk exists where there is a third party or property of a third party within the defined area prescribed in Figure 2.

137.03.3 TAKE-OFF DISTANCE AND FLIGHT PATH

1. Third party risk

The third party risk referred to in CAR 137.03.3, means the third party risk defined in section 2 of technical standard 137.03.2.

137.03.4 TAKE-OFF FLIGHT PATH

1. Third party risk

The third party risk referred to in CAR 137.03.4, means the third party risk defined in section 2 of technical standard 137.03.2.

FIGURES

Figure 1: Maximum percentage mass increase

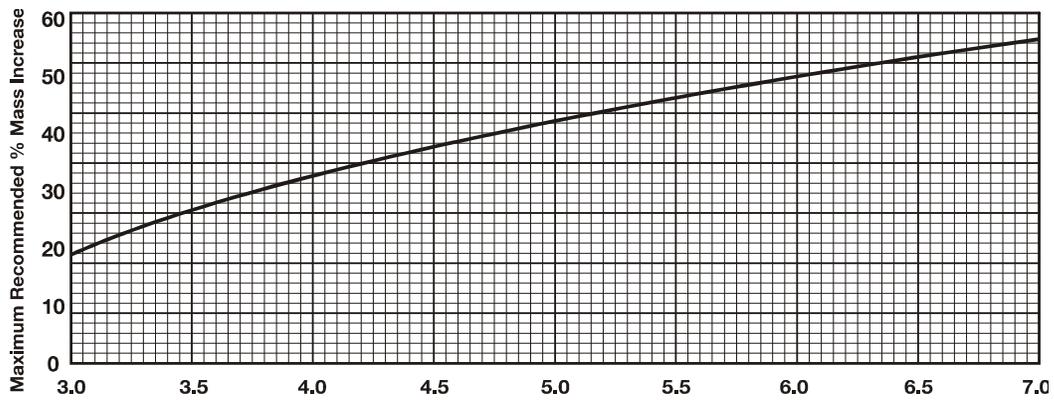
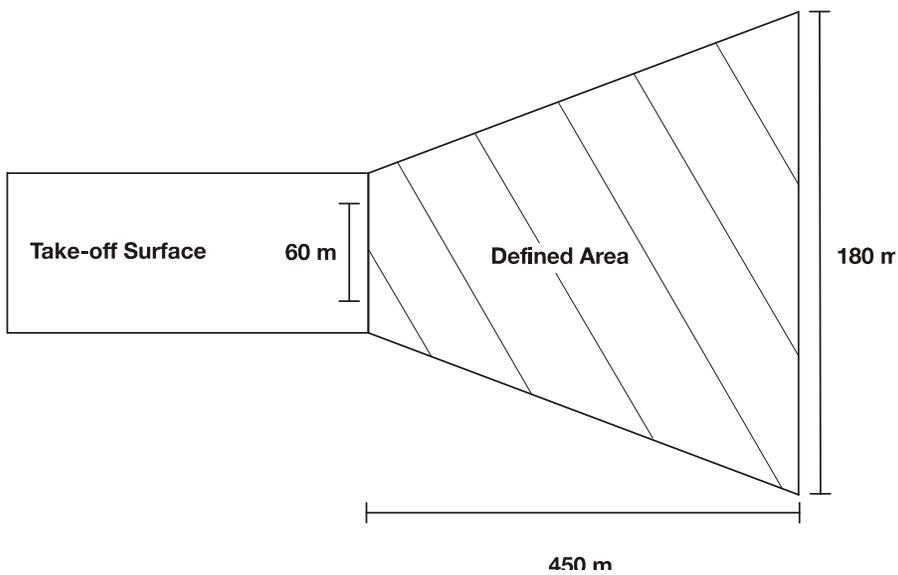


Figure 2: Third party risk



SA-CATS 138
Air ambulance operations

List of technical standards

138.03.1 TRAINING OF FLIGHT CREW, MEDICAL PERSONNEL AND OPERATIONS PERSONNEL

1. Initial training of flight crew
2. Recurrent training of flight crew
3. Initial training of medical personnel
4. Recurrent training of medical personnel
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6. Recurrent training of operations personnel

138.04.2 MANUAL OF PROCEDURE

1. Structure and contents

138.06.2 DISPATCHING BASE

1. Operations centre

138.03.1 TRAINING OF FLIGHT CREW, MEDICAL PERSONNEL AND OPERATIONS PERSONNEL

1. Initial training of flight crew

- (1) Flight crew members engaged in air ambulance operations must successfully complete a course of instruction prior to undertaking flying duties, and course must include the following subjects:
 - (a) an overview of the way in which air ambulance operations function, their purpose and limitations;
 - (b) orientation to infection control;
 - (c) a basic knowledge of the medical and rescue equipment carried in the aircraft;
 - (d) a basic understanding of patient transport consideration including stabilisation, preparation and handling;
 - (e) patient loading and unloading procedures;
 - (f) hot-loading policy and hot-unloading procedures
 - (g) emergency medical service communication procedures;
 - (h) aircraft emergency procedures pertaining to air ambulance flights, securing oxygen, securing loose equipment and patient evacuation;
 - (i) requirements for use of unprepared or unlit landing sites; and
 - (j) an overview of the training courses the operator supplies to medical personnel and operations personnel.
- (2) Flight crew weather members engaged in air ambulance operations must successfully complete operational training, which must include:
 - (a) terrain and weather considerations peculiar to the area;
 - (b) specific knowledge of the manual of procedure of the operator; and
 - (c) in the case of helicopter flight crew: review of landing sites at referring and receiving hospitals.

2. Recurrent training of flight crew

- (1) The syllabus of the recurrent training course must cover the same subject matter as contained in the initial training course contemplated in section 1 of technical standard 138.03.1.
- (2) The amount of training required by the recurrent training course is determined after due note has been taken of the flight crew member's previous training, competency and experience, but shall include any relevant new developments in air ambulance operations and emergency medical procedures.

3. Initial training of medical personnel

Medical personnel members engaged in air ambulance operations must successfully complete a course of instruction prior to undertaking flying duties, and such course must include the following:

(1) General knowledge

A medical personnel member must receive instruction on:

- (a) all aircraft types operated by the air ambulance operator, their capacity, performance, range, capabilities, as well as aircraft handling (ground);
- (b) aircraft pressurisation aspects;
- (c) introduction to aviation, air traffic control, navigation procedures;
- (d) emergency medical service communication procedures;
- (e) the manual of procedure of the operator;
- (f) dress;
- (g) insurance cover provided by the operator, if any, and additional cover available in the market; and
- (h) different responsibilities of the flight crew and medical personnel and authority of the pilot-in-command;
- (i) overdue actions – emergency plans;
- (j) communications in an emergency;
- (k) basic survival instructions;
- (l) a clear understanding of the day and night flying limitations;
- (m) a basic understanding of aerodrome and heliport requirements;
- (n) requirements for use of unprepared or unlit landing sites; and
- (o) crowd control and flight crew and medical personnel duties.

(2) Definite knowledge

A medical personnel member must receive instruction on:

- (a) danger areas around the aircraft;
- (b) standard helicopter and aeroplane safety rules;
- (c) look-out assistance for obstructions, wires and debris;
- (d) location and operation of safety equipment, fire extinguishers, emergency exits and ELT;
- (e) location and operation of aircraft electrical master switches and fuel shut-off valves;
- (f) location and operation of oxygen emergency shut-off valves;
- (g) correct stowage of medical equipment;
- (h) patient loading and unloading procedures;
- (i) hot-loading policy and hot-unloading procedures; and
- (j) aircraft emergency procedures pertaining to air ambulance operations, securing oxygen securing loose equipment, set belts, forced-landing drills and patient evacuation.

4. Recurrent training of medical personnel

- (1) The syllabus of the recurrent training course shall cover the same subject matter as contained in the initial training course contemplated in section 3 of technical standard 138.03.1.
- (2) The amount of training required by the recurrent training course is determined after due note has been taken of the medical personnel member's previous training, competency and experience, but

shall include any new developments in air ambulance operations and emergency medical procedures.

5. Initial training of operations personnel

Operations personnel engaged in air ambulance operations must successfully complete a course of instruction prior to undertaking duties, and such course must include the following:

- (1) All operations personnel
 - (a) general knowledge regarding helicopter and aeroplane types, their capacity, performance, range and capabilities;
 - (b) danger areas around the aircraft;
 - (c) standard safety rules;
 - (d) location and operation of safety equipment, fire extinguishers and emergency exits;
 - (e) patient loading and unloading procedures;
 - (f) hot-loading and hot-unloading procedures;
 - (g) overdue actions;
 - (h) a clear understanding of the day and night flying limitations;
 - (i) requirements for the use of unprepared or unlit landing sites, including the effect of dust, rubbish, obstructions and wires.
- (2) Radio operators and dispatchers
Radio operators and dispatchers must receive additional training on:
 - (a) introduction to aviation, air traffic control and navigation procedures;
 - (b) emergency medical service communications procedures;
 - (c) the manual of procedure of the operator; and
 - (d) emergency plans.

6. Recurrent training of operations personnel

- (1) The syllabus of the recurrent training course shall cover the same subject matter as contained in the initial training course contemplated in TS 138.03.1.5.
- (2) The amount of training required by the recurrent training course is determined after due note has been taken of the operation personnel member's previous training, competency and experience, but shall include any new developments in air ambulance operations and emergency medical procedures.

138.04.2 MANUAL OF PROCEDURE

1. Structure and contents

- (1) The manual of procedure must contain specific policies and procedures regarding aircraft operations in the following areas-
 - (a) patient loading and unloading procedures;
 - (b) protocols for hot loading and unloading, if applicable;
 - (c) refuelling with the rotors or propellers turning;
 - (d) refuelling with medical personnel and/or patient on board;
 - (e) hearing protection for medical personnel;
 - (f) use of safety equipment, such as flame retardant clothing;
 - (g) use of seat belts and shoulder harnesses by medical personnel;
 - (h) infection control; and
 - (i) records of personnel health or immunisation status.
- (2) The manual of procedure must contain a recurrent training programme for flight crew members, medical personnel and operations personnel.

138.06.2 DISPATCHING BASE

1. Operations centre

The operation centre must provide for the following:

- (a) 24-hour access to the operation centre;
- (b) telephone line;
- (c) facsimile line;
- (d) ability to communicate with the aircraft as described in CAR 138.05.3;
- (e) maps of the area of operation;
- (f) a database of the contact numbers of emergency medical services, police, fire and traffic departments in the area of operation;
- (g) a log sheet system or method to record all communications and actions related to operations; and
- (h) contact details of the operator's aero-medical advisor.

SA-CATS 139 Aerodromes and Heliports

List of technical standards

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- 139.02.31 ACCESS OF GROUND VEHICLES TO AERODROME MOVEMENT AREA**
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1. Signs, signals or standards
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139.01.30 OBSTACLE LIMITATIONS AND MARKINGS OUTSIDE AERODROME OR HELIPORT

1. Marking of obstacles

1.1 Applicability

- (1) If a difference between a standard prescribed in ICAO Annex 14 and the SA-CATS 139 exists, the SA-CATS 139 standard shall prevail.

1.2. Structures to be marked

- (1) Any structure exceeding 45 m above ground level, or structures where the top of the structure exceeds 150 m above the MEAN ground level, like on top of a hill, the mean ground level considered to be the lowest point in a 3 kilometre radius around such structure. Structures lower than 45 m, which are considered as a danger or a potential danger to aviation, shall be marked as such when specified.
- (2) Overhead wires, cables, etc., crossing a river, valley or major roads shall be marked and in addition, their supporting towers marked and lighted if an aeronautical study indicates that it could constitute a hazard to aircraft.

NOTE: Wind turbine generator (Windfarms) support structures are dealt with separately.

1.3. Painted Markings (Day Markings)

(1) Paint Colours

Alternate sections of international orange or signal red and white paint shall be used as they provide maximum visibility of an obstruction by contrast in colours.

The colours shall comply with the National Standard SANS 1091 2004 as indicated –

- (a) INTERNATIONAL ORANGE
S2075-Y70R
- (b) SIGNAL RED
S1580-Y90R
- (c) CLOUD WHITE
S0505-G20Y
- (d) GOLDEN YELLOW
S3040-Y

(2) Paint Standards

Quality paints compatible with the relevant surfaces are to be used and applied to the published South African standards for the relevant surfaces.

(3) Surfaces Not Requiring Paint

Ladders, decks, and walkways of steel towers and similar structures need not be painted if a smooth surface presents a potential hazard to maintenance personnel. Paint may also be omitted from precision or critical surfaces if it would have an adverse effect on the transmission or radiation characteristics of a signal. This should not reduce the overall marking effect of the structure.

(4) Solid Pattern

Obstacles should be coloured in orange (or red) if the structure has a horizontal dimension of less than 1,5 m and vertical dimensions not exceeding 4,5 m.

(5) Checkerboard Pattern

Alternating rectangles of orange (or red) and white are normally displayed on the following structures:

- (a) Water reservoirs, fuel storage tanks, and grain storage silos when required.
- (b) Buildings, as required.
- (c) Large structures where its projection on any vertical plane equals or exceeds 4.5 m in both dimensions. The pattern should consist of rectangles of not less than 1.5 m and not more than 3 m on a side, the corners being of the darker colour. The colours of the pattern should contrast each with the other and with the background against which they will be seen. Orange (or red) and white should be used. However, if it is impractical because of the size or shape of a structure, the patterns may have sides less than 1,5 m. When possible, corner surfaces should be coloured orange.

(6) Alternate Bands

Alternate bands of orange (or red) and white are normally displayed on structures when –

- (a) it has essentially unbroken surfaces and has one dimension, horizontal or vertical, greater than 1,5 m and the other dimension, horizontal or vertical, less than 4,5 m, or
- (b) it is of skeletal type with either a vertical or a horizontal dimension greater than 1.5 m, and Includes the following structures –
 - (i) Communication towers and catenary support structures.
 - (ii) Poles.
 - (iii) Smokestacks.
 - (iv) Skeletal framework of storage tanks and similar structures.
 - (v) Coaxial cable, conduits, and other cables attached to the face of a tower.

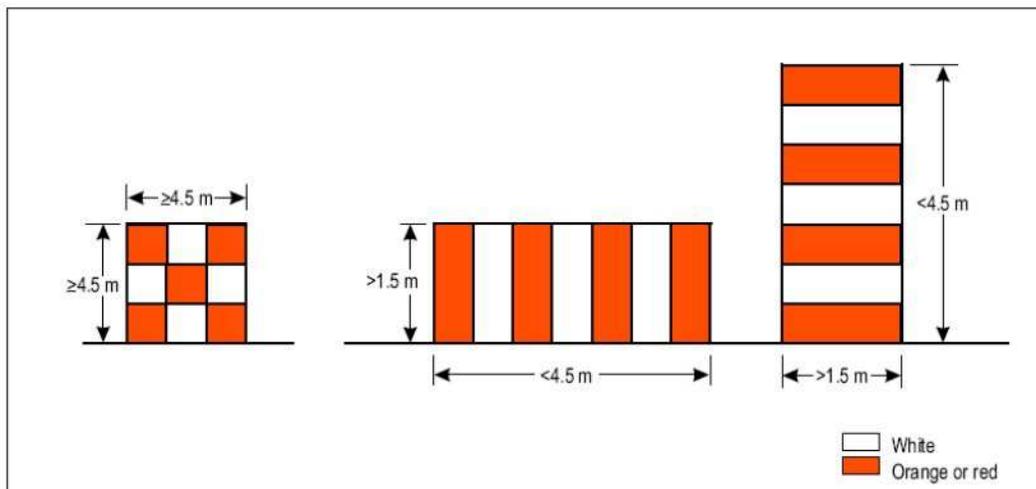


Figure 1

(7) Colour Band Characteristics

The bands should be perpendicular to the longest dimension and have a width approximately 1/7 of the longest dimension or 30 m, whichever is less, and not less than 0,65 m. The colours of the bands should contrast with the background against which they will be seen. Orange (or red) and white should be used, except where such colours are not conspicuous when viewed against the background. The bands on the extremities of the object should be of the darker colour.

Marking Band Widths		
Longest Dimension		Band width
Greater than (m)	Not exceeding (m)	
4,5	210	1/7
210	270	1/9

270	330	1/11	
330	390	1/13	
390	450	1/15	
450	510	1/17	
510	570	1/19	
Table 1			

Note: Table 1 shows a formula for determining bandwidths and for having an odd number of bands, thus permitting both the top and bottom bands to be of the darker colour.

(8) Skeletal Structures on Top of Buildings

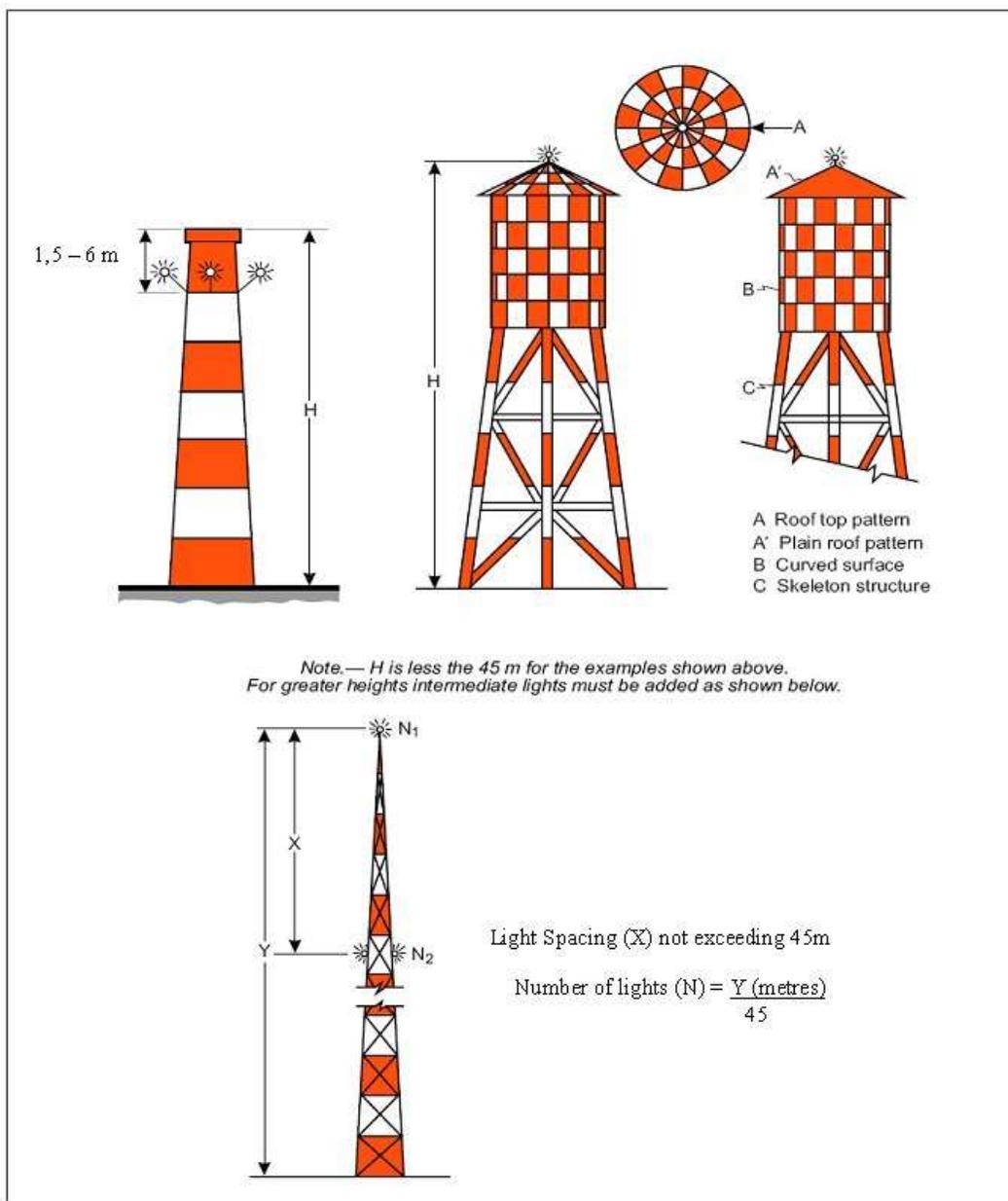
If a flagpole, skeletal structure, or similar object is erected on top of a building, the combined height of the object and building will determine whether marking is required; however, only the height of the object under study determines the width of the colour bands.

(9) Partial Marking

If marking is recommended for only a portion of a structure because of shielding by other objects or terrain, or it is not practicable to mark the full structure, the width of the bands should be determined by the overall height of the structure. A minimum of three bands shall be displayed on the upper third of the structure.

(10) Extensive Structures

Paint markings may be omitted when an aeronautical study indicates that a structure is extensive to the extent that additional marking will not improve the visual impact of the structure.



1.4. Markers

Markers are used to highlight structures when it is impractical to make them conspicuous by painting. Markers may also be used in addition to orange (or red) and white paint when additional conspicuousness is necessary for aviation safety. They should be displayed in conspicuous positions on or adjacent to the structures so as to retain the general definition of structure. They should be recognisable in clear air from a distance of at least 1 000 m and in all directions from which aircraft are likely to approach. Markers should be distinctively shaped, i.e., spherical or cylindrical, so they are not mistaken for items that are used to convey other information. They should be replaced when faded or otherwise deteriorated.

(1) Spherical Markers

Spherical markers are used to identify overhead wires. Markers may be of another shape, i.e., cylindrical, provided the projected area of such markers will not be less than that presented by a spherical marker. The Director may require that additional lighting systems be added to enhance visibility.

(2) Size and Colour

The diameter of the markers used on extensive catenary wires across canyons, lakes, rivers, etc., shall be not less than 60 cm.

Smaller 30 cm spheres are permitted on less extensive power lines or on power lines below 15 m above the ground and within 500 m of an aerodrome runway end. Each marker should be a solid colour such as orange or white.

(3) Installations

(a) Spacing

Markers should be spaced equally along the wire at intervals of approximately 30 m where the marker diameter is 60 cm progressively increasing to 35 m where the marker diameter is 80 cm and further progressively increasing to a maximum of 40 m where the marker diameter is at least 130 cm.

Where multiple wires, cables, etc. are involved, a marker should be located not lower than the level of the highest wire at the point marked. They should be displayed on the highest wire or by another means at the same height as the highest wire. Where there is more than one wire at the highest point, the markers may be installed alternately along each wire if the distance between adjacent markers meets the spacing standard. This method allows the weight and wind loading factors to be distributed. Where 30 cm spheres are used, intervals between markers should be 10 m to 15 m.

(b) Pattern

An alternating colour scheme provides the most conspicuousness against all backgrounds. Overhead wires shall be marked by alternating solid coloured markers of international orange and white. An orange sphere is placed at each end of a line and the spacing is adjusted not to exceed the maximum spacing for the applicable size of spheres used to accommodate the rest of the markers. When less than four markers are used, they should all be international orange.

1.5. Flags

- (1) Flags used to mark objects shall be displayed around, on top of, or around the highest edge of, the object. When flags are used to mark extensive objects or groups of closely spaced objects, they shall be displayed at least every 15m. Flags shall not increase the hazard presented by the object they mark.
- (2) Flags used to mark fixed objects shall not be less than 0.6 m square and flags used to mark mobile objects, not less than 0.9 m square.
- (3) Flags used to mark fixed objects should be orange in colour or a combination of two triangular sections, one orange and the other white, or one red and the other white, except that where such colours merge with the background, other conspicuous colours should be used.
- (4) Flags used to mark mobile objects shall consist of a chequered pattern, each square having sides of not less than 0.3 m. The colours of the pattern shall contrast each with the other and with the background against which they will be seen. Orange and white or alternatively red and white shall be used, except where such colours merge with the background.

1.6. Omission or alternatives to marking

Although paint markings are the preferred method of marking, an alternative method of marking by white strobe lights may be approved on application.

1.7. Lighting of objects

(1) High Intensity Flashing White Lighting Systems

High intensity lighting systems are more effective than orange/red and white paint under certain ambient light conditions involving the position of the sun relative to the direction of flight and therefore may be recommended instead of marking. When operated 24 hours a day, other methods of marking and lighting may be omitted. High intensity lighting systems are not recommended on structures of 150 m AGL or less.

(2) Medium Intensity Flashing White Lighting Systems

When medium intensity type “A” flashing white lighting systems are operated 24 hours a day on structures of less than 150 m AGL, other methods of marking may be omitted. When used on structures in excess of 150 m AGL it shall only be used in conjunction with paint markings.

(3) **Dual Lighting Systems**

When approved, a dual lighting system consisting of medium intensity white strobe lights with a peak intensity of at least 20 000 candela for daytime use and steady burning red lights of at least 32 candela intensity for twilight and night time use may be used on mast structures not exceeding 150m above ground level (AGL).

Dual lighting systems would require uninterruptible power supply systems with at least 12 hours of autonomy. These lighting systems are subject to monitoring and immediate repair in the event of failure.

(4) **Omission of Markings**

All markings may be omitted, on application, in bona fide nature conservation areas on structures not exceeding 150m.

1.8. Standards of lighting

The characteristics of lights shall comply with Annex 14 chapter 6 table 6-3.

Red aeronautical obstacle lights on top of structures that require marking shall be dual units for redundancy purposes unless the system is monitored and failed units can be replaced within one working day.

1.9. Lighting systems

(1) Red, steady burning low intensity type lights of at least 10 candela intensity shall be used when required on structures not exceeding 45 m AGL.

(2) Red steady (or flashing) low intensity type B lights of at least 32 candela intensity shall be used on structures exceeding 45 m but not exceeding 150m AGL.

Intermediate lights shall consist of at least 3 single units spaced at 120 degree intervals, depending on the diameter of the structure, and may be low intensity type “A” lights of at least 10 candela. When flashing lights are used, the flashes shall be synchronised.

(3) Structures exceeding 150 m AGL shall comply with the standards of Annex 14 chapter 6 unless specified differently.

(4) **Temporary Construction Equipment Lighting**

Construction cranes in urban areas should be painted in a conspicuous colour that is in a sharp contrast to the background. In addition, the jib should be illuminated with red flashing low intensity type B lights clearly defining the outline and extremities of the jib as well as the highest point of the crane. Spacing between lights should not exceed 45m.

1.10. Chimneys, smoke stacks, and similar solid structures

When required, lights may be displayed as low as 6m below the top to avoid the obscuring effect of deposits and heat generally emitted by this type of structure. It is important that these lights be readily accessible for cleaning and lamp replacement.

(1) **Number of Light Units**

(a) The number of units recommended depends on the diameter of the structure at the top. The number of lights recommended below is the minimum.

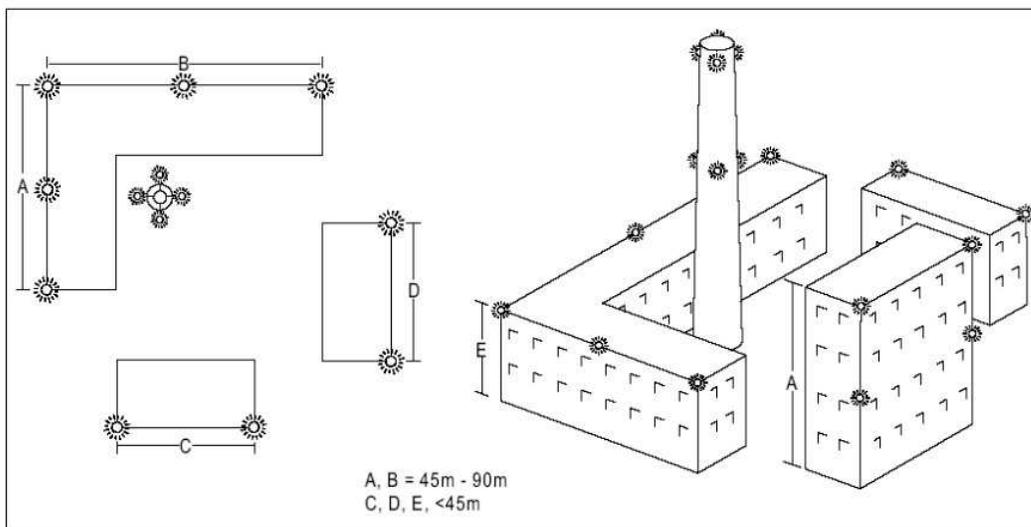
(b) When the structure diameter is:

(i) 6 m or less. Three light units per level.

(ii) Exceeding 6 m but not more 30 m. Four light units per level.

(iii) Exceeding 30 but not more than 60m. Six light units per level.

(iv) Exceeding 60m. Eight light units per level.



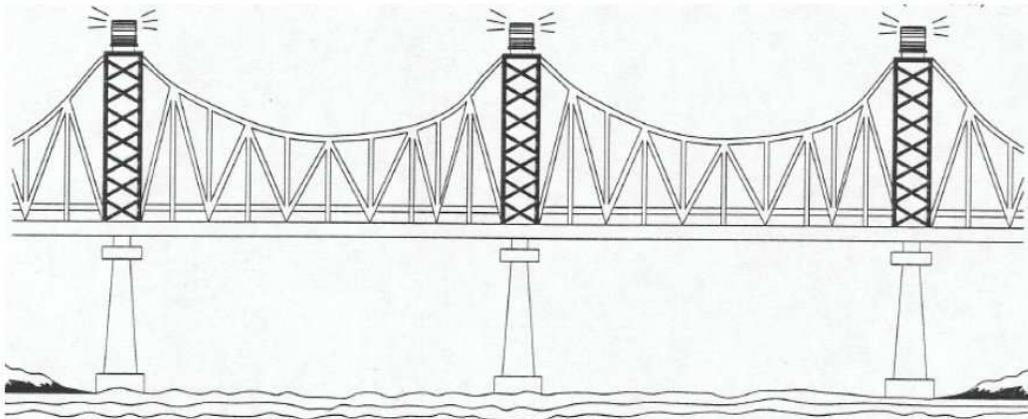
- (c) Lighting of buildings and other solid structures may be omitted if an aeronautical study indicated that other means of reaching the required visibility in the form of flood lighting or other effect lighting may suffice. The Director may require an uninterruptible power source for such lighting.

1.11. Alternate method of displaying obstruction lights

When recommended in a CAA aeronautical study, lights may be placed on poles equal to the height of the obstruction and installed on or adjacent to the structure instead of installing lights on the obstruction.

1.12. Bridges

- (1) When required, bridge structures shall be illuminated by low intensity type B, steady burning red obstruction lights of at least 32 candela intensity. The Director may require an uninterruptible power source for such lighting. Dual units shall be required for redundancy.



- (2) Balloons and other tethered devices
The Director may require that balloons and other tethered devices be illuminated for night time/twilight use.

1.13. Control of lights

Day-to-Twilight. This should not occur before the illumination drops to 646 Lux but should occur before it drops below 377 Lux. Illuminance-sensing device should, if practical, face the Southern sky.

1.14. Wind turbine generators (Windfarms)

- (1) Introduction
A wind turbine generator is a special type of aviation obstruction due to the fact that at least the top third of the generator is continuously variable and offers a peculiar problem in as much marking by night is concerned.
When wind turbine generators are grouped in numbers of three or more they will be referred to as "Windfarms".
- (2) Windfarm Placement

Due to the potential of wind turbine generators to interfere on radio navigation equipment, no Windfarm should be built closer than 35km from an aerodrome. In addition much care should be taken to consider visual flight rules routes, proximity of known recreational flight activity such as hang-gliders, en route navigational facilities etc.

(3) Windfarm Configurations

Windfarms come primarily in three predominant configurations, although actual installations may contain one or any combination of the three configurations. These three configurations are linear, cluster, and grid.

- (a) Linear configurations are those where the turbines are placed in a line-like arrangement along a ridgeline, the face of a mountain, on a hill or along the borders of a field. The line may be ragged in shape or be periodically broken and may vary from just a few turbines to over several kilometres of wind turbines.
- (b) Cluster configurations are those where the turbines are placed in circle-like groups on top of a hill or within a large field. A cluster is typically characterised by having a pronounced perimeter with various turbines placed inside the circle at various, erratic distances throughout the centre of the circle.
- (c) Grid configurations are those where the turbines are arranged in a geographical shape such as a square or a rectangle, with each turbine placed a consistent distance apart in rows, giving the appearance of a square-like pattern.

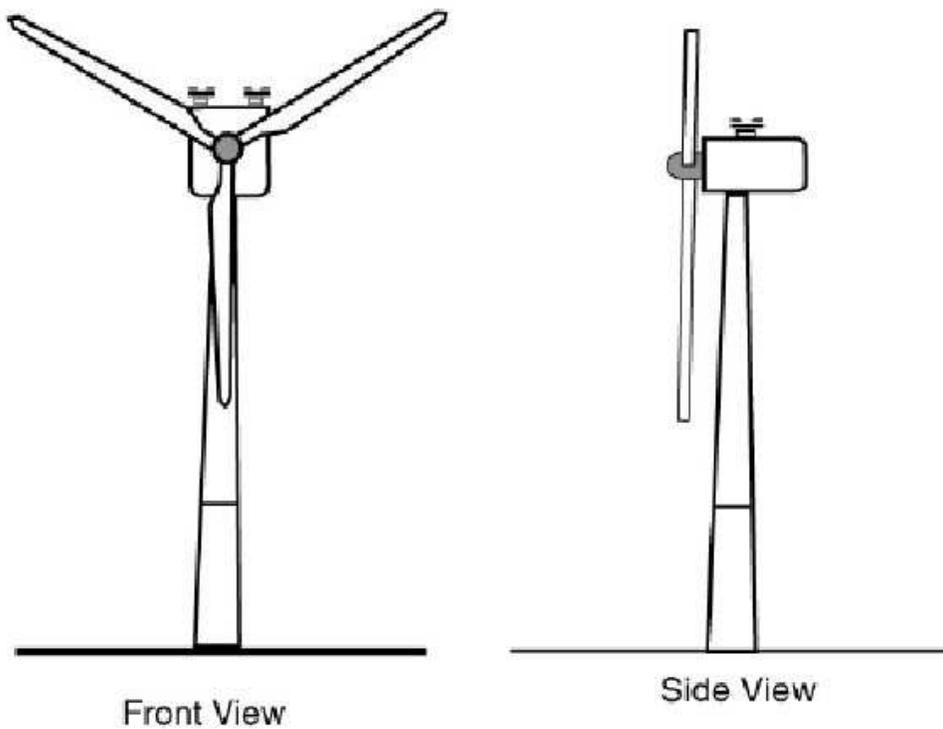
(4) Windfarm Markings

Wind turbines shall be painted bright white to provide the maximum daytime conspicuousness. The colours grey, blue and darker shades of white should be avoided altogether. If such colours have been used, the wind turbines shall be supplemented with daytime lighting, as required.

(5) Windfarm Lighting

(a) Individual wind turbine structures

Individual wind turbine structures shall be lighted by mounting two medium intensity type B lights on top of the generator housing and should flash simultaneously. Lighting fixtures are to be mounted at a horizontal separation to ensure an unobstructed view of at least one fixture by an aircraft approaching from any angle of azimuth. No intermediate level lights are required on these structures.



Lighting of individual wind turbines

(b) Windfarm (3 or more units) Lighting

In determining the required lighting of a Windfarm, it is important to identify the layout of the Windfarm first. This will allow the proper approach to be taken when identifying which turbines need to be lit. Any special consideration to the site's location in proximity to aerodromes or known corridors, as well as any special terrain considerations, must be identified and addressed at this time.

Details are as follows:

- (i) Not all wind turbine units within an installation or Windfarm need to be lit. Definition of the periphery of the installation is essential. Lighting of interior wind turbines is of lesser importance unless they project above the peripheral units. This can be the case when higher ridges or plateaus are present within the Windfarm area.
- (ii) Obstruction lights within a group of wind turbines should have unlighted separations or gaps of no more than 800m if the integrity of the group appearance is to be maintained. This is especially critical if the arrangement of objects is essentially linear, as is the case with most wind turbine groups.
- (iii) Any array of flashing or pulsed obstruction lighting, intended to warn of a group of wind turbines forming an entity (i.e., a line, string, or series of units), shall be synchronised to flash simultaneously. If an installation consists of a number of widespread, but obviously separated areas or entities more than 1500 m from each other, it is not necessary that all such areas flash synchronously.
- (iv) Night time wind turbine obstruction lighting should consist of medium intensity type B aviation red flashing lights. Minimum intensities of 2000 candela for night-time red flashing or strobe lights are required.
Note: Steady-burning obstruction lights shall not be used.
- (v) White medium intensity type "A" strobe lights may be used in lieu of the preferred medium intensity type "B" strobe lights, but must be used alone without any red lights, and must be positioned in the same manner as the red flashing lights.
- (vi) Since the hub of the wind turbine unit is frequently as large as the nacelle (body) itself, a top-mounted obstruction light should be raised well above the surface of the nacelle so that it may be easily seen from directly in front of the turbine. Placement of the light fixtures on the turbine nacelle should be accomplished to ensure that they are visible from 360 degrees, with particular attention being made to ensure that the hub of the turbine rotor in no way blocks the light from an aircraft approaching the windward side of the turbine at the same elevation as the turbine hub.
- (vii) When possible, antennas or towers of heights over 45 m that are within the turbine farm area should be incorporated into the lighting plan for the site, as they offer tall, unobstructed platforms on which lighting fixtures can be mounted and should be included in the synchronisation and spacing calculations.
- (viii) Each turbine should only require one fixture if the site is monitored, and that a failed light fixture can be replaced within the next working day. Failure to replace a failed fixture, which is essential to maintaining the 800 m-separation requirement, will result in an unsafe gap in the lighting configuration. If the facility does not possess the capability to replace fixtures

within the next working day, each turbine shall be fitted with two separate fixtures.

- (ix) A well-balanced lighting plan has all the light fixtures within the Windfarm flash at the same time, thus delineating the farm as one large obstruction and navigation between the turbines should be discouraged. The synchronisation function can be accomplished through various means, either by radio frequency devices, hard-wired control cables, or independently mounted global positioning system synchroniser units. The site developer can decide the selection of the units, as long as the end result is that all lights flash perceivably at the same time. If the developer fails to synchronise the fixtures, the developer will be required to add additional fixtures at closer spacing. The very basis of the lighting standards for Windfarms is centred on the synchronous flashing of the perimeter lighting.

(6) Turbine Lighting Assignment

The following guidelines should be followed to determine which turbines, need to be equipped with lighting fixtures. Again, the placement of the lights is contingent upon which type of configuration is being used.

- (a) Linear: A light should be placed on each turbine positioned at each end of the line or string of turbines. From those end turbines, lights should then be positioned such that the next lit turbine is no more than 800 m, from the last lit turbine. This pattern should continue until the end of the string is reached. If the last segment is significantly short, it may be practical to move the lit turbines back one or two turbines towards the starting point to present a nice, well-balanced string of lights. A high concentration of lights, in close proximity, should be avoided.
- (b) Cluster: A starting point should be selected along the outer perimeter of the cluster. This turbine should be lit, and then, continuing along the outer perimeter of the farm, a light should be placed on the next turbine with the maximum gap between the lit turbines being no more than 800 m. This pattern should continue around the perimeter of the cluster, and end at the starting point. If it appears that the lights are crowded at the ending point, the lit turbines may be moved back by one turbine to present a balanced lighting presentation. If it is determined that the distance across the cluster is of a distance greater than 1500m, or the terrain may vary within the cluster (+30 m from the perimeter elevations), it may be appropriate to place a few lit turbines at strategic locations throughout the centre of the cluster. This will prevent pilots from believing they may be able to climb over the outer perimeter and descend down into the centre of the cluster. Discretion should be used when placing these lights to maintain a well-balanced, safe lighting configuration.
- (c) Grid: Initially, each of the defined corners of the grid layout should be selected for lighting, and then, using the same concept of the cluster configuration, lights should be placed on turbines along the outer limits of the farm so that the maximum spacing between lit turbines is no more than 800m. If it appears as though the end of the lighting strings may be crowded, it may be necessary to move the lights back one or two turbines to create an even lighting configuration. If the grid is more than 1500 m wide across the centre of the group of turbines, it may be appropriate to position one or two lights within the centre of the configuration to again provide warning to pilots attempting to climb over the outer limits of the grid, and descending into the centre of the grid. Elevation should also be considered.
- (d) Special Instances: On occasion, if one or two turbines may be positioned at locations that do not lend themselves to the linear, cluster, or grid layouts, the following guidelines should be followed. If the turbine protrudes from the general limits of the

Windfarm, the turbine should automatically receive a lighting fixture. If another turbine is collocated with the first turbine, it does not require any lighting as long as it is within 150 m from the lit turbine and not positioned on the outboard side of the lit turbine. If these requirements cannot be met, both turbines, in this case, would need to be illuminated.

139.01.31 LEAD IN LIGHTS

1. Runway lead-in lighting

- (1) A runway lead-in lighting system should consist of groups of lights positioned so as to define the desired approach path and so that one group may be sighted from the preceding group. The interval between adjacent groups should not exceed approximately 1 600m. A runway lead in lighting system should extend from a point as determined by the appropriate authority, up to a point where the approach lighting system, if provided, or the runway or the runway lighting system is in view.
- (2) Each group of lights of a runway lead-in lighting system should consist of at least three flashing lights in a linear or clustered configuration. The system may be augmented by steady burning lights, where such lights would assist in identifying the system.
- (3) The flashing lights should be white, and the steady lights should be gaseous discharge lights.
- (4) Where practicable, the flashing lights in each group should flash in sequence towards the runway.

139.01.32 SURFACE MOVEMENT GUIDANCE AND CONTROL SYSTEM

1. Taxiway centre line lights

- (1) Taxiway centre line lights shall be provided on an exit taxiway and taxiway intended for use in runway visual range conditions less than a value of 350 m in such a manner as to provide continuous guidance between the runway centre line and aircraft stands. These lights need not be provided where the traffic density is light and medium and taxiway edge lights and centre line marking provide adequate guidance.
- (2) Taxiway centre line lights shall be provided on a taxiway intended for use at night in runway visual range conditions of 350m or greater, and particularly on complex taxiway intersections and exit taxiways. These lights need not be provided where the traffic density is light and medium and taxiway edge lights and centre line marking provide adequate guidance.
- (3) Taxiway centre line lights shall be provided on an exit taxiway and taxiway in all visibility conditions when it is part of an advanced surface movement guidance and control system (ASMGCS) so as to provide continuous guidance between the runway centre line and aircraft stands.
- (4) Taxiway centre line lights on exit taxiways other than rapid exit taxiways shall commence at the point where the taxiway centre line marking begins to curve from the runway centre line, and follow the curved taxiway centre line marking at least to the point where the marking leaves the runway. The first light shall be at least 60 cm from any row of runway centre line lights, as shown in ICAO Annex 14, Volume 1, Figure 5-25.

- (5) The lights shall be spaced at longitudinal intervals of not more than 7.5 m.
- (6) Taxiway centre line lights on a runway forming part of a standard taxi-route and intended for taxiing in runway visual range conditions less than a value of 350 m shall be spaced at longitudinal intervals not exceeding 15 m.
- (7) Taxiway centre line lights shall be provided on a runway forming part of a standard taxi-route and intended for taxiing in runway visual range conditions less than a value of 350m. These lights need not be provided where the traffic density is light and taxiway edge lights and centre line marking provide adequate guidance.
 - (8) Taxiway centre line lights shall be provided in all visibility conditions on a runway forming part of a standard taxi-route when it is part of a surface movement guidance and control system.
- (9) Taxiway centre line lights on a taxiway other than an exit taxiway and on a runway forming part of a standard taxi-route shall be fixed lights, showing green with beam dimensions such that the light is visible only from aeroplanes on or in the vicinity of the taxiway.
- (10) Taxiway centre line lights on an exit taxiway shall be fixed lights. Alternate taxiway centre line lights shall show green and yellow from their beginning near the runway centre line to the perimeter of the ILS/MLS critical/sensitive area or the lower edge of the inner transitional surface, whichever is farthest from the runway; and thereafter all lights shall show green as indicated in the ICAO directions. All the centre line lights shall show green to aircraft approaching the runway.
- (11) Taxiway centre line lights shall be in accordance with the specifications of ICAO Annex 14, Volume 1: (L) Appendix 2, Figure 2-12, 2-13, or 2-14 for taxiways intended for use in runway visual range conditions of less than a value of 350 m; and (2) Appendix 2, Figure 2-15 or 2-16 for other taxiways.
- (12) Where taxiway centre line lights are part of an ASMGCS and where, from an operational point of view, higher intensities are required to maintain ground movements at a certain speed in very low visibilities or in bright daytime conditions, taxiway centre line lights shall be in accordance with the specifications of ICAO Annex 14, Volume 1, Appendix 2, Figure 2-17, 2-18 or 2-19. High-intensity centre line lights shall only be used in case of an absolute necessity and following a specific study.
- (13) Taxiway centre line lights shall normally be located on the taxiway centre line marking, except that they may be offset by not more than 30 cm where it is not practicable to locate them on the marking.
- (14) Taxiway centre line lights on a straight section of a taxiway shall be spaced at longitudinal intervals of not more than 30 m, except that:
 - (a) larger intervals not exceeding 60 m may be used where, because of the prevailing meteorological conditions, adequate guidance is provided by such spacing;
 - (b) intervals less than 30m shall be provided on short straight sections; and
 - (c) on a taxiway intended for use in RVR conditions of less than a value of 350 m, the longitudinal spacing shall not exceed 15 m.
- (15) Taxiway centre line lights on a taxiway curve shall continue from the straight portion of the taxiway at a constant distance from the outside edge of the taxiway curve. The lights shall be spaced at intervals such that a clear indication of the curve is provided.
- (16) On a taxiway intended for use in RVR conditions of less than 350m, the lights on a curve shall not exceed a spacing of 15 m and on a curve of less than 400 m radius the lights shall be spaced at intervals of not greater than 7.5 m. This spacing shall extend for 60 m before and after the curve.

2. Rapid exit taxiway lights

- (1) Taxiway centre line lights shall be provided on a runway intended for use in runway visual conditions less than a value of 350 m and/or where traffic density is heavy.
- (2) Taxiway centre line lights on a rapid exit taxiway shall commence at a point at least 60 m before the beginning of the taxiway centre line curve, as shown in ICAO Annex 14, Volume 1, Figure 5.23, and continue beyond the end of the curve to a point on the centre line of the taxiway where an aeroplane can be expected to reach normal taxiing speed. The lights on that portion parallel to the runway centre line shall always be at least 60 cm from any row of runway centre line lights, as shown in ICAO Annex 14, Volume 1, Figure 5-25.
- (3) The lights shall be spaced at longitudinal intervals of not more than 15 m, except that, where runway centre line lights are not provided, a greater interval not exceeding 30 m may be used.

3. Taxiway edge lights

- (1) Taxiway edge lights shall be provided on a taxiway not provided with taxiway centre line lights and intended for use at night: Provided that taxiway edge lights need not be provided where, considering the nature of the operations, adequate guidance can be achieved by surface illumination or other means such as taxiway edge markers.
- (2) Taxiway edge markers may be used at small aerodromes, in lieu of taxiway edge lights, where the taxiway code number is 1 or 2. The markers shall be spaced at uniform longitudinal intervals of 60 m and be retro-reflective blue conforming to the specifications contained in Appendix 1 of Annex 14, Volume 1. The markers shall be cylindrical in shape, in accordance with the ICAO Doc 9157-AN/901, Part 4, Figure 2.11 and when installed no portion must exceed 350 mm above the mounting surface.
- (3) Taxiway edge lights shall be provided on a runway forming part of a standard taxi-route and intended for taxiing at night where the runway is not provided with taxiway centre line lights.
- (4) Taxiway edge lights on a straight section of a taxiway and on a runway forming part of a standard taxi-route shall be spaced at uniform longitudinal intervals of not more than 60 m. The lights on a curve shall be spaced at intervals less than 60m so that a clear indication of the curve is provided. The lights shall be located as near as practicable to the edges of the taxiway or runway, etc. or outside the edges at a distance of not more than 3 m.
- (5) Taxiway edge lights shall be fixed lights showing blue. The lights shall show up to at least 30° above the horizontal and at all angles in azimuth necessary to provide guidance to a pilot taxiing in either direction. At an intersection, exit or curve the lights shall be shielded as far as practicable so that they cannot be seen in angles of azimuth in which they may be confused with other lights.

4. Intermediate holding position lights

- (1) Except where a stop bar has been installed, intermediate holding position lights shall be provided at an intermediate holding position intended for use in runway visual range conditions less than a value of 350 m.
- (2) Intermediate holding position lights shall be provided at an intermediate holding position where there is no requirement for a stop bar.
- (3) Intermediate holding position lights shall be located along the intermediate holding position marking at a distance of 0.3 m prior to the marking.

- (4) Intermediate holding position lights shall consist of three fixed unidirectional lights showing yellow in the direction of approach to the intermediate holding position with a light distribution similar to taxiway centre line lights if provided. The lights shall be disposed symmetrically about and at right angles to the taxiway centre line, with individual lights spaced 1.5 m apart.

5. Runway guard lights

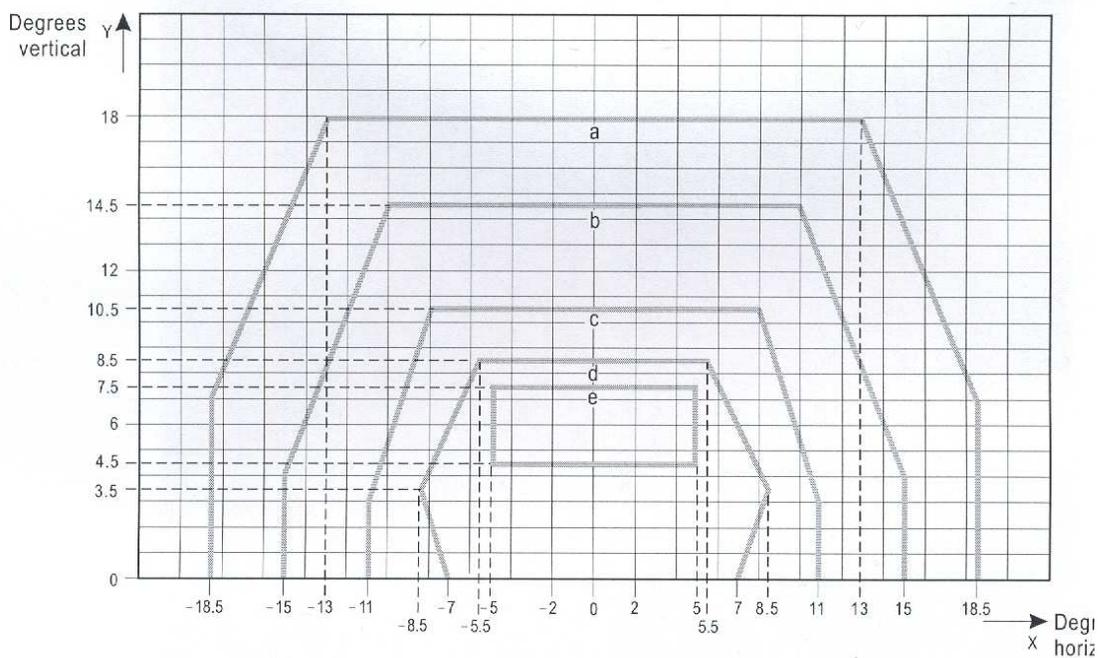
- (1) There are two standard configurations of runway guard lights which are detailed in ICAO Annex 14, Volume 1, Figure 5-26.
- (2) Configuration A shall be used at each runway/taxiway intersection associated with a runway approved for operations with –
 - (a) runway visual range (RVR) less than a value of 550 m where a stop bar is not installed with RVR values between 550m and 1,200 m where the traffic density is heavy; and
 - (b) RVR conditions of values less than 550m where a stop bar is installed with RVR of values between 550m and 1,200m where the traffic density is medium or light.
- (3) Configuration A or Configuration B or both, shall be provided at each taxiway/runway intersection where enhanced conspicuity of the taxiway/runway intersection is needed, such as on a wide entrance taxiway. Configuration B shall not be co-located with a stop bar.
- (4) Configuration A, shall be located at each side of the taxiway at a distance from the runway centre line not less than that specified for a take-off runway in ICAO Annex 14, Volume 1, Table 3-2.
- (5) Configuration B shall be located across the taxiway at a distance from the runway centre line not less than that specified for a take-off runway in ICAO Annex 14, Volume 1 Table 3-2.
- (6) Configuration A shall consist of two pairs of yellow lights.
- (7) Where there is a need to enhance the conspicuity of runway guard lights, Configuration A, during daylight, a visor or some other device may be fitted to prevent sunlight from entering the lens.
- (8) Configuration B shall consist of yellow lights spaced at intervals of 3m across the taxiway.
- (9) The light beam shall be unidirectional and aligned so as to be visible to the pilot of an aeroplane taxiing to the holding position.
- (10) The intensity in yellow light and beam spreads of lights of Configuration A shall be in accordance with the specifications in ICAO Annex 14, Volume 1 Appendix 2, Figure 2-24.
- (11) Where runway guard lights are intended for use during the day, the intensity in yellow light and beam spreads of lights of Configuration A shall be in accordance with the specifications in ICAO Annex 14, Volume 1 Appendix 2, Figure 2-25.
- (12) Where runway guard lights are specified as components of an advanced surface movement guidance and control system where higher light intensities are required, the intensity in yellow light and beam spreads of lights of Configuration A shall be in accordance with the specifications in ICAO Annex 14, Volume 1 Appendix 2, Figure 2-25.
- (13) The intensity in yellow light and beam spreads of lights of Configuration B shall be in accordance with the specifications in ICAO Annex 14, Volume 1 Appendix 2, Figure 2-12.
- (14) Where runway guard lights are intended for use during the day, the intensity in yellow light and beam spreads of lights of Configuration B shall be in accordance with the specifications in ICAO Annex 14, Volume 1 Appendix 2, Figure 2-20.
- (15) Where runway guard lights are part of an ASMGCS where higher light intensities are required, the intensity in yellow light and beam spreads of lights of Configuration B shall be in accordance with the specifications in ICAO Annex 14, Volume 1 Appendix 2, Figure 2-20.
- (16) The lights in each unit of Configuration A shall be illuminated alternately.

- (17) For Configuration B, adjacent lights shall be alternately illuminated and alternative lights shall be illuminated in unison.
- (18) The lights shall be illuminated between 30 and 60 cycles per minute and the light suppression and illumination periods shall be equal and opposite in each light.

6. Stop bars lights

- (1) Stop bar lights shall be controlled either manually or automatically by air traffic services.
- (2) A stop bar shall be provided at every runway-holding position serving a runway when it is intended that the runway will be used in RVR conditions less than a value of 550m, except where:
 - (a) appropriate aids and procedures are available to assist in preventing inadvertent incursions of aircraft and vehicles onto the runway; and
 - (b) operational procedures exist to limit, in RVR conditions less than a value of 550m, the number of aircraft on the manoeuvring area to one at a time and for vehicles on the manoeuvring area to the essential minimum.
- (3) A stop bar shall be provided at an intermediate holding position when it is desired to supplement markings with lights and to provide traffic control by visual means.
- (4) Where the normal stop bar lights might be obscured from a pilot's view, then a pair of elevated lights shall be added to each end of the stop bar. These lights shall be located not less than 3m from the taxiway edge and shall have the same characteristics as the lights in the stop bar, but shall be visible to approaching aircraft up to the stop bar position.
- (5) Stop bars shall be located across the taxiway at the point where traffic shall stop.
- (6) Stop bars shall consist of lights spaced at intervals of 3m across the taxiway, showing red in the intended direction(s) of approach to the intersection or runway-holding position.
- (7) Stop bars installed at a runway-holding position shall be unidirectional and shall show red in the direction of approach to the runway.
- (8) Selectively switchable stop bars shall be installed in conjunction with at least three taxiway centre line lights (extending for a distance of at least 90m from the stop bar) in the direction that the aircraft is to proceed after the stop bar.
- (9) The intensity in red light and beam spreads of stop bar lights shall be in accordance with the specifications in Figures 2-12 through 2-16, as appropriate.
- (10) The intensity in red light and beam spreads of stop bar lights shall be in Figures 2-17 through 2-19, as appropriate, when:
 - (a) stop bars are part of an ASMGCS;
 - (b) from an operational point of view, higher intensities are required to maintain ground movements at a certain speed in very low visibilities or in bright daytime conditions; and
 - (c) a wide beam fixture is required, the intensity in red light and beam spreads of stop bar lights shall be in accordance with the specifications of ICAO Annex, 14 Volume 1, Appendix 2, Figures 2-17 or 2-19, as appropriate.
- (11) The lighting circuit shall be designed so that:
 - (a) stop bars located across entrance taxiways are selectively switchable;
 - (b) stop bars located across taxiways, used only as exit taxiways, are switchable selectively or in groups;

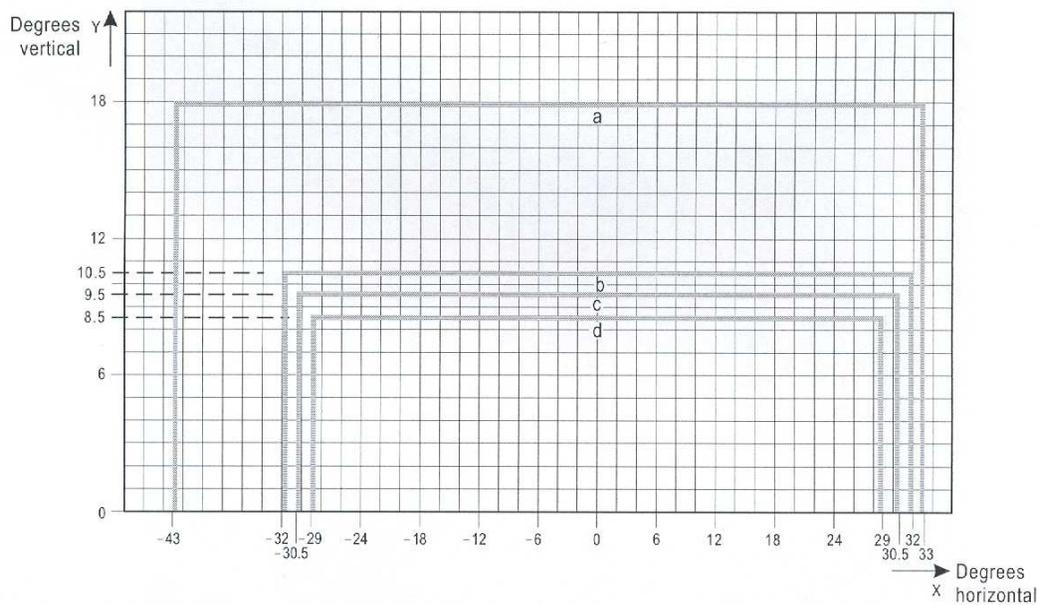
- (c) when a stop bar is illuminated, any taxiway centre line lights installed beyond the stop bar shall be extinguished for a distance of at least 90m; and
 - (d) stop bars shall be interlocked with the taxiway centre line lights so that when the centre line lights beyond the stop bar are illuminated, the stop bar is extinguished and vice versa.
- 139.F.103 Road-holding position lights.
- (12) A road-holding position light shall be provided at each road-holding position serving a runway when it is intended that the runway will be used in runway visual range conditions less than a value of 550m.
 - (13) A road-holding position light shall be located adjacent to the holding position marking 1.5m (\pm 0.5m) from one edge of the road, i.e. left or right as appropriate to the local traffic regulations.
 - (14) The road-holding position light shall comprise:
 - (a) a red (stop) / green (go) traffic light controlled by air traffic services; and
 - (b) a flashing-red light.
 - (15) The road-holding position light beam shall be unidirectional and aligned so as to be visible to the driver of a vehicle approaching the holding position.
 - (16) The intensity of the light beam shall be adequate for the conditions of visibility and ambient light in which the use of the holding position is intended, but shall not dazzle the driver.
 - (17) The flash frequency of the flashing-red light shall be between 30 and 60 per minute.
 - (18) The following tables are used to calculate light intensities when taxiway centre light and /or stop bars are used as part of an advanced surface movement guidance and control system:



Curve	a	b	c	d	e
Intensity (cd)	8	20	100	450	1 800

Notes:

- (19) These beam coverages are generally satisfactory and cater for a normal displacement of the cockpit corresponding to the outer main gear wheel on the taxiway edge.
- (20) Figure A2-18 is an Isocandela diagram for high-intensity taxiway centreline (15m spacing) and stop bar lights in straight sections intended for use in advanced surface movement guidance and control system where higher intensities are required and stop bar lights in curved sections intended for use in an advanced surface movement guidance and control system where higher light intensities are required.



Curve	a	b	c	d
Intensity (cd)	8	100	200	400

Notes:

1. Lights on curves to be toed-in 17 degrees with respect to the tangent of the curve.
2. See collective notes for Figures A2-12 to A2-21.

Figure A2-19. Isocandela diagram for high-intensity taxiway centre line (7.5 m spacing)

139.02.1 REQUIREMENTS FOR LICENCE

1. Conditions for issue and renewal

The documents, contemplated in regulation 139.02.1 as condition for the issuing and renewal of an aerodrome licence, are the standards contained in the relevant ICAO Annexes and Documents, and the recommended practice contained in these documents incorporated by the Director as a standard, are the following:

139.02.2 AERODROME DESIGN REQUIREMENTS

1. Aerodrome design standards

The aerodrome design and operating standards which apply in respect of the physical characteristics, obstacle limitation surfaces, visual aids, operations and equipment and installations provided at an aerodrome, are:

- (1) the appropriate aerodrome design standards contained in the latest editions of the following Annexes to the Convention on International Civil Aviation:
 - (a) Annex 14 'Aerodromes', Volume I 'Aerodrome Design and Operations';
 - (b) Annex 10 'Aeronautical Telecommunications', Volume 1 (Radio Navigation Aids); and
 - (c) Annex 17 'Security - Safeguarding International Civil Aviation Against Acts of Unlawful Interference';
- (2) the following documentation approved and published by decision of the Council of the International Civil Aviation Organisation:
 - (a) the extracts from the "Technical Instructions for the Safe Transport of Dangerous Goods by Air" (Doc 928-AN 905) as contained in the Attachment to Annex 17; and
 - (b) the "Security Manual for Safeguarding Civil Aviation Against Acts on Unlawful Interference" (Doc 8973/5 (Restricted)).

139.02.4 QUALITY ASSURANCE SYSTEM

1. Minimum standards for a quality assurance system

- (1) The quality assurance system referred to in CAR 139.02.4, must include –
 - (a) a clear definition of the level of quality the aerodrome operator intends to achieve;
 - (b) a procedure that sets out the level and frequency of the internal reviews;
 - (c) a procedure to record the findings and communicate them to management;
 - (d) a list of responsible persons;
 - (e) procedures by which other quality indicators such as facility malfunction reports, incidents, occurrences, complaints and defects are brought into the quality control system;
 - (f) procedures for management analysis and overview;
 - (g) procedures for rectifying any deficiencies which may be found; and
 - (h) procedures for documenting the complete review process from the inspection to the satisfactory management review so that this is available to the Director during a safety inspection and audit.
- (2) Measures must be taken to ensure that the system is understood, implemented and complied with at all levels.
- (3) The quality assurance system must be documented in the operations manual referred to in CAR 139.02.3.

139.02.6 ESTABLISHMENT OF AERODROME EMERGENCY MANAGEMENT SYSTEM

- (1) The aerodrome operator shall establish an aerodrome emergency management system (AEMS) as contemplated in CAR 139.02.6 which shall include the following, but not be limited to:
 - (a) aircraft emergencies;
 - (b) sabotage including bomb threats;
 - (c) unlawful seizure of aircraft;
 - (d) dangerous goods occurrences;

- (e) building fires;
 - (f) natural disasters, such as floods, veld fires, tsunamis, etc.;
 - (g) public health emergencies including communicable diseases.
- (2) Part 7 of ICAO Doc 9137-AN/89 is herewith incorporated in terms of section 163(2) of the Civil Aviation Act as the minimum standard for an AEMS.
- (3) The medical equipment and medical supplies depicted in Appendix 3 table 3-1 of ICAO Doc 9137-AN/8989, Part 7, shall be made available on the aerodrome. If not self-proficient, the aerodrome operator shall enter into an agreement with a service provider, capable of providing such service, to make the necessary medical equipment and required medication available in the event of an emergency. The aerodrome operator shall ensure that the agreement is kept current and that the service provider is at all times capable of its obligations.

139.02.7 AERODROME RESCUE AND FIRE FIGHTING

1. Classification matrix

Column I	Column II	Column III	Column IV
Aerodrome License Category	Aircraft Category for Fire Fighting	Aircraft Overall Length	Aircraft Maximum Fuselage Width
1.	1	less than 9 m	2 m
2.	2	at least 9 m but less than 12 m	2 m
3.	3	at least 12 m but less than 18 m	3 m
4.	4	at least 18 m but less than 24 m	4 m
5.	5	at least 24 m but less than 28 m	4 m
6.	6	at least 28 m but less than 39 m	5 m
7.	7	at least 39 m but less than 49 m	5 m
8.	8	at least 49 m but less than 61 m	7 m
9.	9	at least 61 m but less than 76 m	7 m
10.	10	at least 76 m but less than 90	8 m

2. When using the classification matrix contained in paragraph 1 above, aerodromes qualifying for the issue of an aerodrome license in category 4, may provide an aircraft fire fighting service one category lower if:
- (a) a full risk assessment has been carried out by the operator which indicates that even with a lower category fire fighting service, an acceptable level of safety can be maintained.

(b) the level of aerodrome rescue and fire fighting services protection provided is no less than that required for a category 3 level of protection and includes both the foam, dry chemical powder and rescue equipment requirements.

(c) fully trained and permanently appointed fire fighting personnel are provided.

(d) for category 4 and lower aircraft fire fighting service, each fire fighting vehicle is capable of discharging its content at the required application rate as indicated in Column VI of the minimum useable amount of extinguishing agent table in the appropriate mixture. Where nitrogen is used as the propellant to eliminate possible faulty pump operational systems; the full (pre mixed) content can be discharged as fire fighting foam. This does not preclude the use of a fire fighting vehicle fitted with a pump and foam induction system provided that the full content can be discharged at the required application rate.

Minimum useable amounts of extinguishing agent:

Column I Aerodrome License Category	Column II Critical Category for Fire Fighting	Column III Quantity of Water or premix foam solution (in litres)	Column IV Quantity of Complementary Extinguishing Agents (in kilograms)	Column V Minimum Number of Aircraft Fire-fighting Vehicles	Column VI Total Discharge Capacity (in litres per minute)
1.	1	230	45	1	230
2.	2	670	90	1	550
3.	3	1 200	135	1	900
4.	4	2 400	135	1	1 800

(e) These fire fighting vehicles shall have both a hand-line and a roof mounted turret/mirror. A discharge distance of at least the length of the longest aeroplane using the aerodrome is required through the vehicle turret.

(f) The fire appliances deployed shall be a self propelled 4 X 4 vehicle that can achieve the required response times of 0 to 80 km/h within 25 seconds as depicted for Rapid Intervention Vehicles when fully laden and have a maximum speed of not less than 105 km/h.

(g) The ancillary equipment to be carried on the vehicle shall consist of the equipment depicted in the rescue equipment list below:

Rescue equipment List:

Airport rescue and fire fighting category	1-2	3-5	6-7	8-10
Adjustable wrench	1	1	1	1
Axe, rescue, large non wedge type	1	1	1	1
Axe, small non-wedge type or aircraft type	1	2	4	4
Cutter bolt 61 cm	1	1	1	1

Crowbar, 95 cm	1	1	1	1
Crowbar 1.65 m	-	-	1	1
Chisel, cold 2.5 cm	-	1	1	1
Flashlight	2	3	4	8
Hammer 1.8 kg	-	1	1	1
Hook, grab or salvaging	1	1	1	1
Saw, metal cutting or hacksaw, heavy duty with spare blades	1	1	1	1
Blanket, fire resisting	1	1	1	1
Ladder, extending (of over-all length appropriate to aircraft in use	-	1	2	2 or 3
Rope line 15 m length	1	1	-	-
Rope line 30 m length	-	-	1	1
Pliers 17.8 cm (side cutting)	1	1	1	1
Pliers, slip joint 25 cm	1	1	1	1
Screwdrivers, assorted set	1	1	1	1
Snippers, tin	1	1	1	1
Chocks 15 cm high	-	-	1	1
Chocks 10 cm high	1	1	-	-
Powered rescue saw complete with two blades; or pneumatic chisel complete - plus spare cylinder, chisel, and retaining spring	1	1	1	2
Harness cutting tool	1	2	3	4
Gloves, flame resistant pairs, unless issued to individuals	2	3	4	8
Breathing apparatus and cylinders	-	2	3	4
Spare cylinders	-	2-	3-	4
Hydraulic or pneumatic forcing tool		1	1	1
Medical-First aid kit	1	1	1	1

- (h) It is further required that the operator of an aerodrome shall establish a maintenance programme for the rescue and fire fighting vehicles and equipment to ensure full operation ability at all times. The operator shall also maintain records of inspection, serviceability and maintenance for all fire fighting vehicles and equipment.
- (i) The AEMS referred to in CAR 139.02.7 (3)(e), shall adequately address all identified risks associated with the higher level of operation. The Aerodrome Emergency Management System shall be a separate document submitted to the CAA for approval and will also be listed in the Aerodrome Operations Manual as contemplated in CAR 139.02.3.

139.02.8 AERODROME RESCUE AND FIRE FIGHTING TRAINING FACILITY

1. Training facilities for category 6 or above

- (1) For aerodromes operating in terms of an aerodrome licence category 6 level or higher the structure of the facility contemplated in CAR 139.02.8 shall provide for:
- (a) Effective training in the following aspects –
- (i) Aircraft structural fires external;
 - (ii) Aircraft structural fires internal;

- (iii) Aircraft wheel fires;
 - (iv) Aircraft engine fires reciprocating as well as jet engines;
 - (v) Aircraft cabin fires;
 - (vi) Aircraft overhead storage bin fires;
 - (vii) Aircraft galley fires;
 - (viii) Aircraft baggage-hold fires; as well as a facility to conduct Self Contained breathing apparatus training in a smoke filled environment;
 - (ix) Pressure fed aircraft fuel fires;
 - (x) Sufficient space and structure to exercise rescue equipment skills, with the type of equipment required for level of operation;
 - (xi) An area where ladder drills can be performed, preferably at the simulated aircraft structure;
 - (xii) An area where vehicle monitor/ turret deployment can be utilized and practiced;
 - (xiii) A suitable area where first-aid hose-reels and soft delivery hand-lines can be deployed;
 - (xiv) First aid to at least level 2.
- (b) The facilities referred to in this item must be constructed in such a way that it is environmental friendly and include an effluent drainage separation pit.
 - (c) The entire facility shall have a bunt wall to contain un-burnt fuel and extinguishing media with ample drainage and filter system leading to the drainage pit.
 - (d) The facilities should be constructed in such a way that the smoke emission does not affect the aircraft operation of the aerodrome.
 - (e) In addition to the above, classroom facilities must be provided for effective conveyance of theoretical information to students. This classroom must be suitably equipped to provide the necessary instruction and be suitably constructed so as to accommodate at least one shift of the required staffing levels for the appropriate category of aerodrome.
 - (f) The facility where theoretical training is to be conducted should be as close as possible to the fire station to facilitate rapid response by the students to any eventuality if they form part of the operational staffing levels.
 - (g) Ablution facilities must be provided.

2. Training facilities for aerodromes operating a category 3 where flying schools have been established and category 4 and 5

- (1) For aerodromes operating a category 3 where flying schools have been established and category 4 and 5, at least the following training facilities are required:
 - (a) An open air training facility where the routine fire fighting techniques can be practiced under simulated conditions to keep personnel skills level honed. This area should provide for –
 - (i) An area where fire fighting vehicle deployment can be practiced and the correct positioning at a potential disaster site can be exercised;
 - (ii) A facility where under simulated conditions, Self Contained Breathing Apparatus (SCBA) familiarisation and training can be exercised;

- (iii) Sufficient space where fire fighting vehicle monitor/turret and hand-line application can be practiced.
 - (iv) Sufficient space to effectively utilize rescue equipment.
 - (b) The fire ground must be enclosed with a bunt-wall to contain any un-burnt fuel or material and should preferably have concrete floor covered with a steel pan.
 - (c) Additional standards regarding an effective training facility can be found in the NFPA 1001/3 standards.
- (2) If an aerodrome issued with an aerodrome licence below a category 4 level, including category 3 aerodromes where flying schools have been established, is not capable of establishing such training facility, approval from the Director is required to deviate from this requirement, in which case, the required training shall be conducted at an aerodrome where such facilities are available and the training standards of that facility is SACAA endorsed or approved.

139.02.9 AERODROME RESCUE AND FIRE FIGHTING PERSONNEL TRAINING STANDARDS

- (1) The holder of the license of an aerodrome above category 3 level shall establish training standards, for approval by the Director.
- (2) The training standards for aerodromes above category 3 level of operation and frequency of re-training required in this subpart shall include but not be limited to –
- (a) Initial training to achieve a new qualification or competency;
 - (b) Training to transfer or upgrade from a current qualification or competency to a new qualification or competency;
 - (c) Special requirements for direct entry staff:
 - (i) Airside induction;
 - (ii) Radio telephony;
 - (iii) Vehicle driver/operator training on each different type of vehicle deployed for aerodrome rescue and fire fighting purposes. Competency certification in this regard is required.
 - (d) Basic fire fighting procedure for aircraft rescue and fire fighting personnel based on aerodrome specific equipment and infrastructure including the type of aircraft normally operating to and from that aerodrome and the potential problems such aircraft may pose to the aerodrome rescue and fire fighting services.
 - (e) Effective utilisation of rescue and fire fighting equipment.
- (3) All fire fighting personnel deployed at an aerodrome must be in possession of at least a Level One fire-fighter certificate obtained from the CAA accredited institution; and be given on the job training in accordance with a program to ensure that core competencies applicable to the functional levels are obtained and maintained. Re-training intervals not exceeding 90 days must be maintained. Certification with regard to all training obtained must be maintained and be available for inspection purposes.
- (a) All persons in an officer's position must be in possession of at least a Fire Fighter 2 or 3 CAA approved Certificate.
 - (b) Training can only be conducted by persons in possession of a training instructors' certificate and must at least hold the rank of an officer.

- (c) Training must consist of both theoretical and practical training in all aspects. Practical testing of competence must be conducted not more than 14 days after theoretical training was concluded. If this is not achieved, retraining in the theoretical part is required within 90 days.
 - (d) Level of competence achieved (both theoretical and practical) must be documented and trainees must sign for all training received.
 - (e) Training records must include a section where the instructor put his or her perception of success or competence achieved by trainees.
 - (f) Training records must include a section where the trainee can deliberate his or her perception of competence achieved.
 - (g) Training must be provided individually, as well as in group context, record thereof must be kept per individual.
- (4) Core competency training for each qualification held is required within the 90 day period. The core competencies are listed below. This list is not exhaustive and may require local rating, e.g. water rescue services and/or specialised training in desert/sandy area, water logged arrears if or mountainous area operations if prevalent at the aerodrome or immediate vicinity:
- (a) Aircraft construction for aerodrome rescue and fire fighting personnel on the type of normally operating to and from the aerodrome. This does not preclude the types normally flying within the aerodrome airspace and could make use of the facility for emergency landings.
 - (b) The fire fighting vehicle driver or operator training in off-road conditions on each of the types of surface areas most likely to be encountered on or in the vicinity of the aerodrome.
 - (c) Besides the national drivers licence for the specific code of fire fighting vehicle, driver/operator certification on all different type/s of vehicles is required. This must include equipment deployed at the aerodrome and also include competency certification in the following aspects: This includes but is not limited to:
 - (i) Foam induction systems deployed on the vehicles, inline indicators;
 - (ii) Vehicle primer systems, all types used on the aerodrome;
 - (iii) Switching mode from on-road to off-road driving;
 - (iv) Vehicle operational panel layout;
 - (v) Dry chemical powder unit operations;
 - (vi) Vehicle pumps and primers operations;
 - (vii) Vehicle valve operations;
 - (viii) Vehicle replenishment;
 - (ix) Vehicle public address systems and marking beacons;
 - (x) Vehicle deployment, approach and set-up at accident site;
 - (xi) Deep lifting utilizing the vehicles primer pump and the associated equipment.
 - (d) Aerodrome topography including aerodrome runway and taxiway layout, as well as an area of up to 10 kilometres from the aerodrome reference point:
 - (i) Aerodrome radio telephony certified by CAA accredited training institution. Certification is subject to Air Traffic Control (ATC) endorsement, this ATC endorsement is aerodrome specific.
 - (ii) Aerodrome topography and vicinity familiarization training to cover at least the area within which response is required under the Aerodrome Emergency Management System contained in CAR 139.02.6.

- (iii) Individuals from whom it is expected to utilize Self Contained Breathing Apparatus (SCBA) must be in possession of a competency certificate in the testing and utilization of the SCBA sets used at the aerodrome. The instructor conducting this type of training must have had his/ her training at the manufacturers/supplier of such equipment.
- (5) Training and certification of competence in utilization of specialised equipment must be conducted on all different types of specialised equipment deployed at the aerodrome; this includes but is not limited to:
 - (a) Heavy lifting devices, if provided or required;
 - (b) Specialised cutting devices if provided or required;
 - (c) Boats if provided for water rescue if provided or required;
 - (d) All electrical equipment supplied.
 - (e) Self contained Breathing Apparatus (SCBA).
- (6) Small gear training must include all types of equipment depicted in the rescue equipment list for the appropriate category of fire fighting operations. The following areas of competence are required and need to be included in the training curriculum:
 - (a) Application of foam onto an appropriate fire, consisting of material representative or normally found in aircraft, with an attack vehicle monitor;
 - (b) Vehicle hand-line and first –aid attack line operations;
 - (c) Fire station communication centre if provided;
 - (d) Fire alarms and alarm notification systems;
 - (e) Indicator panels for fixed fire-detection and suppression systems;
 - (f) Foam branches;
 - (g) Type specific branches used at the aerodrome;
 - (h) Ladder construction and deployment;
 - (i) Knots and lines;
 - (j) Soft and hard deliveries composition and uses;
 - (k) Agent application through operational branches and use of equipment for rescue purposes;
 - (l) Deep lifting aerodrome category 5 and higher.
- (7) The required training shall be conducted at an aerodrome where training facilities and training standards are available and the training standards and facility is CAA endorsed or approved as follows:
 - (a) For aerodromes category 3 and lower, training standards of at least a fire fighter 1 category at a CAA approved aviation training institution is required; the basis for this level of training shall be derived from ICAO Doc 9137 – AN/898 Part 1 and ICAO Doc 7192 – AN/857 Part E2.
 - (b) Competency based training on vehicles and equipment specified for all levels of operation must be conducted at a CAA aviation approved institution with intervals not exceeding 90 days and must include all vehicles and equipment specified for aerodrome rescue and fire fighting for the respective levels of aerodrome and fire fighting service specified for the aerodrome.
 - (c) Record of all training conducted must be kept for at least 5 years. These records must reflect the type of training conducted, duration of such training and competency levels achieved. The record must be signed by both the trainees and the instructors.
- (d) First Aid up to a level 2 is required. This shall include triaging of patient.

139.02.10 AERODROME RESCUE AND FIRE FIGHTING DEVIATIONS

1. Requirements and standards

- (1) The holder of an aerodrome licence must continuously assess operations at the aerodrome in relation to the rescue and fire fighting capability, and during anticipated periods of reduced or increased activity, the level of protection must be no less than needed for the highest category of aircraft planned to use the aerodrome during that time, irrespective of the number of movements.
- (2) The holder of the licence may, during any period of operations limited to aircraft with a specification lower than that which is normally applicable under CAR 139.02.7, reduce the rescue and fire fighting capability to the appropriate level required for the aerodrome category referred to in TS 139.02.7, corresponding with the level of operation.
- (3) Any reduction in the rescue and fire fighting capability, must include in the aerodrome operations manual –
 - (a) procedures for, and particulars of the persons having the authority to implement the reduction; and
 - (b) procedures for recall of the full aerodrome rescue and fire fighting capability.
- (4) A reduction in the rescue and fire fighting capability may not be implemented unless information on the anticipated level of services is forwarded to the air traffic service unit concerned and the Director, for the necessary publication of such information in an AIP.
- (5) If the required response time cannot be met by rescue and fire fighting services which are not based at the aerodrome, the holder of the licence must have the rescue and fire fighting services based at the aerodrome in order to comply with the response time, and –
 - (a) introduce a system of preventative maintenance of such vehicles and equipment to ensure effectiveness and compliance with the required response time throughout the entire life of each vehicle;
 - (b) immediately repair or replace any required rescue and fire fighting vehicle or equipment that becomes inoperative to the extent that the holder of the licence cannot meet the response capability with a vehicle or a piece of equipment which will enable the holder of the licence to meet such capability.
- (6) If the replacement of a vehicle or a piece of equipment is not immediately possible or available, the holder of the licence must –
 - (a) follow the procedure prescribed in CAR 139.02.7;
 - (b) if the required response time cannot be met within 72 hours, limit operations on the aerodrome equal to the category level of protection it can provide with the remainder of vehicles and equipment as determined in accordance with TS 139.02.7.
- (7) The holder of the licence must respond to each emergency during aerodrome operations with rescue and fire fighting equipment suitable to limit loss of life and to prevent damage to property.
- (8) All equipment, facilities and services shall be in compliance with the standards set out in ICAO Doc 9137-AN/898 and Doc 7192-AN/857.

139.02.12 NOTIFICATION OF AERODROME DATA AND INFORMATION

1. Determination and reporting of water on runways

- (1) Whenever water is present on a runway, a description of the runway surface condition in the centre half of the width of the runway, including the possible assessment of water depth, where applicable, should be made available using the following terms:

DAMP— the surface shows a change of colour due to moisture.

WET—the surface is soaked but there is no standing water.

WATER PATCHES—significant patches of standing water are visible.

FLOODED— extensive standing water is visible.

- (2) Information that a runway or portion thereof may be slippery when wet shall be made available.

139.02.22 GENERAL DUTIES OF HOLDER OF LICENCE

1. Marking of obstructions

The marking of obstructions referred to in CAR 139.02.22(2)(c), must be done in accordance with the requirements and standards contained in Chapter 6 of Annex 14, Volume I.

2. Markings

The markings referred to in CAR 139.02.22(2)(g), are the appropriate markings contained in Annex 14, Volume I.

3. Marking of unserviceable areas on landing terrain

The markings referred to in CAR 139.02.22(2)(j), are the appropriate markings contained in Annex 14, Volume I.

4. Aerodrome financial data and aerodrome traffic statistics

- (1) The aerodrome financial data referred to in CAR 139.02.22(3)(a), are the aerodrome financial data contained in Annexure K.
- (2) The aerodrome traffic statistics referred to in CAR 139.02.22(3)(a), are the aerodrome traffic statistics contained in Annexure L.

5. Facilitation plan

(Reserved.)

6. Monitoring of aircraft noise

(Reserved.)

7. Meteorological equipment

- (1) Specifics concerning the sighting and construction of meteorological equipment are contained in Annex 14, Volume 1, and Chapter 8. Where an ATSU is required, meteorological sensing equipment should be provided to measure, monitor and relay to the remote display system within the ATSU the following information –
 - (a) real-time surface wind direction and speed;
 - (b) real-time surface air temperature and dew point;
 - (c) real-time barometric pressure;
 - (d) at aerodromes with CAT I, II and III instrument-approach and landing operations; and
 - (e) authorised automated equipment for measuring and remote-indicating of runway visual range and cloud height.
- (2) Meteorological instruments shall be exposed, operated and maintained in accordance with the practices, procedures and specifications contained in ICAO, Annex 3. The accuracy of meteorological instruments shall comply with the requirements of ICAO as contained in Annex 3, Attachment A.
- (3) In addition to the specifications of Annex 3, the following specifications will be adhered to:
 - (a) Environmental Operating Conditions
 - (i) Systems shall recover to their calibrated specifications from specified meteorological extreme conditions that may occur in South Africa, but which are outside the norm for airfield operations.
 - (ii) Sensors and equipment installed within the environment to be measured shall operate within and recover to the tolerance values specified over the following range of environmental conditions and safety/operating requirements.
 - (iii) The systems shall be designed to fail-to-safe where possible.

Environmental Condition	In Tolerance Operating Range	Recoverable Range
Temperature	minus 25°C to plus 50°C	minus 30°C to plus 70°C
Pressure	800 to 1050 mb (hPa)	800 to 1200 mb (hPa)

Humidity	5 to 100% RH condensing	0 to 100% RH condensing
Wind speed	0 to 100 knots	0 to 130 knots

(b) Surface wind speed and direction measurement

(i) Sensor Performance Requirements

- (aa) The surface wind speed and direction-measuring equipment shall have a level of performance, which is able to provide an accurate and uncorrupted representative measurement of wind speed and direction at a height of approximately 10m (30 ft) above the whole runway and the whole runway complex if there is more than one runway. Multiple sensors may be required to satisfy this objective.
- (bb) Representative surface wind observations should be obtained by the use of sensors appropriately sited as determined by local conditions. Sensors for surface wind observations for local routine and special reports should be sited to give the best practicable indication of conditions along the runway, e.g. lift-off and touchdown zones. At aerodromes where topography or prevalent weather conditions cause significant differences in surface wind at various sections of the runway, additional sensors should be provided.
- (cc) Surface wind indicators relating to each sensor shall be located in the appropriate Air Traffic Services Unit (ATSUs) with corresponding indicators in the meteorological station. The indicators in the meteorological station and the air traffic services units shall relate to the same sensors, and where separate sensors are required as specified in (bb), the indicators shall be clearly marked to identify the runway and section of runway monitored by each sensor.

(ii) Wind Speed & Direction Sensor Accuracy

- (aa) With wind speeds in excess of 3 knots, the wind direction system shall be capable of producing an overall accuracy better than plus or minus 10 degrees, including “dead band”.
- (bb) The sensor shall be sampled at a minimum sample rate of four per second. If wind variation information is processed at the sensor head or in a remote processing unit, samples/averages shall be transmitted at a minimum rate of once per second.
- (cc) Systems relying on polled sampling shall ensure that the complete data word from the remote sensor is sampled at a minimum of once every second.
- (dd) The equipment shall measure a 3-second gust as a rolling average of the wind speed samples.
- (ee) The equipment shall produce 2 and 10 minute rolling averages of the wind speed and direction.
- (ff) The average direction displayed shall take cognisance of the numerical discontinuity at North.

(iii) Wind Speed & Direction Sensor Resolution for Analogue & Digital Systems

- (aa) Operationally desirable and currently attainable accuracy of measurement:

Element to be observed	Operationally desirable accuracy of meteorological instrumentation	Attainable accuracy of measurement
Mean surface wind	Direction: $\pm 10^\circ$ Speed: ± 2 Km/h (1kt) up to 19 Km/h (10 kt)	Direction: $\pm 5^\circ$ Speed: ± 2 Km/h (1 kt) up to 37 Km/h (20 kt) $\pm 5\%$ above 37 Km/h (20 kt)
Variations from the mean surface wind	± 4 Km/h (2 kt), in terms of longitudinal and lateral components	Direction: $\pm 5^\circ$ Speed: ± 2 Km/h (1 kt) up to 37 Km/h (20 kt)

		± 5% above 37 Km/h (20 kt)
Runway visual range	± 10m up to 400m ± 25m between 400m and 800m ± 10% above 800m	± 25m up to 150m ± 50m between 150m and 500m ± 10% above 500m up to 2000m
Cloud height	± 10m (33ft) up to 100m (330ft) ± 10% above 100m (330ft)	± 10m (33ft) up to 1000m (3300ft) ± 30m (100ft) above 1000m (3300ft) ± 10% above 100m (330ft) up to 3000m (10 000ft)
Air temperature and dew point temperature	± 1°C	± 0,2°C
Pressure value (QNH, QFE)	± 0,5 hPa	± 0,3 hPa

- (iv) Monitoring
 - (aa) The equipment shall be self-monitoring and shall provide a suitable indication of equipment status and serviceability.
- (v) Monitor and Monitoring Configuration
 - (aa) The display shall present a clear and unambiguous indication of the operational status of the sensor system to the user.
 - (bb) The system shall be designed to fail-to-safe.
- (vi) Displays
 - (aa) The display device shall be designed in such a way as to draw the attention of the operator to significant reportable changes in the displayed surface wind information.
 - (bb) The display shall provide information compliant with the ICAO Annex 3 Chapter 4.5.5 requirements for marked discontinuity, wind variation and wind speed (gusts).
 - (cc) On aerodromes with multiple runways, the display shall indicate the sensor selected, (or indicate the runway selected on dedicated displays) and display the surface wind information relevant to the active runway(s).
 - (dd) If wind direction and deviation is displayed as a circle, the display shall have a resolution of at least 10 degrees.
 - (ee) The combined numeric and analogue display shall be linked so that both display the same information relevant to the chosen display mode.
- (c) Ground-Based Pressure Measurement Equipment
 - (i) Pressure Sensor Performance Requirements
 - (aa) No aerodrome-observing system shall be dependent upon a single sensor for pressure measurement. A minimum of 2 co-located sensors shall be used with an integrity within 0,5mb (hPa) of each other.
 - (bb) The measurement system shall provide a pressure reading to an accuracy of ±0.5mb (hPa), or better over a range of at least 800 to 1050mb (hPa).
 - (cc) The sensor shall provide an output with a minimum system resolution of 0,1 mb (hPa).
 - (dd) For automated systems, the sensor shall be sampled at a minimum rate of once a minute.

- (ee) The reference level for computation of QFE shall be the aerodrome elevation. For non-precision approach runways, the thresholds of which are 2m (7ft) or more below the aerodrome elevation, and for precision approach runways, the QFE, if required, shall refer to the relevant threshold elevation.
- (ii) Displays
 - (aa) The display device shall be designed in such a way as to draw the attention of the operator to a change of 1 mb or more from the previous reading to 1 decimal place. (i.e. 998,4 mb to 997,4 mb).
 - (bb) The display shall provide the indication of pressure to the nearest tenth of a millibar/hektoPascal).
 - (cc) On aerodromes with multiple runways and sensor systems, the display shall indicate the sensor selected, (or indicate the runway selected on dedicated displays) and display the pressure information relevant to the active runway(s).
 - (dd) Where a combined numeric and analogue display is used, they shall be linked so that both display the same information relevant to the chosen display mode.
- (d) Ground-Based Temperature And Dew-Point Measurement
 - (i) Sensor Performance Requirements
 - (aa) The equipment shall be installed in a position such that the sensor measurements are suitable for the operational purpose and representative of the whole runway or runway complex.
 - (bb) The sensors shall be mounted approximately 1,25m (4ft) above an earth or grass surface and in such a position, where it will not be degraded by anomalous temperatures and protected from the exhaust fumes of aircraft.
 - (cc) The sensors shall be exposed in an instrument housing or property ventilated screen, which provides protection from atmospheric radiation and water drops either as precipitation or fog.
 - (ii) Accuracy
 - (aa) The equipment shall be capable of measurement to accuracy better than plus or minus 0, 5 degree Celsius for air temperature and dew point, over the operating range -30 to +50 degrees Celsius.
 - (bb) The sensor(s) shall be sampled at minimum of once per minute.
 - (iii) Resolution

Air Temperature and the dew point temperature shall be reported to the nearest whole degree Celsius rounded up.

NOTE: Dew point must be displayed for temperatures below zero.
- (e) Meteorological Instruments: Maintenance Requirements
 - (aa) The equipment shall operate, and be maintained, in a manner which fulfils the operational purpose in all respects.
 - (bb) The equipment shall be certified by a person accredited by the manufacture of the specific equipment to manufacturer's specification four times per year when associated with an aerodrome with Instrument Landing System (ILS) equipment and once per year otherwise, unless manufacturer's requirements state a shorter period of time.
 - (cc) The equipment shall be re-certified after any repair that could jeopardise the state of calibration thereof.
 - (dd) Certification shall be traceable through a recognised accrediting organisation.
 - (ee) A comprehensive fault, repair and maintenance record shall be kept.
- (f) Meteorological Information Records
 - (i) Where automated meteorological instruments are in use, the equipment shall be capable of producing a printed record of data recorded during the preceding 30 days.

8. PAVEMENT

(1) Determination and reporting of aircraft classification number (ACN)/ Pavement classification number (PCN) bearing strengths of runways

(a) Codes to be used for reporting pavement type for ACN-PCN determination, substrate strength category, maximum allowable tyre pressure category and evaluation method:

(i) **Pavement type for ACN-PCN determination:**

	Code
Rigid pavement	R
Flexible pavement	F

Note: - If the actual construction is composite or non-standard, include a note to that effect.

(ii) **Subgrade strength category:**

	Code
High strength: Characterised by $K= 150 \text{ MN/m}^3$ and representing all K values above 120 MN/m^3 for rigid pavements, and by $\text{CBR}=15$ and representing all CBR values above 13 for flexible pavements.	A
Medium strength: Characterised by $K= 80 \text{ MN/m}^3$ and representing all K values of 60 to 120 MN/m^3 for rigid pavements, and by $\text{CBR}=10$ and representing all CBR values of 8 to 13 for flexible pavements.	B
Low strength: Characterised by $K= 40 \text{ MN/m}^3$ and representing all K values of 25 to 60 MN/m^3 for rigid pavements, and by $\text{CBR}=6$ and representing all CBR values of 4 to 8 for flexible pavements.	C
Ultra Low strength: Characterised by $K= 20 \text{ MN/m}^3$ and representing all K values below 25 MN/m^3 for rigid pavements, and by $\text{CBR}=3$ and representing all CBR values below 4 for flexible pavements.	D

(iii) **Maximum allowable tyre pressure category:**

	Code
High: No pressure limit	W
Medium: Pressure limited to 1.5 MPa	X
Low: Pressure limited to 1.00 MPa	Y
Very Low: Pressure limited to 0.5 MPa	Z

(iv) **Evaluation Method:**

	Code	
Technical Evaluation: representing a specific study of the pavement and application of pavement behaviour technology.	T	characteristics

Using aircraft Experience: representing a specific knowledge of the specific type and mass of aircraft satisfactorily being supported under regular use. **U**

Note: Examples of the above available on www.caa.co.za Aerodromes/ Pavements

- (b) The criteria used to regulate the use of a pavement by an aircraft with an ACN higher than the PCN reported for that pavement shall be in accordance with the criteria below:
 - (i) for flexible pavements, occasional movements by aircraft with ACN not exceeding 10 per cent above the reported PCN should not adversely affect the pavement;
 - (ii) for rigid or composite pavements, in which a rigid pavement layer provides a primary element of the structure, occasional movements by aircraft with ACN not exceeding 5 per cent above the reported PCN should not adversely affect the pavement;
 - (iii) if the pavement structure is unknown, the 5 per cent limitation shall apply; and
 - (iv) the annual number of overload movements shall not exceed 5 per cent of the total annual aircraft movements.
- (2) Pavement surface condition and friction characteristics
 - (a) In adopting tolerances for surface irregularities, the standard of construction set out in Table A1 is achievable for short distances of 3 m and conforms to good engineering practice; except across the crown of a chamber or across drainage channels, where the finished surface of the wearing course is to be of such regularity that when tested with a 3 m straight-edge placed anywhere in any direction on the surface, there is no deviation greater than 3 mm between the bottom of the straight-edge and the surface of the pavement anywhere along the straight edge.
 - (b) Caution should also be exercised when inserting runway lights or drainage grills in runway surfaces to ensure that adequate smoothness of the surface is maintained.
 - (c) The operation of aircraft and differential settlement of the surface foundations will eventually lead to increases in surface irregularities. Small deviations in the above tolerances will not seriously hamper aircraft operations. In general, isolated irregularities of the order of 2.5 mm to 30 mm over a 45 m distance are tolerable.
 - (d) Corrective surface maintenance action shall be taken when the friction characteristics of a runway or portion thereof, are below the minimum friction level specified in the Table below:

Table A1

Test Equipment	Test tyre type	Pressure (kPa)	Test speed (km/h)	Test water depth	Design objective for new surface	Maintenance planning level	Minimum friction level
Mu-meter Trailer	A	70	65	1.0	0.72	0.52	0.42
	A	70	95	1.0	0.66	0.38	0.26
Skiddometer Trailer	B	210	65	1.0	0.82	0.60	0.50
	B	210	95	1.0	0.74	0.47	0.34
Surface friction tester vehicle	B	210	65	1.0	0.82	0.60	0.50
	B	210	95	1.0	0.74	0.47	0.34
Runway friction tester	B	210	65	1.0	0.82	0.60	0.50

vehicle							
	B	210	95	1.0	0.74	0.54	0.41
TATRA friction tester vehicle	B	210	65	1.0	0.76	0.57	0.48
	B	210	95	1.0	0.67	0.52	0.42
Griptester Trailer	C	140	65	1.0	0.74	0.53	0.43
	C	140	95	1.0	0.64	0.36	0.24

139.02.23 WORKS ON AERODROME

1. Requirements and standards

- (1) The holder of an aerodrome licence must have the following available for purposes of planning and carrying out construction and maintenance work safely on or in the vicinity of the movement area, which may extend above an obstacle limitation surface:
 - (a) appropriate arrangements for effective communication between the air work;
 - (b) the names, contact numbers and roles and responsibilities of the individuals or organisations responsible for the planning and carrying out of the work, and arrangements for communicating with those individuals or organisations at all times;
 - (c) the names and contact numbers, during and after working hours, of the aerodrome fixed-base operators, ground handling agents and aircraft operators who have to be notified of the work;
 - (d) a distribution list for work plans, if required.
- (2) In this technical standard “construction and maintenance work” includes construction and maintenance work that may have to be planned and carried out on short notice.
- (3) During the carrying out of low visibility operations when “construction and maintenance work” is in progress, the following provisions regarding low visibility conditions are applicable:
 - (a) Low Visibility Operations
 - (i) Aircraft operations at aerodromes during reduced visibility or low cloud conditions present additional hazards to the aircraft and to other aerodrome users. As visibility reduces, the ability of air traffic service staff, remedial action in a timely manner becomes limited. In conditions of low cloud, the time available for the pilot of an approaching aircraft to assess the aerodrome environment visually is reduced.
 - (ii) Aerodromes that wish to continue operating in poor visibility or are available for instrument approaches in conditions of low cloud are required to develop and maintain procedures to be implemented in poor weather conditions in order to safeguard the operation of aircraft. These procedures are known as Low Visibility Procedures (LVPs).
 - (iii) Aerodromes that are available to precision instrument approaches are required to develop and maintain additional procedures that ensure suitable measures are in place to protect the signal produced by the ground based radio navigation equipment.
 - (b) Responsibilities with respect to Low Visibility Procedures
 - (i) It is the responsibility of the aerodrome licensee to develop and maintain the LVPs used at their aerodrome.
 - (ii) Whilst ATC are responsible for advising pilots of the status of LVPs at an aerodrome, it is the responsibility of the aerodrome licensee to ensure that all

measures required to protect aircraft operations in poor weather conditions are in place before advising ATC that LVPs can be declared to be in force.

(c) Hazards

- (i) On aerodromes where the ground marking and lighting is satisfactory, ground traffic flow rates can often be sustained safely in visibilities down to 500m. An aircraft on the ground is most vulnerable during the landing and the take-off phases of flight, when the pilot is severely restricted in the damaged or destroyed if it collides, at high speed, with any sizeable object. As visibility deteriorates the potential for runway incursions by aircraft, vehicles or personnel increases.
- (ii) The risk of inadvertent runway incursion by taxiing aircraft is greatest at aerodromes with complex layouts and multiple runway access points. This risk can only be managed adequately by the application of procedures that provide the pilot with clear, unambiguous guidance on routing and holding points or ground traffic patterns.
- (iii) The safe operation of vehicles on the movement area depends to a large degree upon drivers being adequately trained and thoroughly familiar with the aerodrome layout in all visibility conditions and by complying with procedures, signs, signals and ATC instructions. As part of their SMS, aerodrome licensees should have in place a procedure that ensures force, are not only appropriately trained but also remain competent in view of the limited occasions in which these conditions occur.
- (iv) During precision instrument approach operations, interference to the signal guiding the aircraft can cause deviation to the aircraft's flight path and can cause unnecessary go-around.

(d) Low Visibility Procedures

- (i) In order that flying operations may be safely conducted at aerodromes in low visibility conditions, aerodrome licensees, in consultation with local ATS staff, should determine the movement rate that they wish to sustain and develop LVPs that will support the desired movement rate. These by the CAA prior to inclusion in the Aerodrome Manual and the unit Manual of Air Traffic Services Part 2 and their subsequent implementation. LVPs should take account of the factors described in the following paragraphs.
- (ii) In order to protect aircraft operating on the ground in low visibilities, it is essential to prevent unauthorised vehicular traffic from entering the movement area. The area should, where practicable, be fenced and provided with manned controlled entry points. Where unguarded gates are they remain secure. Where physical closure is not practicable, for example between aircraft maintenance areas and manoeuvring areas, entry points should be manned and where the opening is too wide for visual surveillance then it should be fitted with intruder detection equipment movement area in this manner it should be possible to exclude unauthorised personnel who will not be aware of aerodrome traffic control procedures.
- (iii) Complete protection can be expensive and is sometimes difficult to achieve, particularly on large aerodromes where taxiways cross vehicular traffic routes, and where maintenance areas compete with parking aprons for space. Where it is not practicable to secure the area in this manner recommended above the aerodrome licensee shall satisfy the CAA as to the security of the aerodrome's operations in low visibility conditions.
- (iv) When LVPs are in force, only vehicles essential to the aerodrome operation and driven by formally tested and authorised drivers should be allowed on to the movement area. All such vehicles should be equipped showing all taxiways, runways, holding points and vehicle routes marked with their appropriate designation. The chart should be accompanied by

written instructions clearly detailing the action that the driver should take in the event that the vehicle should break down or that the driver should be operating on the manoeuvring area should be equipped with R/T and the driver required to maintain contact with ATC at all times. Authorised drivers should be thoroughly briefed and familiar with the aerodrome layout including closed taxiway junctions and runway access points, the appropriate, standard R/T phraseology. Drivers that are restricted to certain areas of operation should be familiar with the limits of those areas, particularly if they cannot be clearly marked, for example, on the aerodrome surface. Authorised drivers should be checked periodically for vehicles and personnel, e.g. works contractors and maintenance parties and their equipment must be withdrawn from the manoeuvring area.

- (v) In order to continue unrestricted operations for as long as possible whilst implement most of the ground-based measures in good time, and in certain circumstances before they are absolutely necessary. The final measures, which are wholly within the control of ATC, should be implemented only when the weather conditions demand it. However, in status of LVPs at the aerodrome. Procedures should ensure that the potential for such misunderstandings is minimised and that there is a single point from which definitive information about the current status of LVPs can be confirmed.
 - (vi) Rescue and Fire Fighting Service (RFFS) vehicles are essential to airfield operations at all times and response and deployment times are of vital concern to aerodrome licensees. Although it is unlikely that RFFS response time will be significantly affected in visibilities down to 200m, very large or complicated aerodrome. In visibilities below 200m there is greater probability that response times will be affected. Operational procedures and training should be developed in accordance with the guidance at Chapter 8, Appendix 8B.
 - (vii) Similarly, because congregations of birds are difficult for both ATS staff or pilots to observe in poor weather conditions, bird hazard control operations should not be restricted during LVPs. Procedures should ensure that adequate time between movements is afforded to permit bird hazard control measures to be implemented. The importance of implementation is also highlighted. This too should be accounted for when determining the declared movement rate.
 - (viii) The risk of inadvertent runway incursion by an aircraft, or aircraft miss-routing, is increased in low visibility conditions. Where possible this risk should be minimized by keeping taxiway routings as simple as is practicable. This can be best achieved by restricting the available taxiway system wherever possible to a single route from the apron to the runway, with intermediate junctions closed, a clearly defined runway entry point, holding point and a separate exit taxiway and return route for landings or rejected takeoffs. All other runway access or crossing points should be closed. This can be achieved by the use of red stop-bars or by a physical barrier using the used in this manner should either be retro-reflective or augmented by lights of the type described at Chapter 4 paragraphs 12.10.1 and 12.10.2. In this way the procedural control of aircraft and vehicles at complex aerodromes can be simplified. On major aerodromes where traffic is such that several routes are operated simultaneously, a Surface Movement Guidance and Control system is likely to be required in order to achieve the declared movement rate.
 - (ix) ICAO Annex 14 currently recommends the provision of Surface Movement Radar (SMR) at aerodromes where operations in RVR in less than 400m take place. However, unless the CAA has approved specific procedures, SMR is a monitoring tool only; SMR enhances existing ATC procedures and its use should not normally be regarded as the prime method by which collision avoidance can be effected.
- (e) Visibility Conditions and Associated Actions

- (i) The point at which LVPs should be implemented will vary from one available. The point at which LVPs are to be implemented must be clearly defined and should be related to a specific RVR or cloud ceiling measurement (e.g. 1000m RVR or 300ft cloud ceiling). Adequate consideration should be given to the time taken to implement fully all of the measures required to protect operations in low visibility conditions. Provision should also be made for alerting airlines and other organisations with movement area access in good time of the introduction of LVPs. This is particularly important where companies exercise control over their own apron areas and maintenance facilities adjacent to the manoeuvring area.
 - (ii) It is not possible to lay down definitive rules governing the actions to be taken in order to ensure the smooth implementation of LVPs at every aerodrome. The following guidelines may be of assistance in developing robust LVPs.
- (f) Visibility Condition 1
- (i) Visibility Condition 1 is defined as visibility sufficient for the pilot to taxi and to avoid collision with other traffic on taxiways and at intersections by visual reference and for ATC personnel to exercise control over all traffic on the basis of visual surveillance.
 - (ii) No additional requirements for the protection of ground operations by aircraft are required during Visibility Condition 1.
- (g) Visibility Condition 2
- (i) Visibility Condition 2 is defined as visibility sufficient for a pilot to taxi and to avoid collision with other traffic on taxiways and at intersections by visual reference, but insufficient for ATC personnel to exercise control over all traffic on the basis of visual surveillance.
 - (ii) Actions required in Visibility Condition 2 are dependent on the dimensions of the manoeuvring area and the position of the control tower. Procedures and visual aids will allow the pilot to determine his position and follow the required route. In the lower ranges of Visibility Condition 2, the necessary procedures might limit the movement rate unless some additional aids are available, such as Surface Movement Guidance and Control Systems, which may enable a greater movement rate to be achieved safely.
 - (iii) Adequate safeguards against runway incursions should be in place, such as limited taxi routing, surface movement radar assistance and stop-bars or physical barriers at runway access points.
 - (iv) When the visibility decreases to a value equivalent to about 1000 m RVR, and is expected to fall further, the withdrawal of vehicles and personnel involved in construction, maintenance and other non-essential activities on the manoeuvring area should normally be initiated. Routine maintenance on visual and non-visual aids should be suspended and the ILS sensitive area should be cleared of all traffic.
As the RVR deteriorates to 600m, or the cloud ceiling reduces to 200ft, the withdrawal of non-essential vehicles and personnel from the manoeuvring area should be completed and all activities on the manoeuvring area should be brought under specific control by ATC (e.g. all activities subject to individual clearances as opposed to free ranging).
- (g) Visibility Condition 3
- (i) Visibility Condition 3 is defined as visibility equivalent to an RVR of less than 400m.
 - (ii) In such visibility conditions it is likely to be necessary to further restrict the operation of vehicles and persons on the maneuvering area. Procedures developed for ATC to assist bird hazard control and the Rescue and Fire Fighting services (in case of an accident or incident) should be implemented.
- (h) Precision approach operations
- (i) As the RVR deteriorates to the minimum at which category I approaches can be made (typically below 600m but the exact value is determined by a variety of factors), or the cloud ceiling reduces to 200ft, the withdrawal of non-essential vehicles and personnel from the manoeuvring area should be completed.

- (ii) In such conditions all measures designed to protect Category II and III approaches should be in place.
 - (iii) It should be noted that a pilot will expect a precision approach aid to be fully safeguarded and available for Category II or III use if LVPs are declared to be in force by ATC (see paragraph 10) at the aerodrome 1.
- (j) Declaration of Low Visibility Procedures in force
- (i) It is essential that all LVP measures are verified as in place before LVPs are declared to be in force by ATC. Similarly, LVPs should be declared as cancelled before the aerodrome licensee withdraws any measures. It should be remembered that aircraft established on an approach may have commenced that approach
 - (ii) At aerodromes that support Category II or III operations and in conditions that preclude Category I operations, under no circumstances should LVPs be declared to be in force if the appropriate safeguards for Category II or III operations are not fully in place to protect the landing aids and runway.
 - (iii) Misunderstandings about the status of LVPs can easily arise during periods when the procedures are being introduced or withdrawn. This is particularly true at aerodromes where LVPs include a phase where preparatory actions are taken prior to the full implementation and declaration of “LVPs in force” or where some measures may be left in place during what may be a temporary improvement in the weather conditions so that full LVPs can be re-instituted at short notice should the weather deteriorate again. Local procedures should ensure that the statuses of LVPs are clearly understood by all those that are involved in aerodrome operations.
- (k) Review of Low Visibility Procedures
- (i) Aerodrome authorities, in co-operation with local ATC staff and other agencies involved in LVP operations, should regularly review the effectiveness of LVPs. Any need for change should be agreed with the CAA prior to implementation and inclusion in the Aerodrome Manual and the Manual of Air Traffic Services Part 2.
Whilst it is normal practice to protect Category II and III approaches when the cloud ceiling is 200ft or below, an aerodrome may choose to implement these measures when the cloud base is 200ft or below in order to further reduce the risk of an aircraft having to go-around due to disturbance of the ILS signal if the cloud requires the approach to be made to Category I minima.
- (l) Additional information
- (i) Low visibility operations are discussed in greater detail in ICAO Doc 9476 Manual of Surface Movement and Guidance Control Systems Chapter 5 and examples of LVPs in use at several international airports are given in Appendix B to that Document.
 - (ii) Systems designed to enable movement rates to be sustained are discussed in ICAO Doc 9830 Advanced Surface Movement Guidance and Control Systems (ASMGCS) Manual.
- (m) Conversion of Reported Meteorological Visibility to RVR
- (i) At aerodromes where RVR measurements are not made, or in case of unserviceability of RVR measuring equipment, LVPs should include criteria for implementation and withdrawal based on the reported meteorological visibility.
 - (ii) Pilots, when converting meteorological visibility to an equivalent RVR, may apply the factors Table 2B.1 provides. This method of obtaining RVR is not intended for direct application by aerodrome authorities but is included in order to provide assistance for aerodromes at which RVR is not available.
- Lighting Elements available
RVR = Reported Met Visibility
Day Night

High Intensity Approach and Runway Lighting

1.5 2.0

Any type of lighting installation other than above 1.0.1.5

No lighting 1.0

139.02.29 DEMARCATION OF ROUTES ON APRON

1. Minimum clearance

- (1) An aircraft stand shall provide the following minimum clearances between an aircraft, using the stand and any adjacent building, aircraft on another stand and other object:

Code Letter	Clearance
A	3 m
B	3 m
C	4.5 m
D	7.5 m
E	7.5 m
F	7.5 m

- (2) When special circumstances so require, these clearances may be reduced at a nose-in aircraft stand, where the code letter is D, E or F:
- (a) between the terminal, including any fixed passenger bridge, and the nose of an aircraft; and
 - (b) over any portion of the stand provided with azimuth guidance by a visual docking guidance system.

139.02.31 ACCESS OF GROUND VEHICLES TO AERODROME MOVEMENT AREA

1. Signs, signals or standards

The signs, signals and standards prescribed in Chapter IX of the National Road Traffic Regulations, 2000, apply with the changes required by the context to the use of all surface roads in the aerodrome movement area.

2. Rules and procedures for the operation of ground vehicles

- (1) The rules and procedures for the operation of ground vehicles in the aerodrome movement area are the rules and procedures prescribed in Chapter X of the National Road Traffic Regulations, 2000.
- (2) The mechanism and sanction to ensure compliance with the rules and procedures for the operation of ground vehicles in the aerodrome movement area is the mechanism and sanction prescribed in section 56 of the Criminal Procedure Act, 1977.
- (3) The holder of an aerodrome licence must appoint a person to effectively administer vehicle control within the aerodrome movement area.

139.03.1 REQUIREMENTS FOR LICENCE

1. Conditions for issue and renewal

The documents, contemplated in CAR 139.03.1 as condition for the issuing and renewal of a heliport licence, are the standards contained in the relevant ICAO Annexes and Documents, and the recommended practice contained in these documents incorporated by the Director as a standard, are the following:

139.03.2 HELIPORT DESIGN REQUIREMENTS

1. Heliport design standards

- (1) The heliport design standards that apply in respect of the physical characteristics, obstacle limitation surfaces, visual aids, and equipment and installations provided at a licensed heliport, are the appropriate heliport design standards contained in ICAO Annex 14, Volume II.
- (2) The heliport design standards that apply in respect of the physical characteristics, obstacle limitation surfaces, visual aids, and equipment and installations provided at an approved heliport, are the appropriate heliport design standards contained in CAA Document J97HG “Heliports and Helistops”.

2. Runway lead-in lighting

- (1) A runway lead-in lighting system should consist of groups of lights positioned so as to define the desired approach path and so that one group may be sighted from the preceding group. The interval between adjacent groups should not exceed approximately 1 600m. A runway lead-in lighting system should extend from a point as determined by the appropriate authority, up to a point where the approach lighting system, if provided, or the runway or the runway lighting system is in view.
- (2) Each group of lights of a runway lead-in lighting system should consist of at least three flashing lights in a linear or clustered configuration. The system may be augmented by steady burning lights, where such lights would assist in identifying the system.
- (3) The flashing lights should be white, and the steady lights should be gaseous discharge lights.
- (4) Where practicable, the flashing lights in each group should flash in sequence towards the runway.

139.03.4 QUALITY ASSURANCE SYSTEM

1. Minimum standards for a quality assurance system

- (1) The quality assurance system referred to in CAR 139.03.4(2), must include –
 - (a) a clear definition of the level of quality the heliport operator intends to achieve;
 - (b) a procedure that sets out the level and frequency of the internal reviews;
 - (c) a procedure to record the findings and communicate them to management;
 - (d) a list of responsible persons;
 - (e) procedures by which other quality indicators such as facility malfunction reports, incidents, occurrences, complaints and defects are brought into the quality control system;
 - (f) procedures for management analysis and overview;
 - (g) procedures for rectifying any deficiencies which may be found; and
 - (h) procedures for documenting the complete review process from the inspection to the satisfactory management review so that this is available to the Director during a safety inspection and audit.
- (2) Measures must be taken to ensure that the system is understood, implemented and complied with at all levels.
- (3) The quality assurance system must be documented in the operations manual referred to in CAR 139.03.3.

139.03.7 HELIPORT RESCUE AND FIRE FIGHTING

1. Rescue and fire fighting categories of heliports

The rescue and fire fighting categories of heliports referred to in CAR 139.03.7(2), are the categories contained in paragraph 6.1 of Annex 14, Volume II.

2. Requirements and standards

- (1) The holder of a heliport licence must continuously assess operations at the heliport in relation to the rescue and fire fighting capability, and during anticipated periods of reduced

or increased activity, the level of protection must be no less than needed for the highest category of helicopters planned to use the heliport during that time, irrespective of the number of movements.

- (2) The holder of the licence may, during any period of operations limited to helicopters with a specification lower than that which is normally applicable under CAR 139.03.7, reduce the rescue and fire fighting capability to the appropriate level required for the heliport category referred to in TS 139.03.7, corresponding with the level of operation.
- (3) Any reduction in the rescue and fire fighting capability, must include in the heliport operations manual –
 - (a) procedures for, and particulars of the persons having the authority to implement the reduction; and
 - (b) procedures for recall of the full heliport rescue and fire fighting capability.
- (4) A reduction in the rescue and fire fighting capability may not be implemented unless information on the anticipated level of services is forwarded to the air traffic service unit concerned and the Director, for the necessary publication of such information in an AIP.
- (5) If the required response time cannot be met by rescue and fire fighting services which are not based at the heliport, the holder of the licence must have the rescue and fire fighting services based at the heliport in order to comply with the response time, and –
 - (a) introduce a system of preventative maintenance of such vehicles and equipment to ensure effectiveness and compliance with the required response time throughout the entire life of each vehicle;
 - (b) immediately repair or replace any required rescue and fire fighting vehicle or equipment that becomes inoperative to the extent that the holder of the licence cannot meet the response capability with a vehicle or a piece of equipment which will enable the holder of the licence to meet such capability.
- (6) If the replacement of a vehicle or a piece of equipment is not immediately possible or available, the holder of the licence must –
 - (a) follow the procedure prescribed in CAR 139.03.9;
 - (b) if the required response time cannot be met within 72 hours, limit operations on the heliport equal to the category level of protection it can provide with the remainder of vehicles and equipment as determined in accordance with TS 139.03.7.
- (7) The holder of the licence must respond to each emergency during heliport operations with rescue and fire fighting equipment suitable to limit loss of life and to prevent damage to property.

139.03.19 GENERAL DUTIES OF HOLDER OF LICENCE

1. Marking of obstructions

The marking of obstructions referred to in CAR 139.03.19(2)(c), must be done in accordance with the requirements and standards contained in Chapter 5 of Annex 14, Volume II.

2. Markings

The 3 markings referred to in CAR 139.03.19(2)(f), are the appropriate markings contained in Annex 14, Volume II.

3. Marking of unserviceable areas on touch-down terrain

The 3 markings referred to in CAR 139.03.19(2)(i), are the appropriate markings contained in Annex 14, Volume II.

4. Heliport financial data and heliport traffic statistics

- (1) The heliport financial data referred to in CAR 139.03.19(3)(a), are the heliport financial data contained in Annexure K.

- (2) The heliport traffic statistics referred to in CAR 139.03.19(3)(a), are the heliport traffic statistics contained in Annexure L.

5. Facilitation plan

(Reserved)

6. Monitoring of helicopter noise

(Reserved.)

139.03.20 WORKS ON HELIPORT

1. Requirements and standards

- (1) The holder of an heliport licence must have the following available for purposes of planning and carrying out construction and maintenance work safely on or in the vicinity of the movement area, which may extend above an obstacle limitation surface:
- (a) Appropriate arrangements for effective communication between the air traffic services unit concerned and the work team during the progress of such work;
 - (b) the names, contact numbers and roles and responsibilities of the individuals or organisations responsible for the planning and carrying out of the work, and arrangements for communicating with those individuals or organisations at all times;
 - (c) the names and contact numbers, during and after working hours, of the aerodrome fixed-base operators, ground handling agents and aircraft operators who have to be notified of the work;
 - (d) a distribution list for work plans, if required.
- (2) In this technical standard ‘construction and maintenance work’ includes construction and maintenance work that may have to be planned and carried out on short notice.

139.03.28 ACCESS OF GROUND VEHICLES TO HELIPORT MOVEMENT AREA

1. Signs, signals or standards

The signs, signals and standards prescribed in Chapter IX of the National Road Traffic Regulations, 2000, apply with the changes required by the context to the use of all surface roads in the heliport movement area.

2. Rules of procedures for the operation of ground vehicles

- (1) The rules and procedures for the operation of ground vehicles in the heliport movement area are the rules and procedures prescribed in Chapter X of the National Road Traffic Regulations, 2000.
- (2) The mechanism and sanction to ensure compliance with the rules and procedures for the operation of ground vehicles in the heliport movement area is the mechanism and sanction prescribed in section 56 of the Criminal Procedure Act, 1977.
- (3) The holder of an aerodrome licence must appoint a person to effectively administer vehicle control within the heliport movement area.

**SA-CATS 140
Safety management system**

List of technical standards

140.01.3 REQUIREMENTS OF SAFETY MANAGEMENT SYSTEM

1. Minimum standards for the safety management system

140.01.3 REQUIREMENTS OF A SAFETY MANAGEMENT SYSTEM

1. Minimum standards for a safety management system

1.1. For the holder of a Category 4 or higher aerodrome licence where commercial activities take place

- (1) The aerodrome operator of a Category 4 or higher aerodrome licence where commercial activities take place shall establish a safety management system as prescribed in this technical standard and in ICAO Doc 9774 and Doc 9859 in a format acceptable to the Director for the control and supervision of the services covered by the operation.
- (2) A description of the safety management system established in terms of paragraph (1) by the operator, to the satisfaction of the Director, for the control and supervision of the services covered by the operation, shall include –
 - (a) the identification of safety hazards;
 - (b) remedial action necessary to maintain an acceptable level of safety;
 - (c) continuous monitoring and regular assessment of the safety level achieved;
and
 - (d) continuous improvement to the overall level of safety.
- (3) The safety management system shall clearly define lines of safety accountability throughout the air transport operation, including a direct accountability for safety for senior management.
- (4) The minimum standards for a safety management system shall be as prescribed in paragraph (5) below.
- (5) The safety management system must include the following minimum standards:
 - (a) A clear definition of the level of safety that the operator intends to achieve.
 - (b) Proof by the aerodrome operator to the Director that adequate safety measures to maintain the required level of safety will be or are instituted.
 - (c) The components and elements described in paragraph (6) below.
- (6) Components and elements required for a safety management system
 - (a) Safety Policy & Objectives
 - (i) Management commitment and responsibility
 - (aa) The aerodrome operator shall define its safety policy which shall be in accordance with international and national requirements, and which shall be signed by the accountable executive.
 - (bb) The safety policy shall reflect its commitments regarding safety; including a clear statement about the provision of the necessary human and financial resources for its implementation; and be communicated, with visible endorsement, throughout the operation.
 - (cc) The safety policy shall be reviewed at least biannually to ensure that it remains relevant and appropriate to the operator.
 - (ii) Safety accountabilities of managers
 - (aa) The aerodrome operator shall identify the accountable executive who, irrespective of other functions, shall have ultimate responsibility and accountability for the implementation and maintenance of the SMS.

- (bb) The aerodrome operator shall identify the safety accountabilities of all members of senior management, irrespective of other functions. Safety accountabilities and authorities shall be documented and communicated throughout the operation.
- (iii) Appointment of key safety personnel
 - (aa) The aerodrome operator shall identify a safety manager, if he or she is not performing this function, to be the responsible individual and focal point for the implementation and maintenance of an effective SMS.
 - (bb) The safety manager shall report directly to the accountable manager (CEO or MD of the operator, organisation or provider) with respect to any significant safety concerns with unacceptable risk and with respect to implementation and maintenance of the SMS.
 - (cc) The selection criteria for safety managers or safety officers and suggested attributes and qualifications include:
 - (A) Broad operational knowledge and experience in the functions of the organisation;
 - (B) Sound knowledge of safety management principles and practices, including theoretical training and theoretical experience;
 - (C) At least 2 years of experience (safety officer) and at least 5 years of experience (safety manager) with the implementation and management of an aviation safety management system;
 - (D) Good written and verbal communication skills;
 - (E) Well-developed interpersonal skills;
 - (F) Computer literacy;
 - (G) The ability to relate at all levels, both inside and outside the organisation;
 - (H) Organisational ability;
 - (I) Capable of working unsupervised;
 - (J) Good analytical skills;
 - (K) Leadership skills and authoritative approach;
 - (L) Worthy of respect among peers and management;
 - (M) Project management skills.
- (iv) SMS implementation plan
 - (aa) The aerodrome operator shall develop and maintain an SMS implementation plan that defines the operator's approach to manage safety in a manner that meets the operator's safety needs.
 - (bb) The SMS implementation plan of the aerodrome operator shall explicitly address the coordination between the SMS of the operator and the SMS of other service providers (that may affect aviation safety and security) with whom the operator may interface during the provision of services.
 - (cc) The SMS implementation plan shall be endorsed by senior management of the operator.
- (v) Coordination of emergency response planning
 - (aa) The aerodrome operator shall develop, coordinate and maintain an emergency response plan that ensures orderly and efficient transition from normal to emergency operations, and return to normal operations.
 - (bb) The Aerodrome Emergency Management System (aircraft-related) is a separate document under CAR 139.02.6 and should be in accordance with the guidelines in ICAO Doc 9137-AN/898 Part 7, and should be listed in the Aerodrome Operations Manual.

- (vi) Documentation
 - (aa) The aerodrome operator shall develop and maintain SMS documentation to describe the following:
 - (A) safety policy and objectives;
 - (B) the SMS standards to be achieved;
 - (C) the SMS procedures and processes;
 - (D) the accountabilities, responsibilities and authorities for procedures and processes;
 - (E) the SMS areas of responsibilities; and
 - (F) the SMS outputs.
 - (bb) The aerodrome operator shall incorporate its safety management documentation into its operations manual to communicate its approach to safety throughout the operation, including the provision of applicable portions to airports tenants, or in a separately approved SMS manual.
- (b) Safety risk management shall include, but is not limited to:
 - (i) Hazard identification process

The aerodrome operator shall develop and maintain a formal process for effectively collecting, recording, acting on and generating feedback about hazards in operations, based on a combination of reactive, proactive and predictive methods of safety data collection.

Note: *Reactive methods refer to methods of identifying hazards that are based on the investigation of occurrences. Proactive methods aim to use any other information within the organisation for the identification of potential hazards. Predictive methods rely on data that is collected within the organisation that could be used effectively to predict the existence of hazards, usually done by trend analysis.*
 - (ii) Risk assessment and mitigation process
 - (aa) The aerodrome operator shall develop and maintain a formal risk management process that ensures analysis (in terms of probability and severity of occurrence), assessment (in terms of tolerability or acceptability) and control (in terms of mitigation) of risks to an acceptable level.
 - (bb) The following matrixes should be used for purposes of analysing and assessing risk:

Risk Severity Matrix

<i>Risk Severity definition</i>	<i>Description: Consequence (can lead to)...</i>	<i>Examples of what to look out for...</i>
Category A Catastrophic	One or multiple deaths & complete loss/ destruction of equipment	A major accident.
Category B Hazardous	Serious injuries/Major Damage to equipment	Large reduction in safety margins, physical distress or workload such that the operators cannot be relied upon to perform their tasks accurately or completely.

Category C Major	Minor injuries/ Minor equipment damage	A significant reduction in safety margins, a reduction in the ability of the operators to cope with adverse operating conditions as a result of increase in workload, or as a result of conditions impairing their efficiency.
Category D Minor	Incidents	Operating limitations are breached. Procedures are not used correctly.
Category E Negligible	Negligible/Inconvenience	Few consequences. No safety consequences. Nuisance.

Risk Probability Matrix

<i>Likelihood/Probability Category</i>	<i>Description</i>	<i>Examples of what to look out for</i>
1	Extremely improbable (Rare)	Almost inconceivable that the event will occur.
2	Improbable (Seldom)	Very unlikely that the event will occur. It is not known that it has ever occurred before.
3	Remote (Unlikely)	Unlikely but could possibly occur. Has occurred rarely.
4	Occasional	Likely to occur sometimes. Has occurred infrequently.
5	Frequent	Likely to occur many times/regularly. Has occurred frequently/regularly.

RISK PROBABILITY		RISK SEVERITY				
		Catastrophic A	Hazardous B	Major C	Minor D	Negligible E
Frequent	5	5A	5B	5C	5D	5E
Occasional	4	4A	4B	4C	4D	4E
Remote	3	3A	3B	3C	3D	3E
Improbable	2	2A	2B	2C	2D	2E

Extremely improbable	1	1A	1B	1C	1D	1E
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Risk assessment Index	Suggested Criteria
5A, 5B, 5C, 4A, 4B, 4C, 3A, 3B, 2A	Unacceptable under the existing circumstances. Risk mitigation critical.
5D, 4D, 3C, 3D, 2B, 2C, 1A, 1B	Risk mitigation required. It might require management decision.
5E, 4E, 3E, 2D, 2E, 1C, 1D, 1E	Acceptable.

(cc) The following is an example of strategies that can be introduced for mitigation (risk control):

Avoidance	The operation or activity is cancelled because the risks exceed the benefits of continuing the operation or activity.
Reduction	The frequency of the operation or activity is reduced, or action is taken to reduce the magnitude of the consequences of the accepted risks.
Segregation of exposure	Action is taken to isolate the effects of risks or build in redundancy to protect against it.

- (dd) Alternative means of analysing, assessing and controlling risk may be implemented by the aerodrome operator with the approval of the Director.
- (ee) All safety information reported to the Director shall be in the format specified in the above matrixes.
- (ff) The aerodrome operator shall also define those levels of management with authority to make decisions regarding the tolerability/acceptability of safety risks, and the introductions of mitigating measures.

(c) Safety assurance

- (i) Monitoring and measurement of safety performance
 - (aa) The aerodrome operator shall develop and maintain the means to verify the safety performance of the operation compared to the safety policy and objectives, and to validate the effectiveness of safety risk controls.
 - (bb) The safety reporting procedures relating to safety performance and monitoring shall clearly indicate which types of operational behaviours are acceptable or unacceptable, and include the conditions under which immunity from disciplinary action would be considered. A non-punitive policy is required to enhance the reporting culture. Immunity from disciplinary action may not be granted in instances of violation and negligence.
 - (cc) The aerodrome operator shall create an environment where voluntary reporting mechanisms are established as opposed to collection of safety-related information by purely relying on investigative processes.

- (ii) The management of change
The aerodrome operator shall develop and maintain a formal process to identify changes within the organisation which may affect established processes and services; to describe the arrangements to ensure safety performance before implementing changes; and to eliminate or modify safety risk controls that are no longer needed or effective due to changes in the operational environment.
- (iii) Continuous improvement of the SMS
The aerodrome operator shall develop and maintain a formal process to identify the causes of sub-standard performance of the SMS, to determine the implications of sub-standard performance in operations, and to eliminate such causes. This may be achieved through audits of the SMS to ensure its effective implementation.
- (d) Safety promotion
 - (i) Training and education
 - (aa) The aerodrome operator shall develop and maintain a safety training programme that ensures that personnel responsible for the associated functions as contained in the SMS are trained and competent to perform their respective duties and thus not compromising SMS goals.
 - (bb) The scope of the safety training shall be appropriate to each individual's involvement in the SMS.
 - (ii) Safety communication
The aerodrome operator shall develop and maintain formal means for safety communication, which ensures that all personnel are fully aware of the SMS, conveys safety critical information, and explains why particular safety actions are taken and why safety procedures are introduced or changed.
- (e) Safety reporting requirements
 - (i) The aerodrome operator shall report any significant safety concern identified through its SMS to the Director within 7 days of it being verified.
 - (ii) The aerodrome operator shall report the following safety information to the Director on an annual basis, as per a schedule agreed to with the Director:
 - (aa) The top 20 hazards identified by the operator;
 - (bb) The mitigation strategies implemented to address the risk.

1.2 Safety management system for other organisations

- (1) This section prescribes the requirements of a safety management for the holder of –
 - (a) an aviation training organisation approval;
 - (b) an aircraft maintenance organisation approval;
 - (c) a manufacturing organisation approval ;
 - (d) an air traffic service unit approval;
 - (e) a design organisation approval;
 - (f) an operating certificate issued in terms of Parts 127;
 - (g) a procedure design organisation approval; and
 - (h) an electronic services organisations approval.
- (2) The safety management system, referred to in CAR 140.01.1, for the organisations referred to in paragraph (1) above, shall include:
 - (a) A clear definition of the level of safety that the organisation intends to achieve;

- (b) Proof by the approved organisation or the operator concerned to the Director that adequate safety measures to maintain the required level of safety will be or have been instituted;
- (c) The components and elements described in paragraph (3) below.

(3) Components and elements required for a safety management system

(a) Safety Policy and Objectives

(i) Management commitment and responsibility

- (aa) The approved organisation or operator concerned shall define its safety policy which shall be in accordance with international and national requirements, and which shall be signed by the accountable executive.
- (bb) The safety policy shall reflect its commitments regarding safety; including a clear statement about the provision of the necessary human and financial resources for its implementation; and be communicated, with visible endorsement, throughout the organisation.
- (cc) The safety policy shall be reviewed at least biannually to ensure that it remains relevant and appropriate to the organisation.

(ii) Safety accountabilities of managers

- (aa) The approved organisation shall identify the accountable executive who, irrespective of other functions, shall have ultimate responsibility and accountability for the implementation and maintenance of the SMS.
- (bb) The approved organisation or operator concerned shall identify the safety accountabilities of all members of senior management, irrespective of other functions. Safety accountabilities and authorities shall be documented and communicated throughout the organisation.

(iii) Appointment of key safety personnel

- (aa) The approved organisation or operator concerned shall identify a safety manager, if he or she is not performing this function, to be the responsible individual and focal point for the implementation and maintenance of an effective SMS.
- (bb) The safety manager shall report directly to the accountable manager (CEO or MD of the operator, organisation or provider) with respect to any significant safety concerns with unacceptable risk and with respect to implementation and maintenance of the SMS.
- (cc) The selection criteria for safety managers or safety officers and suggested attributes and qualifications include:
 - (A) Broad operational knowledge and experience in the functions of the organisation;
 - (B) Sound knowledge of safety management principles and practices, including theoretical training and theoretical experience;
 - (C) At least 2 years of experience (safety officer) and at least 5 years of experience (safety manager) with the implementation and management of an aviation safety management system;
 - (D) Good written and verbal communication skills;
 - (E) Well-developed interpersonal skills;
 - (F) Computer literacy;
 - (G) The ability to relate at all levels, both inside and outside the organisation;
 - (H) Organisational ability;
 - (I) Capable of working unsupervised;
 - (J) Good analytical skills;
 - (K) Leadership skills and authoritative approach;
 - (L) Worthy of respect among peers and management;

- (M) Project management skills.
- (IV) SMS implementation plan
 - (aa) The approved organisation or operator concerned shall develop and maintain an SMS implementation plan that defines the organisation's approach to manage safety in a manner that meets the organisation's safety needs.
 - (bb) The SMS implementation plan of the approved organisation or operator concerned shall explicitly address the coordination between the SMS of the approved organisation or operator concerned and the SMS of other service providers (that may affect aviation safety and security) with whom the approved organisation or operator concerned may interface during the provision of services.
 - (cc) The SMS implementation plan shall be endorsed by senior management of the organisation.
- (v) Coordination of emergency response planning

The approved organisation or operator concerned shall develop, coordinate and maintain an emergency response plan that ensures orderly and efficient transition from normal to emergency operations, and return to normal operations.
- (vi) Documentation
 - (aa) The approved organisation or operator concerned shall develop and maintain SMS documentation to describe the following:
 - (A) safety policy and objectives;
 - (B) the SMS requirements;
 - (C) the SMS procedures and processes;
 - (D) the accountabilities, responsibilities and authorities for procedures and processes; and
 - (E) the SMS outputs.
 - (bb) The approved organisation or operator concerned shall incorporate its safety management documentation into its manual of procedures to communicate its approach to safety throughout the operation, or in a separately approved SMS manual.
 - (cc) An SMS manual developed in terms of any other Part of the Regulations will be acceptable, provided the approved organisation or operator concerned is associated with the holder of the approval.
- (b) Safety risk management
 - (i) Hazard identification process

The approved organisation or operator concerned shall develop and maintain a formal process for effectively collecting, recording, acting on and generating feedback about hazards in operations, based on a combination of reactive, proactive and predictive methods of safety data collection.

Note: *Reactive methods refer to methods of identifying hazards that are based on the investigation of occurrences. Proactive methods aim to use any other information within the organisation for the identification of potential hazards. Predictive methods rely on data that is collected within the organisation that could be used effectively to predict the existence of hazards, usually done by trend analysis.*
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RISK PROBABILITY		RISK SEVERITY				
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Risk assessment Index	Suggested Criteria
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(dd) Alternative means of analysing, assessing and controlling risk may be implemented by the approved organisation or operator concerned with the approval of the Director .

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(c) Safety assurance

(i) Monitoring and measurement of safety performance

- (aa) The approved organisation or operator concerned shall develop and maintain the means to verify the safety performance of the organisation compared to the safety policy and objectives, and to validate the effectiveness of safety risk controls.
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 - (aa) The approved organisation or operator concerned shall develop and maintain a safety training programme that ensures that personnel responsible for the associated functions as contained in the SMS are trained and competent to perform the SMS duties.
 - (bb) The scope of the safety training shall be appropriate to each individual's involvement in the SMS.
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 - (ii) The approved organisation or operator concerned shall report the following safety information to the Director on an annual basis, as per a schedule agreed to with the Director :
 - (aa) The top 20 hazards identified by the operator;
 - (bb) The mitigation strategies implemented to address the risk.

SA-CATS 141
Aviation Training Organisations

List of technical standards

141.02.2 TRAINING AND PROCEDURES MANUAL

1. Information to be contained in training and procedures manual for flight crew training
2. Purpose
3. Compliance
4. Contents of manual

141.02.3 QUALITY ASSURANCE SYSTEM

1. Minimum standards for a quality assurance system

141.02.4 PERSONNEL REQUIREMENTS

1. Personnel requirements

141.02.2 TRAINING AND PROCEDURES MANUAL

1. Information to be contained in training and procedures manual for flight crew training

- (1) The training and procedures manual applicable to flight crew training shall at least contain the following divisions:
 - (a) General;
 - (b) Aircraft operating information;
 - (c) Routes;
 - (d) Staff training;
 - (e) Training plan;
 - (f) Training syllabus;
 - (g) Simulation training syllabus;
 - (h) Theoretical knowledge syllabus;
 - (i) Tests and checks conducted for the issue of a licence or a rating;
 - (j) Records;
 - (k) Safety management system;
 - (l) Quality assurance system; and
 - (m) Appendices.
- (2) The training and procedures manual applicable to aviation training other than flight crew training shall at least contain the following divisions:
 - (a) General;
 - (b) Staff training;
 - (c) Training plan;
 - (d) Training syllabus;
 - (e) Theoretical knowledge syllabus;

- (f) Tests and checks conducted for the issue of a qualification;
- (g) Records;
- (h) Safety management system;
- (i) Quality assurance system; and
- (j) Appendices.

2. Purpose

- (1) The purpose of this technical standard is to provide information and guidance to aviation training organisations in the implementation of Internationally Recommended Best Practices (IRBP) and the movement towards industry self regulation.
- (2) Although some of the contents or parts of the manual may be deemed to be generic, the contents should be customized to meet the specific vision and management style of the organisation. It must be stressed that each procedure prescribed must describe the unique system appropriate to each organisation and include a quality procedure. The content of a training and procedures manual should be regarded as “industrial confidential”.
- (3) This technical standard when applicable to flight crew training is to be read in conjunction with Part of 61 of the Regulations.

3. Compliance

- (1) All aviation training organisations are to include any Parts or Subparts into the existing format of the organisations’ training and procedures manual within 90 days of the coming into operation of this amendment.
- (2) The manual shall be fully amended in the new format within 3 years in accordance with CAR 141.02.2(2).
- (3) All new applicants, where CAR 141.02.11 is applicable, shall submit the training and procedures manual in accordance with this technical standard with the application.

4. Contents of manual

The contents of the Training and Procedures Manual shall, with the necessary changes, include the following elements as far as they are appropriate to the type of the training to be provided in the format below:

(1) Control Pages

Details

Page No.

Cover Page

(i) (viewed/unviewed)

Registered name of ATO, in accordance with commercial legislation, and certificate Number

Record of Amendments

(ii)

No.	Date Applicable	Date Entered	Entered by

Index/Master Index

(iii)

In the case where a training organisation has separate volumes in a Training and Procedures Manual System, a master Index shall be including the applicable volumes are to be included in the master index e.g. a safety management system and quality management system. Additions not included in the index, or List of Effective Pages shall not be accepted as an inclusion.

Foreword

(iv)

The foreword, or introduction, shall include a statement of compliance by the Chief Executive Officer describing the standpoint and commitment to regulatory requirements and as an aviation training organisation.

Table of Amendments

(v)

No.	Source	Subject	Effective Date

Should a source or subject be longer than space available, more than one line shall be used.

A single amendment may include the amendment of a number of paragraphs, parts, subparts and be a new edition, but the original Record of Amendments and Table of Amendments must be continued.

List of Effective Pages

(vi)

Amendment No.	Date	Page No.(s)

The list forms a checklist (quality control) for the state and currency of the controlled copies issued.

From Part 1: General page numbers continue consecutively to the Appendices, as applicable, where Appendices have their own numbering system.

Glossary

(vii)

A glossary of terms, definitions and abbreviation, limited to the use in this manual, shall be included for clarity of all personnel of the organisation.

Distribution List

Copy Holder	Copy No.	Parts Held

(2) **General (Divider)**

- (a) Preamble relating to use by and authority of the manual shall include reference to and authority of aircraft operations manuals, or aircraft flight manuals in the case of certain aircraft as approved. The statement should be more than one paragraph at the discretion of the promulgator. The statement shall contain the organisations' commitment to aviation safety, safety in general and to the current Occupational Health and Safety Act (OHSA). Management recognition of authorities or organisation, other than the SACAA, and reference material for compliance by the ATO staff, reference should be made.
- (b) Amendment, revision and distribution of the manual procedures for amendment. The accountable manager shall document a policy and procedure for the amendment, revision and distribution of the training procedures manual and appoint persons responsible for the amendment, revision and distribution thereof.
- (c) The procedure for approval to deviate from the manual. The documented procedure shall describe the process for approval of key personnel, activities or operation and any other approval not provided for in the manual while amendments are in progress or for an isolated situation within the authorised scope training.
- (d) Description of the structure and layout of the manual, including:
 - (i) various parts, sections, their contents and use; and
 - (ii) the paragraph numbering system.
- (e) Description of the scope of training authorized under the organization's terms of approval, including the following lists:
 - (i) training authorised on the ATO certificate of approval and
 - (ii) approved sites or airports where training flights may originate.
- (f) Organization/Organogram chart of the organisation management posts are included as a guide in Annexure A. The charts may be customized to suite the management style of the organisation.
- (g) The qualifications requirements, responsibilities and succession of command of management and key operational personnel, including but not limited to:
 - (i) Accountable manager. The responsibilities of the accountable manager (refer Glossary (ALSA) and include in manual glossary) shall, in accordance with ALSA, include the documentation and promulgation of policies, duties and procedures consistent with approved training, as may applicable, for:
 - (aa) the issue and control of the ATO training and procedures manual and distribution there of.
 - (bb) for the appointment and evaluation of each key member and ATO qualification acceptance criteria for the post, including prospective flight, flight simulator and ground instructors.
 - (cc) the succession of command of management and key operational personnel ensuring that an ATO has supervision by a Grade I or Grade II instructor at all times.
 - (dd) each key member post.
 - (ee) the promulgation and maintenance of all training syllabi and curricula accredited to the organisation as in Parts 6, 7 and 8 below.
 - (ff) all aspects included in paragraph 1.9 below and any other part as may be required for management of the ATO.
 - (gg) the compliance with the OHSA.
 - (viii) for ATO student administration, or responsible person, engage in a contract with each student for training and financial obligations in writing.
 - (ii) Head of training (refer Glossary Accountable Manager). In small(er) organisations (Annexure A), the Chief Flight Instructor would normally be responsible for both ground and flight training and any other accredited training. The head of training (HOT) may assume all

- or part of the responsibilities if the CFI provided that the HOT is the holder of a valid Grade I or Grade II flight instructor rating in the category of aircraft operated by the ATO.
- (iii) Chief flight instructor. The Chief flight instructor shall be the holder of a valid Grade 1 or Grade II flight instructor rating in the category of aircraft operated by the ATO and shall be responsible to ensure that:
- (aa) all training staff are versed in the content of the ATO training and procedures manual.
 - (bb) all training is carried out in accordance with the ATO Training Plan and that relevant regulations are complied with.
 - (cc) the flight, flight simulator and theoretical training syllabi and ATO curriculum is adhered to as described in Parts 6, 7 and 8 below.
 - (dd) Records are kept in accordance with Part 10 below.
 - (ee) the flight authorisation book as required in CATS 141 is comprehensively completed and controlled in accordance with the ATO training and procedures manual.
 - (ff) a high standard of flying discipline is maintained in accordance with the policy prescribed in ATO Flight training manual.
 - (gg) oversight is carried out over Grade III instructors to uphold training standards and mentor instructors in preparation for a Grade II by:
 - (A) allocation of instructors to students and training flights.
 - (B) briefing of instructors on exercise to be carried out, recap on instructional techniques, common errors that may be expected from students and safety.
 - (C) the regular monitoring of pre-flight and after-flight briefings
 - (D) evaluate instructor progress in relation to student progress.
 - (E) monitoring and implementing the staff flight training in order to assess if training is meeting the ATO and regulatory requirements prescribed in Part 4 below.
 - (hh) oversight of student training with reference to:
 - (A) student progress, records (Part 10) and maintenance of student training files;
 - (B) the training plan (Part 5);
 - (C) flight training syllabus (Part 6);
 - (D) flight simulator training syllabus (Part 7);
 - (E) theoretical knowledge syllabus (Part 8);
 - (F) tests and checks (Part 9).
- (iv) Chief ground instructor (CGI) The chief ground instructor may be delegated all or part of the responsibilities delegated to the CFI in respect of ground/theoretical training and shall be responsible to the CFI or HOT, as may be applicable.
- (v) Maintenance manager. Maintenance manager/person responsible aircraft shall be responsible for:
- (aa) the maintenance and safe keeping of aircraft documentation;
 - (bb) the correctness of, addition, alterations and unserviceability entries made;
 - (cc) the handing over and acceptance from the applicable Air Maintenance Organisation (AMO);
 - (dd) regular checking of the aircraft documentation and aircraft between servicing;
 - (ee) a projected maintenance schedule;
- (vi) Aviation safety manager. The aviation safety manager is directly responsible to the Accountable Manager for:
- (aa) safety oversight of all ATO operations
 - (bb) the co-ordination and management of a Safety Management System

- (cc) the monitoring and implementation of the annual safety plan.
- (vii) Quality manager. The quality manager is directly responsible to the Accountable Manager for quality assurance as prescribed in CAR 141.02.3 and may be jointly the Aviation Safety Manager.
- (viii) Instructors. The instructors (ground, flight and flight simulation training devices) shall carry out training for which they have been evaluated and delegated. They may assist the CFI with the execution of his/her duties provided that the duties are formally documented and delegated with procedures to be followed under direct supervision of the CFI.
- (ix) Accountant and/or auditing agency. As irregularities in accounting practices have been reported to the SACAA:
 - (aa) all sole proprietors shall appoint an accounting agency to administer returns to the Receiver of Revenue.
 - (bb) All ATO accounting agencies are to pay special attention to financial contractual obligations between the students and the school and the fulfillment thereof.
 - (cc) In the event of irregularities being reported, the SACAA may request from the ATO accounting agency any information in respect of the reported irregularity.
 - (dd) A signed statement by the all key personnel above accepting the responsibilities of the post and acknowledging the authority of the training and procedures manual, shall be includes in this part of the manual.
- (h) A list of key personnel by appointment and name.
- (i) A list of flying and simulator instructors with rating and name.
- (j) A list of ground instructors utilized with rating and name.
- (k) A list of aircraft and simulator(s) operated.
- (l) Policies and relevant procedures:
 - (i) regarding approval of flights and flight authorisation:
 - (aa) A student shall not fly unless authority is granted in writing in his/her presence for each flight separately in accordance with Subpart 2 of Part 61 and related technical standards and the instructor is competent and qualified to carry out the intended flight.
 - (bb) The flight shall be authorised in an authorisation book or authorisation sheet as described in Subpart 2 of Part 61 and related technical standards.
 - (cc) The authorisation book or sheet in paragraph (ii) above shall be limited to the prescribed format and shall not include any accounting information.
 - (dd) Should an ATO wish to make use of an electronic system, the onus is on the ATO to provide documentary proof that the integrity of the system is such that the system legally meets the requirement of signatories and audit practice.
 - (ii) for responsibilities of the pilot-in-command;
 - (iii) for flight planning— general;
 - (iv) regarding carriage of passengers;
 - (v) for an operational control system, which shall include but not be limited to:
 - (aa) availability, access and control of the ATO training and procedures manual, Air Information Circulars, Air Information Publications and Supplements.
 - (bb) control and positioning of the authorisation book and aircraft documentation notice boards emergency response plan overdue action
 - (cc) the method of attaining meteorological reports before flight and the display of information.
 - (dd) completion and submission of flight plans and reference to NOTAMS.
 - (ee) feed back to flying personnel on all relevant management, environmental, safety or operational information.

- (ff) notice boards, student/instructor status boards, aircraft status boards and the information that is to be displayed.
- (gg) the control of log books, student and instructor files
- (vi) regarding safety, including hazards, accidents and incidents reporting and safety management systems which is to include an annual safety plan and risk assessment procedure. The information gathered shall be conveyed to students through the feed back system.
- (vii) for flying duty period and flight time limitations for flying staff and students;
- (viii) for rest periods for flying staff and students;
- (ix) for amendment of controlled publications, Air Information Circulars, Air Information Publications and Supplements are all controlled documents.
- (x) of a feed back system which shall include all information requiring the attention of training personnel and students, especially elements of safety. For quality assurance purposes, the process should include feed back to management as to when and how the information has been disturbed.
- (xi) for any procedure identified by the SACAA for compliance by an ATO. Where during an audit, SACAA personnel identify an element of safety management not being adequately address by the ATO, or where an ATO has a unique operation, additional policies and procedures not included in this document, the ATO may be required to include unique policies and procedures
- (xii) for weight and balance calculations before flight:
 - (aa) As an ATO is a training organisation and in order to instil good practice habits, a weight and balance calculations is to be documented in accordance with the respective flight operations manual and/or as approved by the SACAA for each flight.
 - (bb) No flight may be authorised without a weight and balance documents being completed and checked by an instructor.
 - (cc) The weight and balance sheets shall be kept for a period of 6 months and made available during SACAA audits.
 - (dd) A scale(s) suitable for the purpose of the ATO approved training shall be available.
- (xiii) for maintenance of discipline.
- (m) Description of the facilities available, including:
 - (i) the number and size of classrooms;
 - (ii) training aids provided; and
 - (iii) flight simulation training devices and training aircraft.
 - (iv) the OHSA requirements that including but not limited to:
 - (aa) fire extinguisher positioning,
 - (bb) first aid kits, kit positioning, first aid personnel and personnel requirements
- (3) Aircraft Operating Information**
- (a) Certification and operating limitations;
- (b) Aircraft handling, including:
 - (i) performance limitations;
 - (ii) use of checklists; and
 - (iii) aircraft maintenance procedures.
- (c) Instructions for aircraft loading, weight and balance calculations and securing of load.
The processes, describing the policy is in paragraph 2.12(m) above for aircraft loading, weight and balance calculations and securing of load shall be described.
- (d) (i) Fuelling procedures, including non-standard refuelling as may be applicable. A full description of the correct refuelling procedure with regard to checking fuel before refuelling, static grounding of the fuel tanker and aircraft etc. is required.

- (ii) Where other means of refuelling are in use or envisaged, such as refuelling from drums, the procedures for checking the fuel, grounding, storage of drums for a long period etc. are to be described.
- (e) Emergency procedures
- (4) Routes**
- (a) Performance criteria, e.g.: take-off, route, landing, etc.
- (b) Flight planning procedures including:
 - (i) fuel and oil requirements;
 - (ii) minimum safe altitudes; and
 - (iii) navigation equipment
- (c) Weather minima for all instructional training flights during day, night, VFR and IFR operations.
- (d) Weather minima for all student training flights at various stages of training.
- (e) Training routes, general flying areas (FAD) and practice areas. Flight training areas are coded as Danger Areas (FAD) to advise airmen of flying activities.
 - (i) All ATOs shall restrict flying to FADs or area where the necessary permission as been granted from the appropriate authorities and the appropriate NOTAMs have been issued.
 - (ii) Training areas and routing to the areas shall be displayed on a aeronautical map accessible to all flying personnel.
- (5) Staff training**
- (a) Persons responsible for standards and competency of instructional personnel.
- (b) Details of the procedures to determine competency of instructional personnel as required by CAR 141.02.4(3).
- (c) Details of the training program for instructional personnel as required by CAR 141.02.4(4).
- (d) Procedures for proficiency checks and upgrade training.
- (6) Training plan**
- (a) Aim of the course in the form of a statement of what the student is expected to do as a result of the training, the level of performance, and the training constraints observed.
- (b) Pre-entry requirements, including:
 - (i) minimum age;
 - (ii) education requirements;
 - (iii) medical requirements; and
 - (iv) linguistic requirements.
- (c) Credits for previous experience, which should be obtained from the SACAA before the training commences.
- (d) Training curricula, with an aim, expected result and performance level including the:
 - (i) flying curriculum (single engine);
 - (ii) flying curriculum (multi-engine);
 - (iii) theoretical knowledge curriculum and
 - (iv) flight simulation training curriculum.
- (e) The general arrangements of daily and weekly programs for flying training, ground training and flight simulation training.
- (f) Training policies in terms of:
 - (i) bad weather constraints;
 - (ii) maximum student training times—flying, theoretical knowledge and synthetic flight training, per day/week/month;
 - (iii) restrictions in respect of training periods for students;
 - (iv) duration of training flights at various stages;
 - (v) maximum student flying hours in any day or night period;
 - (vi) maximum number of student training flights in any day or night period; and

- (vii) minimum rest periods between training periods.
- (g) Policy for the conduct of student evaluation, including:
 - (i) procedures for flying progress checks and skill tests;
 - (ii) procedures for knowledge progress tests and knowledge tests;
 - (iii) procedures for authorization for tests;
 - (iv) procedures for refresher training before retest;
 - (v) test reports and records;
 - (vi) procedures for knowledge test preparation, type of questions and assessments, standards required for a pass;
 - (vii) procedures for question analysis and review and issuing replacement exams; and
 - (viii) knowledge test re-write procedures.
- (h) Policy regarding training effectiveness, including:
 - (i) individual student responsibilities;
 - (ii) liaison procedures between training departments;
 - (iii) procedures to correct unsatisfactory progress;
 - (iv) procedures for changing instructors;
 - (v) maximum number of instructor changes per student;
 - (vi) internal feedback system for detecting training deficiencies;
 - (vii) procedures for suspending a student from training;
 - (viii) requirements for reporting and documentation; and
 - (ix) completion standards at various stages of training to ensure standardization.

(7) Flight training syllabus

- (a) Detailed statement of the content specifications of all air exercises to be taught, arranged in the sequence to be flown with main and sub-titles.
- (b) Flight lesson reference list in the form of an abbreviated list of the above exercises giving only main and sub-titles for quick reference in a form to facilitate daily use by instructors.
- (c) Statement of how the course will be divided into phases, indicating how they will be arranged to ensure completion in the most suitable learning sequences and that essential or emergency exercises are repeated at the proper frequency.
- (d) Syllabus hours for each phase and for groups of lessons within each phase and when progress tests are to be conducted.
- (e) Statement of what a student is expected to be able to do and the standard of proficiency required before progressing from one phase of training to the next. Include minimum experience requirements in terms of hours and satisfactory exercise completion before undertaking significant lessons, such as night flying.
- (f) Requirements for instructional methods, particularly with respect to pre-flying and post-flying briefings, adherence to syllabi and training specifications, and authorization of solo flights.
- (g) Instruction in respect to the conduct and documentation of all progress checks.
- (h) Instruction, where applicable, given to all examining staff in respect to the conduct of tests.

(8) Flight simulation training syllabus

- (a) Syllabus for flight simulation training shall be structured generally as in paragraph 7 above.

(9) Theoretical knowledge syllabus

- (a) The syllabus for theoretical knowledge instruction shall be structured generally as in Part 6 of this attachment but with a training specification and objective for each subject. Ground or theoretical training is as much a part of pilot training as flight training.
- (b) As for flight training the theoretical knowledge each subject shall be divided into modules that are to be completed before the respective flight training may be conducted.
- (c) Each module shall be divided into lessons which make up the programme, and together with other same subject modules, make up the lesson time prescribe in the CAR for the course, if applicable.

(d) An attendance register in accordance with the ATO training programme/plan is to be kept for inclusion in each individual student's training file, signed by the student, whether PPL, CPL, ATPL or other, as proof of attendance. Without proof of attendance, licences shall not be issued. In the event of an accident, these records will have to be produced as proof that the school carried out the training required at the stage of the student flight training.

(e) A procedure for the liaison with the SACAA with regard to examination results in order to improve training material and quality of instruction should be made.

(10) Tests and checks conducted for the issuance of a licence or a rating

(a) Should a training organisation be approved by the Director to conduct the testing required for the issuance of a licence or rating in accordance with Part 61, the training and procedures manual, it shall include:

- (i) name of the personnel with testing authority and scope of the authority;
- (ii) role and duties of the authorized personnel;
- (iii) if the school has been given authority to appoint personnel to conduct the testing required for the issuance of a licence or rating, the minimum requirement for appointment as well as the selection and appointment procedure; and
- (iv) applicable requirements established by the SACAA such as:
 - (aa) procedures to be followed in the conduct of checks and tests; and
 - (bb) methods for completion and retention of testing records as required by the SACAA.

(11) Records

(a) Policy and Procedures regarding:

- (i) Attendance records;
- (ii) Student training records;
- (iii) Staff training and qualification records;
- (iv) Person responsible for checking records and student personal logs;
- (v) Nature and frequency of record checks;
- (vi) Standardization of record entries;
- (vii) Personal log entries; and
- (viii) Security of records and documents.

(12) Safety management system

Provide a description of the safety management system with reference to a separate safety management manual or, include the full safety management system in this part of the training and procedures manual.

(13) Quality assurance system

Provide a description of the quality assurance system, as required by CAR 141.02.3, with reference to a separate quality assurance manual or, include the full quality assurance system in this part of the training and procedures manual.

(14) Appendices

Sample progress test forms, navigation logs, test reports and records, a copy of the approved training organization approval document, as required.

141.02.3 QUALITY ASSURANCE SYSTEM

1. Minimum standards for a quality assurance system

(1) The training organization shall establish a quality assurance system, acceptable to the Director granting the approval, which ensures that training and instructional practices comply with all relevant requirements.

(2) Quality policy and strategy

- (a) The ATO shall describe how the organization formulates, deploys, and reviews its policy and strategy and turns it into plans and actions applicable to all levels of the organization. A formal written quality policy statement should be established that is a commitment by the

head of the training organization, as to what the quality assurance system is intended to achieve. The quality policy shall reflect the achievement and continued compliance with relevant parts of Part 141, together with any additional standards specified by the ATO.

- (b) The accountable manager of the training organization will have overall responsibility for the quality assurance system including the frequency, format and structure of the internal management review and analysis activities and may delegate the responsibility for the tasks, defined under paragraph 3 below, to a quality manager.
- (3) Quality manager
- (a) The primary role of the quality manager is to verify, by monitoring activities in the field of training, that the standards as established by the ATO and any additional requirements of the Director are being carried out properly.
 - (b) The quality manager shall be responsible for ensuring that the quality assurance system is properly implemented, maintained and continuously reviewed and improved.
 - (c) The quality manager shall:
 - (i) have direct access to the accountable manager; and
 - (ii) have access to all parts of the ATO's organization.
 - (d) The quality manager should be responsible for ensuring that personnel training relating to the quality assurance system is conducted.
- (4) Quality assurance system
- (a) The quality assurance system of the ATO shall ensure compliance with requirements, conformance to standards and adequacy of training activities conducted.
 - (b) Every process that assists the ATO to achieve its results should be identified and the activities and procedures documented.
 - (c) The ATO shall specify the basic structure of the quality assurance system applicable to all training activities conducted.
- (5) Feedback System
- (a) The quality assurance system shall include a feedback system to ensure that corrective actions are both identified and promptly addressed. The feedback system shall also specify who is required to rectify discrepancies and non-conformance in each particular case, and the procedure to be followed if corrective action is not completed within an appropriate timescale.
- (6) Documentation
- (a) Relevant documentation includes the relevant part(s) of the Training and Procedures Manual, which may be included in a separate quality manual.
 - (b) In addition, relevant documentation shall also include the following:
 - (i) quality policy;
 - (ii) terminology;
 - (iii) specified training standards;
 - (iv) a description of the organization;
 - (v) the allocation of duties and responsibilities; and
 - (vi) training procedures to ensure regulatory compliance.
 - (c) The quality assurance audit programme, reflecting:
 - (i) schedule of the monitoring process;
 - (ii) audit procedures;
 - (iii) reporting procedures;
 - (iv) follow-up and corrective action procedures;
 - (v) recording system; and
 - (vi) document control.
- (7) Quality assurance audit programme

- (a) The quality assurance audit programme shall include all planned and systematic actions necessary to provide confidence that all training are conducted in accordance with all applicable requirements, standards and procedures.
- (8) Quality inspection
- (a) The primary purpose of a quality inspection is to observe a particular event/action/document etc., in order to verify whether established training procedures and requirements are followed during the accomplishment of that event and whether the required standard is achieved.
 - (b) Subject areas for quality inspections shall include:
 - (i) actual flight and ground training;
 - (ii) maintenance;
 - (iii) technical standards; and
 - (iv) training standards.
 - (v) all procedures included in the training and procedures manual to ensure the processes instituted meet the aviation training organisation intended goal and facilitate improvement in the processes.
- (9) Audit
- (a) An audit is a systematic, and independent comparison of the way in which a training is being conducted against the way in which the published training procedures say it shall be conducted.
 - (b) Audits shall include at least the following quality procedures and processes:
 - (i) an explanation of the scope of the audit;
 - (ii) planning and preparation;
 - (iii) gathering and recording evidence; and
 - (iv) analysis of the evidence.
 - (c) The various techniques that make up an effective audit are:
 - (i) interviews or discussions with personnel;
 - (ii) a review of published documents;
 - (iii) the examination of an adequate sample of records;
 - (iv) the witnessing of the activities which make up the training; and
 - (v) the preservation of documents and the recording of observations.
- (10) Auditors
- (a) The ATO shall decide, depending on the complexity of the training, whether to make use of a dedicated audit team or a single auditor. In any event, the auditor or audit team shall have relevant training and/or operational experience.
 - (b) The responsibilities of the auditors shall be clearly defined in the relevant documentation.
- (11) Auditor's independence
- (a) Auditors shall not have any day-to-day involvement in the area of the operation or maintenance activity that is to be audited. An ATO may, in addition to using the services of full-time dedicated personnel belonging to a separate quality department, undertake the monitoring of specific areas or activities by the use of part-time auditors.
 - (b) An ATO whose structure and size does not justify the establishment of full-time auditors, may undertake the audit function by the use of part-time personnel from within its own organization or from an external source under the terms of an agreement acceptable to the SACAA.
 - (c) In all cases the ATO shall develop suitable procedures to ensure that persons directly responsible for the activities to be audited are not selected as part of the auditing team. Where external auditors are used, it is essential that any external specialist is familiar with the type of training conducted by the ATO.

- (d) The quality assurance audit programme of the ATO shall identify the persons within the company who have the experience, responsibility and authority to:
 - (i) perform quality inspections and audits as part of ongoing quality assurance;
 - (ii) identify and record any concerns or findings, and the evidence necessary to substantiate such concerns or findings;
 - (iii) initiate or recommend solutions to concerns or findings through designated reporting channels;
 - (iv) verify the implementation of solutions within specific time scales; and
 - (v) report directly to the quality manager.
- (12) Audit scheduling
 - (a) A quality assurance audit programme shall include a defined audit schedule and a periodic review cycle. The schedule should be flexible, and allow unscheduled audits when trends are identified. Follow-up audits should be scheduled when necessary to verify that corrective action was carried out and that it was effective.
 - (b) An ATO shall establish a schedule of audits to be completed during a specific calendar period. All aspects of the training shall be reviewed within a period of twelve months in accordance with the programme.
 - (c) When an ATO defines the audit schedule, significant changes to the management, organization, training, or technologies should be considered, as well as changes to the standards and requirements.
- (13) Monitoring and corrective action
 - (a) The aim of monitoring within the quality system is primarily to investigate and judge its effectiveness and thereby to ensure that defined policy and training standards are continuously complied with. Monitoring activity is based upon quality inspections, audits, corrective action and follow-up. The ATO should establish and publish a quality procedure to monitor compliance with requirements and conformance to standards on a continuing basis. This monitoring activity should be aimed at eliminating the causes of unsatisfactory performance.
 - (b) Any non-conformance identified shall be communicated to the manager responsible for taking corrective action or, if appropriate, the head of the training organization. Such non-conformance shall be recorded, for the purpose of further investigation, in order to determine the cause and to enable the recommendation of appropriate corrective and preventive action.
 - (c) The quality assurance audit programme shall include procedures to ensure that corrective and preventive actions are developed in response to findings. These quality procedures shall monitor such actions to verify their effectiveness and that they have been completed. Organizational responsibility and accountability for the implementation of corrective action resides with the department where the finding was identified. The head of the training organization will have the ultimate responsibility for ensuring, through the quality manager(s), that corrective action has re-established conformance with the standard required by the ATO and any additional requirements established by the SACAA or the ATO.
 - (d) The ATO should identify internal and external customers, and monitor their satisfaction by measuring and analysis of feedback.
- (14) Management review and analysis
 - (a) Management shall accomplish a comprehensive, systematic documented review and analysis of the quality assurance system, training policies, and procedures, and should consider:
 - (i) the results of quality inspections, audits and any other indicators;

- (ii) the overall effectiveness of the management organization in achieving stated objectives; and
 - (iii) correcting trends, and preventing, where applicable, future non-conformities.
 - (b) Conclusions and recommendations made as a result of the review and analysis shall be submitted in writing to the responsible manager for action. The responsible manager shall be an individual who has the authority to resolve issues and take action. The head of the training organization shall decide upon the frequency, format, and structure of internal review and critical analysis meetings.
- (15) Recording
- (a) Accurate, complete and readily accessible records documenting the result of the quality assurance audit programme should be maintained by the ATO. Records are essential data to enable an ATO to analyse and determine the root causes of non-conformity, so that areas of non-compliance can be identified and subsequently addressed.
 - (b) The following records shall be retained at least for the period that may be required by national requirement. In the absence of such requirements, a period of three years is recommended:
 - (i) audit schedules;
 - (ii) quality inspection and audit reports;
 - (iii) responses to findings;
 - (iv) corrective and preventive action reports;
 - (v) follow-up and closure reports; and
 - (v) management review and analysis reports.
- (16) Quality assurance responsibility for satellite ATOs
- (a) An ATO may decide to sub-contract certain activities to external organizations subject to the approval of the SACAA.
 - (b) The ultimate responsibility for the training provided by the satellite ATO always remains with the ATO. A written agreement shall exist between the ATO and the satellite ATO clearly defining the safety-related services and quality to be provided. The satellite ATO's safety-related activities relevant to the agreement shall be included in the ATO's quality assurance audit programme.
 - (c) The ATO shall ensure that the satellite ATO has the necessary authorization/approval when required, and commands the resources and competence to undertake the task. If the ATO requires the satellite ATO to conduct activity that exceeds the satellite ATO's authorization/approval, the ATO is responsible for ensuring that the satellite ATO's quality assurance takes account of such additional requirements.
- (17) Quality insurance system training
- (a) Correct and thorough training is essential to optimize quality in every organization. In order to achieve significant outcomes of such training the ATO shall ensure that all staff understands the objectives as laid down in the training and procedures or quality manual, as may be applicable.
 - (b) Those responsible for managing the quality assurance system shall receive training covering:
 - (i) an introduction to the concept of quality assurance system;
 - (ii) quality management;
 - (iii) concept of quality assurance;
 - (iv) quality manuals;
 - (v) audit techniques; and
 - (vi) reporting and recording.
- (18) The way in which the quality system will function in the ATO:

- (a) Time shall be provided to train every individual involved in quality assurance and for briefing the remainder of the employees. The allocation of time and resources shall be governed by the size and complexity of the operation concerned.
- (19) Sources of personnel training
 - (a) Quality assurance courses are available from the various national or international standards institutions, and an ATO should consider whether to offer such courses to those likely to be involved in the management of the Quality Assurance System. Organizations with sufficient appropriately qualified staff should consider whether to carry out in-house training.

141.02.4 PERSONNEL REQUIREMENTS

1. Personnel requirements

- (1) The duties and responsibilities of the personnel specified in CAR 141.02.4 including matters for which they have responsibility to deal directly with the Director on behalf of the organisation.
- (2) An organisation chart showing lines of responsibility of the personnel specified in CAR 141.02.4 and extending to each location listed under sub-paragraph 3.
- (3) Details of those locations where members or personnel of the organisation are to exercise functions or powers delegated by the Director.
- (4) A summary of the resources at and the scope of training to be conducted at each location listed under subparagraph 3.
- (5) Details of the organisation's procedure for recording which of its members and personnel hold authorisations granted by the organisation or delegations of the Director's functions or powers, or both, including the extent and scope of those authorisations and delegations.
- (6) Details of the procedures required by -
 - (a) CAR 141.02.4 regarding the competence of personnel;
 - (b) CAR 141.02.3 regarding quality control of the organisation.
- (7) Procedures to control amend and distribute the manual of procedure.

SA-CATS 145

Aircraft maintenance organisations

List of technical standards

145.01.6 CATEGORIES OF RATINGS

- 1. Categories A and B
- 2. Categories C and D
- 3. Category E
- 4. Category W
- 5. Category X

145.01.10 DESIGNATION OF AIRWORTHINESS REPRESENTATIVES

- 1. Conditions, requirements, rules, procedures and standards connected with a designation

145.01.11 TRAINING AND CHECKING

- 1. Initial training
- 2. Ongoing and recurrent training
- 3. RVSM maintenance procedures

145.02.1 MANUAL OF PROCEDURE

1. Information to be contained in manual of procedure

145.02.2 QUALITY ASSURANCE SYSTEM

1. Minimum standards for a quality assurance system

145.01.6 CATEGORIES OF RATINGS

In addition to the granting of ratings for named types of aircraft, engines and items of equipment for aircraft maintenance organisation approvals, ratings will be granted for the classes of aircraft, engines and items of equipment shown below.

1. Categories A and B

- (1) **Class 1**
Aeroplanes of wooden construction, with a maximum certificated mass of 5 700 kg or less
- (2) **Class 2**
Aeroplanes constructed of composites, with a maximum certificated mass of 5 700 kg or less
- (3) **Class 3**
Aeroplanes of fabric-covered tubular-metal construction, with a maximum certificated mass of 5 700 kg or less
- (4) **Class 4**
Unpressurised aeroplanes of allmetal construction, with a maximum certificated mass of 5 700 kg or less
- (5) **Class 5**
Pressurised aeroplanes of allmetal construction, with a maximum certificated mass of 5 700 kg or less.
- (6) **Class 6**
Unpressurised aeroplanes of allmetal construction, with a maximum certificated mass exceeding 5 700 kg.
- (7) **Class 8**
Pressurised aeroplanes of allmetal construction, with a maximum certificated mass exceeding 5 700 kg.
- (8) **Class 11**
Aeroplanes constructed of composites, with a maximum certificated mass exceeding 5 700 kg.
- (9) **Class 12**
All other aircraft.

2. Categories C and D

- (1) **Class 01**
All horizontally opposed normally-aspirated piston engines.
- (2) **Class 02**
All horizontally opposed turbo-normalised, turbocharged and supercharged piston engines.
- (3) **Class 03**
All in-line piston engines.
- (4) **Class 04**
All radial engines.
- (5) **Class 05**
Turbine jet engines.

- (6) **Class 06**
All other engines.

3. **Category E**

Rotorcraft. Subdivision of this class will be granted as hereunder:

- (1) **Class 7**
Rotorcraft powered by reciprocating engines.
- (2) **Class 9**
Rotorcraft powered by turbine jet engines, with a maximum certificated mass of 3 175 kg or less.
- (3) **Class 10**
Rotorcraft powered by turbine jet engines, with a maximum certificated mass exceeding 3 175 kg.

4. **Category W**

- (1) **Class W1**
Aircraft electrical installations. Subdivisions of this class will also be granted as hereunder:
- (a) Class W1×1: Electrical installations whose main supply is direct current.
- (b) Class W1×2: Electrical installations whose main supply is alternating current.
- (2) **Class W2**
Radio communication and navigation aid installations. Subdivision of this class will also be granted as hereunder:
- (a) Class W2×1: Radio communications installations.
- (c) Class W2×2: Radio navigational aid installations.
- (d) Class W2×3: Electronically operated system installations, including amplifiers, computers, recorders, flight management and entertainment systems.
- (3) **Class W3**
Aircraft instrument installations. Subdivisions of this class will be granted as hereunder:
- (a) Class W3×1: Simple instrument and automatic pilot installations which fall outside the types covered by classes W3×2 and W3×3 and the compensation of compasses which are not gyrostabilised.
- (b) Class W3×2: Gyrostabilised magnetic direction indicating installations, integrated instrument installations and flight director installations.
- (c) Class W3×3: Complex electric electronic automatic pilot installations.

5. **Category X**

- (1) **Class X1**
Aircraft electrical and ignition equipment, subdivisions of this class will also be granted as hereunder:
- (a) Class X1×1: Equipment operating on direct current.
- (b) Class X1×2: Equipment operating on alternating current.
- (c) Class X1×3: Ignition equipment.
- (d) Class X1×4: Ignition equipment restricted to engines under groups 01, 02 and 03.
- (2) **Class X2**
Aircraft radio communication and navigation aid equipment. Subdivisions of this will also be granted as hereunder:
- (a) Class X2×1: Radio communication equipment.
- (b) Class X2×2: Radio navigational aid equipment: Non pulse.
- (c) Class X2×3: Radio navigational aid equipment: Pulse.
- (d) Class X2×4: Electronically operated systems i.e. amplifiers, computers, recorders, flight management and entertainment systems.
- (3) **Class X3**

Aircraft instruments. Subdivision of this class will also be granted as hereunder:

- (a) Class X3×1: Mechanically operated instruments i.e. bourdon tube, diaphragm and centrifugal types.
- (b) Class X3×2: Electrically operated instruments i.e. synchro and electrical indicating types.
- (c) Class X3×3: Gyroscopic instruments i.e. those using gyroscopic principles whether operated electrically or by air pressure.
- (d) Class X3×4: Electronic automatic pilots and flight director systems.

(4) **Class X4**

Propellers. Subdivisions of this class will also be granted as hereunder:

- (a) Class X4×1: Fixed pitch metal propellers.
- (b) Class X4×2: Fixed pitch wooden propellers.
- (c) Class X4×3: Variable pitch propellers fitted to piston engines.
- (d) Class X4×4: Variable pitch propellers fitted to turbine engines.

(5) **Class X5**

Welding processes.

145.01.10 DESIGNATION OF AIRWORTHINESS REPRESENTATIVES

1. Conditions, requirements, rules, procedures and standards connected with a designation

1.2 Qualification criteria

(1) General qualifications

To qualify for a designation as DAR, all applicants must possess the general qualifications listed hereunder in addition to having the specialised experience described in paragraphs (2), (3) and (4) and appropriate to the particular function for which designation is sought:

- (a) Current and thorough working knowledge of the CARs and relevant Aeronautical Information Circulars, CATS Documents, etc;
- (b) current technical knowledge and experience commensurate with that required for the particular function;
- (c) unquestionable integrity, cooperative attitude, and the ability to exercise sound judgement;
- (d) the ability to maintain the highest degree of objectivity while performing authorised functions on behalf of the Director and in compliance with the CARs and safety goals, notwithstanding any coercion to the contrary;
- (e) at least five years of satisfactory experience of working directly with the Civil Aviation Authority in the field of work covered by the designation.

(2) Specialised experience required for maintenance functions

In the area of maintenance, in addition to the general qualifications specified in paragraph (1), a DAR applicant must have the following specialised experience and demonstrated ability in respect of each particular function for which DAR designation is sought:

- (a) Five years of experience as the designation person at an AMO which has been concerned with either –
 - (i) the issuing of certificates of airworthiness; or
 - (ii) the management of programmes leading to the issuing of certificates of airworthiness, in either case for aircraft of similar type and complexity to those for which DAR designation is sought;
- (b) the applicant must also hold a current valid aircraft maintenance engineer licence with an appropriate rating and must demonstrate the ability to determine that an aircraft, submitted for (recurrent) certification has either remained in, or has been restored to its original approved design

configuration and meets all pertinent requirements. The aircraft concerned must be of similar type and complexity to those for which DAR designation is sought.

(3) Experience required for issuing of certificates of release to service of Class I products for export

To qualify for a designation to perform this function, a DAR applicant must have the following experience and demonstrated ability:

- (a) Five years of experience as a designated person at an AMO authorised to carry out and certify such maintenance functions; and
- (b) the applicant must hold a current valid aircraft maintenance engineer licence with an appropriate rating and must demonstrate the ability to determine that Class I products, of similar type and complexity to those for which DAR designation is sought, meet the special/additional requirements of the importing country.

(4) Experience required for undertaking AMO approval renewal inspections

To qualify for a designation to perform this function, a DAR applicant must have the following experience and qualifications:

- (a) Five years of experience as a designated person of an AMO authorised to carry out and certify such maintenance functions; and
- (b) the applicant must hold a current valid aircraft maintenance engineer licence with an appropriate rating.

1.3 Application procedure

- (1) Any suitably qualified person may apply for designation as a DAR. Applications for a designation must be initiated by an application in the appropriate form.
- (2) Applications submitted by individual applicants must be accompanied by –
 - (a) three letters attesting to the DAR applicant's integrity and technical qualifications to perform the function(s) on products of similar type and complexity to those for which designation is being sought. At least one of the letters must be from a CAA official with whom the applicant must have had a direct working relationship. The other letters should be from aviation industry organisations (not private persons) such as approved aircraft maintenance organisations; and
 - (b) supporting documents to substantiate that he/she meets all the relevant qualifications specified in paragraph 1.2.

1.4 Procedure followed with regard to selection and appointment

- (1) Receipt of an application will be acknowledged by the Director to the applicant.
- (2) The Director will evaluate the applicant's qualifications and check the personal references submitted.
- (3) On determination that the applicant meets all the relevant requirements, the Director will prepare a document, which will identify him/her as a DAR. Functions authorised will be stated on the face of this document. However, should the space available preclude the listing of all authorised functions, the document will provide reference to a letter (supplement) which will set out the DAR's limits of authority in full detail. The reverse side of the document will be endorsed by the Director who will personally present the document to the DAR.

- Notes:**
- 1. In all cases, the authority of the DAR is restricted to specific functions commensurate with the applicant's knowledge and experience.**
 - 2. The authorised functions will also be limited to products of the type and complexity for which the individual has been determined qualified.**
 - 3. The document will be in a format suitable for framing and display.**
 - 4. Unsuccessful applicants will be advised why their application did not succeed.**

1.5 Duration of designation

- (1) Unless otherwise stated, designations are effective for a period not exceeding one year, and such may be renewed annually by the Director.
- (2) Before renewal of a designation can be considered, the DAR must –
 - (a) submit a written request for re-designation in the prescribed form;
 - (b) produce evidence of satisfactory activity during the previous appointment; and
 - (c) prove that within the past 12 months training has been received by attendance of the CAA DAR standardisation course. Failure to attend the DAR standardisation course when called upon to do so, could result in delay of the re-designation until such time as adequate training can be provided to bring the DAR up to date with policy/regulatory material.
- (3) A DAR document will be reissued by the Director upon a satisfactory recommendation from a CAA official.
- (4) A designation as DAR may be terminated for various reasons, including a lack of sufficient activity to warrant continuance of the designation.

1.6 Training

- (1) The CAA shall provide training for DARs on their designation and as necessary on an ongoing basis. This training will normally be offered by the CAA.
- (2) DAR training will normally be limited to familiarisation with CAA administrative procedures. Training in technical areas will not be provided, since a DAR applicant should already have the necessary technical expertise as a prerequisite to appointment.

1.7 Monitoring and supervision

All DARs will be subject to monitoring and supervision, as appropriate, for the particular authorised functions. This will normally be accomplished by the Regional Area Inspectors.

1.8 Limits of authority

The documents presented to each DAR will identify all authorised functions. These functions are limited to those for which the DAR is qualified.

1.9 Authorised functions

A DAR is entitled to perform the following functions:

- (1) Maintenance functions
 - (a) The inspection of new and used aircraft, and the recommendation of the issue of the South African Certificate of Airworthiness (C of A) to aircraft with a mcm of 5 700 kg or less.
 - (b) The inspection of such aircraft to revalidate the C of A after an accident.
 - (c) The inspection of such aircraft for the issue of a C of A for export, with a relevant recommendation to the Director.
 - (d) The grounding of an aircraft if an unsafe condition exists.
- (2) Approved maintenance organisation (AMO) inspections
The initial inspection of an AMO employing less than 50 persons and to be approved for maintenance or repair aircraft with a mcm of 5 700 kg or less.
- (3) Accountability
The functions referred to in subparagraphs (1) and (2) are performed for and on behalf of the Director.

145.01.11 TRAINING AND CHECKING

1. Initial training

- (1) Aviation maintenance personnel in the employ of the holder of an aviation maintenance organisation approval, issued in terms of Part 145 of the CAR, shall have successfully completed

the training prescribed in Part 66 for the appropriate licence and rating or ratings if such personnel are to be in direct charge of any maintenance or inspection performed on behalf of the organisation, or are authorised to issue on behalf of the organisation certificates of release to service and certificates relating to the maintenance of an aircraft.

- (2) All other aviation maintenance personnel in his or her employ shall have successfully completed basic training in maintenance practices as relevant to their particular responsibilities.

2. Ongoing and recurrent training

- (1) All aviation maintenance personnel in the employ of the holder of an aviation maintenance organisation approval, issued in terms of Part 145 of the CAR, shall receive ongoing and recurrent training in accordance with the organisation's approved training programme.
- (2) Ongoing training should be aimed at expanding the employee's knowledge and skills, and should provide for new aircraft and their components that are introduced.
- (3) Recurrent training should be aimed at ensuring that maintenance personnel remain current with evolving new technologies and maintenance techniques, as well as with changing legislation, to the extent applicable to the organisation's aviation maintenance approval.

3. RVSM Maintenance procedures

Each holder of an aviation maintenance organisation approval, issued in terms of Part 145 of the CAR, and responsible for the continued airworthiness of an aircraft certified for RVSM operations, shall ensure that aviation maintenance personnel in his or her employ, involved with such maintenance, shall be aware of the specific maintenance procedures prescribed in Section (7) of technical standard 91.07.31 in Document SA-CATS 91, and the guidance material provided in Appendices 2 and 3 to the aforementioned technical standard.

145.02.1 MANUAL OF PROCEDURE

1. Information to be contained in manual of procedure

- (1) The information referred to in CAR 145.02.1(1)(b), which must be contained in the manual of procedure of the applicant, must include the following:

(a) Management

- (i) Corporate commitment
A statement containing the commitment of the accountable manager and the organisation to comply with the airworthiness requirements as set out in this document and approved by the Director.
- (ii) Management personnel
A list of the key management personnel and their positions.
- (iii) Duties and responsibilities of the management personnel
A statement containing the duties and responsibilities of each management position mentioned in (2). For clarity, additional positions may be added.
- (iv) Management organisation chart
The chart must show all line management positions down to supervisory level.
- (v) List of certifying personnel
A list of all certifying personnel authorised to release aircraft on behalf of the organisation, with a scope of their authority and with signatures and stamps must be provided.
A separate document may be referenced.
- (vi) Human resources
A statement identifying the human resources employed by the organisation.
- (vii) General description of facilities at each address intended to be approved

A description of the facilities and layout is required.

(viii) Organisation's intended approved scope of work

A statement of the scope of work being applied for.

(ix) Notification procedure to the Director regarding changes in the organisation's activities/approval/location/personnel

A statement indicating who is responsible for notifying the Director regarding changes, and what changes are subject to notification.

(x) Manual of procedure amendment procedures

A statement regarding the responsibility and procedure for amendment of the manual of procedure, as well as the associated documents referred to in the manual of procedure.

(b) Maintenance procedures

(i) Purchasing procedure

A description of, or reference to, a procedure indicating that purchase documents will contain data clearly describing the product ordered, as well as the traceability documentation or data to be delivered with the product ordered.

(ii) Supplier evaluation procedure

A description of, or reference to, a procedure used by the organisation to evaluate and approve suppliers.

(iii) Acceptance/inspection of aircraft components from outside contractors

A description of, or reference to, a procedure for the documented control of verification, storage and maintenance of aircraft components from outside contractors.

(iv) Storage, tagging and release of aircraft components and material to aircraft maintenance

A description of, or reference to, a procedure for handling, storage, packaging (tagging), preservation of aircraft components and material to aircraft maintenance.

(v) Acceptance of tools and equipment

A description of, or reference to, a procedure for acceptance of tools and equipment by the organisation for use in the maintenance of aircraft.

(vi) Calibration of tools and equipment

A description of, or reference to, a procedure for the calibration of measuring and testing tools and equipment used on aircraft systems and equipment.

(vii) Use of tools and equipment by personnel

A description of, or reference to, a procedure for the methods in which special tools and equipment are used.

(viii) Cleanliness standards of maintenance facility

A statement regarding the standard of cleanliness to be maintained.

(ix) Repair procedure

A description of, or reference to, the procedures for the repair of aircraft components.

(x) Maintenance, structural repair and parts manuals

A description of, or reference to, a procedure for the updating and availability to personnel of the relevant maintenance, structural repair and parts manuals for the aircraft to be maintained.

(xi) Aircraft maintenance programme, A.D. procedures, modification procedures and technical record control

A description of, or reference to, a procedure indicating compliance with the aircraft maintenance programme, A.D. procedures, modification procedures and technical record control.

(xii) Maintenance documentation

A description of, or reference to, a procedure of the relevant documentation to be used and instructions for the completion thereof.

(xiii) Rectification of defects

A description of, or reference to, a procedure for the methods to be employed for the rectification of defects arising during base maintenance.

(xiv) Release to service

A description of, or reference to, a procedure for the manner in which an aircraft is to be released to service after base maintenance.

(xv) Records for the operator

A description of, or reference to, a procedure for the records to be kept and the manner in which they are to be given to the operator.

(xvi) Defective aircraft components

A description of, or reference to, a procedure for the return of defective aircraft components to the store and the method to be employed for routing the defective aircraft components to outside contractors and the return thereof.

(xvii) Special maintenance procedures

A description of, or reference to, a procedure for the manner in which specific maintenance procedures that may be required, such as –

(aa) engine running;

(bb) aircraft pressurisation tests;

(cc) aircraft towing and others,

are to be employed.

(c) Line maintenance

(i) Line maintenance control

A description of, or reference to, a procedure for the control of aircraft components, tools, equipment, etc., used during line maintenance.

(ii) Servicing, fuelling, etc. during line maintenance

A description of, or reference to, a procedure for the servicing, fuelling, etc. done during line maintenance.

(iii) Control of defects and repetitive defects

A description of, or reference to, a procedure for the manner in which defects and repetitive defects are to be controlled.

(iv) Completion of technical log

A description of, or reference to, a procedure for the completion of aircraft technical log during line maintenance.

(v) Return of defective parts removed from aircraft

A description of, or reference to, a procedure for the return to the stores of defective aircraft parts removed from the aircraft during line maintenance.

(2) The manual of procedure must contain the information to demonstrate that the organisation has the management, resources and procedures to comply with the requirements of the CARs Part 145.

(3) The manual of procedure may either be a self contained document, or it may refer to other documents referred to in the manual of procedure which will be considered to be equally binding on the organisation.

145.02.2 QUALITY ASSURANCE SYSTEM

1. Minimum standards for a quality assurance system

(1) The objectives of the quality assurance system referred to in CAR 145.02.2(2) are –

(a) to monitor, and report to management, the level of compliance with the organisation's manual of procedure and airworthiness requirements;

- (b) to correct any non-compliance identified and to implement actions to prevent the recurrence of such non-compliance; and
 - (c) to present to management for the purpose of review and implementing further corrective or preventive action, quality indicators such as audit reports, accidents, incidents, occurrences, customer complaints and personnel reports.
- (2) The quality assurance system must include –
- (a) Quality audit of the organisation
A description of, or reference to, a procedure for the quality audits to be performed on the organisation.
 - (b) Quality audit of aircraft
A description of, or reference to, a procedure for the quality audits to be done on the aircraft during maintenance work.
 - (c) Quality audit remedial action
A description of, or reference to, a procedure of remedial actions to be taken after quality audits.
 - (d) Management analyses and overview
A description of, or reference to, a procedure for bringing to the attention of management quality indicators (such as audit reports, progress on corrective action, accidents, incidents, occurrences, customer complaints and personnel reports) and documenting the appropriate action decided and implemented to maintain an adequate level of conformance to airworthiness requirements.
 - (e) Certifying personnel competence and training
A description of, or reference to, a procedure for the competence required of certifying personnel and the programme of training and recurrent training of certifying personnel.
 - (f) Certifying personnel records
A description of, or reference to, a procedure of the methods to be used for keeping technical records of certifying personnel.
 - (g) Quality audit personnel
A chart or a list indicating the qualifications of quality audit personnel.
 - (h) Qualifying inspectors and mechanics
A description of, or reference to, a procedure for the competence required of qualifying inspectors or mechanics, and a programme of training and recurrent training of personnel.
 - (i) Exemption/concession control
A description of, or reference to, a procedure to be used when permission is required to deviate from the requirements of the organisation's manual of procedures, or to deviate from specified aircraft/aircraft component maintenance tasks.
 - (j) Specialised activities
A description of, or reference to, a procedure for applying specialised activities such as welding, N.D.T. etc.
- (3) Measures must be taken to ensure that the system is understood, implemented and complied with at all levels.
- (4) The quality control system must be documented in the manual of procedure referred to in CAR 145.02.1.

SA-CATS 147
Design Organisation

List of technical standards

147.02.2 MANUAL OF PROCEDURE

1. Information to be contained in manual of procedure

147.02.3 DESIGN CONTROL SYSTEM

1. Minimum standards for a design control system

147.02.2 MANUAL OF PROCEDURE

1. Information to be contained in manual of procedure

The information referred to in CAR 147.02.2(b), which must be contained in the manual of procedure of the applicant, must include the following:

1.1 General information

- (1) A statement signed by the accountable manager on behalf of the applicant's organisation confirming that the manual of procedure and any included manuals –
 - (a) define the organisation and demonstrate its means and methods for ensuring ongoing compliance with Part 147; and
 - (b) will be complied with at all times.
- (2) The titles and the names of the personnel required by CAR 147.02.4.
- (3) The duties and responsibilities of the personnel specified in CAR 147.02.4 including matters for which they have responsibility to deal directly with the Director on behalf of the organisation.
- (4) An organisation chart showing lines of responsibility of the personnel specified in CAR 147.02.4 and extending to each work location where personnel of the organisation are to discharge their allocated responsibilities.
- (5) Details of the procedures required by –
 - (a) CAR 147.02.4(2) regarding the competence of personnel;
 - (b) CAR 147.02.3 regarding design control of the organisation.
- (6) Procedures to control, amend and distribute the manual of procedure.

1.2 Information relating to design of products and changes to products

- (1) The manual must describe, either directly or by cross-reference, the organisation, the relevant procedures and the products or changes to products to be designed.
- (2) Where any parts or appliances or any changes to the products are designed by partner organisations or subcontractors of the applicant, the manual must include a statement of how the applicant will be able to give, for all parts and appliances, the assurance of compliance required by TS 147.02.3, and must contain, directly or by cross-reference, descriptions and information on the design activities and organisation of those partners and subcontractors, as necessary to establish this statement.
- (3) The manual must contain a statement of the competence of the management personnel and other persons approved by the Director, who are responsible for making decisions affecting airworthiness in the organisation.
- (4) The manual must be amended as necessary to remain an up-to-date description of the organisation, and copies of amendments must be submitted to the Director.

147.02.3 DESIGN CONTROL SYSTEM

1. Minimum standards for a design control system

The minimum standards referred to in CAR 147.02.3(2), which must be contained in the design control system for the control and supervision of the design of products and changes thereto, are the following:

- (1) The design control system must be such as to enable the applicant –

- (a) to ensure that the design of the products, or the design change thereof, comply with the applicable requirements;
 - (b) to ensure that its responsibilities are properly discharged in accordance with the appropriate regulations in CAR 147.02.14; and
 - (c) to independently monitor the compliance with, and adequacy of, the documented procedures in the system. This monitoring must include a feedback system to a person or group of persons having the responsibility to ensure corrective actions.
- (2) The design control system must include an independent checking function of the showing of compliance on the basis of which the applicant submits compliance statements and associated documentation to the Director.
- (3) The applicant must specify the manner in which the design control system accounts for the acceptability of the parts or appliances designed or the tasks performed by partners or subcontractors according to methods which are the subject of written procedures.

SA-CATS 148

Manufacturing Organisations

List of technical standards

148.02.4 QUALITY SYSTEM

- 1. Minimum standards for a quality system

148.02.5 MANUAL OF PROCEDURES

- 1. Information to be contained in manual of procedure

148.02.4 QUALITY SYSTEM

1. Minimum standards for a quality system

- (1) The objectives of the quality system referred to in CAR 148.02.4(2) are –
- (a) to monitor, and report to management, the level of compliance with the organisation's manual of procedure and airworthiness requirements;
 - (b) to correct any non-compliance identified and to implement actions to prevent the recurrence of such non-compliance; and
 - (c) to present to management for the purpose of review and implementing further corrective or preventive action, quality indicators such as audit reports, accidents, incident occurrences, customer complaints and personnel reports.
- (2) The quality system must include –
- (a) Quality audit of the organisation
A description of, or reference to, a procedure of the quality audits to be performed on the organisation.
 - (b) Quality audit of products, parts or appliances
A description of, or reference to, a procedure of the quality audits to be done on the products, parts or appliances during manufacturing work.
 - (c) Quality audit remedial action
A description of, or reference to, a procedure of remedial actions to be taken after quality audits.
 - (d) Management analyses and overview
A description of, or reference to, a procedure for bringing to the attention of management quality indicators (such as audit reports, progress on corrective action, accidents, incidents,

occurrences, customer complaints and personnel reports) and documenting the appropriate action decided and implemented to maintain an adequate level of conformance to airworthiness requirements.

- (e) Personnel competence and training
A description of, or reference to, a procedure for the competence required of personnel and the programme of training and recurrent training of personnel.
 - (f) Personnel records
A description of, or reference to, a procedure of the methods to be used for keeping technical records of personnel.
 - (g) Quality audit personnel
A chart or a list indicating the qualifications of quality audit personnel.
 - (h) Qualifying inspectors and mechanics
A description of, or reference to, a procedure for the competence required of qualifying inspectors or mechanics, and a programme of training and recurrent training of personnel.
 - (i) Exemption/concession control
A description of, or reference to, a procedure to be used when permission is required to deviate from the requirements of the organisation's manual of procedure, or to deviate from specified product, part or appliance manufacturing tasks.
 - (j) Specialised activities
A description of, or reference to, a procedure for applying specialised activities.
- (3) Measures must be taken to ensure that the system is understood, implemented and complied with at all levels.
 - (4) The quality control system must be documented in the manual of procedure referred to in CAR 148.02.5.

148.02.5 MANUAL OF PROCEDURE

1. Information to be contained in manual of procedures

1.1 The information referred to in CAR 148.02.5(b), which must be contained in the manual of procedure of the applicant, must include the following:

1.1.1 Management

- (1) Corporate commitment
A statement containing the commitment of the accountable manager and the organisation to comply with the airworthiness requirements as set out in this document and approved by the Director.
- (2) Management personnel
A list of the key management personnel and their positions.
- (3) Duties and responsibilities of the management personnel
A statement containing the duties and responsibilities of each management position mentioned in paragraph (2). For clarity, additional positions may be added.
- (4) Management organisation chart
The chart must show all line management positions down to supervisory level.
- (5) Personnel
 - (a) The titles and names of the personnel required by CAR 148.02.1.
 - (b) The duties and responsibilities of the personnel mentioned in paragraph (a), including matters for which they have responsibility to deal directly with the Director on behalf of the organisation.

- (c) Details of the procedures required by CAR 148.02.1 regarding the competence of the personnel.
- (6) General description of facilities at each address intended to be approved
A description of the facilities and layout referred to in CAR 148.02.1(a) is required.
- (7) Organisation's intended/approved scope of work
A statement of the scope of work being applied for.
- (8) Notification procedure to the Director regarding changes in the organisation's activities/approval/location/personnel
A statement indicating who is responsible for notifying the Director regarding changes, and what changes are subject to notification.
- (9) Manual of procedure amendment procedures
A statement regarding the responsibility and procedure for amendment of the manual of procedure, as well as the associated documents referred to in the manual of procedure.

1.1.2 Manufacturing procedures

- (1) Arrangement with approved design organisation
A description of, or reference to, the manner in which CAR 148.02.13(e) will be complied with.
- (2) Technical literature, equipment, materials and facilities
A description of, or reference to, compliance with CAR 148.02.1(b).
- (3) Storage, segregation and protection of products, parts or appliances
A description of, or reference to, a procedure for storing, segregating and protecting products, parts or appliances and for the materials and supplies to be used.
- (4) Acceptance of tools and equipment
A description of, or reference to, a procedure for acceptance of tools and equipment by the organisation for use in the manufacturing of products, parts or appliances.
- (5) Calibration of tools and equipment
A description of, or reference to, a procedure for the calibration of tools and equipment to be used in the manufacturing of products, parts or appliances.
- (6) Use of tools and equipment by personnel
A description of, or reference to, a procedure for the methods in which special tools and equipment are used.
- (7) Cleanliness standards of manufacturing facility
A statement regarding the standard of cleanliness to be maintained at each manufacturing facility.
- (8) Manufacturing documentation
A description of, or reference to, a procedure for the relevant documentation to be used and instructions for the completion thereof.

1.2 The manual of procedure must contain the information to demonstrate that the organisation has the management, resources and procedures to comply with the requirements of CAR Part 148.

1.3 The manual of procedure may either be a self contained document, or it may refer to other documents referred to in the manual of procedure which will be considered to be equally binding on the organisation.

SA-CATS 149 Aviation Recreation Organisations

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1. Information to be contained in manual of procedure

149.02.3 QUALITY ASSURANCE SYSTEM

1. Minimum standards for a quality assurance system

149.02.2 MANUAL OF PROCEDURE

1. Information to be contained in manual of procedure

The information referred to in CAR 149.02.2(b), which must be contained in the manual of procedure of the applicant, must include the following:

- (1) A statement signed by the accountable manager on behalf of the applicant's organisation confirming that the manual of procedure and any included manuals –
 - (a) define the organisation and demonstrate its means and methods for ensuring ongoing compliance with Part 149; and
 - (b) will be complied with at all times.
- (2) The titles and names of the personnel required by CAR 149.02.4.
- (3) The duties and responsibilities of the personnel specified in CAR 149.02.4 including matters for which they have responsibility to deal directly with the Director on behalf of the organisation.
- (4) An organisation chart showing lines of responsibility of the personnel specified in CAR 149.02.4 and extending to each location listed under subparagraph (5).
- (5) Details of those locations where members or personnel of the organisation are to exercise functions or powers delegated by the Director.
- (6) A summary of the resources at and the scope of activity to be conducted at each location listed under subparagraph (5).
- (7) Details of the organisation's procedure for recording which of its members and personnel hold authorisations granted by the organisation or delegations of the Director's functions or powers, or both, including the extent and scope of those authorisations and delegations.
- (8) Details of the procedures required by –
 - (a) CAR 149.02.4 regarding the competence of personnel;
 - (b) CAR 149.02.3 regarding quality assurance of the organisation.
- (9) Procedures to control, amend and distribute the manual of procedure.

149.02.3 QUALITY ASSURANCE SYSTEM

1. Minimum standards for a quality assurance system

- (1) The quality assurance system referred to in CAR 149.02.3(2), must include –
 - (a) a clear definition of the level of quality the organisation intends to achieve;
 - (b) a procedure that sets out the level and frequency of the internal reviews;
 - (c) a procedure to record the findings and communicate them to management;
 - (d) a list of responsible persons;
 - (e) procedures by which other quality indicators such as facility malfunction reports, incidents, occurrences, complaints and defects are brought into the quality assurance system;
 - (f) procedures for management analysis and overview;
 - (g) procedures for rectifying any deficiencies which may be found; and
 - (h) procedures for documenting the complete review process from the inspection to the satisfactory management review so that this is available to the Director during a safety inspection and audit.

- (2) Measures must be taken to ensure that the system is understood, implemented and complied with at all levels.
- (3) The quality assurance system must be documented in the manual of procedure referred to in CAR 149.02.2.

SA-CATS 171

Aeronautical telecommunication service providers (Electronic Service Organisations)

List of technical standards

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- 171.03.13 FLIGHT INSPECTION OF NAVIGATION EQUIPMENT
- 171.03.14 STATION (SITE) LOGS

1. Definitions

In this technical standard, unless the context indicates otherwise –

“**technical safeguarding**” is the process employed to protect radio signals from being affected by physical or electromagnetic changes in their transmission environment.

171.01.2 REQUIREMENTS FOR APPROVAL

1. Aeronautical telecommunication services and facilities

(1) Classification of Services

- (a) Aeronautical telecommunication services are the ground-based stations of those services supporting an air traffic service provided under Part 172. Airborne stations are not included.
 - (i) Aeronautical Broadcasting Service. A broadcasting service intended for the transmission of information relating to air navigation.
 - (ii) Aeronautical Fixed Service. A telecommunication service between specified fixed points provided primarily for the safety of air navigation and for the regular, efficient and economical operation of air services.
 - (iii) Aeronautical Fixed Telecommunication Network Service. A worldwide system of aeronautical fixed circuits provided, as part of the aeronautical fixed service, for the exchange of messages and/or digital data between aeronautical fixed stations having the same or compatible communication characteristics.
 - (iv) Aeronautical Telecommunication Network Service. An inter-network that allows ground, air-ground and avionics data sub-networks to interoperate by adopting common interface services and protocols based on the International Organisation for Standardization (ISO) Open Systems Interconnect (OSI) reference model.
 - (v) Aeronautical Mobile Service. A mobile service between aeronautical ground stations and aircraft stations, in which survival craft stations may participate; emergency position-indicating radio-beacon stations may also participate in this service on distress and emergency frequencies. This service does not include ground stations that are provided for other than ATS purposes.
Note: Pilot Activated Lighting (PAL) is not included.
 - (vi) Any telecommunication service which processes or displays air traffic control data, including aviation meteorological data, for use by an ATS provider under Part 172.
 - (vii) Electronic briefing and flight plan lodgement service for the use of pilots.

2. Aeronautical Radio Navigation services

(1) Classification of Services

- (a) A radio navigation service intended for the benefit, and for the safe operation of aircraft.
- (b) Radio navigation services include radio determination (radar surveillance services) supporting ATS.

(2) Classification of Facilities

The following list classifies the kinds of facilities used for the provision of aeronautical telecommunication and radio navigation services:

- (a) VHF air/-ground voice communication facilities;
- (b) HF air/-ground voice communication facilities;
- (c) UHF air/-ground voice communication facilities;
- (d) Precision approach radio navigation aids;
- (e) Instrument Landing System facilities;
- (f) Non-precision radio navigation aids;
- (g) Distance Measuring Equipment;
- (h) VHF Omni-range (VOR) facilities;
- (i) Non-directional beacons (NDB);
- (j) Flight data processing facilities;
- (k) Flight information facilities;
- (l) Radar data processing facilities;
- (m) Primary surveillance radar facilities;
- (n) Secondary surveillance radar facilities;
- (o) Surface movement radar facilities;
- (p) Multi Lateration surveillance facilities (Mlat)
- (q) Precision runway monitor facilities;
- (r) Automatic dependent surveillance system facilities;
- (s) Voice switching and control facilities;
- (t) ATS point-to-point communication facilities;
- (u) Air/ground data links;
- (v) Ground to ground data interchange networks;
- (w) Human Machine Interface systems, including Tower Consoles, ATS Work Stations, and Display facilities;
- (x) Uninterruptible and emergency power supplies;
- (y) Essential services in buildings and in equipment shelters housing facilities (electrical power supplies, air-conditioning, and security facilities);
- (z) Global Navigation Satellite System ground based augmentation stations or facilities;
- (za) Aeronautical databases used in or by a facility;
- (zb) Meteorological Display Systems used for ATS;
- (zc) Voice and Data Recording facilities;
- (zd) Any other facilities supporting ATS provided under Part 172.

171.02.1 MANUAL OF PROCEDURE

1. Information to be contained in manual of procedure

The information referred to in CAR 171.02.1 which must be contained in the manual of procedure of the applicant, must include the following:

(1) Management

(a) Corporate commitment

A statement containing the commitment of the accountable manager on behalf of the applicant confirming that –

- (i) the manual of procedures demonstrates the means and methods for ongoing compliance with the requirements of this part;
- (ii) the manual will be complied to at all times and is approved by the Director.

- (2) Management personnel
A list of the key management personnel and their positions.
- (3) Duties and responsibilities of the management personnel
A statement containing the duties and responsibilities of each management position mentioned in paragraph (2). For clarity, additional positions may be added.
- (4) Management organisation chart
The chart must show all line management positions down to supervisory level.
- (5) Human resources
A statement identifying the human resources employed by the organisation.
- (6) General description of facilities at each address intended to be approved
A description of the facilities and layout is required.
- (7) Organisation's intended approved scope of work
A statement of the scope of work being applied for.
- (8) The quality control system which must include –
 - (a) a clear definition of the level of quality the organisation intends to achieve;
 - (b) a procedure that sets out the level and frequency of the internal reviews and assessments of electronic services organisation personnel;
 - (c) a procedure to record the findings and communicate them to management;
 - (d) a list of responsible persons;
 - (e) procedures by which other quality indicators such as facility malfunction reports, incidents, occurrences, complaints and defects are brought into the quality control system and should include the overall procedures adopted in the case of unscheduled interruptions (failures) to services provided, for –
 - (i) Technical personnel call-out procedure in and out of working hours;
 - (ii) a specified service recovery time which is to be the basis of the planned response to a failure;
 - (iii) The process to be undertaken should it become obvious that the specified recovery time cannot be achieved;
 - (iv) The planned procedure, if any, to establish an alternate service as a contingency in situations where there is a loss of service for extended periods.
 - (f) procedures for the control of documents and data associated with service provision;
 - (g) procedures to ensure currency in equipment related software and the on and off site safeguarding of the source software;
 - (h) procedures to establish a security program that minimises the risk of unauthorised access, entry by animals, or malicious damage to a service or facilities.
 - (i) procedure for initially assessing, and a procedure for maintaining, the competence of those personnel involved in planning, performing, supervising, inspecting or certifying the maintenance undertaken by the organisation.
 - (j) procedures and practices that for the calibration and maintenance of test equipment used in the operation and maintenance of services and facilities.
 - (k) procedures for management analysis and overview;
 - (l) procedures for rectifying any deficiencies which may be found; and
 - (m) procedures for documenting the complete review process from the inspection to the satisfactory management review so that this is available to the Director during a safety inspection and audit.
- (9) Notification procedure to the Director regarding changes in the organisation's activities/approval/location/personnel. A statement indicating who is responsible for notifying the Director regarding changes, and what changes are subject to notification.

- (10) Manual of procedure amendment procedures. A statement regarding the responsibility and procedure for amendment of the manual of procedure, as well as the associated documents referred to in the manual of procedure.

171.02.8 PRIVILEGES

1. Category B rating

- (1) An Electronic Services Provider certificate specifies the aeronautical telecommunication services and aeronautical facility types that the certificate holder is authorised to operate in support of IFR flight or an air traffic service.
- (2) The holder of an Electronic Services Provider certificate may operate any of the aeronautical facility types specified on the holder's certificate so long as each aeronautical facility operated is listed in the certificate holder's application; or if the aeronautical facility is not listed in the application, its operation is for site test purposes controlled by the procedures required under CAR 171.03.6.

2. Category F rating

- (1) An Electronic Services Organisation type F certificate specifies the aeronautical Radio Navigation Services types that the certificate holder is authorised to conduct flight inspection on in support of IFR flight or an air traffic service.
- (2) The holder of an Electronic Services Organisation certificate may conduct flight inspection on types specified on the holder's certificate so long as each aeronautical Radio Navigation Services type is listed in the certificate holder's application.

171.03.1 RADIO SITE APPROVAL

1. Requirements

- (1) Any radio site, whether temporary or permanent shall obtain prior approval from the Director.
- (2) Applications shall be submitted to the Director on the form prescribed by the Director.
- (3) The application shall indicate the type and duration of the service.
- (4) Safety assurance documentation (safety case) shall be submitted with the application for any new service, and shall –
- (a) contain argument and evidence that the system meets or exceeds the appropriate standard of safety.
 - (b) reflect one of two situations; the safety of the existing, on-going, operation or a change to the existing operation, such as a new project or procedure.
 - (c) be presented in a reasonable format as long as its scope is well defined and it provides the necessary arguments and evidence required for its purpose.
- (5) Private radiotelephony base station applications shall be accompanied by proof of competency in the use of aeronautical voice radio equipment.
- (a) A certificate of competency for aviation base operations personnel shall be the minimum requirement.
 - (b) At least two (2) certificates shall be required for every eight (8) hour daily shift of operation.
 - (c) A private radiotelephony base station application is not subject to a safety case, but should be accompanied by a motivation justifying the application.
- (6) Hand held or mobile radio equipment used within the confines of an aerodrome shall be deemed to be a base station.

171.03.3 PROTECTION OF RADIO SITES

1. Introduction

- (1) The license holder is responsible for the technical safeguarding of all of the radio sites for which they hold approvals. This document provides guidance to assist with that process.
- (2) The license holder shall register safeguarding maps with the Local Planning Authorities and shall receive, from the Local Planning Authority, copies of applications for developments in and within the vicinity of the radio site. This information shall be made available to the person responsible for the technical safeguarding of radio sites.
- (3) If safeguarding is not undertaken then it is likely that a gradual degradation of the Integrity of the radio signal will take place. This will be perceived in several ways; for example, complaints from pilots or ATC regarding poor coverage, increased background noise or worsening flight calibration results for ILS and VOR. This can be avoided by proactively safeguarding the technical sites.
- (4) The Director will expect to see evidence of adequate technical safeguarding. If the quality of service of the radio signal reduces below acceptable limits, such service can be withdrawn until corrective measures have been taken.

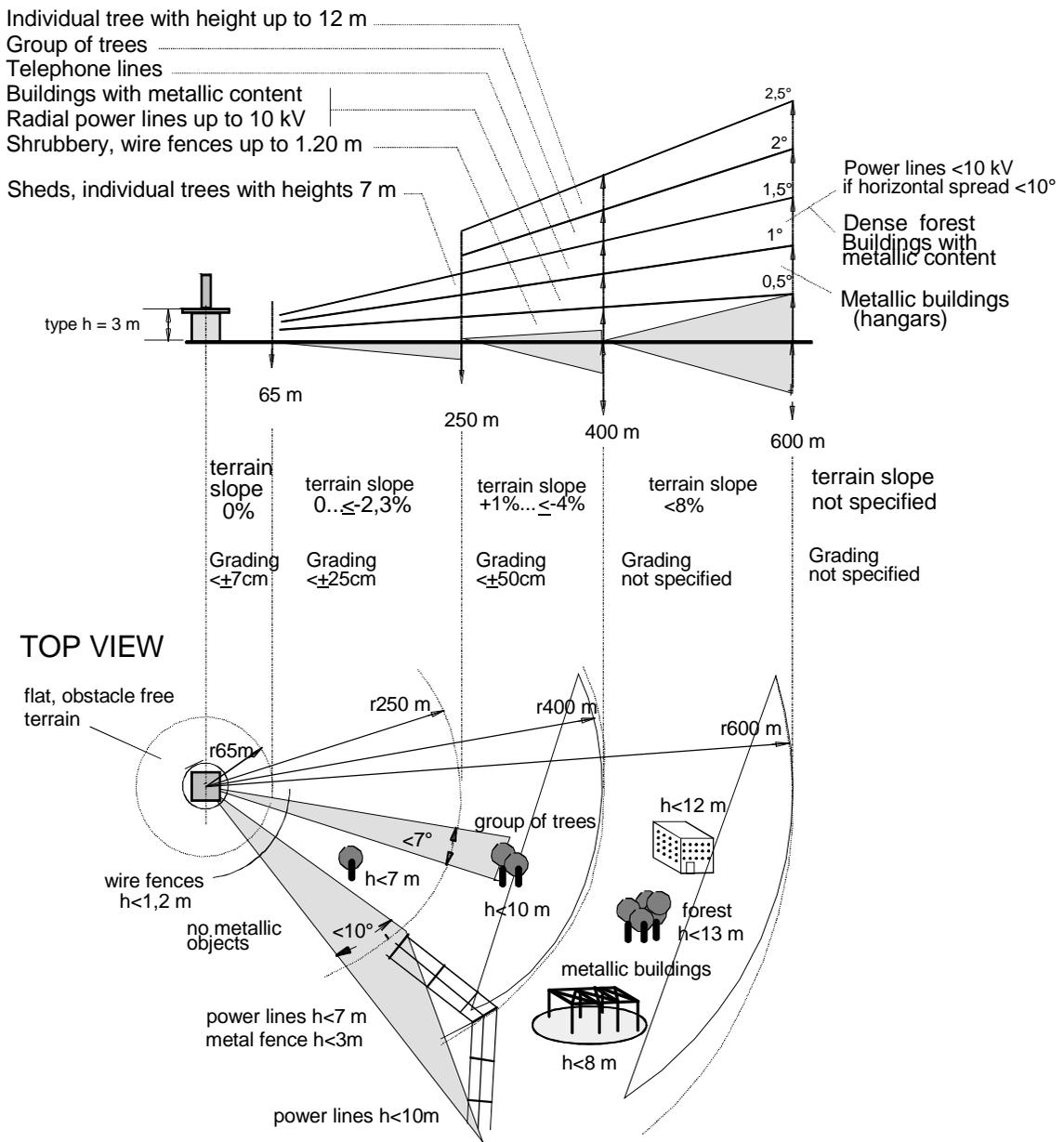
2. Background

Technical Safeguarding consists of two processes: Physical protection and radio spectrum protection.

- (1) Physical protection
 - (a) Most physical objects act as reflectors or diffractors of radio signals. A combination of object size, design, material, proximity and incident radio wavelength, can make them particularly efficient reflectors or diffractors. Technical site safeguarding, a process applied as part of the technical safeguarding of Radio sites, seeks to prevent any development nearby radio sites, which may degrade the electro-magnetic signals by enabling such reflection or diffraction.
 - (b) Physical protection Process
 - (i) Each radio site has a technical area to be safeguarded associated with it. On an aeronautical chart, a frame, representing this area, is drawn around the location of such equipment. If a proposed development falls within that frame or volume, further analysis, or reasoned outright rejection must be considered. In the case of development within an ILS area it is expected that computer modelling of the development is undertaken. The size and shape of the frame is dependent upon the type of equipment and its aerial system.
 - (ii) The dimensions provided are examples of frame sizes associated with specific types of equipment. These sizes should be applied in the absence of data from other sources. The holders of an electronic services organisation approval shall obtain specific criteria from the manufacturer or supplier of their equipment. It is likely that the manufacturer may specify a smaller area to be safeguarded, which could provide operational benefits. The holders of an electronic services organisation approval are expected to maintain and apply criteria pertinent to their own technical sites. The criteria used shall be made available to an inspector or authorised person on request.
 - (c) The following list of equipment is not exclusive.
 - (i) ILS
Note: These dimensions should not be confused with the ILS Critical and Sensitive areas.
 - (aa) ILS Localiser Cat I/II
The frame can be defined in two separate segments:

- (A) a sector of 750 metres radius centred on the localiser and $\pm 60^\circ$ about the runway centreline at ground level, in the direction of the runway threshold.
 - (B) a sector, centred on the localiser, $\pm 15^\circ$ about the runway centreline and 1500 metres along the runway, at ground level, in the direction of the runway threshold.
- (bb) ILS Localiser Cat III
The above Cat I/II segments plus the following:
Note 1: This frame is defined with respect to the localiser site and the landing "end of concrete" to take account of the variable length of runways and inset threshold conditions
- (A) a rectangle 300 metres either side of, and parallel to, the extended runway centreline, commencing 100 metres behind the respective localiser, and extending to 100 metres beyond the end of concrete at the landing end of the respective runway. This space is from ground level:-
 - (B) from 100 metres from the end of concrete, at ground level, on a projected 1:50 slope to a range of 1000 metres, and ± 300 metres about the extended runway centreline.
Note 2: The holders of an electronic services organisation approval may consider extending the above Cat III criteria of ± 300 metres to ± 500 metres if large-scale development, on the edge of the ± 300 metre boundary is likely.
- (ii) ILS Glide Path
This space is defined with respect to the glide path aerial mast. A sector of 750 metres radius $\pm 60^\circ$ about a line, originating at the glide path aerial, parallel to the approach runway centreline. This space is from ground level.
- (iii) DME associated with ILS
An inverted cone of 500 metres radius with a 2% (1:50) slope, originating at the base of the DME aerial.
- (iv) Elevation Systems
A sector of 500 metres radius, centred on the elevation aerial, $\pm 30^\circ$ about a line parallel to the approach runway centreline.
- (v) VOR
A differentiation exists between the protection criteria of the C- VOR (Conventional VOR) and the D- VOR (Doppler VOR) and should be noted.

C - VOR



- (vi) DME
The foregoing VOR constraints where co-located with a VOR, otherwise a 2% (1:50) slope surface, originating at the site ground level extending with a 300 metres radius.
- (vii) RADAR
 - (aa) Line of sight from the installation to surveillance areas or volume shall be maintained. No obstruction shall penetrate the volume above the radar platform for a distance of 4 600m from the installation, or prevent line-of-sight from the installation to aircraft during the approach phase and movements on runways.
Consultation regarding the non-use of designs or certain materials considered to be reflective, or that could cause attenuation of the signal (such as metal reinforced glass, metal cladding, chain-link fencing, tree, plants, etc) on elevations facing the installation shall be undertaken. Designs shall to be altered and electromagnetic wave absorption material used for exterior finishes if required by the ATS provider. This applies to any development within a radius of 4 600m from the installation or within 1000m from the aerodrome perimeter, aerodrome included.
 - (bb) SSR
Line of sight from the installation to surveillance areas or volume shall be maintained to a distance of 15km. No obstruction shall penetrate the volume above the radar platform for a distance of 4 600m from the installation, or prevent line-of-sight from the installation to aircraft during the approach phase and movements on runways.
Consultation regarding the non-use of designs or certain materials considered to be reflective or that could cause attenuation of the signal (such as metal reinforced glass, metal cladding, chain-link fencing, etc), on elevations facing the SSR installation shall be undertaken. Designs shall to be altered and electromagnetic wave absorption material used for exterior finishes, if required by the ATS provider. This applies to any development within a radius of 4 600m from the installation or within 1000m from the aerodrome perimeter, aerodrome included.
 - (cc) Surface Movement Radar
Line-of-sight shall be maintained at ground level from the radar to all areas within the aerodrome boundary where any movement of aircraft, personnel or vehicles can occur.
Consultation regarding the non-use of designs or certain materials considered to be reflective or that could cause attenuation of the signal (such as metal reinforced glass, metal cladding, chain link fencing, trees, plants, etc) on elevations facing the installation shall be undertaken.
 - (dd) Multi Lateration (Mlat)
Line of sight from the installation to surveillance areas or volume shall be maintained. No obstruction shall penetrate the volume above the surveillance platform for a distance of 4 600m from the installation, or prevent line-of-sight from the installation to aircraft during the approach phase and movements on runways.
Consultation regarding the non-use of designs or certain materials considered to be reflective or that could cause attenuation of the signal (such as metal reinforced glass, metal cladding, chain-link fencing, etc), on elevations facing the Mlat installation shall be undertaken. Designs shall to be altered and electromagnetic wave absorption material used for exterior finishes, if required by the ATS provider. This applies to any development within a radius of 4 600m from the installation or within 1000m from the aerodrome perimeter, aerodrome included
 - (ee) Automatic Dependant Surveillance – Broadcast (ADS-B)

Line of sight from the installation to surveillance areas or volume shall be maintained. No obstruction shall penetrate the volume above the Surveillance platform for a distance of 4 600m from the installation, or prevent line-of-sight from the installation to aircraft during the approach phase and movements on runways.

Consultation regarding the non-use of designs or certain materials considered to be reflective or that could cause attenuation of the signal (such as metal reinforced glass, metal cladding, chain-link fencing, etc), on elevations facing the ADS-B installation shall be undertaken. Designs shall to be altered and electromagnetic wave absorption material used for exterior finishes, if required by the ATS provider.

This applies to any development within a radius of 4 600m from the installation or within 1000m from the aerodrome perimeter, aerodrome included

- (viii) VHF Direction Finder (VDF)
Ground level safeguarding of circle radius 120 metres centred on aid, and 2% (1:50) slope from ground level at aid out to a radius of 450 metres.
 - (ix) VHF / UHF Receivers / Transmitters
Ground level safeguarding of circle radius 91 metres centred on the base of the main aerial tower (or equivalent structure). Additionally, from an elevation of 9 metres on this circle, a 2% (1:50) slope out to a radius of 610 metres.
 - (x) Radar and Radio Link Routes
Areas of high ground need to be safeguarded against development using designs or certain materials considered to be reflective, or that could cause attenuation of the signal (such as metal-reinforced glass, metal cladding, chain-link fencing, trees, plants, etc) on elevations facing the installations in order to protect radar/radio beams.
 - (xi) 75 MHz Marker Beacons
Ground level safeguarding out to a radius of 100 metres.
 - (xii) NDB
From the centre of the aerial, at a height of 5 metres out, to a radius of 30 metres, with a further slope to a height of 14 metres above ground, out to a radius of 90 metres.
- (2) Radio spectrum protection
- (a) Radio signals may also be degraded by interference from other radio sites, such as a broadcast station whose harmonics conflict with an aeronautical frequency.
 - (b) With the planning of a new radio site, due care and consideration must be taken of existing facilities and the potential of such facilities to negatively impact on the planned site.
 - (c) The radio spectrum protection process starts with an application to ICASA, the regulating authority, for the intended use of aviation frequency spectrum.
 - (d) The documents describe the frequency band, location, output power, modulation and aerial directivity required by the party requesting agreement to establish or modify a radio site.
 - (e) ICASA then forwards the application to the Director who will arrange for the technical evaluation of, and the checking on the siting of such a proposed facility. If successful, the Director will issue a frequency and request ICASA to issue a licence to the applicant.
 - (f) No new facility, intended for operation within the aviation frequency spectrum, shall be allowed to be switched on and radiate electromagnetic waves without the prior authorisation of the Director. Such authorisation is dependent on successful commissioning completed to the standards of ICAO Annex 10 and on compliance with the Electronic Communications Act, 2005 (Act No. 36 of 2005).

171.03.6 TEST TRANSMISSIONS

- (1) Transmissions for site evaluation or testing purposes shall be limited to a period not exceeding 30 days.

- (2) A temporary facility shall be allowed to radiate for a period not exceeding 90 days
- (3) When a Morse identification signal is radiated during a test transmission the code "TST" (Tango Sierra Tango) shall be used.
- (4) Any voice transmission shall indicate that it is a test transmission.

171.03.7 SPECIFICATIONS REGARDING NAVIGATION AIDS

- (1) Specifications as outlined in ICAO Annex 10 Volume 1 Chapters 1, 2, 3 and all Attachments and maintained to the standards of the following associated documentation, namely the "Manual on testing of radio navigational aids - Doc 8071 (as amended), consisting of –
 - (a) Volume I, Testing of Ground-Based Radio Navigation Systems;
 - (b) Volume II, Testing of Satellite- based Radio Navigation Systems;
 - (c) Volume III, Testing of Surveillance Radar Systems; or
 - (d) The manufactures recommendations, if it is more demanding than the standards of Doc 8071.

171.03.8 SPECIFICATIONS REGARDING COMMUNICATION PROCEDURES

1. Specifications as outlined in ICAO Annex 10 Volume II

- (a) Requirements for Flight & Ground Inspection of VHF Direction Finding (VDF) Systems

2. Requirements

(1) Safety objective

The VDF equipment shall provide indications of known accuracy to ATC of the magnetic bearing to or from the VDF site of aircraft transmitting on associated aerodrome communication frequencies.

(2) Functional requirements

- (a) Introduction
- (b) To achieve the safety objective the accuracy and useful service area of the VDF installation shall be demonstrated by Flight Inspection.
- (c) VDF Flight Inspection shall be undertaken on commissioning of new equipment, replacement of aerial system, relocation of equipment or other major adjustment or modification which may cause the accuracy of the equipment to be compromised, or at any other time as required by a CAA Inspector.
- (d) Use can be made of any suitable method, providing that the positioning accuracy of the aircraft is better than the required accuracy of the VDF by a factor of 2, i.e. Class A / 2 = $\pm 1^\circ$ aircraft positioning accuracy.

(3) Required procedures

- (a) The following activities shall be carried out during the commissioning of the VDF.
- (b) Ground checks
 - (i) Checks to confirm the bearing accuracy shall be carried out using suitable test oscillator(s) or portable radio equipment, at previously surveyed ground points around the VDF antenna.
NOTE: Establishment of accurate test points is necessary in order to provide confidence that the alignment of the VDF is correct prior and subsequent to, flight inspection.
 - (ii) Unless otherwise advised by the VDF manufacturer, ground test points shall be located every 10 degrees around the VDF antenna if practicable.

- (iii) Periodic confirmation of the bearing accuracy, using ground checks, shall be undertaken in accordance with the equipment manufacturer's recommendations, but shall be at least annually.
- (c) Checks using aircraft
 - (i) The flight calibration aircraft shall complete an orbit of the VDF, measuring the actual magnetic bearing from the VDF, which shall be compared with those indicated by the direction finder display. Any suitably equipped aircraft may be used.
Note: It may be necessary to complete orbit flights in both directions in order to eliminate any 'lag error'.
 - (ii) The height and radius for the flight inspection is dependant on the required operational coverage for the VDF. The flight check shall take place at the limit of the required operational coverage and be at an altitude which will maintain radio line of site, whilst observing any minimum safe altitude criteria.
 - (iii) Where the operational coverage is not specified then the limits of the VDF, with its associated communications equipment, shall be established.
Note: Ground and Air checks may need to be repeated if the equipment is adjusted in order to eliminate errors.
 - (iv) Areas where out of tolerance errors cannot be corrected or where VHF communication was not of sufficient quality shall be subject to further investigation. Any subsequent limitations to coverage shall be published in the CAA AIP.
- (d) Approach procedures
 - (i) VDF is intended as a "positional awareness" aid to ATC in the absence of surveillance facilities and is NOT intended to support approach procedures.
- (e) Frequencies
 - (i) Tests shall be carried out on the primary VDF frequency.
 - (ii) Bearing accuracy spot checks shall be carried out on all other communication frequencies associated with the VDF.
 - (iii) Standby power
 - (aa) Checks at the ground check points shall be repeated using the standby power source, if installed.
- (4) The results shall be assessed for categorisation using the following criteria. ICAO Annex 10 Volume ii Chapter 6, refers.
 - (a) Category Range of Bearing Error
 - (b) Class A - accurate within plus or minus 2 degrees
 - (c) Class B - accurate within plus or minus 5 degrees
 - (d) Class C - accurate within plus or minus 10 degrees.
- (5) The results and supporting evidence shall then be submitted to the CAA for acceptance and approval of the facility.

171.03.9 SPECIFICATIONS DATA AND VOICE COMMUNICATION SYSTEMS

1. Specifications as outlined in ICAO Annex 10 Volume III

- (1) Maintenance shall be done in accordance with manufactures recommendations or shall be done at least annually; whichever requirement is the more demanding.
- (2) The following checks shall be included during maintenance for communication systems:
 - (a) Transmitter frequency stability
 - (b) Transmitter modulation
 - (c) Transmitter power
 - (d) Receiver sensitivity

- (e) Antenna cabling
- (f) Connectors at antenna and equipment
- (g) Cleanliness of both the equipment and radio site

171.03.10 SPECIFICATIONS REGARDING SURVEILLANCE AND COLLISION AVOIDANCE SYSTEMS

- (1) Specifications as outlined in Annex 10 Volume IV and maintained to the standards of the following associated documentation, namely the “Manual on testing of radio navigational aids - Doc 8071 (as amended), consisting of –
 - (a) Volume I, Testing of Ground-Based Radio Navigation Systems;
 - (b) Volume II, Testing of Satellite- based Radio Navigation Systems;
 - (c) Volume III, Testing of Surveillance Radar Systems; or
 - (d) The manufactures recommendations, if it is more demanding than the standards of Doc 8071.

171.03.11 SPECIFICATIONS REGARDING RADIO FREQUENCY SPECTRUM UTILISATION

- (1) Specifications regarding radio frequency spectrum are outlined in Annex 10 Volume V and Doc 9718.

171.03.12 SPECIFICATIONS REGARDING METEOROLOGICAL EQUIPMENT

- (1) Specifics concerning the siting and construction of meteorological equipment are contained in Annex 14, Volume 1, Chapter 8.
- (2) Where an ATSU is required, meteorological sensing equipment be provided to measure, monitor and relay to the remote display system within the ATSU the following information –
 - (a) Real time surface wind direction and speed; (b)
Real time surface air temperature and dew point;
 - (c) Real time barometric pressure; and
 - (d) At aerodromes where CAT I, II, and III instrument approach and landing operations are authorized automated equipment for measuring and remote indicating of runway visual range and cloud height.
- (3) Meteorological instruments shall be exposed, operated and maintained in accordance with the practices, procedures and specifications contained in ICAO Annex 3. The accuracy of meteorological instruments shall comply with the requirements of ICAO as contained in Annex 3, Attachment B.
- (4) In addition to the specifications of Annex 3, the following specifications shall be adhered to –
 - (a) Environmental operating conditions
 - (i) Systems shall recover to their calibrated specifications from specified meteorological extreme conditions that may occur in the South Africa, but which are outside the norm for aerodrome operations.
 - (ii) Sensors and equipment installed within the environment to be measured, shall operate within and recover to the tolerance values specified over the following range of environmental conditions and safety/operating requirements
 - (iii) The systems shall be designed to fail-to-safe where possible.

Environmental Condition	In Tolerance Operating Range	Recoverable Range
Temperature	minus 25°C to plus 50°C	minus 30°C t o plus 70°C
Pressure	800 to 1050 mb (hPa)	800 to 1200 mb (hPa)

(b) Surface wind speed and direction measurement

(i) Sensor Performance Requirements

- (aa) The surface wind speed and direction measuring equipment shall have a level of performance, which is able to provide an accurate and uncorrupted representative measurement of wind speed and direction at a height of approximately 10m (30 ft) above the whole runway and the whole runway complex if there is more than one runway. Multiple sensors may be required to satisfy this objective.
- (bb) Representative surface wind observations should be obtained by the use of sensors appropriately sited as determined by local conditions. Sensors for surface wind observations for local routine and special reports should be sited to give the best practicable indication of conditions along the runway, e.g. lift-off and touchdown zones. At aerodromes where topography or prevalent weather conditions cause significant differences in surface wind at various sections of the runway, additional sensors should be provided.
- (cc) Surface wind indicators relating to each sensor shall be located in the appropriate Air Traffic Services Unit (ATSU's) with corresponding indicators in the meteorological station. The indicators in the meteorological station and the air traffic services units shall relate to the same sensors, and where separate sensors are required as specified in paragraph (bb), the indicators shall be clearly marked to identify the runway and section of runway monitored by each sensor.

(ii) Wind Speed & Direction Sensor Accuracy

- (aa) With wind speeds in excess of 3 knots, the wind direction system shall be capable of producing an overall accuracy better than plus or minus 10 degrees, including 'dead band'.
- (bb) The sensor shall be sampled at a minimum sample rate of four per second. If wind variation information is processed at the sensor head or in a remote processing unit, samples / averages shall be transmitted at a minimum rate of once per second.
- (cc) Systems relying on polled sampling, shall ensure the complete data word from the remote sensor is sampled at a minimum of once every second.
- (dd) The equipment shall measure a 3 second gust as a rolling average of the wind speed samples.
- (ee) The equipment shall produce 2 and 10 minute rolling averages of the wind speed and direction.
- (ff) The average direction displayed shall take regard of the numerical discontinuity at North.

(iii) Wind Speed & Direction Sensor Resolution for Analogue & Digital Systems Operationally desirable and currently attainable accuracy of measurement

Element to be observed	Operationally desirable accuracy of meteorological instrumentation	Attainable accuracy of measurement
Mean surface wind	Direction: $\pm 10^\circ$ Speed: ± 2 Km/h (1kt) up to 19 Km/h (10 kt)	Direction: $\pm 5^\circ$ Speed: ± 2 Km/h (1 kt) up to 37 Km/h (20 kt) $\pm 5\%$ above 37 Km/h (20 kt)
Variations from the mean surface wind	± 4 Km/h (2 kt), in terms of longitudinal and lateral components	Direction: $\pm 5^\circ$ Speed: ± 2 Km/h (1 kt) up to 37 Km/h (20 kt) $\pm 5\%$ above 37 Km/h

(bb) The system shall be designed to fail-to-safe.

(vi) Displays

- (aa) The display device shall be designed in such a way as to draw the attention of the operator to significant reportable changes in the displayed surface wind information.
- (bb) The display shall provide information compliant with the ICAO Annex 3 Chapter 4.5.5 requirements for marked discontinuity, wind variation and wind speed (gusts).
- (cc) On aerodromes with multiple runways, the display shall indicate the sensor selected, (or indicate the runway selected on dedicated displays) and display the surface wind information relevant to the active runway(s).
- (dd) If wind direction and deviation is displayed as a circle, the display shall have a resolution of at least 10 degrees.
The combined numeric and analogue display shall be linked so that both display the same information relevant to the chosen display mode.

- (c) Ground based pressure measurement equipment
 - (aa) Pressure Sensor Performance Requirements
 - (A) No aerodrome observing system shall be dependent upon a single sensor for pressure measurement. A minimum of 2 co-located sensors shall be used with an integrity within 0,5mb (hPa) of each other.
 - (B) The measurement system shall provide a pressure reading to an accuracy of ± 0.5 mb (hPa), or better over a range of at least 800 to 1050mb (hPa).
 - (C) The sensor shall provide an output with a minimum system resolution of 0,1 mb (hPa).
For automated systems, the sensor shall be sampled at a minimum rate of once a minute.
The reference level for computation of QFE shall be the aerodrome elevation. For non-precision approach runways, the thresholds of which are 2m (7ft) or more below the aerodrome elevation, and for precision approach runways, the QFE, if required, shall refer to the relevant threshold elevation.
 - (bb) Displays
 - (A) The display device shall be designed in such a way as to draw the attention of the operator to a change of 1 mb or more from the previous reading to 1 decimal place, (i.e. 998,4 mb to 997,4 mb).
 - (B) The display shall provide the indication of pressure to the nearest tenth of a millibar/hektoPascal).
 - (C) On aerodromes with multiple runways and sensor systems, the display shall indicate the sensor selected, (or indicate the runway selected on dedicated displays) and display the pressure information relevant to the active runway(s).
 - (D) Where a combined numeric and analogue display is used, they shall be linked so that both display the same information relevant to the chosen display mode.
- (d) Ground based temperature and dew-point measurement
 - (i) Sensor Performance Requirements
 - (aa) The equipment shall be installed in a position such that the sensor measurements are suitable for the operational purpose and representative of the whole runway or runway complex.
 - (bb) The sensors shall be mounted approximately 1,25m (4ft) above an earth or grass surface and in such a position, where it will not be degraded by anomalous temperatures and protected from the exhaust fumes of aircraft.
 - (cc) The sensors shall be exposed in an instrument housing or properly ventilated screen, which provides protection from atmospheric radiation and water drops either as precipitation or fog.
 - (ii) Accuracy
 - (aa) The equipment shall be capable of measurement to an accuracy better than plus or minus 0,5 degree Celsius for air temperature and Dew-point, over the operating range -30 to +50 degrees Celsius.
The sensor(s) shall be sampled at minimum of once per minute.
Resolution
Air temperature and the Dew point temperature shall be reported to the nearest whole degree Celsius rounded up.
Note: Dew-point must be displayed for temperatures below zero.
- (e) Meteorological instruments maintenance requirements

- (i) The equipment shall operate, and be maintained, in a manner, which fulfils the operational purpose in all respects.
- (ii) The equipment shall be certified by a person accredited by the manufacture of the specific equipment to manufacturer's specification four times per year when associated with an aerodrome with Instrument Landing System (ILS) equipment and once per year otherwise, unless manufacturers requirements states a shorter period of time.
- (iii) The equipment shall be re-certified after any repair that could jeopardise the state of calibration thereof.
- (iv) Certification shall be traceable through a recognised accrediting organisation.
- (v) A comprehensive fault, repair and maintenance record shall be kept.
- (f) Meteorological information records
 - (i) Where automated meteorological instruments are in use, the equipment shall be capable of producing a printed record of data recorded during the preceding 30 days.

171.03.13 FLIGHT INSPECTION OF NAVIGATION EQUIPMENT

- (1) Flight Inspection Intervals.
 - (a) I.L.S. facilities
 - (i) The prescribed interval between successive inspections is 150 days unless an extended interval was granted.
 - (ii) Where an extended interval has been granted, the prescribed interval between successive inspections is 180 days.
 - (b) C-VOR facilities shall be inspected at least once per year.
 - (c) D-VOR facilities shall be inspected at least once per year.
 - (d) Tolerances.

A Tolerance of + 30 days is applicable to the prescribed intervals. Flight Inspection unit(s) shall strive to ensure that flight inspection takes place as closely as possible to the prescribed intervals. If the previous inspection lasted more than one day, the interval shall be calculated from the date when the inspection started.
 - (e) Inspections earlier than due date.

Flight inspections may be made up to ten days earlier than the due date without affecting the due date for the next inspection. If an inspection is made more than ten days before the due date, the date of the subsequent inspections shall be advanced.
 - (f) Tolerance Extension for certain facilities.

Under exceptional circumstances, for facilities not using an extended inspection interval, the tolerance period of 30 days may be extended by a further period not exceeding 25 days. This extension shall be granted by the Director and shall be granted only if the Director is satisfied with the facility performance.

This requires that:

 - (i) Previous flight inspections do not have marginal results and do not show any tendency towards parameter drift.
 - (ii) Monitor readings are stable.
 - (iii) Ground checks where applicable are stable.
 - (iv) No adverse reports have been received from users in the period since the last flight check.

Extended inspection intervals

Where an ILS facility passed three (3) consecutive flight inspections without any adjustment, an extended inspection interval not exceeding 180 days may be granted on application.

Category III (Cat III) facilities are not subject to extended inspection intervals.

NDB Facilities

A flight inspection shall be done upon commissioning of equipment to establish the operational parameters of the installation. The Director may require an annual flight inspection if operationally required.

171.03.14 STATION (SITE) LOGS

- (1) Standards for Site Logs
- (a) Site logs shall be kept for all facilities used to provide an aeronautical telecommunication service or a radio navigation service.
 - (b) The site log records all occurrences and actions relating to operation, maintenance, modification, failure, faults, and removal from and restoration to service.
 - (c) Site logs entries shall include the date, time, nature of activities, name and the signature of the person making the entry.
 - (d) Site log records are retained for at least five years.

SA-CATS 172

Airspace and Air Traffic Services

List of technical standards

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FIGURES

Table 1: Classification of airspace

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- Annexure B: Example of a completed annual en route facility financial report
- Annexure C: Example of a completed annual en route facility traffic report
- Annexure D: Air traffic service incident report
- Annexure E: Letter of agreement between A and B

172.01.2 ALLOCATION OF AIR TRAFFIC SERVICES

1. Detailed business case, safety case and risk assessment

The need for the provision of air traffic services and the discontinuation thereof shall be accompanied by a detailed business case, safety case and risk assessment.

172.02.2 CLASSIFICATION OF AIRSPACE AND LEVEL OF SERVICE PROVISION

1. Classes of airspace

The classes of airspace are –

- (1) controlled –
 - (a) Class A – airspace in which only IFR flights are permitted and all such flights are –
 - (i) subject to air traffic control services; and
 - (ii) separated from each other;
 - (b) Class B – airspace in which IFR flights and VFR flights are permitted and all such flights are –
 - (i) subject to air traffic control services; and
 - (ii) separated from each other;
 - (c) Class C – airspace in which IFR flights and VFR flights are permitted and –
 - (i) all such flights are subject to air traffic control services;
 - (ii) IFR flights are separated from each other and from VFR flights; and
 - (iii) VFR flights are separated from IFR flights and receive traffic information in respect of all other VFR flights;
 - (d) Class D – airspace in which IFR flights and VFR flights are permitted and –
 - (i) all such flights are subject to air traffic control services;
 - (ii) IFR flights are separated from each other and receive traffic information in respect of VFR flights; and
 - (iii) VFR flights receive traffic information in respect of all other IFR flights and VFR flights;
 - (e) Class E – airspace in which IFR flights and VFR flights are permitted and –
 - (i) IFR flights are subject to air traffic control services and are separated from each other; and

- (ii) all such flights receive traffic information; and
- (2) uncontrolled –
 - (a) Class F – airspace in which IFR flights and VFR flights are permitted and –
 - (i) IFR flights receive an air traffic advisory service; and
 - (ii) all such flights receive flight information services, if requested; and
 - (b) Class G – airspace in which IFR flights and VFR flights are permitted and all such flights receive flight information services, if requested.

Note: The airspace classifications are contained in Table 1 for ease of reference.

172.02.4 DESIGNATION OF FLIGHT INFORMATION REGIONS

1. Requirements for the designation of a flight information region

- (1) The Director must take into consideration the recommendations made by the National Airspace Committee, established in terms of Part 11, and consult the regional planning requirements set out in the Air Navigation Plan – Africa-Indian Ocean Region (ICAO AFI plan).
- (2) Flight information regions must be delineated to cover the whole of the air route structure to be served by such regions.
- (3) A flight information region must include all airspace within its lateral limits, except as limited by an upper flight information region.
- (4) Where a flight information region is limited by an upper flight information region, the lower limit specified for the upper flight information region constitutes the upper vertical limit of the flight information region and must coincide with a VFR cruising level.
- (5) The flight information region must be published in accordance with the AIRAC Cycle in the AIP, AIP Supplement or NOTAM.

172.03.1 MANUAL OF PROCEDURE

1. Contents

- (1) The manual of procedure must contain –
 - (a) a statement signed by the accountable manager, on behalf of the applicant, confirming that the manual of procedure –
 - (i) demonstrates the means and methods for ensuring ongoing compliance with the requirements prescribed in this Part; and
 - (ii) that the manual will be complied with at all times;
 - (b) a list of air traffic service units operated by the applicant;
 - (c) an organisational chart showing lines of responsibility of the organisation's personnel;
 - (d) a declaration stating that the air traffic service unit holds a copy of the air traffic control instructions issued in terms of this document, and that the air traffic service unit will operate in compliance with the air traffic control instructions;
 - (e) a copy of the quality control system;
 - (f) a list of facilities as required for each air traffic service unit;
 - (g) a copy of the station standing instructions, and –
 - (i) where one air traffic service unit is operated, a complete copy must be provided with the manual;
 - (ii) where more than one air traffic service unit is operated, the signature page of each copy must be included in the manual of procedure with a statement that the station standing instructions are held by the air traffic service unit and that it is current and will be amended from time to time;
 - (h) a list of the documentation held by each air traffic service unit;

- (i) a copy of the internal inspections procedure;
- (j) a copy of the reporting procedure used to report aeronautical information to the Director;
- (k) a copy of the procedure for the reporting and investigation of accidents and incidents;
- (l) the procedure for amending and controlling the contents of the manual of procedure; and
- (m) a copy of the air traffic service unit approval.

172.03.2 QUALITY ASSURANCE SYSTEM

1. Minimum standards for quality assurance system

- (1) The quality assurance system referred to in CAR 172.03.2, must include –
 - (a) a clear definition of the level of quality the organisation intends to achieve;
 - (b) a procedure that sets out the level and frequency of the internal reviews and assessments of air traffic service personnel;
 - (c) a procedure to record the findings and communicate them to management;
 - (d) a list of responsible persons;
 - (e) procedures by which other quality indicators such as facility malfunction reports, incidents, occurrences, complaints and defects are brought into the quality control system;
 - (f) procedures for management analysis and overview;
 - (g) procedures for rectifying any deficiencies which may be found; and
 - (h) procedures for documenting the complete review process from the inspection to the satisfactory management review so that this is available to the Director during a safety inspection and audit.
- (2) Measures must be taken to ensure that the system is understood, implemented and complied with at all levels.
- (3) The quality assurance system must be documented in the manual of procedure referred to in CAR 172.03.1.

2. Assessment of air traffic service personnel

- (1) As part of the quality assurance system, the holder of an air traffic service unit approval must assess the air traffic service personnel in his, her or its employ.
- (2) A formal proficiency assessment must be carried out before a validation certificate or a rating validation can be issued to assess whether the applicant has achieved the demanded level of competence.
- (3) In addition, a formal assessment must be carried out at least every 12 months to determine whether all operational personnel are maintaining the required level of competence in the positions for which a valid rating is held. Routine assessments should be conducted on an on-going basis during duty assignment.
- (4) Personnel must be assessed in key elements of the performance areas detailed on an assessment form.
- (5) An assessment must be made of both the quality of work and the level of knowledge of the elements assessed.
- (6) The person conducting the assessment must record the assessment on the form contained in Annexure A, together with relevant remarks and any discrepancies noted. Assessments shall be retained on the controllers' unit training record.
- (7) Proficiency checks must be part of the process of assessing efficiency of personnel and must be conducted progressively throughout the year.

- (8) The assessment system must not be directed at fault finding, but should be an objective and constructive means through which individual controllers are encouraged and led towards higher personal achievement.
- (9) A proficiency assessment record must be maintained for each controller and each record must indicate the objective and impartial judgement of an individual's ability, based on regular checks and continuous observation.
- (10) The acceptance of proficiency checks as a process of personnel assessment and development is determined to a large degree by the objectivity, honesty and integrity with which the checks are administered and the degree of participation and protection afforded the individual controller. Counselling is an important feature in controller development and therefore controllers undergoing the assessment shall be made aware, by formal and informal counselling, of the assessments and remarks made by the assessing officer on the proficiency assessment record. Strengths as well as weaknesses shall be discussed with the controller.
- (11) If a controller performs his or her duties in a manner which causes doubt as to the acceptable standard of his or her performance, an assessment shall be made at any time irrespective of the period of time that has elapsed since the completion of the last preceding assessment. This assessment shall require the controller to demonstrate an acceptable standard of performance and knowledge in each of the key elements in his or her performance which are being checked.
- (12) When corrective training is indicated, the assessing officer must record on the assessment record whether the controller is competent to continue performing operational duties while he or she is under training. Should the assessing officer consider that the controller being assessed is not competent, the person responsible for providing the service should be notified immediately.
- (13) An oral examination conducted by the assessing officer may be used to determine the level of knowledge in the key aspects of the rating which is being assessed. The oral examination must be conducted separately from the practical assessment.
- (14) Check/assessment list
The following minimum points must be evaluated when assessing the individual performance of a controller:
 - (a) aerodrome/approach –
 - (i) knowledge of separation standards and their application;
 - (ii) recognition of aircraft capabilities, i.e. differences in speed, climb, descent, altitude requirements, take off/landing requirement, engine failure performance, and other differences of performance;
 - (iii) awareness and analysis of traffic situations;
 - (iv) planning, sequencing and expedition of the traffic flow;
 - (v) adjusting traffic to changing conditions in case of radar failure or radio aid failure;
 - (vi) changes in flight rules, aerodrome closures, low visibility procedures and diversions;
 - (vii) use of local procedures such as selection of runways, noise abatement procedures, departure and instrument approach procedures;
 - (viii) co-ordination with other sectors or units, including methods of transfers and updating of information;
 - (ix) utilisation of radar;
 - (x) composition of clearances in respect of contents, clarity, conciseness and expedition;
 - (b) flight information procedures –
 - (i) receipt, recording and checking of flight plans;

- (ii) issuance of essential flight information on collision hazards;
 - (iii) passing of clearances and flight information to aircraft, including their correctness, identification of originators and, where necessary, time limitations;
- (iv) recognition of aircraft capabilities;
- (v) knowledge of local procedures;
- (vi) co-ordination procedures with other air traffic service units;
- (c) radar procedures –
 - (i) methods of identification of targets including those used in case of mis-identification, re-identification, after fade area, blind velocity and merging of targets;
 - (ii) adherence to prescribed separation standards;
 - (iii) recognition of aircraft capabilities;
 - (iv) composition of clearances when using radar;
 - (v) radar control of arriving traffic, its sequencing, vectoring and provision of adequate terrain clearance;
 - (vi) radar control of departing traffic, including radar releases and traffic expedition;
 - (vii) radar control of overflying traffic including vectoring;
 - (viii) methods of transfer of radar control including instructions to aircraft, transfer of control to final radar controller and transfer of control to aerodrome control;
 - (ix) provision of radar position information to aircraft;
 - (x) provision of radar-derived navigation assistance to aircraft;
 - (xi) provision of radar-derived traffic information, including the use of such information, its necessity and need for unambiguity;
 - (xii) provision of radar-derived assistance to aircraft in emergency;
 - (xiii) co-ordination with other sectors or units;
- (d) radar vectors –

conduct of surveillance radar vectors, their accuracy and positioning, their sequencing and issue of advice on distances;
- (e) radar equipment –
 - (i) equipment operation and alignment, including setting up and check procedures, level of brilliance, map, range rings, and checking accuracy;
 - (ii) recognition of types of interference, including those caused by terrain and weather, blind velocity and tangential velocity;
 - (iii) recognition of fade areas and application of possible counter measures;
- (f) radio and telephone –
 - (i) use of correct procedures and phraseology knowledge of coverage limitations, call signs, abbreviated procedures, phraseologies, unnecessary repetitions, and use of correct position identifier;
 - (ii) clarity, modulation, speed, diction and evenness of voice communications;
 - (iii) promptness of response, confidence and avoidance of uncertainties;
 - (iv) adequacy of monitoring of air-ground communication channels;
 - (v) courtesy, attitude, and co-operativeness in telephone communications;
- (g) data display –
 - (i) posting and updating of flight data and other relevant information;
 - (ii) acceptance and use of meteorological reports;
 - (iii) dissemination of meteorological reports to aircraft;
- (h) loss of communication and alerting service procedures –
 - (i) recognition and response to loss of communication situation and promptness of action;
 - (ii) response to likely emergency situations;

- (iii) use of correct emergency procedures – type of emergency, appropriateness of procedures;
 - (iv) declaration of alerting phases and co-operation with search and rescue services;
 - (v) action in performance of local operating procedures;
 - (vi) response to cases of unlawful interference with aircraft;
- (i) responsibilities –
 - (i) it is the responsibility of the officer-in-charge to establish and maintain unit proficiency standards;
 - (ii) specific senior officers are to be appointed and tasked by the person responsible for the service as proficiency assessment officers (standards officers) for each discipline;
 - (iii) at units where operational staff are multi-disciplined, the person responsible for the service must appoint and task at least one standards officer. Standards officers may be appointed and tasked for each discipline although it is a multi-disciplined environment;
 - (iv) at approach and/or aerodrome units, the manager is to appoint and task the officer or air traffic controller responsible for satellite units as the standards officer;
 - (v) a person assessed as unsatisfactory may not be permitted to continue in the assessed discipline without supervision. If after a reasonable period a person is unable to pass the proficiency check, all details pertaining to the unsatisfactory assessment shall be assembled and sent to the Civil Aviation Authority;
 - (vi) standards officers must prepare proficiency check rosters so that all operational staff are screened on a regular basis. Personnel must be given advanced notice of a real time annual proficiency check so that adequate preparation, mentally and functionally, can be made.

Note: Although the check list is comprehensive it should not be considered exhaustive.

172.03.4 FACILITY REQUIREMENTS

1. General

The following minimum facility requirements must be met:

- (1) each unit must be appropriately equipped to enable individuals to remain current, proficient and capable of supplying an acceptable service;
- (2) all persons involved with the provision of service must be fully conversant with current ICAO standards and recommended practices, instructions, directives and relevant information; and
- (3) the working environment must be conducive to providing the service consistent with reasonable expectation and demand, by making the necessary facilities available to the personnel.

2. Records

Records must be maintained on the following:

- (1) regular reports and returns to the Civil Aviation Authority;
- (2) local Incidents with remedial actions;
- (3) personnel files including supervisory reports;
- (4) training files;
- (5) licence and medical validity details;
- (6) minutes of staff meetings, aerodrome maintenance, bird control, emergency planning and other committee meetings;
- (7) rosters and roster keys; and
- (8) leave records.

3. General equipment

The facility must have –

- (1) the means to monitor the emergency frequency 121.5 MHz independent of mains and standby radio equipment;
- (2) emergency lighting;
- (3) notice boards;
- (4) head sets;
- (5) lockers and a safe;
- (6) emergency exits;
- (7) lightning protection; and
- (8) fire alarm.

4. Accommodation

The facility must have –

- (1) a briefing room;
- (2) equipment repair space;
- (3) technical equipment storage;
- (4) toilet facilities;
- (5) running water; and
- (6) entry control.

5. Aerodrome control

- (1) The tower must permit the controller to survey those portions of the aerodrome and its vicinity over which control is exercised.
- (2) The tower must be equipped so as to permit the controller rapid and reliable communications with aircraft with which he or she is concerned.
- (3) The controller must be able to discriminate between aircraft and vehicles while they are on the same or different runways/taxiways.

6. Aerodrome control tower

An aerodrome control tower must have –

- (1) headsets;
- (2) microphones;
- (3) transceivers;
- (4) speakers;
- (5) radio selector panel;
- (6) telephone selector panel/handsets;
- (7) intercom;
- (8) auto-switch headset/speaker;
- (9) recorder (radio and telephone) where applicable;
- (10) power;
- (11) back-up power;
- (12) wind speed and direction display;
- (13) altimeter setting indicator;
- (14) clock;
- (15) aerodrome lighting panel;
- (16) navaid(s) monitor panel;
- (17) lighting, including emergency lights;
- (18) daylight radar/display consoles, as appropriate;
- (19) flight data panel, flight progress strip card holders and/or the display of electronic flight progress strip cards;
- (20) clipboards/displays (NOTAM etc.);
- (21) automatic terminal information system recorder where applicable;
- (22) fire alarm and extinguishers;

- (23) desks/consoles/shelves;
- (24) chairs;
- (26) shades;
- (27) air conditioning, heating/cooling;
- (28) binoculars;
- (29) sound-absorbing coverings (floor/wall); and
- (30) aeronautical fixed telecommunication network terminal.

7. Aerodrome/approach combined service

An aerodrome/approach combined service must, in addition to the above the requirements as specified for an approach service, have –

- (1) headsets;
- (2) microphones;
- (3) transceivers;
- (4) speakers;
- (5) radio selector panel;
- (6) telephone selector panel/handsets;
- (7) intercom;
- (8) auto-switch headset/speaker;
- (9) recorder (radio and telephone);
- (10) power;
- (11) back-up power;
- (12) wind speed and direction display;
- (13) altimeter setting indicator;
- (14) clock;
- (15) navaid(s) monitor panel;
- (16) lighting, including emergency lights;
- (17) radar displays, controls, consoles, as appropriate;
- (18) secondary radar controls, as appropriate;
- (19) radar simulator, as appropriate;
- (20) flight data panel, flight progress strip card holders and/or the display of electronic flight progress strip cards;
- (21) automation equipment, if required;
- (22) clipboards/displays (NOTAM etc.);
- (23) automatic terminal information system recorder;
- (24) fire alarm and extinguishers;
- (25) desks/consoles/shelves;
- (26) chairs;
- (27) air conditioning, heating/cooling;
- (28) sound-absorbing coverings (floor/wall);
- (29) plotting and writing area;
- (30) navigation plotting equipment; and
- (31) aeronautical fixed telecommunication network.

8. An area control centre and flight information centre

An area control centre (ACC) and a flight information centre must have –

- (1) writing area/counter space;
- (2) plotting table;
- (3) navigation plotting equipment;
- (4) large-scale area map;
- (5) headsets;
- (6) microphones;

- (7) speakers;
- (8) radio communications selector panels;
- (9) telephones and selector panels;
- (10) aeronautical fixed telecommunications network;
- (11) access to direction-finding equipment;
- (12) flight progress console and equipment;
- (13) clocks;
- (14) lighting including emergency lighting;
- (15) chairs;
- (16) storage for reference documents;
- (17) lavatory;
- (18) running water;
- (19) fire alarm and extinguisher;
- (20) air conditioning heating/cooling;
- (21) power; and
- (22) back-up power.

9. Equipment

All equipment used in the provision of Air Traffic Services, including navigation and approach services shall perform and be maintained in accordance with the standards and recommended practices as contained in ICAO Annex 10, Volumes 1 and 2, as well as ICAO Document 8071.

172.03.12 DUTIES OF HOLDER OF APPROVAL

1. Procedures for the provision of services

The standards and procedures for the provision of services are contained in the manual of standards and procedures for Air Traffic Services.

2. En route facility financial data

The holder of an approval must provide the Director with en route facility financial data in the form contained in Annexure B.

3. En route facility traffic statistics

The holder of an approval must provide the Director with en route facility traffic statistics in the form contained in Annexure C.

4. Accident and incident procedures

When receiving an accident or incident notification in terms of Part 12, the air traffic service unit must follow the following procedures:

- (1) Air traffic service incident check list
 - (a) Stay calm.
 - (b) Record details in writing, even if on scrap paper, as this will serve to accurately summarise into the appropriate log.
- (c) Note times, names, callsigns and sequence of events.
 - (d) Identify type of incident and initiate relevant procedure.
 - (e) Notify all concerned persons and agencies.
 - (f) Ensure correctly addressed signal action and reporting.
- (2) Minor incidents e.g. go arounds
 - (a) Report to supervisor or officer-in-charge.
 - (b) Log incident.
 - (c) Complete incident form accurately and dispatch.
- (3) Major incident e.g. engine failures, hydraulic and other aircraft failures, bomb scares
 - (a) Report to supervisor or officer-in-charge.
 - (b) Inform fire and rescue services, if appropriate.
 - (c) Inform airport manager, if local to airport.

- (d) Inform operator.
 - (e) Inform ground handling agent if handling required, e.g. tug to tow aircraft, with hydraulic failure, off the runway.
- (f) Impound tapes, ensuring times, details, callsigns and names are included.
- (g) Complete incident form and present to supervisor or officer-in-charge for dispatch.
- (h) Log incident with all relevant data, e.g. meteorological conditions.
 - (i) The aeronautical rescue coordination centre (ARCC) is to be alerted if the incident constitutes a possible search and rescue operation.
- (4) SAR action
 - (a) Inform supervisor or officer-in-charge.
 - (b) Inform operator.
 - (c) Alert the ARCC.
 - (d) Complete and dispatch a search and rescue (SAR) form giving details of progress in respect of telephonic search.
 - (e) Retain all relevant flight plans, departure and weather reports.
- (5) Accidents – assuming immediate SAR action already taken
 - (a) Inform supervisor or officer-in-charge.
 - (b) Inform accident investigator and the Civil Aviation Authority.
 - (c) Alert the South African Police Services who are to guard the wreckage until released by the investigator-in-charge.
 - (d) Inform operator.
 - (e) Inform airport manager if local to the airport or if destination or departure was the airport.
 - (f) Impound tapes and relevant documentation.
 - (g) Complete and dispatch reports and accident forms.
- (6) Missile or hijack related incidents
 - (a) Comply with checks and major incidents.
 - (b) Alert security forces.
 - (c) Alert the CAA.
- (7) Code words

When passing a message via channels not secured, e.g. paper or radio, it is necessary to transmit the level of urgency without attracting attention. The following codes are to be quoted instead of plain language explanation.

Those codes may also be used by certain aircraft when trying to convey a message without wishing to use plain language.

Category followed by call sign:

Category A: Hijack alert (specific);

Category B: Hijack alert (non-specific);

Category C: Bomb warning;

Category D: Bomb found;

Category E: Actual hijack;

Category F: Missile alert;

Category G: Missile strike;

Category H: Attach/threat to offices and installations;

Category I: Notifiable incident;

Category J: Minor accident (up to injuries);

Category K: Major accident (fatalities);

Category L: Disastrous accident (100% fatalities);

Category M: Any of the above situations outside of South Africa, of, in or to a South African registered aircraft; and

Category N: Overdue or search and rescue related.

5. Investigation of air traffic service incidents

The air traffic service incident reporting form is contained in Annexure F.

172.03.13 STATION STANDING INSTRUCTIONS MANUAL

1. General

The station standing instructions (SSI) Manual must not be seen in isolation but rather as the document necessary to provide the interface between peculiarities of a particular unit and the various source documents, and does not negate air traffic service personnel from the responsibility of being familiar with and the application of procedures laid down in the following documents:

- (1) Integrated Aeronautical Information Package; (AIP, supplements, AIC's NOTAM);
- (2) Civil Aviation Act;
- (3) Civil Aviation Regulations, –
 - (a) Part 139;
 - (b) Subpart 6 of Part 91;
 - (c) Part 12;
 - (d) Part 92; and
 - (e) Part 172;
- (4) Air traffic control instructions manual, approved, authorised published and amended by the Civil Aviation Authority;
- (5) the manual of procedure; and
- (6) relevant documents, manuals and annexes published by ICAO.

2. Contents

An SSI manual must contain the following:

- (1) Detailed unit operational procedures and requirements;
 - (2) detailed unit administrative requirements, including the responsibilities of each operating position;
- (3) amplification and/or explanation of provisions of the national requirements, where necessary;

Notes:

1. ***In the construction of an SSI manual, relevant instructions contained in other readily accessible documents should only be referred to and not repeated in order to avoid the need to amend the SSI manual every time the quoted instructions are changed.***
2. ***Specific terminology should be indicated to differentiate between mandatory, recommended and optional application of the relevant provision and other terminology and abbreviations should conform to those used in other relevant official documents.***

3. Preparation

A SSI manual is prepared under the direction of the officer-in-charge of the unit, and must be verified by the person responsible for the service e.g. the manager of the flight information region.

4. Amendments

- (1) Amendments to the SSI manual should be recorded in the document itself and brought to the attention of all concerned.
- (2) Air traffic controllers are required to indicate, in the appropriate manner, that an amendment has been noted.
- (3) Any amendments by hand must be accompanied by the authorised person's signature and date. Authorised person means any air traffic controller authorised by his or her manager to make the relevant amendment by hand. Notice of these amendments must be transmitted to the head office responsible for the relevant service for ratification.

5. Format

The format must be as follows:

- (1) Station standing instructions must be constructed in A4 size within a file for protection, easy access and amending.
- (2) The document must be divided into eight parts constituting:
 - (a) Part 1: Preface (Introduction).
 - (b) Part 2: Amendment check lists.
 - (c) Part 3: General (non operational).
- (d) Part 4: General Operating Procedures.
 - (e) Part 5: Special Operating Procedures e.g. low visibility procedures.
 - (f) Part 6: Training/Standards.
 - (g) Part 7: Emergency Procedures including checklists.
 - (h) Part 8: Appendices.

Note: An index or table of content should precede Part 1 for easy reference.

- (3) Each part contains sections which can be broken down into sub-sections, for example:

PART II
SECTION 7
RESTRICTION OF INBOUND TRAFFIC FLOW INTO THE REPUBLIC'S FLIGHT INFORMATION REGIONS AND/OR TERMINAL CONTROL AREAS
7.1 INTRODUCTION
The Approach SSI (Part II, Section 4) make provision for Flow Control Restrictions in respect of flights departing a terminal control area (TMA). Traffic density situations (or downgraded non-radar equipment) may, however, necessitate the imposition of restrictions to inbound traffic flows into the flight information region (FIR) or TMA.
The approach controller may find it necessary to impose restrictions to the inbound traffic flow. In such cases, the following procedures are to be complied with:
7.2 APPROACH CONTROL: – RESTRICTING THE FLOW OF INBOUND TRAFFIC INTO A TMA.
7.2.1 RESPONSIBLE CONTROLLER
When considered necessary by approach control, any approach controller will inform the aeronautical rescue coordination centre (ARCC) that the flow of air traffic into the TMA is being restricted.
7.2.2 PROCEDURE
Once the approach executive has informed the ARCC that the flow of inbound traffic into the TMA is being restricted, the approach executive is required to do the following:–
(i) Instruct the ARCC to activate the holding stacks at the TMA entry points;
(ii) Request the ARCC to send a FLOW RESTRICTION MESSAGE, giving (a) the anticipated length of delays in the TMA entry holding stacks and (b) the onward clearance time for aircraft required to hold where an aircraft is to hold in excess of 10 minutes.
(iii) Inform any air traffic service unit within the Republic's FIR that will be affected by the restriction.

Note: The aforementioned information is for the purpose of example only and may not be current.

(4) Page numbering must indicate Part, section, page and date included. e.g. 2-3-10-4/96 where the 2 = Part, – 3 = section, – 10 = Page and relevant as from April 1996.

(5) Provision must be made in the preface for signatures of, the compiler, (normally the officer in charge of the unit).

172.03.14 DOCUMENTATION

1. Documentation

The following documentation must be available in an air traffic service unit:

- (1) Procedures manual;
- (2) air traffic control instructions manual;
- (3) station standing instructions manual;
- (4) AIP and AIP Supplements;
- (5) AIC's and NOTAM;
- (6) Civil Aviation Regulations;
- (7) South African Search and Rescue (SASAR) Manual, issued by the Civil Aviation Authority;
- (8) airport emergency plan, where applicable;
- (9) directives and instructions file;
- (10) occurrence logs;
- (11) unserviceability logs;
- (12) circulars and bulletins file;
- (13) equipment manuals;
- (14) technical standards and practices; and
- (15) all applicable ICAO documents.

172.03.15 INTERNAL INSPECTION

1. Internal inspections

The following must be periodically inspected:

- (1) Documentation available (current):
 - (a) Procedures manual;
 - (b) air traffic control instructions manual;
 - (c) station standing instructions manual;
 - (d) AIP and AIP supplements
 - (e) NOTAM;
 - (f) Civil Aviation Regulations;
 - (g) SASAR manual;
 - (h) airport emergency plan;
 - (i) air traffic service unit emergency plan;
 - (j) directives;
 - (k) personnel files (supervisors reports);
 - (l) statistics;
 - (m) occurrence log;
 - (n) rosters and roster keys;
 - (o) responsibilities for amendments or originating alterations; and
 - (p) formal procedure for keeping personnel up to date with amendments.
- (2) Organisation:
 - (a) Current unit organisational chart and written delegated responsibilities;
 - (b) man-loading of positions;
 - (c) designated instructors and standards officers;
 - (d) system for coordinating; and

- (e) staffing of unit.
- (3) Planning for quality:
Staff planning/deployment.
- (4) Statistics:
 - (a) Regular returns made to the Civil Aviation Authority;
 - (b) local analysis and use of statistical returns;
 - (c) filing of incidents; and
 - (d) implementation of corrective actions based on statistics.
- (5) Non conformance/corrective actions:
The number of defects over the previous 12 months within the following areas:
 - (a) Equipment;
 - (b) materials;
 - (c) personnel;
 - (d) training;
 - (e) documentation of system defects;
 - (f) procedures used to resolve defect problems; and
 - (g) analysis of complaints.
- (6) Records:
 - (a) Validation and standards check details;
 - (b) training files;
 - (c) leave records;
 - (d) traceability of records; and
 - (e) regular reviewing of records.
- (7) Service safety:
 - (a) General knowledge level of own environment;
 - (b) involvement in committees for airport emergency planning, bird control and aerodrome maintenance – minutes;
 - (c) frequency of emergency exercises;
 - (d) documentation of local contingency planning;
 - (e) monitoring of 121.5 MHZ;
 - (f) processes associated with search and rescue; and
 - (g) emergency checklist and categories.
- (8) Radar and general air traffic control application:
 - (a) Areas of responsibility;
 - (b) how often is radar actually used for separation;
 - (c) how often is radar actually used for navigation, clear of terrain or weather;
 - (d) radar monitoring;
 - (e) radar transfers;
 - (f) establishment of identity; and
 - (g) specific separation standards used (non radar).
- (9) Miscellaneous:
 - (a) Regularity of staff meetings; and
 - (b) licence validity monitoring.
- (10) General:
 - (a) Basic hygiene requirements;
 - (b) supply of traffic information;
 - (c) general knowledge of special procedures, events or airspaces;
 - (d) ambient noise levels;
 - (e) aerodrome lighting panel;

- (f) meteorological instrumentation; and
- (g) aeronautical terminal information system.

172.03.16 AIR TRAFFIC CONTROL CLEARANCES

1. Contents

- (1) Air traffic control clearances must contain –
 - (a) aircraft identification;
 - (b) clearance limit;
 - (c) route of flight; and
 - (d) level(s) of flight for the route or part thereof and changes of levels if required;
 - (e) any necessary instructions or information on other matters such as SSR transponder operations; and
 - (f) approach or departure manoeuvres, communications and time of expiry of the clearance.
- (2) Instructions instituted in clearances to levels must consist of:
 - (a) cruising level(s) or, for cruise climb, a range of levels, and, if necessary, the point to which the clearance is valid with regard to the level(s);
 - (b) levels at which specified significant points are to be crossed, when necessary;
 - (c) the place or time for starting climb or decent, when necessary;
 - (d) the rate of climb or decent, where necessary; and
 - (e) detailed instructions concerning departure of approach levels, when necessary.

172.03.18 TRANSFER OF RESPONSIBILITY FOR CONTROL

1. Transfer of responsibility for control

Where units are providing services adjacent to areas serviced by other units a letter of agreement must be compiled between the units in accordance with the format contained in Annexure E.

FIGURES

Table 1: Classification of airspace

ATS AIRSPACE CLASSIFICATIONS								
CONTROLLED						UNCONTROLLED		
	A	B	C	D	E	F	G	
I F R	SEPARATION: All aircraft	SEPARATION: All aircraft	SEPARATION: IFR from IFR IFR from VFR	SEPARATION: IFR from IFR	SEPARATION: IFR from IFR	SEPARATION: IFR from IFR	SEPARATION: as far as practical	SEPARATION: Not provided
	SERVICES: Air traffic control service	SERVICES: Air traffic control service	SERVICES: Air traffic control service	SERVICES: Air traffic control service including traffic information about VFR flights (and traffic avoidance advice on	SERVICES: Air traffic control service and traffic information about VFR flights as far as practical	SERVICES: Air traffic advisory service Flight information service	SERVICES: Flight information service	SERVICES: Flight information service

	VMC MINIMA: Not applicable	VMC MINIMA: Not applicable	request) VMC MINIMA: Not applicable	VMC MINIMA: Not applicable	VMC MINIMA: Not applicable	VMC MINIMA: Not applicable
	SPEED LIMITATION: As published for relevant airspace	SPEED LIMITATION: As published for relevant airspace	SPEED LIMITATION: As published for relevant airspace	SPEED LIMITATION: As published for relevant airspace	SPEED LIMITATION: As published for relevant airspace	SPEED LIMITATION: As published for relevant airspace
	RADIO: 	RADIO: 	RADIO: 	RADIO: 	RADIO: 	RADIO: 
	CLEARANCE: ATC ▪	CLEARANCE: ATC ▪	CLEARANCE: ATC ▪	CLEARANCE: ATC ▪	CLEARANCE: Not required	CLEARANCE: Not required
	SEPARATION SERVICES: Air traffic control service	SEPARATION SERVICES: (1) Air traffic control service for separation from IFR	SEPARATION SERVICES: Not provided Traffic information between VFR and IFR flights (and traffic avoidance advice on request)	SEPARATION SERVICES: Not provided Traffic information as far as practical	SEPARATION SERVICES: Not provided Flight information service	SEPARATION SERVICES: Not provided Flight information service
VFR ALLOWED	VMC MINIMA: As published in RSA – Part 91, Subpart 06	VMC MINIMA: As published in RSA – Part 91, Subpart 06	VMC MINIMA: As published in RSA – Part 91, Subpart 06	VMC MINIMA: As published in RSA – Part 91, Subpart 06	VMC MINIMA: As published in RSA – Part 91, Subpart 06	VMC MINIMA: As published in RSA – Part 91, Subpart 06
	SPEED LIMITATION: As published for relevant airspace	SPEED LIMITATION: As published for relevant airspace	SPEED LIMITATION: As published for relevant airspace	SPEED LIMITATION: As published for relevant airspace	SPEED LIMITATION: As published for relevant airspace	SPEED LIMITATION: As published for relevant airspace
	RADIO: 	RADIO: 	RADIO: 	RADIO: Not required	RADIO: 	RADIO: Not required
	CLEARANCE: ATC ▪	CLEARANCE: ATC ▪	CLEARANCE: ATC ▪	CLEARANCE: Not required	CLEARANCE: Not required	CLEARANCE: Not required

**ANNEXURE
Annexure A
WORK PERFORMANCE ASSESSMENT REPORT
AIR TRAFFIC SERVICE PERSONNEL**

Evaluator:	Evaluee:
Unit:	Unit:
Period of assessment	From: To:
Evaluator's superior: Unit:	

ETC

Proficiency assessment: (standard check)	Positions				
Validation assessment:	Positions				
50 Hour check:					
Mid term check:	Hours dual				
Ad hoc assessment	Requested				
	Current grade				
Date of assessment notice served:					

ASSESSMENT SCALES

Assessment is to take place in accordance with the following 5 point scale:

1. Unacceptable
 2. Below average
 3. Satisfactory
 4. Very good
 5. Excellent
- A. ALL GRADINGS (marking relevant to grading requirements)
1. General administration (log keeping, registers, leave, forms, etc.)

EVALUEE	1	2	3	4	5
EVALUATOR	1	2	3	4	5

Evaluator's comments:

Evaluee	Agrees:	Disagrees:
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2. Knowledge and application of procedures (ATCIs, SSIs directives, CARs etc.)

EVALUEE	1	2	3	4	5
EVALUATOR	1	2	3	4	5

Evaluator's comments:

Evaluee	Agrees:	Disagrees:
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3. Operational administration (Strip marking, reporting, INCREPS construction and decoding of messages, issuing of NOTAMs, statistics, etc.)

EVALUEE	1	2	3	4	5
EVALUATOR	1	2	3	4	5

Evaluator's comments:

Evalúee	Agrees:		Disagrees:		
4. Relevant general knowledge (area of responsibility, aerodrome layouts, airspace construction, local geography, routes, etc.)					
EVALÚEE	1	2	3	4	5
EVALÚATOR	1	2	3	4	5
Evaluator's comments:					

Evalúee	Agrees:		Disagrees:		
5. Knowledge and control of relevant equipment (Own equipment, nav aids, systems, etc.)					
EVALÚEE	1	2	3	4	5
EVALÚATOR	1	2	3	4	5
Evaluator's comments:					

Evalúee	Agrees:		Disagrees:		
6. Insight into pending problems and ability to plan ahead					
EVALÚEE	1	2	3	4	5
EVALÚATOR	1	2	3	4	5
Evaluator's comments:					

Evalúee	Agrees:		Disagrees:		
7. Ability to cope with pressure (consistency even with high work levels)					
EVALÚEE	1	2	3	4	5
EVALÚATOR	1	2	3	4	5
Evaluator's comments:					

Evalúee	Agrees:		Disagrees:		
8. Screen technique, phraseology and telephone manners					
EVALÚEE	1	2	3	4	5
EVALÚATOR	1	2	3	4	5
Evaluator's comments:					

Evalúee	Agrees:		Disagrees:		
9. Taking, storing, processing and transmission of flight plans					
EVALÚEE	1	2	3	4	5
EVALÚATOR	1	2	3	4	5
Evaluator's comments:					

Evalúee	Agrees:		Disagrees:		
10. Knowledge and interest of associated functions					
EVALÚEE	1	2	3	4	5
EVALÚATOR	1	2	3	4	5

Evaluator's comments:

Valuee	Agrees:	Disagrees:
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11. Interaction with colleagues (Team person, ability to impart knowledge and coaching of subordinates)

EVALUEE	1	2	3	4	5
EVALUATOR	1	2	3	4	5

Evaluator's comments:

Valuee	Agrees:	Disagrees:
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12. Punctuality and interpretation of discipline and authority

EVALUEE	1	2	3	4	5
EVALUATOR	1	2	3	4	5

Evaluator's comments:

Valuee	Agrees:	Disagrees:
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B. ATSA'S AND ALL ATC GRADES

13. Level of confidence

EVALUEE	1	2	3	4	5
EVALUATOR	1	2	3	4	5

Evaluator's comments:

Valuee	Agrees:	Disagrees:
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14. Knowledge and application of standard instrument departures (SID's), standard arrivals (STAR's) and preferential ratings

EVALUEE	1	2	3	4	5
EVALUATOR	1	2	3	4	5

Evaluator's comments:

Valuee	Agrees:	Disagrees:
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15. Understanding and application of a safe, expeditious flow of air traffic

EVALUEE	1	2	3	4	5
EVALUATOR	1	2	3	4	5

Evaluator's comments:

Valuee	Agrees:	Disagrees:
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16. Knowledge of flow control and slot time application

EVALUEE	1	2	3	4	5
EVALUATOR	1	2	3	4	5

Evaluator's comments:

Evalúee	Agrees:		Disagrees:		
17. Coordination and liaison-timing and technique					
EVALÚEE	1	2	3	4	5
EVALUATOR	1	2	3	4	5

Evaluator's comments:

Evalúee	Agrees:		Disagrees:		
18. Ability to handle a busy situation					
EVALÚEE	1	2	3	4	5
EVALUATOR	1	2	3	4	5

Evaluator's comments:

Evalúee	Agrees:		Disagrees:		
19. Knowledge of and handling capability of emergency and SAP situations					
EVALÚEE	1	2	3	4	5
EVALUATOR	1	2	3	4	5

Evaluator's comments:

Evalúee	Agrees:		Disagrees:		
20. Passing of essential traffic information, aerodrome and oceanic					
EVALÚEE	1	2	3	4	5
EVALUATOR	1	2	3	4	5

Evaluator's comments:

Evalúee	Agrees:		Disagrees:		
C. ALL ATC'S					
21. Radar vectoring and/or associated procedures (Speeds, distances, and performances, etc.)					
EVALÚEE	1	2	3	4	5
EVALUATOR	1	2	3	4	5

Evaluator's comments:

Evalúee	Agrees:		Disagrees:		
22. Overall "Non Radar" procedures and use of facilities					
EVALÚEE	1	2	3	4	5
EVALUATOR	1	2	3	4	5

Evaluator's comments:

Evalúee	Agrees:		Disagrees:		
23. Understanding and application of complex ATC situations (Parallel runway-operations, crossing runways and/or airways)					
EVALÚEE	1	2	3	4	5

EVALUATOR	1	2	3	4	5
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Evaluator's comments:

Evaluee	Agrees:	Disagrees:
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24. Use of standard published procedures

EVALUEE	1	2	3	4	5
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EVALUATOR	1	2	3	4	5
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Evaluator's comments:

Evaluee	Agrees:	Disagrees:
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D. FOR ASSESSING CANDIDATES SUITABILITY INTO SUPERVISORY RANKS (to be completed for all current senior and principal ATC's)

25. Consistent exemplary conduct

EVALUEE	1	2	3	4	5
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EVALUATOR	1	2	3	4	5
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Evaluator's comments:

Evaluee	Agrees:	Disagrees:
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26. Voluntarily puts in additional effort to ensure efficient operation of the unit

EVALUEE	1	2	3	4	5
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EVALUATOR	1	2	3	4	5
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Evaluator's comments:

Evaluee	Agrees:	Disagrees:
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27. Attends relevant meetings (Bird control, aerodrome, maintenance, airlines, etc.)

EVALUEE	1	2	3	4	5
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EVALUATOR	1	2	3	4	5
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Evaluator's comments:

Evaluee	Agrees:	Disagrees:
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28. Involved in unit management duties (Standards, operations, head specific committees, etc.)

EVALUEE	1	2	3	4	5
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EVALUATOR	1	2	3	4	5
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Evaluator's comments:

Evaluee	Agrees:	Disagrees:
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29. Arranges unit visits, lectures and promotes the image of ATC

EVALUEE	1	2	3	4	5
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EVALUATOR	1	2	3	4	5
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Evaluator's comments:

Valuee	Agrees:	Disagrees:
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30. Actively involved in unit's morale building exercises

EVALUEE	1	2	3	4	5
EVALUATOR	1	2	3	4	5

Evaluator's comments:

Valuee	Agrees:	Disagrees:
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31. Has obtained additional relevant specialist knowledge (Construction of SID's and STAR's, flow control, ICAO SARPS, etc.)

EVALUEE	1	2	3	4	5
EVALUATOR	1	2	3	4	5

Evaluator's comments:

Valuee	Agrees:	Disagrees:
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32. Volunteers to cover additional operational duties due to staff or other emergencies

EVALUEE	1	2	3	4	5
EVALUATOR	1	2	3	4	5

Evaluator's comments:

Valuee	Agrees:	Disagrees:
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33. Accepted as a specialist ATC by colleagues and subordinates

EVALUEE	1	2	3	4	5
EVALUATOR	1	2	3	4	5

Evaluator's comments:

Valuee	Agrees:	Disagrees:
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34. Has an ability to defuse conflict situations and naturally takes the lead in relevant discussions

EVALUEE	1	2	3	4	5
EVALUATOR	1	2	3	4	5

Evaluator's comments:

Valuee	Agrees:	Disagrees:
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35. Convenes own meetings (Staff, operations, planning, etc.)

EVALUEE	1	2	3	4	5
EVALUATOR	1	2	3	4	5

Evaluator's comments:

Evaluated	Agrees:	Disagrees:			
36. Completes projects on time and accurately					
EVALUEE	1	2	3	4	5
EVALUATOR	1	2	3	4	5

Evaluator's comments:

Evaluated	Agrees:	Disagrees:
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Annexure C

EXAMPLE OF A COMPLETED ANNUAL EN ROUTE FACILITY FINANCIAL REPORT

**CIVIL AVIATION AUTHORITY
AIR TRANSPORT REPORTING FORM
EN ROUTE FACILITY FINANCIAL DATA**

State: XYZ Year ended: 31 December 20--
 FIR/UIR(s) covered: Currency: RX

ABC Data are required for all of Part I, and for Items I through 5 in column (a), and for rows 6 and 6.1 of Part II. All other data items are optional.
 BCD
 CDE
 EFG Estimated data, identified by an asterisk (*), may be used if exact data are not available.

PART I: REVENUES

Revenue item	Amounts
1. Route facility charges	57 000 000
2. Revenues from airport charges allocated to route facilities	
3. Grants and subsidies allocable to route facilities— (specify individually in the “Remarks” section any item exceeding 10% of ite	
4. Other revenues allocable to route facilities including profit on assets sold (specify individually in the “Remarks” section any item exceeding 10% of item 5)	431 000 A/
5. Total en route revenues	57 431 000

PART II: EXPENSES

Total expenses for route facilities and services	Expenses by facility or service					
	Total facilities and services	All ATS	COM	MET	SAR	AIS
Expenses by item	(a)	(b)	(c)	(d)	(e)	(f)
1. Operation and	33 190 842	14 045 385	9 800 000	7 503 016	–	1 842 441

maintenance (e.g. labour, spares, materials, power, etc.)							
2. Administrative overheads B/	1 017 855	927 855	C/	C/	–		90 000*
3. Depreciation and/or amortisation	18 051 281	16 943 938	C/	961 574	–		145 769
4. Interest	10 411 803	10 004 806	C/	379 681	–		27 316
5. Other expenses (specify individually in the "Remarks" section any item exceeding 10% of item 6)	1 808 369	1 808 369	C/	C/	–		C/
6. Total expenses	64 480 150	43 730 353	9 800 000*	8 844 271	–		2 105 526
Expense allocation by type of utilisation (amounts or percentages of total expenses)							
6.1 En route utilisation	34 085 614	20 565 160	5 730 600*	5 684 328	–		2 105 526
6.2 Airport utilisation	30 394 536	23 165 193	4 069 400*	3 159 943	–		
6.3 Non-aeronautical utilisation							

PART III:

CAPITAL ASSETS – GROSS CAPITAL INVESTMENTS DURING THE YEAR

Facility or service	Gross capital investments
1. ATS – Air traffic services	20 315 000
2. COM – Communications	1 720 000
3. MET – Meteorological services	5 250 000
4. SAR – Search and rescue services	–
5. AIS – Aeronautical information services	–
6. TOTAL	27 285 000

Remarks: (including description of any major deviation(s) from the reporting instructions)

A/ Revenue from sale of publications

B/ Includes contribution to the Eurocontrol Agency budget in respect of services rendered

C/ Included under column B/

GENERAL INSTRUCTIONS

This form is to be filed by the holder of an air traffic service unit approval providing en route air navigation facilities and services, within its territory or externally to it, for international civil aviation.

The form is to be filed annually. It is preferred that the data reported cover the calendar year (January to December). However, if this is not practical, it may cover a different 12-month period (e.g. financial year).

The form should be filed as soon as possible after the annual data become available but no later than 6 months after the end of the period to which it refers.

It is recognised that holders may experience difficulties in reporting all of the data requested on the form, in which case the following general guidelines apply:

1. Where an actual figure cannot be reported a reasonable estimate will be adequate. Estimates should be identified with an asterisk (*) following the estimated figure.
2. Combined financial data for two or more facilities or services, or items, can be reported if a breakdown cannot be made, in which case this should be clearly indicated on the form.
3. General guidance in the area of route facility cost-accounting and cost-allocation may be found in the Manual on Route Air Navigation Facility Economics (ICAO Doc 9161-AT/724).
4. The "Remarks" section of the form should be used to explain any major deviations from the reporting instructions.

FACILITIES AND SERVICES

For purposes of this form:

"FIR/UIR" means flight information region/Upper flight information region;

"ATS" (air traffic services) means the employment of personnel and facilities for providing variously, flight information service, alerting service, air traffic advisory service, air traffic control service, area control service, approach control service or aerodrome control service;

"COM" (communication facilities) means the communication facilities that are broadly classifiable under three main categories COM fixed (aeronautical fixed service), COM mobile (aeronautical mobile service) and NAV AIDS (aeronautical radio navigation service);

"COM fixed" comprises all facilities and personnel employed to maintain telecommunication services between fixed points, such as LTT, RTT, MAS, ATS direct speech circuits, and ATS computer data circuits, including terminals and switching centres;

"COM mobile" comprises all facilities and personnel located on the earth's surface that are engaged in air/ground communications and radiotelephony broad-casts such as VOLMET (i.e. VHF and HF transmitting and receiving stations);

"NAVAIDS" comprises radio equipment provided on the earth's surface for the benefit of aircraft, and intended for the determination of position or direction, or for warning of obstructions to air navigation: included, for example, are VOR, DME, NDB, LORAN and CONSOL;

"MET" (meteorological services) means meteorological services that comprise those facilities and services that furnish aviation with meteorological forecasts, briefs and observations as well as SIGMET information, VOLMET broadcasting material and any other meteorological data provided by States for aeronautical use;

"SAR" means search and rescue services;

"AIS" (aeronautical information services) means the employment of personnel and facilities for providing information pertaining to the availability of air navigation facilities and services and the procedures associated with them, necessary for the safety, regularity and efficiency of air navigation (i.e. AIP, AIC, NOTAM, etc.).

INSTRUCTIONS FOR PART I: REVENUES

1. Route facility charges
Any charges and fees specifically levied and collected for the provision of en route facilities and services.
2. Revenues from aerodrome charges allocated to route facilities
Any revenues from aerodrome charges (e.g. landing or passenger-service charges) which are applied towards the costs of providing en route facilities and services.
3. Grants and subsidies allocable to route facilities
Any payments received to meet the costs of providing en route facilities and services and not requiring the transfer of assets or provision of services in return.
4. Other revenues allocable to route facilities

All other revenues not included in Items 1 to 3, but which are applied towards the costs of providing route facilities and services. Included here would be the profit, if any, on assets sold (i.e. the difference between the depreciated value (book value) and the sales price).

INSTRUCTIONS FOR PART II: EXPENSES

The expenses which are to be reported are those contained in the accounting system to which should be added any additional costs which may have been included in the cost basis for route facility charging purposes.

1. Expenses by item
 - 1.1 Operation and maintenance (salaries, supplies and services)

The costs of employing operating and maintenance personnel (i.e. direct remuneration, training, travel, social insurance, pensions, remuneration in kind, etc.); the costs of power supply for operating and maintenance purposes; the costs of spare parts and materials incorporated or expended in maintaining equipment and buildings; rentals paid for premises and equipment; and charges for operating and maintenance services provided by others. Also to be included are the costs of services and supplies such as heating, air conditioning, lighting water, cleaning, laundry, sanitation, stationery and postage.
 - 1.2 Administrative overheads

To the extent they have not been included under Item 1 include the costs of common administrative services such as overall management, economic planning, etc.
 - 1.3 Depreciation and/or amortisation

The amounts by which the value of the assets has decreased during the year due to physical deterioration, obsolescence and other such factors that limit their productive life. Also to be included are amounts by which intangible assets (e.g. investments in experimental research and training projects) have been written off during the year.
 - 1.4 Interest

Interest paid or payable on debt during the year as well as any interest computed on capital assets.
 - 1.5 Other expenses

Expenses not already included under expense items 1.1 to 1.4 above.
2. Expenses by facility or service

Columns (b) to (f) provide for the reporting of expenses by facility or service. The totals for all the facilities and services are to be reported in column (a), rows 1 to 6.
3. Expense allocation by type of utilisation

In reporting the allocations of total expenses to en route, aerodrome and non-aeronautical utilisation, approximate absolute amounts or even percentages will suffice. (Guidance concerning such allocations may be found in the Manual on Route Air Navigation Facility Economics, ICAO Doc 9161-AT/724).

INSTRUCTIONS FOR PART III: CAPITAL ASSETS – GROSS CAPITAL INVESTMENTS DURING THE YEAR

1. Gross capital investments during the year

The value of any fixed assets acquired during the year.
2. Fixed assets

All the physical property that is of a lasting nature, such as land and improvements thereto, buildings and durable equipment (machinery, vehicles, furniture and fixtures, tools, etc.).

Note: *When an asset, such as a building, is being completed gradually over a period of years, the capital expenditure incurred during the year should be reported rather than the accumulated total once the asset is put into commission.*

SYMBOLS

Please use the following symbols in filling this form:

- ⊠ Estimated data
- & Magnitude less than half the unit value
- Magnitude nil
- Category not applicable
- Data not available.

Annexure C

EXAMPLE OF A COMPLETED ANNUAL EN ROUTE FACILITY TRAFFIC REPORT

CIVIL AVIATION AUTHORITY
 AIR TRANSPORT REPORTING FORM
 EN ROUTE FACILITY TRAFFIC STATISTICS

State: XYZ Year ended: 20–

FIR/UIR(s) covered:
 ABC
 BCD
 CDE
 EFG

Data required are the totals at the foot of columns (b) and (e). The breakdown by FIR/UR is optional.
 Estimated data, identified by an asterisk (*), may be used if exact data are not available.

Name of FIR/UIR	Number of flights			
	International flights (including IGA)	Domestic flights (including GA)	Other flights	Total flights
(a)	(b)	(c)	(d)	(e)
ABC	8 639*	173 447*	10 928*	193 014*
BCD	100 473*	18 335*	14 294*	133 102*
CDE	35 234*	205 510*	20 961*	261 705*
EFG	3 800*	128 000*	20 000*	151 800*
Total – all FIR/UIR(s)	148 146*	525 292*	66 183*	739 621*

Remarks: (including description of any major deviation(s) from the reporting instructions)
 Column (d) includes training, local and domestic military flight.

GENERAL INSTRUCTIONS

This form is to be filed by the holder of an air traffic service unit approval providing area control or flight information services for one or more FIRs/UIRs within its territory of externally to it

The form is to be filed annually. It should be filed within four months of the year being reported.

Only IFR and other flights for which flight plans have been filed with the respective area control centre(s) or flight information centre(s) should be reported. Flights should be counted separately for each FIR/UIR through which they move.

It is recognised that holders may experience difficulties in reporting all of the data requested on the form, in which case the following general guidelines apply:

1. Where an actual figure cannot be reported a reasonable estimate will be adequate. The estimates should be identified with an asterisk (*) following the estimated figure.

2. The "Remarks" section of the form should be used to explain any major deviations from the reporting instructions.

DEFINITION OF TERMS AND INSTRUCTIONS

For purposes of this form:

"domestic flights" (including GA) means all flights including general aviation wholly within the territory of one State except flights by State aircraft for other than civil purposes which should be reported under column (d) "Other flights";

"FIR/UIR" means flight information region/upper flight information region;

"flight" means the movement of an aircraft during its en route phase through the airspace of an FIR/UIR;

Each such movement following a landing within the FIR/UIR is to be counted as a separate flight;

"international flights" (including IGA) means all international air transport flights and all international general aviation flights;

"other flights" means all flights not reported under columns (b) and (c).

SYMBOLS

Please use the following symbols in filling this form:

- ☐ Estimated data
- & Magnitude less than half the unit value
- Magnitude nil
- Category not applicable
- Data not available.

Annexure D

AIR TRAFFIC SERVICE INCIDENT REPORT

LOGO

		Tick		appropriate
1.	Actions performed by ATSU			
1.1	Radiotelephony and telephone tape recordings impounded	YES	NO	
1.2	Radiotelephony and telephone tape recordings transcribed and attached to report with cassette copy included	YES	NO	
1.3	Recorded radar data available	YES	NO	
1.4	Copies of meteorological reports and forecasts relevant to the time of the incident	YES	NO	
1.5	Copies of flight progress strips and other relevant data	YES	NO	
1.6	Technical statements concerning the operation status of equipment, if applicable	YES	NO	
1.7	Unit findings and recommendations for corrective actions, if appropriate	YES	NO	
1.8	Appropriate INCREP filed. Note: If NO please state reason	YES	NO	

2. Background to the incident (Description based on available facts)

3. Personal information

3.1 Name of ATC

3.2 Licence number

3.3 Position and frequency

3.4 Date of last standards evaluation

3.5 Date of last medical

4. Analysis of incident

4.1 Procedures

4.2 Data and display

4.3 Coordination

4.4 Communication

4.5 Equipment

4.6 Personnel performance

4.7 Task environment

[Empty box]

4.8 General operations

[Empty box]

5. Unit findings (factual)

[Empty box]

6. Probable cause of the incident

[Empty box]

7. Unit recommendations

[Empty box]

Investigating Officer Date

8. Appendices

[Empty box]

9. Standards officer recommendations

[Empty box]

Standards Officer Date

10. Officer-in-charge of ATSU comments

[Empty box]

11. Quality control
An applicant for the issuing of an air traffic service licence shall:

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Annexure E

LETTER OF AGREEMENT BETWEEN A and B

1. DOCUMENT MANAGEMENT

1.1 Table of contents

Topic	See page
Table of contents	2
Checklist of effective pages	2
Introduction	3
Objective	3
Scope	3
Effective date	3
Airspace definition	4
Separation	5
Coordination and communication	6
Revision	10
Dissemination	11
Authority	11

1.2 Checklist of effective pages

Subject	Pages	Issue date
Letter of agreement	11	

2. OVERVIEW

Introduction The following document is a Letter of Agreement between

involving the following units:

And

Objective A statement of agreed procedures between

Scope The procedures contained in this operational Letter of Agreement supplement or detail, where so required in the vicinity of the common FIR boundary, those prescribed by ICAO Annex 2, Annex 11, PANS-RAC (Document 4444), Regional Supplementary Procedures (Document 7030) and local AIP, ATS instructions and

Effective date This Letter of Agreement becomes effective on

3. AIRSPACE

Airspace definition

4. SEPARATION

General

Vertical separation Assignment of cruising levels shall, as far as possible, comply with the IFR table of Cruising Levels in Appendix

3 of ICAO Annex 2, except:
Cruising levels which do not correlate to track and cruise
climbs may be approved, subject to prior coordination
and agreement.

Longitudinal
separation

5. COORDINATION AND COMMUNICATION

- Transfer of control point
- Communication systems
- Level changes
- Near boundary operations
- Transfer of responsibility
- Transfer of communication

6. REVISION

Revision conditions This agreement shall be subject to revision whenever a modification to ICAO standards, recommended practices and/or regional supplementary procedures standard operating procedures, AIP or instructions, which might affect the procedures contained in this agreement occurs, or when new communications facilities, or air traffic services which might affect these procedures are commissioned.

For any other reason which might make it advisable to change this agreement and its associated attachments, either ATSU shall propose the pertinent revision, with approval from

When less than thirty (30) days exists between an identified need to amend this agreement and the effective date of the amendment, the respective Centre Manager or their designated deputies shall agree via telephone, followed by confirming fax message signed by all parties, on the nature of the change and publish the change to staff by a suitable local instruction. Formal exchange of signed copies of the amended document shall take place as soon as practicable thereafter, following approval.

7. DISSEMINATION

Dissemination agreement Notwithstanding the provisions outlined in revisions, the dissemination of this agreement and its subsequent modification shall be made in full, thirty (30) days before the effective date.

Authority Signed in and

OIC Air traffic services OIC Air traffic services

Date

Date

**SA-CATS 173
Flight Procedure Design**

List of technical standards

173.01.5 RATINGS

1. Ratings for flight procedure design approval

173.01.7 TRAINING AND CHECKING

1. Requirements for training and checking personnel
2. Approval of training programme
3. Recurrent training

173.01.9 FACILITIES AND EQUIPMENT

1. Procedures for data and database

173.01.14 DOCUMENTS AND RECORDS

1. Documents to be kept

173.02.1 OPERATIONS MANUAL

1. Information to be kept on manual
2. Approval of manual

173.02.2 PERSONNEL REQUIREMENTS

1. Performance of flight procedure design
2. Minimum requirements for Chief Designer
3. Minimum requirements for supervisory personnel
4. Minimum requirements for Qualified Designer
5. Procedure for assessing and maintaining competency

173.02.4 DUTIES OF APPROVAL HOLDER

1. Standards for design of flight procedures

173.03.1 OPERATIONS MANUAL

1. Information contained in manual for approval

173.03.2 PERSONNEL REQUIREMENTS

1. Qualified Designer

173.03.3 PRIVILEGES

1. Adaption of flight procedure

173.03.4 DUTIES OF APPROVAL HOLDER

1. Duties of holder

173.01.5 RATINGS

1. Ratings for flight procedure design approval

- (1) The following is a list of the type of flight procedures included under each flight procedure design rating:
 - (a) Conventional non-precision rating:
 - (i) Conventional non-precision approach procedure
 - (ii) Standard instrument arrival (STAR)
 - (iii) Standard instrument departure (SID)
 - (b) Conventional precision rating:
 - (i) Instrument landing system (ILS) approach
 - (c) PBN excluding RNP-AR rating:
 - (i) RNAV
 - (ii) RNP
 - (iii) SBAS
 - (iv) GBAS
 - (d) PBN including RNP-AR rating:
 - (i) RNAV
 - (ii) RNP
 - (iii) SBAS
 - (iv) GBAS
 - (v) RNP-AR

173.01.7 TRAINING AND CHECKING

1. Requirements for training and checking personnel

- (1) In accordance with CAR 173.01.7(3)(b), training and checking personnel shall meet the requirements prescribed in ICAO Document 9906-AN/472 Volume II Flight Procedure Design Training, as amended.

2. Approval of training programme

- (1) In accordance with CAR 173.01.7(9) the approval process of the holder's training programme shall be as prescribed in ICAO Document 9906-AN/472 Volume II Flight Procedure Design Training, as amended.
- (2) In accordance with CAR 173.01.7(9), the following will be considered in order to determine whether a training programme can be considered as an approved training programme –
 - (a) an appropriate syllabus as prescribed in ICAO Document 9906-AN/472 Volume II Flight Procedure Design Training, as amended.
 - (b) appropriately qualified and experienced course lecturers;
 - (c) adequate course duration;
 - (d) the provider or institution.

- (3) Approval of the training programme referred to in paragraph (2) may require on-site inspection and observation of the conduct of the course
- (4) Where assessment required in paragraph (3) is not possible due to the lapse in time since the training was provided, the training may be considered approved if:
 - (a) sufficient evidence exists that the training was completed satisfactorily;
 - (b) the training could reasonably have been expected to meet the minimum requirements of approved training applicable at the time that it was completed; and
 - (c) the applicant can provide evidence of additional training or practical experience which enable the applicant to satisfy the syllabus requirements of an approved course.

3. Recurrent training

- (1) In accordance with CAR 173.01.7(10), the duration between recurrent training shall not exceed three years.

173.01.9 FACILITIES AND EQUIPMENT

1. Procedures for data and database

- (1) In accordance with CAR 173.01.9(2), procedures to be put into effect shall be as prescribed by ICAO Document 9881 - Guidelines for Electronic Terrain, Obstacle and Aerodrome Mapping Information.

173.01.14 DOCUMENTS AND RECORDS

1. Documents to be kept

- (1) In accordance with CAR 173.01.14(1)(a) and CAR 173.01.14(3)(e), the following documents shall be kept for the following periods to time –
 - (a) electronic design files – indefinitely
 - (b) design reports – indefinitely
 - (c) superseded charts - indefinitely
 - (d) training file – ten years

173.02.1 OPERATIONS MANUAL

1. Information to be kept on manual

- (1) The information referred to in CAR 173.02.1(1)(b), which must be contained in the operations manual of the applicant, shall include the following:
 - (a) a table of contents based on the items in the manual, indicating the page number on which each item begins;
 - (b) a description of the designer's organisational structure and a statement setting out the functions that the designer performs, or proposes to perform under CAR 173;
 - (c) a description of the chain of command established, or proposed to be established, by the designer and a statement of the duties and responsibilities of any supervisory positions within the organisational structure;
 - (d) a statement showing how the designer determines the number of operational staff required including the number of operational supervisory staff;

- (e) a list of the design services that the designer provides, or proposes to provide;
- (f) a statement, for each design service, that identifies the location from where the service is provided, or proposed to be provided;
- (g) a statement of the responsibilities and functions for each position;
- (h) a description of the arrangements made or proposed to be made by the designer to ensure that it has, and will continue to receive, the information necessary for providing the service;
- (i) a description of the arrangements made or proposed to be made by the designer to ensure that it has, and will continue to be able to provide, information in connection with its design services to another person whose functions reasonably require that information;
- (j) a description of the designer's record keeping system;
- (k) a statement detailing any agreement entered into by the designer in relation to the provision of a design service provided by another party;
- (l) a copy of the document that sets out the designer's safety management system;
- (m) a description of the processes and documentation used to present to staff the relevant standards, rules and procedures contained in ICAO Doc 8168 and this document, and any of the designer's site-specific instructions for the provision of design services;
- (n) a description of the processes and documentation used to provide operational instructions to staff;
- (o) a description of the procedures to be followed to ensure all operational staff are familiar with any operational changes that have been issued since they last performed operational duties;
- (p) a description of the designer's training and checking program;
- (q) a description of the procedures to be used in commissioning new facilities, equipment and services;
- (r) a description of the procedures to be used to ensure that designs are completed in accordance with the drafting conventions contained in this document;
- (s) a description of the format(s) that will be used for the issue of completed designs for publication;
- (t) a description of the procedures to be used to ensure that all equipment, including software is operated in accordance with the manufacturer's operating instructions and manuals;
- (u) the safety management system of the designer;
- (v) a description of the procedures to be used to conduct environmental assessments; and
- (w) the procedures to be followed for revising the operations manual.

2. Approval of manual

- (1) In considering the holder's operations manual for approval, the Director shall consider the compliance of the operations manual to this Part.

173.02.2 PERSONNEL REQUIREMENTS

1. Performance of flight procedure design

- (1) In accordance with CAR 173.02.2(1)(a)(vi), the chief designer shall have a duty to ensure that any flight procedure design covered by the approval is performed as prescribed in –
 - (a) SA FPD Manual of Standards – Guidance Material for the Design and Submission of Flight Procedures; and
 - (b) ICAO Document 9906-AN/472 The Quality Assurance Manual for Flight Procedure Design, as amended.

2. Minimum requirements for Chief Designer

- (1) The minimum requirements for a Chief Designer required by CAR 173.02.2(2), are –
 - (a) the qualification and experience requirements of a Qualified Designer;
 - (b) four years full time experience as a Qualified Designer.

3. Minimum requirements for supervisory personnel

- (1) The minimum requirements for Supervisory Personnel required by CAR 173.02.2(2), are:

- (a) the qualification and experience requirements of a Qualified Designer;
- (b) two years full time experience as a Qualified Designer.

4. Minimum requirements for Qualified Designer

- (1) The minimum requirements for a Qualified Designer required by CAR 173.02.2(4), are:
 - (a) Qualifications: A Qualified Designer shall, as a minimum –
 - (i) have satisfactorily completed an approved training programme as prescribed in CAR 173.01.7(9);
 - (ii) have satisfactorily completed a course of in-service training in flight procedure design as detailed in the designer's operations manual;
 - (b) Experience: A Qualified Designer shall –
 - (i) have completed a minimum of three designs, checked and approved by a Qualified Designer, and completed within any twelve consecutive months;
 - (ii) ensure that at least two of the designs completed as prescribed in subregulation (i) above, are of the same rating as the rating of the flight procedures which he or she intends to design.
 - (iii) ensure that within the three designs required in subregulation (i), are included at least –
 - (aa) in the case of a conventional non-precision rating –
 - (A) one conventional non-precision approach procedure; and
 - (B) one standard instrument departure (SID).
 - (bb) in the case of a PBN excluding RNP-AR rating –
 - (A) one PBN approach; and
 - (B) one PBN departure.
 - (cc) in the case of a PBN including RNP-AR rating –
 - (A) one RNP-AR approach; and
 - (B) one RNP-AR departure.
 - (iv) have successfully obtained at least one rating within twelve months of completing the training prescribed in 173.02.2(4)(a)(i) above.
 - (c) Recency
A Qualified Designer shall, in the preceding six months, have designed at least one procedure per applicable rating.

5. Procedure for assessing and maintaining competency

- (1) In accordance with CAR 173.02.2(6), the procedure for initially assessing, and maintaining the competence of those personnel involved in planning, supervising, conducting or verifying the design activities covered by the approval shall be as prescribed in ICAO Document 9906-AN/472 Volume II Flight Procedure Design Training, as amended.

173.02.4 DUTIES OF APPROVAL HOLDER

1. Standards for design of flight procedures

- (1) The standards to which flight procedures shall be designed prescribed in CAR 173.02.4(1)(e), and the requirements in performing flight procedure design as required by CAR 173.02.4(2) shall be as prescribed in SA FPD Manual of Standards – Guidance Material for the Design and Submission of Flight Procedures.

173.03.1 OPERATIONS MANUAL

1. Information contained in manual for approval

- (1) The information referred to in CAR 173.03.1(1)(b), which must be contained in the operations manual of the applicant, must include –
 - (a) a table of contents based on the items in the manual, indicating the page number on which each item begins;
 - (b) a description of the designer's organisational structure and a statement setting out the functions that the designer performs, or proposes to perform under CAR 173;
 - (c) a list of the design services that the designer provides, or proposes to provide;
 - (d) a statement, for each design service, that identifies the location from where the service is provided, or proposed to be provided;
 - (e) a statement of the responsibilities and functions for each position;
 - (f) a description of the arrangements made or proposed to be made by the designer to ensure that it has, and will continue to be able to provide, information in connection with its design services to another person whose functions reasonably require that information;
 - (g) a statement detailing any agreement entered into by the designer in relation to the provision of a design service provided by another party;
 - (h) a copy of the document that sets out the designer's safety management system;
 - (i) a description of the designer's training and checking program;
 - (j) a description of the procedures to be used in commissioning new facilities, equipment and services;
 - (k) a description of the procedures to be used to ensure that designs are completed in accordance with the drafting conventions contained in this document;
 - (l) a description of the format(s) that will be used for the issue of completed designs for publication;
 - (m) a description of the procedures to be used to ensure that all equipment, including software is operated in accordance with the manufacturer's operating instructions and manuals;
 - (n) the safety management system of the designer;
 - (o) a description of the procedures to be used to conduct environmental assessments; and
 - (p) the procedures to be followed for revising the operations manual.
- (2) In accordance with CAR 173.03.1(1)(c), in considering the holder's operations manual for approval, the Director shall consider the compliance of the operations manual to this Part.

173.03.2 PERSONNEL REQUIREMENTS

1. Qualified designer

- (1) In accordance with CAR 173.03.2(1), the qualified designer shall have a duty to ensure that any flight procedure design covered by the approval is performed as prescribed in –
 - (a) SA FPD Manual of Standards – Guidance Material for the Design and Submission of Flight Procedures; and
 - (b) ICAO Document 9906-AN/472 – The Quality Assurance Manual for Flight Procedure Design, as amended.
- (2) In accordance with CAR 173.03.2(2), the minimum requirements for a qualified designer shall be as prescribed in CAR 173.02.2(4).

173.03.3 PRIVILEGES

1. Adaptation of flight procedure

- (1) In accordance with CAR 173.03.3(1)(a) and 173.03.4(2), adaptation of a flight procedure to the conservative shall be as prescribed in SA FPD Manual of Standards – Guidance Material for the Design and Submission of Flight Procedures.

173.03.4 DUTIES OF APPROVAL HOLDER

1. Duties of holder

- (1) The holder shall maintain each flight procedure, at periodic intervals and upon the conditions prescribed in SA FPD Manual of Standards – Guidance Material for the Design and Submission of Flight Procedures.

Sa-Cats 175 Aeronautical Information Services

List of technical standards

175.02.1 MANUAL OF PROCEDURE

1. Contents

175.02.2 QUALITY MANAGEMENT SYSTEM

1. Minimum standards

175.02.3 PERSONNEL REQUIREMENTS

1. Training requirements
2. Personnel requirements

175.02.4 FACILITY REQUIREMENTS

1. General
2. General equipment

175.02.10 STATION STANDING INSTRUCTIONS MANUAL

1. General
2. Contents
3. Preparation
4. Amendments
5. Format

175.02.11 DOCUMENTATION

1. Documents to be provided

175.03.2 COLLECTION OF INFORMATION

1. Procedure for collection of information

175.03.3 PUBLICATION OF AERONAUTICAL INFORMATION OR IAIP

1. Procedure for publication
2. Conditions, requirements, rules, procedures and standards for publication of aeronautical information
3. Components of an IAIP

175.03.4 PRE-FLIGHT AND POST-FLIGHT INFORMATION SERVICES

1. Information to be provided

175.03.5 ERROR CORRECTION IN PUBLISHED INFORMATION

1. Procedure for error correction

175.02.1 MANUAL OF PROCEDURE

1. Contents

- (1) The manual of procedure shall contain –
 - (a) a statement signed by the accountable manager, on behalf of the applicant, confirming that the manual of procedure –
 - (i) demonstrates the means and methods for ensuring ongoing compliance with the requirements prescribed in the regulations; and
 - (ii) that the manual will be complied with at all times;
 - (b) a list of services operated by the applicant;
 - (c) an organisational chart showing lines of responsibility of the organisation's personnel;
 - (d) a declaration stating that the AIS unit holds a copy of the AIS instructions issued in terms of this document, and that the AIS unit will operate in compliance with the instructions;
 - (e) a copy of the quality management system;
 - (f) a list of facilities as required for each AIS unit;
 - (g) a copy of the station standing instructions;
 - (h) a list of the documentation held by each AIS unit;
 - (i) a copy of the internal inspections procedure;
 - (j) a copy of the reporting procedure used to report aeronautical information to the Director;
 - (k) the procedure for amending and controlling the contents of the manual of procedure; and
 - (l) a copy of the AIS unit approval.

175.02.2 QUALITY MANAGEMENT SYSTEM

1. Minimum standards

- (1) The holder of an AIS certificate shall establish internal quality assurance procedures to ensure compliance with, and the adequacy of the organizational procedures.
- (2) The procedures referred to in paragraph (1) shall specify —
 - (a) the level of quality that the certificate holder intends to achieve;
 - (b) the level and frequency of internal reviews;
 - (c) the person or persons responsible for carrying out the internal reviews;
 - (d) how the findings of the internal reviews are to be recorded and reported to the Accounting officer
 - (e) how quality indicators such as error reports, incidents, and complaints are incorporated into the internal quality assurance procedures;
 - (f) the senior person's responsibilities for analysis and overview of the internal reviews;
 - (g) the means for rectifying any deficiencies found during an internal review;
 - (h) the documentation requirements for all aspects of the review.
- (3) The senior person who has the responsibility for internal quality assurance shall have direct access to the Accountable manager on matters affecting the adequacy, accuracy, timeliness, format, and

dissemination of the published aeronautical information. Should the organization already have an established QMS approved under an alternate Part of the Regulations, such QMS may be approved in terms of this Part provided the provisions of paragraph 2 are met.

175.02.3 PERSONNEL REQUIREMENTS

1. Training requirement

- (1) The AIS provider shall establish procedures to ensure that all its personnel possess the skills and competencies required in the provision of aeronautical information services. The AIS provider shall develop an overall training policy and program and detailed job descriptions for its staff. The training policy and program should lay down the training courses that different levels of staff have to undergo to perform their duties, including initial, recurrent and specialized training. The job description should depict the job purpose, key responsibilities, and outcome to be achieved of each staff.
- (2) The AIS provider shall ensure that its staff undergoes a suitable period of supervised on-the-job training before being deployed for duties.
- (3) The AIS provider shall maintain individual training records for each of its staff, which should include a training plan detailing the courses completed by each staff as well as the time-frame for attending future courses as required under his training plan.
- (4) The AIS provider shall conduct a yearly review of the training plan for each staff at the beginning of the year to identify any gaps in competency, changes in training requirement and prioritise the type of training required for the coming year.

2. Personnel requirement

- (1) The AIS provider shall employ adequate number of competent personnel to perform the operation of the service.
- (2) The AIS provider shall provide in the operations manual an analysis of the number of personnel required to perform the aeronautical information service taking into account the duties and workload required.

175.02.4 FACILITY REQUIREMENTS

1. General

- (1) The following minimum facilities and equipment, in addition to basic office furniture and stationary, shall be provided for the AIS Headquarters and each NOF and aerodrome/heliport AIS Unit:
 - (a) Each unit shall be appropriately equipped to enable individuals to remain current, proficient and capable of supplying an acceptable service.
 - (b) All persons involved with the provision of service shall be fully conversant with current ICAO standards and recommended practices, instructions, directives and relevant information.
 - (c) The working environment shall be conducive to providing the service consistent with reasonable expectations and demand, by making necessary facilities available to the personnel.

2. General equipment

- (1) AIS headquarters is required to have at least the following equipment –
 - (a) personal computers (PC's) for each post, printer and connection to the internet;
 - (b) photocopying equipment;
 - (c) AFS connection;
 - (d) telephones;
 - (e) telefax equipment;
 - (d) clock;

- (2) International NOTAM Office (NOF) and aerodrome or heliport AIS unit are required to have at least the following equipment –
- (a) adequate table or counter space for processing information;
 - (b) adequate filing or card index system;
 - (c) full teletypewriter service (receive and transmit) linked to the AFS;
 - (d) PC/computer terminal, printer, connection to the internet and typewriter (if necessary);
 - (e) photocopier for pre-flight bulletin production;
 - (f) telephone;
 - (g) telefax equipment;
 - (h) a reliable clock and, for the NOF, a time-stamp clock, both showing UTC and where appropriate a second clock showing local time;
 - (i) reference chart and documents required for consultation and pre-flight briefing.

175.02.10 STATION STANDING INSTRUCTIONS MANUAL

1. General

- (1) The station standing instructions (SSI) manual shall not be seen in isolation but rather as the document necessary to provide the interface between peculiarities of a particular unit and the various source documents, and does not negate AIS personnel from the responsibility of being familiar with and the application of procedures laid down in the following documents:
- (a) Integrated Aeronautical Information Package; (AIP, supplements, AIC's NOTAM);
 - (b) Civil Aviation Act;
 - (c) Civil Aviation Regulations;
 - (d) Instructions manual, approved, authorised published and amended by the Director of Civil Aviation;
 - (e) the manual of procedure; and
 - (f) relevant documents, manuals and annexes published by ICAO.

2. Contents

- (1) An SSI manual shall contain the following:
- (a) Detailed unit operational procedures and requirements;
 - (b) detailed unit administrative requirements, including the responsibilities of each operating position;
 - (c) explanation of provisions of the national requirements, where necessary;

Notes:

1. *In the construction of an SSI manual, relevant instructions contained in other readily accessible documents should only be referred to and not repeated in order to avoid the need to amend the SSI manual every time the quoted instructions are changed.*
2. *Specific terminology should be indicated to differentiate between mandatory, recommended and optional application of the relevant provision and other terminology and abbreviations should conform to those used in other relevant official documents.*

3. Preparation

An SSI manual is prepared under the direction of the officer-in-charge of the unit, and shall be verified by the person responsible for the service e.g. the manager of the flight information region.

4. Amendments

- (1) Amendments to the SSI manual should be recorded in the document itself and brought to the attention of all concerned.
- (2) AIS personnel are required to indicate, in the appropriate manner, that an amendment has been noted.
- (3) Any amendments by hand shall be accompanied by the authorised person's signature and date. Authorised person means any AIS personnel authorised by his or her manager to make the relevant amendment by hand. Notice of these amendments shall be transmitted to the head office responsible for the relevant service for ratification.

5. Format

The format shall be as follows:

- (a) Station standing instructions shall be constructed in A4 size within a file for protection, easy access and amending.
- (b) The document shall be divided into eight parts constituting:
 - (i) Part 1: Preface (Introduction);
 - (ii) Part 2: Amendment check lists;
 - (iii) Part 3: General (non operational);
 - (iv) Part 4: General Operating Procedures;
 - (v) Part 5: Training/Standards;
 - (vi) Part 6: Appendices.

Note: An index or table of content should precede Part 1 for easy reference.

175.02.11 DOCUMENTATION

1. Documents to be provided

The following documentation shall be available in AIS unit:

- (a) Procedure manual;
- (b) Station standing instruction manual;
- (c) AIP and AIP Supplements;
- (d) AIC's and NOTAM where applicable;
- (e) Civil Aviation Regulations;
- (f) Civil Aviation Technical Standards and recommended practices;
- (g) Airport emergency plan, where applicable;
- (h) Occurrence logs
- (i) Unserviceability logs;
- (j) Equipment manuals;
- (k) All applicable ICAO documents.

175.03.2 COLLECTION OF INFORMATION

1. Procedure for collection of information

- (1) The holder of an AIS certificate shall establish procedures to collect and collate the information required for the aeronautical information services listed in their manual of procedure.
- (2) The procedures shall be established to ensure that –
 - (a) applicable information is obtained from organisations that provide services in support of the South African air navigation system; and
 - (b) applicable information is obtained from the aeronautical information services of other States relevant to the requirements of international aircraft operators operating –
 - (i) in the areas of the Johannesburg Oceanic FIR in which South Africa is responsible for air traffic services; and
 - (ii) on international air routes originating from South Africa; and

- (c) arrangements for the timely provision of information are made with the information originators prescribed in sub-paragraphs (2)(a) and (b); and
 - (d) information received from the information originators prescribed in paragraph (2)(a) is certified as accurate by a person identified by the originator to be responsible for the accuracy of that information.
- (3) The procedures for the NOTAM service shall, in addition to paragraph (2), ensure that any originator's request for the issue of a NOTAM does not require the NOTAM to be effective for more than 3 months.

175.03.3 PUBLICATION OF AERONAUTICAL INFORMATION OR IAIP

1. Procedure for publication

- (1) The holder of an AIS certificate shall establish procedures to check, co-ordinate, edit, publish and disseminate aeronautical information for the services listed in the holder's manual of procedure.
- (2) The certificate holder shall ensure that the procedures established under paragraph (1) require –
 - (a) the information received under CAR 175.03.2 to be checked against available information to verify its accuracy prior to publication and to be edited, accurately published, and disseminated –
 - (i) in the format applicable to the operational significance of the information;
 - (ii) if applicable, in accordance with these technical standards; and
 - (iii) in a format that takes account of the circumstances under which the information is to be used;
 - (b) except for paragraph (2)(c) below, permanent publications and long-term temporary publications to be clearly identified as being published under the authority of the applicant's aeronautical information service certificate;
 - (c) if aeronautical information obtained from the aeronautical information services of other States as prescribed in paragraph (2)(b) is disseminated, that information to be clearly identified as having the authority of the originating State;
 - (d) if information that has not been certified is disseminated, that information to be clearly identified as being unverified;
 - (e) any permanent change to published information to be coordinated with other applicable information originators before the change is published; and
 - (f) temporary information that is published without a defined expiry date to be reviewed at an appropriate time to ensure that the originator takes the required action to cancel or reissue the information;
 - (g) the aeronautical information to be published in the English language;
 - (h) place names to be spelt according to local usage;
 - (i) units of measurement to be consistent with those prescribed;
 - (j) abbreviations, consistent with those prescribed in Part 1, to be used in the published aeronautical information if –
 - (i) their use is appropriate;
 - (ii) their use facilitates the dissemination of the information;
 - (k) any of the aeronautical information published to be promptly made available to the aeronautical information services of other States, upon request by those States;
 - (l) the aeronautical information to be made available in a form that is suitable for the operational requirements of –
 - (i) flight operations personnel, including flight crew members and the services responsible for pre-flight briefing; and
 - (ii) the air traffic service units responsible for flight information services.

- (3) The certificate holder shall ensure that the procedures for the Aeronautical Information Publication service, require –
- (a) aeronautical charts, and operationally significant information published in AIP Amendments and AIP Supplements, to be published in accordance with the AIRAC system;
 - (b) the information published under the AIRAC system to be clearly identified with the acronym AIRAC;
 - (c) the information published under the AIRAC system to be distributed so that recipients receive the information at least 28 days before its effective date;
 - (d) the information published under the AIRAC system not to change for at least 28 days after the effective date, unless the circumstance notified is of a temporary nature and would not persist for the full period;
 - (e) if an AIP Supplement is published to replace a NOTAM, the supplement to include a reference to the serial number of the NOTAM;
 - (f) if an AIP Amendment or AIP Supplement is published under the AIRAC system a NOTAM to be originated giving a brief description of the operationally significant contents, the effective date and the reference number of each amendment or supplement. The NOTAM shall –
 - (i) come into force on the same effective date as the amendment or supplement;
 - (ii) remain in force for a period of 14 days;
 - (g) if there is no applicable information to be published by the AIRAC date, a *NIL* notification to be issued;
 - (h) a NOTAM to be originated if information to be published as an AIP Amendment or AIP Supplement takes effect prior to the effective date of the amendment or supplement.

2. Conditions, requirements, rules, procedures and standards for publication of aeronautical information

- (1) The holder of an AIS certificate for the AIP service shall publish IAIP in accordance with Annex 15 to the Convention of International Civil Aviation and relevant parts thereof.
- (2) The certificate holder shall, in addition to the requirement in paragraph (1) –
- (a) designate an office as South Africa's point of contact with the aeronautical information services of other States for the interchange of the Integrated Aeronautical Information Package, NOTAM;
 - (b) make the South African AIP and AIP Amendments available to any person or organization that may apply to the supply of the publications;
 - (c) establish a system to disseminate the South African AIP, AIP, Supplements, aeronautical charts, and AIC;
 - (d) ensure that every aeronautical chart published as part of the South African AIP conforms to the applicable standards for the charts; and
 - (e) coordinate the input of all aeronautical information from the originators prescribed in regulation 175.03.1 except –
 - (i) information which is of immediate operational significance necessitating the immediate issue of a NOTAM; and
 - (ii) temporary information of a duration of less than 3 months, that only requires the issue of a NOTAM.

3. Components of an IAIP

3.1 AIP

- (1) The AIP shall contain current information, data and aeronautical charts relating to –
 - (a) the regulatory and airspace requirements for air navigation in which South Africa is responsible for air traffic services;
 - (b) the South African services and facilities that support international air navigation to and from South Africa.
 - (c) aerodromes as defined in Part 1 operating under an aerodrome operating certificate issued in accordance with Part 139.
- (2) The AIP may contain current information, data, and aeronautical charts relating to aerodromes not operating under an aerodrome operating certificate, if –
 - (a) the aerodrome operator provides the holder of the aeronautical information service certificate for the AIP service with the required data and information relating to the aerodrome;
 - (b) the aerodrome operator accepts responsibility for the accuracy and currency of that data and information.
- (3) The AIP shall include at an appropriate location –
 - (a) a statement to advise which certificated organisations are responsible for the air navigation facilities, services and procedures covered by the AIP;
 - (b) the general conditions under which those services and facilities are available for use;
 - (c) a list of the differences with the ICAO Standards, Recommended Practices and Procedures that the Director has filed under Article 38 of the Convention;
 - (d) a summary of any significant standards, practices and procedures followed by South Africa, where the ICAO Standards, Recommended Practices and Procedures allow alternative courses of action.
- (4) Each publication that forms part of the AIP shall –
 - (a) specify the purpose of the publication, the geographic area covered and that the publication is part of the AIP ;
 - (b) be self-contained, include a table of contents with page numbers, and be paginated clearly;
 - (c) specify that it is published by the holder of the aeronautical information service certificate for the AIP service or under the authority of the holder's certificate issued by the Director;
 - (d) not duplicate information unnecessarily and if duplication is necessary, there shall be no difference in the duplicated information in respect of the same facility, service or procedure;
 - (e) be dated and have amendment number, or if the publication is in loose-leaf form, each page shall be dated. The date shall consist of the day, month by name, and the year when the aeronautical information becomes effective;
 - (f) be updated by means of AIP Amendments or by reissue at regular intervals;
 - (g) show clearly the degree of reliability of any unverified information.
- (5) A publication published in loose-leaf form shall –
 - (a) specify on each page, which publication the page belongs to and that the page is part of the AIP;
 - (b) contain a checklist that –
 - (i) gives the current date, and page number or chart title of each page or chart in the publication;
 - (ii) is issued with each Aeronautical Information Publication Amendment;
 - (iii) specifies which publication it belongs to;
 - (iv) is printed with a page number and the date as prescribed in paragraph (1)(e).

3.2 AIP Amendments

- (1) The AIS provider shall ensure that permanent changes to the AIP are published as AIP Amendments. Each AIP Amendment shall be allocated a serial number, which shall be consecutive. Each AIP Amendment page, including the cover sheet, shall display a publication date. A brief indication of the subjects affected by the amendment shall be given on the AIP Amendment cover sheet.
- (2) The AIS provider should establish and publish the publication dates for its AIP Amendments in the AIP.

3.3 AIP Supplements

- (1) The AIS provider shall ensure that temporary changes of long duration (three months or longer) and information of short duration which contains extensive text and/or graphics are published as AIP Supplement.
- (2) AIP Supplement shall be allocated a serial number which shall be consecutive and based on the calendar year. The AIP Supplement pages shall remain part of the South African AIP while any part of their contents remains valid.
- (3) A checklist of AIP Supplements currently in force shall be issued with each AIP Supplement or at intervals of not more than one month. The checklist shall be given the same distribution as the supplement.

3.4 Notice to airmen (NOTAM)

- (1) NOTAM service shall –
 - (a) designate a NOF for South Africa
 - (b) operate the NOF on a 24-hour basis;
 - (c) establish agreements with other international NOF for the exchange of NOTAM;
 - (d) ensure that –
 - (i) the NOF is connected to the ATN;
 - (ii) the ATN connection provides for printed communication;
 - (iii) the NOF has appropriate facilities to issue and receive NOTAM distributed by means of telecommunication;
 - (e) promptly issue a NOTAM that is in accordance with DOC 8126 and Annex 15, whenever information received under CAR 175.03.1 requires the issue of a NOTAM;
 - (f) at intervals of not more than one month, issue a checklist over the AFS of the NOTAM that are currently in force.
- (2) Each NOTAM shall be allocated a serial number the NOTAM Office in either an A series, B series or a C series. The serial number within each series shall be consecutive and based on the calendar year.
- (3) The A series NOTAM is information of concern to long- or medium range flights, and given selected international distribution.
- (4) The B series NOTAM is information on all aerodromes/heliports, facilities and procedures available for use in international civil aviation and given international distribution to adjacent States only.
- (5) The C series NOTAM is information of concern to aircraft other than those engaged in international civil aviation and given national distribution only.
- (6) Each NOTAM shall be brief, deal with only one subject, and be compiled so that its meaning is clear without reference to another document.
- (7) If a NOTAM contains information that requires an amendment to the South African AIP or an AIP Supplement, NOTAM shall contain a cross-reference to the affected AIP text or AIP Supplement.
- (8) If a NOTAM is issued which cancels or supersedes a previous NOTAM, the serial number of the previous NOTAM shall be specified.

- (9) If an error is detected in a NOTAM, a replacement NOTAM which cancels the original shall be issued.
- (10) Location indicators included in the text of a NOTAM shall conform to those as prescribed in ICAO Document 7910.
- (11) If no location indicator is assigned to the location, the name of the place and the coordinates shall be entered in the text of the NOTAM.
- (12) The NOTAM checklist shall be issued every month end and shall –
 - (a) refer to the latest AIP Amendments, AIP Supplements and AIC;
 - (b) have the same distribution as the actual NOTAM series to which the checklist refers and shall be clearly identified as a checklist.
- (13) A monthly printed plain language Summary of NOTAM in force including a reference to the latest AIP AMDT, checklist of AIP SUP and AIC issued, shall be prepared with a minimum delay and forwarded by the most expeditious means to the recipients of the IAIP.

3.5. Aeronautical Information Circulars (AIC)

- (1) An AIC shall be issued whenever it is necessary to promulgate the following information:
 - (a) A long term forecast of any major change in legislation, regulation, procedures or facilities.
 - (b) Information of a purely explanatory or advisory nature liable to affect flight safety.
 - (c) Information or notification of explanatory or advisory nature concerning technical, legislative or administrative matters.
- (2) AIC's are classified into the following subjects: General, Operation of Aircraft, Personnel Licensing, Air Navigation Services, Aerodromes and Airworthiness. Serial numbers will be allocated and each subject shall be published through a medium.

Series	Subject
10 – 19	General
20 – 29	Operation of aircraft
30 – 39	Personnel licensing
40 – 49	Air navigation services
50 – 59	Aerodromes
60 – 69	Airworthiness

- (3) AIC's shall be numbered consecutively, e.g. 20.1; 20.2; etc.
- (4) The date of issue will appear on each AIC, and when an AIC is re-issued or amended, the number will remain the same but the date of issue will be changed.
- (5) A checklist of AIC (AIC 10.2) currently in force shall be issued quarterly.
- (6) AIC's shall be made available to all South African Pilot license holders, Contracting States, all ATS units and subscribers of aeronautical information.
- (7) The Director shall approve all AIC's before publication.

3.6 Aeronautical Information Regulation and Control (AIRAC)

- (1) The AIS provider shall publish under the AIRAC system the establishment, withdrawal of, and premeditated significant changes (including operational trials) to aeronautical information stipulated under Appendix 4 of ICAO Annex 15. Guidance material on the procedures applicable to the AIRAC system is found in ICAO Doc 8126.
- (2) The information under the AIRAC system shall be published in paper copy form and shall be distributed at least 42 days in advance of the effective date with the objective of reaching recipients at least 28 days in advance of the effective date. The information published shall not be changed

further for at least another 28 days after the effective date, unless the circumstance notified is of a temporary nature and would not persist for the full period.

- (3) The AIS provider should publish, on a yearly basis, an AIC listing the AIRAC effective dates, publication dates and latest dates on which the raw data shall reach AIS in order for an AIRAC AIP Supplement to be published and reach recipients at least 28 days in advance of the effective date
- (4) The AIS provider shall ensure that when updating contents covered by the AIRAC system on its aeronautical database, the effective date of data coincide with the established AIRAC effective date used for the publication of information in paper copy form.

175.03.4 PRE-FLIGHT AND POST FLIGHT INFORMATION SERVICES

1. Information to be provided

- (1) The aeronautical information required by CAR 175.03.4 shall include, where applicable –
 - (a) a summary of current NOTAM and other information of an urgent character, in a plain text PIB;
 - (b) relevant elements of the IAIP;
 - (c) relevant maps and charts; and
 - (d) current information relating to the aerodrome of departure concerning any of the following:
 - (i) construction or maintenance work on or immediately next to the manoeuvring area;
 - (ii) rough portions of any part of the manoeuvring area, whether marked or not, including broken parts of the surface of runways and taxiways;
 - (iii) presence and depth of snow, ice, or water on runways and taxiways, including their effect on surface friction;
 - (iv) snow, drifted or piled on or next to runways or taxiways;
 - (v) parked aircraft or other objects on or immediately next to taxiways;
 - (vi) the presence of other temporary hazards including those created by birds;
 - (vii) failure or irregular operation of part or all of the aerodrome lighting system including approach, threshold, runway, taxiway, and obstruction lights, and manoeuvring area unserviceability lights, and aerodrome power supply;
 - (viii) failure, irregular operation or changes in the operational status of air navigation facilities including ILS and markers, PSR, SSR, VOR, NDB, VHF aero mobile channels, RVR.
- (2) The holder of an aeronautical information service certificate for a pre-flight information service shall make provision for flight crew members to report post-flight information at those aerodromes listed in the holder's manual.
- (3) The holder of an aeronautical information service certificate for a pre-flight information service shall forward any post-flight information reported by flight crew members under sub regulation (3) concerning the state and operation of air navigation facilities, to the operator of the navigation facility.

175.03.5 ERROR CORRECTION IN PUBLISHED INFORMATION

1. Procedure for error correction

- (1) The holder of an AIS certificate shall establish procedures to record, investigate, correct, and report any errors that are detected in the aeronautical information published under the authority of their certificate.
- (2) The procedures shall be established to ensure that –
 - (a) the error is corrected by the most appropriate means relative to the operational significance of the error;
 - (b) the correction is clearly identified in the republished information; and
 - (c) the source of the error is identified and, where possible, correct error.

SA-CATS 177

ICAO aeronautical charts

List of technical standards

177.00.1 Provision of ICAO aeronautical charts

177.00.2 Minimum standards

177.00.2 Provision of ICAO aeronautical charts

The Director shall –

- (a) be responsible for the provision of instrument flight procedures to ensure that the procedures necessary for the safety, regularity or efficiency of air navigation are available in a form suitable for operational requirements of –
 - (i) flight operations personnel, including flight crew and the personnel responsible for the provision of pre-flight information; and
 - (ii) providers of air traffic services;
- (b) design or approve instrument flight procedures and ICAO aeronautical charts concerning the territory of the Republic; and
- (c) publish the instrument flight procedures and ICAO aeronautical charts in the integrated aeronautical information package.

177.00.3 MINIMUM STANDARDS

The Director shall design, approve and publish instrument flight procedures and ICAO aeronautical charts in accordance with the standards, recommended practices and procedures contained in Annex 4, Annex 11 and Annex 15 to the Convention, and applicable ICAO Documents including:

Doc 4444 – PANS-RAC

Doc 8168 – PANS: Aircraft Operations

Doc 8400 – PANS: Abbreviations & Codes

Doc 8697 – Aeronautical Chart Manual

Doc 9184 – Airport Planning Manual