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NAMCAR: PART 91

GENERAL AVIATION AND OPERATING FLIGHT RULES

LIST OF REGULATIONS

SUBPART 1: GENERAL PROVISIONS

91.01.1 Applicability

(1) Subject to the provisions of sub-regulation (2), this Part applies to-

(a) aircraft operated within Namibia whether registered in Namibia or in a foreign country;

(b) aircraft registered in Namibia and operated internationally;

(c) persons acting as crew members of aircraft registered in Namibia;

(d) persons who are on board an aircraft operated under this Part; and

(e) crew members licensed in terms of these Regulations whether operating a Namibian or foreign registered aircraft.

(2) Additional rules to, and exemptions from, the provisions of this Part, are prescribed, in respect of-

(a) the conveyance of dangerous goods, in Part 92;

(b) corporate aviation operations, in Part 93;

(c) operation of non-type certificated aircraft, in Part 94;

(d) commercial operation of non-type certificated aircraft, in Part 96;

(e) parachuting operations, in Part 105;

(f) aeroplanes engaged in commercial air transport operations carrying more than 19 passengers, in Part 121;

(g) helicopters engaged in commercial air transport operations, in Part 127;

(h) helicopters engaged in external-load operations, in Part 133;

(i) aeroplanes engaged in commercial air transport operations carrying 19 or fewer passengers, in Part 135;

(j) operations of balloons, in Part 136;

(k) aircraft engaged in aerial work operations, in Part 137; and

(l) aircraft engaged in air ambulance operations, in Part 138.

91.01.2 Authority of PIC and crew members

All persons on board an aircraft shall obey all lawful commands given by the PIC or a crew member of the aircraft for the purpose of ensuring the safety and security of such aircraft, of persons or property carried therein or good order and discipline on board the aircraft.

91.01.3 Authorisation of personnel to taxi aeroplanes

No owner or operator of an aeroplane shall permit the taxiing of, and no person shall taxi, an aeroplane on the movement area of an aerodrome unless the person at the controls of the aeroplane-

(a) is the holder of a valid pilot licence; or

(b) has received instruction in the taxiing of an aeroplane from, and has been declared competent to taxi an aeroplane by, the holder of a flight instructor rating or, in the case of a foreign registered aeroplane, a person authorized by an appropriate authority; and

(c) uses a radio apparatus, such person is authorized to use the radio apparatus; and

(d) is conversant with the aerodrome layout, routes, signs, markings, lighting, air traffic service signals and instructions, phraseology and procedures, if required, and is able to conform to the standards required for safe aeroplane movements at such aerodrome: Provided the aeroplane does not enter the manoeuvring area in a case where radio communication is mandatory.

91.01.4 Search and rescue information

The PIC or in the case of an aircraft engaged in commercial air transport operations, the operator, shall ensure that all essential information concerning the search and rescue services in the area over which it is intended that the aircraft will be flown, is available on board the aircraft.

91.01.5 Information on emergency and survival equipment

(1) The owner or operator of an aircraft shall have available for immediate communication to rescue coordination centres, a list containing information regarding the emergency and survival equipment carried on board the aircraft.

(2) The minimum information to be contained in the list referred to in sub-regulation (1) is prescribed in Document NAM-CATS 91.

91.01.6 Method of carriage of persons

No person shall be in any part of an aircraft in flight which is not a part designed for the accommodation of persons, unless temporary permission has been granted by the PIC to access such part of the aircraft-

(a) for the purpose of taking action necessary for the safety of such aircraft or of any person, animal or goods therein; and

(b) in which cargo or stores are carried, being a part which is designed to enable a person to have access thereto while such aircraft is in flight.

91.01.7 Admission to flight deck

(1) No person other than the assigned flight deck crew shall be carried on the flight deck of a Namibian registered aircraft except with the permission of the PIC.

(2) The admission of any person to the flight deck shall not interfere with the operation of the aircraft.

(3) Any person carried on the flight deck shall be made familiar with the applicable safety equipment and pertinent operational procedures.

91.01.8 Unauthorised carriage

No person shall conceal himself, herself, animals or cargo on board an aircraft.

91.01.9 Portable electronic devices

(1) Subject to subregulation (2), an operator of an aircraft shall ensure that neither a passenger nor a crew member operates any portable electronic device on an aircraft without permission of a PIC of that aircraft.

(2) The provisions of subregulation (1) does not apply to-

(a) a heart pacemaker;

(b) a hearing aid;

(c) a portable voice recorder;

(d) an electric shaver;

(e) portable equipment used to sustain life or similar equipment with the ability to generate an electrical charge for the purpose of pacing or resuscitation; or

(f) any other portable electronic device, the operation of which-

(i) in the case of an aircraft engaged in a commercial air transport operation, the operator; or

(ii) in the case of an aircraft engaged in an operation other than a commercial air transport operation, the PIC,

has determined will not cause interference with the systems and equipment of the aircraft in which it is to be used.

(3) A portable electronic device referred to in subregulation (2)(c), (d) or (f) shall not be used by any person during the critical phases of flight.

91.01.10 Endangering safety

(1) No person shall, through any act or omission-

(a) endanger the safety of an aircraft or person therein; or

(b) cause or permit an aircraft to endanger the safety of any person or property.

(2) No person shall cause, by any means, a beam of light or other energy source, either visible or not, to be emitted towards any aircraft or air traffic control tower or any person therein such that there would be the potential for causing blindness or otherwise adversely affecting the ability of such person to safely carry out his or her duties.

91.01.11 Preservation of documents and records

(1) The owner or operator of an aircraft who is required to retain any of the documents and records for the specified period referred to in Subpart 3, shall retain such documents for such specified period irrespective of the fact that such owner or operator, before the expiry of such period, ceases to be the owner or operator of the aircraft.

(2) The owner or operator of an aircraft operated in the mass category specified under Table 1 of Part 187 and issued with a certificate of airworthiness in any category in terms of Part 21, shall be liable for a currency fee, as

prescribed in table 1 of Part 187. Such fees shall be payable in advance on the anniversary date on which the certificate of airworthiness was issued or

(3) Should the aircraft be unserviceable and not in possession of a valid certificate of airworthiness at that time, the currency fee will be waived until the aircraft is again serviceable and the certificate of airworthiness reissued. The fee for the re-issue of the certificate of airworthiness as prescribed by Part 187 shall then be applicable.

(4) The onus to demonstrate that the aircraft was unserviceable, or not in possession of a valid Certificate of Airworthiness rest with the owner/operator.

91.01.12 Use of time

(1) For the purposes of reporting and recording time, Coordinated Universal Time (UTC) shall be used and shall be expressed in hours and minutes and, when required, seconds of the 24-hour day beginning at midnight.

(2) A time check shall be obtained from an air traffic services unit, if possible, prior to operating a controlled flight and at such other times during the flight as may be necessary.

(3) Wherever time is utilized in the application of data link communications, it shall be accurate to within 1 second of UTC.

91.01.13 Additional flight crew member equipment

A flight crew member assessed as fit to exercise the privileges of a licence, subject to the use of suitable correcting lenses, shall have a spare set of the correcting lenses readily available when exercising those privileges.

91.01.14 Carriage of dangerous goods

The owner or operator of an aircraft shall not carry dangerous goods during flight time unless such goods are carried in accordance with the provisions of Part 92.

91.01.15 Passenger intoxication and unruly behaviour

(1) No person may board an aircraft while under the influence of alcohol or any psychoactive substance such that the safety of the aircraft or its occupants is, or is likely to be, endangered.

(2) No person may consume alcohol or any psychoactive substance while on board an aircraft if, as a result of such consumption, the effects are, or are likely to, endanger the safety of the aircraft or its occupants.

(3) No person may act in any manner that will, or is likely to, endanger the aircraft or its occupants.

91.01.16 Psychoactive substances

(1) Subject to sub-regulation (2), no person shall act in the capacity of any crew member, ground support, servicing or maintenance personnel, or perform any function or participate in any decision-making process that could affect aviation safety, where such person is, or is likely to be impaired by any psychoactive substance.

(2) Where a medication that may be considered to be a psychoactive substance has been prescribed by a medical doctor, the duties in sub-regulation (1) may be undertaken provided an aviation medical examiner so designated in terms of Part 67 certifies what duties may be safely accomplished while taking such medication.

(3) A person who has been prescribed medication that may adversely affect performance or is otherwise of the opinion that his or her performance may be impaired through the use of medication or combinations of medication shall so inform the operator.

SUBPART 2: CREW

91.02.1 Crew composition and qualifications

(1) The number and composition of the flight crew shall not be less than the number and composition specified in the AFM referred to in Regulation 91.03.2 or any other document defining the certification of the aircraft.

(2) In the case of aircraft originally certified with a passenger seating capacity greater than 19 and not involved in commercial air transport operations, the Executive Director may require the inclusion of cabin crew members for the safe operation of the aircraft. The complement, training and checking requirements of such crew members are prescribed in Document NAM-CATS 91.

(3) The flight crew members and, if applicable, the cabin crew members, shall

(a) have maintained competency and be qualified to perform the duties assigned to them;

(b) hold the appropriate valid crew licences, ratings and certificates; and

(c) have the ability to speak and understand the language used for aeronautical Radiotelephony communications for the routes being flown.

(4) The flight crew shall include at least one flight crew member who holds a valid radiotelephony operator licence or an equivalent document issued by an appropriate authority, authorising such member to operate the type of radio transmitting equipment to be used.

(5) In the case of a multi-pilot crew, the owner or operator shall designate one pilot among the flight crew as PIC of the aircraft and the PIC may delegate the conduct of the flight to another suitably qualified pilot.

(6) The owner or operator shall ensure that each flight and cabin crew member meets the requirements of sub-regulation (3).

(7) Where the Executive Director has determined the need for cabin crew members as prescribed in sub-regulation (2), the owner or operator of that aircraft shall-

(a) ensure each cabin crew member is seated and secured in the seat prescribed by Regulation 91.04.14(2) during take-off, landing or as otherwise directed by the PIC; and

(b) ensure each cabin crew member receives training prior to his or her first flight in that aircraft and annual recurrent training thereafter.

(8) In instances of non-commercial operations, the pilot in command shall be responsible for ensuring compliance with (3).

(9) For each flight of an aeroplane above 49 000 ft, the operator shall maintain records so that the total cosmic radiation dose received by each crew member over a period of 12 consecutive months can be determined.

91.02.2 Crew member emergency duties

(1) The owner or operator and, where appropriate, the PIC of a multi-crew aircraft shall assign to each crew member concerned, the necessary functions to be performed in an emergency or a situation requiring emergency evacuation.

(2) The functions referred to in sub-regulation (1) shall be such as to ensure that any reasonably anticipated emergency can be adequately dealt with and shall take into consideration the possible incapacitation of individual crew members.

91.02.3 Crew member responsibilities

(1) No person shall act as a crew member of an aircraft-

(a) whilst using any psychoactive substance which may affect his or her faculties in any manner that may jeopardise safety;

(b) within 24 hours following scuba diving by such flight crew member;

(c) within 72 hours following blood donation by such flight crew member;

(d) if the crew member knows or suspects that he or she is suffering from or, having due regard to the circumstances of the flight to be undertaken, is likely to suffer from fatigue to such an extent that it may endanger the safety of the aircraft or its occupants; or

(e) if the crew member is in any doubt of being able to accomplish his or her assigned duties on board the aircraft.

(2) No crew member shall-

(a) consume any alcohol less than 8 hours prior to commencing standby for operational duty or commencing operational duty, which operational duty shall be deemed to commence at the specified reporting time, if applicable;

(b) commence an operational duty period while the concentration of alcohol in his or her blood, is more than 0,02 gram per 100 millilitres; or

(c) consume alcohol during flight duty or whilst on standby, or within eight hours after an accident or reportable incident involving the aircraft, unless the accident or incident was not related to his or her duties.

(3) No Person shall act as a flight crew member of an aircraft if, prior to each flight, the expected flight time exceeds, or is likely to exceed, the permissible aggregate of-

(a) for all flying-

(i) 8 hours within one calendar day;

(ii) 100 hours, during the preceding 30 days;

(iii) 1000 hours, during the preceding 12 months;

Unless otherwise specified in an approved flight and duty scheme;

(b) in the case of flight instructors conducting ab initio or any training towards an initial rating or licence, six hours within one calendar day: Provided that, for the purposes of computing flight time in meeting the limitation referred to in paragraph (a)(i), each flight hour spent in such training shall be deemed to be one and one-half (1½) hours flight time;

(i) as part of a multi-pilot crew for a flight to be undertaken wholly or partly under IFR, 100 hours, during the preceding 30 days;

(c) as the sole pilot of an aircraft for a flight to be undertaken wholly or partly under IFR, 100 hours during the preceding 30 days.

(4) No person shall act as a cabin crew member of an aircraft for which the Executive Director has determined the need for cabin crew members, as prescribed in Regulation 91.02.1(2), if prior to each flight the expected flight time exceeds, or is likely to exceed, the permissible aggregate of-

(a) 300 hours, during the preceding 90 days;

(b) 1000 hours, during the preceding 12 months.

Unless otherwise specified in an approved flight and duty scheme;

91.02.4 Recency

(1) A pilot shall not act as PIC of an aircraft, or second-in-command (SIC) of an aircraft required to be crewed by more than one pilot, carrying passengers by day, unless such pilot has personally, within the 90 days immediately preceding the flight, carried out either by day or by night at least three take-offs and three landings in the same class or, if a type-rating is required, type or variant of aeroplane, and in the case of a helicopter three circuits including three take-offs and three landings in the same type of helicopter as that in which such flight is to be undertaken. The landings required by this sub-regulation may be completed in a FSTD approved for the purpose. In the case of a tail-wheel aeroplane, each landing shall be carried out to a full stop.

(2) A person shall not operate an aircraft in commercial air transport or carrying passengers as PIC at night unless he or she holds an IR or has, in the preceding 90 days, carried out at least one take-off and landing at night as PF in an aircraft of the same type or class or an FFS representing that type of class.

(3) Where the take-off and landing requirement referred to in sub-regulations (1) and (2) have been satisfied in a multi-engine aircraft, the requirement shall be deemed to have been met in respect of single-engine aircraft as well.

(4) A pilot shall not act as PIC or SIC of an aircraft on an instrument approach to an aerodrome in IMC unless the pilot has, within the 90 days immediately preceding such approach procedure or procedures established by the Executive Director or an appropriate authority-

(a) executed at least two approaches in an aircraft or a FSTD approved for the purpose or a combination of aircraft and FSTD approved for the purpose, either under actual or simulated conditions, with reference to flight instruments only; or

(b) undergone the appropriate skill test as prescribed in Part 61 of these Regulations.

91.02.5 Crew members at duty stations

(1) In the case of a multi-crew aircraft-

(a) each crew member shall be at his or her assigned station or seat, properly secured by all seat belts and shoulder harnesses provided, during take-off and landing and whenever deemed necessary by the PIC in the interests of aviation safety: Provided that the shoulder harness of a flight crew member not occupying a pilot seat may be unfastened if it interferes with the performance of his or her duties, but the seat belt must remain fastened;

(b) each crew member shall keep his or her seat belt fastened while at his or her assigned station, during phases of the flight, other than the phases referred to in paragraph (a);

(c) each flight crew member required to be on flight deck duty, shall be at his or her assigned station, during take-off and landing;

(d) all flight crew members on flight deck duty shall remain at their assigned stations during all phases of the flight other than the phases referred to in subparagraph (c): Provided that-

(i) a flight crew member may leave his or her assigned station, in the course of the performance of his or her duties with regard to the operation of the aircraft or for physiological needs; and

(ii) at least one suitably qualified pilot remains at the controls of the aircraft at all times; and

(e) the PIC or, where applicable, the operator shall ensure that flight and, if applicable, cabin crew members do not perform any activities during critical phases of the flight other than those required for the safe operation of the aircraft.

(2) In the case of a single-pilot aircraft, the PIC shall, during all phases of the flight, remain at the controls of the aircraft.

91.02.6 Laws, Regulations and procedures

(1) The PIC of an aircraft shall be familiar with the laws, Regulations and procedures pertinent to the performance of his or her duties, prescribed for the areas to be traversed, the aerodromes to be used and the air navigation facilities relating thereto and shall ensure that other members of the flight crew are familiar with such laws, Regulations and procedures as are pertinent to the performance of their respective duties in the operation of the aircraft.

(2) Subject to sub-regulation (3), the PIC of an aircraft shall comply with the Regulations contained in this Part unless they conflict with the rules published by the State having jurisdiction over the territory over flown: Provided that if any Regulation of this Part is more restrictive and may be followed without violating the rules of that State, it shall be complied with.

(3) In an emergency situation which endangers, or is likely to endanger the aircraft, persons on board such aircraft, or persons or property on the surface, the PIC shall take any action which he or she considers necessary under the circumstances.

(4) If a PIC deviates from any law, Regulation or operational procedure in an emergency situation referred to in sub-regulation (3), he or she shall notify the appropriate authority of the State within or over the territory of which the deviation occurs, of such deviation without delay.

(5) If the appropriate authority of the State within or over the territory of which the deviation occurs, requests the PIC to submit a report on such deviation, the PIC shall submit the report containing full details of the deviation-

(a) to such appropriate authority, within the period specified by such appropriate authority,; and

(b) if the deviation occurred in a foreign State, to the Executive Director, within 10 days from the date on which such report is requested by the appropriate authority of such State.

91.02.7 Duties of PIC regarding flight preparation

(1) The PIC of an aircraft shall not commence a flight unless he or she is satisfied that-

(a) the aircraft is airworthy;

(b) the instruments and navigation, communication and other equipment required for the particular type of operation to be undertaken, are installed and are serviceable and functioning correctly, except as provided for in the MEL, if any;

(c) the aircraft has been released to service in accordance with Part 43;

(d) the mass of the aircraft at any time does not exceed the MCM calculated from the performance information provided in the AFM referred to in Regulation 91.03.2, in terms of which the operating limitations referred to in Subpart 9 are complied with;

(e) the load carried by the aircraft is properly secured, fit to be conveyed in accordance with Part 92 and is so distributed that the centre of gravity is within the limits prescribed in the AFM referred to in Regulation 91.03.2;

(f) an ATS flight plan, referred to in Regulation 91.03.4, has been properly completed and filed with the appropriate ATSU, if such flight plan is required in terms of Regulation 91.03.4;

(g) all the documents and forms required to be carried on board are carried as specified in Regulation 91.03.1;

(h) a check has been completed indicating that the operating limitations referred to in Subpart 8 will not be exceeded;

(i) the search and rescue information, referred to in Regulation 91.01.4, is available on board;

(j) the requirements in respect of fuel, oil, oxygen, weather, minimum safe altitudes, aerodrome operating minima and availability of alternate aerodromes for the route being flown and any likely alternatives, whether flown under instrument or VFR, are complied with;

(k) the aerodrome operating minima are not less than the operating minima of the aerodrome being operated to or from, established by the appropriate authority of the State in which the aerodrome is located, unless such appropriate authority approves lower aerodrome operating minima;

(l) current and suitable IFR or VFR, as applicable, charts and related publications required to-

(i) depart the place of origin;

(ii) operate on the route to the destination, or other route that a flight could reasonably be expected to be diverted to; and

(iii) arrive at the destination or any alternate,

are carried on board;

(m) the external surfaces are checked prior to take-off for any deposit which might adversely affect the performance or controllability of the aircraft, unless otherwise permitted in the AFM referred to in Regulation 91.03.2, and if such deposit is found, to have it removed;

(n) according to the information available to him or her-

(i) in respect of an aeroplane, the condition of the runway intended to be used will not prevent a safe take-off at departure or a safe landing at the destination aerodrome or alternate aerodrome, as applicable; and

(ii) the weather at the departure and arrival aerodromes and en route, including any possible alternate aerodromes or routes, will not preclude safe completion of the flight;

(o) the RVR or visibility in the take-off direction of the aircraft is equal to, or better than, the applicable minimum;

(p) the flight crew members are properly qualified for the specific operation to be undertaken, except that for commercial air operations, the air operator shall ensure that the flight crew are properly qualified;

(q) an adequate and suitable aerodrome is available for take-off, en route and destination, should it become inadvisable to continue to or land at the destination aerodrome; and

(r) if flight in RVSM airspace is contemplated-

(i) the aircraft has been approved for RVSM operations;

(ii) the crew has been trained and is otherwise qualified for the flight;

(iii) the minimum required equipment pertaining to height-keeping and alerting systems is installed and serviceable; and

(iv) no airframe or operating restrictions prevent operation in the particular RVSM airspace.

(2) The PIC of an aircraft shall-

(a) not commence a flight unless he or she has ascertained through the relevant NOTAM, AIC, IAIP or IAIP Supplement that the aerodromes, navigation aids and communication facilities are adequate for the manner in which the flight is to be conducted;

(b) prior to take-off from an aerodrome at which an ATSU is in operation, determine through the aeronautical information services available from the unit or any other reliable source, that the unserviceability of any aerodrome, navigation aids or communication facilities required for such flight, will not prejudice the safe conduct of the flight; and

(c) advise an ATSU, as soon as it is practical to do so, of any inadequate facilities encountered in the course of operations.

(3) Where a load and trim sheet is required in terms of these Regulations, the load and trim sheet shall be acceptable to and countersigned by the PIC before a flight commences: Provided that if the load and trim sheet is submitted to the PIC by electronic data transfer, commencement of the flight shall be deemed to be the acceptance thereof by such PIC.

(4) Completed flight preparation forms shall be kept by the operator for a period of three months.

91.02.8 Duties of PIC regarding flight operations

(1) The PIC of an aircraft shall, whether manipulating the controls or not, be responsible for-

(a) the operation, safety and security of the aircraft, crew members, passengers and cargo in accordance with these Regulations while he or she is in command;

(b) operational control of the aircraft unless otherwise provided for in terms of Part 93, 121, 127 or 135 under an approved operational control system;

(c) the conduct of crew members and passengers carried; and

(d) the maintenance of discipline by all persons on board.

(2) The PIC of the aircraft shall have the authority-

(a) to give such commands he or she deems necessary in the interest of the safety of the aircraft, persons or property; and

(b) to disembark any person or cargo which in his or her opinion, represents a potential hazard to the safety of the aircraft, persons or property.

(3) The PIC of the aircraft shall ensure that all passengers are informed as to-

(a) when and how oxygen equipment is to be used, if the carriage of oxygen is required;

(b) the location and use of life jackets or equivalent individual flotation devices, where the carriage thereof is required;

(c) the location and method of opening emergency exits;

(d) when seat belts are to be fastened;

(e) when smoking is prohibited;

(f) when portable electronic devices may be used;

(g) the existence and location of the passenger safety features card, if carried on board; and

(h) before take-off, the location and general manner of use of the relevant emergency equipment carried for collective use and, when an emergency arises, instruct the passengers to take such emergency action as may be appropriate.

(4) A PIC of an aircraft shall-

(a) ensure that a pre-flight inspection is carried out, and that the checklists, and where applicable, the flight deck procedures and other instructions regarding the operation of an aircraft, the limitations contained in an AFM referred to in Regulation 91.03.2 or equivalent certification document, are fully complied with at the appropriate times during a flight;

(b) decide whether or not to accept an aircraft with unserviceabilities allowed by CDL or MEL, where applicable;

(c) determine that aircraft performance will permit the take-off and departure to be carried out safely;

(d) ensure that, before take-off and landing and whenever, by reason of turbulence, any emergency occurring during a flight or whenever deemed necessary in the interest of aviation safety the precaution is considered necessary -

(i) all persons on board aircraft are secured in their seats by means of the seat belts or shoulder harnesses provided; and

(ii) equipment and baggage are properly secured and all exit and escape paths are unobstructed.

(e) when re-planning, whilst in flight, to proceed along a route or to a destination other than a route or destination originally planned, shall amend an OFP, if such a plan was required in terms of Regulation 91.02.7(1)(f), and notify a nearest ATSU of such change;

(f) not continue towards an aerodrome of intended landing unless the latest available information indicates that at the expected time of arrival, a landing can be effected at that aerodrome or at least one destination alternate aerodrome, in compliance with the operating minima established in accordance with Regulation 91.07.5;

(g) report any accident or incident involving an aircraft in accordance with Part 12, unless a PIC is incapacitated or an operator has established another means of reporting accidents or incidents, in which case an operator shall initiate the report;

(h) report any dangerous goods accident or incident involving an aircraft in accordance with Part 92;

(i) if an aircraft is endangered in flight by a near collision with any other aircraft or object, faulty air traffic procedure or lack of compliance with applicable procedures by an ATSU or a flight crew member or a failure of ATS facilities, submit an ATS incident report as prescribed by Part 12.

(j) record any technical defect and the exceeding of any technical limitation which occurred while he or she was responsible for such flight, in the flight folio;

(k) if a potentially hazardous condition such as bird accumulation, an irregularity in a ground or navigation facility, meteorological phenomena, a volcanic ash cloud, or a greater than normal radiation level is observed during flight, notify an ATSU as soon as possible;

(l) if an aircraft is equipped with an ELT, prior to engine shut-down at the end of each flight as part of the post-flight checks, tune the VHF receiver to 121,5 MHz to listen for ELT activation. If an ELT has been activated inadvertently as a result of a hard landing or for other reasons, this shall be -

(i) reported immediately to a rescue co-ordination centre, through a nearest ATSU; and

(ii) recorded in an appropriate flight log as maintenance may be required before it is returned to service;

(m) report any occurrence of height keeping errors encountered in an RVSM environment, as prescribed in Document NAM-CATS 91; and

(n) report a runway braking action through an air-report when a runway braking action encountered is not as good as reported.

(5) The PIC of the aircraft shall ensure that-

(a) breathing oxygen is available to crew members and passengers if flights in a non-pressurised aircraft are contemplated above 10 000 feet and up to 12 000 feet in excess of 120 minutes intended flight time, or above 12 000 feet; and

(b) breathing oxygen is carried in sufficient quantities for all flights at such altitudes where a lack of oxygen might result in impairment of faculties of crew members or harmfully affect passengers.

(6) The PIC of the aircraft shall not-

(a) require a crew member to perform any duties during a critical phase of the flight, except those duties required for the safe operation of the aircraft;

(b) permit any activity during a critical phase of the flight which could distract any crew member from the performance of his or her duties or which could interfere in any way with the proper conduct of those duties; and

(c) commence a flight in the event a crew member is incapacitated by any cause such as injury, fatigue, sickness or the effects of any psychoactive substance or continue a flight beyond the nearest suitable aerodrome in the event of a flight crew member becoming unable to perform any essential duties as a result of fatigue, sickness or lack of oxygen.

(7) The PIC of an aircraft which is being subjected to unlawful interference-

(a) shall notify the appropriate ATSU of this fact, any significant circumstances associated therewith and any deviation from the current flight plan necessitated by the circumstances, in order to enable the ATSU to give priority to the aircraft and to minimize conflict with other aircraft;

(b) shall attempt to land as soon as practicable at the nearest suitable aerodrome or at a dedicated aerodrome assigned by the appropriate authority unless considerations aboard the aircraft dictate otherwise; and

(c) immediately following the incident unless unable, in which case the owner or operator of the aircraft shall report the act of unlawful interference with the operation of the aircraft or the authority of the PIC-

(i) if the act of unlawful interference occurs within Namibia, to the Executive Director; or

(ii) if the act of unlawful interference occurs within or over the territory of a foreign State, to the appropriate authority of the State and the Executive Director.

(8) The PIC of an aircraft, that is equipped with a flight deck door, shall ensure that at all times from the moment the passenger entry doors are closed in preparation for departure until they are opened on arrival, that the flight deck door is closed and locked from within the flight deck.

SUBPART 3: DOCUMENTATION AND RECORDS

91.03.1 Documents to be carried on board

(1) An owner or an operator of an aircraft shall ensure that the following documents, or certified true copies thereof, are carried on board aircraft on each individual flight-

(a) If an aircraft is engaged in an international flight-

(i) a certificate of registration;

(ii) a certificate of airworthiness or, for non-type certificated aircraft, an authority to fly;

(iii) an appropriate licence and medical certificate of each crew member;

(iv) a general declaration;

(v) an aircraft radio station licence;

(vi) a passenger manifest, unless if such information is included in a general declaration referred to in subparagraph (iv);

(vii) if cargo is carried, a manifest and detailed declaration of cargo;

(viii) a certificate of release to service;

(ix) a navigation log when a navigator is carried;

(x) an AFM, referred to in Regulation 91.03.2, or an equivalent document, which document shall include the statements referred to in Document NAM-CATS 91, if flight in RVSM airspace is contemplated;

(xi) mass and balance report;

(xii) flight folio;

(xiii) MEL, if applicable;

(xiv) noise certificate, if such certificate has been issued for a type of aircraft;

(xv) a list of visual signals and procedures for use by intercepting and intercepted aircraft;

(xvi) if a flight in RVSM airspace is contemplated-

(aa) a valid RVSM licence endorsement issued by the Executive Director; and

(bb) if applicable, a valid RVSM operational approval for a particular RVSM airspace;

(xvii) a licence to operate air services, FOP or equivalent document giving authority for such flight; and

(xviii) where applicable, a special flight permit.

(b) if an aircraft is engaged in a domestic flight-

(i) certificate of registration;

(ii) certificate of airworthiness;

(iii) appropriate licence and medical certificate of each crew member;

(iv) aircraft radio station licence;

(v) certificate of release to service;

(vi) AFM referred to in Regulation 91.03.2 or an equivalent document;

(vii) mass and balance report;

(viii) flight folio;

(ix) MEL, if applicable;

(x) noise certificate, if such certificate has been issued for the type of aircraft;

(xi) list of visual signals and procedures for use by intercepting and intercepted aircraft;

(xii) licence to operate the service, if required; and

(xiii) where applicable, a special flight permit.

91.03.2 Aircraft flight manual

(1) The owner or operator of an aircraft shall keep an approved AFM for each aircraft of which he or she is the owner or operator and shall keep such manual current with amendments and implement changes issued by an appropriate authority.

(2) The flight crew members of the aircraft shall, on each flight, operate such aircraft in accordance with the AFM, unless an unforeseen emergency dictates otherwise.

91.03.3 Aircraft checklist

(1) The owner or operator of an aircraft shall establish and make available to the flight crew and other personnel in his or her employ needing the information, a checklist system for the aircraft, to be used by such flight crew and other personnel for all phases of the operation under normal, abnormal and emergency conditions.

(2) The PIC shall ensure the checklists used on board the aircraft are complied with and utilised having due regard to human factors principles.

(3) The checklists required in terms of sub-regulation (1) shall be designed having due regard to human factors principles as prescribed in Document NAM-CATS 91.

91.03.4 Air traffic service flight plan and associated procedures

(1) The owner or operator of an aircraft shall ensure that an ATS flight plan is completed if required in terms of sub-regulation (4).

(2) The items to be contained in the ATS flight plan shall be as prescribed Document NAM-CATS 91.

(3) The ATS flight plan shall be filed with the appropriate ATSU unless other arrangements have been made for submission of repetitive flight plans and such unit shall be responsible for transmitting such ATS flight plan to all ATSUs concerned with the flight.

(4) The ATS flight plan shall be filed in respect of-

(a) all flights to be conducted in controlled or advisory airspace: Provided that this requirement shall not apply in respect of-

(i) a local flight;

(ii) a flight crossing an airway or advisory routes at right angles; or

(iii) a VFR flight entering or departing from an aerodrome traffic zone or control zone, from or to an unmanned aerodrome and where no other controlled or advisory airspace will be entered during the flight;

(b) an international flight;

(c) all flights undertaken for the purposes of commercial air transport operations issued in terms of the Air Services Act, 1949;

(d) any flight within or into designated areas, or along designated routes, when so required by the appropriate ATS authority to facilitate the provision of flight information, alerting and search and rescue services; and

(e) any flight within or into designated areas, or along designated routes, when so required by the appropriate ATS authority to facilitate coordination with appropriate military units or with ATSUs in adjacent States in order to avoid the possible need for interception for the purpose of identification.

(5) An ATSU may instruct a flight for which an ATS flight plan is required in terms of sub-regulation and for which an ATS flight plan has not been filed, to clear or to remain clear of controlled airspace, and not to cross the border of Namibia or to enter its airspace until such time as the required ATS flight plan has been filed.

(6) Unless otherwise authorized by the responsible ATSU, an ATS flight plan for a flight to be conducted in controlled or advisory airspace, shall be filed-

(a) for domestic flights, at least 30 minutes before departure;

(b) for international flights, at least 60 minutes before departure; or

(c) if filed during flight while outside controlled or advisory airspace for a flight to be conducted in such airspace, it shall be filed with the responsible ATSU at least 10 minutes before the aircraft is estimated to reach the intended point of entry into the controlled or advisory airspace or the point of crossing the airway or advisory route.

(7) The PIC of an aircraft operating an IFR or controlled VFR flight shall ensure that all changes which become applicable to an ATS flight plan before departure or in flight are reported, as soon as practicable, to the responsible ATSU. For other VFR flights, changes regarding fuel endurance or total number of persons carried on board shall, as a minimum, be reported.

(8) If an ATS flight plan has been filed with an ATSU prior to departure, and is not activated with an ATSU within one hour of original estimated time of departure or amended estimated time of departure, the ATS flight plan shall be regarded as cancelled and a new ATS flight plan shall be filed.

(9) Where an ATSU is not in operation at the aerodrome of intended landing, a report of arrival as prescribed in Document NAM-CATS 91 shall be submitted to an ATSU, by the quickest means of communication available, immediately after landing, in respect of a flight for which an ATS flight plan was submitted and not as yet closed or for which search and rescue notification was requested and designated with a particular ATSU.

(10) When communication facilities at the arrival aerodrome are inadequate and alternate arrangements for the handling of arrival reports on the ground are not available, the PIC shall, prior to landing the aircraft or immediately thereafter, if practicable, transmit to the appropriate ATSU, a message comparable to an arrival report, in respect of a flight for which an ATS flight plan was submitted and not as yet closed or for which a search and rescue notification was requested with a nominated ATSU.

(11) Subject to the provisions of sub-regulation (12), the PIC shall ensure that the aircraft adheres to the current ATS flight plan filed for a controlled flight, unless a request for a change has been made and accepted by the ATSU responsible for the controlled airspace in which the aircraft is operating, or unless an emergency situation arises which necessitates immediate action, in which event the responsible ATSU shall, as soon as circumstances permit, be notified of the action taken and that such action was taken under emergency authority.

(12) In the event of a controlled flight inadvertently deviating from its current ATS flight plan, a PIC shall -

(a) if an aircraft is off track, adjust the heading of an aircraft to regain track as soon as practicable;

(b) if an aircraft deviates from an ATC clearance with an assigned Mach number or indicated airspeed, inform an appropriate ATSU immediately;

(c) if an aircraft deviates from an assigned Mach number by approximately Mach 0.02 or from true airspeed by approximately 10 kt, inform an appropriate ATSU;

(d) except where ADS-C is activated, serviceable and usable, notify an appropriate ATSU as soon as possible if the time estimate for the next applicable reporting point, FIR boundary or destination aerodrome, whichever comes first changes in excess of two minutes, or such other period of time as is prescribed by an appropriate ATS provider; and

(e) if an aircraft deviates from its altitude, take action to correct such altitude deviation.

(13) When an automatic dependent surveillance (ADS) agreement is in place, the ATSU shall be informed automatically via data link whenever changes occur beyond the threshold values stipulated by the ADS event contract.

(14) If prior to departure it is anticipated that, subject to a re-clearance in flight, a decision may be taken to proceed to a revised destination aerodrome, the appropriate ATSUs shall be so notified by the insertion in the flight plan of information concerning the revised route, where known, and the revised destination. The revised destination shall be subject to the fuel and oil provisions of Regulation 91.07.12.

91.03.5 Flight folio

(1) The owner or operator of a Namibian registered aircraft shall ensure that the aircraft carries a flight folio or any other similar document which meets the requirements of and contains the information as prescribed in Document NAM-CATS 91, at all times.

(2) The flight folio shall be kept up-to-date and maintained in a legible manner by the PIC.

(3) All entries shall be made immediately upon completion of the occurrence to which they refer.

(4) In the case of maintenance being undertaken on the aircraft, the entry shall be certified by the person taking responsibility for the maintenance performed.

(5) The owner or operator shall retain the flight folio for a period of five years calculated from the date of the last entry therein.

91.03.6 Fuel record

(1) The owner or operator shall maintain fuel records to enable the Executive Director to ascertain that, for each flight under his or her control, the requirements of Regulation 91.07.12 are complied with.

(2) The PIC of the aircraft shall enter the fuel and oil records referred to in sub-regulation (1) in the flight folio.

(3) The owner or operator shall maintain oil records to enable the Executive Director to ascertain that trends for oil consumption are such that an aircraft has sufficient oil to complete each flight.

(4) Fuel and oil records shall be retained by the owner or operator for a period of three months.

91.03.7 Certificate of release to service

(1) No owner or operator of an aircraft shall operate-

(a) a Namibian registered aircraft without holding a valid certificate of release to service signed by the holder of an appropriately rated AME licence or AMO approval; or

(b) a foreign aircraft without holding a valid certificate, equivalent to the certificate referred to in paragraph (a), issued by an appropriate authority.

(2) The owner or operator shall-

(a) ensure that one copy of the certificate of release to service or equivalent certificate is carried on board the aircraft to which it relates and, in the case of a Namibian registered aircraft, a second copy shall be filed at the normal station of the aircraft; and

(b) retain the certificate of release to service for a period of 12 months calculated from the date of issue of such certificate of release to service.

91.03.8 Flight recorder records

(1) The owner or operator of an aircraft on which a flight recorder is carried, shall-

(a) in the case of an accident or incident involving such aircraft, preserve the original recording, as retained by the flight recorder, for a period of not less than 60 days calculated from the date of the accident or incident, or until permission for disposal of such recording has been given by the investigator-in-charge or an appropriate authority, whichever is the latter date; and

(b) when the Executive Director so directs, preserve the original recording, as retained by the flight recorder, for a specified period calculated from the date of such direction.

(2) If an aircraft is required under this Part to be fitted with a FDR, the owner or operator of the aircraft shall-

(a) have the recording for the period of operating time as required by sub-regulations (1)(a) and (b): Provided that for the purpose of testing and maintaining a FDR one hour of the oldest recorded material at the time of testing may be erased;

(b) keep a recording of at least one representative flight made within the preceding 12 months which includes a take-off, climb, cruise, descent, approach and landing, together with a means of identifying the recording with the flight to which it relates; and

(c) keep a document which represents the information necessary to retrieve and convert the stored data into engineering units.

(3) The owner or operator of an aircraft on which a flight recorder is carried shall, within a reasonable time after being requested to do so by the Executive Director or an appropriate authority, produce any recording made by such flight recorder which is available or has been preserved.

(4) A CVR recording may be used for purposes other than for the investigation of an accident or incident only with the consent of all the flight crew members concerned.

(5) The FDR recordings may be used for purposes other than the investigation of an accident or incident which is subject to mandatory reporting, only when such recordings are-

(a) used by the owner or operator for airworthiness or maintenance purposes only;

(b) de-identified; or

(c) disclosed under secure procedures.

91.03.9 Logbooks

(1) The following logbooks shall be kept in respect of Namibian registered aircraft and in respect of other specified equipment for the purpose of recording therein the maintenance history of the equipment to which each relates-

(a) an aircraft logbook for each aircraft;

(b) an engine logbook for each aircraft engine; and

(c) a propeller logbook for each propeller.

(2) The provisions of sub-regulation (1) shall not apply to aircraft which do not qualify for the issue of a certificate of airworthiness.

(3) Logbooks to be kept in terms of sub-regulation (1) shall conform to such format as the Executive Director may from time to time prescribe in an AIC.

(4)

(a) Logbooks should preferably be kept at the aircraft's base of operation.

(b) Details in respect of maintenance carried out while away from base shall be transferred to the appropriate logbook or logbooks within 48 hours after the return of the aircraft to its base of operation or entered within 48 hours on completion of any maintenance performed on the aircraft or installed equipment at a base other than its base of operation.

(5) All logbooks to be kept and maintained in terms of the preceding sub-regulations shall on demand be made available at all times for inspection by an authorised officer.

(6) The logbooks required to be kept in accordance with this Part shall be preserved in a safe place at all times and for a period of 6 (six) months after the date of destruction of the airframe, engine or propeller for which they were kept.

(7) Logbooks shall not be carried in the aircraft to which they relate unless the aircraft is flown to a place where the logbooks are required for compliance with maintenance to the aircraft. Where a logbook is carried on board an aircraft, a suitable record of the last inspection performed shall be maintained at the base of operation of the aircraft.

(8) Entries in the logbooks required to be kept in accordance with this Part shall be made and signed by the holder of an appropriate licence or by a person approved by the Executive Director, except that matters that could not have come to the notice of the holder of an appropriate licence holder or an approved person, shall be entered and signed by the PIC.

(9) Any record kept for the purpose of compiling a logbook or any other technical data relating to the airworthiness of an aircraft or component shall be produced when called for in the event of any inspection or investigation.

(10) All entries made in logbooks shall furnish the information and particulars provided for in the relevant logbook.

(11) When repairs to an aircraft, aircraft engine or component or fixed or removable equipment have been required in consequence either of damage caused by a forced landing or of defects which have occasioned a forced landing or any other incident, the entry or entries made in the relevant logbook or books in respect of such repairs shall state that they have been so required and shall identify the forced landing or incident in question.

(12) The logbooks referred to in this Part shall be kept up to date and maintained in ink in a legible manner and reasonable condition and in accordance with the “Instructions for use” in the relevant logbook.

(13) In the event that required maintenance records have been lost or destroyed, alternative proof should be provided that the tasks in question have been performed.

SUBPART 4: INSTRUMENTS AND EQUIPMENT

91.04.1 Use and installation of instruments and equipment

(1) Instruments on an aircraft which are used by a pilot shall be arranged in such a manner that the pilot can see their indications readily from his or her station, with the minimum practicable deviation from the position and line of vision which he or she normally assumes when looking forward along the flight path.

(2) If a single instrument or item of equipment in an aircraft is required to be operated by more than one pilot, such single instrument or item of equipment shall be installed in such a manner that it can be readily seen and operated from each pilot station.

(3) An aircraft shall be equipped with means for indicating the adequacy of the power being supplied to the required flight instruments.

(4) Placards and instrument markings, containing those operating limitations required by the type certificate or by Regulation to be visible to the flight crew, shall be displayed in the aircraft.

(5) An operator shall ensure that a flight does not commence unless the instruments and equipment required under the Regulations are functioning and are in a condition for safe operation of the kind being conducted, except as provided for in a MEL.

(6) The operator shall not be required to obtain approval for the-

(a) fuses referred to in Regulation 91.04.2;

(b) intrinsically safe electric torches referred to in Regulation 91.04.3(1)(d);

(c) accurate time piece referred to in Regulations 91.04.4 and 91.04.5;

(d) first aid equipment referred to in Regulation 91.04.16;

(e) megaphones referred to in Regulation 91.04.24; and

(f) survival equipment referred to in Regulation 91.04.29.

(7) Aircraft with advanced cockpit automation systems (glass cockpits) must have system redundancy that provides the flight crew with attitude, heading, and airspeed and altitude indications in case of failure of the primary system or display.

91.04.2 Circuit protection devices

(1) No owner or operator of an aircraft in which fuses are used, shall operate the aircraft unless there are spare fuses available for use in flight equal to at least ten per cent or three, whichever is the greater, of the number of fuses of each rating required for complete circuit protection, which spare fuses shall be accessible to the flight crew during flight.

(2) If the ability to reset a circuit breaker or replace a fuse is essential to safety in flight, such circuit breaker or fuse shall be located and identified in such a manner that it can be readily reset or replaced in flight.

(3) No person shall deactivate a circuit breaker in flight other than in accordance with the aircraft flight manual referred to in Regulation 91.03.2.

91.04.3 Aircraft operating lights

(1) No owner or operator of an aircraft shall operate such aircraft by night, unless, in addition to the equipment specified in Regulation 91.04.4 or 91.04.5(1), whichever is applicable, the aircraft is equipped with-

(a) serviceable navigation lights;

(b) either-

(i) two serviceable landing lights; or

(ii) one single serviceable landing light housing with two separately energized filaments;

(c) a serviceable rotating beacon or strobe light; and

(d) a serviceable electrical torch for each required crew member, readily accessible to such crew member when seated at his or her designated station.

(2) Power supplied from the electrical system of the aircraft shall-

(a) provide adequate illumination for all instruments and equipment, used by the flight crew and essential for the safe operation of the aircraft; and

(b) be adequate to provide illumination in all passenger compartments, if any.

(3) No owner or operator of a helicopter shall operate the helicopter by night unless such helicopter is equipped with-

(a) in the case of a flight by night within 10 nautical miles, a light or lights providing adequate illumination both forward and downward to facilitate safe approaches, landings and take-offs; or

(b) in the case of a flight by night of more than 10 nautical miles, two landing lights or a single light having two separately energised filaments which are capable of providing adequate illumination both forward and downward to facilitate safe approaches, landings and take-offs.

(4) No owner or operator of a seaplane or an amphibious aircraft shall operate the seaplane or amphibious aircraft unless it is equipped with-

(a) the instruments and equipment referred to in sub-regulation (1), (2) or (3), as the case may be; and

(b) when operating on water by night, display lights to conform with the International Regulations for Prevention Collisions at Sea.

(5) The navigation lights to be displayed by aircraft by night, on the water or on the manoeuvring area of an aerodrome, shall be as prescribed in technical standard 91.06.10 of Document NAM-CATS 91.

91.04.4 Flight, navigation and associated equipment for aircraft operated under VFR

No owner or operator of an aircraft shall operate the aircraft in accordance with VFR, unless such aircraft is equipped with the following functioning equipment-

(a) a magnetic compass;

(b) an accurate time-piece showing the time in hours, minutes, and seconds;

(c) a sensitive pressure altimeter with a subscale setting, calibrated in hectopascal, adjustable for any barometric pressure setting likely to be encountered during flight;

(d) an airspeed indicator;

(e) if so required for use in designated airspace, a pressure-altitude reporting transponder, unless authorised by the responsible ATSU; and

(f) if to be operated by night, a chart holder in an easily readable position which can be illuminated.

91.04.5 Flight, navigation and associated equipment for aircraft operated under IFR

(1) No owner or operator of an aircraft shall operate the aircraft in accordance with IFR, unless such aircraft is equipped with functioning navigation equipment appropriate to the route to be flown and-

(a) a magnetic compass;

(b) an accurate time-piece showing the time in hours, minutes and seconds;

(c) for large aeroplanes, two independent sensitive pressure altimeter systems with subscale settings, calibrated in hectopascal, adjustable for any barometric pressure setting likely to be encountered during flight and for all other aircraft, one sensitive pressure altimeter with subscale settings, calibrated in hectopascal, adjustable for any barometric pressure setting likely to be encountered during flight;

(d) an airspeed indicator system with heated pitot tube or equivalent means for preventing malfunctioning due to either condensation or icing;

(e) a vertical-speed indicator;

(f) a stabilised direction indicator;

(g) a turn-and-bank indicator, or a turn co-ordinator incorporating a slip indicator;

(h) an attitude indicator and for large aeroplanes for which an individual certificate of airworthiness was first issued after 1 January 1975, an emergency power supply, independent of the main electrical generating system, for the purpose of operating and illuminating, for a minimum period of 30 minutes, an attitude indicator, clearly visible to the PIC. The emergency power supply shall be automatically operative after the total failure of the main electrical generating system and clear indication shall be given on the instrument panel that the attitude indicators) is being operated by emergency power;

(i) a means of indication, in the cockpit or in the flight deck, the outside air temperature in degrees Celsius;

(j) a chart holder in an easily readable position which can be illuminated for operations by night;

(k) a means of measuring and displaying whether the supply of power to the gyroscopic instruments is adequate; and

(l) a pressure-altitude reporting transponder.

(2) A person shall not operate an aircraft in an RVSM airspace unless such aircraft is equipped as specified in Document NAM-CATS 91.

(3) No owner or operator of a large pressurised aeroplane shall operate the aeroplane when carrying passengers at night or under IMC unless it is equipped with operative weather-detecting equipment capable of detecting thunderstorms whenever the aeroplane is being operated in areas where such conditions may be expected to exist along the route.

91.04.6 Additional equipment for single-pilot operation under IMC or at night

(1) No owner or operator of an aircraft shall conduct single-pilot operations in an aircraft under IMC or at night unless such aircraft has been certificated for single-pilot operations and-

(a) the single pilot flying is equipped with a headset with boom microphone or equivalent and has a transmit button positioned in such a way that it may be operated without the pilot having to remove his or her hands from the control wheel, joy stick or cyclic stick;

(b) the aircraft is equipped with a means of displaying charts that enables them to be readable in all ambient light conditions;

(c) if the aircraft is flown under IMC, such aircraft has been certificated for single pilot IFR operations and is equipped with a serviceable automatic flight control system with at least altitude hold and heading mode; or

(d) in the case of a helicopter, if it is flown at night under VMC, such helicopter is equipped with a serviceable automatic flight control system with at least altitude and heading mode or similar equipment: Provided that this requirement shall not apply to a helicopter operated in the circuit of the aerodrome of departure or over densely populated, well-lighted areas in accordance with the provisions of Regulation 91.06.32(2) but not higher than 3 500 feet above the prescribed minimum height.

(2) Nothing in this Regulation shall be construed as meaning that a flight under IFR or at night for the purpose of flight instruction conducted by an appropriately rated flight instructor would be a single-pilot operation, or that such a training flight, if conducted in terms of any of the Parts 93, 121, 127 or 135 would be required to be operated by two qualified pilots.

91.04.7 Mach number indicator

No owner or operator of an aircraft with speed limitations expressed in terms of Mach number shall operate the aircraft unless such aircraft is equipped with a Mach number indicator.

91.04.8 Radio altimeter

No owner or operator of a helicopter shall operate the helicopter on a flight over water at a distance from land corresponding to more than 10 minutes at normal cruise speed, unless such helicopter is equipped with a radio altimeter with an audio voice warning or other aural means of notifying the flight crew when operating below a preset height and with a visual warning capable of alerting the flight crew when operating below a preset height selectable by the flight crew.

91.04.9 Equipment for operations in icing conditions

(1) No owner or operator of an aircraft shall operate the aircraft in forecast or actual icing conditions unless such aircraft is certificated and equipped to operate in icing conditions.

(2) The owner or operator shall not operate the aircraft in forecast or actual icing conditions by night unless such aircraft is equipped with a means to illuminate or detect the formation of ice.

(3) The means of illumination referred to in sub-regulation (2), shall be of a type which does not cause glare or reflection which may handicap flight deck crew members in the performance of their duties.

(4) A flight to be planned or expected to operate in suspected or known ground icing conditions shall not take off unless the aircraft has been inspected for icing and, if necessary, has been subjected to appropriate ground de-icing. Accumulation of ice or other naturally occurring contaminants shall be removed so that the aeroplane is kept in an airworthy condition prior to take-off.

91.04.10 Flight recorders

(1) For the purposes of this regulation, any reference to-

(a) a specified date upon which an application for a type certification is submitted to a Contracting State means a date upon which such application is made for a new aircraft type, not a date of certification of particular aircraft variants or derivative models; and

(b) a specified date upon which an individual certificate of airworthiness is first issued means the first time a certificate of airworthiness is issued for a new individual aircraft serial number that has just come off assembly line.

(2) A person shall not operate an aircraft engaged in international general aviation operation which-

(a) is an aeroplane with a MTOW exceeding 5700 kg for which an individual certificate of airworthiness was first issued on or after 1 January 2005 unless such aeroplane is equipped with a Type 1A FDR that complies with the requirements prescribed in Document NAM-CATS 91;

(b) is an aeroplane with MTOW exceeding 27000 kg for which an individual certificate of airworthiness was first issued on or after 1 January 1989 unless such aeroplane is equipped with a Type 1 FDR that complies with the requirements prescribed in Document NAM-CATS 91;

(c) is a helicopter with MTOW exceeding 3180 kg for which an individual certificate of airworthiness was first issued on or after 1 January 2016 unless such helicopter is equipped with a Type IVA FDR that complies with the requirements prescribed in Document NAM-CATS 91; or

(d) is a helicopter with MTOW exceeding 7000 kg or having a passenger seating configuration of more than 19, for which an individual certificate of airworthiness was first issued on or after 1 January 1989 unless such helicopter is equipped with a Type IV FDR that complies with the requirements prescribed in Document NAM-CATS 91.

(3) A turbine-engine aeroplane with MCM exceeding 27 000 kg of which a prototype was type certificated by an appropriate authority after 30 September 1969, may not be operated in general aviation operations within Namibia unless such aeroplane is equipped with a Type II FDR that complies with the requirements prescribed in Document NAM-CATS 91.

(4) The following aircraft may only be operated if such aircraft is equipped with a CVR which complies with the requirements prescribed in Document NAM-CATS 91-

(a) a turbine-engine aeroplane with MTOW exceeding 5 700 kg for which an application for type certification was submitted to a Contracting State on or after 1 January 2016 and required to be operated by more than one pilot;

(b) an aeroplane with MTOW exceeding 27 000 kg for which an individual certificate of airworthiness was first issued on or after 1 January 1987;

(c) a helicopter with MTOW exceeding 7 000 kg: Provided that for helicopters not equipped with an FDR, at least the main rotor speed shall be recorded on a CVR; and

(d) an aeroplane of a maximum certificated take-off mass of over 5 700 kg, up to and including 27 000 kg, for which an individual certificate of airworthiness is first issued on or after 1 January 1987.

(5) A person shall not operate a turbine engine aeroplane for which a type certificate was first issued on or after 1 January 2016 and required to be operated by more than one pilot unless such aeroplane is equipped with either a CVR or a CARS.

(6) A person shall not operate an aircraft for which the individual certificate of airworthiness is first issued on or after 1 January 2016 and which is required to be fitted with a CVR or for aeroplanes, a CARS, unless the CVR or CARS, as applicable, is provided with an independent power source that complies with the requirements prescribed in Document NAM-CATS 91.

(7) A person shall not operate an aircraft for which the individual certificate of airworthiness was first issued on or after 1 January 2016, which utilises any data link communications and is required to carry a CVR, unless all data link communications messages to and from the aircraft are recorded on a data link recorder (DLR) or other flight recorder. The minimum recording duration shall be equal to the duration of the CVR and shall be correlated to the recorded cockpit audio.

(8) A person shall not operate an aircraft which is modified on or after 1 January 2016 to install and utilise any data link communications and is required to carry a CVR, unless the data link communications messages are recorded on a DLR or other flight recorder.

(9) An FDR required in terms of this Part shall be prescribed in Document NAM-CATS 91 and shall be capable of retaining the information recorded during at least-

(a) in the case of an aeroplane, the last 25 hours of its operation; or

(b) in the case of a helicopter, the last 10 hours of its operation.

(10) A CVR or CARS required by this regulation shall meet the specific recorded information time as prescribed in Document NAM-CATS 91.

(11) A person shall not use the following mediums to record any information or data required to be recorded in terms of this Part-

(a) engraving metal foil, photographic film and analogue using frequency modulation (FM) in FDRs;

(b) from 1 January 2016, magnetic tape in FDRs and magnetic tape and wire in CVRs.

(12) A flight recorder shall not be switched off during flight.

(13) A flight recorder installed in an aircraft shall meet the installation, crashworthiness and fire protection specifications prescribed in Document NAM-CATS 91 and shall 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, recorded data may be recovered in a preserved and intelligible state.

(14) An owner or operator of an aircraft shall ensure that retrieving the recorded data from the storage medium will be readily possible.

(15) A PIC, owner or operator of an aircraft shall ensure, to the extent possible, in the event an aircraft becomes involved in an accident or incident, that-

(a) all related flight recorder records, and if possible the associated flight recorders, are preserved and retained in safe custody pending their disposition to the accident or incident investigation team;

(b) a flight recorder is deactivated upon completion of flight time following an accident or incident; and

(c) a flight recorder is not reactivated before their disposition to the accident or incident investigation team.

(16) An owner or operator of an aircraft shall ensure that the quality assurance programme of an organisation responsible for the maintenance of his or her aircraft includes verification of the measurement range, recording interval and accuracy of parameters on installed flight recorder equipment.

(17) An owner or operator of an aircraft shall ensure that documentation concerning parameter allocation, conversion equations, periodic calibration and other serviceable or maintenance information is maintained by the organisation responsible for maintenance of his or her aircraft. The documentation shall be sufficient to ensure that accident investigation authorities have necessary information to read out the data in engineering units.

(18) An owner or operator of an aircraft shall-

(a) conduct daily and annual inspections of each flight recorder as specified in Document NAM-CATS 91; and

(b) record and retain the results of such check for a period of 5 years calculated from the date of such check.

(19) CVR and FDR referred to in this Part may be combined.

(20) An aircraft may commence a flight with FDR inoperative: Provided that-

(a) such aircraft shall not depart from an aerodrome where repairs or replacements to each FDR can be made;

(b) such aircraft does not exceed six further consecutive flights with an FDR unserviceable;

(c) not more than 48 hours have elapsed since such FDR became unserviceable;

(d) such FDR is not combined with CVR and an aircraft is equipped with CVR that is serviceable and functioning in accordance with the requirements prescribed in Document NAM-CATS 127{127~60}; and

(e) for aircraft with an approved MEL, such aircraft is operated in accordance with that MEL.

(21) An aircraft may commence a flight with CVR or CARS inoperative: Provided that-

(a) such aircraft shall not take-off from an aerodrome where repairs or replacements to such CVR can be made;

(b) such aircraft does not exceed six further consecutive flights with CVR unserviceable;

(c) not more than 48 hours have elapsed since such CVR became unserviceable;

(d) any FDR required to be carried is operative, unless such FDR is combined with a CVR;

(e) for aircraft with an approved MEL, such aircraft is operated in accordance with such MEL.

(22) An operator shall not use the recordings or transcripts of CVR, CARS, Class A AIR, and Class A AIRS for purposes other than the investigation of an accident or incident in terms of Part 12, except where the recordings or transcripts are:

(a) related to a safety-related event identified in the context of an SMS and are:

(i) restricted to the relevant portions of a de-identified transcript of the recording; and

(ii) subject to the protections stipulated in Part 140;

(b) sought for use in criminal proceedings not related to an event involving an aircraft accident or incident investigation and are subject to the protections stipulated in Part 140; or

(c) used for inspections of flight recorder systems as provided in Part 91 and it's associated Document NAM-CATS 91.

(23) An operator shall not use the recordings or transcripts of an FDR, an Aircraft Data Recording System as well as Class B and Class C AIR and AIRS for purposes other than the investigation of an accident or incident in terms of Part 12 except where a recording or a transcript is subject to the protections accorded by Part 140 and are:

(a) used by an operator for airworthiness or maintenance purposes;

(b) used by an operator in the operation of a flight data analysis programme required in this Part;

(c) sought for use in proceedings not related to an event involving an accident or incident investigation;

(d) de-identified; or

(e) disclosed under secure procedures.

Note: Provisions on the protection of safety data, safety information and related sources are contained in Part 140.

91.04.11 Seat, seat safety belt, harness, child restraint device and carriage of an infant

(1) A person shall not operate an aircraft unless such aircraft is equipped, as applicable, with-

(a) a seat or berth for each person who is aged two years or more;

(b) a safety belt with or without a diagonal shoulder strap, or a safety harness, for use in each passenger seat for each passenger who is aged two or more;

(c) a safety belt for use in each passenger berth;

(d) a child restraint device for the carriage of a child as prescribed in Document NAM-CATS 91;

(e) a safety harness for each flight crew member seat, incorporating a device which shall automatically restrain the occupant's torso in the event of rapid deceleration; and

(f) a safety harness for each cabin crew member seat: Provided that a safety belt with one diagonal shoulder strap is permitted if the fitting of a safety harness is not reasonably practical.

(2) A seat for any cabin crew member shall, where possible, be located near a floor-level emergency exit and any additional cabin crew member seat required shall be located such that a cabin crew member may best be able to assist any passenger in the event of an emergency evacuation: Provided such a seat shall be forward or rearward facing within 15° of the longitudinal axis of an aircraft.

(3) If a PIC cannot see all the passenger seats in an aircraft from his or her own seat, a means of indicating to all passengers and cabin crew members that seat belts should be fastened, shall be installed.

(4) A safety harness and safety belt shall have a single point release.

(5) A passenger shall not be allowed to be responsible for the safety of more than one infant on board aircraft.

91.04.12 Stowage of articles, baggage and cargo

No owner or operator of an aircraft shall operate the aircraft unless all articles, baggage and cargo carried on board, except those items in use by either the flight crew or by passengers, if such use is not prohibited in the interest of the safety of the aircraft or its occupants, are placed-

(a) in a manner which prevents movement likely to cause injury or damage and does not obstruct aisles and exits; or

(b) in stowages designed to prevent movement likely to cause injury or damage.

91.04.13 First aid and universal precaution kits

(1) No owner or operator of an aircraft used in general aviation operations shall operate the aircraft unless such aircraft is equipped with the first aid kit consisting of the medical supplies as prescribed in Document NAM-CATS 91.

(2) The owner or operator shall carry out periodical inspections of the first aid kit to ensure that, as far as practicable, the contents thereof are in a condition necessary for their intended use.

(3) The contents of the first aid kit shall be replenished at regular intervals, in accordance with instructions contained on their labels, or as circumstances require.

(4) The first aid kit shall be readily accessible to the crew or passengers.

(5) No owner or operator of an aircraft used in general aviation operations for which the maximum certificated passenger seating is 20 or more and on which is carried a cabin attendant shall operate the aircraft unless such aircraft is equipped with universal precaution kits specified in Document NAM-CATS 91.

(6) The contents of the universal precaution kits shall be as prescribed in Document NAM-CATS 91.

91.04.14 First aid oxygen

(1) No owner or operator of an aircraft in respect of which the carriage of a cabin crew member is required in terms of this Part, shall operate the aircraft unless such aircraft is equipped with the appropriate supply of first aid oxygen prescribed in Document NAM-CATS 91.

(2) The conditions, rules, requirements, procedures or standards for first aid oxygen shall be as prescribed in Document NAM-CATS 91.

91.04.15 Supplemental oxygen in case of pressurised aircraft

(1) No owner or operator of a pressurised aircraft shall operate the aircraft unless such aircraft is equipped with the supplemental oxygen as prescribed in Document NAM-CATS 91 and such oxygen may be used continuously whenever the circumstances for which its supply has been prescribed prevail.

(2) No owner or operator of a pressurised aircraft shall operate the aircraft above 25 000 feet unless all flight crew members have available at their flight duty station a quick-donning type of oxygen mask which will readily supply oxygen upon demand.

91.04.16 Supplemental oxygen in case of non-pressurised aircraft

(1) No owner or operator of a non-pressurised aircraft shall operate the 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 such aircraft is equipped with the supplemental oxygen as prescribed in Document NAM-CATS 91 and such oxygen may be used continuously whenever these circumstances prevail.

(2) The conditions, rules, requirements, procedures or standards for supplemental oxygen shall be as prescribed in Document NAM-CATS 91.

91.04.17 Flight crew protective breathing equipment

(1) No person shall operate a pressurised aeroplane or an unpressurised aeroplane with a MCM exceeding 5 700 kilograms and a maximum approved passenger seating configuration of more than 19 seats, at altitudes above 12 000 feet, unless such aeroplane-

(a) is equipped with equipment to protect the eyes, nose and mouth of each flight crew member while on flight deck duty and to provide oxygen for a period of at least 15 minutes;

(b) has sufficient portable protective breathing equipment to protect the eyes, nose and mouth of all cabin crew members required to be carried in terms of this Part and to provide breathing gas for a period of at least 15 minutes; and

(c) if no cabin crew member is carried, is equipped with portable protective breathing equipment to protect the eyes, nose and mouth of one member of the flight crew and to provide breathing gas for a period of at least 15 minutes.

(2) The supply for protective breathing equipment may be provided by supplemental oxygen referred to in Regulation 91.04.15 or 91.04.16.

(3) Protective breathing equipment intended for use by flight deck crew, shall be conveniently located on the flight deck and be easily accessible for immediate use by each required flight deck crew member at his or her assigned duty station.

(4) Protective breathing equipment intended for use by cabin crew shall be installed adjacent to each required cabin crew member duty station.

(5) Additional, easily accessible portable protective breathing equipment shall be provided and located at, or adjacent to, the hand fire extinguishers: Provided that where the fire extinguisher is located inside a cargo compartment, the protective breathing equipment shall be stowed outside, but adjacent to, the entrance to such compartment.

(6) Protective breathing equipment, while in use, shall not prevent communication, where required.

91.04.18 Fire extinguishers

No owner or operator of an aircraft shall operate the aircraft unless such aircraft is equipped with the appropriate fire extinguisher as prescribed in Document NAM-CATS 91.

91.04.19 Crash axes and crowbars

(1) No owner or operator of an aeroplane with a MCM exceeding 5 700 kilograms or a maximum approved passenger seating configuration of more than nine seats, shall operate the aeroplane unless such aeroplane is equipped with at least one crash axe or crowbar located on the flight deck.

(2) If the maximum approved passenger seating configuration is more than 200 seats, an additional crowbar shall be carried in the aeroplane and located out of sight in or near the most rearward galley area.

91.04.20 Marking of break-in points

The owner or operator of an aircraft shall ensure that, if areas of the fuselage suitable for break-in by rescue crews in emergency, are marked on the aircraft, such areas shall be marked in accordance with the requirements as prescribed in Part 47.

91.04.21 Megaphones

No owner or operator of an aircraft with a maximum approved passenger seating configuration of more than 60 seats and which is carrying one or more passengers, shall operate the aircraft unless such aircraft is equipped with the appropriate portable battery-powered megaphones as prescribed in Document NAM-CATS 91.

91.04.22 Emergency lighting

No owner or operator shall operate the aircraft unless such aircraft is equipped with the appropriate emergency lighting system as prescribed in Document NAM-CATS 91.

91.04.23 Emergency locator transmitters

(1) Except as provided in sub-regulation (3), no owner or operator of an aircraft specified in Document NAM-CATS 91 shall operate such aircraft unless it is equipped with one or more approved ELTs.

(2) The number and type of ELTs, the manner in which these shall be carried, the specifications to which they shall adhere, the frequencies on which they shall be able to transmit and the manner in which they shall be maintained are prescribed in Document NAM-CATS 91.

(3) The following aircraft are exempted from the requirement prescribed in sub-regulation (1)-

(a) aircraft engaged in flights remaining within a radius of 50 nautical miles from their point of departure;

(b) aircraft engaged in the aerial application of chemicals or other substances for agricultural purposes, and on flights incidental thereto;

(c) a new aircraft on a flight for a purpose associated with its manufacture and preparation for delivery, but not when on its delivery flight;

(d) an aircraft flown for the purpose of moving it to a place to have an approved ELT fitted, or a fitted ELT repaired, removed or overhauled: Provided that only the required flight crew members may be carried on board;

(e) an aircraft of which the ELT has been temporarily removed for inspection, repair, modification or replacement: Provided the necessary logbook entries have been made, a placard stating "ELT not installed or carried" has been installed in a position easily visible to the flight crew, and a period of 90 days is not exceeded;

(f) aircraft certified for research and development purposes;

(g) aircraft used for showing compliance with Regulations, or in crew training, air racing, air display or market surveys;

(h) aircraft with an approved seating configuration of not more than one person;

(i) aircraft operated in terms of Part 94; and

(j) any aircraft on a flight or a series of flights for which an exemption in writing has been granted by the Executive Director.

(4) The Executive Director shall maintain a register of all aircraft equipped with 406 MHz ELTs, which shall contain the following particulars-

(a) the nationality and registration marks of the aircraft;

(b) particulars of the manufacturer's designation and serial number of the aircraft;

(c) the full name and contact details of the registered owner of the aircraft;

(d) the make and model number/s of the ELT/s;

(e) the 15-digit Unique Identification Number (UIN) provided by the manufacturer of the ELT, or the aircraft's Mode S transponder code; and

(f) the name/s and contact details of the person/s who know/s the aircraft's itinerary and who may be contacted 24 hours a day.

(5) On the payment of the appropriate fee as prescribed in Part 187, an excerpt of the ELT register shall be furnished to any person who requests such an excerpt.

(6) For the registration, deregistration and changing of an ELT, the fee as prescribed in Part 187 is payable.

91.04.24 Life jackets and other flotation devices

(1) No person-

(a) shall operate an aeroplane other than an aeroplane referred to in paragraph (b)-

(i) when flying over water and beyond gliding distance of land in the case of the aeroplane not capable of continuing the flight to an aerodrome with the critical power-unit becoming inoperative at any point along the route or any planned diversion;

(ii) when taking off or landing at an aerodrome where the take-off or approach path is so disposed over water that in the event of an incident, there would be a likelihood of a ditching,

unless such aeroplane is equipped with a flotation device or a life jacket containing a survivor locator light, for each person on board, stowed in a position easily accessible, with safety belt fastened, from the seat or berth of the person for whose use it is provided, and an individual infant flotation device, containing a locator survival light for use by each infant on board;

(b) shall operate a seaplane or amphibious aeroplane unless such seaplane or amphibious aeroplane is equipped with-

(i) a flotation device or a life jacket containing a survivor locator light, for each person on board, stowed in a position easily accessible, with safety belt fastened, from the seat or berth of the person for whose use it is provided, and an individual infant flotation device, containing a survivor locator light, for use by each infant on board; and

(ii) life jackets, other than the life jackets referred to in subparagraph (i), for 20 per cent of the number of persons on board such seaplane or amphibious aeroplane, located in the passenger compartment near the emergency exits and readily accessible;

(c) shall operate a helicopter over water beyond autorotative distance from land, other than only for take-off and initial climb, or final approach and landing, unless-

(i) each person on board is wearing a life jacket containing a survivor locator light; and

(ii) an individual infant flotation device containing a locator survival light for use by each infant on board, stowed in a position easily accessible for the person in which care the infant is; and

(d) shall operate a free balloon or airship over a body of water that may pose a risk of drowning to any person on board such free balloon or airship unless the operator has put in place appropriate floatation devices or alternative drowning preventative measures.

(2) No person shall operate the following helicopters over water unless such helicopter is certificated as an amphibian helicopter or for ditching or is equipped with permanent or rapidly deployable emergency flotation equipment-

(a) a performance Class 3 helicopter operating below a height that would permit the helicopter to complete an autorotation to a landing on land in the event of an engine failure;

(b) a performance Class 1 or 2 helicopter operating in a hostile environment more than 10 minutes from land that would be unable to maintain flight to a suitable landing site in the event of an engine failure; or

(c) a performance Class 1 helicopter operating in a non-hostile environment at a distance from land equivalent to 30 minutes at normal cruising speed or 50 nautical miles, whichever is the lesser:

Provided that in the case of aerial spraying operations over water, the owner or operator may apply to the Executive Director for an exemption in terms of Part 11.

(3) Sea state shall be an integral part of ditching information.

91.04.25 Life rafts and survival radio equipment for extended over-water flights

No person shall operate an aircraft over water at a distance equivalent to 30 minutes at normal cruising speed or 50 nautical miles, whichever is the lesser, away from land unless such aircraft-

(a) is equipped with life rafts sufficient to accommodate all persons on board; and

(b) is equipped with the survival equipment and complies with the provisions as prescribed in Document NAM-CATS 91.

91.04.26 Survival equipment

No person shall operate an aircraft over areas where search and rescue would be especially difficult, unless such aircraft is equipped with the appropriate survival equipment and complies with the provisions as prescribed in Document NAM-CATS 91.

91.04.27 Seaplanes, amphibious aeroplanes and amphibious helicopters

No person shall operate a seaplane, amphibious aeroplane or amphibious helicopter on water, unless it is equipped with-

(a) a sea anchor and other equipment necessary to facilitate mooring, anchoring or manoeuvring such seaplane, amphibious aeroplane or amphibious helicopter on water, appropriate to its size, mass and handling characteristics; and

(b) equipment for making the sound signals prescribed in the International Regulations for Preventing Collisions at Sea, where applicable.

91.04.28 Airborne collision avoidance system

(1) Except as otherwise provided for in Part 121 and Part 135, no person may operate a turbine-engine aeroplane of a maximum certificated take-off mass in excess of 15 000 kg or authorized to carry more than 30 passengers, for which the individual certificate of airworthiness was first issued after 1 January 2007, unless such aeroplane is equipped with an ACAS that meets the specifications prescribed in Document NAM-CATS 91.

(2) No person shall operate an aeroplane required to be equipped with ACAS unless he or she has completed the training and checking as specified in Document NAM-CATS 91.

(3) ACAS training shall be provided through an approved training programme.

(4) Whenever an aircraft is equipped with an ACAS, such system shall-

(a) meet the specifications in, and function in accordance with, the relevant provisions of Document NAM-CATS 91; and

(b) when serviceable, be activated at all times during flight in all airspace, including oceanic, international, foreign and domestic airspace, even if in terms of these Regulations the carriage of ACAS equipment is not compulsory for that particular type of aircraft or the type of operation.

(5) Whenever an ACAS becomes unserviceable during flight when operation of ACAS is mandatory, the PIC of that aeroplane shall inform the responsible ATSU as soon as is practical.

(6) No pilot may act as PIC of a Namibian-registered aircraft during any period while an ACAS is activated unless such pilot is ACAS-current.

(7) When a flight crew receives a traffic avoidance instruction from an ATSU that is in conflict with the resolution advisory message issued by the aircraft's approved ACAS, the ACAS resolution advisory takes priority over the ATSU instruction.

(8) Document NAM-CATS 91 contains instructions in respect of ACAS operational use and event reporting.

(9) For the purpose of this Regulation, an ACAS-current pilot means a pilot who,-

(a) within the immediately preceding 12 months, completed initial ACAS II training;

(b) within the immediately preceding two (2) years, completed initial ACAS training and subsequently completed ACAS II renewal training more than 9 months and less than 12 months after the earlier training; or

(c) within the immediately preceding 12 months, completed a session of ACAS II cyclic training.

91.04.29 Cabin pressurisation

No person shall operate a pressurized aeroplane, for which the individual certificate of airworthiness was first issued on or after 1 January 1990, above 25 000 feet unless such aeroplane is equipped with a device to provide positive warning to the flight crew of any dangerous loss of pressurization.

91.04.30 Terrain awareness and warning systems

(1) Within six months from the commencement of these Regulations, a turbine-engine aeroplane of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than nine passengers operating according to the IFR shall be equipped with a TAWS which has a predictive terrain avoidance function that meets the requirements specified in Document NAM-CATS 91.

(2) A TAWS installed in turbine-engine aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than nine passengers for which the individual certificate of airworthiness was first issued after 1 January 2011 shall provide, as a minimum, warnings of at least the circumstances specified in Document NAM-CATS 91.

(3) Except as provided in sub-regulation (4), each TAWS required by sub-regulation (1) shall be functioning properly prior to flight.

(4) An aircraft may be operated without a functioning TAWS-

(a) as provided for in an approved MEL; or

(b) if repairs cannot be effected at the aerodrome last operated into, the aircraft is flown by the most direct routing to the nearest facility where the repairs can be made.

(5) A TAWS shall automatically provide a timely and distinctive warning to the flight crew when the aeroplane is in potentially hazardous proximity to the earth's surface.

91.04.31 RVSM operations

(1) An aircraft shall not enter an RVSM airspace unless –

(a) such aircraft has a valid RVSM specific approval issued by the Executive Director as prescribed in the Document NAM-CATS 91;

(b) its minimum RVSM equipment as specified in an approved MEL is serviceable;

(c) its flight crew has successfully completed RVSM training as prescribed in Document NAM-CATS 91; and

(d) such aircraft is operated as provided in an ATSU clearance to climb or descend through RVSM airspace to or from levels above RVSM flight level band.

(2) The requirements for the issue of an RVSM specific approval, including minimum equipment, maintenance, and crew training requirements, are specified in Document NAM-CATS 91.

(3) The Executive Director shall issue an RVSM specific approval only if the Executive Director is satisfied that –

(a) vertical navigation performance capability of an aircraft satisfies the requirements specified in Document NAM-CATS 91.

(b) an aircraft owner or operator has instituted appropriate procedures in respect of continued airworthiness, maintenance, and repair practices and programmes;

(c) an aircraft owner or operator has instituted appropriate flight crew procedures for operation in RVSM airspace;

(d) an aircraft is provided with equipment which is capable of –

(i) indicating, to a flight crew, a flight level being flown;

(ii) automatically maintaining a selected flight level;

(iii) providing an alert to flight crew when a deviation occurs from a selected flight level;

(iv) calibration of an alert system threshold which shall not exceed an approximate height of 300 ft;

(v) automatically reporting pressure-altitude; and

(e) in the event of the failure of one item of equipment at any stage of a flight, the remaining equipment will enable an aircraft to navigate in accordance with RVSM.

(4) In considering an application for an RVSM specific approval, the Executive Director may conduct an investigation deemed necessary to ascertain compliance with the requirements for RVSM operations prescribed in Document NAM-CATS 91.

(5) If the Executive Director is not so satisfied with compliance referred to in subregulation (4) the Executive Director shall notify an applicant for a concerned RVSM specific approval of the reasons for such dissatisfaction, and grant

such applicant an opportunity to rectify any shortcoming within a determined period, after which period the Executive Director may grant or refuse an application concerned.

(6) If the Executive Director is satisfied that an applicant has complied with the relevant requirements, the Executive Director shall issue an RVSM specific approval in the format as prescribed in Document NAM-CATS 91.

(7) The Executive Director shall maintain a register of all RVSM specific approvals issued in terms of this regulation.

(8) A register of RVSM specific approvals shall contain the following particulars, which shall be recorded in the register within 30 days from the date of issue of an RVSM specific approval:

(a) make, model, and registration marks of an aircraft;

(b) full names of owner of an aircraft or names of an air service licence holder and an air service licence number, where applicable;

(c) postal address of an RVSM specific approval holder; and

(d) date on which an RVSM specific approval was issued.

(9) A register of RVSM specific approval shall be kept in a safe place at the office of the Executive Director or at a location approved by the Executive Director.

(10) A copy of a register of RVSM specific approval shall be furnished to a person who requests such copy upon payment of the appropriate fee as prescribed in Part 187.

(11) A duplicate of RVSM specific approval may be issued upon application thereof by a holder of such RVSM specific approval or by an AMO approved under Part 145 and responsible for the servicing and maintenance of a concerned aircraft.

(12) An application for a duplicate RVSM specific approval shall –

(a) be made in the appropriate form as prescribed in Document NAM-CATS 91; and

(b) be accompanied by –

(i) data package referred to in Document NAM-CATS 91; and

(ii) the appropriate fee as prescribed in Part 187.

(13) A holder of an RVSM specific approval shall –

(a) report any occurrence involving poor height-keeping in an RVSM environment as specified in Document NAM-CATS 91 within 24 hours; and

(b) make an effective, timely response to each height-keeping error.

(14) An aircraft owner or operator authorised to operate in RVSM airspace shall ensure that as a minimum each aircraft type grouping of its fleet shall have their height-keeping performance monitored as defined in Document NAM-CATS 91 at least once every two years or within intervals of 1 000 flight hours per aircraft, whichever period is longer.

(15) An aircraft owner or operator found to be operating in an RVSM airspace, within or outside Namibia, without a valid specific approval shall be subjected to enforcement action.

SUBPART 5: COMMUNICATION AND NAVIGATION

91.05.1 Communication and surveillance equipment

(1) Except with prior written approval by the Executive Director, no aircraft shall be operated in designated airspace or under IFR unless such aircraft is equipped with radio communication equipment capable of

(a) two way communication at any time during the flight on such frequencies as prescribed by the appropriate authority; and

(b) receiving meteorological information at any time during flight.

(2) The radio communication equipment referred to in sub-regulation (1) shall be capable of providing communication on the aeronautical emergency frequency 121.5 MHz.

(2A) For operation where an RCP specification for PBC is prescribed, an owner or operator shall establish-

(a) normal and abnormal procedures, including contingency procedures for such operation;

(b) flight crew qualification and proficiency requirements, in accordance with appropriate RCP specifications;

(c) a training programme for relevant personnel consistent with the intended operations;

(d) appropriate maintenance procedures to ensure continued airworthiness in accordance with appropriate RCP specifications; and

(e) a monitoring programme to receive reports of observed communication performance for submission to the Executive Director.

(2B) For operations where surveillance equipment is required to meet RSP specifications for PBS, an aircraft shall, in addition to the requirements prescribed in sub-regulation (2A)-

(a) be provided with surveillance equipment which will enable it to operate in accordance with the prescribed RSP specifications;

(b) have information relevant to the aircraft RSP specification capabilities listed in the flight manual or other aircraft documentation approved by the State of Design or State of Registry; and

(c) have information relevant to the aircraft RSP specification capabilities included in the MEL where applicable.

(2C) For commercial operations, the procedures or information required by sub-regulations (2A) and (2B) shall be established and documented in the operations manual.

(3) An aircraft and aircraft navigation system operating in accordance with PBN requirements may be approved by the Executive Director for operation on the applicable RNP routing and in RNP designated airspace.

(4) Prior to operating an aircraft in a specific area, an operator or PIC shall ensure that such aircraft is equipped with a functional Mode C, Mode S, ADS-B or ADS-C transponder as appropriate for an operating area concerned.

(5) An owner or operator of an aircraft referred to in subregulation (2B) shall:

(a) establish a monitoring programme; and

(b) submit reports to the Executive Director of observed surveillance performance derived from information collected by the monitoring programme.

(6) The Executive Director shall take immediate corrective action for individual aircraft, aircraft types, or operators identified in such reports as not complying with the RSP specifications.

91.05.2 Navigation equipment

(1) A person shall not operate an aircraft unless such aircraft is equipped with navigation equipment enabling it to proceed in accordance with its flight plan, including approaches at a planned destination or any alternate aerodrome, and the appropriate ATS requirements: Provided that the provisions of this regulation shall not apply to a flight operated in accordance with VFR, if such flight can be accomplished by visual reference to landmarks.

(2) For the purposes of a helicopter, the landmarks referred to in subregulation (1) shall be no further apart than 60 nautical miles.

(3) An aircraft operated within a Namibian airspace shall be equipped as prescribed in Document NAM-CATS 91 and with sufficient navigation equipment to ensure that in the event of a failure of one item of equipment at any stage of a flight, a remaining equipment enables such aircraft to proceed with such flight.

(4) A navigation equipment referred to in subregulation (3) shall be installed in such a way that a failure of any single unit required for either navigation or communication purpose or both will not result in a failure of another unit required for navigation or communication purpose.

(5) An aircraft and aircraft navigation system operating in accordance with RNP requirements shall be approved by the Executive Director for operation on the applicable RNP rouging and in RNP designated airspace.

(6) A person shall not operate an aircraft in an airspace where minimum navigation performance or PBN specifications apply, unless such aircraft is equipped with navigation equipment that meets the performance specifications as prescribed in Document NAM-CATS 91.

(7) If an aircraft is required to be operated by two pilots, a navigation equipment referred to in subregulation (3) shall be visible and usable by each pilot seated at his or her duty station.

(8) A person may not use inertial navigation or reference systems for navigation unless approved under Parts 93, 121, 127 or 135, as may be applicable.

(9) A person may not operate an aircraft under IFR using any system required for navigation unless such system is maintained, checked and inspected under a procedure approved in terms of this Part.

(10) A person shall not use a navigation system based on electronic data unless-

(a) procedures are implemented that ensure the timely distribution and insertion of current and unaltered electronic navigation data to all aircraft that require it;

(b) the source of the data is-

(i) a manufacturer of an aircraft concerned;

(ii) a manufacturer of a concerned navigation system; or

(iii) a supplier approved by the Executive Director or a manufacturer of a concerned aircraft or navigation system; and

(c) procedures are implemented to verify the accuracy and validity of the data received.

91.05.3 Use of global navigation satellite system

(1) No person shall operate an aircraft using a GNSS as a means of navigation unless-

(a) the GNSS equipment meets the airworthiness criteria prescribed in Document NAM-CATS 91;

(b) all flight crew members required by Regulation or the type certificate of the aircraft being flown have received the training and checking specified in Document NAM-CATS 91; and

(c) the procedures specified in Document NAM-CATS 91 are followed.

(2) In order to fly published RNAV (GNSS) arrivals, departures and approach procedures; the PIC shall ensure that-

(a) the air navigation routes to be flown are contained in the database of the aircraft; and

(b) the information contained in the aircraft database is current.

(3) The PIC shall fly the instrument departure of a FMS equipped aircraft without the capability of manually setting the course direction indicator (CDI), with the aid of a flight director.

(4) Helicopter-only RNAV (GNSS) departure procedures shall be flown at 70 knots or less.

(5) Upon clearance for the approach by the appropriate ATSU, the pilot shall select the appropriate aerodrome, the runway approach procedure and the initial approach fix on the RNAV system to determine the validity of the RAIM for such approach.

91.05.4 Operational criteria for use of RNAV/BARO VNAV systems

(1) No person may conduct RNAV/BARO vertical navigation (VNAV) operations unless approved by the Executive Director in terms of the operational provisions specified in Document NAM-CATS 91.

(2) An aircraft equipped with a RNAV/BARO VNAV system approved by the Executive Director for the appropriate level of RNAV/BARO VNAV operations, may be used to conduct RNAV/BARO VNAV approaches if-

(a) the RNAV/BARO VNAV equipment is serviceable;

(b) the aircraft and aircraft systems are appropriately certified for the intended RNAV/BARO VNAV approach operations and the aircraft is equipped with an integrated LNAV system with an accurate source of barometric altitude; and

(c) the VNAV altitudes and all relevant procedural and navigational information are retrieved from a current navigation database whose integrity is supported by approved appropriate quality assurance measures.

SUBPART 6: RULES OF THE AIR

Division One: Flight Rules

91.06.1 Landing on roads

(1) No person shall use a public road as a place of landing or take-off in an aircraft, except-

(a) in the case of an emergency involving the safety of the aircraft or its occupants;

(b) for the purpose of saving human lives; or

(c) when involved in civil defence or law-enforcement operations: Provided that at all times reasonable care is taken for the safety of others with due regard to the prevailing circumstances.

91.06.2 Dropping objects, spraying or dusting

Except in an emergency or unless granted special permission by the Executive Director or approved by an ATSU, no article shall be dropped from an aircraft in flight other than-

(a) fine sand or clean water used as ballast; or

(b) chemical substances for the purpose of spraying, dusting or cloud seeding.

91.06.3 Picking up objects

The PIC of an aircraft in flight shall not permit objects to be picked up except with the prior written approval of the Executive Director.

91.06.4 Towing

The PIC of an aircraft in flight shall not permit anything to be towed by the aircraft except with the prior written approval of the Executive Director.

91.06.5 Operation of vehicle- or vessel-towed aircraft

(1) Except with the prior written approval of the Executive Director and subject to such conditions as he or she may impose, an aircraft which is intended, for purposes of flight, to be towed by a vehicle or vessel travelling on the surface or to be moored on the surface, shall not-

- (a) be flown higher than 150 feet above the surface on which the towing vehicle or vessel is travelling or to which such aircraft is moored;
- (b) be flown closer than five nautical miles from the boundary of an aerodrome; or
- (c) take-off from, land on or be flown above any public road.

(2) The provisions of sub-regulation (1)(a) and (b) shall not apply to the winching or towing of gliders at the aerodrome of departure.

91.06.6 Proximity and formation flights

(1) No person shall operate an aircraft in formation flight while carrying passengers for commercial purposes or, except as provided in sub-regulation (2),-

- (a) in such proximity to other aircraft so as to create a collision hazard;
- (b) in formation flight, except by arrangement with the PIC of each aircraft in the formation; or

(2) Formation flight in controlled airspace may be approved by an ATSU: Provided that-

- (a) the formation operates as a single aircraft with regard to navigation and position reporting;
- (b) separation between aircraft in the flight shall be the responsibility of the flight leader and the pilots-in-command of the other aircraft in the flight and shall include periods of transition when aircraft are manoeuvring to attain their own separation within the formation and during join-up and breakaway; and

(c) a distance not exceeding 1 km (0.5 NM) laterally and longitudinally and 30 m (100 ft) vertically from the flight leader shall be maintained by each aircraft.

(3) Formation flight for display purposes may be approved by the Executive Director.

91.06.7 Right of way

(1) An aircraft which has the right-of-way, shall maintain its heading and speed, but nothing in these provisions shall relieve the PIC of an aircraft from the responsibility of taking such action as will best avert collision, including collision avoidance manoeuvres based on resolution advisories provided by ACAS equipment.

(2) An aircraft which is obliged, by the provisions of this Subpart, to keep out of the way of another aircraft, shall avoid passing over or under the other aircraft, or crossing ahead of such aircraft, unless passing well clear, taking into account the effects of wake turbulence.

(3) When two aircraft are approaching head-on or approximately so and there is danger of collision, each aircraft shall alter its heading to the right.

(4) When two aircraft are converging at approximately the same level, the aircraft which has the other aircraft on its right, shall give way, except in the following circumstances-

(a) power-driven heavier-than-air aircraft shall give way to airships, gliders and balloons;

(b) airships shall give way to gliders and balloons;

(c) gliders shall give way to balloons;

(d) power-driven aircraft shall give way to aircraft which are-

(i) seen to be towing other aircraft or objects;

(ii) carrying an underslung load or are engaged in winching operations; and

(iii) being towed or tethered.

(5) An aircraft which is being overtaken has the right-of-way and the overtaking aircraft, whether climbing, descending or in horizontal flight, shall keep out of the way of the overtaken aircraft by altering its heading to the right, and no subsequent change in the relative positions of the two aircraft shall absolve the overtaking aircraft from its obligation until such aircraft is entirely past and clear: Provided that where a right-hand circuit is being followed at an aerodrome, the overtaking aircraft shall alter its heading to the left.

(6) An aircraft in flight or operating on the ground or water, shall give way to other aircraft landing or on final approach to land.

(7) When two or more heavier-than-air aircraft are approaching an aerodrome for the purpose of landing, the aircraft at the higher level shall give way to the aircraft at the lower level, but-

(a) the latter aircraft shall not take advantage of this provision to cut in front of another aircraft which is on final approach to land, or to overtake such aircraft; and

(b) power-driven heavier-than-air aircraft shall give way to gliders in all circumstances.

(8) An aircraft about to take-off, shall not attempt to do so until there is no apparent risk of collision with other aircraft.

(9) An aircraft which is aware that another aircraft is compelled to land, shall give way to such aircraft.

(10) For the purposes of this Regulation, an overtaking aircraft is an aircraft which approaches another aircraft from the rear on a line forming an angle of less than 70 degrees with the plane of symmetry of the latter aircraft, and will therefore be in such position with reference to the other aircraft, that by night it should be unable to see either of the other aircraft's wingtip navigation lights.

91.06.8 Following line features

An aircraft flying at or below 1 500 feet above the surface and following a power line, a road, a railway line, a river, a coastline or any other line feature within one nautical mile of such line feature, shall fly to the right of such line, road, railway line, river, coastline or other line feature, except when the aircraft is instructed to do otherwise by an ATSU.

91.06.9 Aircraft speed

(1) Unless otherwise authorised by the Executive Director, no person shall, outside controlled airspace and below flight level 100, fly an aircraft at an indicated air speed of more than 250 knots.

(2) Unless otherwise authorised or required by an ATSU, no person shall fly an aircraft within a control zone or an aerodrome traffic zone at an indicated air speed of more than-

(a) 160 knots, in the case of a reciprocating-engine aircraft; or

(b) 200 knots, in the case of a turbine-powered aircraft:

Provided that if the minimum safe indicated air speed for a particular flight is greater than the maximum indicated air speed prescribed in this Regulation, the aircraft may be flown at the minimum safe indicated air speed.

91.06.10 Lights to be displayed by aircraft

(1) Except as provided by sub-regulation (4) and unless the aircraft was initially type-certificated without such lights or is a non-type certificated aircraft approved without such lights, all aircraft shall display-

(a) while operating in flight during the day and at all times at night, anti-collision lights intended to attract attention to the aircraft;

(b) while operating during night, navigation lights intended to indicate the relative path of the aircraft to an observer;

(c) while operating on the movement area of an aerodrome, lights intended to attract attention to the aircraft, as specified in the IAIP; and

(d) while operating with engines running on the movement area of an aerodrome, display a rotating beacon to indicate that fact.

(2) Except as provided by sub-regulation (4)-

(a) all aircraft moving on the movement area of an aerodrome during night shall display navigation lights intended to indicate the relative path of the aircraft to an observer; and

(b) unless stationary and otherwise adequately illuminated, all aircraft on the movement area of an aerodrome during night shall display lights intended to indicate the extremities of their structure.

(3) In respect of sub-regulations (1)(b) and (2)(a), other lights shall not be displayed if they are likely to be mistaken for these lights.

(4) A pilot shall be permitted to switch off or reduce the intensity of any flashing lights fitted to meet the requirements of sub-regulations (1), (2) and (3) if they do or are likely to-

(a) adversely affect the satisfactory performance of duties; or

(b) subject an outside observer to harmful dazzle.

(5) The lights which shall be displayed by aircraft by day, night, on water or on the manoeuvring area of an aerodrome, are prescribed in Document NAM-CATS 91.

91.06.11 Taxi rules

(1) Aircraft which are landing or taking off, shall be given right of way by other aircraft and by vehicles.

(2) An aircraft shall, after landing, unless otherwise authorised or instructed by an ATSU, be moved clear of the runway in use, as soon as it is safely possible to do so.

(3) A vehicle which is towing an aircraft shall be given right of way by vehicles and by other aircraft which are not landing or taking off.

(4) An aircraft shall be given right of way by a vehicle which is not towing an aircraft.

(5) An aircraft or vehicle which is obliged by the provisions of this Regulation to give right of way to another aircraft, shall, if necessary in the circumstances in order to do so, reduce its speed or stop.

(6) If danger of collision exists between an aircraft or vehicle and another aircraft or vehicle, such of the following procedures as may be appropriate in the circumstances, shall be applied:

(a) When the two are approaching head-on or nearly head-on, each shall turn to the right;

(b) when one is overtaking the other, the one which is overtaking shall keep out of the way of the other by turning to the right, and no subsequent change in the relative positions of the two shall absolve the one which is overtaking from this obligation, until it is finally past and clear of the other;

(c) when the two are converging, the one which has the other on its right, shall give way to the other and shall avoid crossing ahead of the other unless passing well clear of it.

(7) A vehicle moving along a runway or taxiway, shall as far as practicable keep to the right side of the runway or taxiway.

(8) When an aircraft is being towed, the person in charge of the towing vehicle shall be responsible for compliance with the provisions of this Regulation.

(9) An aircraft operated on a controlled aerodrome shall not taxi on the manoeuvring area without clearance from the aerodrome control tower and shall comply with any instructions given by that unit.

(10) An aircraft taxiing on the manoeuvring area of an uncontrolled aerodrome shall taxi in accordance with the ground control procedures which may be in force at such aerodrome.

(11) While taxiing, an aircraft shall-

(a) stop and hold at all runway-holding positions unless otherwise authorized by the aerodrome control tower; and

(b) stop at all lighted stop bars and may proceed further when the lights are switched off.

(12) Nothing in this Regulation shall relieve the PIC of an aircraft or the person in charge of a vehicle, from the responsibility for taking such action as will best aid to avert collision.

91.06.12 Operation on and in vicinity of aerodrome

(1) The PIC of an aircraft operated on or in the vicinity of an aerodrome, shall be responsible for compliance with the following rules-

(a) observe other aerodrome traffic for the purpose of avoiding collision;

(b) conform with or avoid the pattern of traffic formed by other aircraft in operation;

(c) make all turns to the left when approaching for a landing and after taking off, unless otherwise instructed by an ATSU, or unless a right hand circuit is in force: Provided that a helicopter may, with due regard to other factors and when it is in the interest of safety, execute a circuit to the opposite side;

(d) land and take off, as far as practicable, into the wind unless safety, the runway configuration or air traffic considerations dictate that a different direction is preferable, or unless otherwise instructed by an ATSU; and

(e) fly across the aerodrome or its environs at a height of not less than 2 000 feet above the level of such aerodrome: Provided that if circumstances require such PIC to fly at a height of less than 2 000 feet above the level of the aerodrome, he or she shall conform with the traffic pattern at such aerodrome.

(2) If an aerodrome control tower is in operation, the PIC shall also, whilst the aircraft is within the aerodrome traffic zone-

(a) maintain a continuous radio watch on the frequency of the aerodrome control tower responsible for providing aerodrome control service at the aerodrome, establish two way radio communication as necessary for aerodrome control purposes and obtain such clearances for his or her movements as may be necessary for the protection of aerodrome traffic; or

(b) if this is not possible, keep a watch for and comply with such clearances and instructions as may be issued by visual means.

(3) If an aerodrome flight information service unit is in operation, the PIC shall also, whilst the aircraft is within the aerodrome traffic zone-

(a) maintain a continuous radio watch on the frequency of the aerodrome flight information service unit responsible for providing aerodrome flight information service at the aerodrome, establish two-way radio communication as necessary for aerodrome flight information service purposes and obtain information in respect of the surface wind, runway in use and altimeter setting and in respect of aerodrome traffic on the manoeuvring area and in the aerodrome traffic zone; or

(b) if this is not possible, keep a watch for visual signals which may be displayed or may be issued by the aerodrome flight information service unit.

(4) An aircraft which is unable to communicate by radio shall, before landing at an aerodrome, make a circuit of the aerodrome for the purpose of observing the traffic, and reading such ground markings and signals as may be displayed thereon, unless it has the consent of the appropriate ATSU to do otherwise.

91.06.13 Signals

(1) The PIC of an aircraft in flight shall, upon observing or receiving any of the signals as prescribed in Document

NAM-CATS 91, take such action as may be required by the interpretation of the signal as prescribed in Document NAM-CATS 91.

(2) No person may perform the functions of a signalman unless trained and qualified to carry out such functions as contained in Document NAM-CATS 91.

(3) Any person acting as a signalman shall be responsible for providing the standard marshalling signals, as prescribed in Document NAM-CATS 91, to aircraft in a clear and precise manner.

91.06.14 Water operations

(1) When two aircraft or an aircraft and a vessel are approaching one another and there is a risk of collision, the aircraft shall proceed with careful regard to existing circumstances and conditions including the limitations of the respective craft.

(2) An aircraft which has another aircraft or a vessel on its right shall give way so as to keep well clear.

(3) An aircraft approaching another aircraft or a vessel head-on, or approximately so, shall alter its heading to the right to keep well clear.

(4) An aircraft or vessel which is being overtaken has the right of way, and the one overtaking shall alter its heading to keep well clear.

(5) Aircraft landing on or taking off from the water shall, insofar as practicable, keep well clear of all vessels and avoid impeding their navigation.

(6) All aircraft on the water shall display lights between sunset and sunrise as prescribed in document NAM-CATS 91.

(7) In areas in which the International Regulations for Preventing Collisions at Sea are in force, aircraft operated on the water shall comply with the provisions thereof.

91.06.15 Reporting position

(1) The PIC of an aircraft-

(a) flying in controlled airspace;

(b) flying in advisory airspace; or

(c) on a flight for which alerting action is being provided,

shall ensure that reports are made to the responsible ATSU, as soon as possible, of the time and level of passing each compulsory reporting point, together with any other required information, and he or she shall further ensure that position reports are similarly made in relation to additional reporting points, if so requested by the responsible air traffic service unit and that, in the absence of designated reporting points, position reports are made at the intervals specified by the responsible air traffic service unit or published by the Executive Director in terms of Part 175 for that area.

(2) Controlled flights providing position information to the appropriate ATSU via data link communications shall only provide voice position reports when requested.

91.06.16 Mandatory radio communication in controlled airspace

The PIC of an aircraft shall ensure that before the aircraft enters a controlled airspace, two-way radio contact is established with the responsible ATSU on the designated radio frequency, and shall ensure, while the aircraft is within, and until it leaves, the controlled airspace, that continuous radio watch is maintained and that such further two-way radio communication as such ATSU may require, is established: Provided that-

(a) the ATSU may permit an aircraft not capable of maintaining continuous two-way radio communication, to fly in the control area, TMA, control zone or aerodrome traffic zone for which it is responsible, if traffic conditions permit, in which case the flight shall be subject to such conditions as such ATSU deems necessary to ensure the safety of other air traffic; and

(b) in the case of radio failure, a flight for which an air traffic service flight plan was filed and activated by the ATSU on receipt of a departure time, may continue in controlled airspace if the communication failure procedures specified in Document NAM-CATS 91 are complied with.

91.06.17 Mandatory radio communication in advisory airspace

The PIC of an aircraft shall ensure that before the aircraft approaches or enters an advisory airspace-

(a) two-way radio communication with the responsible ATSU is established on the designated radio frequency;

(b) if such communication is not possible, two-way radio communication is established with any ATSU which is capable of relaying messages to and from the responsible ATSU; or

(c) if such communication is not possible, broadcasts are made on the designated radio frequency giving information on the aircraft's intention to enter the airspace, and such PIC shall ensure that, while the aircraft is within the advisory airspace and until it departs there from, a continuous radio watch is maintained on the designated radio frequency and that-

  (i) such further two-way radio communication as the responsible ATSU may require, is established with any other ATSU which is capable of relaying messages to and from such responsible ATSU;

  (ii) if such communication is not possible, such further two-way radio communication is established with any other ATSU which is capable of relaying messages to and from the responsible ATSU, as such responsible ATSU may require; or

  (iii) if such communication is not possible, broadcasts are made on the designated radio frequency giving information on passing reporting points and when leaving the airspace concerned: Provided that-

    (aa) an aircraft maintaining a Selcal watch while operating within an advisory route in the Namibian flight information region and whose Selcal callsign has been communicated to the Namibian flight information centre, shall be deemed to be maintaining a continuous radio watch; and

    (bb) in the case of a radio failure, a flight for which an air traffic service flight plan was filed and activated by an ATSU on receipt of a departure time, may continue in advisory airspace if the communication failure procedures specified in technical standard 91.06.16 of Document NAM-CATS 91 are complied with.

91.06.18 Compliance with rules of air and air traffic control clearances and instructions

(1) The operation of an aircraft either in flight or on the movement area of an aerodrome shall be in compliance with the general operating rules in this Part and, in addition, when in flight, either in VFR or IFR.

(2) The pilot of an aircraft shall-

(a) comply with any air traffic control clearance which is obtained, unless the pilot obtains an amended clearance;

(b) operate the aircraft in accordance with any instruction issued by an ATSU in an area in which an air traffic control service is provided; and

(c) when deviating from an air traffic control clearance or instruction, notify the ATSU of the deviation, as soon as practicable.

(3) The pilot of an aircraft shall include the information specified in Document NAM-CATS 91 when requesting a deviation from an air traffic control clearance or flight planned altitude or route.

(4) Nothing in these Regulations shall relieve the PIC of an aircraft from the responsibility of taking such action, including collision avoidance manoeuvres based on resolution advisories by ACAS equipment, as will best avert a collision.

91.06.19 Prohibited areas

(1) The Executive Director may, by notice in the IAIP, declare any area to be a prohibited area and shall, when so declaring an area to be a prohibited area-

(a) specify a height above the ground surface of such area; or

(b) specify an altitude in respect of such area, as the Executive Director may deem expedient, in the notice in question.

(2) No person shall fly any aircraft whatsoever in the air space above a prohibited area-

(a) below the height specified in terms of sub-regulation (1)(a); or

(b) below the altitude specified in terms of sub-regulation (1)(b), as the case may be, in respect of the prohibited area in question.

91.06.20 Restricted areas

(1) The Executive Director may by notice in the IAIP declare any area to be a restricted area and shall, when so declaring an area to be a restricted area, specify in the notice in question-

(a) the nature and extent of the restriction applicable in respect of the area in question; and

(b) the authorisation under which flights in such restricted area shall be permitted.

(2) No person shall, in contravention of a restriction contemplated in sub-regulation (1)(a), fly any aircraft to which the said restriction applies, in any restricted area, unless the flight in question has been permitted by virtue of an authorisation contemplated in sub-regulation (1)(b).

Division Two: Visual flight rules

91.06.21 Visibility and distance from cloud

(1) Every VFR flight shall be so conducted that the aircraft is flown with visual reference to the surface by day and to identifiable objects by night and at no time above more than three eighths of cloud within a radius of five nautical miles of such aircraft and-

(a) in the case of aircraft excluding helicopters operating under conditions of visibility and distance from cloud equal to, or greater than, the conditions specified in tables 1 and 2-

Table 1

Airspace	Forward Flight visibility	Distance from clouds	Ground visibility and ceiling
Control zones	Five km	Horizontally: 600 metres Vertically: 500 feet	No aircraft shall take-off from, land at, or approach to land at an aerodrome or fly within the control zone when the ground visibility at the aerodrome concerned is less than five km and the ceiling is less than 1 500 feet.[(1)]
Within an aerodrome traffic zone (which does not also comprise a control zone or part of a control zone)	Five km	Horizontally: 600 metres Vertically: 500 feet	No aircraft shall take-off from, land at or approach to land at an aerodrome or fly within the aerodrome traffic zone when the ground visibility within such aerodrome traffic zone is less than five km and the ceiling is less than 1500 feet.

Table 2

In Airspaces other than those specified in Table 1

Airspace class	Altitude band	Forward Flight visibility	Distance from cloud
C F G	At and above 10 000 feet above MSL	8 km	1 500 m horizontally 1 000 ft vertically
C F G	Below 10 000 feet AMSL and above 3 000 ft above MSL, or above 1 000 feet above terrain, whichever is the higher	5 km	1 500 m horizontally 1 000 ft vertically
C		5 km	1 500 m horizontally 1 000 ft vertically

F G	At and below 3 000 feet above MSL, or 1 000 feet above terrain, whichever is the higher	5 km	Clear of cloud and with the surface in sight

Provided that the minima specified in Table 1 are not applicable when entering or leaving a CTR and the flight has received clearance from an ATSU to operate under Special VFR minima as referred to in Regulation 91.06.22.

(b) in the case of helicopters, under conditions of visibility and distance from cloud equal to, or greater than, those conditions specified in Tables 3 and 4:

Table 3

Airspace	Flight visibility	Distance from clouds	Ground visibility and ceiling
Control zones	5 km	Horizontally: 300 m Vertically: Clear of cloud	Except when operating under a SVFR clearance no helicopter shall take-off from, land at, or approach to land at an aerodrome or fly within the control zone when the ground visibility at the aerodrome concerned is less than 5 000 metres and the ceiling is less than 1 500 ft
Within an aerodrome traffic zone (which does not also comprise a control zone or part of a control zone)	5 km	Horizontally: 300 m Vertically: Clear of cloud	No helicopter shall take-off from, land at, or approach to land at an aerodrome or fly within the aerodrome traffic zone when the ground visibility at the aerodrome concerned is less than 5 000 metres and the ceiling is less than 1 500 ft

Table 4

In Airspaces other than those specified in Table 3

Airspace class	Altitude band	Flight visibility	Distance from cloud
C F G	At and above 10 000 feet above MSL	8 km	1 500 m horizontally 1 000 ft vertically
C F G	Below 10 000 ft AMSL and above 3 000 feet above MSL, or above 1 000 feet above terrain, whichever is the higher	5 km	1 500 m horizontally 1 000 ft vertically
C	At and below 3 000 feet above MSL, or 1 000 feet above terrain, whichever is the higher	2 500 m	1 500 m horizontally 1 000 ft vertically
FG		1 500 m unless in accordance with (iii) below	Clear of cloud and with the surface in sight

Provided that:

(i) the limitations as contained in Table 3 shall not prevent a helicopter from conducting hover-in-ground-effect or hover-taxi operations within the confines of a controlled aerodrome or heliport, if the visibility is not less than 100 m;

(ii) the minima specified in Table 3 are not applicable when a helicopter is entering or leaving a CTR and such flight has received clearance from an ATSU to operate under Special VFR minima as prescribed in Regulation 91.06.22; and

(iii) helicopters shall be permitted to operate in less than 1 500 m flight visibility outside of controlled airspace, if manoeuvred at a speed that will give adequate opportunity to observe other traffic or any obstacles in time to avoid collision.

(2) VFR flight is not permitted-

(a) at transonic or supersonic speed; or

(b) in Class A airspace.

91.06.22 Special VFR weather minima

(1) A PIC of an aeroplane may only conduct Special VFR operations in weather conditions below the conditions prescribed in Regulation 91.06.21 within a control zone (CTR)-

(a) under the terms of an air traffic control clearance;

(b) by day only;

(c) with a cloud ceiling of at least 600 feet and visibility of at least 1 500m, measured from the aerodrome reference point;

(d) when the Special VFR flight will not unduly delay an IFR flight;

(e) if the aeroplane is equipped with two way radio equipment capable of communicating with an ATSU on the appropriate frequency; and

(f) if leaving the control zone, in accordance with instructions issued by an ATSU prior to departure.

(2) A PIC of a helicopter may only conduct Special VFR operations in weather conditions below the conditions referred to in Regulation 91.06.21 within a CTR -

(a) under the terms of an air traffic control clearance;

(b) by day only with a cloud ceiling of at least 300 ft and visibility of at least 800 m offshore;

(c) when clear of clouds;

(d) if a helicopter will be operated at such a speed that its pilot has adequate opportunity to observe any obstructions or other traffic in sufficient time to avoid collisions;

(e) if a flight can be conducted in accordance with Regulation 91.06.32 with regard to minimum height; and

(f) when a Special VFR flight will not unduly delay an IFR flight.

91.06.23 VFR flight determination and weather deterioration

(1) The PIC of an aircraft operating outside a control zone or an aerodrome traffic zone is responsible to ascertain whether or not weather conditions permit flight in accordance with VFR.

(2) Whenever weather conditions do not permit a pilot to maintain the minimum distance from cloud and the minimum visibility required by VFR, the pilot shall-

(a) if in controlled airspace, request an amended clearance enabling the aircraft to continue in VMC to the nearest suitable aerodrome, or to leave the airspace within which an ATC clearance is required;

(b) if no clearance in accordance with paragraph (a) can be obtained, continue to operate in VMC and land at the nearest suitable aerodrome, notifying the appropriate ATC unit of the action taken;

(c) if operating within a control zone, request authorization to operate as a special VFR flight; or

(d) request clearance to operate in accordance with the IFR.

Division Three: Instrument Flight Rules

91.06.24 Compliance with IFR

A flight conducted above flight level 200 shall be flown in compliance with IFR as prescribed in this Subpart.

91.06.25 Aircraft equipment

Aircraft shall be equipped with suitable instruments and radio navigation apparatus appropriate to the route to be flown and in accordance with the provisions of Subpart 5.

91.06.26 Change from IFR flight to VFR flight

(1) The PIC of an aircraft who elects to change the conduct of flight of the aircraft from compliance with IFR to compliance with VFR shall, if a flight plan was submitted for the flight, notify the ATSU concerned that the IFR flight is cancelled and communicate to such ATSU the intended changes to be made to the current flight plan.

(2) When an aircraft operating under IFR is flown in or encounters VMC, the PIC shall not cancel its IFR flight unless it is anticipated, and intended, that the flight will be continued for a reasonable period in uninterrupted VMC.

91.06.27 IFR procedures

(1) Unless otherwise authorised by the responsible ATSU, aircraft flown in compliance with the rules contained in this Division, shall comply with IFR procedures applicable in the relevant airspace.

(2) Unless otherwise authorized by the appropriate ATS authority, or directed by the appropriate air traffic control unit, controlled flights shall, insofar as practicable-

(a) when on an established ATS route, operate along the defined centre line of that route; or

(b) when on any other route, operate directly between the navigation facilities and/or points defining that route.

(3) An aircraft operating along an ATS route segment defined by reference to VHF omnidirectional radio ranges shall change over for its primary navigation guidance from the facility behind the aircraft to that ahead of it at, or as close as operationally feasible to, the changeover point, where established.

(4) Subject to the provisions of regulation 91.06.25, the PIC of an aircraft may execute, or endeavour to execute, a cloud-break or let-down procedure at an aerodrome or nominate an aerodrome as an alternate aerodrome: Provided that the requirements relating to cloud-break or let-down procedures and to flights under IMC, as published by the Executive Director in the IAIP, can be complied with.

Division Four: Specific Provisions Regarding Aircraft

91.06.28 Foreign military aircraft

No foreign military aircraft shall fly over or land in Namibia except on the express invitation or with the express permission of the Minister of Works and Transport, but any such aircraft so flying over or landing in Namibia shall be exempt from these Regulations to such extent and on such conditions as are specified in the invitation or permission.

91.06.29 Identification and interception of aircraft

(1) No person shall institute in-flight surveillance against, give an interception signal in connection with or give an instruction to land to a civilian aircraft suspected to be in contravention of the Act except-

(a) on instruction by the Minister of Works and Transport, the Executive Director, an authorized officer or authorized person; or

(b) if the person is a member of the Namibian Police Services or Namibian National Defence Force, acting within the course and scope of his or her duties; and

(c) the in-flight surveillance, interception signal or instruction to land is in the public interest.

(2) The in-flight surveillance, interception signal or instruction to land must be executed in a manner that does not unduly affect aviation safety.

(3) The intercepted aircraft must follow out the instructions of the intercepting aircraft as prescribed in Document NAM-CATS 91.

(4) When the aircraft is intercepted, the pilot-in command (PIC) must immediately establish radio contact with the intercepting aircraft on 121,5 MHz.

(5) If the intercepting aircraft cannot establish radio contact with or contact in any other practical way the intercepted aircraft, visual signals as prescribed in Document NAM-CATS 91 must be used.

(6) The PIC of an aircraft flying in Namibian airspace when intercepted shall comply with the procedures specified in this Regulation.

(7) The PIC of an aircraft flying in foreign airspace when intercepted shall comply with the interception procedures of that country.

Division Five: Air Traffic Rules

91.06.30 ATS procedures

The PIC of an aircraft to be operated in controlled airspace shall-

(a) ensure that an ATS flight plan is submitted and changes thereto are notified as prescribed in Regulation 91.03.4;

(b) ensure that radio contact is established with the responsible ATSU and that radio communication is maintained as prescribed in Regulation 91.06.16 except where such communication is accomplished using air data link; and

(c) for flight in controlled airspace, obtain and comply with air traffic control clearances and instructions: Provided that-

(i) the PIC of an aircraft may deviate from an air traffic control clearance in exceptional circumstances, but such deviation shall be reported to the responsible ATSU as soon as possible; and

(ii) the PIC of an aircraft may propose an amendment to an air traffic control clearance, but such amendment shall not be applied until acceded to by the responsible ATSU.

91.06.31 Priority

(1) An ATSU may, with regard to arrivals and departures, give priority to aircraft operating in accordance with ATS flight plan clearance over aircraft not so engaged.

(2) However, an ATSU shall give priority to certain flights regardless of whether such flight is operating on an ATS flight plan or not, if the PIC has notified the ATSU that-

(a) the aircraft is in a state of emergency, or the PIC has declared a distress or MAYDAY situation; or

(b) the PIC has declared an urgency or PAN situation; or

(c) the PIC has stated that there is a critically ill person on board the aircraft, or the flight is operated as an emergency air ambulance flight and the type of flight has been annotated accordingly in the flight plan; or

(d) the PIC has declared that the aircraft is in a state of minimum fuel.

(3) An ATSU shall, with regard to flight operations and provided that there is no priority in force in terms of sub-regulation (2), give priority to aircraft-

(a) engaged in the transportation of the President or Deputy President; or

(b) engaged in the transportation of any visiting Head of State or foreign government official recognised by the Namibian government as qualifying for priority services; or

(c) engaged in operations related to national security, humanitarian emergencies, public safety emergencies or any other operation that the Executive Director authorises as qualifying for priority services.

(4) An aerodrome operator shall, with regard to arrivals, departures and passenger movements and provided that there is no priority in force in terms of sub-regulation (2), give priority to aircraft-

(a) engaged in the transportation of the President or Deputy President; or

(b) engaged in the transportation of any visiting Heads of State or foreign government official recognised by the Namibian government as qualifying for priority services; or

(c) engaged in operations related to national security, humanitarian emergencies, public safety emergencies or any other operation that the Executive Director authorises as qualifying for priority services.

(5) Whenever an aircraft has requested a clearance involving priority in terms of sub-regulations (2), (3) or (4), a report explaining the necessity for such priority shall be submitted by the pilot-in command if requested by the Executive Director, the appropriate ATSU or the appropriate airfield operator.

Division Six: Heights and Instrument Approach and Departure Procedures

91.06.32 Minimum heights

(1) Except when necessary for taking off, or landing, or except with prior written approval of the Executive Director, no aircraft-

(a) shall be flown over congested areas or over an obvious open-air assembly of persons at a height less than 1 000 feet above the highest obstacle, within a radius of 2 000 feet from the aircraft;

(b) when flown elsewhere than specified in paragraph (a), shall be flown at a height less than 500 feet above the ground or water, unless the flight can be made without hazard or nuisance to persons or property on the ground or water and the PIC operates at a height and in a manner that allows safe operation in the event of an engine failure; and

(c) shall circle over or do repeated overflights over an obvious open-air assembly of persons at a height less than 3 000 feet above the surface.

(2) A helicopter shall be permitted to be flown at heights less than those prescribed in sub-regulation (1)(a), provided that-

(a) the operation is conducted without unnecessary nuisance or hazard to persons and property on the ground or water; and

(b) the PIC operates at a height and in a manner that allows safe operation in the event of an engine failure.

(3) Except when necessary for take-off or landing, or with the express permission of the Executive Director, an aircraft shall at night, in IMC or when operated in accordance with IFR, be flown-

(a) at a height of at least 1 000 feet above the highest terrain or obstacle where the height of such terrain or obstacle does not exceed 5 000 feet above sea level within five nautical miles of the aircraft in flight; or

(b) at a height of at least 2 000 feet above the highest terrain or obstacle located within five nautical miles of the aircraft in flight where the height of such terrain or obstacle exceeds 5 000 feet above sea level: Provided that within areas determined by the Executive Director the minimum height may be reduced to 1 000 feet above the highest terrain or obstacle located within 5 nautical miles of the aircraft in flight, the aircraft is flown in accordance with such procedures as the Executive Director may determine.

(4) The PIC of an aircraft shall, in addition to the requirements of this Regulation, comply with any altitude restrictions prescribed for the area or route to be operated within or over.

91.06.33 Semi-circular rule

(1) Unless otherwise directed by an ATSU, the PIC of an aircraft in level flight shall fly at an altitude or flight level, as appropriate, selected according to magnetic track from the table as prescribed in Document NAM-CATS 91.

(2) Aircraft flown in accordance with VFR at a height of less than 1 500 feet above the surface, shall not be required to comply with the provisions of sub-regulation (1), unless if otherwise directed by an ATSU.

(3) A flight conducted from flight level 200 and above, shall be flown in compliance with IFR.

91.06.34 Aerodrome approach and departure procedures

(1) When an instrument approach to, or instrument departure from, an aerodrome is necessary, the PIC of an aircraft shall use the instrument approach and departure procedure as published by the Executive Director in the AIC, IAIP, IAIP Supplement or NOTAM or otherwise approved by the Executive Director.

(2) No person flying an aircraft may execute, or endeavour to execute an instrument approach or instrument departure at an aerodrome unless-

(a) the provisions of Regulation 91.06.25 are complied with;

(b) the flight is conducted in accordance with procedures for instrument approach or instrument departure authorised by the Executive Director for the specific aerodrome and manoeuvre to be executed;

(c) the requirements for flights conducted under IMC authorised by the Executive Director are complied with; and

(d) where applicable, has received a clearance for the approach from the relevant air traffic services unit.

(3) No PIC of an aircraft under IFR may nominate an aerodrome as an alternate aerodrome unless-

(a) there is a procedure for an instrument approach authorised by the Executive Director, if the forecast for the alternate is IMC;

(b) the aircraft complies with the requirements of Regulation 91.06.25; and

(c) there is reasonable certainty that the requirements for flights conducted under IMC will be complied with.

SUBPART 7: FLIGHT OPERATIONS

91.07.1 Routes and areas of operation

The owner or operator of an aircraft shall ensure that-

(a) operations are only conducted along such routes or within such areas, for which approval or authorisation has been obtained, where required, from the appropriate authority concerned;

(b) all flights are planned and conducted in accordance with any mandatory routings that have been published for any airspace being operated in, unless otherwise authorised in an air traffic control clearance;

(c) the performance of the aircraft intended to be used, is adequate to comply with minimum flight altitude requirements; and

(d) the instruments and equipment of the aircraft intended to be used, comply with the minimum requirements for the planned operation and will enable the flight crew to control the flight path of the aircraft, carry out any required procedural manoeuvres and observe the operating limitations of the aircraft in the expected operating conditions.

91.07.2 Minimum flight altitudes

(1) No pilot shall operate an aircraft at altitudes below-

(a) altitudes, established by the owner or operator, which provide the required terrain clearance, taking into account the operating limitations referred to in Subpart 8; and

(b) the minimum altitudes referred to in Subpart 6;

except when necessary for take-off and landing.

(2) The method of establishing minimum flight altitudes referred to in sub-regulation (1)(a) is prescribed in Document NAM-CATS 91.

(3) Where the minimum flight altitudes established by the appropriate authority of a foreign State are higher than the minimum flight altitudes prescribed in this Regulation, the minimum flight altitudes established by such appropriate authority shall apply in respect of a Namibian registered aircraft flying in the airspace of the foreign State concerned.

91.07.3 Use of aerodromes

(1) A person shall neither select nor authorise a selection of an aerodrome for use as a destination or destination alternate aerodrome, unless such aerodrome is properly licensed in terms of Part 139 and is determined to be adequate for a type of aircraft and operation concerned.

(2) Except in an emergency, an aircraft shall not take-off or land by night, unless a place of take-off or landing is equipped with night flying facilities.

91.07.4 Helicopter landings and take-offs

(1) No pilot-in-command of a helicopter shall land at or take-off from any place unless the place is so situated to permit the helicopter, in the event of an engine failure arising during such landing or take-off, continue to operate in a manner that allows safe operation without undue hazard to persons or property on the surface.

(2) The pilot-in-command of a helicopter shall ensure that any place used for landing, take-off or hover-

(a) shall have-

(i) physical characteristics; and

(ii) obstacle limitation surfaces, commensurate with the ambient light conditions and the characteristics of the helicopter being operated;

(b) allows the helicopter to operate clear of obstacles and without causing nuisance to third parties through its rotor wash;

(c) has a surface area suitable for touch-down and lift-off; and

(d) meets the requirements of regulation 91.08.2.

(3) No pilot of a helicopter shall land on, or take-off from, any elevated helicopter landing place, unless such place meets the design requirements prescribed in Part 139 of these Regulations, for the operation of heliports and unless, such elevated helicopter landing place is situated within a built-up area, the place has been licenced or approved in terms of Part 139.

(4) No pilot-in-command of a helicopter shall land or take-off from any place within a built-up area unless he or she has assured him- or herself that local by-laws do not prohibit such take-off or landing without specific permission by the local authority, provided that this restriction shall not apply.

(5) The Executive Director may, in the interests of aviation safety, impose conditions or institute restrictions as to the use of any building, structure or place for the landing or take-off of helicopters, or require special flight procedures to be adopted at, or special routes to be followed to or from, such building, structure or place by helicopters, and the Executive Director may impose different conditions, institute different restrictions or require different special flight procedures to be adopted in respect of different buildings, structures or places.

(6) Nothing in this Regulation shall be construed as conferring any right to land at any building, structure or place against the wishes of the owner of, or any other person who has an interest in, the building, structure or place or as prejudicing the rights or remedies of any person in respect of any injury to persons or property caused by the helicopter or its occupants.

91.07.5 Aerodrome operating minima

(1) No pilot of an aircraft shall use an aerodrome as a destination or alternate aerodrome, unless the operating minima for such aerodrome, established by the appropriate authority of the State in which the aerodrome is situated, can be complied with.

(2) The aerodrome operating minima for a specific type of approach and landing procedure shall be applicable if-

(a) the ground equipment shown on the respective instrument approach and landing chart required for the intended procedure, is operative;

(b) the aircraft systems required for the type of approach, are operative;

(c) the required aircraft performance criteria are complied with; and

(d) the flight crew is qualified to conduct the type of approach.

(3) In determining or establishing the aerodrome operating minima applicable to any particular operation, the owner or operator shall take into account-

(a) the type, performance and handling characteristics of the aircraft;

(b) the composition of the flight crew, their competence and experience;

(c) the surface condition, dimensions and characteristics of the runways or touch-down areas which may be selected for use;

(d) the adequacy and performance of the available visual and non-visual ground aids;

(e) the equipment available in the aircraft for the purpose of navigation or control of the flight path, as appropriate, during the take-off, approach, flare, landing or missed approach;

(f) the obstacles in the approach and missed approach areas and the climb-out areas and necessary clearance;

(g) the obstacle clearance altitude or height for the instrument approach procedures;

(h) the means to determine and report meteorological conditions; and

(i) the availability and adequacy of emergency services.

(4) The aerodrome operating minima are those prescribed in Document NAM-CATS 91 and no pilot shall conduct operations in weather conditions lower than such minima unless approved by the Executive Director to do so.

91.07.6 Threshold crossing height

The PIC of an aircraft being used to conduct an instrument approach, shall ensure that the aircraft crosses the threshold by a safe margin and in the required landing configuration and altitude.

91.07.7 Pre-flight selection of aerodromes

(1) The owner or operator of an aircraft shall select destination or alternate aerodromes in accordance with Regulation 91.07.5 when planning a flight.

(2) The owner or operator shall select a departure, destination or alternate aerodrome only when the serviceability status of the aerodrome permits safe operation of the type of aircraft concerned.

(3) A take-off alternate aerodrome shall be selected and specified in the operational and ATS flight plan, as regulated in by Regulation 91.03.4 if the meteorological conditions at the aerodrome of departure are at or below the applicable aerodrome operating minima or it would not be possible to return to the aerodrome of departure for other reasons.

(4) The take-off alternate aerodrome referred to in sub-regulation (3), shall be located within the following time from the aerodrome of departure-

(a) twenty (20) minutes flying time from the departure aerodrome in the case of single-engine aeroplanes;

(b) for aeroplanes with two engines, one hour of flight time at a one-engine-inoperative cruising speed, determined form the aircraft flight manual referred to in regulation 91.03.2, calculated in International Standard Atmosphere (ISA) and still-air conditions using the actual take-off mass; or

(c) for aeroplanes with three or more engines, two hours of flight time at an all-engine cruising speed, determined from the aircraft flight manual, calculated in ISA and still-air conditions using the actual take-off mass;

(d) for aeroplanes engaged in extended diversion time operations (EDTO) where an alternate aerodrome meeting the distance criteria of Sub Regulations b) or c) is not available, the first available alternate aerodrome located within the distance of the operator's approved maximum diversion time considering the actual take-off mass;

(e) for an aerodrome to be selected as a take-off alternate the available information shall indicate that, at the estimated time of use, the conditions will be at or above the operator's established aerodrome operating minima for that operation; and

(f) En-route alternate aerodromes, required by sub-regulation 91.07.7(4) for extended diversion time operations by aeroplanes with two turbine engines, shall be selected and specified in the air traffic services (ATS) flight plan.

Provided that if the aircraft flight manual referred to in regulation 91.03.2 does not contain a one-engine inoperative cruising speed as referred to in sub-regulations (b) and (c), the speed to be used for calculation shall be the speed which is achieved with the remaining engine or engines set at maximum continuous power.

(5) The owner or operator of a helicopter shall select at least one destination alternate aerodrome for each IFR flight, unless the meteorological conditions prevailing are such that, for the period from one hour before until one hour after the expected time of arrival at the destination aerodrome, the approach from the minimum sector safe altitude and landing can be made in VMC.

(6) For a flight to be conducted in accordance with instrument flight rules, the owner or operator of an aeroplane shall select at least one destination alternate aerodrome which shall be specified in the ATS flight plan, unless-

(a) the duration of the flight from the departure aerodrome, or from the point of in-flight re-planning to the destination aerodrome is such that, taking into account all meteorological conditions and operational information relevant to the flight, at the estimated time of use, a reasonable certainty exists that:

(i) the approach and landing may be made under visual meteorological conditions; and

(ii) separate runways are usable at the estimated time of use of the destination aerodrome with at least one runway having an operational instrument approach procedure.

(b) the aerodrome is isolated. Operations into isolated aerodromes do not require the selection of a destination alternate aerodrome(s) and shall be planned in accordance with sub-regulation 91.07.12(3)(d) and

(i) for each flight into an isolated aerodrome a point of no return shall be determined; and

(ii) a flight to be conducted to an isolated aerodrome shall not be continued past the point of no return unless a current assessment of meteorological conditions, traffic and other operational conditions indicate that a safe landing can be made at the estimated time of use.

Note- Separate runways are two or more runways at the same aerodrome configured such that if one runway is closed, operations to the other runway(s) can be conducted.

(7) Except as provided in sub-regulations (10) and (13), when planning a flight, the owner or operator shall only select an aerodrome as a destination or alternate aerodrome if the appropriate weather reports or forecasts, or a combination thereof, are at or above the applicable planning minima for a period of one hour before to one hour after the estimated time of arrival of the aircraft at the aerodrome.

(8) The owner or operator of a helicopter shall select at least one destination alternate aerodrome for each IFR flight unless-

(a) available current meteorological information indicates that the following meteorological conditions will exist from two hours before to two hours after the estimated time of arrival, or from the actual time of departure to two hours after the estimated time of arrival, whichever is the shorter period-

(i) a cloud base of at least 400 ft above the minimum associated with the instrument approach procedure; and

(ii) visibility of at least 1.5 km more than the minimum associated with the procedure, or

(b) the heliport of intended landing is isolated and no suitable alternate is available and-

(i) an instrument approach procedure is prescribed for the isolated heliport of intended landing; and

(ii) a point of no return (PNR) is determined in case of an offshore destination.

(9) Suitable offshore alternates for helicopters may be specified subject to the following –

(a) the offshore alternates shall be used only after passing a PNR. Prior to a PNR, onshore alternates shall be used;

(b) mechanical reliability of critical control systems and critical components shall be considered and taken into account when determining the suitability of the alternate;

(c) one-engine inoperative performance capability shall be attainable prior to arrival at the alternate;

(d) to the extent possible, deck availability shall be guaranteed; and

(e) weather information must be reliable and accurate.

(10) Two destination alternate aerodromes shall be selected and specified in the operational and ATS flight plans when at the destination aerodrome:

(a) Meteorological conditions at the estimated time of use will be below the operator's established aerodrome operating minima for that operator; or

(b) Meteorological information is not available.

(11) The owner or operator of an aircraft shall specify the destination alternate aerodrome, if required, in the ATS flight plan referred to in Regulation 91.03.3.

(12) The owner or operator shall specify en route alternate aerodromes for extended-range operations with twin-engine aeroplanes and shall specify such en route alternate aerodromes in the ATS flight plan referred to in Regulation 91.03.4.

(13) In addition to the provisions of sub-regulation (10), an owner or operator may conduct a flight in accordance with IFR to a destination for which there is no aviation weather report or forecast available: Provided the requirements specified in Document NAM-CATS 91 are met.

(14) Notwithstanding the provisions in sub-regulations 91.07.7(3), 91.07.7(6), and 91.07.7(8); the Executive Director may, based on the results of a specific safety risk assessment conducted by the owner or operator which demonstrate how an equivalent level of safety will be maintained approve operational variations to alternate aerodrome selection criteria. The specific safety risk assessment shall include at least the:

(a) Capabilities of the pilot-in-command or operator;

(b) Overall capability of the aeroplane and its systems;

(c) Available aerodrome technologies, capabilities and infrastructure;

(d) Quality and reliability of meteorological information;

(e) Identified hazards and safety risks associated with each alternate aerodrome variation; and

(f) Specific mitigation measures.

91.07.8 Planning minima for IFR flights

(1) The owner or operator of an aircraft shall not select an aerodrome as a take-off alternate aerodrome for a flight to be conducted, wholly or partly in accordance with IFR under IMC unless the appropriate weather reports or forecasts, or any combination thereof, indicate that, during a period commencing one hour before and ending one hour after the estimated time of arrival at the aerodrome, the weather conditions will be at or above the applicable landing minima prescribed in Regulation 91.07.5.

(2) The ceiling shall be taken into account when the only approaches available are non-precision or circling approaches.

(3) Any limitation related to one-engine inoperative operations shall be taken into account.

(4) Except as provided in Regulation 91.07.7(13), the owner or operator of an aircraft shall only select the destination aerodrome or destination alternate aerodrome, if required, if the appropriate weather reports or forecasts, or any combination thereof, indicate that, during a period commencing one hour before and ending one 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 a destination aerodrome-

(i) RVR or visibility specified in accordance with Regulation 91.07.5; and

(ii) for non-precision approach or a circling approach, the ceiling at, or above, MDA/H; and

(b) planning minima for a destination alternate aerodrome shall be as prescribed in Document NAM-CATS 91.

(5) The owner or operator of an aircraft shall 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 one hour before and ending one hour after the estimated time of arrival at the aerodrome, the weather conditions will be at or above the planning minima as prescribed in Document NAM-CATS 91.

91.07.9 Meteorological conditions

(1) On a flight conducted in accordance with-VFR, the pilot shall not commence take-off unless current meteorological reports, or a combination of current reports and forecasts, indicate that the meteorological conditions along the route, or that part of the route to be flown under VFR shall, at the appropriate time, be such as to enable compliance with the provisions prescribed in this Part.

(2) A flight to be conducted in accordance with IFR;

(a) shall not take off from the departure aerodrome unless meteorological conditions, at the time of use, are at or above the operator's established aerodrome operating minima for that operator; and

(b) shall not take off or continue beyond the point of in-flight re-planning unless at the aerodrome of intended landing or at each alternate aerodrome to be selected in compliance with regulation 91.07.7, current meteorological reports, or a combination of current reports and forecasts, indicate that the meteorological conditions will be, at the estimated time of use, at or above the operator's established aerodrome operating minima for that operation.

(3) In the case of commercial air transport operations, to ensure that adequate margin of safety is observed in determining whether or not an approach and landing can be safely carried out at each alternate aerodrome, the operator shall specify appropriate incremental values, acceptable to the Executive Director, for height of cloud base and visibility to be added to the operator's established aerodrome operating minima for the estimated time of use of an aerodrome.

91.07.10 VFR operating minima

The owner or operator of an aircraft shall ensure that-

(a) VFR flights are conducted in accordance with the VFR prescribed in Subpart 6; and

(b) special VFR flights are not commenced when the visibility is less than the visibility prescribed in Regulation 91.06.22(1).

91.07.11 Mass and balance

(1) The owner or operator of an aircraft shall ensure that, during any phase of the operation, the loading, mass and the centre of gravity of the aircraft complies with the limitations specified in the approved AFM referred to in Regulation 91.03.2 or the operations manual if the limitations therein are more restrictive.

(2) The owner or operator shall establish the mass and the centre of gravity of the aircraft by actual weighing prior to initial entry into operation and thereafter at intervals of five years.

(3) The accumulated effects of modifications and repairs on the mass and balance of the aircraft, shall be accounted for and properly documented by the owner or operator.

(4) The aircraft shall be weighed in accordance with the provisions of sub-regulation (2), if the effect of modifications on the mass and balance is not accurately known.

(5) The owner or operator shall determine the mass of all operating items and flight crew members included in the dry operating mass of the aircraft, by weighing or by using the appropriate standard mass as prescribed in Document NAM-CATS 91.

(6) The influence of the mass of the operating items and flight crew members referred to in sub-regulation (5) on the centre of gravity of the aircraft shall be determined by the owner or operator of such aircraft.

(7) The owner or operator shall establish the mass of the traffic load, including any ballast, by actual weighing, or determine the mass of the traffic load in accordance with the appropriate standard passenger and baggage mass as prescribed in Document NAM-CATS 91.

(8) The owner or operator shall determine the mass of the fuel load by using the actual specific gravity or, if approved by the Executive Director, a standard specific gravity.

91.07.12 Fuel and oil requirements

(1) A pilot-in-command of an aircraft shall not commence a flight unless he or she is satisfied that the aircraft is carrying a sufficient amount of usable fuel, to complete the planned flight safely and to allow for deviations from the planned operation.

(2) The pilot-in-command shall ensure that the amount of useable fuel to be carried shall, as a minimum, be based on:

(a) The following data:

(i) Current aircraft-specific data derived from a fuel consumption monitoring system, if available; or

(ii) If current aircraft-specific data is not available, data provided by the aeroplane manufacturer; and

(b) the operator conditions for the planned flight including:

(i) anticipated aeroplane mass;

(ii) Notices to Airmen;

(iii) Current meteorological reports or a combination of current reports and forecasts;

(iv) Air traffic services procedures, restrictions and anticipated delays; and

(v) The effects of deferred maintenance items and/or configuration deviations.

(3) The pre-flight calculation of usable fuel required shall include:

(a) Taxi fuel, which shall be the amount of fuel expected to be consumed before take-off; taking into account local conditions at the departure aerodrome and auxiliary power unit (APU) fuel consumption;

(b) Trip fuel, Which shall be the amount of fuel required to enable the aeroplane to fly from take-off or the point of in-flight re-planning until landing at the destination aerodrome taking into account the operating conditions of sub-regulation 91.07.12 (2)(b);

(c) Contingency fuel, which shall be the amount of fuel required to compensate for unforeseen factors. It shall be five per cent of the planned trip fuel or of the fuel required from the point of in-flight re-planning based on the consumption rate used to plan the trip fuel but in any case shall, in the case of aeroplanes, shall not be lower than the amount required to fly for 5 minutes at holding speed at 1 500 ft above the destination aerodrome in standard conditions;

Note: unforeseen factors are those factors that could have an influence on the fuel consumption to the destination aerodrome, such as deviations of an individual aeroplane from the expected fuel consumption data, deviations from forecast meteorological conditions, extended delays.

(d) Destination alternate fuel, which shall be:

(i) Where a destination alternate aerodrome is required, the amount of fuel required to enable the aeroplane to:

(aa) perform a missed approach at the destination aerodrome;

(bb) climb to the expected cruising altitude;

(aa) fly the expected routing;

(bb) descend to the point where expected approach is initiated; and

(cc) conduct the approach and landing at the destination alternate aerodrome; or

(ii) Where two destination alternate aerodromes are required, the amount of fuel, as calculated in sub-regulation 91.07.12 (3), required to enable the aeroplane to proceed to the destination alternate aerodrome which requires the greater amount of alternate fuel; or

(iii) Where a flight is operated without a destination alternate aerodrome, the amount of fuel required to enable the aeroplane to fly for 15 minutes at holding speed at (1 500 ft) above the destination aerodrome elevation in standard conditions; or

(iv) Where the aerodrome of intended landing is an isolated aerodrome:

(aa) For a reciprocating engine aeroplane, the amount of fuel required to fly for 45 minutes plus 15 per cent of the flight time planned to be spent at cruising level, including final reserve fuel, or two hours, whichever is less; or

(bb) For a turbine engine aeroplane, the amount of fuel required to fly for two hours at normal cruise consumption above the destination aerodrome, including final reserve fuel;

(e) Final reserve fuel, which shall be the amount of fuel calculated using the estimated mass on arrival at the destination alternate aerodrome or the destination aerodrome, when no destination alternate aerodrome is required:

(i) For a reciprocating engine aeroplane, the amount of fuel required to fly for 45 minutes, under speed and altitude conditions specified by the Executive Director

(ii) For a turbine engine aeroplane, the amount of fuel required to fly for 30 minutes at holding speed at 1 500 ft above aerodrome elevation in standard conditions;

(f) Additional fuel, which shall be the supplementary amount of fuel required if the minimum fuel calculated in accordance with sub-regulations 91.07.12 (a), (b), (c), (d) or (e) is not sufficient to:

(i) Allow the aeroplane to descend as necessary and proceed to an alternate aerodrome in the event of engine failure or loss of pressurization, whichever requires the greater amount of fuel based on the assumption that that such a failure occurs at the most critical point along the route;

(aa) Fly for 15 minutes at holding speed at 1 500 ft above aerodrome elevation in standard conditions; and

(bb) Make an approach and landing

(ii) Allow an aeroplane engaged in EDTO to comply with the EDTO critical fuel scenario as established by the Executive Director.

(iii) Meet additional requirements not covered above;

(g) Discretionary fuel, which shall be the extra amount of fuel to be carried at the discretion of the pilot-in-command.

(4) Operators shall determine one final reserve fuel value for each aeroplane type and variant owned or operated rounded up to an easily recalled figure.

(5) An aeroplane shall not take off or continue from the point of in-flight re-planning unless the usable fuel on board meets the requirements prescribed in paragraphs (b), (d), (e) or (f) of sub-regulation 91.07.12 (3), if applicable.

(6) The pilot-in-command shall continually ensure that the amount of usable fuel remaining on board is not less than the fuel required to proceed to an aerodrome where a safe landing can be made with the planned final reserve fuel remaining upon landing.

(6A) The use of fuel after flight commencement for purposes other than originally intended during pre-flight planning shall require a re-analysis and, if applicable, adjustment of the planned operation.

(7) The pilot-in-command shall request delay information from ATC when unanticipated circumstances may result in landing at the destination aerodrome with less than the final reserve fuel plus any fuel required to proceed to an alternate aerodrome or the fuel required to operate to an isolated aerodrome.

(8) The pilot-in-command shall advise ATC of a minimum fuel state by declaring MINIMUM FUEL when, having committed to land at a specific aerodrome, the pilot calculates that any change to the existing clearance to that aerodrome may result in landing with less than planned final reserve fuel.

Note: The declaration of MINIMUM FUEL informs ATC that all planned aerodrome options have been reduced to a specific aerodrome of intended landing and any change to the existing clearance may result in landing with less than the planned final reserve fuel. This is not an emergency situation but an indication that an emergency situation is possible should any additional delay occur.

(9) The pilot-in-command shall declare a situation of fuel emergency by broadcasting MAYDAY MAYDAY MAYDAY FUEL, when the calculated usable fuel predicted to be available upon landing at the nearest aerodrome where a safe landing can be made is less than the planned final reserve fuel.

(10) Notwithstanding the provisions in sub-regulations 91.07.12(3) (a), (b), (c), (d), and (f); the Executive Director may, based on the results of a specific safety risk assessment conducted by the operator which demonstrates how an equivalent level of safety will be maintained, approve variations to the pre-flight fuel calculation of taxi fuel, trip fuel, contingency fuel, destination alternate fuel, and additional fuel. The specific safety risk assessment shall include at least the:

(i) Flight fuel calculations;

(ii) Capabilities of the operator include:

(aa) A data-driven method that includes a fuel consumption monitoring programme; and/or

(bb) The advanced use of alternate aerodromes; and

(iii) Specific mitigation measures.

91.07.13 Refuelling or defueling with passengers on board

(1) Except as provided for in Parts 93, 121, 127 and 135, the owner or operator of an aircraft shall ensure that the aircraft is not refuelled or defueled with aviation gasoline or wide-cut type fuel when passengers are embarking, on board or disembarking such aircraft.

(2) In cases other than the cases referred to in sub-regulation (1), necessary precautions shall be taken and the aircraft shall be properly manned by qualified personnel ready to initiate and direct an evacuation of such aircraft by the most practical and expeditious means available.

91.07.14 Smoking in aircraft

(1) No person shall smoke in a Namibian registered aircraft or in any foreign registered aircraft when in or over Namibia.

(2) In all Namibian registered aircraft, notices shall be displayed in a prominent place in the aircraft indicating that smoking is prohibited and that such notices are clearly visible to all passengers and flight crew members.

91.07.15 Instrument approach and departure procedures

(1) The owner or operator of an aircraft shall ensure that the instrument approach and departure procedures, established by the appropriate authority of the State in which the aerodrome to be used, is located, are used.

(2) Notwithstanding the provisions prescribed in sub-regulation (1), a PIC may accept an air traffic control clearance to deviate from a published approach or departure route: Provided that-

(a) obstacle clearance criteria are observed and full account is taken of the operating conditions; and

(b) the final approach is flown visually.

(3) The owner or operator of an aircraft shall ensure that the appropriate temperature corrections to all published altitudes are applied when conducting approaches at an aerodrome in temperatures below standard.

91.07.16 Noise abatement

(1) No person shall operate an aircraft contrary to noise abatement procedures established for an aerodrome in terms of the provisions of the Regulations of the State into or out of which the aircraft is being flown.

(2) As from 1 January 2016, no person shall operate in Namibia a subsonic jet aeroplane for which the application for a type certificate was submitted before 6 October 1977, except for an aeroplane-

(a) requiring a runaway length of 610 m or less at maximum certificated mass for airworthiness;

(b) powered by engines with a bypass ratio of two or more and for which a certificate of airworthiness for the individual aeroplane was first issued before 1 March 1972;

(c) powered by engines with bypass ratio of less than two and for which the application for the type certificate was submitted before 1 January 1969, and for which a certificate of airworthiness for the individual aeroplane was first issued before 1 January 1976; or

(d) that has been fitted with hush-kit that complies with the noise standards prescribed in Chapter 3 of ICAO Annex 16.

91.07.17 Submission of ATS flight plan

The owner or operator of an aircraft shall ensure that a flight is not commenced unless an ATS flight plan has been filed, or adequate information has been deposited in order to permit alerting services to be activated, if required.

91.07.18 Seats, safety belts and harnesses

(1) Before take-off and landing, and whenever deemed necessary in the interests of aviation safety, the PIC of an aircraft shall ensure that each person on board such aircraft occupies a seat or berth with his or her safety belt or harness, where provided, properly secured.

(2) The PIC shall ensure that multiple occupancy of aircraft seats does not occur other than by one adult and one infant who is properly secured by a child restraint device.

91.07.19 Passenger seating

(1) The owner or operator of an aircraft shall ensure that passengers are seated where, in the event that an emergency evacuation is required, such passengers may best assist and not hinder evacuation from the aircraft.

(2) The owner or operator of an aircraft shall ensure that if a disabled passenger is carried together with other passengers, such passenger shall not be positioned in such a way that access to emergency exits is blocked.

(3) Passengers may be carried in an aircraft, other than an air ambulance aircraft operated and equipped in terms of Part 138, on a stretcher only if such stretcher and the manner in which it is secured to the aircraft have been approved by the Executive Director and the condition of the passenger does not require the attention of an aviation health care provider or require the passenger to be connected to any external medical equipment.

(4) In the case of an emergency medical situation, where no air ambulance aircraft operated and equipped in terms of Part 138 can be made available within a reasonable time span at or near the place where the situation exists, an aircraft owner or operator may disregard sub-regulations (1), (2) and (3) in the interest of saving human life.

(5) Any non-standard emergency transport in terms of sub-regulation (4) shall be reported by the operator to the Executive Director on the appropriate form as described in Document NAM-CATS 138, explaining the reasons for the deviation from Regulation 91.07.19, within fourteen days of the flight having taken place.

91.07.20 Passenger movements and briefing

(1) The owner or operator of an aircraft shall take reasonable steps to provide for the safe movement of his or her passengers to or from the aircraft while on the aerodrome movement area.

(2) The owner or operator of an aircraft shall ensure that-

  (a) passengers are verbally briefed about safety matters, parts or all of which may be given by an audio-visual presentation; and

  (b) in an emergency during flight, passengers are instructed in such emergency action as may be appropriate to the circumstances.

(3) The owner or operator shall ensure that, before take-off –

  (a) passengers are briefed, to the extent applicable, on-

    (i) the smoking prohibition;

(ii) when the back of the seat is to be in the upright position and the tray table stowed;

(iii) the location of emergency exits;

(iv) the location and use of floor proximity escape path markings;

(v) the stowage of carry-on baggage;

(vi) any restrictions on the use of portable electronic devices; and

(vii) the location and the contents of the safety briefing card; and

(b) passengers receive, to the extent applicable, a demonstration of-

(i) the use of safety belts or safety harnesses, including the manner in which the safety belts or safety harnesses are to be fastened and unfastened;

(ii) the location and use of oxygen equipment; and

(iii) the location and use of life jackets.

(4) The owner or operator shall ensure that, after take-off, passengers are reminded of-

(a) the smoking prohibition; and

(b) the use of safety belts or safety harnesses.

(5) The owner or operator shall ensure that, before landing, passengers are reminded of-

(a) the smoking prohibition;

(b) the use of safety belts or safety harnesses;

(c) when the back of the seat is to be in the upright position and the tray table stowed, if applicable;

(d) the re-stowage of carry-on baggage; and

(e) any restrictions on the use of portable electronic devices.

(6) The owner or operator of an aircraft shall ensure that, after landing, passengers are reminded of-

(a) the smoking prohibition while on board the aircraft and any prohibitions after disembarkment; and

(b) the use of safety belts or safety harnesses.

91.07.21 Passenger health and safety

(1) The PIC of an aircraft shall notify air traffic control where it appears that any person displays the symptoms and signs of a communicable disease as provided in Document NAM-CATS 91.

(2) The owner or operator of an aircraft shall establish procedures for-

(a) evaluation by flight crew member or cabin crew member of a person who displays the symptoms referred to in sub-regulation (1); and

(b) notification of the air traffic control by the PIC of a suspected case as prescribed in Document NAM-CATS 91.

91.07.22 Emergency equipment

(1) The owner or operator of an aircraft shall ensure that emergency equipment, carried or installed in the aircraft in order to meet the requirements prescribed in this Part and the MEL, is in such condition that it will satisfactorily perform its design function.

(2) The PIC of the aircraft shall ensure that the emergency equipment concerned remains easily accessible for immediate use by the flight crew.

91.07.23 Illumination of emergency exits

When an aircraft, which is equipped with an emergency lighting system is in flight and below 1 000 feet above ground level, or on the ground with passengers on board-

(a) the emergency lighting system shall be switched on; or

(b) the normal cabin lighting system shall be switched on and the emergency lighting shall be armed.

91.07.24 Use of supplemental oxygen

(1) The PIC of an aircraft shall ensure that flight crew members engaged in performing duties essential to the safe operation of an aircraft in flight, use supplemental oxygen

  (a) continuously when the flight deck pressure altitude exceeds 10 000 feet for more than 120 minutes intended flight time, and

  (b) at all times when the flight deck pressure altitude exceeds 12 000 feet.

(2) The PIC of an aircraft shall ensure that when a flight is conducted above FL 410, at least one pilot at a pilot station wears an oxygen mask when the other pilot leaves the flight deck for any reason.

91.07.25 Approach and landing conditions

(1) Before commencing an approach to land, a PIC of an aircraft shall be satisfied that, according to the information available, the weather and the condition of the touch-down and runway area at an aerodrome intended to be used, a safe approach, landing or missed approach can be executed having regard to the performance information specified in an AFM or similar document.

(2) An approach to land shall not be continued below 1 000 ft above aerodrome elevation, unless a PIC, based on the information available, is satisfied that –

  (a) a runway surface condition permits a safe landing; and

  (b) an aeroplane performance information indicates that a safe landing can be made.

91.07.26 Approach ban

(1) A PIC shall not continue with an instrument approach if at an altitude of 1 000 ft above an aerodrome elevation, a relevant RVR or visibility for that runway is at the time, less than the specified minimum for landing.

(2) In such an instance as referred to in subregulation (1), a PIC may continue with an approach to DA/H or MDA/H.

(3) A PIC may continue with an approach below DA/H or MDA/H and complete a landing, provided that the required visual reference is established at the DA/H or MDA/H and is maintained.

91.07.27 In-flight testing on passenger- and cargo-carrying flights

The owner or operator of an aircraft, when passengers or cargo are on board such aircraft, shall ensure that no person-

(a) simulates emergency situations in the aircraft affecting the flight characteristics of such aircraft;

(b) conducts flight testing for the initial skills test or renewal of an instrument rating;

(c) conducts any flight or skills test other than a route proficiency test; or

(d) conducts any skills test for a class or type rating.

91.07.28 Turning helicopter rotors

(1) Except as provided for in sub-regulation (2), no person engaged in helicopter operations shall permit helicopter rotors to be turned under power without a qualified pilot at the controls of such helicopter.

(2) A licensed AME, who has undergone instruction from a qualified Grade II or higher qualified helicopter flight instructor on the ground-running of the relevant helicopter type, and thereafter has been certified as competent to undertake such a task by the instructor in his or her AME's Record of Experience (TV2/308), may turn helicopter rotors under power for the purposes of blade tracking on condition that-

(a) the collective has been locked in the down position; and

(b) ground-runs are carried out when the helicopter is stationary, and wind conditions do not require major cyclic inputs.

91.07.29 Starting and running of engines

(1) Except when the brakes are serviceable and are fully applied, chocks shall be placed in front of the wheels of an aeroplane before starting the engine or engines, and a competent person shall be seated at the controls when the engine or engines are running.

(2) Where the pilot of an aeroplane is the only person present and it has been necessary for chocks to be used, he or she shall ensure that the chocks are removed prior to starting the engine, unless the aircraft is equipped with a parking brake, in which case the parking brake shall be set before the pilot removes the chocks.

(3) Except as provided in sub-regulation (2), when the engines are running, at least one pilot seat of an aircraft shall be attended by a person qualified to occupy the pilot seat.

91.07.30 Acrobatic flights

(1) No aircraft shall be flown acrobatically so as to endanger air traffic.

(2) Except by individual permission from the Executive Director, aircraft shall not be flown acrobatically

(a) unless the manoeuvre can be concluded and the aircraft brought on an even keel at a height of not less than 2 000 feet above the ground or water;

(b) within a five nautical mile distance of an aerodrome reference point of an aerodrome licensed and approved in terms of Part 139 unless at a height not less than 4 000 feet above ground level;

(c) in the vicinity of air traffic services routes; or

(d) over any populous area or public gathering.

91.07.31 Simulated instrument flight in aircraft

(1) The owner or operator of an aircraft shall ensure that no person operates the aircraft in simulated instrument flight in VMC unless-

(a) the other aircraft control seat is occupied by a safety pilot who possesses at least a PPL with category and class ratings appropriate to the aircraft being flown;

(b) the safety pilot has adequate vision forward and to each side of the aircraft, or there is a competent observer in the aircraft who adequately supplements the vision of the safety pilot; and

(c) except in the case of lighter-than-air aircraft, the aircraft is fitted with fully functioning dual controls: Provided that simulated instrument flight may be conducted in a single-engine aircraft, equipped with a single, functioning throw-over control wheel in place of fixed dual controls of the elevator and ailerons, when-

(i) the safety pilot has determined that the flight can be conducted safely; and

(ii) the person manipulating the controls has at least a PPL with appropriate category, class and type ratings.

(2) When simulated instrument flight is being practised by a pilot, at least one of the two pilots shall hold the appropriate valid type rating in respect of the aircraft being flown and shall act as the PIC.

(3) When a simulated instrument flight takes place at night in VMC, the safety pilot shall be the holder of a valid instrument rating.

(4) When simulated instrument flight is being practised for the purpose of obtaining an instrument rating, the safety pilot shall be an appropriately rated flight instructor.

91.07.32 Aeroplane operating procedures

Unless otherwise specified in an air traffic control instruction, the PIC of an aircraft shall climb or descend to an assigned altitude or flight level at a rate less than 1 500 ft/min throughout the last 1 000 ft of climb or descent to the assigned altitude or flight level.

91.07.33 Head-up displays and vision systems

(1) An owner or operator of an aeroplane may only prescribe the use of automatic landing systems, a HUD or equivalent display, EVS, SVS, CVS, or any combination of those systems into a hybrid system for the safe operation of an aeroplane, if-

(a) such owner or operator of an aeroplane has an approval to do so;

(b) such owner or operator of an aeroplane complies with the requirements for automatic landing systems, a HUD or equivalent display, EVS, SVS, or CVS as applicable, as prescribed in Document NAM-CATS 91;

(c) such equipment meets the appropriate airworthiness certification requirements;

(d) such owner or operator of an aeroplane has carried out a safety risk assessment of the operations supported by the automatic landing systems, a HUD or equivalent display, EVS, SVS, or CVS;

(e) the Executive Director has authorised operational credit for such operations with an aeroplane equipped with automatic landing systems, a HUD or equivalent displays, EVS, SVS, or CVS; and

(f) such owner or operator of an aircraft has acquired a specific approval where operational credit relates to low visibility operations: Provided that such specific approval shall not affect the classification of instrument approach procedure.

(2) An owner or an operator of an aeroplane shall include suitable operational procedures for use of, and training requirements for such equipment, which shall cover at least the following:

(a) equipment limitations;

(b) operational credits as specified in Document NAM-CATS 91;

(c) flight planning;

(d) ground and airborne operations;

(e) crew resource management;

(f) standard operating procedures; and

(g) ATS flight plans and communication.

91.07.34 Electronic flight bags

(1) A PIC shall not use an EFB, portable or installed, on board aircraft except with the approval of the Executive Director.

(2) The Executive Director may only approve the use of EFB on board aircraft if the requirements prescribed in Document NAM-CATS 91 are met.

(3) If an EFB is used on board aircraft, a PIC and an operator or owner of an aircraft shall -

(a) assess the safety risk associated with each EFB function;

(b) establish procedures for the use of, and training requirements for, each EFB function;

(c) ensure that, in the event of EFB failure, sufficient information is readily available to a flight crew for the flight to be conducted safely;

(d) ensure that requirements are established for redundancy of information, if appropriate, contained and displayed by the EFB functions;

(e) ensure that EFB equipment and its associated installation hardware, including interaction with aircraft systems if applicable, meet the appropriate airworthiness certification requirements; and

(f) establish and document procedures for the management of EFB function including any database it may use.

(4) If a portable EFB is used on board aircraft, a PIC and an operator or owner of such aircraft shall ensure that such EFB does not affect the performance of aircraft systems, equipment or the ability to operate the aircraft.

91.07.35 Additional EDTO requirements

(1) Requirements for operations beyond 60 minutes to an en-route alternate aerodrome

(a) Operators conducting operations beyond 60 minutes, from a point on a route to an en-route alternate aerodrome shall ensure that:

(i) For all aeroplanes:

(aa) en-route alternate aerodromes are identified; and

(bb) the most up-to-date information is provided to the flight crew on identified en-route alternate aerodromes, including operational status and meteorological conditions;

(ii) for aeroplanes with two turbine engines, the most up-to-date information provided to the flight crew indicates that conditions at identified en-route alternate aerodromes will be at or above the operator's established aerodrome operating minima for the operation at the estimated time of use.

(b) In addition to the requirements in paragraph (a), all operators shall ensure that the following are taken into account and provide the overall level of safety intended by the provisions of this Part:

(i) operational control and flight dispatch procedures;

(ii) operating procedures; and

(ii) training programmes.

(2) Requirements for EDTO:

(a) Unless the operation has been specifically approved by the Executive Director, an aeroplane with two or more turbine engines shall not be operated on a route where diversion time from any point on the route, calculated in ISA and still air conditions at the one-engine inoperative cruise speed for aeroplanes with two turbine engines and at the all-engine operating cruise speed for aeroplanes with more than two turbine engines, to an adequate en-route alternate aerodrome exceeds a threshold time established for such operations.

(b) The maximum diversion time, for an operator of a particular aeroplane type engaged in extended diversion time operations shall be approved by the Executive Director.

(c) When approving the appropriate maximum diversion time for an operator for a particular aeroplane type engaged in EDTO, the Executive Director shall be satisfied that-

(i) for all aeroplanes, the maximum diversion time shall not exceed the value of the EDTO significant system time limitation, if any, indicated in the aircraft flight manual directly or by reference, reduced by an operational safety margin of 15 minutes; and

(ii) for an aeroplane with two turbine engines, the aeroplane is EDTO certified;

(d) Notwithstanding the provisions of said paragraph 91.07.35 (2) (c) (i); the Executive Director may, based on the results of a specific safety risk assessment conducted by the operator which demonstrates how an equivalent level of safety will be maintained, approve operations beyond the time limits of the most time-limited system. The specific safety risk assessment shall include at least the:

(i) capabilities of the operator;

(ii) overall reliability of the aeroplane;

(iii) reliability of each time limited system;

(iv) relevant information from the aeroplane manufacturer; and

(v) specific mitigation measures.

(e) For aeroplanes engaged in EDTO, the additional fuel required by paragraph 91.07.12 of sub-regulation (3)(f) shall include the fuel necessary to comply with the EDTO critical fuel scenario as established by the Executive Director.

(f) A flight shall not proceed beyond the threshold time in accordance with Sub-regulation 91.07.35(2)(a) unless the identified en-route alternate aerodromes have been re-evaluated for availability and the most up to date information indicates that, during the estimated time of use, conditions at those aerodromes will be at or above the operator's established aerodrome operating minima for the operation. If any conditions are identified that would preclude a safe approach and landing at that aerodrome during the estimated time of use, an alternative course of action shall be determined.

(g) The Executive Director shall, when approving maximum diversion times for aeroplanes with two turbine engines, ensure that the following are taken into account in providing the overall level of safety intended:

(i) reliability of the propulsion system;

(ii) airworthiness certification for EDTO of the aeroplane type; and

(iii) EDTO maintenance programme

Note When the diversion time exceeds the threshold time, the operation is considered to be an extended diversion time operation (EDTO)

Note: For the purpose of EDTO, the take-off and/or destination aerodromes may be considered en-route alternate aerodromes.

91.07.36 Disinfection of aircraft

(1) The Executive Director shall, in consultation with public health authorities, establish and determine, based on a risk assessment, procedures prescribing the conditions under which an aircraft is disinfected.

(2) An owner or operator of an aircraft shall ensure that the following requirements apply to a disinfection:

(a) disinfection measures are put in place for equipment or tools used to disinfect surfaces or equipment of an aircraft contaminated by bodily fluids;

(b) disinfection of contaminated areas or surfaces is conducted in accordance with the measures referred to in paragraph (a) and in accordance with procedures provided by an aircraft manufacturer and subject to any prescripts issued by the World Health Organisation;

(c) suspected contaminated areas are disinfected with chemical or non-chemical compounds possessing suitable germicidal properties appropriate to a suspected infectious agent;

(d) disinfection is carried out expeditiously by trained personnel wearing suitable personal protective equipment;

(e) suitable mitigation measures are put in place where chemical or non-chemical measures or means are used for disinfection in order to –

(i) safeguard an aircraft structure and its operating equipment and materials against damage; and

(ii) protect the health of passengers, crew, personnel, or live cargo from any deleterious effects;

(f) appropriate application methods or means shall be used to mitigate the deleterious effects of disinfection chemical compounds;

(g) aircraft disinfection required for animal health reasons, shall only be done using methods and disinfectants prescribed by the World Health Organisation for Animal Health (OIE);

(h) extra disinfection in response to either a health incident on board or after a contamination on board, shall be limited to disinfection of a container or to a compartment of an aircraft in which contamination is suspected;

(i) procedures in accordance with an aircraft manufacturer's guidelines are in place, for specific sensitive areas such as amongst others, the cockpit, electronics bay and galley areas.

(3) When the Authority requires an operator to submit evidence of disinfection, the following documents shall be submitted:

(a) a general notification on a passenger manifest or General Declaration as provided for in Appendix 1 of Annex 9;

(b) a pertinent disinfection control sheet as proof that disinfection has been performed in accordance with procedures recommended by the World Health Organisation; and

(c) a statement by a PIC indicating that passengers and crew were disembarked from an aircraft when disinfection was conducted.

(4) With respect to guidance on the technical specification of disinfectants to be used on aircraft, the Authority shall consult with –

(a) the World Health Organisation and relevant public health authorities;

(b) other appropriate authorities;

(c) aircraft manufacturers;

(d) chemical suppliers in the region; and

(e) Contracting States in the region.

(5) In determining the disinfectant to be used on board aircraft, the Authority shall take into account –

(a) the type and risk groups of the pathogens; and

(b) the procedures for the administering of the disinfectant which shall be in accordance with the current guidance material of the World Health Organisation and recommendations made by aircraft manufacturer, if applicable.

91.07.37 Disinsection of aircraft

(1) An owner or operator of an aircraft shall, in consultation with the National Department of Health and the Authority, and subject to the provisions of subregulation (2), establish procedures and conditions under which an aircraft shall be disinsected.

(2) An owner or operator of an aircraft shall-

(a) limit routine disinsection of aircraft cabin and flight deck with an aerosol while passengers and crew are on board, to same aircraft operations originating in, or operating through territories that are considered, based on a risk assessment, to pose a threat to public health, agriculture, or environment;

(b) ensure a periodical review of the requirements for disinsection of aircraft and modify them, as appropriate, in the light of all available evidence relating to the transmission of insects by aircraft;

(c) authorise or accept only those methods whether chemical or non-chemical, or insecticides, which are recommended by the World Health Organization and which are considered efficacious; and

(d) ensure that the procedures for disinsection are not injurious, do not pose deleterious effects to the health of passengers, crew, personnel, and live cargo, resulting in the minimum discomfort to them.

(3) The Executive Director shall, upon request, provide to an aircraft operator, appropriate information, in plain language, for crew and passengers, explaining the provisions of this regulation, the reasons for and the safety of properly performed aircraft disinsection.

(4) When disinsection has been performed in accordance with procedures prescribed by the World Health Organization, the Executive Director shall accept a certification on the General Declaration or, in the case of residual disinsection, a Certificate of Residual Disinfection.

(5) An owner or operator of an aircraft shall keep records of disinsection in the form of a Certificate of Residual Disinfection or certification on the General Declaration and such certificate shall be presented or made available to the appropriate authorities in the country of destination.

(6) An owner or operator of an aircraft shall ensure that-

(a) suitable mitigation measures are in place for the use of any insecticide, or any other substance used for disinsection in order to safeguard against damage to an aircraft structure or its operating equipment and material; and

(b) flammable chemical compounds or solutions likely to damage aircraft structure, such as by corrosion, shall not be used to disinsect an aircraft.

91.07.38 Operations in RNP designated airspace

(1) A person shall not operate an aircraft in RNP designated airspace, unless -

(a) an RNP operations procedures manual is available and is incorporating all amendments, approved in accordance with this Part for that aircraft and aircraft navigation system;

(b) such operation is performed in accordance with procedures, instructions and limitations contained in an approved manual;

(c) the instruments and equipment required by Document NAM-CATS 91 for a particular RNP operation have been inspected and maintained in accordance with an approved maintenance program;

(d) each flight crew member has adequate knowledge of, and familiarity with an aircraft concerned and-

(i) its navigation system; and

(ii) procedures to be used, including normal, abnormal and contingency procedures; and

(e) a PIC has ensured that such aircraft and its navigation system are both approved by the Executive Director for RNP operation and that an RNP operation procedures manual is complied with for a planned route and any alternate routes.

(2) A procedures manual referred to in subregulation (1)(a) may be incorporated in an approved operations manual and maintenance control manual of a holder of AOC.

(3) An operator of an aircraft performing an RNP operation shall keep a current copy of an RNP operation procedures manual at its principal base of operation and shall make it available for inspection upon request by the Executive Director, inspector or any authorised person.

(4) A person requiring approval or amendment of an RNP operation procedures manual, shall submit such proposed manual or amendment to the Executive Director for approval.

(5) An RNP operation procedures manual shall contain minimum requirements as prescribed in Document NAM-CATS 91.

(6) Unless authorised by ATC, a PIC shall ensure that at least two independent long-range navigation systems are serviceable and accurate.

(7) The serviceability contemplated in subregulation (5) shall be done 30 minutes before entry into an RNP designated airspace and upon entry into an RNP designated airspace.

(8) If an aircraft does not meet the provisions of subregulation (7), a PIC shall-

(i) notify an ATC when an aircraft cannot meet the RNP criteria; and

(ii) when an aircraft is operating with a single long-range navigation system.

(9) If an aircraft is operating inside an RNP airspace, a PIC shall notify ATC whenever an aircraft cannot meet the RNP criteria and whenever an aircraft is operating with a single long-range navigation system.

91.07.39 Repatriation and relief flight

(1) The Executive Director shall, in consultation with the Department of Transport, National Department of Health and other relevant authorities, establish policy or procedures to facilitate relief and repatriation flights.

(2) The Executive Director shall, in consultation with the Department of Transport, Department of Health and other relevant authorities:

(a) facilitate the entry, departure and transit of aircraft engaged in repatriation and relief flight; and

(b) take all possible measures to ensure the safe operation of repatriation and relief flight.

(3) A repatriation and relief flight shall commence as soon as possible after reaching agreement with the States involved.

(4) The Authority shall, after consultation with a holder of an aerodrome licence and other relevant stakeholders, ensure that personnel and carry-on baggage, hold baggage, cargo, and other goods arriving on repatriation and relief flight are cleared without delay.

(5) An air service operator shall ensure that human remains infected with a communicable disease are transported according to the requirements stipulated in Part 113 and the applicable Department of Health regulations.

(6) An air service operator shall expedite clearance processes for entry or departure and transit of an aircraft, passengers, cargo, and other goods involved in repatriation and relief flight.

SUBPART 8: PERFORMANCE OPERATING LIMITATIONS

91.08.1 General provisions

(1) The owner or operator of an aircraft shall ensure that, under all conditions that could reasonably be expected to be encountered, the aircraft is operated in compliance with-

(a) the terms and conditions of the certificate of airworthiness and AFM issued in respect of such aircraft;

(b) the operating limitations, the markings and placards as prescribed by the appropriate authority of the State of Registry; and

(c) the mass limitations prescribed in Part 21 or as imposed by compliance with the applicable noise certification standards under which the aircraft was certified unless otherwise authorized in exceptional circumstances by the competent authority of the State in which the aerodrome is situated for a certain aerodrome or a runway where there is no noise disturbance problem.

(2) In complying with sub-regulation (1), the owner or operator shall take account of airframe configuration, environmental conditions and the operation of systems which may have an effect on the performance of the aircraft, when appropriate, including aircraft mass, operating procedures, the pressure altitude appropriate to the elevation of the aerodrome, temperature, wind, runway gradient and condition of runway.

(3) An air service operator of an aircraft engaged in a commercial air transport operation, shall comply with the provisions of the appropriate regulations in Parts 93, 121, 127 or 135, as the case may be.

91.08.2 Helicopter operating limitations

(1) Except as provided in Part 127, performance Class 3 helicopters shall only be operated in conditions of weather and light, and over such routes and diversions therefrom, which may permit a safe forced landing to be executed in the event of an engine failure.

(2) The provisions of sub-regulation (1) shall apply to performance Class 2 helicopters prior to the take-off decision point or after passing the landing decision point.

(3) Only performance Class 1 helicopters shall be permitted to operate from elevated heliports in built-up urban areas.

91.08.3 Helicopter performance classification

For performance purposes, helicopters are classified as follows:

(a) Class 1 helicopter- a helicopter with performance such that, in case of critical power unit failure, the helicopter is able to safely continue the flight to an appropriate landing, unless the failure occurs prior to reaching the take-off decision point or after passing the landing decision point, in which cases the helicopter must be able to land within the rejected take-off or landing area;

(b) Class 2 helicopter- a helicopter with performance such that, in case of critical power unit failure, the helicopter is able to safely continue the flight, except when the failure occurs early during the take-off manoeuvre or late in the landing manoeuvre, in which case a forced landing may be required; and

(c) Class 3 helicopter- a helicopter with performance such that, in case of power unit failure at any point in the flight profile, a forced landing has to be performed.

91.08.4 Aeroplane performance classification

For performance purposes, aeroplanes are classified as follows-

(a) Class A aeroplanes-

(i) multi-engine aeroplanes powered by turbo-propeller engines with a maximum certificated mass exceeding 5 700 kilograms; and

(ii) multi-engine turbojet-powered aeroplanes;

(b) Class B aeroplanes- propeller-driven aeroplanes, other than single-engine aeroplanes, with a MCM of 5 700 kilograms or less;

(c) Class C aeroplanes- aeroplanes powered by two or more reciprocating engines with a MCM exceeding 5 700 kilograms; and

(d) Class D aeroplanes- single-engine aeroplanes.

91.08.5 Performance limitations Class A and Class C aeroplanes

(1) No owner or operator of a Class A or C aeroplane shall start a take-off unless the aeroplane is able, in the event of a critical power-unit failing at any point in the take-off, either to discontinue the take-off and stop within either the accelerate-stop distance available or the runway available, or to continue the take-off and clear all obstacles along the flight path by an adequate margin until the aeroplane is in a position to safely transition to the en route phase of flight.

(2) The adequate margin referred to in sub-regulation (1) shall be determined as prescribed in Document NAM-CATS 91.

(3) For the purposes of sub-regulation (1), in determining the length of the runway available, account shall be taken of the loss, if any, of runway length due to alignment of the aeroplane prior to take-off.

(4) No owner or operator of a Class A or C aeroplane shall operate such aeroplane unless it is able, in the event of the critical engine becoming inoperative at any point along the route or planned diversions there from, to continue the flight to an aerodrome at which the requirements of sub-regulation (5) can be met, without flying below the minimum obstacle clearance altitude at any point.

(5) No owner or operator of a Class A or C aeroplane shall operate such aeroplane unless it is able, at the aerodrome of intended landing and at any alternate aerodrome, after clearing all obstacles in the approach path by a safe margin, be able to land, with assurance that it can come to a stop or, for a seaplane, to a satisfactorily low speed, within the landing distance available. Allowance shall be made for expected variations in the approach and landing techniques, if such allowance was not made during the establishment of the aeroplane's performance data.

(6) An owner or operator may, in meeting the requirements of sub-regulations (4) and (5), make allowance for normal fuel consumption and if applicable, the ability to jettison fuel en route.

(7) An owner or operator of aeroplanes without approved performance data may submit an alternative means of meeting the requirements of sub-regulations (1), (4) and (5) to the Executive Director for approval.

SUBPART 9: MAINTENANCE

91.09.1 General

(1) No owner, operator or pilot of an aircraft shall operate the aircraft unless such aircraft is maintained and released to service in accordance with the provisions of Part 24 or Part 43, as applicable to the aircraft.

(2) An owner or operator may assign the responsibility for the maintenance and release of his or her aircraft to an approved maintenance organisation by means of a written agreement.

91.09.2 Aeroplane maintenance programme

Each owner or operator shall ensure that the aeroplane is maintained in accordance with an aeroplane maintenance programme as specified in Document NAM-CATS 43 or Document NAM-CATS 24, as applicable.

91.09.3 Maintenance responsibilities

(1) The owner or operator of an aircraft, or maintenance organisation so assigned in accordance with Regulation 91.09.01(2), shall ensure that, in accordance with procedures acceptable to the Executive Director-

(a) the aircraft is maintained in an airworthy condition;

(b) the operational and emergency equipment necessary for an intended flight is serviceable; and

(c) the certificate of airworthiness or authority to fly, as applicable, of the aircraft remains valid.

(2) The owner or operator shall not operate the aircraft unless it is maintained and released to service under a system acceptable to the Executive Director.

(3) When the maintenance release is not issued by an approved maintenance organization in accordance with the provisions of Part 145, the person signing the maintenance release shall be licensed in accordance with the provisions of Part 66.

(4) The owner or operator shall ensure that the maintenance of the aircraft is performed in accordance with a maintenance programme acceptable to the Executive Director.

91.09.4 Maintenance records

(1) An owner or operator of an aircraft, or maintenance organisation so assigned in accordance with regulation 91.09.01 (2), shall ensure that the following records are kept for the periods mentioned in subregulation (2)-

(a) the total time in service hours of an aircraft and all life-limited components specified in terms of calendar time and cycles, as appropriate;

(b) the current status of compliance with all applicable mandatory continuing airworthiness information;

(c) appropriate details of modifications and repairs;

(d) the time in service in terms of hours, calendar time and cycles, as appropriate since the last overhaul of an aircraft or its components subject to a mandatory overhaul life;

(e) the current status of an aircraft's compliance with the maintenance programme; and

(f) detailed maintenance records to show that all requirements for the signing of a maintenance release have been met.

Note – the form and format of the records may include, for example, paper records, visual media records, electronic records or any combination thereof.

(2) The records in sub-regulations (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 and the records in sub-regulation (1)(f) for a minimum period of one year after the signing of the maintenance release.

(3) In the event of a temporary change of owner or lessee, the records shall be made available to the new owner or lessee. In the event of any permanent change of owner or lessee, the records shall be transferred to the new owner or lessee.

91.09.5 Modifications and repairs

All modifications and repairs shall comply with airworthiness requirements acceptable to the Executive Director. Procedures shall be established to ensure that the substantiating data supporting compliance with the airworthiness requirements are retained.

91.09.6 Maintenance release

(1) A maintenance release shall be completed and signed, as prescribed by the Executive Director, to certify that the maintenance work performed has been completed satisfactorily and in accordance with data and procedures acceptable to the Executive Director.

(2) A maintenance release shall contain a certification including-

(a) basic details of the maintenance performed;

(b) the date such maintenance was completed;

(c) when applicable, the identity of the approved maintenance organization;

(d) the identity of the authorized person or persons signing the release;

(e) the expiry date of the release where a calendar limit exists;

(f) the hours at which the release will expire;

(g) if the maintenance program makes provision for such, the hours or time by which the inspection may be extended.

(3) An owner shall, notwithstanding an extension as contemplated in sub-regulation (2)(g), ensure that a maintenance release remains valid by meeting the requirements of sub-regulation (2)(d) and (e) or (f), as applicable, with respect to such extension.

91.09.7 Continuing airworthiness information

An owner or operator of an aeroplane of a maximum certificated take-off mass in excess of 5 700 kg shall monitor and assess maintenance and operational experience with respect to continuing airworthiness and provide such information as required by the Executive Director and shall report said information to him or her using a reporting system the Executive Director has developed for that purpose.

SUBPART 10: CORSIA

91.10.1 Applicability

(1) This Subpart applies to an aeroplane operator that-

(a) is attributed to Namibia in accordance with regulation 91.10.2; and

(b) produces annual CO_2 emissions greater than 10,000 tonnes from the use of an aeroplane with a MCTOW greater than 5,700 kg conducting international flights on or after 1 January 2019.

(2) This Subpart is not applicable to-

(a) a humanitarian flight;

(b) a medical flight;

(c) a firefighting flight; and

(d) a flight preceding or following a humanitarian, medical, or firefighting flight, as prescribed in Document NAM-CATS 91.

(3) The formulae and units, related to the CORSIA, are prescribed in Document NAM-CATS 91.

91.10.2 Attribution of aeroplane operator to Namibia

(1) An aeroplane operator with international flights shall be identified and considered attributed to Namibia if an aeroplane operator -

(a) has an ICAO designator;

(b) has a valid AOC, or equivalent, issued by the Executive Director;

(c) is registered as a juristic person; or

(d) is a natural person with resident status in Namibia.

(2) If an aeroplane operator changes its attributes and is attributed to a new State but has not established a new entity or a subsidiary, then that new State shall become the State to which an aeroplane operator fulfils its requirements under this Subpart at the start of the next compliance period.

(3) An aeroplane operator and its wholly owned subsidiary aircraft operator may be treated as a single consolidated aeroplane operator liable for compliance with the requirements of this Subpart, subject to the approval of the Executive Director.

(4) An EMP of an aeroplane operator with a wholly owned subsidiary aeroplane operator shall be accompanied by documentary proof of ownership of that subsidiary aeroplane operator.

91.10.3 Attribution of international flights to an aeroplane operator

(1) An aeroplane operator shall identify international flights that are attributed to it in terms of sub-regulation (2).

(2) An attribution of a specific international flight to an aeroplane operator shall be determined as follows:

(a) when an aeroplane identification of a flight plan contains the ICAO Designator, that international flight shall be attributed to the aeroplane operator that has been assigned this designator;

(b) when aeroplane identification of a flight plan contains a nationality or common mark, and registration mark of an aeroplane that is explicitly listed in an AOC, a flight concerned shall be attributed to the aeroplane operator that holds such AOC; and

(c) when an aeroplane has not been identified in terms of sub-paragraph (a) and (b), an international flight shall be attributed to an aeroplane owner who shall be considered an aeroplane operator.

(3) An aeroplane owner shall, upon request by the Executive Director, provide information to identify an actual aeroplane operator of a particular flight.

(4) An aeroplane operator may, by contract, delegate the administrative requirements of this Subpart to a third party, provided that a delegated third party is not the same entity as a verification body.

(5) Notwithstanding the provisions of sub-regulation (4), liability for compliance may not be delegated and shall remain with the aeroplane operator in all situations.

91.10.4 Record keeping, compliance periods and equivalent procedure

(1) An aeroplane operator shall keep records relevant to this Subpart for a period of ten years.

(2) The Authority shall keep records relevant to an aircraft operator's CO_2 emissions per State pair in order to calculate an aeroplane operator's offsetting requirements during the 2030 to 2035 compliance periods.

(3) An aeroplane operator shall comply with the compliance periods for CORSIA as prescribed in Document NAM-CATS 91.

(4) If an aeroplane operator makes use of equivalent procedures, instead of the procedures prescribed in this Subpart, such equivalent procedures may be approved by the Executive Director if in line with the requirements in Document NAM-CATS 91.

91.10.5 Monitoring requirements of aeroplane operator's annual CO_2 emissions

(1) The monitoring requirements of an aeroplane operator's annual CO_2 emissions as prescribed in Document NAM-CATS 91 shall be applicable to an aeroplane operator from the year after it qualifies to be classified in terms of regulation 91.10.1.

(2) The monitoring requirements referred to in sub-regulation (1) shall be applicable to a new entrant from the year after it meets the requirements referred to in 91.10.1.

91.10.6 Eligibility of monitoring methods

(1) CO_2 emissions monitoring methods prescribed in Document NAM-CATS 91 shall be considered as eligible, if an aeroplane operator monitors and records its fuel use from international flights, in accordance with an eligible monitoring method as provided for by subregulations (3) and (4).

(2) An aeroplane operator shall use the same eligible monitoring method for the compliance period in accordance with an EMP approved by the Executive Director.

(3) An aeroplane operator shall comply with the compliance period prescribed in Document NAM-CATS 91.

(4) The eligibility thresholds, for the use of an eligible monitoring method for the 2019 to 2020 compliance period and the 2021 to 2035 compliance period, shall be as prescribed in Document NAM-CATS 91.

91.10.7 EMP

(1) An aeroplane operator shall-

(a) develop an EMP as prescribed in Document NAM-CATS 91;

(b) submit an EMP in the prescribed form to the Executive Director for approval in accordance with the information and timelines as prescribed in Document NAM-CATS 91;

(c) if a new entrant, submit an EMP to the Executive Director for approval within three months of falling within the scope of applicability; and

(d) submit any material or substantial change on information contained in an EMP to the Executive Director for approval.

(2) An aeroplane operator shall inform the Executive Director of any change to an EMP even if an aeroplane operator does not consider such change to be a material change.

(3) The Executive Director shall inform an aeroplane operator, during an approval process of an EMP, of a level of aggregation for which a reporting of number or flight and CO_2 emissions shall be conducted.

91.10.8 Calculation of CO_2 emissions from aeroplane fuel use

(1) An aeroplane operator shall-

(a) apply a fuel density value to calculate fuel mass where an amount of fuel uplift is determined in units of volume;

(b) record fuel density which may be an actual or a standard value of 0.8 kg per litre that is used for operational and safety reasons such as in an operational, flight or technical log; and

(c) detail a procedure for informing the use of actual or standard density in an EMP along with a reference to a relevant aeroplane operator documentation.

(2) An aeroplane operator using a fuel use monitoring method shall determine CO_2 emissions from international flights, using the following equation:

$$CO_2 = \sum_f \mathrm{M}_f * FCF_f$$

Where:

CO_2 = CO_2 emissions (in tonnes);

M_f = Mass of fuel f used (in tonnes); and

FCF_f = Fuel conversion factor of given fuel f, equal to 3.16 (in kg CO_2/kg fuel) for Jet-A fuel and 3.10 (in kg CO_2/kg fuel) for AvGas or Jet-B fuel.

91.10.9 Monitoring of CORSIA eligible fuel claims

(1) An aeroplane operator intending to claim for emissions reduction from the use of CORSIA eligible fuel shall-

(a) use CORSIA eligible fuel that meets the CORSIA sustainability criteria as prescribed in Document NAM-CATS 91; and

(b) only use CORSIA eligible fuel from a fuel producer that is certified by an approved sustainability certification scheme as prescribed in Document NAM-CATS 91.

(2) Fuel shall not be accounted for as CORSIA eligible fuel if an aeroplane operator fails to or cannot demonstrate that such fuel meets the CORSIA sustainability criteria as prescribed in Document NAM-CATS 91.

91.10.10 Reporting requirements for aeroplane operator annual CO_2 emissions

(1) An aeroplane operator-

(a) shall submit to the Executive Director, a copy of a verified emissions report for approval and a copy of an associated verification report in accordance with the timeline as prescribed in Document NAM-CATS 91;

(b) shall ensure that an emissions report contains the information as prescribed in Document NAM-CATS 91;

(c) shall report a number of international flights and CO_2 emissions in accordance with a level of aggregation decided on by the Executive Director during an approval process of an EMP, which shall either be at a level of State pair or aerodrome pair;

(d) that uses a CERT is not required to report information on a type and mass of fuel used and shall use the standardised emissions report template provided in Document NAM-CATS 91 for submission;

(e) reporting on its consolidated CO_2 emissions from international flights, during the 2019-2020 period, shall append to the main emission report the disaggregated data relating to each subsidiary aeroplane operator; and

(f) may request the Authority in writing, not to publish its CO_2 emissions monitoring data, as prescribed in Document NAM-CATS 91.

(2) The Executive Director may publicly publish CO_2 emissions data after consultation with a concerned aeroplane operator.

(3) Any person aggrieved by the decision of the Executive Director to publicly publish CO_2 emissions data may appeal against that decision as prescribed.

91.10.11 Reporting of CORSIA eligible fuel

(1) An aeroplane operator shall not include CORSIA eligible fuel traded or sold to a third party from its total reported quantity of CORSIA eligible fuel.

(2) An aeroplane operator shall declare other GHG schemes it participates in where emissions reduction from the use of CORSIA eligible fuel may be claimed, and that it has not made claims for the same batches of CORSIA eligible fuel under these schemes.

(3) To claim emissions reduction from the use of CORSIA eligible fuel in an emissions report, an aeroplane operator shall provide supplementary information as prescribed in Document NAM-CATS 91 within a given compliance period.

(4) An aeroplane operator may make CORSIA eligible fuel claim on an annual basis in order to ensure all documentation is submitted timeously.

(5) An aeroplane operator shall follow the procedures prescribed in Document NAM-CATS 91 in order to purchase fuel from a supplier downstream from a fuel blender.

91.10.12 Verification of CO_2 emissions

(1) An aeroplane operator's emissions report shall be verified annually as follows:

(a) by performing an internal pre-verification of its emissions report prior to the verification by a verification body;

(b) by a verification body for aeroplane operator's annual emissions report; and

(c) by a verification body that is included in the list prescribed in Document NAM-CATS 91.

(2) A verification body shall conduct a verification according to ISO 14064-3:2006, and the relevant requirements prescribed in Document NAM-CATS 91.

(3) A verified emissions report shall be submitted, as prescribed in Document NAM-CATS 91.

(4) The requirements for the verification of CORSIA eligible fuel shall be as follows:

(a) fuel purchases, transaction reports, fuel blending records, and sustainability credentials shall constitute documentary proof for the purpose of verification and approval of emissions reductions from the use of CORSIA eligible fuel; and

(b) an aeroplane operator, or its representative, shall verify the production records for the CORSIA eligible fuel that it purchases as prescribed in Document NAM-CATS 91.

91.10.13 Error corrections to emissions report

(1) If an error in an aeroplane operator's reported emissions has been identified by the Authority, verification body or by an aeroplane operator after CO_2 emissions have been submitted to ICAO, the Executive Director shall-

(a) update reported CO_2 emissions to address an error identified; and

(b) assess any implications with respect to an aeroplane operator's offsetting requirements in previous years and where necessary, make adjustments to compensate for an error during a compliance period in which an error has been identified.

(2) The Executive Director shall report an error in an aeroplane operator's CO_2 emissions report and the results of a follow-up on related adjustments to ICAO.

91.10.14 Requirements for addressing data gaps

(1) An aeroplane operator using a fuel use monitoring method, shall fill data gaps using the ICAO CORSIA CERT, as prescribed in Document NAM-CATS 91, provided that data gaps during a compliance period do not exceed the following thresholds:

(a) 2019-2020 period: 5% of international flights; and

(b) 2021-2035 period: 5% of international flights subject to offsetting requirements.

(2) An aeroplane operator shall correct concerns identified with data and information management system in a timely manner to mitigate ongoing data gaps and system weaknesses.

(3) If an aeroplane operator realises that it has data gaps and system weaknesses that exceed the threshold referred to in sub-regulation (1), an aeroplane operator shall engage with the Executive Director to take remedial action to address the identified data gaps and system weaknesses.

(4) If an aeroplane operator exceeds the threshold referred to in sub-regulation (1), it shall state the percentage of international flights for the 2019-2020 period, or flights subject to offsetting requirements for the 2021-2035 period that had data gaps, and shall provide an explanation to the Executive Director in their annual emissions report.

(5) An aeroplane operator shall fill all data gaps and correct systematic errors and misstatements prior to the submission of an emissions report.

91.10.15 CO_2 offsetting requirements

(1) The offsetting requirements of CORSIA shall –

(a) be applicable from 1 January 2021 to 31 December 2035, to an aeroplane operator referred to in regulation 91.10.1, whose international flights are between Namibia and States defined in Document NAM-CATS 91.

(b) not be applicable to a new entrant aeroplane operator –

(i) for thee years starting from the year when such operator meets the requirements of regulation 91.10.1; or

(ii) until the annual CO_2 emissions exceed 0.1 percent of its total CO_2 emissions from international flights in 2020, whichever occurs first.

(2) Methods of calculation of emissions for offsetting requirements shall be as prescribed in Document NAM-CATS 91.

(3) The Authority shall calculate the annual aeroplane operator's final CO2 offsetting requirements, based on the data reported in accordance with Chapter 2 of the CORSIA Methodology for Calculating Actual Life Cycle Emissions Values and the applicability requirements as prescribed in Document NAM-CATS 91.

91.10.16 Total final CO_2 offsetting requirements for given compliance period with emissions reductions from use of CORSIA eligible fuels

(1) The amount of CO_2 emissions required to be offset by an aeroplane operator, after considering emissions reductions from the use of CORSIA eligible fuels from 1 January 2021 to 31 December 2035 given compliance period, shall be calculated by the Authority using the requirements prescribed in Document NAM-CATS 91.

(2) Where an aeroplane operator's total final offsetting requirements during a compliance period FORc is negative, the negative offsetting requirements shall not be carried forward to subsequent compliance periods and such an aeroplane operator shall have no offsetting requirements for the compliance period.

(3) The total final offsetting requirements of an aeroplane operator shall, during a compliance period FORc, be rounded up to the nearest tonne of CO_2.

(4) The Executive Director shall inform an aeroplane operator, of its total final offsetting requirements, for a compliance period, according to the timelines for the given compliance period 2019 to 2020 as prescribed in Document NAM-CATS 91.

91.10.17 Cancellation of CORSIA Eligible Emissions Units

(1) The CORSIA Eligible Emissions Units shall be as prescribed in Document NAM-CATS 91.

(2) Cancellation of emissions units shall be applicable to an aeroplane operator, subject to the offsetting requirements stipulated in regulation 91.10.15.

(3) An aeroplane operator shall meet the offsetting requirements stipulated in regulation 91.10.15, as calculated by the Authority, by cancelling CORSIA Eligible Emissions Units in a quantity equal to its total offsetting requirements, for a given compliance period, FORc.

(4) To fulfil the provision of subregulation (2), and aeroplane operator shall:

(a) cancel such CORSIA Eligible Emissions Units within a registry, designated by a CORSIA Eligible Emissions Unit Programme, in accordance with the timelines as prescribed in Document NAM-CATS 91; and

(b) request each CORSIA Eligible Emissions Unit Programme registry to make visible on the registry's public website, information on each of such aeroplane operator's cancelled CORSIA Eligible Emissions Units, for a given compliance period, in terms of the timelines as prescribed in Document NAM-CATS 91.

(5) Information for each cancelled CORSIA Eligible Emissions Unit shall include consolidated identifying information in an Emissions Unit Cancellation Report, as prescribed in Document NAM-CATS 91.

91.10.18 Accreditation of verification body

(1) An aeroplane operator shall engage a verification body, accredited by a national accreditation body, to ISO 14065:2013, ISO/IEC 17011:2004 and the relevant requirements as prescribed in Document NAM-CATS 91, for the verification of its Emissions Unit Cancellation Report.

(2) A verification body shall be accredited and comply with the standards specified in ISO 14064:3:2006, and the relevant requirements prescribed in Document NAM-CATS 91.

(3) An aeroplane operator shall upon request, by a verification body, provide access to relevant information on the cancellation of emissions units.

91.10.19 Verification of Emissions Unit Cancellation Report

(1) An aeroplane operator shall report to the Authority the cancellation of CORSIA Eligible Emissions Units, carried out in accordance with regulation 91.10.18, to meet its total final offsetting requirements for a given compliance period, by submitting to the Executive Director for approval:

(a) a copy of a verified Emissions Unit Cancellation Report; and

(b) a copy of an associated Verification Report.

(2) An Emissions Unit Cancellation Report submitted to the Authority shall contain information and be in accordance with the timelines prescribed in Document NAM-CATS 91.

(3) A verification body referred to in regulation 91.10.18 shall independently submit a copy of Emissions Unit Cancellation Report and associated Verification Report, to the Executive Director, in accordance with the timelines as prescribed in Document NAM-CATS 91.

(4) The Executive Director shall perform an order of magnitude check of Emissions Unit Cancellation Report submitted in terms of subregulation (3), in accordance with the timeline, as prescribed in Document NAM-CATS 91.

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NAM-CATS 91

General Aviation and Operating Flight Rules

LIST OF TECHNICAL STANDARDS

DEFINITIONS

"contact tracing" means the practice of identifying, notifying, and monitoring individuals who may have had close contact with or who have been exposed to, and possibly infected by, a person having a confirmed or probable case of an infectious disease as a means of controlling the spread of infection.

"deleterious effects" means effects that are capable of posing a hazard to the health of passengers, personnel, live cargo or the structure of an aircraft;

"health-related documentation" means documentary evidence required by Contracting States, including those standardised by the World Health Organisation (WHO) International Health Regulations (IHR) (2005), to indicate that passengers and crew members have fulfilled the requirements for preventing and mitigating the spread of communicable diseases for the purposes of transiting or entering a Contracting State;

"repatriation flights" means special flights organised, facilitated, or supported by a State for the exclusive purpose of transporting that State's nationals, and other eligible persons, from foreign countries to that State, or a safe third country, through operations by State aircraft, humanitarian flights or chartered or non-scheduled commercial flights;

"risk assessment" means the process of hazard identification, risk analysis and risk evaluation;

"standardised health documents" means documents standardized by the World Health Organization (WHO) under the International Health Regulations (IHR) (2005);

"quarantine" means the restriction of activities or separation from other persons of suspect persons who are not ill or of suspect baggage, containers, conveyances, or goods in such a manner as to prevent the possible spread of infection or contamination;

"pandemic" means a worldwide spread of an infection or communicable disease;

"epidemic" means a sudden disease outbreak that affects many people in a particular region, community, or population;

"public health event of international concern" means an extraordinary event which is determined to constitute a public health risk to other States through the international spread of disease and to potentially require a co-ordinated international response.

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 Executive Director's decision to require cabin crew members will be based on -

(a) the complexity of the aircraft with respect to at least -

(i) its instrumentation and equipment;

(ii) its 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 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 Executive 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

(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 Executive Director of any checklist modified from its original form, as prepared by the Manufacturer or other source approved by the State of Manufacturer and, if deemed necessary in the interests of safety, the Executive 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 Executive 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 Executive 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 Executive Director.

(2) The Executive 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 aircraft maintenance status of what maintenance, scheduled or out of phase, is next due;

(n) all outstanding deferred defects which affect the operation of the aircraft;

(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) An owner or operator shall ensure that all entries are made concurrently and that they are made in ink or electronic method.

(4) Electronic flight folio system shall record the parameters as detailed in subsection (1):

(a) electronic flight folio system shall record personnel interactions with the system and changes made on the system;

(b) electronic flight folio system shall track changes made by personnel and archived records shall be available as a read only document;

(c) electronic flight folio system shall address location and time of signatories;

(d) electronic flight folio system may require airworthiness approval if it incorporates changes in the type design. Installed Electric Flight Folio's may be incorporated during the aircraft type design, by a change to the type design or added by a supplemental type certificate;

(e) an off the shelf electric flight folio hardware that is not connected to an aircraft system does not need an airworthiness approval;

(f) an off the shelf equipment may only connect to aircraft power through a certified power source;

(g) a hardware that transmit data or acquire data from the aircraft systems on any phase of the flight needs an approval by the Authority; and

(h) a software that interfaces with aircraft systems.

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 for aeroplanes age and requirements.

(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 sub-paragraph (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 sub-paragraph (i);

(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 sub-paragraph (i). In addition, a Type IIA FDR shall retain sufficient information from the preceding take-off for calibration purposes; and

(iv) aeroplane age and requirements.

***Notes**: The following requirements shall be applicable with effect from 1 January 2023.*

***Note**: The following requirements shall be applicable with effect from 1 January 2023, and shall replace the requirements of subsection (3) paragraph (h) (table for parameters to be recorded by FDR).*

TABLE A1

AEROPLANE AGE AND REQUIREMENTS

The weight of the aircraft (take-off mass)		Age of Aircraft	Parameters to be recorded by FDR
1	5700kg or Less	All turbine engine aeroplanes for which the individual certificate of airworthiness is first issued on or after 01 January 2016	(a) At least the first 16 parameters in the table in subregulation (h) (b) A class C AIR or AIRS which shall record at least the flight path and speed parameters displayed to the subregulation (h) or (c) An ADRS which shall record at least the first 7 parameters listed in the table in subregulation (h)
2	Over 27000kg	All aeroplanes for which the individual certificate of airworthiness is first issued on or after 01 January 1989	At least the first 32 parameters in the table in subregulation (h)
3	Over 5700kg up to and including 2700kg	All aeroplanes for which the individual certificate of airworthiness is first issued on or after 01 January 1989	At least the first 16 parameters in the table in subregulation (h)
4	5700kg or less	All multi-engine turbine engine aeroplanes for which individual certificate of airworthiness first issued on or after 01 January 1990	At least the first 16 parameters in the table in subregulation (h)
5	Maximum 5700kg	All multi-engine aircraft for which individual airworthiness certificate is first issued on or after 01 January 1990	At least the first 16 parameters in the table in subregulation (h)
6	Over 5700kg	All turbine-engine aeroplanes, for which the individual certificate of airworthiness was first issued before 01 January 1989, with a maximum certificated take-off mass of over 5700 kg, except those mentioned in no 7 on this table	At least the first 5 parameters in the table in subregulation (h)
7	Over 5700kg	All turbine engine aeroplanes, for which the individual certificate of airworthiness was first issued on or after 01 January 1987 but before 01 January 1989 except those mentioned on item no 7 in this table	At least the first 9 parameters in the table in subregulation (h)
8	Over 27000kg	Individual certificate of airworthiness first issued on or after 01 January 1987 but before 01 January 1989 types of which the prototype was certified by the appropriate authority after 30 September 1969	At least the first 16 parameters in the table in subregulation (h)
9	Over 27000kg	All turbine engine aeroplanes for which the individual certificate of airworthiness was first issued before 01 Jan 1987 but the prototype was certified by the appropriate authority after 30 September 1969	At least the first 05 parameters listed in the table in subregulation (h) and meet the objectives of (a) The attitude of the aeroplane in achieving its flight path; and (b) The basic forces acting upon the aeroplane resulting in the achieved flight path and the origin of such basic forces.
10	Over 5700kg	First individual airworthiness certificate issued on or after 01 January 2005	Record at least the first 78 parameters listed in the table in subregulation (h)
11	Over 5700kg	All aeroplanes with a mass of over 5700kg Take Off Mass of which application for type certification is submitted to the contracting state on or after 01 January 2023	At least the first 82 parameters in the table in subregulation (h)
12	5700kg or less	All turbine-engine aeroplanes with a seating configuration of more than five passenger seats and a MCTOM of 5700 kg or less for which the individual certificate of airworthiness is first issued on or after 1 January 2016	(a) an FDR which should record at least the first 16 parameters in Table H1 (b) a Class C AIR or AIRS which should record at least the fight path and speed parameters displayed to the pilot(s), as defined in Technical Standard 91.04.10 3 (9) (c) an ADRS which shall record at least the first 7 parameters listed in Table F1

(b) The parameters for a helicopter 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 sub-paragraph (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 sub-paragraph (j);

(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 sub-paragraph (j); and

(iv) Helicopter age and requirements.

Note: The following requirements shall apply with effect from 1 January 2023, and shall replace the requirements of subsection (3)(b)(i), (ii) and (iii).

TABLE B1

HELICOPTER AGE AND REQUIREMENTS

Weight of Aircraft	Condition	Parameters
All helicopters of with a MTOW of over 3 175kg	Individual Certificate of Airworthiness first issued on or after 1 January 2016	An FDR shall record the first 48 parameters of the table listed in 3(i)
All helicopters of Certified take-off mass of over 7000kg or having a passenger seating configuration of more than nineteen	Individual Certificate of Airworthiness first issued on or after 1 January 1989	An FDR shall record the first 30 parameters of the table listed in (3)(i)
All helicopters of a maximum certificated take-off mass of over 3 175 kg to 7 000kg (3 175 kg – 7000kg)	Individual Certificate of Airworthiness first issued on or after 1 January 1989	An FDR shall record the first 15 parameters of the table listed in (3)(i)
All turbine-engine helicopters of a maximum certificated take-off mass of over 2 250kg, up to and including 3 175kg	The application for type certification was submitted to a contracting state on or after 1 January 2018	(a) An FDR shall record the first 48 parameters of the table listed in (3)(i) (b) A Class C AIR or AIRS which should record at least the flight path and speed parameters displayed to the pilot, as defined in Appendix 4 Table 6(b) (c) An ADRS which shall record the first 7 parameters listed in Table 6(b)
All helicopters of a maximum certificated take-off mass of3 175kg or less	The individual Certificate of Airworthiness is first issued on or after 1 January 2018	(a) An FDR shall record the first 48 parameters listed in Table (3)(i) (b) A Class C AIR or AIRS which should record at least the flight path and speed parameters displayed to the pilot, as defined in Appendix 6(b) (c) An ADRS which shall record the first 7 parameters listed in Table 6(b)
All helicopters of a maximum certificated take-off mass of over 3 175kg	Application for type certificate is submitted to a contracting state on or after 1 January 2023	FDR record shall record the at least the first 53 parameters listed in Table (3)(i)
All helicopters of a maximum certificated take-off mass of over 3 175kg	Individual certificate of airworthiness is first issued on or after 1 January 2023	FDR record shall record the at least the first 53 parameters listed in Table (3)(i)

(c) The parameters that satisfy the requirements for FDRs are listed in the sub-paragraphs 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 synchronisation 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 discretes, 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 -

TABLE G1

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 000ft (-300m) to maximum certificated altitude of aircraft +5 000ft (+1 500m)	1	±100ft to ±700ft (±30m to ±200m)	5ft (1.5m)
3	Indicated airspeed or calibrated airspeed	50kt to max Vso (Note 2) Vso to 1.2 VD (Note 3)	1	± 5% ± 3%	1kt (0.5kt recommended
4	Heading (primary flight crew reference)	360°	1	±2°	0.5°
5	Normal acceleration (Note 4)	-3g to +6	0.125	±1% of maximum range excluding datum error of ±5%	0.004g
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 on 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	±1g	0.25	±0.015g excluding a datum error of ±0.05g	0.004g
Note - ***The preceding 16 parameters satisfy the requirements for a Type II FDR.***					

Serial number	Parameter	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR read-out)	Recording resolution (Note 1)
17	Lateral acceleration (Note 4)	±1g	0.25	±0.015g excluding a datum error of ±0.05g	0.004g
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	-20ft to 2 500ft (-6m to 750m)	1	±2ft (±0.6m) or ±3% whichever is greater below 500ft (150m) and ±5% above 500ft (150m)	1ft (0.3m) below 500ft (150m); 1ft (0.3m)/0.5% of full range above 500ft (150m)
21*	Vertical beam deviation (ILS/GPS/GLS glidepath, 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 - 200NM (0 - 370km)	4	As installed	1NM (1852m)
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)	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.***					

Serial number	Parameter	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR read-out)	Recording resolution (Note 1)
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, discretes 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)	Discrete	1	As installed	
37*	Windshear warning	Discrete	1	As installed	
38*	Selected barometric setting (pilot, co- pilot)	As installed	64	As installed	0.1mb (0.01in- 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	

Serial number	Parameter	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR read-out)	Recording resolution (Note 1)
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%	100psi
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 (±311N (±70lbf), ±378N (±85lbf), ±734N (±165lbf))	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. *Vso means stalling speed or minimum steady flight speed in the landing configuration.*
3. *Vso 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.*

Note: The following requirements shall be applicable with effect from 1 January 2023, and shall replace the requirements of Table G1 in total with the effect of 1 January 2023.

TABLE H1

PARAMETERS FOR AEROPLANE FLIGHT DATA RECORDERS

Serial #	Parameter	Applicability	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR read-out)	Recording resolution
1	Time (UTC when available, otherwise relative time count or GPS time sync)		24 hours	4	±0.125% /h	1 s
2	Pressure altitude		-300m (-1 000ft) to maximum certificated altitude of aircraft +1 500m (+5 000ft)	1	±30m to ±200m (±100ft to ±700ft)	1.5m (5ft)
3	Indicated airspeed or calibrated airspeed		95 km/h (50kt) to max Vso (Note 1) Vso to 1.2 V_D (Note 2)	1	± 5% ± 3%	1kt (0.5kt recommended
4	Heading (primary flight crew reference)		360°	1	±2°	0.5°
5	Normal acceleration (Note 8)	Application for type certification is submitted to a Contracting State before 1 January 2016 Application for type certification is submitted to a Contracting State on or after 1 January 2016	-3 g to + 6 g	0.125	±1% of maximum range excluding datum error of ±5%	0.004g
6	Pitch attitude		±75° or usable range whichever is greater	0.25	±2°	0.5°
7	Roll attitude		±180°	0.25	±2°	0.5°
8	Radio transmission keying		On-off (one discrete)	1		
9	Power on each engine (Note 3)		Full range	1 (per engine)	±2%	0.2% of full range or the resolution required to

Serial #	Parameter	Applicability	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR read-out)	Recording resolution
						operate the aircraft
10*	Trailing edge flap and cockpit control section		Full range or 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 or 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 8	Application for type certification submitted to a Contracting State before 1 January 2016	±1g	0.25	±0.015g excluding a datum error of ±0.05g	0.004g
		Application for type certification submitted to a Contracting State on or after 1 January 2016	±1g	0.0625	±0.015g excluding a datum error of ±0.05g	0.004g
17	Lateral acceleration Note 8	Application for type certification submitted to a Contracting State before 1 January 2016	±1g	0.25	±0.015g excluding a datum error of ±0.05g	0.004g
		Application for type certification submitted to a Contracting State on or after 1 January 2016	±1g	0.0625	±0.015g excluding a datum error of ±0.05g	0.004g
18	Pilot input and/or control surface position - primary controls (pitch, roll, yaw) (Notes 4 and 8)	Application for type certification submitted to a Contracting State before 1 January 2016	Full range	0.25	±2° unless higher accuracy uniquely required.	0.2% of full range or as installed
		Application for type certification submitted to a Contracting State on or after 1 January 2016	Full range	0.125	±2° unless higher accuracy uniquely required.	0.2% of full range or as installed

Serial #	Parameter	Applicability	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR read-out)	Recording resolution
19	Pitch trim position		Full range	1	±3% unless higher accuracy uniquely required	0.3% of full range or as installed
20*	Radio altitude		-6m to 750m (-20ft to 2 500ft)	1	±0.6m (±2ft) or ±3% whichever is greater below 150m (500 ft) and ±5% above 150m (500 ft)	0.3m (1 ft) below 150m (500 ft); 0.3m (1ft) +0.5% of full range above 150m (500 ft)
21*	Vertical beam deviation (ILS/GNSS/GLS glidepath, MLS elevation, IRNAV/IAN vertical deviation)		Signal range	1	±3%	0.3% of full range
22*	Horizontal beam deviation (ILS/GNSS/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 5		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 5 and 6)		0 - 370km (0 - 200NM)	4	As installed	1852m (1NM)
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 7)		As installed	1	As installed	
32*	Landing gear and gear selector position		Discrete	4	As installed	
33*	Groundspeed		As installed	1	Data should be	1 kt

Serial #	Parameter	Applicability	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR read-out)	Recording resolution
					obtained from the most accurate system	
34	Brakes (left and right brake pressure, left and right brake pedal position)		(Maximum metered brake range, discretes 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, engine fuel metering valve position)	Engine fuel metering valve position: Application for type certification is submitted to a Contracting State on or after 1 January 2023	As installed	Each engine each second	As installed	2% of full range
36*	TCAS/ACAS (traffic alert and collision avoidance system)		Discrete	1	As installed	
37*	Windshear warning		Discrete	1	As installed	
38*	Selected barometric setting (pilot, co-pilot)		As installed	64	As installed	0.1mb (0.01in- 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	

Serial #	Parameter	Applicability	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR read-out)	Recording resolution
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%	100psi
71*	Loss of cabin pressure		Discrete	1		
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,		Full range (±311N (±70lbf), ±378N (±85lbf), ±734N (±165lbf))	1	±5%	0.2% of full range or as installed

Serial #	Parameter	Applicability	Measurement range	Maximum sampling and recording interval (seconds)	Accuracy limits (sensor input compared to FDR read-out)	Recording resolution
	rudder pedal)					
76*	Event marker		Discrete	1		
77*	Date		365 days	64		
78*	ANP or EPE or EPU		As installed	4	As installed	
79*	Cabin pressure altitude	Application for type certification submitted to a Contracting State on or after 1 January 2023	As installed (0ft to 40000ft recommended)	1	As installed	100 ft
80*	Aeroplane computed weight	Application for type certification submitted to a Contracting State on or after 1 January 2023	As installed	64	As installed	1% of full range
81*	Flight direct command	Application for type certification submitted to a Contracting State on or after 1 January 2023	Full range	1	±2°	0.5°
82*	Vertical speed	Application for type certification submitted to a Contracting State on or after 1 January 2023	As installed	0.25	As installed (32 ft/min recommended)	16 ft/min

Notes.-

1. *Vso stalling speed or minimum flight speed in the landing configuration as in Section "Abbreviations and Symbols".*
2. *Vo design diving speed.*
3. *Record sufficient inputs to determine power.*
4. *For aeroplanes with control systems in which movement of a control surface shall back drive the pilot's control, "or" applies. For aeroplanes with control systems in which movement of control surface shall 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.*
5. *If signal available in digital form.*
6. *Recording of latitude and longitude from INS to other navigation system is a preferred alternative.*
7. *If signals readily available.*
8. *It is not intended that aeroplanes issued with an individual certificate of airworthiness before 1 January 2016 be modified to meet the measurement range, maximum sampling and recording interval, accuracy limits or recording resolution description detailed in this Part.*

9. *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.*

(j) The measurement range, recording interval and accuracy of parameters on installed FDR equipment on helicopters shall meet the specifications in the following table -

TABLE C1

PARAMETERS FOR HELICOPTER FLIGHT DATA RECORDERS

Serial #	Parameter	Measurement range	Maximum sampling and recording interval	Accuracy limits (sensor input compared to FDR readout)	Recording resolution
1	Time (UTC when available, otherwise relative time count or GPS time sync)	24 hours	4	±0.125% per hour	1s
2	Pressure altitude	-1 000ft (-300m) to maximum certificated altitude of aircraft +5 000ft (+1 500m)	1	±100ft to ±700ft (±30m to ±200m)	5ft (1.5m)
3	Indicated airspeed	As the installed pilot display measuring system	1	±3%	1kt
4	Heading	360°	1	±2°	0.5°
5	Normal acceleration	-3g to +6g	0.125	±0.09g excluding a datum error	0.004g
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	Discrete	1	-	-
13	Outside air temperature	Sensor range	2	±2°C	0.3°C
14*	Autopilot/auto throttle/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	6.895kN/m 2 (1psi)
17*	Main gearbox oil temperature	As installed	2	As installed	1°C

Serial #	Parameter	Measurement range	Maximum sampling and recording interval	Accuracy limits (sensor input compared to FDR readout)	Recording resolution
18	Yaw rate	±400°/second	0.25	±1.5% maximum range excluding datum error	±2°/s
19*	Sling load force	0 to 200% of certified load	0.5	f ±5% ±3% of maximum range	0.5% for maximum certified load
20	Longitudinal acceleration	±1g	0.25	±0.015g excluding a datum error of ±0.05 g	0.004g
21	Lateral acceleration	±1g	0.25	±0.015g excluding a datum error	0.004g
22*	Radio altitude	-20ft to 2 500ft (-6m to 750m)	1	±2f ft (±0.6m) or ±3% whichever is greater below 500ft (150m) and ±5% above 500ft (150m)	1ft (0.3m) below 500ft (150m), 1ft (0.3m) + 0.5% of full range above 500ft (150m)
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	0-200NM (0-370km)	4	As installed	1 NM (1 852m)
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	0.1mb (0.0 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

Serial #	Parameter	Measurement range	Maximum sampling and recording interval	Accuracy limits (sensor input compared to FDR readout)	Recording resolution
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)	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 centralised aircraft monitor (ECAM) and engine indication and crew alerting system (EICAS); and

(b) additional engine parameters (EPR, N1, fuel flow, etc.)

Note: The following requirements shall apply with effect from 1 January 2023 and shall replace the requirements of subsection (3)(j) Table C1.

TABLE D1

PARAMETERS FOR HELICOPTERS FLIGHT DATA RECORDER TABLE

Serial #	Parameter	Applicability	Measure Range	Recording Intervals	Accuracy Limits	Recording Resolution
1	Time (UTC when available, otherwise relative time count or GNSS time sync)		24 hours	4	±0.125% per hour	1s
2	Pressure altitude		-300m (-1 000ft) to maximum certificated altitude of aircraft +1 500m (+5 000ft)	1	±30m to ±200m	1.5m (5ft) (±100ft to ±700ft)
3	Indicated airspeed		As the installed pilot display measuring system	1	±3%	1kt
4	Heading		360°	1	±2°	0.5°
5	Normal acceleration		-3g to +6g	0.125	±0.09g excluding a datum error of ±0.045g	0.004g
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 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 pitch, tail rotor pedal)		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/auto throttle/AFCS mode and engagement status		A suitable combination of discretes	1	-	-
15*	Stability augmentation system engagement		Discrete	1	-	-
16*	Main gearbox oil pressure		As installed	1	As installed	6.895kN/ m2 (1psi)
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	±2°/s
19*	Sling load force		0 to 200% of certified load	0.5	±3% of maximum range	0.5% for maximum certified load

Serial #	Parameter	Applicability	Measure Range	Recording Intervals	Accuracy Limits	Recording Resolution
20	Longitudinal acceleration		±1g	0.25	±0.015g excluding a datum error of ±0.05 g	0.004g
21	Lateral acceleration		±1g	0.25	±0.015g excluding a datum error	0.004g
22*	Radio altitude		-6m to 750m (-20ft to 2 500ft)	1	±0.6m (±2f ft) or ±3% whichever is greater below 150m (500ft) and ±5% above 150m (500ft)	0.3m (1ft) below 150m (500ft), 0.3m (1ft) + 0.5% of full range above 150m (500ft)
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 distances		0-370 km (0-200NM)	4	As installed	1852 m (1 NM)
29*	Navigation data (latitude/ longitude, ground speed, drift angle, wind speed, wind direction)		As installed	2	As installed	As installed
30*	Landing gear and gear selector position		Discrete	4	-	-
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 system		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	0.1mb (0.0 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		As installed	1	As installed	Sufficient to determine

Serial #	Parameter	Applicability	Measure Range	Recording Intervals	Accuracy Limits	Recording Resolution
	operation)					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	-	-
49*	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) and (operational status)	Application for type certification is submitted to a Contracting State on or after 1 January 2023	Discrete(s)	1	As installed	
50*	TCAS/ACAS (traffic alert and collision avoidance system) and (operational status)	Application for type certification is submitted to a Contracting State on or after 1 January 2023	Discrete(s)	1	As installed	
51*	Primary flight controls – pilot input forces	Application for type certification is submitted to a Contracting State on or after 1 January 2023	Full range	0.125 (0.0625 recommended)	±3% unless higher accuracy is uniquely required	0.5% of operating range
52*	Computed centre of gravity	Application for type certification is submitted to a Contracting State on or after 1 January 2023	As installed	64	As installed	1% of full range
53*	Helicopter computed weight	Application for type certification is submitted to a Contracting State on or after 1 January 2023	As installed	64	As installed	1% of full range

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 date 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.

(8) An aeroplane for which the individual certificate of airworthiness was first issued before 1 January 2016, that are required to carry a CVR and are modified on or after 1 January 2016 to use any of the data link communications applications referred to in Technical Standard 91.04.10 4 (5) shall record the data link communications messages on a crash-protected flight recorder.

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;

(c) ARINC 573-717;

(d) ARINC 717; and

(e) 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 minimised 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 pressurised 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 jeopardising 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.

(5A) Installation of flight recorder systems

Note: The following requirements apply with effect from 1 January 2023

(a) Flight data recorder shall be non-deployable container or automatic deployable container.

The following requirements shall be applicable with effect from 1 January 2023.

1.1 Non-deployable flight recorder containers shall be painted with a distinctive orange colour.

1.2 Non-deployable crash-protected flight recorder containers shall:

(a) carry reflective material to facilitate their location; and

(b) have securely attached an automatically activated underwater locating device operating at a frequency of 37.5 KHz and this device shall operate for a minimum of 90 days.

1.3 Automatic deployable flight recorder containers shall:

(a) be painted a distinctive orange colour, however the surface visible from outside an aircraft may be of another colour;

(b) carry reflective material to facilitate their location; and

(c) have an integrated automatically activated ELT.

1.4 Installation of the flight recorder shall ensure:

(a) the probability of damage to the recordings is minimised;

(b) there is an aural or visual means for pre-flight checking that the flight recorder systems are operating properly;

(c) if the flight recorder systems have a erasure device, the installation shall be designed to prevent operation of the device during flight time or crash impact; and

(d) aeroplanes for which the individual certificate of airworthiness is first issued on or after 1 January 2023, a fight crew-operated erase function shall be provided on the flight deck which, when activated, modifies the recording of a CVR and AIR so that it cannot be retrieved using normal replay or copying techniques. The installation shall be designed to prevent activation during flight. In addition, the probability of inadvertent activation of an erase function during an accident shall also be minimised;

Note. – The erase function is intended to prevent access to CVR and AIR recordings by normal replay or copying means, but would not prevent accident investigation authorities access to such recordings by specialised replay or copying techniques.

(e) the flight recorder systems shall be installed to receive electrical power from a bus that provides the maximum reliability for operation of the flight recorder systems without jeopardising service to essential or emergency loads;

(f) the flight recorder systems, when tested by methods approved by the appropriate certificating authority, shall be demonstrated to be suitable for the environmental extremes over which they are designed to operate; and

(g) means shall be provided for an accurate time correlation between the flight recorder systems recordings.

1.5 The manufacturer shall provide the appropriate certificating authority with the following information in respect of the flight recorder systems:

(a) manufacturer's operating instructions, equipment limitations and installation procedures;

(b) parameter origin or source and equations which relate counts to units of measurement; and

(c) manufacturer's test reports or reports from a service provider.

(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 Executive Director for monitoring purposes.

(e) Calibration of the FDR-system -

(i) for those parameters which have sensors dedicated only to the FDR and are not checked by other means, recalibration shall be carried out at least every five years or in accordance with the recommendations of the sensor manufacturer 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;

(ii) when the parameters of altitude and airspeed are provided by sensors that are dedicated to the FDR system, there shall be a recalibration performed as recommended by the sensor manufacturer, or at least every two years; and

(iii) should it be evident during FDR download that a parameter was not recorded or an error occurred on a particular parameter or sensor, the error shall be rectified as per maintenance manual. The FDR should be in operation for a maximum of three flights and download be performed to verify the error has been rectified.

(9) Where further FDR recording capacity is available, recording of the following additional information is to be considered and implemented:

(a) operational information from electronic display systems, such as electronic flight instrument systems (EFIS), electronic centralised aircraft monitor (ECAM) and engine indication and crew alerting system (EICAS) in the following order of priority:

(i) parameters selected by the flight crew relating to the desired flight path, e.g. barometric pressure setting, selected altitude, selected airspeed, decision height, and autoflight system engagement and mode indications if not recorded from another source;

(ii) display system selection or status, e.g. SECTOR, PLAN, ROSE, NAV, WXR, COMPOSITE, COPY;

(iii) warnings and alerts; and

(iv) the identity of displayed pages for emergency procedures and checklists;

(b) retardation information including brake application for use in the investigation of landing overruns and rejected take-offs.

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 authorised 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 to 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) An 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 -

TABLE E1

PARAMETERS FOR AIRCRAFT DATA RECORDER SYSTEMS

Serial number	Parameter and Category	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

Serial number	Parameter and Category	Minimum recording range	Maximum recording interval (seconds)	Minimum recording accuracy	Minimum recording resolution	Remarks
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	-300m (-1 000ft) to maximum certificated altitude of aircraft + 1 500m (5 000ft)	2 (1 if available)	As installed (±50ft) (±15m) recommended)	5ft (1.5m)	
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 000kt	2 (1 if available)	As installed (±5kt recommended)	1kt	
12	Positioning system: channel E	0 - 360 degrees	2 (1 if available)	As installed (±2 degrees recommended)	0.5 degree	
13	Normal acceleration E	-3g to +6g	0.25 (0.125 if available)	As installed (±0.09g excluding a datum error of ±0.45g recommended)	0.004g	
14	Longitudinal acceleration E	±1g	0.25 (0.125 if available)	As installed (±0.015g excluding a datum error of ±0.05g recommended)	0.004g	
15	Lateral acceleration E	±1g	0.25 (0.125 if available)	As installed (±0.015g excluding a datum error of ±0.05g recommended)	0.004g	
16	External static pressure (or pressure altitude) R	34.4mb (3.44in-Hg) to 310.2mb (31.02in-Hg) or available sensor range	1	As installed (±1mb) (0.1in-Hg) or ±100ft (±30m) to ±700ft (±210m) recommended)	0.1mb (0.01in-Hg) or 5ft (1.5m)	
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)	1kt (0.5kt recommended)	

Serial number	Parameter and Category	Minimum recording range	Maximum recording interval (seconds)	Minimum recording accuracy	Minimum recording resolution	Remarks
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	

Serial number	Parameter and Category	Minimum recording range	Maximum recording interval (seconds)	Minimum recording accuracy	Minimum recording resolution	Remarks
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	

Note: The following requirements shall apply with effect from 1 January 2023 and shall replace Table E1

TABLE F1

PARAMETER GUIDANCE CHARACTERISTICS FOR AIRCRAFT DATA RECORDING SYSTEMS

N°	Parameter name	Parameter category	Minimum recording range	Maximum recording interval in seconds	Minimum recording accuracy	Minimum recording resolution	Remarks
1	Heading: a) Heading (Magnetic or True) b) Yaw rate		±180° ±300°/s	1 0.25	±2° ±1% + drift of 360°/h	0.5° 2°/s	*Heading is preferred, if not available, yaw rate shall be recorded
2	Pitch: A) Pitch attitude b) Pitch rate		±90° ±300°/s	0.25 0.25	±2° ±1% + drift of 360°/h	0.5° 2°/s	*Pitch attitude is preferred, if not available, pitch rate shall be recorded
3	Roll: (a)Roll attitude (b) Roll rate		±180° ±300°/s	0.25 0.25	±2° ±1% + drift of 360°/h	0.5° 2°/s	*Roll attitude is preferred, if not available, roll rate shall be recorded
4	Positioning system (a) Time (b) Latitude / Longitude (c) Altitude (d) Ground speed (e) Track		24 hours Latitude: ±90° Longitude: ±180° –300 m (–1 000 ft) to maximum certificated altitude of aircraft +1 500 m (5 000 ft) 0-1 000 kt 0-360°	1 2 (if available) 2 (if available) 2 (if available) 2 (if available)	±0.5° As installed (0.00015° recommended) As installed (±15 m (±50 ft) recommended) As installed (±5 kt recommended) As installed	0.1° 0.00005° 1.5m(5 ft) 1 kt 0.5°	UCT time preferred where available Shall be recorded if readily available

N°	Parameter name	Parameter category	Minimum recording range	Maximum recording interval in seconds	Minimum recording accuracy	Minimum recording resolution	Remarks
	(f) Estimate error		Available range		(±2t recommended) As installed	As installed	
5	Normal acceleration		–3 g to + 6g	0.25 (0.125 if available)	As installed (±0.09 g excluding a datum error of ±0.05 g recommended)	0.004 g	
6	Longitudinal acceleration		±1 g	0.25 (0.125 if available)	As installed (±0.015 g excluding a datum error of ±0.05 g recommended)	0.004 g	
7	Lateral acceleration		±1 g	0.25 (0.125 if available)	As installed (±0.015 g excluding a datum error of ±0.05 g recommended)	0.004 g	
8	External static pressure (or pressure altitude)		34.4 hPa (1.02 in-Hg) to 310.2 hPa (9.16 in-Hg) or available sensor range	1	As installed (±1 hPa (0.3 in-Hg) or ±30 m (±100 ft) to ±210 m (±700 ft) recommended)	0.1 hPa (0.03 in-Hg) or 1.5 m (5 ft)	
9	Outside air temperature (or total air temperature)		–50° to +90°C or available sensor range	2	As installed (±2°C recommended)	1°C	
10	Indicated air speed		As the installed pilot display measuring system or available sensor range	1	As installed (±3% recommended)	1 kt (0.5 kt recommended)	
11	Main rotor speed (Nr)		50% to 130% or available sensor range	0.5	As installed	0.3% of full range	
12	Engine RPM (*)		Full range including overspeed condition	Each engine each second	As installed	0.2% of full range	*For piston-engined helicopters
13	Engine oil pressure		Full range	Each engine each second	As installed (5% of full range recommended)	2% of full range	
14	Engine oil temperature		Full range	Each engine each second	As installed (5% of full range recommended)	2% of full range	
15	Fuel flow or pressure		Full range	Each engine each second	As installed	2% of full range	
16	Manifold pressure (*)		Full range	Each engine each second	As installed	0.2% of full range	*For piston-engined helicopters
17	Engine thrust/power/ torque parameters required to determine propulsive thrust/power*		Full range	Each engine each second	As installed	0.1% of full range	*Sufficient parameters e.g. EPR/N1 or torque/Np as appropriate to the particular engine shall be recorded to

N°	Parameter name	Paramete r category	Minimum recording range	Maximum recording interval in seconds	Minimum recording accuracy	Minimum recording resolution	Remarks
							determine power. A margin for possible overspeed should be provided. Only for turbine-engined helicopters.
18	Engine gas generator speed (Ng) (*)		0–150%	Each engine each second	As installed	0.2% of full range	*Only for turbine-engined helicopters
19	Free power turbine speed (Nf) (*)		0–150%	Each engine each second	As installed	0.2% of full range	*Only for turbine-engined helicopters
20	Collective pitch		Full range	0.5	As installed	0.1% of full range	
21	Coolant temperature (*)		Full range	1	As installed (±5°C recommended	1°C	*Only for piston-engined helicopters
22	Main voltage		Full range	Each engine each second	As installed	1 Volt	
23	Cylinder head temperature (*)		Full range	Each cylinder each second	As installed	2% of full range	*Only for piston-engined helicopters
24	Fuel quantity		Full range	4	As installed	1% of full range	
25	Exhaust gas temperature		Full range	Each engine each second	As installed	2% of full range	
26	Emergency voltage		Full range	Each engine each second	As installed	1 Volt	
27	Trim surface position		Full range or each discrete position	1	As installed	0.3% of full range	
28	Landing gear position		Each discrete position*	Each gear every two seconds	As installed		*Where available, record up-and-locked and down-and-locked position
29	Novel/unique aircraft features		As required	As required	As required	As required	

TABLE I1

PARAMETERS FOR AIRCRAFT DATA RECORDER SYSTEMS

Serial number	Parameter and Category	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

Serial number	Parameter and Category	Minimum recording range	Maximum recording interval (seconds)	Minimum recording accuracy	Minimum recording resolution	Remarks
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	-300m (-1 000ft) to maximum certificated altitude of aircraft + 1 500m (5 000ft)	2 (1 if available)	As installed (±50ft) (±15m) recommended)	5ft (1.5m)	
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 000kt	2 (1 if available)	As installed (±5kt recommended)	1kt	
12	Positioning system: channel E	0 - 360 degrees	2 (1 if available)	As installed (±2 degrees recommended)	0.5 degree	
13	Normal acceleration E	-3g to +6g	0.25 (0.125 if available)	As installed (±0.09g excluding a datum error of ±0.45g recommended)	0.004g	
14	Longitudinal acceleration E	±1g	0.25 (0.125 if available)	As installed (±0.015g excluding a datum error of ±0.05g recommended)	0.004g	
15	Lateral acceleration E	±1g	0.25 (0.125 if available)	As installed (±0.015g excluding a datum error of ±0.05g recommended)	0.004g	
16	External static pressure (or pressure altitude) R	34.4mb (3.44in-Hg) to 310.2mb (31.02in-Hg) or available sensor range	1	As installed (±1mb) (0.1in-Hg) or ±100ft (±30m) to ±700ft (±210m) recommended)	0.1mb (0.01in-Hg) or 5ft (1.5m)	
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)	1kt (0.5kt recommended)	
19	Engine RPM R	Full range including overspeed condition	Each engine each second	As installed	0.2% of full range	

Serial number	Parameter and Category	Minimum recording range	Maximum recording interval (seconds)	Minimum recording accuracy	Minimum recording resolution	Remarks
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 shall 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	

Serial number	Parameter and Category	Minimum recording range	Maximum recording interval (seconds)	Minimum recording accuracy	Minimum recording resolution	Remarks
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.*

Note: *The following requirements shall be applicable with effect from 1 January 2024 and shall replace the requirements of Table I1 with the effect from 1 January 2024*

TABLE J1

PARAMETER GUIDANCE CHARACTERISTICS FOR AIRCRAFT DATA RECORDING SYSTEMS

N°	Parameter name	Minimum recording range	Maximum recording interval in seconds	Minimum recording accuracy	Minimum recording resolution	Remarks
1	Heading: a) Heading (Magnetic or True) b) Yaw rate	 ±180° ±300°/s	 1 0.25	±2° ±1% + drift of 360°/h	0.5° 2°/s	*Heading is preferred, if not available, yaw rate shall be recorded
2	Pitch: A) Pitch attitude b) Pitch rate	 ±90° ±300°/s	 0.25 0.25	 ±2° ±1% + drift of 360°/h	 0.5° 2°/s	*Pitch attitude is preferred, if not available, pitch rate shall be recorded
3	Roll: (a)Roll attitude (b) Roll rate	 ±180° ±300°/s	 0.25 0.25	 ±2° ±1% + drift of 360°/h	 0.5° 2°/s	*Roll attitude is preferred, if not available, roll rate shall be recorded
4	Positioning system (a)Time (b)Latitude/Longitude (c) Altitude (d) Ground speed (e)Track (f) Estimate error	 24 hours Latitude: ±90° Longitude: ±180° –300 m (–1 000 ft) to maximum certificated altitude of aircraft +1 500 m (5 000 ft) 0-1 000 kt 0-360° Available range	 1 2 (if available) 2 (if available) 2 (if available) 2 (if available) 2 (if available)	 ±0.5s As installed (0.00015° recommended) As installed (±15 m (±50 ft) recommended) As installed (±5 kt recommended) As installed (±2° recommended) As installed	 0.1 0.00005° 1.5m (5 ft) 1 kt 0.5° As installed	 UCT time preferred where available Shall be recorded if readily available
5	Normal acceleration	–3 g to + 6g	0.25 (0.125 if available)	As installed (±0.09 g excluding a datum error of ±0.045 g recommended)	0.004 g	

N°	Parameter name	Minimum recording range	Maximum recording interval in seconds	Minimum recording accuracy	Minimum recording resolution	Remarks
6	Longitudinal acceleration	±1 g(*)	0.25 (0.125 if available)	As installed (±0.015 g excluding a datum error of ±0.05 g recommended)	0.004 g	
7	Lateral acceleration	±1 g(*)	0.25 (0.125 if available)	As installed (±0.015 g excluding a datum error of ±0.05 g recommended)	0.004 g	
8	External static pressure (or pressure altitude)	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 ±30 m (±100 ft) to ±210 m (±700 ft) recommended)	0.1 mb (0.01 in-Hg) or 1.5 m (5 ft)	
9	Outside air temperature (or total air temperature)	–50° to +90°C or available sensor range	2	As installed (±2°C recommended)	1°C	
10	Indicated air speed	As the installed pilot display measuring system or available sensor range	1	As installed (±3% recommended)	1 kt (0.5 kt recommended)	
11	Engine RPM (*)	Full range including overspeed condition	Each engine each second	As installed	0.2% of full range	
12	Engine oil pressure	Full range	Each engine each second	As installed (5% of full range recommended)	2% of full range	
13	Engine oil temperature	Full range	Each engine each second	As installed (5% of full range recommended)	2% of full range	
14	Fuel flow or pressure	Full range	Each engine each second	As installed	2% of full range	
15	Manifold pressure	Full range	Each engine each second	As installed	0.2% of full range	
16	Engine thrust/power/ torque parameters required to determine propulsive thrust/power*	Full range	Each engine each second	As installed	0.1% 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 shall be provided
17	Engine gas generator speed (Ng)	0–150%	Each engine each second	As installed	0.2% of full range	
18	Free power turbine speed (Nf)	0–150%	Each engine each second	As installed	0.2% of full range	
19	Coolant temperature (*)	Full range	1	As installed (±5°C recommended	1°C	

N°	Parameter name	Minimum recording range	Maximum recording interval in seconds	Minimum recording accuracy	Minimum recording resolution	Remarks
20	Main voltage	Full range	Each engine each second	As installed	1 Volt	
21	Cylinder head temperature	Full range	Each cylinder each second	As installed	2% of full range	
22	Fuel quantity	Full range	4	As installed	1% of full range	
23	Primary flight control surface position	Full range	0.25	As installed	0.2% of full range	
24				As installed		
25	Exhaust gas temperature	Full range	Each engine each second	As installed	2% of full range	
26	Emergency voltage	Full range	Each engine each second	As installed	1 Volt	
27	Trim surface position	Full range or each discrete position	1	As installed	0.3% of full range	
28	Landing gear position	Each discrete position*	Each gear every two seconds	As installed		*Where available, record up-and-locked and down-and-locked position
29	Novel/unique aircraft features	As required	As required	As required	As required	

7. Aeroplane for which voice or aural recorder is required

An owner or operator of an aeroplane shall ensure that an aeroplane used to operate 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:

TABLE K1

Group See Note 1	Conditions See Note 2	Maximum Certificated Take-Off Mass (kg)	Propulsion System	Recording retained for the last 30 minutes of operation	Recording retained for the last 2 hours of operation	Recoding retained for at least the last 25 hours of operation
1	Application for type certification submitted to Contracting State on or after 1 January 2016 and required to be operated by more than one pilot	> 2250 but ≤ 5700	Turbine	-	X	-
2	Individual certificate of airworthiness first issued on or after 1 January 2003	>8618	All	-	X	-
3	Individual certificate of airworthiness first issued on or after 1 January 1987	>8618	All	=	X	-
4	Individual certificate of airworthiness first issued before 1 January 1987 whose types of which the prototype was certificated by the appropriate national authority after 30 September 1969	>8618 <27000	Turbine	=	X	-
5	Individual certificate of airworthiness is first issued on or after 1 January 2022	>27000	All	-	-	X

Notes-

1. *Group 1 shall be either a CVR or a CARS. Group 2, 3 and 4 recorders shall be CVRs.*

2. *For the purposes of this technical standard, any reference to the application for the type certification being submitted to a Contracting State on or after a specified date means the date an application is made for a new aircraft type, not the date of certification of particular aircraft variants or derivative models. Any reference to the individual certificate of airworthiness being issued first on or after a specified date means the first time a certificate of airworthiness is issued for a new individual aircraft serial number that has just come off the assembly line.*

91.04.11 SEATS, SEAT SAFETY BELTS, HARNESSES AND CHILD RESTRAINT DEVICES AND CARRIAGE OF INFANTS

(1) An owner or operator of an aircraft shall not operate the aircraft unless such aircraft is equipped, as applicable, for the carriage of infants with –

(a) an air service operator shall ensure that an infant is only carried when properly secured in the arms or on the lap of an adult passenger, or with a child restraint system or in a sky cot.

(b) a sky cot may be used provided that it-

(i) is restrained so as to prevent it from moving under the maximum accelerations to be expected in flight;

(ii) is fitting with a restraining device so as to ensure that the infant shall not be thrown from such sky cot under the maximum accelerations to be expected in flight;

(iii) may not be used during critical phases of flight;

(iv) shall be positioned in such a way that they do not prevent or hinder the movement of adjacent passengers or block exits;

(c) a child restraint system may be used provided that-

(i) infants shall not be carried behind a bulkhead unless a child restraint device is used during critical phases of flight and during turbulence.

(ii) an infant may be seated in a car-type infant seat, provided that the infants seat-

(aa) is secured to the aeroplane seat in accordance with the instructions provided with the child seat;

(bb) is designed to be secured to a passenger seat by means of a single lap strap and face the same direction as the passenger seat;

(cc) of the lower part of the shell does not unreasonably extend beyond the forward position of the passenger seat cushion on which it rests;

(dd) is secure to the passenger seat at all times during flight, even when it is unoccupied by the child

(ee) may not be removed only the infant shall be removed from an aircraft in an emergency evacuation;

(ff) is positioned in such a way that it does not prevent or hinder the movement of adjacent passengers or block exits;

(gg) is not placed in an aisle seat, depending on cabin configuration;

(hh) is used in accordance with infant weight limitations specified for such device;

(iii) is fitted with a single release harness, which secures the infant's lap, torso and shoulders, but designed that the child can easily be secured in or removed from it; and

(iv) shall not be located in the same row or row directly forward or aft of an overwing emergency exit; or in the same row as any other exit unless such exit and row are separated by a bulkhead.

(d) When an infant is carried in the arms or on the lap of an adult passenger-

(i) the seat belt, when required to be worn, shall be fastened around the passenger carrying or nursing the infant, but not around the infant; and

(ii) the name of the infant shall be bracketed on the passenger list with the name of the person carrying or nursing the infant.

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 700kg 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 standard 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 000ft 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 Executive 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 000ft 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 (Note 5)	Entire flight time when the cabin pressure altitude exceeds 14 000 feet but does not exceed 15 000 feet.
5. 10% of passengers (Note 5)	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 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, CBrCIF 2), 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.

(g) 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.

(h) 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.

(i) 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.

(j) Where two or more hand fire extinguishers are required in the passenger compartments and their location is not otherwise dictated by consideration of sub-paragraph (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.

(k) 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 over-wing 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(1) -

(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(1)C:\Users\juani\Dropbox\A4SA\NCAA\A4SA WIP\Part 91\21.docx - TS21_21_02_3, 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 Namibia, an area designated as such in the Namibian 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 121,5MHz and 406MHz 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 700kg; 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 121,5MHz ELTs is contained in RTCA Document DO-183 and EUROCAE Document ED.62.

(2) Specification for the 121.5MHz component of ELT for search and rescue -

(a) the ELT shall operate on 121,5MHz. 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 50mW;

(d) the type of emission shall be A3X. Any other type of modulation that meets the requirements of sub-paragraphs (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 700Hz within the range 1600Hz to 300Hz and with a sweep repetition rate of between 2Hz 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 121,5MHz.

(3) Specification for the 406MHz component of ELT for search and rescue -

(a) transmission characteristics for ELTs operating on 406MHz are contained in ITU M633/1;

(b) information on technical characteristics and operational performance of 406MHz ELTs is contained in RTCA Document DO-204 and EUROCAE Document ED.62;

(c) ELTs shall operate on a frequency of 406,025MHz plus or minus 2kHz. The transmitted frequency shall not vary more than plus or minus 5kHz in five years including the initial frequency offset. It shall not vary more than 2 parts in 109 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 5W plus or minus 2dB; and

(f) the 406MHz ELT shall be capable of transmitting a digital message.

(4) Transmitter identification coding -

(a) ELTs operating on 406MHz 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 Namibian 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 minimise 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. UNAUTHORISED 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, e.g., 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 Part 43.

(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.

7. 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) lifesaving 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) 100g glucose tablets;

(ii) 500ml 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 121.5MHz and 243MHz.

(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 co-ordination 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 NAM-CATS 21.02.3 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 Namibia, will be as specified in the Namibian 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) 500ml 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 co-ordination 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 be at least 2.5 metres long and shall be made as conspicuous 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 co-ordinated 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 NCAA 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 NCAA 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 NCAA 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 ± -4ºC, sea level to 5 300 feet MSL. When take-offs or landings are outside this 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.

(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.

(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.

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 take-off; and

(iii) a voice callout "five hundred" when the airplane descends to 500 feet above the nearest terrain or nearest runway elevation.

1.3. 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 REDUCED VERTICAL SEPARATION MINIMA (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 (1013.2hPa/29.92in.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 Namibian registered aircraft including the Namibian Civil Aviation Authority and the Executive 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-UI	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	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 000ft.

(2) An aircraft owner or operator shall establish an acceptable process in his or her operation, for the approval of an aircraft and the owner or operator by the Authority, prior to conducting flights in airspace or on routes where RVSM is applied.

(3) It provides the minimum aircraft systems performance specification (MASPS) for altimetry to support the use of a 1 000ft 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 Executive 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 NCAA.

(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 Executive 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 Executive 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 NCAA) 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 NCAA.

(b) A pilot having completed the training and checking requirements of Part 61 shall present the documentation showing such to the NCAA 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 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 RVSM approval as provided for in this Technical Standard.

(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 authorise 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 Manufacturer, 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 Manufacturer 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 authorise 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 minimise 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 sub-paragraphs (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

(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 each criterion 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, 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 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.

(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 specific airworthiness criteria are 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, are met. The data package must specify how the ASE budget has been allocated between residual SSE and avionics error. The operator and the Authority must agree on what data is needed to satisfy approval criteria.

(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. 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 shall be agreed upon by the Authority. 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 sub-paragraph (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.

(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, 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;

regular calibrations of test equipment traceable to a master standard.

(bb) 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.

(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 Executive 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 Executive 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 Namibian procedures to satisfy the Executive 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.

(d) Operations Manuals and Checklists

The appropriate manuals and checklists must be revised to include information and guidance on standard operating procedures of RVSM. 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 to 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 or Monitoring Programmes

The operator shall establish a plan acceptable to the authority, for participation in any applicable verification or monitoring programme. 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 Executive 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 Executive 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 pre-requisite 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 91.04.31(9) are errors of -

(i) TVE equal to or greater than ±300ft;

(ii) ASE equal to or greater than ±245ft; and

(iii) assigned altitude deviation equal to or greater than ±300ft.

(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 Note – Refer to AIC for RVSM Aircraft Group Categories		**Minimum Operator Monitoring for each Aircraft Group**
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 fulfil 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 authorised by the Executive 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 Executive 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

(1) An owner or operator of an aircraft may operate an aircraft in a defined portion of an airspace where MNPS are prescribed, based on Regional Air Navigational Agreements, if an aircraft is equipped with navigation equipment which:

(a) continuously provides indications to a flight crew member of adherence to or departure from track to the required degree of accuracy at any point along that track; and

(b) an owner or operator of an aircraft has been authorised by the Executive Director for the MNPS operations concerned.

2.1. General

This section gives detailed guidance on the required content of operational practices and procedures. It also describes the steps in an operational and airworthiness approval process and the granting of approval to operate in MNPS airspace.

(1) A Namibian registered aircraft which intends to fly across the North Atlantic and Oceanic areas requires an approval by the Executive Director for flights in MNPS airspace.

(2) In processing an application for approval, an owner or operator for each aircraft group and non-group aircraft, to be used in MNPS operations, the Executive Director needs to be satisfied that-

(a) operational programmes are adequate, by evaluating flight crew training and the operations manuals; and

(b) airworthiness issues are addressed satisfactorily.

(3) If an approval is granted to an owner or operator of an aircraft, the OpSpec shall be amended to include MNPS.

2.2. The MNPS application and approval

(1) An owner or operator of an aircraft shall submit to the Executive Director the following for approval:

(a) the aircraft flight manual or supplements, to show that an aircraft has been approved either for MNPS or to RNP by the State of Manufacture;

(b) description of aircraft navigation equipment appropriate to operations in an MNPS environment;

(c) aircraft navigation equipment which consists of two fully serviceable Long Range Navigation Systems (LRNs), which includes either:

(i) two Inertial Navigation Systems;

(ii) two FMS with two IRS;

(iii) two approved Global GPS;

(iv) one INS and one FMS/IRS;

(v) one INS and one approved GPS; or

(vi) one FMS or IRS and one approved GPS must be capable of providing a continuous indication to the flight crew of an aircraft position relative to track and should be coupled to an automatic pilot.

(d) a maintenance programme that includes, where applicable, items pertinent to operating in MNPS airspace;

(e) a MEL, adapted from the MMEL, shall include items pertinent to operating in MNPS airspace;

(f) training syllabi and other appropriate material showing that the operating practices, procedures and training items related to MNPS operations are incorporated in training programmes shall cover, as a minimum flight planning:

(i) pre-flight procedures;

(ii) aircraft procedures for entry;

(iii) in-flight and contingency procedures; and

(iv) flight crew training procedures.

(2) The content of the MNPS application and training programmes referred to in paragraph (f) may be sufficient to validate an aircraft.

(3) An approval process may require a demonstration flight through MNPS airspace at the discretion of an authorised officer to verify that relevant procedures are applied effectively.

(4) Where the performance is satisfactory, operational approval for MNPS airspace may be granted by the Executive Director.

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 Namibian 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 Executive 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 NCAA-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 Executive 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 NCAA Licensing Division for the appropriate licensing action.

(b) The licensing action referred to sub-paragraph (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 Document NAM-CATS 91.05.2;

(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 Executive Director.

6. 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.

7. 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 (e.g. 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 - e.g. 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" - e.g. 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.

8. 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 (e.g. 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 (e.g. creation of new flight plan).

9. 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 Namibia, 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 NCAA. This data will be used to verify the predicted integrity of the GPS system in Namibian 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 Executive 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 +100ft (+30m) and over -50ft (-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.

91.05.5 AUTOMATIC DEPENDENT SURVEILLANCE

1. Broadcast (ADS-B) Transmitting Equipment

(1) An aircraft operating in RVSM, Class A and any other airspace considered and approved through the appropriate structures shall use the RTCA DO-260B / EROCAE ED-102A, as the adopted standard, unless a different standard has been specified by the Executive Director.

(2) An aircraft with a MCTOW 5700KG or less and capable of a speed of up to 250 KIAS, operating below RVSM airspace but intending to operate in Class A, and any other airspace considered and approved through the appropriate structures, shall use the RTCA DO-260A/EUROCAE ED-102 adopted standard, unless a different standard has been specified by the Executive Director.

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.

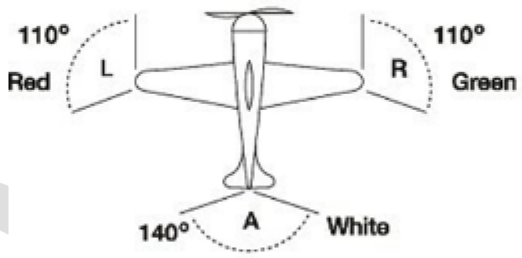


Figure 1

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 3.7km (2NM). The light described in the fourth item should be visible at a distance of 9.3km (5NM) when fitted to an aeroplane of 20m or more in length or visible at a distance of 5.6km (3NM) when fitted to an aeroplane of less than 20m in length.

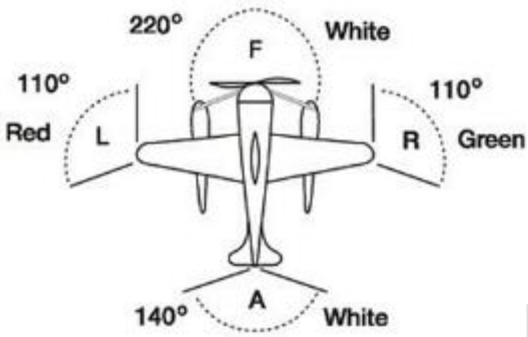


Figure 2

(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 2m 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 2m above it.

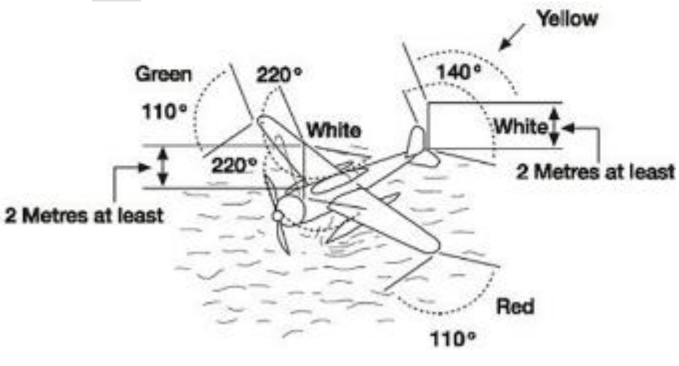


Figure 3

(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 1m apart, and of such a character as to be visible all around the horizon at a distance of at least 3.7km (2NM).

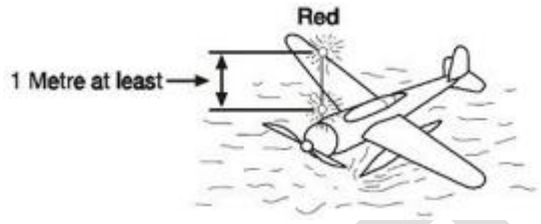


Figure 4

(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).

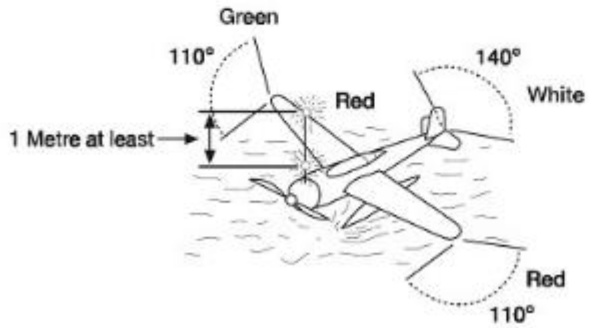


Figure 5

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 50m 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 3.7km (2NM).

Figure 6

(b) If 50m 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 5.6km (3NM).

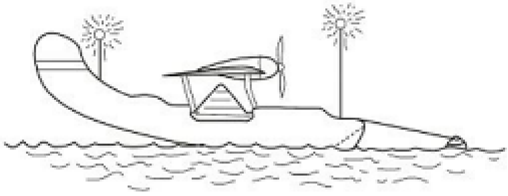


Figure 7

(c) If 50m 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 1.9km (1NM).

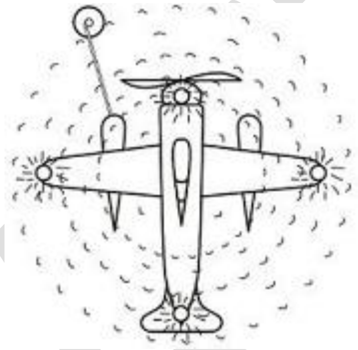


Figure 8

Figure 9

(8) When aground

The lights prescribed in paragraph (7) and in addition two steady red lights in vertical line, at least 1m 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 200Hz and the other a frequency of 1 300Hz, 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	Cleared to land	Cleared for take-off
	Steady red	Give way to other aircraft And continue circling	Stop
	Series of green flashes	Return for landing*	Cleared to taxi
	Series of red flashes	Aerodrome unsafe, do not land	Taxi clear of landing area in use
	Series of white flashes	Land at this aerodrome and proceed to apron*	Return to starting point on the aerodrome
	Steady red on final approach	Notwithstanding any previous instructions, do not land for the time being	
* Clearance to land and to taxi will be given in due course.			

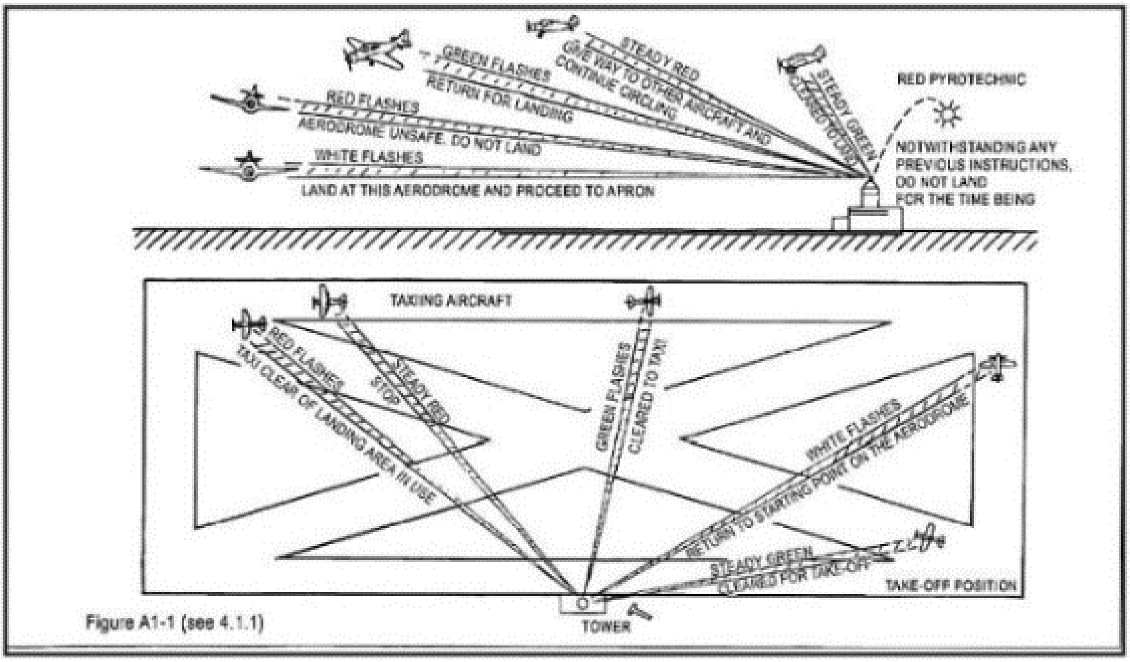


Figure A1-1 (see 4.1.1)

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;

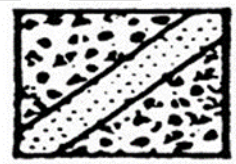


Figure 1.3

(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

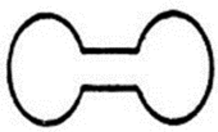


Figure 1.4

(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;

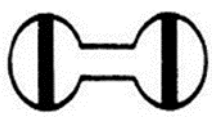


Figure 1.5

(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;

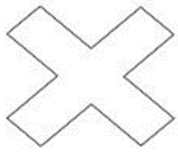


Figure 1.6

(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.*

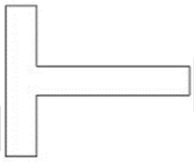


Figure 1.7

(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 -

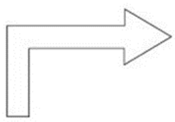


Figure 1.9

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;

(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;

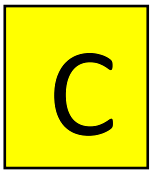


Figure 1.10

(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

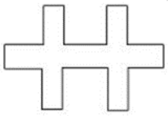


Figure 1.11

(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.

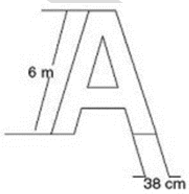


Figure 1.12

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) A person shall not guide an aircraft unless trained, qualified and approved by the appropriate authority to carry out the functions of a signalman.

(5) A 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 -

Notes:

1. *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.*
2. *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, on left side of aircraft, where best seen by the pilot; and*
   - b. *for helicopters, where the signalman can best be seen by the pilot.*
3. *The meaning of the relevant signals remains the same if bats, illuminated wands or torchlights are held.*
4. *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).*
5. *Signals marked with an asterisk (*) are designed for use to hovering helicopters.*
6. *References to wands may also be read to refer to daylight-fluorescent table-tennis bats or gloves (daytime only).*
7. *References to the signalman may also be read to refer to marshaller.*

	**1. Wingwalker/guide** Raise right hand above head level with wand pointing up; Move left-hand want pointing down toward body *Note.- This signal provides an indication by a person positioned at the aircraft wing tip, to the pilot/marshaller/push-back operator, that the aircraft movement on/off a parking position would be unobstructed.*

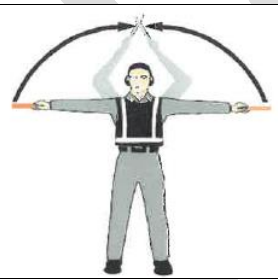
	**2. Identify gate** Raise fully extended arms straight above head with wands pointing up.

	**3. Proceed to next signalman or as directed by tower/ground control** Point both arms upward; move and extend arms outward to sides of body and point with wands to direction of next signalman or taxi area.

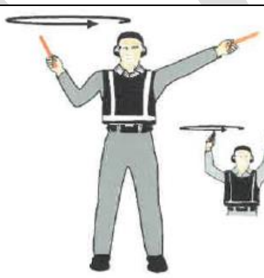
	**4. Straight ahead** Bend extended arms at elbows and move wands up and down from chest height to head.

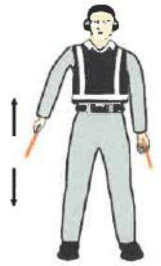
	**5a. Turn left (from pilot's point of view)** With right arm and wand extended at a 90-degree angle to body, make "come ahead" signal with left hand. The rate of signal motion indicates to pilot the rate of aircraft turn.

	**5b. Turn right (from pilot's point of view)** With left arm and wand extended at a 90-degree angle to body, make "come ahead" signal with right hand. The rate of signal motion indicates to pilot the rate of aircraft turn.

	**6a. Normal stop** Fully extend arms and wands at a 90-degree angle to sides and slowly move to above head until wands cross.

	**6b. Emergency stop** Abruptly extend arms and wands to top of head, crossing wands.

	**7a. Set brakes** Raise hand just above shoulder height with open palm. Ensuring eye contact with flight crew, close hand into a fist. Do not move until receipt of "thumbs up" acknowledgement from flight crew.
	**7b. Release brakes** Raise hand just above shoulder height with hand closed in a fist. Ensuring eye contact with flight crew, open palm. Do not move until receipt of "thumbs up" acknowledgement from flight crew.
	**8a. Chocks inserted** With arms and wands fully extended above head, move wands inward in a "jabbing" motion until wands touch. Ensure acknowledgement is received from flight crew.
	**8b. Chocks removed** With arms and wands fully extended above head, move wands outward in a "jabbing" motion. Do not remove chocks until authorised by flight crew.
	**9. Start engine(s)** Raise right arm to head level with wand pointing up and start a circular motion with hand; at the same time, with left arm raised above head level, point to engine to be started.
	**10. Cut engines** Extend arm with wand forward of body at shoulder level; move hand and wand to top of left shoulder and draw wand to top of right shoulder in a slicing motion across throat.

	**11. Slow down** Move extended arms downwards in a “patting” gesture, moving wands up and down from waist to knees.
	**12. Slow down engine(s) on indicated side** With arms down and wands toward ground, wave either right or left wand up and down indicating engine(s) on left or right side respectively should be slowed down.
	**13. Move back** With arms in front of body at waist height, rotate arms in a forward motion. To stop rearward movement, use signal 6a or 6b.
	**14a. Turns while backing (for tail to starboard)** Point left arm with wand down and bring right arm from overhead vertical position to horizontal forward position, repeating right-arm movement.
	**14b. Turns while backing (for tail to port)** Point right arm with wand down and bring left arm from overhead vertical position to horizontal forward position, repeating left-arm movement.

	**15. Affirmative/all clear** Raise right arm to head level with wand pointing up or display hand with “thumbs up”; left arm remains at side by knee. *Note.- This signal is also used as a technical/servicing communication signal.*

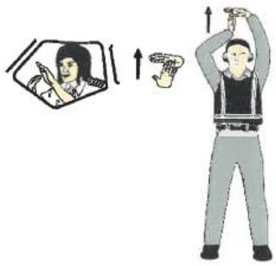
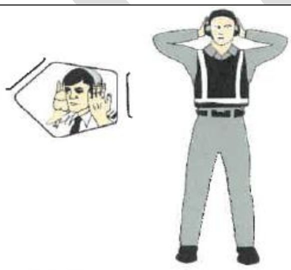
	**16. Hover*** Fully extend arms and wands at a 90-degree angle to sides.

	**17. Move upwards*** Fully extend arms and wands at a 90-degree angle to sides and, with palms turned up, move hands upwards. Speed of movement indicates rate of ascent.

	**18. Move downwards*** Fully extend arms and wands at a 90-degree angle to sides and, with palms turned down, move hands downwards. Speed of movement indicates rate of descent.

	**19a. Move horizontally left (from pilot’s point of view)*** Extend arm horizontally at a 90-degree angle to right side of body. Move other arm in same direction in a sweeping motion.

	**19b. Move horizontally right (from pilot's point of view)*** Extend arm horizontally at a 90-degree angle to left side of body. Move other arm in same direction in a sweeping motion.
	**20. Land*** Cross arms with wands downwards and in front of 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 authorised by flight crew. At night, illuminated wands can also be used to form the "T" above head.
	**26. Negative (technical/servicing communication signal)** 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 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.*

5.1. From the pilot of an aircraft to a signalman

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).*

5.1.1. Brakes

Note – The moment the fist is clenched, or the fingers are extended indicates, respectively, the moment of brake engagement or release.

(a) Brakes engaged: raise arm and hand, with fingers extended, horizontally in front of face, then clench fist.

(b) Brakes released: raise arm, with fist clenched, horizontally in front of face, then extend fingers.

5.1.2. Chocks

(a) Insert chocks: arms extended, palms outwards, move hands inward to cross in front of face.

(b) Remove chocks: hands crossed in front of face, palms outwards, move arms outwards.

5.1.3. Ready to start engine(s)

(a) Raise the appropriate number of fingers on one hand indicating the number of the engine to be started.

5.2. Technical or servicing communication signals

(a) Manual signals shall only be used when verbal communication is not possible with respect to technical or servicing communication signals.

(b) Signalmen shall ensure that an acknowledgement is received from the flight crew with respect to technical or servicing communication signals.

Note – The technical or servicing communication signals are included in this TS to standardise the use of hand signals used to communicate to flight crews during the aircraft movement process that relate to servicing or handling functions.

6. Standard emergency hand signals

The following hand signals are established as the minimum required for emergency communication between the ARFF incident commander/ARFF fire fighters 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 fire fighters from other positions.*

(a) RECOMMEND EVACUATION - Evacuation recommended based on aircraft rescue and firefighting and Incident Commander's assessment of external situation.

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) RECOMMEND STOP - Recommend evacuation in progress be halted. Stop aircraft movement or other activity in progress.

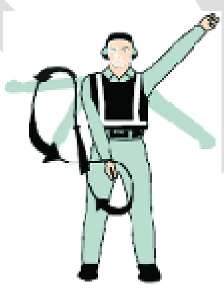
Arms in front of head – Crossed at wrists

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).

(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 Executive 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 Executive 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, re-join 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 sub-paragraph (e), hold over this aid or fix until commencement of descent;

(e) commence descent from the navigation aid or fix specified in sub-paragraph (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 1 000 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 overflown, 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 121,5MHz, 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 243MHz;

(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.

Phrase for use by INTERCEPTING aircraft			Phrases for use by INTERCEPTED aircraft		
Phrase	**Pronunciation[1]**	**Meaning**	**Phrase**	**Pronunciation[1]**	**Meaning**
CALL SIGN	KOL SA-IN	What is your call sign?	CALL SIGN (call sign)[2]	KOL SA-IN (call sign)	My call sign is (call sign)
FOLLOW	FOL-LO	Follow me			
DESCEND	DEE-SEND	Descend for landing	WILCO	VILL-KO	Understood
YOU LAND	YOU LAAND	Land at this aerodrome	CAN NOT	KANN NOTT	Unable to comply
PROCEED	PRO-SEED	You may proceed	REPEAT	REE-PEET	Repeat your instruction
			AM LOST	AM LOSST	Position unknown
			MAYDAY	MAYDAY	I am in distress

	HIJACK[3]	HI-JACK	I have been hijacked
	LAND (place name)	LAAND (place name)	I request to land at (place name)
	DESCEND	DEE-SEND	I require descent

Notes -

1. *In the second column, syllables to be emphasised 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
1	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. Notes – 1. *Meteorological conditions or terrain may require the intercepting aircraft to reverse the positions and direction of turn given above in Series 1.* 2. *If the intercepted aircraft is not able to keep pace with the intercepting aircraft, the latter is expected to fly a series of racetrack patterns and to rock the aircraft each time it passes the intercepted aircraft.*	You have been intercepted. Follow me.	DAY or NIGHT – Rocking aircraft, flashing navigational lights at irregular intervals and follow	Understood, will comply.
2	DAY or NIGHT – An abrupt breakaway manoeuvre from the intercepted aircraft consisting of a climbing turn of 90 degrees or more without crossing the line of flight of the intercepted aircraft.	You may proceed.	DAY or NIGHT – Rocking the aircraft.	Understood, will comply.
3	DAY or NIGHT – Lowering landing gear (if fitted), showing steady landing lights and overflying runway in use or, if the intercepted aircraft is a	Land at this aerodrome.	DAY or NIGHT – Lowering landing gear, if fitted, showing steady landing lights and following the intercepting	Understood, will comply.

	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.		aircraft and if, after overflying the runway in use or helicopter landing area, landing is considered safe, proceeding to land.	

(2) Signals initiated by intercepted aircraft and responses by intercepting aircraft -

Series	INTERCEPTING Aircraft Signals	Meaning	INTERCEPTED 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 000ft but not exceeding 2 000ft (in the case of a helicopter, at a height exceeding 170ft but not exceeding 330ft) 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 following 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.	Understood follow me.
			If it is decided to release the intercepted aircraft, the intercepting aircraft uses the Series 2 signals prescribed for intercepting aircraft.	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 000ft 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	
250		260	
270		280	
290		300	
310		320	
330		340	
350		360	
370		380	
390		400	
410		430	
450		450	
490		470	
etc.		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 000ft (300m) 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	3 350	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			
270	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 -

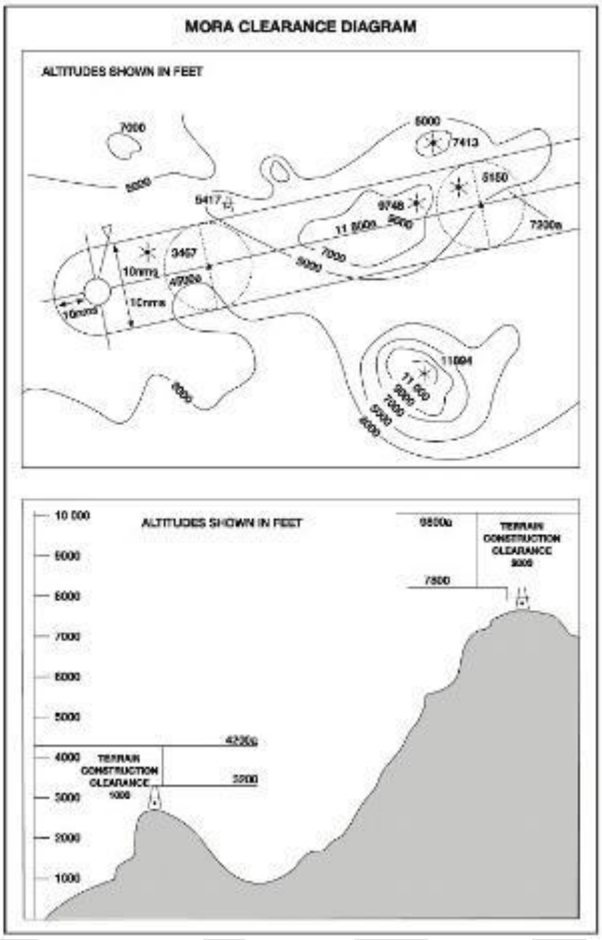
(i) route MORAs e.g. 9800a; and

(ii) grid MORAs e.g. 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 ± are believed not to exceed the altitudes shown. The same clearance criteria as explained in sub-paragraph (c) above apply.



91.07.5 AERODROME OPERATING MINIMA

Note - *Reference in this TS to "category" of aircraft (e.g. 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 - ≤ 91kt;

(b) Category B - 91-121kt;

(c) Category C - 121-141kt;

(d) Category D - 141-166kt; and

(e) Category E - >166kt (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 800m.

Table 1: RVR/Visibility for take-off

Take-off RVR/Visibility	
Facilities	**RVR/Visibility (Note 3)**
Nil (Day only)	500 m
Runway edge lighting and/or centreline marking	250/300 m (Notes 1 and 2)
Runway edge and centreline lighting	200/250 m (Note 1)
Runway edge and centreline lighting and multiple RVR information	150/200m (Notes 1 and 4)

Note 1 The higher values apply to Category D aeroplanes.

Note 2 For night operations at least runway edge and runway end lights are required.

Note 3 The reported RVR/visibility value representative of the initial part of the take-off run can be replaced by pilot assessment.

Note 4 The required RVR value must be achieved for all of the relevant RVR reporting points with the exception given in Note 3 above.

(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 Executive 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 800m. Such aircraft may be permitted minima as low as 400m: Provided the owner or operator submits for the approval of the Executive 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 2 of this section.

Table 2: System minima for non-precision approach aids

System minima	
Facility	**Lowest MDH**
ILS (no glide path - LLZ)	250ft
VOR	300ft
VOR/DME	250ft
NDB	300ft

(2) Minimum descent height

An operator shall 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;

(b) the aircraft system minimum; or

(c) the height as determined for specific or defined CDFA, if applicable.

(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 Executive 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
250ft - 299ft	800m	800m	800m	1 200m
300ft - 449ft	900m	1 000m	1 000m	1 400m
450ft - 649ft	1 000m	1 200m	1 200m	1 600m
650ft and above	1 200m	1 400m	1 400m	1 800m

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
250ft - 299ft	1 000m	1 100m	1 200m	1 400m
300ft - 449ft	1 200m	1 300m	1 400m	1 600m
450ft - 649ft	1 400m	1 500m	1 600m	1 800m
650ft and above	1 500m	1 500m	1 800m	2 000m

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
250ft - 299ft	1 200m	1 300m	1 400m	1 600m
300ft - 449ft	1 300m	1 400m	1 600m	1 800m
450ft - 649ft	1 500m	1 500m	1 800m	2 000m
650ft and above	1 500m	1 500m	2 000m	2 000m

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
250ft - 299ft	1 500m	1 500m	1 600m	1 800m
300ft - 449ft	1 500m	1 500m	1 800m	2 000m
450ft - 649ft	1 500m	1 500m	2 000m	2 000m
650ft and above	1 500m	1 500m	2 000m	2 000m

Notes –

1. *Full facilities comprise runway markings, 720m 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 - 719m of HI/MI approach lights, runway edge lights, threshold lights and runway end lights. Lights must be on.*
3. *Basic facilities comprise runway markings, <420m 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 Tables 3, 4, 5 and 6 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.*
8. *For guidance on applying a CDFA flight technique on non-precision approach procedures refer to the Advisory Circular.*

(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 200ft and a visibility not less than 800m or RVR not less than 550m.

(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) 200ft.

(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 - 250ft	600 m	700 m	800 m	1 000 m
251 ft – 300ft	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, 720m 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 - 719m of HI/MI approach lights, runway edge lights, threshold lights and runway end lights. Lights must be on.*

3. *Basic facilities comprise runway markings, <420m 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 800m 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 × 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 300m.

(b) The approval of the Executive 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) 100ft.

(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
100ft – 120ft	300 m	350 m / 300 m (Note 2)
121ft – 140ft	400 m	400 m
141ft 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 auto-land.

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 175m.

(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 175m but not less than 50m.

(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 Executive 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)			
			Without roll-out system	With roll-out guidance or control system	
Approach category	**Decision height (ft)**			**Fail passive**	**Fail operational**
IIIA	Less than 100ft	175m (Note 1)	175m	175m	175m
IIIB	Less than 50ft	Not authorised	Not authorised	125m	75m
IIIC	No DH	Not authorised	Not authorised	Not authorised	75m

Note - *For operations to actual RVR values less than 300m 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	400ft	500ft	600ft	700ft
Minimum meteorological visibility	1 500m	1 600m	2 400m	3 600m

(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 500m 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 lighting	1.5	2
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 75NM 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 000ft above the minimum associated with the instrument approach procedure; and

(b) visibility of at least 5.5km or of 4km 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 re-joining 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

(iii) 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 200ft added to MDH and 1 000m added to RVR/Visibility. Ceiling must be above the MDH + 200ft
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 85kg for flight deck crew members and 75kg 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 to 29			30 and more	
	Male	Female	Children	All Adult	Children
All flights except holiday charters	88kg	70kg	35kg	84kg	35kg
Holiday charters	83kg	69kg	35kg	76kg	35kg

(5) Mass values for passengers - 19 seats or less

Table 2

Passenger seats	1 – 5	6 – 9	10 – 19
Male	104kg	96kg	92kg
Female	86kg	78kg	74kg
Children	35kg	35kg	35kg

(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, 6kg 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	11kg	11kg
International	15kg	20kg

(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 Executive Director of his or her reasons and gain such approval in advance. After verification and approval by the Executive 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 AND OIL REQUIREMENTS

1. Planning criteria for aeroplanes

Except as provided in Part 91, 93, 121 and 135, an owner or operator must base the fuel policy, including calculation of the amount of fuel and oil 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 pressurisation, 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 500ft 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 500ft 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 power plant, 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 to the air traffic control shall contain, in addition to the person suspected of being infected, the following details -

(a) aircraft identification;

(b) departure aerodrome including all technical or other stops;

(c) destination aerodrome;

(d) estimated time of arrival;

(e) number of persons on board;

(f) number of suspected cases on board; and

(g) nature of the public health risk, if known.

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 VISION SYSTEMS

1. Introduction

(1) This TS provides guidance for the approval for use of automatic landing systems, HUD, equivalent displays and vision systems intended for installation and operational use in aircraft engaged in general aviation operations. These systems and hybrid systems 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 Executive Director.

Note: *"Vision systems" is a generic term referring to the existing systems designed to provide images, i.e. EVS, SVS and CVS.*

(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 -

(a) to supplement conventional flight deck instrumentation; or

(b) as a primary flight display if certified for this purpose.

(2) An owner or operator who has been approved to use an HUD may-

(a) operate with reduced visibility or reduced RVR; or

(b) replace the guidance of certain ground facilities such as touchdown zone or centre line lights.

(3) The functions of an HUD may be provided by a suitable equivalent display: Provided that the appropriate airworthiness approval has been obtained for such a display.

(4) Ground training in the use of the HUD shall be accomplished at an approved training organisation (ATO). The training shall address all flight operations for which the HUD, or equivalent display is used.

(5) 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 co-ordination, 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 co-ordination, 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 tow visibility operations, including taxi, take-off, instrument approach and landing in both day and night conditions. This training shall include the transition from head-down to head-up and head-up to head-down operations.

3. Vision systems

(1) Vision systems can display electronic real-time images of the actual external scene achieved through the use of image sensors such as, CVS, or display synthetic images, which are derived from the on-board avionics systems. Vision systems can also consist of a combination of these two systems, called combined vision systems. The information from vision systems may be displayed head-up or head-down. Such system may display electronic real-time images of the external scene using the EVS component of the system. Operational credit may be granted to vision systems which are appropriately qualified.

(2) Light emitting diode (LED) lights may not be visible to infrared-based vision systems. Operators of such vision systems must acquire information about the LED implementation programmes at aerodromes where they intend to operate.

(3) The use of EVS -

(a) shall allow the pilot to view an image of the external scene obscured by darkness or other visibility restrictions;

(b) shall allow acquisition of an image of the external scene earlier than with natural, unaided vision, hence providing for a smoother transition to references by natural vision;

(c) may improve situational awareness;

(d) may qualify for operational credit if the information from the vision system is presented to the pilots in a suitable way and the necessary airworthiness approval and specific approval from the Executive Director has been obtained for the combined system; and

(e) enable pilots to detect other aircraft on the ground, terrain or obstructions on or adjacent to runways or taxiways.

(4) For an owner or operator who wishes to use EVS to increase situational awareness, ground and flight training at an ATO is recommended.

(5) 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.

(6) 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 co-ordination 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 vision systems approval

(1) For operations with an automatic landing system, an HUD or an equivalent display, a vision system or a hybrid system, the following requirements shall be met -

(a) The owner or operator shall obtain operational and airworthiness approval for the use of a HUD;

(b) Operational and airworthiness EVS approvals are required if the equipment is to be used to lower the owner or operator's aerodrome operating minima;

(c) 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; and

(d) HUD or EVS, as applicable, installed in aircraft in the State of Manufacturer 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;

(2) Prior to installing a HUD or EVS, as applicable, as a retrofit, an owner or operator shall contact the Authority to determine the airworthiness requirements associated with its approval for use.

(3) 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.

(4) An airworthiness approval issued to an aircraft type may be extended to other aircraft types: Provided the Executive 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.

(5) 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.

(6) Operational approval to use the HUD or EVS, as applicable, shall be issued by the Executive Director to the applicant upon presentation of the certificate issued by the ATO. Such approval is pilot-specific.

(7) Systems that are not used for an operational credit or otherwise critical to the aerodrome operating minima such as vision systems used to enhance situational awareness may be used without a specific

approval. The standard operating procedures for these systems shall be specified in the operations manual.

Note: *Operational credit includes -*

(a) For the purpose of an approach ban, a minima below the aerodrome operating minima;

(b) Reducing or satisfying the visibility requirements; or

(c) Requiring fewer ground facilities as compensated for by airborne capabilities.

(8) To obtain specific approval for operational credit, the vision systems compliance list shall include the information that is relevant to the specific approval requested and the registration marks of the aircraft involved. If more than one type of aircraft or fleet is included in a single application a completed compliance list shall be included for each aircraft or fleet. The following items shall be covered in a vision systems compliance list -

(a) reference documents used in compiling the submission for approval;

(b) flight manual;

(c) feedback and reporting of significant problems;

(d) requested operational credit and resulting aerodrome operating minima;

(e) operations manual entries including MEL and standard operating procedures;

(f) safety risk assessment;

(g) training programmes; and

(h) continuing airworthiness.

Note: *More detailed information and guidance on automatic landing systems. HUD or equivalent displays, EVS, SVS and CVS is contained in an AIC for All-Weather Operations*.

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-

(a) an aeroplane type design;

(b) by a change to the type design; or

(c) if added by a STC.

(3) Portable EFBs are not considered to be part of the certified aeroplane configuration. They do not require airworthiness approval but require an operational approval.

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 unauthorised 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 authorised 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 unauthorised 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 depressurisation shall be assessed if the Executive 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 Manufacturer 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 NCAA 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 crew members;

(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 unauthorised 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 paragraphs (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 crew members are sufficiently trained and knowledgeable, the EFB may be used without any required manuals, documents or charts being carried, if desired.

(10) The EFB risk assessment to assess the risks associated with the use of each EFB function shall be done in accordance with the principles prescribed in Part 140 and be performed before the beginning of the approval process (if applicable) and its results shall be reviewed on a periodic basis.

(11) The EFB management system is responsible for hardware and software version and configuration management, maintenance of EFB security and integrity in accordance with documented policies and procedures and shall have an appropriately trained designate to be responsible for the system.

91.07.35 ADDITIONAL EDTO REQUIREMENTS

1. General

(1) This technical standard defines provisions for a EDTO of an aircraft as follows:

(a) two-engine aircraft: This is a flight whose planned routing contains a point further than 60 minutes flying time from an adequate airport at an approved one-engine inoperative cruise speed under standard conditions in still air;

(b) more than two engines' aircraft: This is a flight whose planned routing contains a point further than 180 minutes flying time from an adequate airport at an approved all engine operating cruise speed under standard conditions in still air under standard conditions in still air; and

(c) a EDTO Type Design Assessment: An aircraft with two engines where EDTO certification is required and an aircraft with more than two engines where EDTO certification is not required.

(2) Review of time capabilities of the relevant EDTO time-limited systems (TLSs) on an aircraft with more than two engines shall be performed by an aircraft manufacturer. The objective of this review is to confirm whether:

(a) these time limitations have to be considered for the dispatch of a EDTO flights; and

(b) if the corresponding time limitation is to be provided in relevant aircraft documentation.

(3) The specified aircraft-engine combination shall be certificated to airworthiness standards of transport-category aircraft and be approved for a EDTO.

(4) An owner or operator of an aircraft shall be approved for a EDTO and when requesting any route approval, an owner or operator shall first demonstrate that:

(a) an owner or an operator of an aircraft is able to satisfactorily conduct operations between each required airport as defined for that route or route segment, and any required en route alternate airport; and

(b) the facilities and services specified in their applicable Parts of the regulations are available and adequate for the proposed operation.

NOTE 1 – EDTO requirements are not applicable to Part 91 and Part 93 aircraft.

2. EDTO requirements applicable to aircraft flown in operations

(1) An aircraft needs a viable diversion airport in the case of onboard fire, medical emergency, or catastrophic decompression.

(2) An owner or operator of an aircraft shall ensure:

(a) availability of en route alternate airports;

(b) adequate firefighting coverage at the airports;

(c) fuel planning to account for depressurization; and

(d) that planning for the maximum allowable diversion and worst-case scenarios account for aircraft time-critical systems.

3. Operations by aeroplane with turbine engines beyond 60 minutes to an en-route alternate aerodrome

3.1. General

(1) This section applies to operations of an aeroplane with turbine engines beyond 60 minutes to an en-route alternate aerodrome and to an EDTO.

(2) In applying the requirements for an aeroplane with turbine engines:

(a) operational control;

(b) flight dispatch procedures refer to the method of control and supervision of flight operations. This does not mean a specific requirement for licensed flight dispatchers or a full flight following system;

(c) operating procedures refer to a specification of organisation and methods established to exercise operational control and flight dispatch procedures in the appropriate manuals and shall cover at least a description of responsibilities concerning the initiation, continuation, termination or diversion of each flight as well as the method of control and supervision of flight operations; and

(d) training programme refers to the training for pilots and flight operations officers or flight dispatchers in operations covered by this and following sections.

3.2. Conditions to be used when converting diversion times to distances

(1) For the purpose of this technical standard, an approved one-engine-inoperative (OEI) speed or approved all-engines operative (AEO) speed is any speed within a certified flight envelope of an aeroplane.

(2) Determination of the 60-minute distance – aeroplanes with two turbine engines

(a) For determining whether a point on a route is beyond 60 minutes to an en-route alternate, an operator shall select an approved OEI speed. A distance is calculated from a point of a diversion followed by cruise for 60 minutes, in ISA and still-air conditions. For the purposes of computing distances, credit for drift down may be taken.

(3) Determination of the 60-minute distance – an aeroplane with more than two turbine engines

(a) For determining whether a point on the route is beyond 60 minutes to an en-route alternate, an operator shall select an approved AEO speed. A distance is calculated from a point of a diversion followed by cruise for 60 minutes, in ISA and still-air conditions.

3.3. Training programmes

(1) Training programmes shall contain the following:

(a) route qualification;

(b) flight preparation;

(c) concept of extended diversion time operations; and

(d) criteria for diversions.

3.4. Flight dispatch and operational requirements

(1) Flight dispatch requirements shall ensure the following:

(a) identification of en-route alternate an aerodrome;

(b) prior to departure, a flight crew is provided with the most up-to-date information on an identified en-route alternate an aerodrome, including operational status and meteorological conditions and, in flight, make available means for a flight crew to obtain the most up-to-date weather information;

(c) methods to enable two-way communications between an aeroplane and an operator's operational control centre;

(d) that an operator has a means to monitor conditions along the planned route including an identified alternate aerodrome and those procedures are in place so that a flight crew are advised of any situation that may affect the safety of flight;

(e) that an intended route does not exceed the established aeroplane threshold time unless an operator is approved for an EDTO operations;

(f) pre-flight system serviceability including the status of items in the minimum equipment list;

(g) communication and navigation facilities and capabilities;

(h) fuel requirements;

(i) availability of relevant performance information for an identified en-route alternate aerodrome; and

(j) systems degradation and reduced flight altitude.

(2) In addition, operations conducted by an aeroplane with two turbine engines require that, prior to departure and in flight, a meteorological condition at identified en-route alternate aerodrome shall be at or above an aerodrome operating minimal required for the operation during the estimated time of use.

(3) En-route alternate aerodrome, required by subsection (2) for EDTO by an aeroplane with two turbine engines, shall be selected and specified in an operational and ATS flight plans.

3.5. En-route alternate aerodrome

(1) A PIC shall ensure that an aerodrome to which an aircraft may proceed in the event that a diversion becomes necessary while en route:

(a) is identified and operational;

(b) the necessary services and facilities are available; and

(c) aircraft performance requirements can be met.

(2) En-route alternate aerodrome may also be used as a take-off or destination aerodrome.

4. Extended diversion time operations (EDTO) requirements

4.1. General

(1) This section addresses the provisions that apply to operations by an aeroplane with two or more turbine engines where the diversion time to an en-route alternate aerodrome is greater than the established threshold time.

4.1.1. EDTO significant system

(1) A EDTO significant system may be an aeroplane propulsion system and any other aeroplane systems whose failure or malfunctioning maybe adversely affect safety particular to a EDTO flight, or whose functioning is specifically important to continued safe flight and landing during an aeroplane EDTO diversion.

(2) The aeroplane systems that are essential for non-extended diversion time operations may need to be reconsidered to ensure that the redundancy level or reliability and shall be adequate to support the conduct of safe EDTO.

(3) The maximum diversion time shall not exceed the value of a EDTO significant system limitation, if any, for extended diversion time operations identified in an aeroplane flight manual, directly or by reference, reduced by an operational safety margin of 15 minutes.

(4) The required specific safety risk assessment to approve operations beyond the time limits of a EDTO significant time limited system shall be in accordance with provisions of Part 140 and shall consider the following:

(a) capabilities of an operator refers to an operator’s quantifiable in-service experience, compliance record, aeroplane capability and overall operational reliability that:

(i) are sufficient to support operations beyond the time limits of a EDTO significant time-limited system;

(ii) demonstrate the ability of the operator to monitor and respond to changes in a timely manner; and

(iii) there is an expectation that an operator’s established processes, necessary for successful and reliable extended diversion time operations, can be successfully applied to such operations.

(b) overall reliability of an aeroplane refers to:

(i) quantifiable standards of reliability considering the number of engines, aircraft EDTO significant systems and any other factors that may affect operations beyond the time limits of a particular EDTO significant time-limited system; and

(ii) relevant data from an aeroplane manufacturer and data from an operator reliability programme used as a basis to determine overall reliability of an aeroplane and its EDTO significant systems.

(c) Reliability of each time-limited system refers to quantifiable standards of design, testing and monitoring that ensure the reliability of each particular EDTO significant time-limited system;

(d) Relevant information from an aeroplane manufacturer refers to technical data and characteristics of an aeroplane and worldwide fleet operational data provided by such manufacturer and used as a basis to determine overall reliability of an aeroplane and its EDTO significant systems; and

(e) Specific mitigation measures refer to a safety risk management mitigation strategy, which have manufacturer concurrence, that ensure an equivalent level of safety is maintained. These specific mitigations shall be based on:

(i) technical expertise such as data, evidence, proving an operator's eligibility for an approval of operations beyond the time limit of the relevant EDTO significant system; and

(ii) an assessment of relevant hazards, the probability and the severity of the consequences that may adversely impact the safety of the operation of an aeroplane operated beyond the limit of a particular EDTO significant time-limited system.

4.1.2. Threshold time

An established threshold time is not an operating limit. It is a flight time to an en-route alternate aerodrome, which is established as being a EDTO threshold beyond which particular consideration shall be given to an aeroplane capability as well as an operator's relevant operational experience, before granting a EDTO approval.

4.1.3. Maximum diversion time

An approved maximum diversion time shall take into consideration the most limiting EDTO significant system time limitation, if any, indicated in an aeroplane flight manual (directly or by reference) for a particular aeroplane type and an operator's operational and EDTO experience, if any, with an aeroplane type or, if relevant, with another aeroplane type of model.

4.2. EDTO for an aeroplane with more than two turbine engines

4.2.1. In addition to section 4.1, this section addresses the provisions that apply to an aeroplane with more than two turbine engines.

4.2.2. Operational and diversion planning principles

4.2.2.1.

(1) When planning or conducting EDTO, an operator and PIC shall ensure that:

(a) the minimum equipment list, the communications and navigation facilities, fuel and oil supply, en-route alternate an aerodrome and aeroplane performance are appropriately considered;

(b) if no more than one engine is shut down, a PIC may elect to continue beyond the nearest en-route alternate aerodrome in terms of time, if the PIC determines that it is safe to do so. In making this decision a PIC shall consider all relevant factors; and

(c) in the event of a single or multiple failure of a EDTO significant system excluding engine failure, an aircraft may proceed to and land at the nearest available en-route alternate aerodrome where a safe landing, may be made unless it has been determined that no substantial degradation of safety will result from any decision made to continue the planned flight.

4.2.2.2. EDTO critical fuel

(1) An aeroplane with more than two engines engaged in EDTO operations shall carry enough fuel to fly to an en-route alternate aerodrome as described in section 4.2.6. A EDTO critical fuel shall corresponds to the additional fuel that may be required to comply with Regulation 91.07.35.

(2) The following shall be considered, using the anticipated mass of an aeroplane, in determining the corresponding EDTO critical fuel:

(a) fuel sufficient to fly to an en-route alternate aerodrome, considering at the most critical point of the route, simultaneous engine failure and depressurization or depressurization alone, whichever is more limiting:

(i) the speed selected for the diversions such as depressurization, combine or not with an engine failure may be different from the approved AEO speed used to determine a EDTO threshold and maximum diversion distance;

(b) fuel to account for icing;

(c) fuel to account for errors in wind forecasting;

(d) fuel to account for holding an instrument approach and landing at the en-route alternate aerodrome;

(e) fuel to account for deterioration in cruise fuel-burn performance; and

(f) fuel to account for APU use if required.

(3) The following factors may be considered in determining if a landing at a given aerodrome is a more appropriate course of action:

(a) aeroplane configuration, mass, systems status and fuel remaining;

(b) wind and weather conditions en route at a diversion altitude, minimum altitudes en-route and fuel consumption to an en-route alternate aerodrome;

(c) runways available, runway surface condition and weather, wind and terrain in a proximity of an en-route alternate aerodrome;

(d) instrument approaches and approaches or runway lighting available and rescue and firefighting services (RFFS) at an en-route alternate aerodrome;

(e) a pilot’s familiarity with that aerodrome and information about that aerodrome provided to by an operator; and

(f) facilities for passenger and crew disembarkation and accommodation.

4.2.3. Appropriate threshold time

(1) In establishing an appropriate threshold time and to maintain the required level of safety, the following shall be considered:

(a) an airworthiness certification of an aeroplane type does not restrict operations beyond the threshold time, taking into account an aeroplane system design and reliability aspects;

(b) specific flight dispatch requirements are met;

(c) necessary in-flight operational procedures are established; and

(d) an operator's previous experience on similar aircraft types and routes is satisfactory.

(2) For determining whether a point on a route is beyond a EDTO threshold to an en-route alternate aerodrome, an operator shall use an approved speed as described in this technical standard.

4.2.4. Maximum diversion time

(1) In approving a maximum diversion time, an aeroplane's EDTO significant systems including limiting time limitation, if any, and relevant to that particular operation for a particular aeroplane type and an operator's operational and EDTO experience with an aeroplane type or, if relevant, with another aeroplane type or model shall be considered.

(2) For determining the maximum diversion distance to an en-route alternate, an operator shall use an approved speed as described in this technical standard.

(3) An operator's approved maximum diversion time shall not exceed the most limiting EDTO significant system time limitation identified in an aeroplane flight manual, reduced by an operational safety margin of 15 minutes.

4.2.5. EDTO significant systems

(1) In addition to the provisions in section 4.1.1 this section addresses particular provisions for an aeroplane with more than two turbine engines.

(2) Considerations of time limitations:

(a) Operations beyond an EDTO threshold, an operator shall consider, at time of dispatch and as outlined below, the most limiting EDTO significant system time limitation, if any, indicated in an aeroplane flight manual directly or by reference and relevant to that particular operation;

(b) an operator shall check that from any point on the route, the maximum diversion time does not exceed the most limiting EDTO significant system time limitation, reduced by an operational safety margin of 15 minutes;

(c) the maximum diversion time subject to cargo fire suppression time limitations are considered part of the most limiting EDTO significant time limitations; and

(d) an operator shall consider the approved speed as described in this technical standard or consider adjusting that speed with forecast wind and temperature conditions for operations with threshold times beyond 180 minutes.

4.2.6. En-route alternate an aerodrome

(1) The following shall apply on en-route alternate an aerodrome:

(a) for route planning purposes, an identified en-route alternate aerodrome, which could be used, if necessary, needs to be located at a distance within the maximum diversion time from the route;

(b) in extended diversion time operations, before an aeroplane crosses its threshold time during flight, the conditions at an en-route alternate aerodrome within the approved maximum diversion time will be at or above an operator's established aerodrome operating minimal for an operation during the estimated time of use;

(c) if any conditions, such as weather below landing minima, are identified that may preclude a safe approach and landing at that aerodrome during an estimated time of use, an alternative course of action shall be determined such as selecting another en-route alternate aerodrome within an operator's approved maximum diversion time; and

(d) an en route alternate aerodrome may also be the take-off or destination aerodrome.

4.2.7. Operational approval procedure

(1) In approving an operator with a particular aeroplane type for extended diversion time operations, an appropriate threshold time and maximum diversion time shall be established and, in addition to the requirements previously set forth in this technical standard, the Executive Director must be satisfied that:

(a) an operator's past experience and compliance record is satisfactory, and an operator has established the processes necessary for successful and reliable extended diversion time operations and shown that such processes can be successfully applied throughout such operations;

(b) an operator's procedures are acceptable based on certified aeroplane capability and adequate to address continued safe operation in the event of degraded aeroplane systems;

(c) an operator's crew training programme is adequate for the proposed operation;

(d) documentation accompanying the authorization covers all relevant aspects; and

(e) it has been shown during a EDTO certification of an aeroplane that a flight can continue to a safe landing under the anticipated degraded operating conditions which may arise from:

(i) the most limiting EDTO significant system time limitation, if any, for extended diversion time operations is identified in an aeroplane flight manual, directly or by reference.

(2) Any other condition which the State of the Operator considers to be equivalent in airworthiness and performance risk.

4.2.8. Conditions to be used when converting diversion times to distances for the determination of the geographical area beyond threshold and within maximum diversion distances:

(1) An approved AEO speed is any all-engines-operative speed within a certified flight envelope of an aeroplane.

(2) Application for EDTO

(a) When applying for EDTO the operator shall identify the AEO speed(s), considering ISA and still-air conditions, that will be used to calculate the threshold and maximum diversion distances for approval by the Executive Director.

(b) The speed that shall be used to calculate the maximum diversion distance may be different from the speed used to determine the 60-minute and EDTO thresholds.

(3) Determination of a EDTO threshold:

(a) for determining whether a point on a route is beyond a EDTO threshold to an en-route alternate, an operator shall use the approved speed as described in this technical standard; and

(b) the distance is calculated from the point of a diversion followed by cruise for the determined threshold time.

(4) Determination of the maximum diversion time distance:

(a) for determining the maximum diversion time distance to an en-route alternate, an operator shall use the approved speed as provided for in this technical standard; and

(b) the distance is calculated from the point of the diversion followed by cruise for an approved maximum diversion time.

4.2.9. Additional EDTO requirements

(1) There are no additional EDTO airworthiness certification requirements for an aeroplane with more than two engines.

(2) The most limiting EDTO significant system time limitation, if any, shall be indicated in an aircraft flight manual directly or by reference and relevant to that particular operation.

4.2.10. Maintaining operational approval

(1) In order to maintain the required level of safety on routes where an aeroplane is permitted to operate beyond the established threshold time, an operator shall ensure that:

(a) specific flight dispatch requirements are met;

(b) in-flight operational procedures are established; and

(c) specific operational approval is granted by the Executive Director.

4.2.11. Airworthiness modifications and maintenance programme requirements

There are no additional EDTO airworthiness or maintenance requirements for an aeroplane with more than two engines.

4.3. EDTO for aeroplanes with two turbine engines

4.3.1. General

(1) This section addresses the provisions that apply in particular to an aeroplane with two turbine engines.

(2) EDTO provisions for an aeroplane with two turbine engines do not differ from the previous provisions for extended range operations by an aeroplane with two turbine engines (ETOPS). Therefore, EDTO may be referred to as ETOPS in some documents.

4.3.2. Operational and diversion planning principles

4.3.2.1. When planning or conducting extended diversion time operations, an operator and a PIC shall ensure that:

(1) the minimum equipment list, the communications and navigation facilities, fuel and oil supply, en-route alternate an aerodrome or aeroplane performance are appropriately considered.

(2) in the event of an aeroplane engine shutdown, an aircraft can proceed to and land at the nearest en-route alternate aerodrome, in terms of the least flying time, where a safe landing can be made.

(3) in the event of a single or multiple failure of an EDTO significant system or systems excluding engine failure, an aircraft may proceed to and land at the nearest available en-route alternate aerodrome where a safe landing may be made unless it has been determined that no substantial degradation of safety shall result from any decision made to continue the planned flight.

4.3.2.2. EDTO critical fuel

(1) An aeroplane with two engines engaged in EDTO operations shall carry enough fuel to fly to an en-route alternate aerodrome. This EDTO critical fuel corresponds to the additional fuel that may be required.

(2) The following shall be considered, using the anticipated mass of an aeroplane, in determining the corresponding EDTO critical fuel:

(a) fuel sufficient to fly to an en-route alternate aerodrome, considering at the most critical point of the route, failure of one engine or simultaneous engine failure and depressurization or depressurization alone, whichever is more limiting:

(i) the speed selected for the all-engines-operative diversion such as depressurization alone may be different from the approved OEI speed used to determine a EDTO threshold and maximum diversion distance;

(ii) the speed selected for an OEI diversion such as engine failure alone and combined engine failure and depressurization shall be an approved OEI speed used to determine a EDTO threshold and maximum diversion distance;

(b) fuel to account for icing;

(c) fuel to account for errors in wind forecasting;

(d) fuel to account for holding an instrument approach and landing at the en-route alternate aerodrome;

(e) fuel to account for deterioration in cruise fuel-burn performance; and

(f) fuel to account for APU use where required.

4.3.2.3. The following factors may be considered in determining if a landing at a given aerodrome is the more appropriate course of action:

(1) aeroplane configuration, mass, systems status and fuel remaining;

(2) wind and weather conditions en route at the diversion altitude, minimum altitudes en-route and fuel consumption to an en-route alternate aerodrome;

(3) runways available, runway surface condition and weather, wind and terrain in the proximity of an en-route alternate aerodrome;

(4) instrument approaches and approaches or runway lighting available and RFFS at the en-route alternate aerodrome;

(5) a pilot's familiarity with an aerodrome and information about such an aerodrome provided to a pilot by an operator; and

(6) facilities for passenger and crew disembarkation and accommodation.

4.3.3. Threshold time

(1) In establishing an appropriate threshold time and to maintain the required level of safety, the Executive Director shall consider:

(a) an airworthiness certification of an aeroplane type specifically permits operations beyond a threshold tine, taking into account an aeroplane system design and reliability aspects;

(b) the reliability of the propulsion system is such that the risk of double engine failure from independent causes is extremely remote;

(c) any necessary special maintenance requirements are fulfilled;

(d) specific flight dispatch requirements are met;

(e) necessary in-flight operational procedures are established; and

(f) an operator's previous experience on similar aircraft types and routes is satisfactory.

(2) For determining whether a point on a route is beyond a EDTO threshold to an en-route alternate aerodrome, an operator shall use an approved speed as described in this technical standard.

4.3.4. Maximum diversion time

(1) In approving the maximum diversion time, the Executive Director shall consider an EDTO certified capability of an aeroplane, an aeroplane's EDTO significant systems such as limiting time limitation, if any, and relevant to that particular operation for a particular aeroplane type and an operator's operational and EDTO experience with an aeroplane type or, if relevant, with another aeroplane type or model.

(2) For determining the maximum diversion distance to an en-route alternate, an operator should use the approved speed as described in this technical standard.

(3) An operator's approved maximum diversion time shall not exceed a EDTO certified capability of an aeroplane or the most limiting EDTO significant system time limitation identified in an aeroplane flight manual, reduced by an operational safety margin of 15 minutes.

4.3.5. EDTO significant systems

This section applies to an aeroplane with two turbine engines.

4.3.5.1. The reliability of the propulsion system for an aeroplane or engine or combination of aeroplane and engine being certified is such that the risk of double engine failure from independent causes shall be assessed and found acceptable to support the diversion time being approved.

4.3.5.2. Consideration of time limitations

(1) For all operations beyond a EDTO threshold, as determined by the State of the Operator, an operator shall consider, at time of dispatch and as outlined below, a EDTO certified capability of an aeroplane and the most limiting EDTO significant system time limitation, if any, indicated in an aeroplane flight manual directly or by reference and relevant to that particular operation.

(2) An operator shall check that from any point on the route, the maximum diversion time at an approved speed as described in section 4.3.8 (2), does not exceed the most limiting EDTO significant system time limitation, other than the cargo fire suppression system, reduced by an operational safety margin, commonly 15 minutes, specified by the State of the Operator.

(3) An operator shall check that from any point on the route, the maximum diversion time at all-engines operating cruise speed, considering ISA and still-air conditions, does not exceed a cargo fire suppression system time limitation, reduced by an operational safety margin, commonly 15 minutes, specified by the State of the Operator.

(4) An operator shall consider an approved speed as described in section 4.3.5.2(2) or consider adjusting that speed with forecast wind and temperature conditions for operations with longer threshold times beyond 180 minutes as determined.

4.3.6. En-route alternate an aerodrome

(1) In addition to an en-route alternate aerodrome provisions described in subsection 3.5, the following apply:

(a) for route planning purposes, identified en-route alternate an aerodrome, which maybe be used, if necessary, need to be located at a distance within the maximum diversion time from the route;

(b) in a EDTO, before an aeroplane crosses its threshold time during flight, an en-route alternate aerodrome shall be nominated within the approved maximum diversion time whose conditions shall be at or above an operator's established aerodrome operating minima for an operation during the estimated time of use.

(c) If any conditions, such as weather below landing minima, are identified that may preclude a safe approach and landing at that aerodrome during the estimated time of use, an alternative course of action shall be determined such as selecting another en-route alternate aerodrome within an operator's approved maximum diversion time.

(2) During flight preparation and throughout a flight the most up-to-date information on an identified en-route alternate an aerodrome, including, operational status and meteorological conditions, shall be provided to the flight crew.

(3) En route alternate an aerodrome may also be used as a take-off or destination an aerodrome.

4.3.7. Operational approval procedure

(1) In approving an operator with a particular aeroplane type for EDTO, an appropriate threshold time shall be established and a maximum diversion time shall be approved and, in addition to the requirements previously set forth in this technical standard, the Executive Director must be satisfied that:

(a) an operator's past experience and compliance record is satisfactory;

(b) operator has established the processes necessary for successful and reliable extended diversion time operations and shown that such processes can be successfully applied throughout such operations;

(c) an operator's procedures are acceptable based on certified aeroplane capability and adequate to address continued safe operation in the event of degraded aeroplane systems;

(d) an operator's crew training programme is adequate for the proposed operation;

(e) documentation accompanying the authorization covers all relevant aspects; and

(f) it has been shown during a EDTO certification of an aeroplane that the flight can continue to a safe landing under the anticipated degraded operating conditions which may arise from:

(i) the most limiting EDTO significant system time limitation, if any, for extended diversion time operations identified in an aeroplane flight manual, directly or by reference; or

(ii) total loss of engine-generated electric power; or

(iii) total loss of thrust from one engine; or

(iv) any other condition which the Executive Director considers to be equivalent in airworthiness and performance risk.

4.3.8. Conditions to be used when converting diversion times to distances for the determination of the geographical area beyond threshold and within maximum diversion distances.

(1) For the purpose of this technical standard, an approved OEI speed is any one-engine-operative speed within the certified flight envelope of an aeroplane.

(2) Application for EDTO

(a) When applying for EDTO an operator shall identify, an OEI speed, considering ISA and still-air conditions, that shall be used to calculate a threshold and maximum diversion distances, and the Executive Director shall approve.

(b) an identified speed that will be used to calculate the maximum diversion distance shall be the same one used to determine fuel reserves for OEI diversions.

(c) The speed may be different from the speed used to determine the 60-minute and EDTO thresholds.

(3) Determination of a EDTO threshold

(a) For determining whether a point on the route is beyond an EDTO threshold to an en-route alternate, an operator shall use the approved speed as described in this technical standard.

(b) The distance is calculated from the point of the diversion followed by cruise for the determined threshold time.

(c) For the purposes of computing distances, credit for driftdown may be taken.

(4) Determination of the maximum diversion time distance

(a) For determining the maximum diversion time distance to an en-route alternate, an operator should use an approved speed as described in this technical standard.

(b) The distance is calculated from a point of the diversion followed by cruise for an approved maximum diversion time.

(c) For the purposes of computing distances, credit for driftdown may be taken.

4.3.9. Airworthiness certification requirements for extended diversion time operations beyond a threshold time

(1) During an airworthiness certification procedure for an aeroplane type intended for extended diversion time operations, attention to detail shall be provided to ensure that the required level of safety shall be maintained under conditions which may be encountered during such operations, for example flight for extended periods following failure of an engine or an aeroplane's EDTO significant systems.

(2) Information or procedures specifically related to extended diversion time operations shall be incorporated into an aeroplane flight manual, the maintenance manual, EDTO configuration, maintenance and procedure (CMP) document or other appropriate document.

(3) An aeroplane manufacturer shall supply data specifying an aeroplane's EDTO significant systems and, where appropriate, any time-limiting factors associated with the systems.

4.3.10. Maintaining operational approval

(1) To maintain the required level of safety on routes where aeroplanes are permitted to operate beyond the established threshold time, an operator shall ensure that:

(a) an airworthiness certification of an aeroplane type specifically permits operations beyond the threshold time, taking into account an aeroplane's system design and reliability aspects;

(b) the reliability of a propulsion system is such that a risk of double engine failure from independent causes is extremely remote and found acceptable to support a diversion time being approved;

(c) any special maintenance requirements are fulfilled;

(d) specific flight dispatch requirements are met;

(e) the necessary in-flight operational procedures are established; and

(f) specific operational approval is granted by the State of the Operator.

(2) A determination shall be made of an operator's capability to achieve and maintain an acceptable level of propulsion system reliability based on an operator's past experience or a process review.

(a) For operators with past experience, this determination shall include trend comparisons of an operator's data with other operators as well as the world fleet average values and an application of a qualitative judgement that considers all of the relevant factors. An operator's past record of propulsion system reliability with related types of engines shall be reviewed, as well as its record of achieved systems reliability with an airframe-engine combination for which authorisation is sought to conduct EDTO.

(b) An operator without such experience shall establish a programme that results in a high degree of confidence that a propulsion system reliability appropriate to an EDTO shall be maintained.

(c) An operator shall develop a system for reporting the occurrences listed technical standard 43.02.19.

(d) Following EDTO operational approval, an operator shall continue to monitor a propulsion system reliability for an airplane-engine combination used in EDTO, and take action as required for the specified IFSD rates.

4.3.11. Airworthiness modifications and maintenance programme requirements

(1) Each operator's maintenance programme shall ensure that:

(a) the titles and numbers of an airworthiness modifications, additions and changes which were made to qualify aeroplane systems for extended diversion time operations are provided for;

(b) any changes to maintenance and training procedures, practices or limitations established in the qualification for extended diversion time operations shall be submitted to the Executive Director before such changes are adopted;

(c) a reliability monitoring and reporting programme is developed and implemented prior to approval and continued after approval.

(d) prompt implementation of required modifications and inspections which may affect propulsion system reliability is undertaken;

(e) procedures are established which prevent an aeroplane from being dispatched for an extended diversion time operation after engine shutdown or EDTO significant system failure on a previous flight until the cause of such failure has been positively identified and the necessary corrective action has been completed. Confirmation that such corrective action has been effective may require the successful completion of a subsequent flight prior to dispatch on an extended diversion time operation;

(f) a procedure is established to ensure that an airborne equipment will continue to be maintained at the level of performance and reliability required for extended diversion time operations; and

(g) a procedure is established to minimize scheduled or unscheduled maintenance during the same maintenance visit on more than one parallel or similar EDTO significant system. Minimization can be accomplished by staggering maintenance tasks, performing and supervising maintenance by a different technician, or verifying maintenance correction actions prior to an aeroplane entering an EDTO threshold.

91.07.37 DISINSECTION OF AIRCRAFT

1. Listed States

States listed by World Health Organization as yellow fever risk countries shall be published and updated in the Authority's website by the Executive Director.

2. Disinsection methods and guidelines

(1) The owner or operator of an aircraft shall apply the following methods and guidelines for disinsection of aircraft -

(a) Pre-flight -

(i) a pre-flight containing an insecticide with rapid action and limited residual action shall be applied by ground staff to the flight deck, passenger cabin including toilet areas, open overhead and side-wall lockers, coat lockers and crew rest areas;

(ii) the spray shall be applied before the passengers have boarded the aircraft but not more than one hour before the doors are closed;

(iii) a 2% permethrincis: trans (25:75) formulation is currently recommended for this application, at a target dose of 0.7 g a.i./100 m3. This requires application at 35 g of formulation per 100 m3 to various types of aircraft, with a droplet size of 10-15 um; and

(iv) pre-flight spraying must be followed by a further in-flight spray (i.e. top-of-descent) as the aircraft starts its descent to the arrival airport.

(b) blocks away -

(i) spraying must be carried out by crew members when the passengers are on board, after closure of the cabin door and before the flight takes off;

(ii) an aerosol containing an insecticide for rapid action shall be used;

(iii) the air-conditioning system shall be switched off during cabin spraying;

(iv) the flight deck must be sprayed before the pilot and passengers board;

(v) the doors of overhead luggage racks shall be closed only after spraying has been completed;

(vi) an aerosol containing 2% d-phenothrin shall be applied at a rate of 35 g of formulation per 100 m3 (i.e. 0.7 g a.i./100 m3); and

(vii) cargo holds shall also be disinsected.

(c) top-of-descent -

(i) spraying shall be carried out as the aircraft starts its descent to the arrival airport;

(ii) an aerosol containing 2% d-phenothrin shall be applied with the air recirculation system set at normal flow;

(iii) the amounts applied shall be based on a standard spray rate of 1 g/s and 35 g of the formulation per 100 m3 (i.e. 0.754 g a.i./100 m3); and

(iv) as stated in Annex 9 of the International Health Regulations, the details of each disinsecting such as the place, date, time and method during the flight shall be noted on the Health Part of the Aircraft General Declaration form.

(d) residual treatment -

(i) the internal surfaces of the passenger cabin and cargo hold, excluding food preparation areas, shall be sprayed with a compression sprayer that has a constant flow valve and flat fan nozzle according to WHO specifications;

(ii) permethrin 25:75 (cis:trans) emulsifiable shall concentrate at a target dose of 0.2 g/m2 applied at intervals not exceeding two months;

(iii) the emulsion must be applied at 10 ml/m2 to avoid runoff;

(iv) residual sprays shall be applied by professional pest control operators on aircraft interior surfaces and are intended for long-term residual activity;

(v) in electrically sensitive areas, it may be necessary to use an aerosol instead of a compression sprayer;

(vi) after treatment is completed, air-conditioning packs shall run for at least one hour before the crew and passengers embark to clear the air of the volatile components of the spray;

(vii) areas that undergo substantial cleaning between treatments require supplementary 'touch-up' spraying;

(viii) the pesticide formulations, including spray cans, shall comply with Namibia national regulations and international standards as well as with WHO specifications for pesticides; and

(ix) spray operations shall follow international regulations and WHO recommended procedures and also comply with quarantine requirements of the country of arrival.

91.07.38 OPERATIONS IN RNP DESIGNATED AIRSPACE

1. RNP operation procedures manual

(1) An RNP operation procedures manual shall contain-

(a) the name of an operator; and

(b) the registration, make, and model of an aircraft to which it applies;

(c) the type, manufacturer, and model of an aircraft navigation system to which it applies;

(d) normal, abnormal and contingency procedures;

(e) flight crew and maintenance engineer qualification and proficiency requirements in accordance with the appropriate navigation specifications

(f) a training program for relevant personnel consistent with the intended operations;

(g) a maintenance programme that ensures continued airworthiness in accordance with the appropriate navigation specifications, including procedures for the-

(i) test and inspection of each instrument and item of equipment required by Technical Standard 91.05.2 for RNP operations at intervals that ensure the RNP required for the particular operation is maintained; and

(ii) recording in the maintenance records the date, departure aerodrome, destination airport, and reasons for each RNP operation discontinued because of instrument or equipment malfunction.

(h) procedures and instructions related to-

(i) the mitigation of large navigational errors due to equipment malfunction or operational error;

(ii) in-flight drills that include cross checking procedures to identify navigation errors in sufficient time to prevent inadvertent deviation from ATC cleared routes;

(iii) updating the navigation system to ensure that the required RNP is maintained during operations in RNP designated airspace;

(iv) the maximum permissible deviations of the RNP system within the RNP designated airspace;

(v) the calculation of time limits to meet RNP criteria;

(vi) instrument and equipment failure warning systems;

(vii) system failure;

(viii) system monitoring and the collection of reliability and performance data; and

(ix) other procedures, instructions, and limitations that may be found necessary by the Authority.

TABLE 1 – PBN NAVIGATION SPECIFICATIONS

NAV Spec	Intended Application	Optional functions and comments
RNAV10	To support 50nm lateral and 50nm longitudinal distance-based separation minima in oceanic and remote area airspace	Requires dual independent systems
RNAV 5	Enroute phase of flight in airspace where 5nm lateral accuracy is required	
RNAV 1 and RNAV 2	Applicable to all ATS routes, including routings in the enroute domain, SIDs and STARs and IAPs up to the FAF.	BARO-VNAV is optional.

	Primarily for use in a radar environment.	
RNP 4	To support 30nm lateral and the 30nm longitudinal distance-based separation minima in oceanic and remote area airspace.	Requires dual independent systems.
RNP 2	Intended for enroute operations in oceanic/ remote continental airspace, particularly areas with little or no ground NAVAIDS, limited or no ATS surveillance and low-medium density traffic.	Requires dual independent systems for oceanic/ remote continental airspace. Fixed radius transitions and parallel offset capabilities are optional.
RNP 1	Intended for routings connecting the enroute structure and terminal airspace with little or no ATS surveillance, with low or medium density traffic including SIDs and STARs, and IAPs up to the FAF.	Baro- VNAV and RF path terminators are optional
A-RNP	Designed for oceanic/ remote airspace, on the continental enroute structure and on arrival and departure routings and approaches.	Requires dual independent systems for oceanic/ remote continental airspace to meet the higher continuity requirement. RF path terminator is required.
RNP APCH	Approach applications based on GNSS and minima designated as LNAV or LNAV/VNAV, and augmented GNSS with minima designated as LP or LPV.	RF path terminators are optional
RNP AR APCH	Intended for approach operations to airports where limiting obstacles exist and/or significant operational efficiencies can be gained.	Requires specific operator regulatory approval. Aircraft qualified in this category do not meet A-RNP requirements.
RNP 0.3	Intended for helicopter operations where benefit can be gained from a single accuracy or 0.3nm for all phases of flight.	
Radius to Fix Path Terminator	RF leg enables aircraft to fly a curved path of a defined radius between 2 waypoints. Can be used in the initial and intermediate approach segments, the final phase of a missed approach, SIDs and STARs.	Capability is a required function for A-RNP but optional for RNP 1, RNP 0.3 and RNP APCH.
Fixed Radius Transition	Intended to define transitions along airways where separation between parallel routings is also required in the transition, and the fly-by transition is not compatible with the separation criteria. The default radius is 15nm below FL 195 and 22.5nm above FL195; the turn radius can also be set to a value loaded from the nav database.	This is an optional function.
Barometric Vertical Nav	Enables the use of barometric altitude and area nav information in the definition of vertical flight paths, and vertical tracking to a path.	Baro- VNAV is an optional function

Notes:

1. *Aircraft that are qualified for A-RNP need no further airworthiness examination for Nav accuracy or functional requirements for RNAV 5, RNAV 1 & 2, RNP 2, RNP 1 and RNP APCH nav specifications.*
2. *Aircraft that are qualified for RNP AR APCH need no further airworthiness examination for Baro-VNAV.*
3. *Aircraft that are qualified for RNP AR APCH with RF path terminators need no further airworthiness examination for RF path terminators.*

TABLE 2 – APPLICATION OF NAVIGATION SPECIFICATION BY FLIGHT PHASE

Nav Spec	FLIGHT PHASE (nm)							
	Enroute oceanic / remote	Enroute continental	Arrival	Approach				Departure
				initial	Intermediate	Final	Missed	
RNAV 10	10							
RNAV 5		5	5					
RNAV 2		2	2					
RNAV 1		1	1	1	1		1	1
RNP 4	4							
RNP 2	2	2						
RNP 1			1	1	1		1	1
A-RNP	2	2 or 1	1	1	1	0.3	1	1
RNP APCH				1	1	0.3	1	
RNP AR APCH				1-0.1	1-0.1	0.3-0.1	1-0.1	
RNP 0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3*

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 35ft vertically or at least 90m 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 50ft 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 300m 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 600m 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 900m on either side of the intended track need not be considered when determining net take-off flight path adequate margins.

(5) The owner or operator shall provide information on aircraft climb performance with all engines operating to enable the PIC to determine the climb gradient that can be achieved during the departure phase for the existing take-off conditions and intended take-off technique.

91.10.1 APPLICABILITY

(1) Subpart 10, of Part 91, shall not be applicable to international flights, preceding or following a humanitarian, medical or firefighting flight, provided such flights are conducted with the same aeroplane and are required to accomplish the related humanitarian, medical or firefighting activities, or to reposition thereafter for the next activity. The aeroplane operator shall provide evidence of these activities to the verification body or, upon request, to the Authority.

(2) The Standards and Recommended Practices of Chapter 2 of Annex 16, Volume IV shall not be applicable to international flights, as defined in paragraph 1.1.2 of such standards, preceding or following a humanitarian, medical or firefighting flight, provided such flights are conducted with the same aeroplane, and are required to accomplish the related humanitarian, medical or firefighting activities, or to reposition thereafter the aeroplane for its next activity. The aeroplane operator shall provide supporting evidence of such activities to the verification body or, upon request, to the Authority.

(3) If an aeroplane operator is close to the threshold of annual CO_2 emissions, it shall engage the Authority for guidance. An aeroplane operator, with annual CO_2 emissions below the threshold, may choose to voluntarily engage with the Authority.

(4) When considering whether a flight is international or domestic, an aeroplane operator shall use the ICAO Doc 7910 Location Indicators, which is available on the ICAO CORSIA website. Further guidance material is provided in the Environmental Technical Manual (Doc 9501), Volume IV – Procedures for demonstrating compliance with the CORSIA which is available on the ICAO CORSIA website.

(5) Definitions, abbreviations and units related to the CORSIA are defined as follows:

(a) **"administrative partnership"** means delegation of administrative tasks prescribed in Subpart 10 of Part 91 from one State to another State";"

(b) **"CORSIA eligible fuel"** means a CORSIA sustainable aviation fuel, or a CORSIA lower carbon aviation fuel, which an operator may use to reduce their offsetting requirements;

(c) **"CORSIA lower carbon aviation fuel"** means a fossil-based aviation fuel that meets the CORSIA Sustainability Criteria, under Subpart 10 of Part 91;

(d) **"CORSIA sustainable aviation fuel"** means renewable or waste-derived aviation fuel that meets the CORSIA Sustainability Criteria, under Subpart 10 of Part 91;

(e) **“Great Circle Distance”** means the shortest distance, rounded to the nearest kilometre, between the origin and the destination aerodromes, measured over the earth’s surface modelled according to the World Geodetic System 1984 (WGS84);

Note.— Latitude and longitude coordinates of aerodromes can be obtained from the ICAO Location Indicators database;

(f) **“mass (t)”** means the amount of material in an object of one tonne = 10^3 kg;

(g) **“National accreditation body”** means a body authorized by the State, which attests that a verification body is competent to provide specific verification services;

(h) **“notifying State”** means a State that has submitted to ICAO a request for registration, or change in the three-letter designator of an aeroplane operator, over which it has jurisdiction;

(i) **“operator”** under CORSIA means a person or a juristic person entity engaged in or offering to engage in an aircraft operation in as far as participation in the CORSIA is concerned;

(j) **“pathway”** means a combination of feedstock and conversion process used for the production of aviation fuel;

(k) **“reporting period”** means a period which commences on 1 January and finishes on 31 December in a given year, for which an aeroplane operator or State report is required. The flight departure time (UTC) determines which reporting period a flight belongs to;

(l) **“RTK”** means Revenue Tonne Kilometre;

(m) **“time(h)”** means a period between two events measured as one hour=60min=3600s; and

(n) **“verification team”** means a group of verifiers, or a single verifier that also qualifies as a team leader, belonging to a verification body, conducting the verification of an emissions report and, when required, an emissions units cancellation report. The team can be supported by technical experts.

(6) Recommendations:

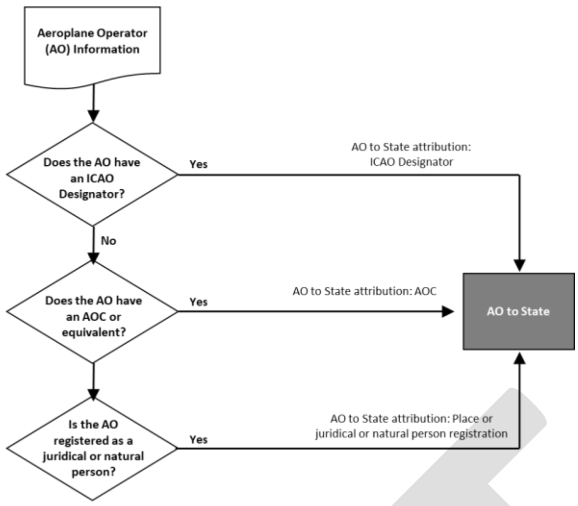
(a) The State providing capacity support, shall assess whether the administrating authority, that has been the delegated authority and which shall provide administering tasks for another State, has the required resources to offer such services.

(b) If an aeroplane operator is close to the threshold of annual CO_2 emissions, as defined in section 2.1.1 and 2.1.3 of Annex 16 Volume IV from international flights, as defined in section 1.1.2 of such standards, the operator shall engage with the Authority for guidance. Likewise, the Authority shall carry out oversight of the aeroplane operators attributed to it, and engage with any such operators that it considers may be close to or above the threshold. An aeroplane operator with annual CO_2 emissions below the threshold may choose to voluntarily engage with the Authority.

91.10.2 ATTRIBUTION OF AN AEROPLANE OPERATOR TO NAMIBIA

(1) The process of attributing an aeroplane operator to a State is illustrated as follows:

Process for attribution of an aeroplane operator to a State

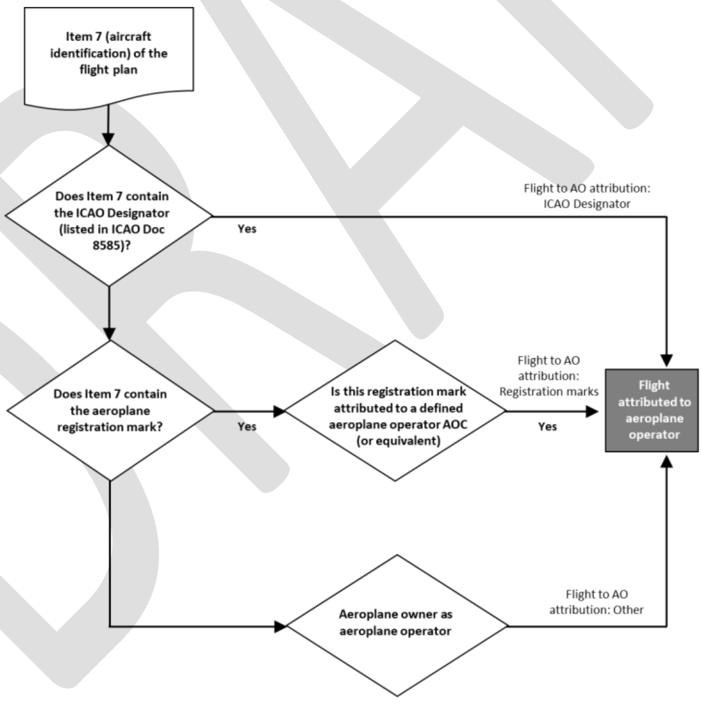


(2) ICAO Designators and Notifying States are contained in Doc 8585-Designators for Aircraft Operating Agencies, Aeronautical Authorities and Services which is available on the ICAO CORSIA website.

91.10.3 ATTRIBUTION OF INTERNATIONAL FLIGHT TO AN AEROPLANE OPERATOR

The process of attributing an international flight to an aeroplane operator is illustrated as follows:

Process for attribution of a flight to an aeroplane operator



91.10.4 RECORD KEEPING, COMPLIANCE PERIODS AND EQUIVALENT PROCEDURES

(1) The Executive Director and aeroplane operator shall comply with the following CORSIA compliance periods and the requirements for the 2019-2020 period:

Timeline	Requirement
1 January 2019 to 31 December 2019	The aeroplane operator shall monitor, CO_2 emissions for 2019 from international flights, as defined in regulation CAR 91 Subpart 10.

28 February 2019	The aeroplane operator shall submit Emissions Monitoring Plan to the Executive Director (only once, unless there is a need to review) in accordance with regulation CAR 91 Subpart 10.
30 April 2019	The Executive Director shall approve Emissions Monitoring Plans (only once, unless there is a review) in accordance with regulation CAR 91 Subpart 10.
30 April 2019	The Executive Director shall submit a list of aeroplane operators that are attributed to it to ICAO, as well as a list of verification bodies accredited in Namibia in accordance with regulation CAR 91 Subpart 10.
31 May 2019	**Recommendation:** *The Executive Director may obtain and use the ICAO document entitled "CORSIA Aeroplane Operator to State Attributions" summarising a list of aeroplane operators and the State to which they have been attributed in accordance with regulation CAR 91 Subpart 10. The document is available on the ICAO CORSIA website.*
1 January 2020 to 31 December 2020	The aeroplane operator shall monitor, CO_2 emissions for 2020 from international flights, in accordance with regulation 91.10.
1 January 2020 to 31 May 2020	The aeroplane operator shall compile 2019 CO_2 emissions data to be verified by a verification body, in accordance with regulation CAR 91 Subpart 10. **Recommendation:** *The Aeroplane operator may submit their Emissions Report for verification as soon as possible after completing their Emissions Report.*
31 May 2020	The aeroplane operator and the verification body shall both submit the verified Emissions Report and associated Verification Report for 2019 to the Executive Director in accordance with regulation CAR 91 Subpart 10.
1 June 2020 to 31 August 2020	The Executive Director shall conduct an order of magnitude check of the verified Emissions Report for 2019, including any filling in of data gaps in case of non-reporting by aeroplane operators in accordance with regulation CAR 91 Subpart 10.
30 June 2020	The Executive Director shall notify ICAO of Namibia's decision to voluntarily participate, or to discontinue the voluntary participation in the applicability of regulation CAR 91 Subpart 10 from 1 January 2021 in accordance with regulation CAR 91 Subpart 10. The Executive Director shall also notify ICAO which option it has selected for calculating the aeroplane operator's CO_2 emissions during the 2021-2023 period in accordance with regulation CAR 91 Subpart 10.
1 August 2020	The Executive Director shall obtain and use the ICAO document entitled "CORSIA States for Chapter 3 State Pairs" applicable for the 2021 compliance year in accordance with regulation CAR 91 Subpart 10.
31 August 2020	The Executive Director shall submit required information regarding CO_2 emissions for 2019 to ICAO in accordance with regulation CAR 91 Subpart 10.
30 November 2020	The Executive Director shall submit updates to the list of aeroplane operators that are attributed to it to ICAO, as well as updates to the list of verification bodies accredited in Namibia in accordance with regulation CAR 91 Subpart 10.
31 December 2020	**Recommendation:** *The Executive Director may obtain and use the ICAO document entitled "CORSIA Aeroplane Operator to State Attributions" summarising a list of aeroplane operators and the State to which they have been attributed in accordance with regulation CAR 91 Subpart 10. The document is available on the ICAO CORSIA website.*

Note.- The time for verification of the aeroplane operator's Emission Report is longer during the 2019-2020 period than subsequent Periods.

(2) The Executive Director and aeroplane operator shall comply with the following CORSIA compliance periods and the requirements for the 2021-2023 period, where applicable:

Timeline	Requirement
1 January 2021 to 31 December 2021	The aeroplane operator shall monitor, CO_2 emissions for 2021 from international flights, in accordance with regulation CAR 91 Subpart 10.
1 January 2021 to 31 May 2021	The aeroplane operator shall compile 2020 CO_2 emissions data to be verified by a verification body, in accordance with regulation CAR 91 Subpart 10. **Recommendation:** *The Aeroplane operator may submit their Emissions Report for verification as soon as possible after completing their Emissions Report.*

31 May 2021	The aeroplane operator and the verification body shall both submit the verified Emissions Report and associated Verification Report for 2020 to the Executive Director in accordance with regulation CAR 91 Subpart 10.
1 June 2021 to 31 August 2021	The Executive Director shall conduct an order of magnitude check of the verified Emissions Report for 2020, including any filling in of data gaps in case of non-reporting by aeroplane operators in accordance with regulation CAR 91 Subpart 10.
30 June 2021	The Executive Director shall notify ICAO of any change in its decision to voluntarily participate, or to discontinue the voluntary participation in the applicability of regulation CAR 91 Subpart 10 from 1 January 2022 in accordance with regulation CAR 91 Subpart 10.
1 August 2021	The Executive Director shall obtain and use the ICAO document entitled "CORSIA States for Chapter 3 State Pairs" applicable for the 2022 compliance year in accordance with regulation CAR 91 Subpart 10.
31 August 2021	The Executive Director shall submit required information regarding CO_2 emissions for 2020 to ICAO in accordance with regulation CAR 91 Subpart 10.
30 September 2021	The Executive Director shall calculate and inform aeroplane operators attributed to it of their average total CO_2 emissions during 2019 and 2020, in accordance with regulation CAR 91 Subpart 10.
30 November 2021	The Executive Director shall submit updates to the list of aeroplane operators that are attributed to it to ICAO, as well as updates to the list of verification bodies accredited in the State in accordance with regulation CAR 91 Subpart 10.
31 December 2021	**Recommendation:** *The Executive Director may obtain and use the ICAO document entitled "CORSIA Aeroplane Operator to State Attributions" summarising a list of aeroplane operators and the State to which they have been attributed in accordance with regulation CAR 91 Subpart 10. The document is available on the ICAO CORSIA website.*
1 January 2022 to 31 December 2022	The aeroplane operator shall monitor, CO_2 emissions for 2022 from international flights, in accordance with regulation CAR 91 Subpart 10.
1 January 2022 to 30 April 2022	The aeroplane operator shall compile 2021 emissions data to be verified by a verification body, in accordance with regulation CAR 91 Subpart 10 **Recommendation:** *The aeroplane operator may submit their Emissions Report for verification as soon as possible after completing their Emissions Report.*
30 April 2022	The aeroplane operator and the verification body shall both submit the Verified Emissions Report and associated Verification Report for 2021 to the Executive Director in accordance with regulation CAR 91 Subpart 10.
1 May 2022 to 31 July 2022	The Executive Director shall conduct an order of magnitude check of the verified Emissions Report for 2021, including any filling in of data gaps in case of non-reporting by aeroplane operators in accordance with regulation CAR 91 Subpart 10.
30 June 2022	The Executive Director shall notify ICAO of any change in its decision to voluntarily participate, or to discontinue the voluntary participation in the applicability of regulation CAR 91 Subpart 10 from 1 January 2023 in accordance with regulation CAR 91 Subpart 10.
31 July 2022	The Executive Director shall submit required information regarding CO_2 emissions for 2021 to ICAO in accordance with regulation CAR 91 Subpart 10.
1 August 2022	The Executive Director shall obtain and use the ICAO document entitled "CORSIA States for Chapter 3 State Pairs" applicable for the 2023 compliance year in accordance with regulation CAR 91 Subpart 10.
31 October 2022	The Executive Director shall obtain and use the Sector's Growth Factor (SGF) for 2021 from the document "CORSIA Central Registry (CCR): Information and Data for the Implementation of CORSIA" that can be found on the ICAO CORSIA website in accordance with regulation 91 Subpart 10.
30 November 2022	The Executive Director shall submit updates to the list of aeroplane operators that are attributed to it to ICAO, as well as updates to the list of verification bodies accredited in Namibia in accordance with regulation CAR 91 Subpart 10. The Executive Director shall calculate and inform aeroplane operators of offsetting requirements for 2021, and based on a chosen formula in accordance with regulation CAR 91 Subpart 10.

31 December 2022	**Recommendation:** *The Executive Director may obtain and use the ICAO document entitled "CORSIA Aeroplane Operator to State Attributions" summarising a list of aeroplane operators and the State to which they have been attributed in accordance with regulation CAR 91 Subpart 10. The document is available on the ICAO CORSIA website.*
1 January 2023 to 31 December 2023	The aeroplane operator shall monitor, CO_2 emissions for 2023 from international flights, as defined in regulation CAR 91 Subpart 10.
1 January 2023 to 30 April 2023	The aeroplane operator shall compile 2022 emissions data to be verified by a verification body, in accordance with regulation CAR 91 Subpart 10. **Recommendation:** *The aeroplane operator may submit their Emissions Report for verification as soon as possible after completing their Emissions Report.*
30 April 2023	The aeroplane operator and the verification body shall both submit the Verified Emissions Report and associated Verification Report for 2022 to the Executive Director in accordance with regulation CAR 91 Subpart 10.
1 May 2023 to 31 July 2023	The Executive Director shall conduct an order of magnitude check of the verified Emissions Report for 2022, including any filling in of data gaps in case of non-reporting by aeroplane operators in accordance with regulation CAR 91 Subpart 10.
30 June 2023	The Executive Director shall notify ICAO of any change in its decision to voluntarily participate, or to discontinue the voluntary participation in the applicability of regulation CAR 91 Subpart 10 from 1 January 2024 in accordance with regulation CAR 91 Subpart 10.
31 July 2023	The Executive Director shall submit required information regarding CO_2 emissions for 2022 to ICAO in accordance with regulation CAR 91 Subpart 10.
1 August 2023	The Executive Director shall obtain and use the ICAO document entitled "CORSIA States for Chapter 3 State Pairs" applicable for the 2024 compliance year in accordance with regulation CAR 91 Subpart 10.
31 October 2023	The Executive Director shall obtain and use the Sector's Growth Factor (SGF) for 2022 from the ICAO document entitled "CORSIA Central Registry (CCR): Information and Data for the Implementation of CORSIA" that is available on the ICAO CORSIA website in accordance with regulation 91 Subpart 10.
30 November 2023	The Executive Director shall submit updates to the list of aeroplane operators that are attributed to it to ICAO, as well as updates to the list of verification bodies accredited in the State in accordance with regulation CAR 91 Subpart 10. The Executive Director shall calculate and inform aeroplane operators of offsetting requirements for 2022, and based on a chosen formula in accordance with regulation 91 Subpart 10.
31 December 2023	**Recommendation:** *The Executive Director may obtain and use the ICAO document entitled "CORSIA Aeroplane Operator to State Attributions" summarising a list of aeroplane operators and the State to which they have been attributed in accordance with regulation CAR 91 Subpart 10. The document is available on the ICAO CORSIA website.*

Note 1.- The time for verification of the aeroplane operator's Emission Report is shorter during the 2021-2023 period than the 2019-2020 period.

Note 2.- During the 2021-2023 period, States may determine the basis of the aeroplane operator offsetting requirements in accordance with regulation CAR 91 Subpart 10.

(3) The Executive Director and aeroplane operator shall comply with the following CORSIA compliance periods and the requirements for the 2024-2026 period, where applicable:

Timeline	Requirement
1 January 2024 to 31 December 2024	The aeroplane operator shall monitor, CO_2 emissions for 2024 from international flights, in accordance with CAR 91 Subpart 10.
1 January 2024 to 30 April 2024	The aeroplane operator shall compile 2023 emissions data to be verified by a verification body, in accordance with regulation CAR 91 Subpart 10. **Recommendation:** *The aeroplane operator may submit their Emissions Report for verification as soon as possible after completing their Emissions Report.*

30 April 2024	The aeroplane operator and the verification body shall both submit the Verified Emissions Report and associated Verification Report for 2023 to the Executive Director in accordance with the regulation CAR 91 Subpart 10.
1 May 2024 to 31 July 2024	The Executive Director shall conduct an order of magnitude check of the verified Emissions Report for 2023, including any filling in of data gaps in case of non-reporting by aeroplane operators in accordance with regulation CAR 91 Subpart 10.
30 June 2024	The Executive Director shall notify ICAO of any change in its decision to voluntarily participate, or to discontinue the voluntary participation in the applicability of regulation CAR 91 Subpart 10 from 1 January 2025 in accordance with regulation CAR 91 Subpart 10.
31 July 2024	The Executive Director shall submit required information regarding CO_2 emissions for 2023 for ICAO in accordance with regulation CAR 91 Subpart 10.
1 August 2024	The Executive Director shall obtain and use the ICAO document entitled “CORSIA States for Chapter 3 State Pairs” applicable for the 2025 compliance year in accordance with regulation CAR 91 Subpart 10.
31 October 2024	The Executive Director shall obtain and use the Sector’s Growth Factor (SGF) for 2023 from the ICAO document entitled: “CORSIA Central Registry (CCR): Information and Data for the Implementation of CORSIA” in accordance with regulation CAR 91 Subpart 10.
30 November 2024	The Executive Director shall calculate and inform aeroplane operators of offsetting requirements for 2023, and based on a chosen formula in accordance with regulation CAR 91 Subpart 10. The Executive Director shall calculate and inform aeroplane operators of their final offsetting requirements for the 2021 to 2023 Period in accordance with regulation CAR 91 Subpart 10. The Executive Director shall submit updates to the list of aeroplane operators that are attributed to it to ICAO, as well as updates to the list of verification bodies accredited in Namibia in accordance with regulation CAR 91 Subpart 10.
31 December 2024	**Recommendation:** *The Executive Director may obtain and use the ICAO document entitled “CORSIA Aeroplane Operator to State Attributions” summarising a list of aeroplane operators and the State to which they have been attributed in accordance with regulation CAR 91 Subpart 10. The document is available on the ICAO CORSIA website.*
1 January 2025 to 31 December 2025	The aeroplane operator shall monitor, CO_2 emissions for 2025 from international flights, in accordance with regulation CAR 91 Subpart 10.
31 January 2025 or 60 days after the State informs aeroplane operators of their final offsetting requirements for the 2021-2023 period	The aeroplane operator shall cancel emissions units for the compliance during the 2021 to 2023 period in accordance with regulation CAR 91 Subpart 10.
7 February 2025	The aeroplane operator shall request that their cancellation of Eligible Emissions Units for the 2021-2023 period is communicated on the respective Eligible Emissions Units Program registry (or registries) public website(s) in accordance with regulation CAR 91 Subpart 10.
1 December 2024 to 30 April 2025	The aeroplane operator shall compile their Emissions Unit Cancellation Report covering the 2021-2023 period to be verified by a verification body, in accordance with regulation CAR 91 Subpart 10.
1 January 2025 to 30 April 2025	The aeroplane operator shall compile 2024 emissions data to be verified by a verification body, in accordance with regulation CAR 91 Subpart 10. **Recommendation:** *The aeroplane operator may submit their Emissions Report for verification as soon as possible after completing their Emissions Report.*
30 April 2025	The aeroplane operator and the verification body shall both submit the Verified Emissions Report and associated Verification Report for 2024 to the Executive Director in accordance with regulation CAR 91 Subpart 10. The aeroplane operator and the verification body shall submit the verified Emissions Unit Cancellation Report and associated Verification Report for the 2021-2023 period to the Executive Director in accordance with regulation CAR 91 Subpart 10.

1 May 2025 to 31 July 2025	The Executive Director shall conduct an order of magnitude check of the verified Emissions Report for 2024, including any filling in of data gaps in case of non-reporting by aeroplane operators in accordance with regulation CAR 91 Subpart 10. If applicable, the Executive Director shall undertake an order of magnitude check of the verified Emissions Unit Cancellation Report for the 2021-2023 period in accordance with regulation CAR 91 Subpart 10.
30 June 2025	The Executive Director shall notify ICAO of any change in its decision to voluntarily participate, or to discontinue the voluntary participation in the applicability of regulation CAR 91 Subpart 10 from 1 January 2026 in accordance with regulation CAR 91 Subpart 10.
31 July 2025	The Executive Director shall submit required information regarding CO_2 emissions for 2024 to ICAO in accordance with regulation CAR 91 Subpart 10. If applicable, the Executive Director shall report to ICAO the required information regarding emissions unit cancellation for the 2021-2023 period in accordance with regulation CAR 91 Subpart 10.
1 August 2025	The Executive Director shall obtain and use the ICAO document entitled "CORSIA States for Chapter 3 State Pairs" applicable for the 2026 compliance year in accordance with regulation CAR 91 Subpart 10.
31 October 2025	The Executive Director shall obtain and use the Sector's Growth Factor (SGF) for 2024 from the ICAO document entitled: "CORSIA Central Registry (CCR): Information and Data for the Implementation of CORSIA" in accordance with regulation CAR 91 Subpart 10.
30 November 2025	The Executive Director shall calculate and inform aeroplane operators of their offsetting requirements for 2024, in accordance with regulation CAR 91 Subpart 10. The Executive Director shall submit updates to the list of aeroplane operators that are attributed to it to ICAO, as well as updates to the list of verification bodies accredited in Namibia in accordance with regulation CAR 91 Subpart 10.
31 December 2025	**Recommendation:** *The Executive Director may obtain and use the ICAO document entitled "CORSIA Aeroplane Operator to State Attributions" summarising a list of aeroplane operators and the State to which they have been attributed in accordance with regulation CAR 91 subpart 10. The document is available on the ICAO CORSIA website.*
1 January 2026 to 31 December 2026	The aeroplane operator shall monitor, in accordance with regulation CAR 91 Subpart 10 CO_2 emissions for 2026 from international flights, in accordance with regulation CAR 91 Subpart 10.
1 January 2026 to 30 April 2026	The aeroplane operator shall compile 2025 emissions data to be verified by a verification body, in accordance with regulation CAR 91 Subpart 10. **Recommendation:** *The aeroplane operator may submit their Emissions Report for verification as soon as possible after completing their Emissions Report.*
30 April 2026	The aeroplane operator and the verification body shall both submit the verified Emissions Report and associated Verification Report for 2025 to the Executive Director in accordance with regulation CAR 91 Subpart 10.
1 May 2026 to 31 July 2026	The Executive Director shall conduct an order of magnitude check of the verified Emissions Report for 2025, including any filling in of data gaps in case of non-reporting by aeroplane operators in accordance with regulation CAR 91 Subpart 10.
30 June 2026	The Executive Director shall notify ICAO of any change in its decision to voluntarily participate, or to discontinue the voluntary participation in the applicability of regulation CAR 91 Subpart 10 from 1 January 2027 in accordance with regulation CAR 91 Subpart 10.
31 July 2026	The Executive Director shall submit required information regarding CO_2 emissions for 2025 to ICAO in accordance with regulation CAR 91 Subpart 10.
1 August 2026	The Executive Director shall obtain and use the ICAO document entitled "CORSIA States for Chapter 3 State Pairs" applicable for the 2027 compliance year in accordance with regulation CAR 91 Subpart 10.
31 October 2026	The Executive Director shall obtain and use the Sector's Growth Factor (SGF) for 2025 from the ICAO document entitled: "CORSIA Central Registry (CCR): Information and Data for the Implementation of CORSIA" in accordance with regulation CAR 91 Subpart 10.

30 November 2026	The Executive Director shall calculate and inform aeroplane operators of their offsetting requirements for 2025. In accordance with regulation CAR 91 Subpart 10. The Executive Director shall submit updates to the list of aeroplane operators that are attributed to it to ICAO, as well as updates to the list of verification bodies accredited in the State in accordance with regulation CAR 91 Subpart 10.
31 December 2026	**Recommendation**: *The Executive Director may obtain and use the ICAO document entitled "CORSIA Aeroplane Operator to State Attributions" summarising a list of aeroplane operators and the State to which they have been attributed in accordance with regulation CAR 91 Subpart 10. The document is available on the ICAO CORSIA website.*

(4) An aeroplane operator shall use the equivalent procedures prescribed in Part 91 Subpart 10 unless an equivalent procedure is approved by the Authority.

(5) An aeroplane operator may apply to the Authority for the use of equivalent procedures for the following reasons:

(a) to make use of previously acquired or existing data; and

(b) to minimise the costs of demonstrating compliance with the requirements of CAR 91 Subpart 10.

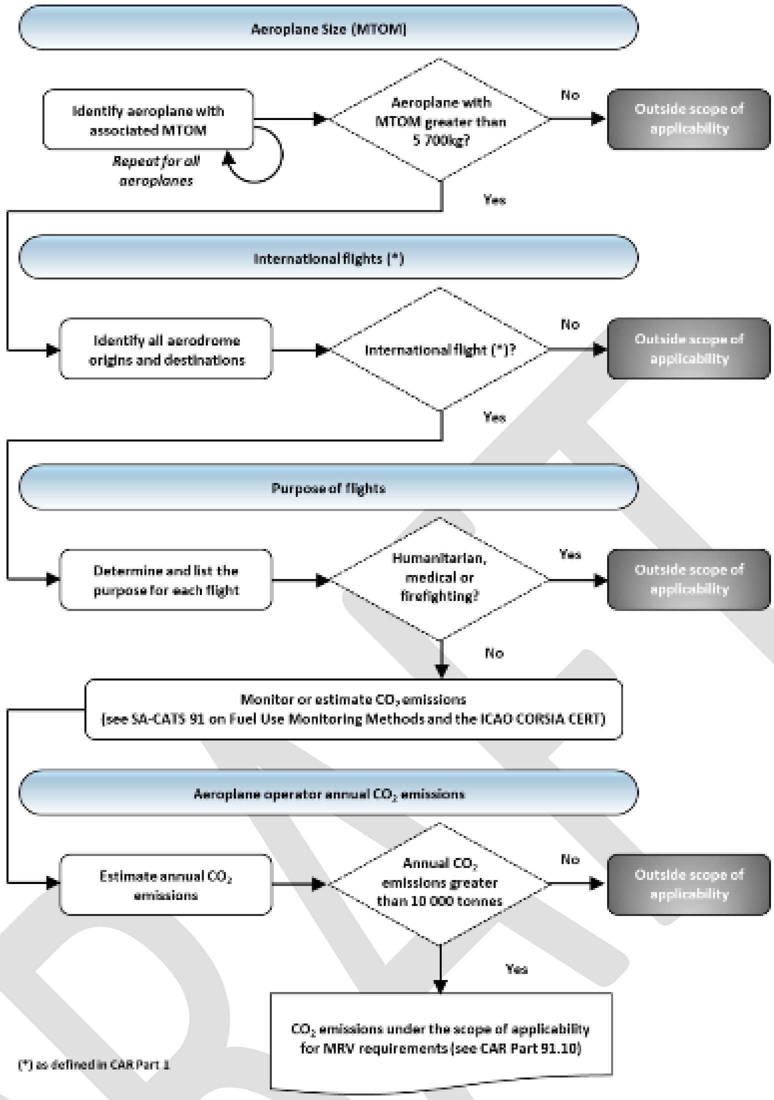
91.10.5 MONITORING REQUIREMENTS OF AEROPLANE OPERATOR ANNUAL CO_2 EMISSIONS

(1) Location indicators shall be assigned by States and shall be checked by ICAO for conformity with the "Formulation and assignment of location indicators".

(2) Details on the "Formulation and assignment of location indicators" and the list of ICAO four-letter location indicators for geographical locations throughout the world is defined in ICAO Doc 7910 which is available on the ICAO CORSIA website.

(3) The applicability of the MRV requirements for international flights shall be determined as follows:

Determination of the applicability of CAR Part 91.10 to international flights (for MRV requirements)

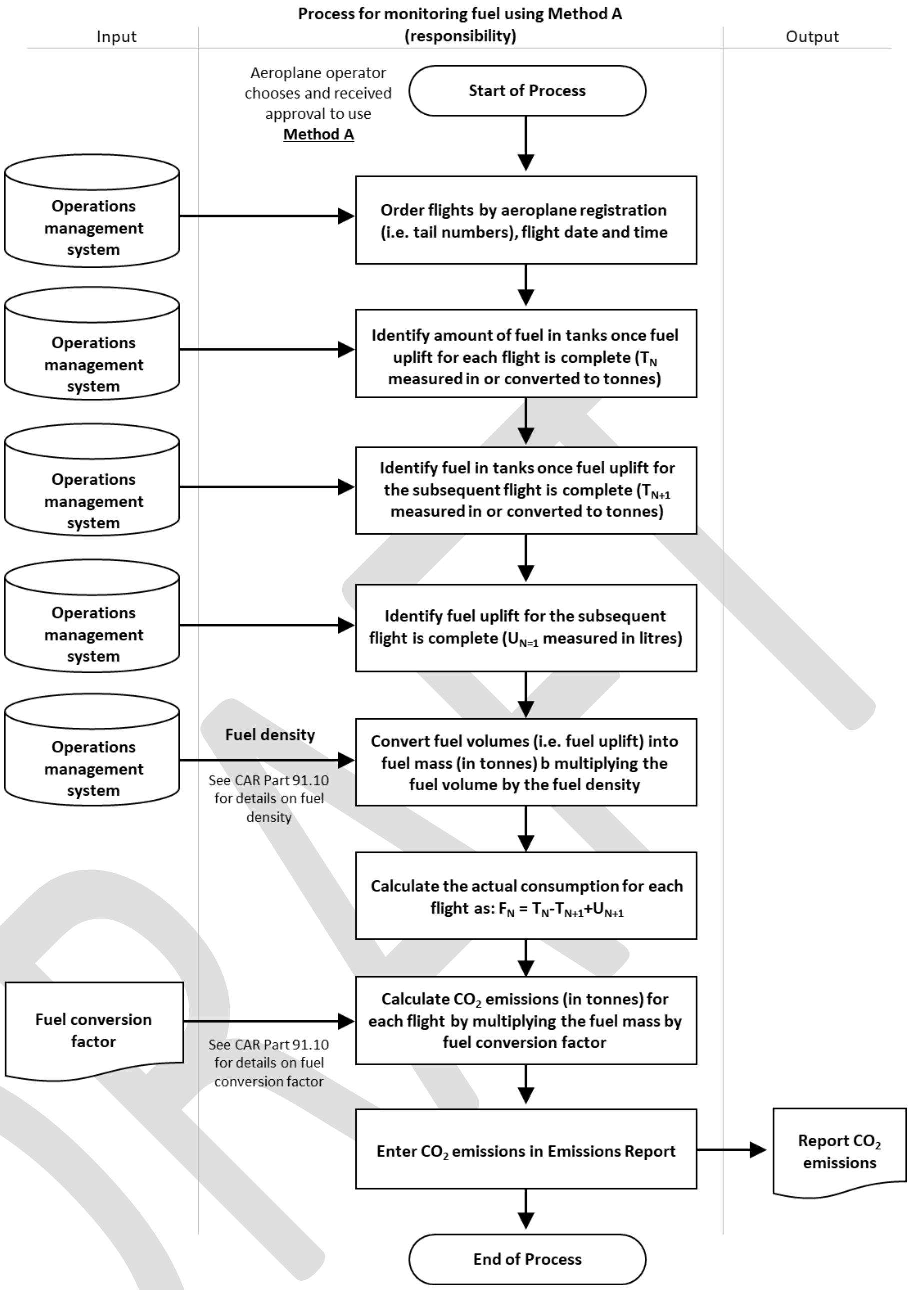


91.10.6 ELIGIBILITY OF MONITORING METHODS

1. An aeroplane operator, excluding an operator eligible to use the ICAO CORSIA CO_2 Estimation & Reporting Tool (CERT), shall choose from the following fuel use monitoring methods:

   1.1. Method A: the process for monitoring fuel use by flight shall be as per the illustration diagram:

Monitoring fuel use by flight using Method A



(a) An aeroplane operator shall use the following formula to compute fuel use according to Method A:

$$F_N = T_N - T_{N+1} + U_{N+1}$$

Where:

F_N = Fuel consumed for the flight under consideration (=flight $_N$) determined using Method A (in tonnes);

T_N = Amount of fuel contained in aeroplane tanks once fuel uplifts for the flight under consideration (i.e. flight $_N$) are complete (in tonnes);

T_{N+1} = Amount of fuel contained in aeroplane tanks once fuel uplifts for the subsequent flight (i.e. flight $_{N+1}$) are complete (in tonnes);

U_{N+1} = Sum of fuel uplifts for the subsequent flight (i.e. flight $_{N+1}$) measured in volume and multiplied with a density value (in tonnes).

Note 1: Requirements on fuel density values are prescribed in CAR 91 Subpart 10. Fuel uplift U_{N+1} is determined by the measurement by the fuel supplier, as documented in the fuel delivery notes or invoices for each flight.

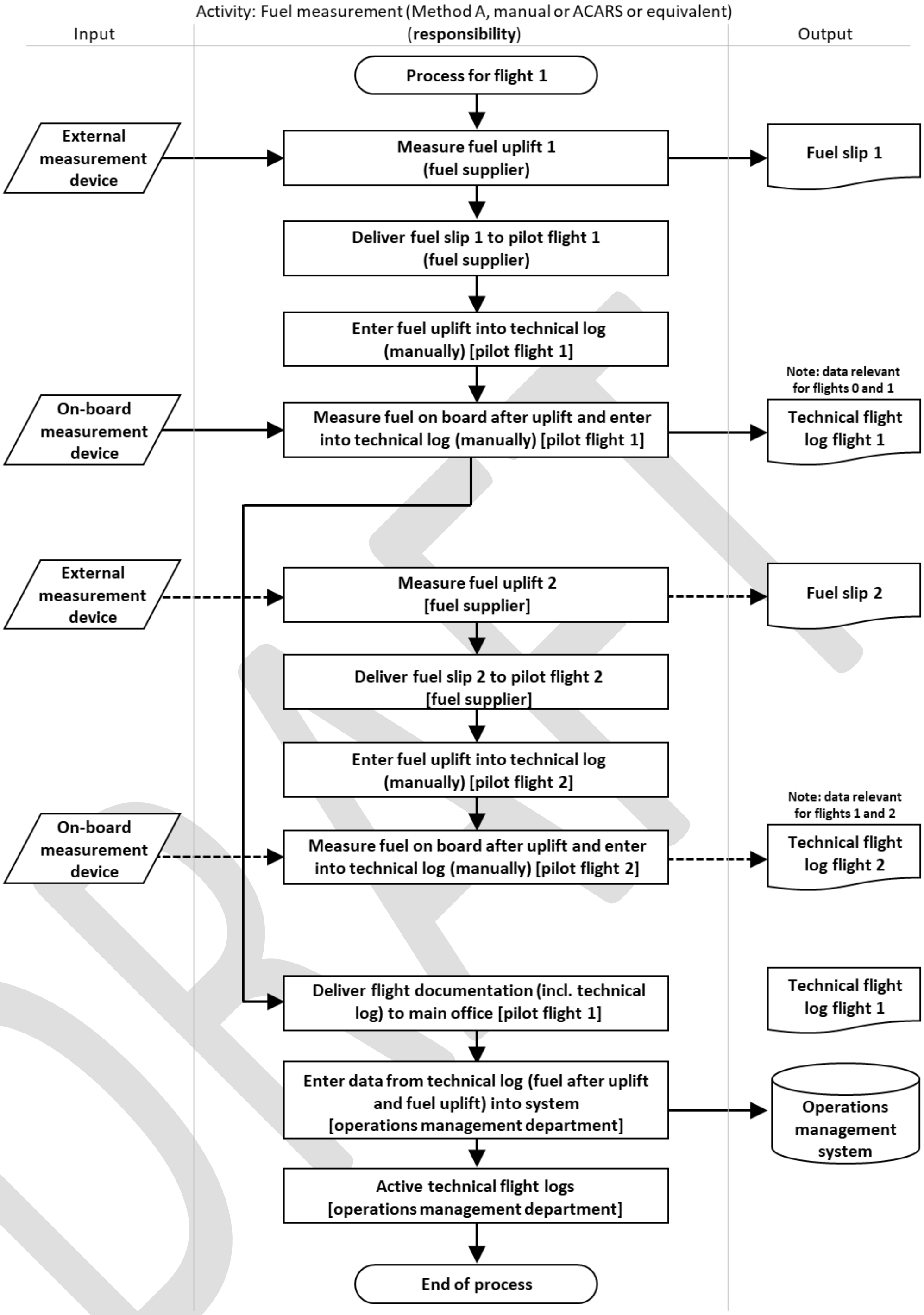
Note 2: For ensuring completeness of the data, it is important to note that not only data generated during the flight under consideration (i.e. flight $_N$) is needed, but also data generated from the subsequent flight (i.e. flight $_{N+1}$). This is of particular importance when a domestic flight is followed by an international flight, as defined in CAR 91 Subpart 10 or vice versa. In order to avoid data gaps, it is therefore recommended that, the Block-on fuel or the amount of fuel in the tank after all fuel uplifts for a flight is always recorded on flights of aeroplane which are used for international flights, as defined in CAR 91 Subpart 10. For the same reasons, fuel uplift data for all flights of those aeroplanes should be collected, before deciding which flights are international.

(b) An aeroplane operator performing on an ad-hoc basis, flights attributed to another aeroplane operator, shall provide to the latter the fuel measurement values according to the Block-off / Block-on method;

(c) Where no fuel uplift for the flight or subsequent flight takes place, the amount of fuel contained in an aeroplane tank (T_N or T_{N+1}) shall be determined at block-off for the flight or subsequent flight; and

(d) Where an aeroplane performs activities other than a flight, including undergoing major maintenance involving the emptying of the tanks, after the flight to be monitored; an aeroplane operator may substitute the quantity “$T_{N+1} + U_{N+1}$” with the amount of fuel remaining in a tank at the start of the subsequent activity of an aeroplane for fuel in tank at Block-on, as recorded by technical logs.

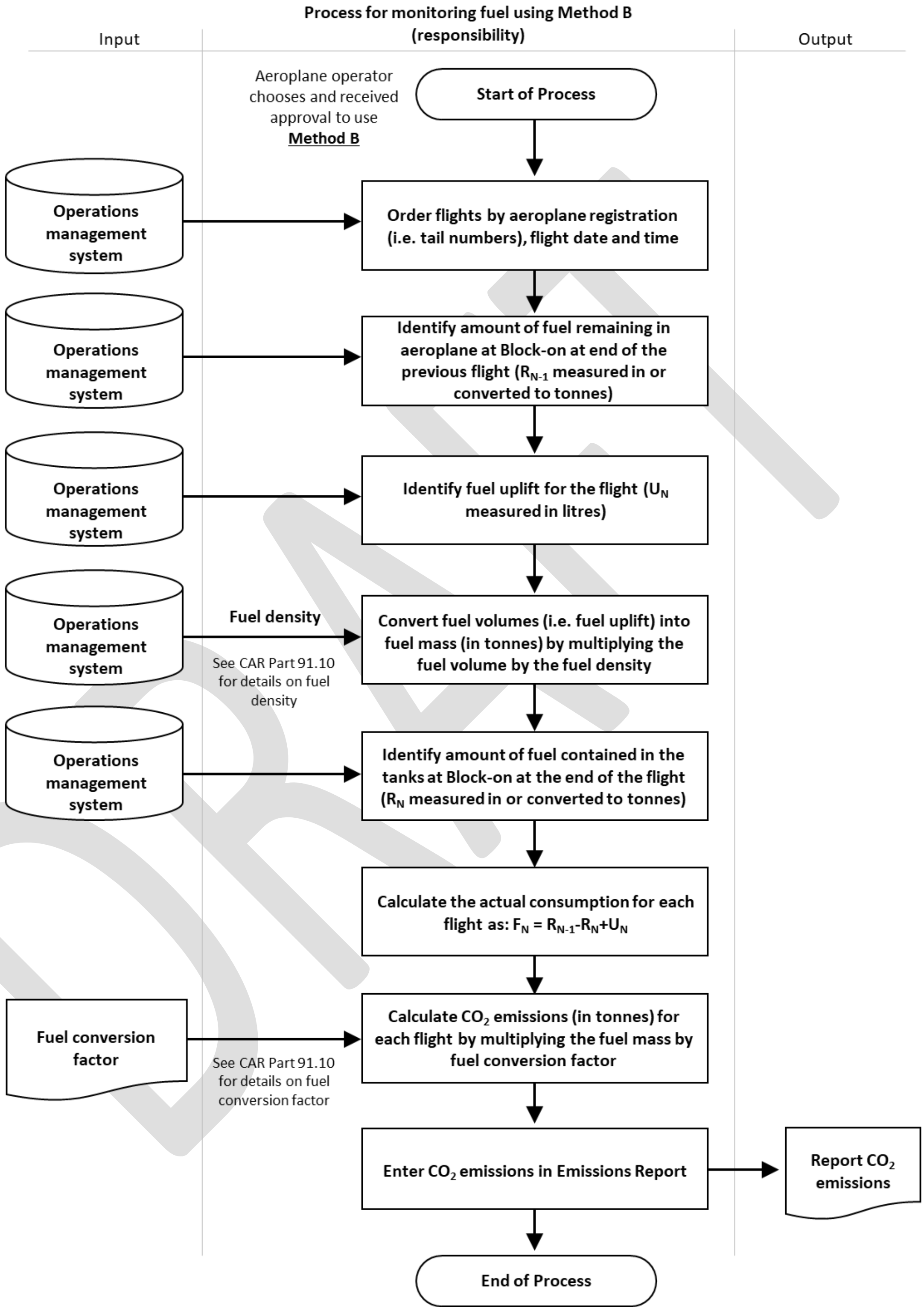
Collection of required data to implement Method A with fuel uplift from fuel supplier



1.2. Method B

(a) The process for monitoring fuel use by flight using Method B shall be as illustrated:

Monitoring fuel use by flight using Method B



(b) The aeroplane operator shall use the following formula to compute fuel use:

$$F_N = R_{N-1} - R_N + U_N$$

Where:

F_N = Fuel consumed for the flight under consideration (i.e. flight $_N$) determined using Method B (in tonnes);

R_{N-1} = Amount of fuel remaining in aeroplane tanks at the end of the previous flight (i.e. flight $_{N-1}$) at Block-on before the flight under consideration (in tonnes);

R_N = Amount of fuel remaining in aeroplane tanks at the end of the flight under consideration (i.e. flight $_N$) at Block-on after the flight (in tonnes);

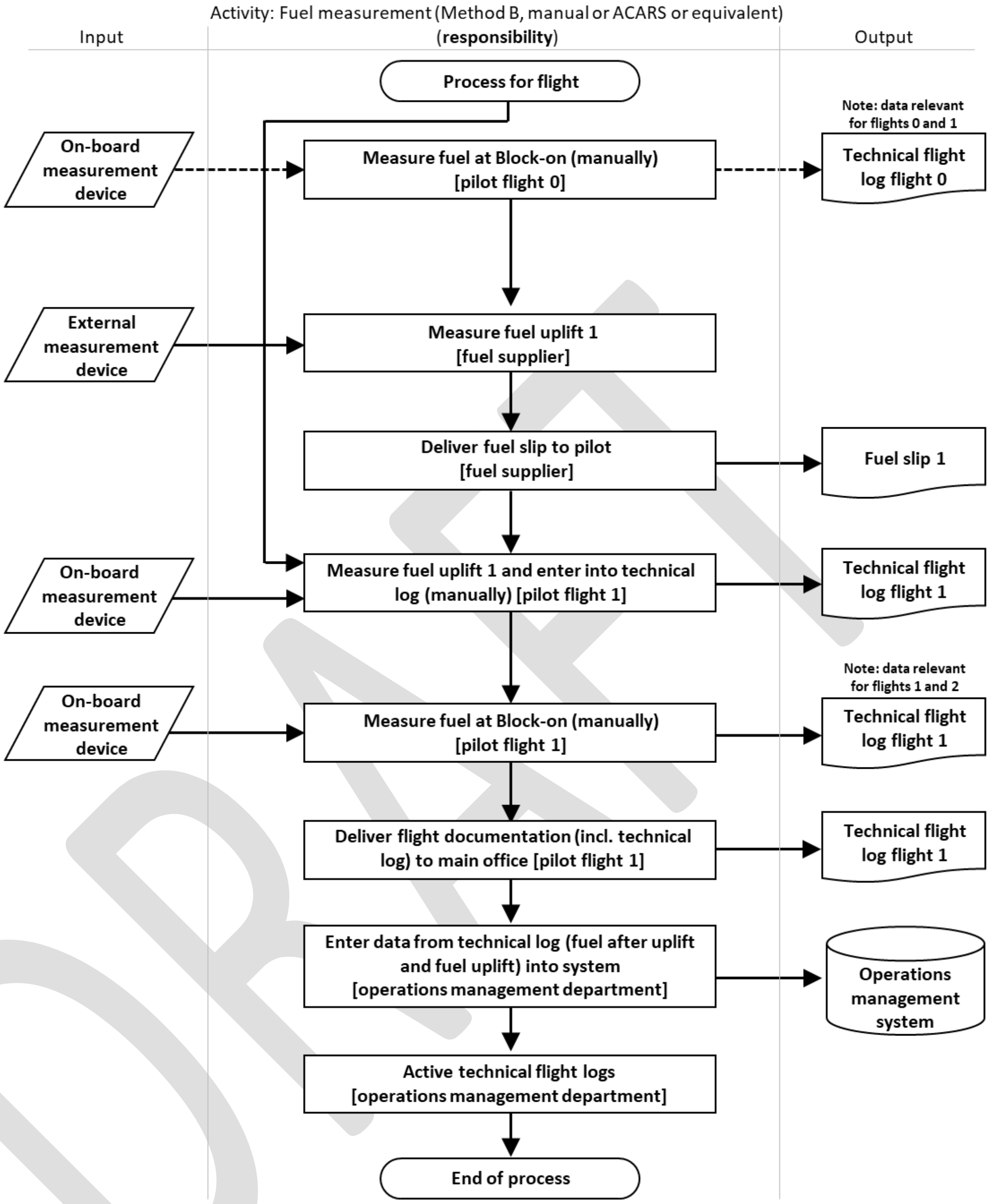
U_N = Fuel uplift for the flight considered measured in volume and multiplied with a density value (in tonnes).

Note: Requirements on fuel density values are prescribed in CAR 91 Subpart 10. Fuel uplift is determined by the measurements by the fuel supplier, as documented in the fuel delivery notes or invoices for each flight.

For ensuring completeness of the data, it is important to note that not only data generated during the flight under consideration (i.e. flight $_N$) is needed, but also data generated from the previous flight (i.e. flight $_{N-1}$). This is in particular important when a domestic flight is followed by an international, or vice versa.

The process diagram for collecting the required data to implement Method B is illustrated as follows:

Collection of required data to implement Method B with fuel uplift (manual process)



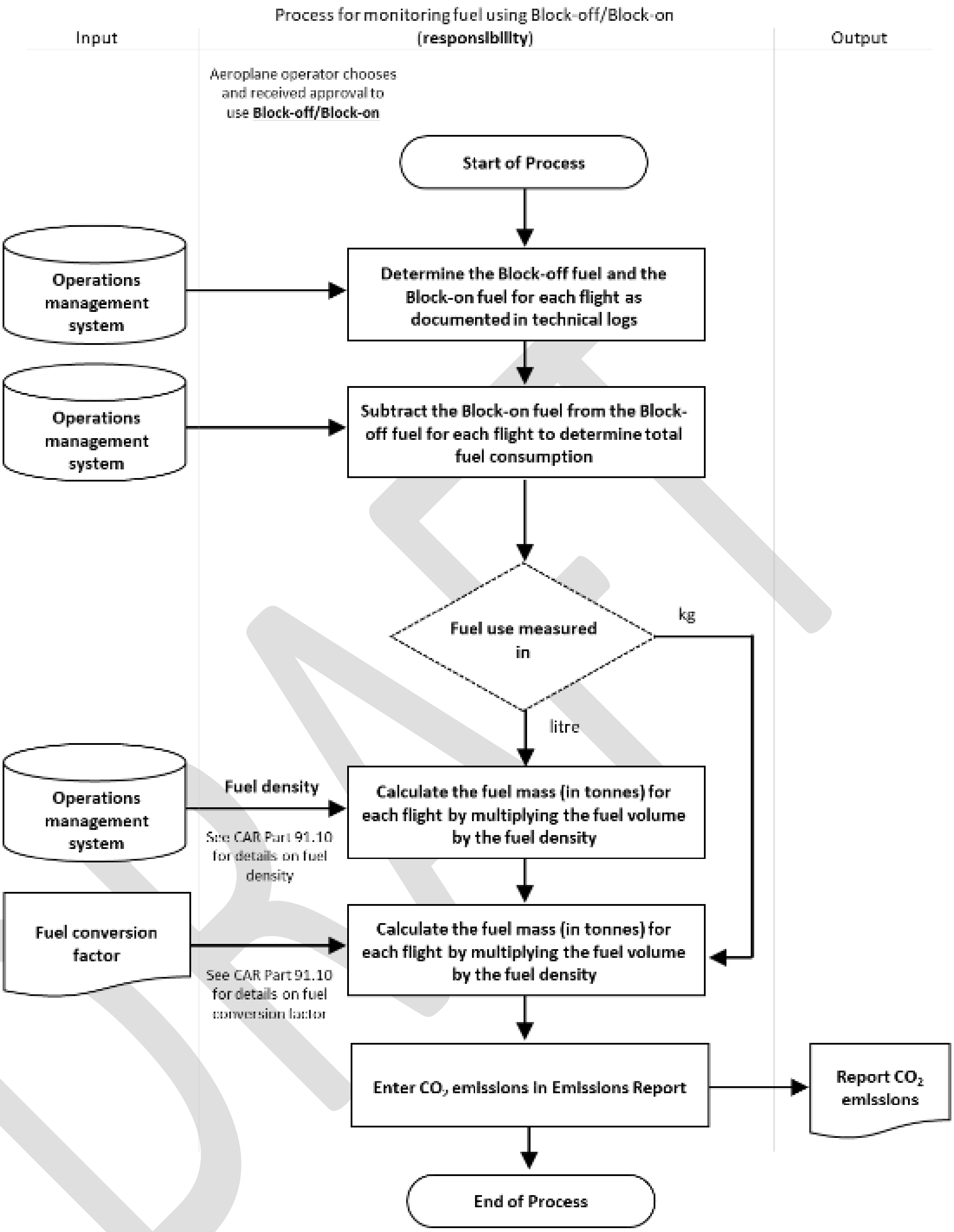
(c) The aeroplane operator performing on an ad-hoc basis, flights attributed to another aeroplane operator, shall provide to the latter the fuel measurement values according to the Block-off / Block-on method; and

(d) Where an aeroplane does not perform a flight previous to the flight for which fuel consumption is being monitored (e.g. if the flight follows a major revision or maintenance), the aeroplane operator may substitute the quantity R_{N-1} with the Amount of fuel remaining in aeroplane tanks at the end of the previous activity of the aeroplane, as recorded by the technical logs.

1.3. Block-off / Block-on method

(a) The process for monitoring fuel use by flight using Method Block-off / Block-on shall be as illustrated:

Monitoring fuel use by flight using Block-off / Block-on



(b) The aeroplane operator shall use the following formula to compute fuel use:

$$F_N = T_N - R_N$$

Where:

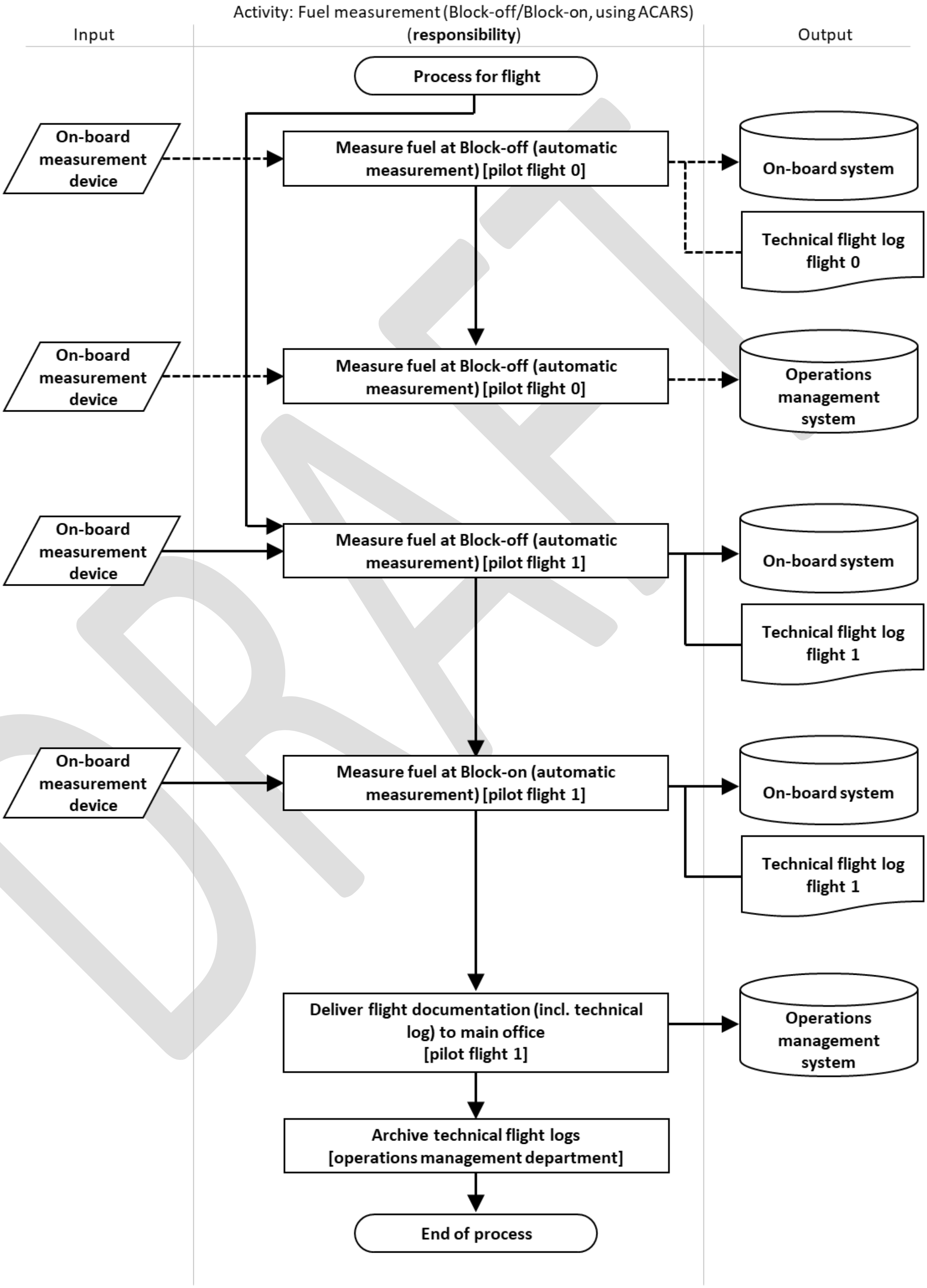
F_N = Fuel consumed for the flight under consideration (=flight $_N$) determined using Block-off / Block-on Method (in tonnes);

T_N = Amount of fuel contained in aeroplane tanks at Block-off for the flight under consideration i.e. flight $_N$ (in tonnes);

R_N = Amount of fuel remaining in aeroplane tanks at Block-on of the flight under consideration i.e. flight $_N$ (in tonnes).

(c) The process for collecting the required data to implement the Block-off / Block-on method shall be as illustrated:

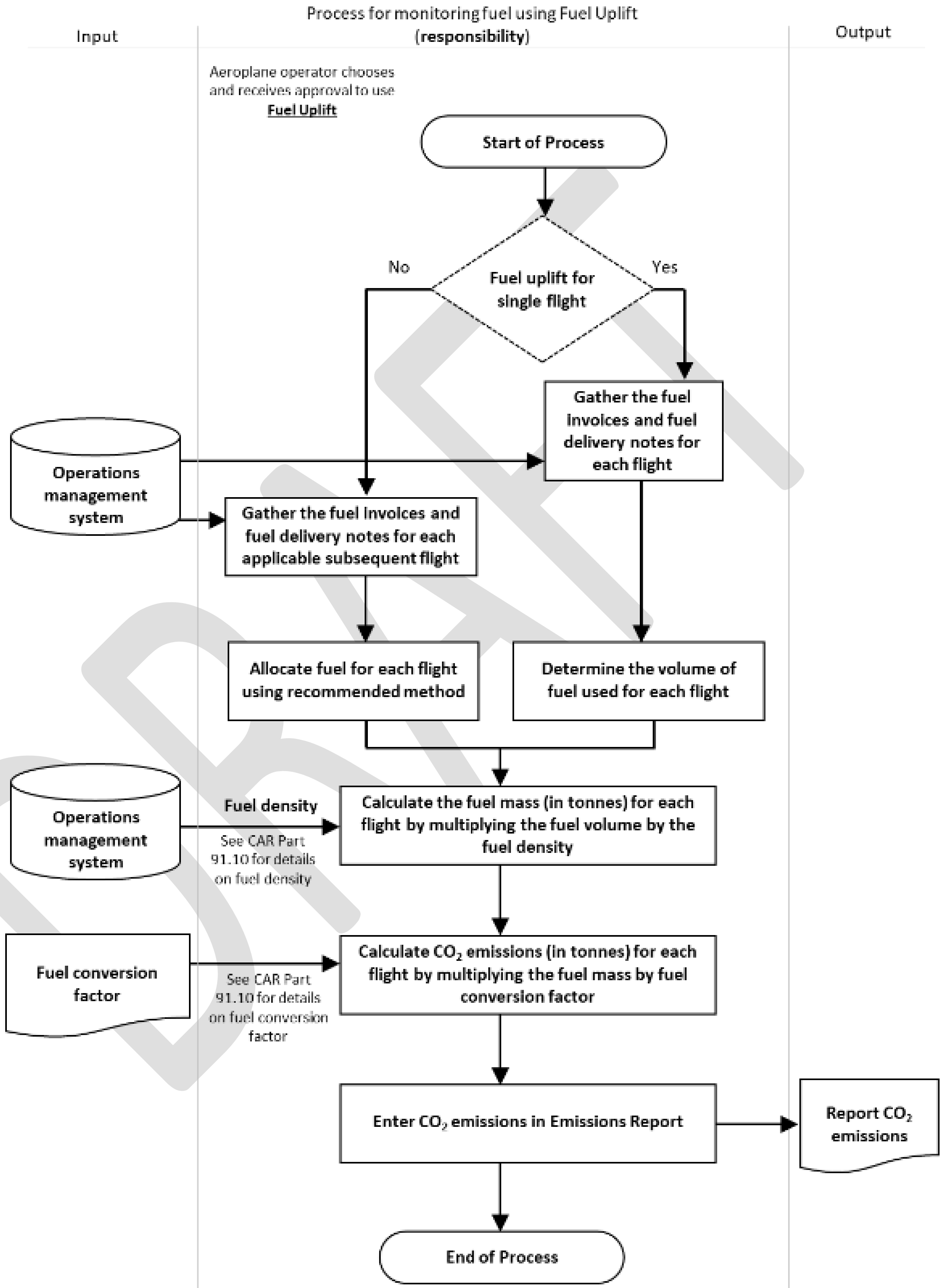
Collection of required data to implement Block-off / Block-on



1.4. Fuel Uplift method

(a) The process for monitoring fuel using the Fuel Uplift method shall be as illustrated:

Monitoring fuel use by flight using Fuel Uplift



(b) For flights with a fuel uplift unless the subsequent flight has no uplift, the aeroplane operator shall use the following formula to compute fuel use according to the Fuel Uplift Method:

$$F_N = U_N$$

Where:

F_N = Fuel consumed for the flight under consideration (i.e. flight $_N$) determined using fuel uplift (in tonnes);

U_N = Fuel uplift for the flight considered, measured in volume and multiplied with a density value (in tonnes).

(c) For flight(s) without a fuel uplift (i.e. flight $_{N+1}$, …, flight $_{N+n}$) an aeroplane operator shall use the following formula to allocate fuel use from the previous fuel uplift (i.e. from flight $_N$) proportionally to block hour:

$$F_{\mathrm{N}} = U_{\mathrm{N}} * \frac{BH_{\mathrm{N}}}{BH_{\mathrm{N}} + BH_{\mathrm{N+1}} + \cdots + BH_{\mathrm{N+n}}}$$

$$F_{\mathrm{N+1}} = U_{\mathrm{N}} * \frac{BH_{\mathrm{N+1}}}{BH_{\mathrm{N}} + BH_{\mathrm{N+1}} + \cdots + BH_{\mathrm{N+n}}}$$

$$F_{\mathrm{N+n}} = U_{\mathrm{N}} * \frac{BH_{\mathrm{N+n}}}{BH_{\mathrm{N}} + BH_{\mathrm{N+1}} + \cdots + BH_{\mathrm{N+n}}}$$

Where:

F_N = Fuel consumed for the flight under consideration (i.e. flight $_N$) determined using fuel uplift (in tonnes);

F_{N+1} = Fuel consumed for the subsequent flight (i.e. flight $_{N+1}$) determined using fuel uplift (in tonnes);

F_{N+n} = Fuel consumed for the follow-on flight (i.e. flight $_{N+n}$) determined using fuel uplift (in tonnes);

U_N = Fuel uplift for the flight under consideration (i.e. flight $_N$) (in tonnes);

BH_N = Block hour for the flight under consideration (i.e. flight $_N$) (in hours);

BH_{N+1} – Block hour for the subsequent flight (i.e. flight $_{N+1}$) (in hours);

…

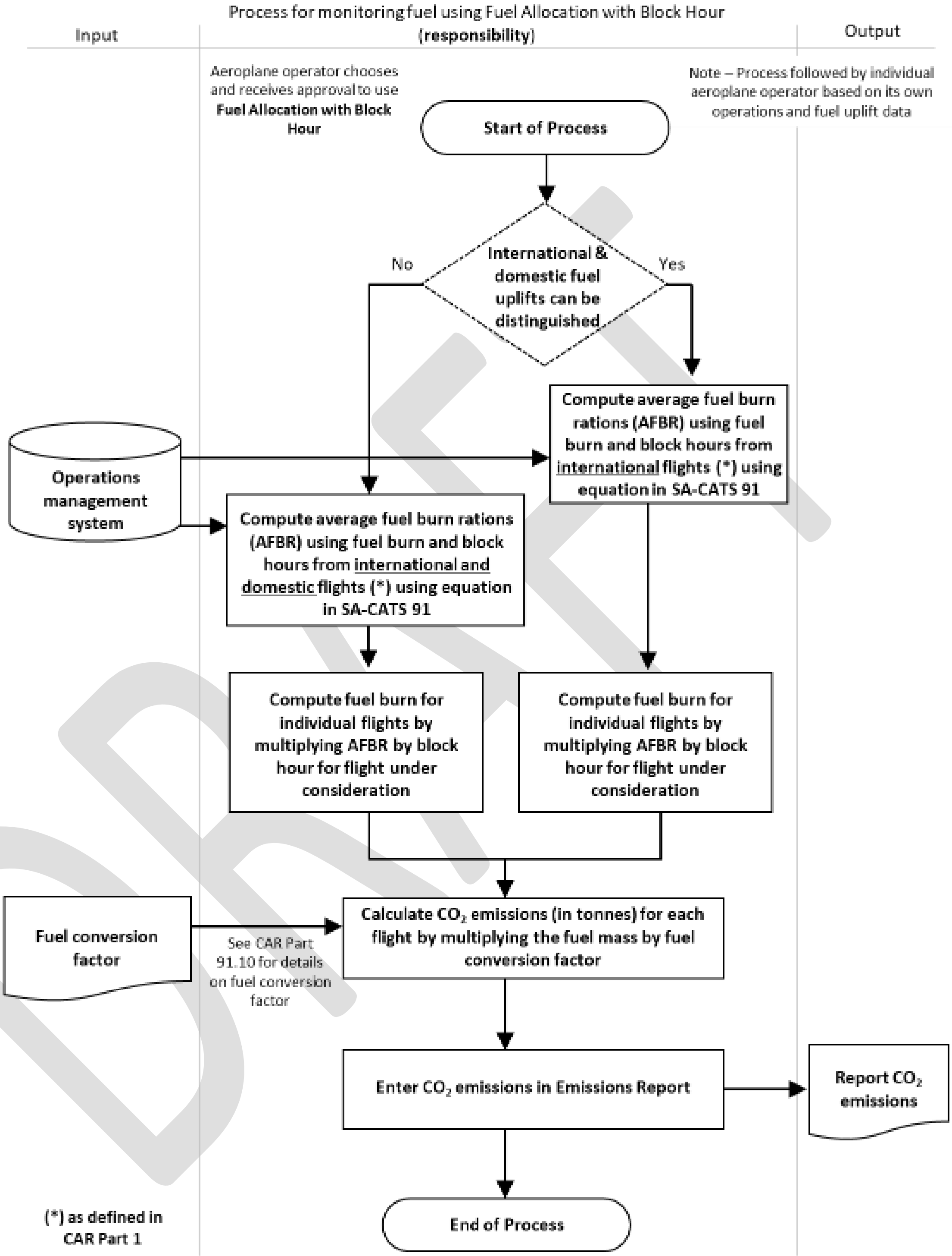
BH_{N+n} = Block hour for the follow-on flight (i.e. flight $_{N+n}$) (in hours).

Note. – Fuel uplift is determined by the measurement by the fuel supplier, as documented in the fuel delivery notes or invoices for each flight.

1.5. Fuel Allocation with Block Hour method

(a) The process for monitoring fuel using the Fuel Allocation with Block hour method shall be as illustrated:

Monitoring fuel use by flight using Fuel Allocation with Block Hour



(b) Computation of average fuel burn ratios

(i) an aeroplane operator with distinguished fuel uplifts, shall compute, for each aeroplane type, the average fuel burn ratios by summing up all actual fuel uplifts from international flights, as defined in CAR 91 Subpart 10, divided by the sum of all actual block hours from international flights for a given year, according to the following formula:

$$AFBR_{\mathrm{AO,AT}} = \frac{\sum_N U_{\mathrm{AO,AT,N}}}{\sum_N BH_{\mathrm{AO,AT,N}}}$$

Where:

$AFBR_{\mathrm{AO,\ AT}}$ = Average fuel burn ratios for aeroplane operator (AO) and aeroplane type (AT) (in tonnes per hour);

$U_{\mathrm{AO,\ AT,\ N}}$ = Fuel uplifted for the international flight $_{\mathrm{N}}$ for aeroplane operator (AO) and aeroplane type (AT) determined using monitoring method Fuel Uplift (in tonnes);

$BH_{\mathrm{AO,\ AT,\ N}}$ = Block hour for the international flight $_{\mathrm{N}}$ for aeroplane operator (AO) and aeroplane type (AT) (in hours).

(ii) an aeroplane operator with undistinguished fuel uplifts, shall compute for each aeroplane type, the average fuel burn ratios by summing up all actual fuel uplifts from international and domestic flights divided by the sum of all actual block hours from these flights for a given year, according to the following formula:

$$AFBR_{\mathrm{AO,AT}} = \frac{\sum_N U_{\mathrm{AO,AT,N}}}{\sum_N BH_{\mathrm{AO,AT,N}}}$$

Where:

$AFBR_{\mathrm{AO,\ AT}}$ = Average fuel burn ratios for aeroplane operator (AO) and aeroplane type (AT) (in tonnes per hour);

$U_{\mathrm{AO,\ AT,\ N}}$ = Fuel uplifted for the international or a domestic flight $_{\mathrm{N}}$ for aeroplane operator (AO) and aeroplane type (AT) measured in volume and multiplied with a specific density value (in tonnes);

$BH_{\mathrm{AO,\ AT,\ N}}$ = Block hour for the international and domestic flight $_{\mathrm{N}}$ for aeroplane operator (AO) and aeroplane type (AT) (in hours).

(iii) An aeroplane operator specific average fuel burn ratios shall be calculated on a yearly basis by using the yearly data from the actual reporting year. The average fuel burn ratios shall be reported, for each aeroplane type, in the aeroplane operator's Emissions Report.

Note CAR 91 Subpart 10 for requirements on fuel density values. Aeroplane types are contained in Doc 8543 on ICAO Aircraft Type Designators available on the ICAO CORSIA website.

(c) Computation of fuel use for individual flights

(i) an aeroplane operator shall compute the fuel consumption for each international flight by multiplying the aeroplane operator specific average fuel burn ratios with the flight's block hour according to the following formula:

$$F_{\mathrm{N}} = AFBR_{\mathrm{AO,AT}} * BH_{\mathrm{AO,AT,N}}$$

Where:

F_N = Fuel allocated to the international flight under consideration (i.e. flight $_N$) using the Fuel Allocation Block Hour method (in tonnes);

$AFBR_{AO, AT}$ = Average fuel burn ratios for aeroplane operator (AO) and aeroplane type (AT) (in tonnes per hour);

$BH_{AO, AT, N}$ = Block hour for the international flight under consideration (= flight $_N$) for aeroplane operator (AO) and aeroplane type (AT) (in hours);

Note – Fuel uplift is determined by the measurement by the fuel supplier, as documented in the fuel delivery notes or invoices for each flight. The Verification Report of the external verification body includes an assessment of the aeroplane operator specific average fuel burn ratio per ICAO aircraft type designator used. Average fuel burn ratio (AFBR) based on all flights for a reporting year and rounded to at least three decimal places.

(ii) Verification body shall cross-check whether the emissions reported are reasonable in comparison to other fuel related data of an aeroplane operator.

2. Use of the CERT for complying with monitoring and reporting requirements-

(a) an aeroplane operator shall use the CERT according to the eligibility criteria and as approved by the Executive Director;

(b) an aeroplane operator shall use either the Block Time input method or the Great Circle Distance input method to enter the necessary information into the CERT;

(c) an aeroplane operator approved to use the Block Time input method shall collect the following data for submission into the CERT to estimate its CO_2 emissions during the compliance year:

(i) ICAO aircraft type-model designator;

(ii) Origin aerodrome ICAO Designator;

(iii) Destination aerodrome ICAO Designator;

(iv) Block time in hours;

(v) Number of flights;

(vi) Date (optional); and

(vii) Flight ID (optional).

(d) an aeroplane operator approved to use the Great Circle Distance input method shall collect the following data for submission into CERT to estimate its CO_2 emissions during the compliance year:

(i) ICAO aircraft model – type designator;

(ii) Origin aerodrome;

(iii) Destination aerodrome;

(iv) Number of flights;

(v) Date (optional); and

(vi) Flight ID (optional).

Note: The ICAO CORSIA CERT is developed for and made available to aeroplane operators to support the monitoring and reporting of their CO_2 emissions. The CERT supports aeroplane operators in fulfilling their monitoring and reporting requirements by populating the standardised Emissions Monitoring Plan and Emissions Report templates available on the ICAO CORSIA website.

3. The Executive Director shall contribute to improving the ICAO CO_2 estimation module used within the CORSIA CERT by:

(a) collecting the following flight level fuel burn data from aeroplane operators:

(i) date and time in Universal Time Coordinated;

(ii) ICAO aircraft type – model designator;

(iii) origin aerodrome ICAO Designator;

(iv) destination aerodrome ICAO Designator;

(v) block hour (in hours to 2 decimal places);

(vi) fuel used (in tonnes to at least 1 decimal place) based on a Fuel Use Monitoring method;

(vii) type of Fuel Use Monitoring method used;

(viii) aircraft maximum certificated take-off mass (in kg); and

(ix) flight Great Circle Distance (in km)

(b) sharing the aeroplane operator data with ICAO:

(i) date and time in Universal Time Coordinated;

(ii) generic code to de-identify aeroplane operator information and allow integration of information;

(iii) ICAO Aircraft Type – Model Designator;

(iv) flight Great Circle Distance (in km);

(v) block hour (in hours to 2 decimal places);

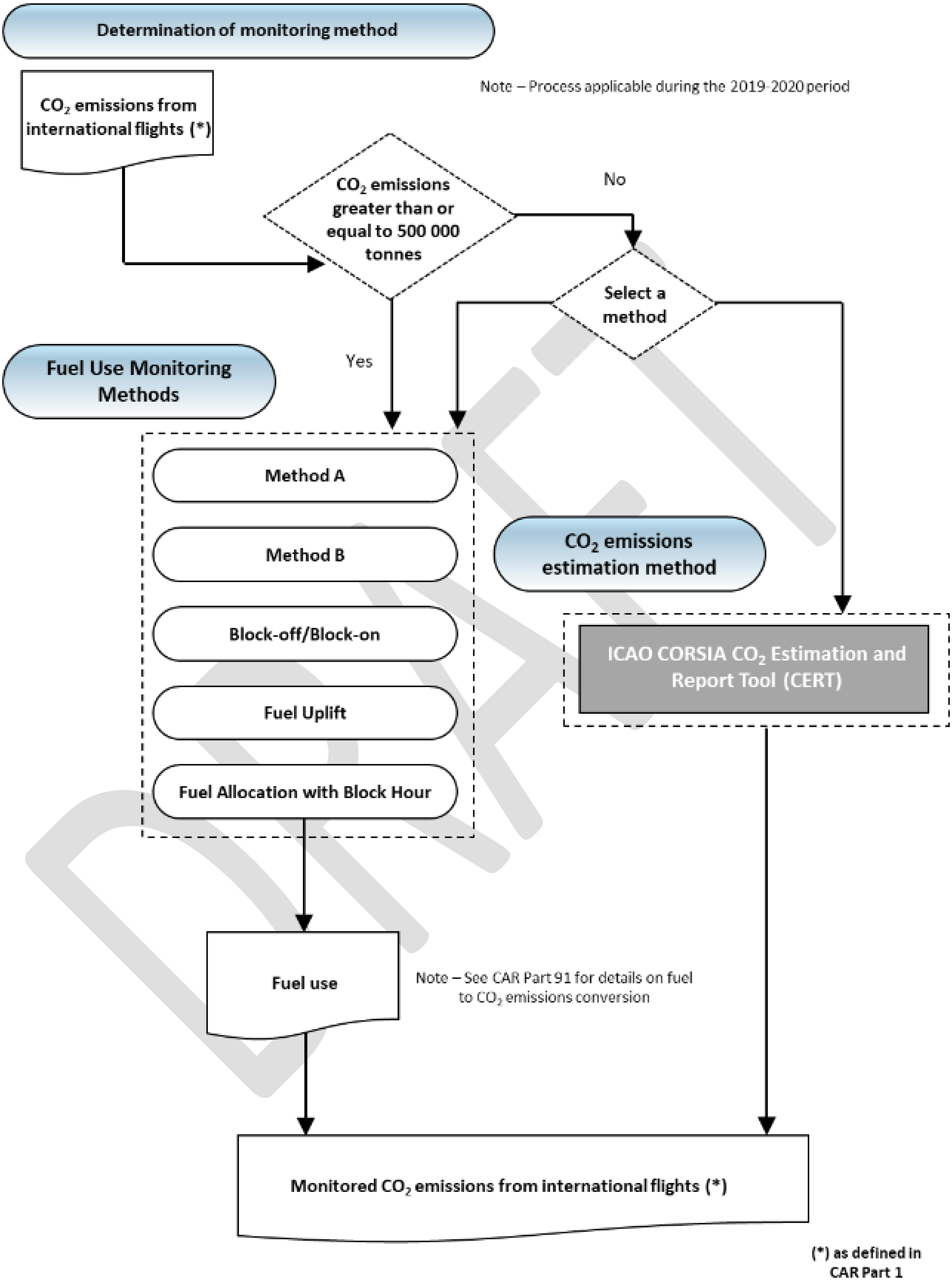
(vi) fuel used (in tonnes to at least 1 decimal place based on a fuel use monitoring method; and

(vii) type of Fuel Use Monitoring method used.

(c) anonymising the aeroplane operator data shared with ICAO.

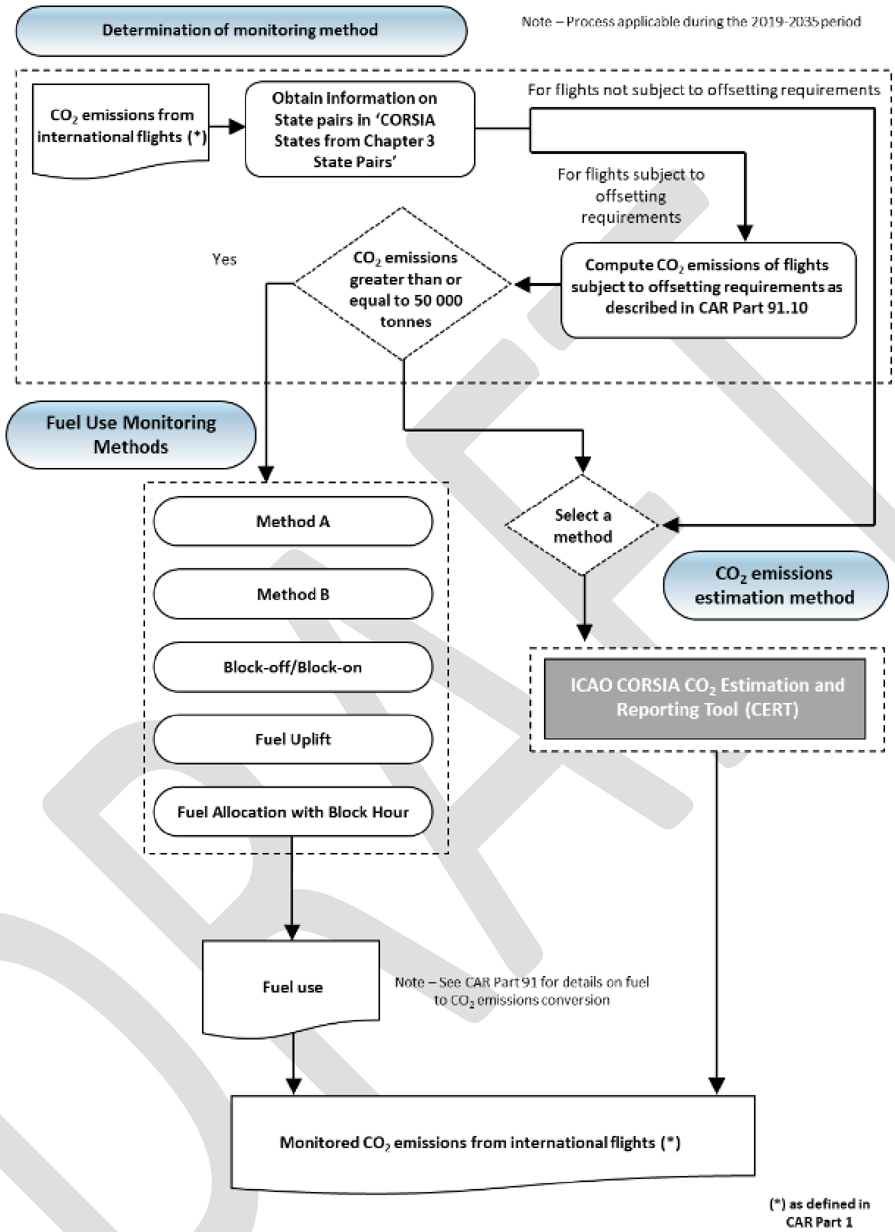
4. When determining the eligibility of the Fuel Use Monitoring methods for the compliance period 2019-2020, the following processes shall be applicable:

Determination of eligible Fuel Use Monitoring Methods during the 2019-2020 period



5. When determining the eligibility of the Fuel Use Monitoring methods for the compliance period 2021-2035, the following process shall be applicable:

Determination of eligible Fuel Use Monitoring Method during the compliance periods (2021 – 2035)



(6) For the 2019-2020 compliance period, an aeroplane operator –

(a) with annual CO_2 emissions from international flights, greater than, or equal to 500 000 tonnes, shall use a fuel monitoring method, as provided for in Document NAM-CATS 91;

(b) with annual CO_2 emissions from international flights, of less than 500 000 tonnes, shall use either a fuel use monitoring method, or the ICAO CORSIA CERT, as provided for in Document NAM-CATS 91;

(c) if it's annual CO_2 emissions from international flights, increases above the threshold of 500 000 tonnes in 2019, the aeroplane operator may continue to use the monitoring method chosen in accordance with paragraph (b), during the 2020 period;

(d) may use the same monitoring method during the 2019-2020 compliance period, that is anticipated to be used during the 2021-2023 compliance period, taking into account its expected annual CO_2 emissions during the 2021-2023 compliance period;

(e) shall change its monitoring method, by submission of a revised EMP to the Executive Director, by 30 September 2020, in order to implement the new monitoring method from 1 January 2021;

(f) if it does not have an approved EMP, as of 1 January 2019, the aeroplane operator shall monitor and record its CO_2 emissions, in accordance with the eligible monitoring method outlined in the EMP, that is intended to be submitted, or has been submitted to the Executive Director;

(g) if its EMP is determined to be incomplete or inconsistent with the eligible fuel use monitoring method, the Executive Director shall approve a different eligible fuel use monitoring method, within the EMP, for a period no later than 30 June 2019; and

(h) if it does not have sufficient information, to use a fuel use monitoring method, the Executive Director shall approve the use of the ICAO CORSIA CERT, for a period not exceeding 30 June 2019.

(7) For the 2021-2035 compliance period, an aeroplane operator, with annual CO_2 emissions from international flights, that is subject to an offsetting requirement:

(a) of greater than or equal to 50 000 tonnes, shall use a fuel use monitoring method for the flights;

(b) of less than 50 000 tonnes, shall use either a fuel use monitoring method or the CERT; if its annual CO_2 emissions increase above the threshold of 50 000 tonnes in a given year (y), and also in year (y+1), the aeroplane operator shall submit an updated EMP by 30 September of year (y + 2) and change to a fuel use monitoring method, as provided for in Document NAM-CATS 91, on 1 January of year (y+3); and

(c) if its annual CO_2 emissions decrease below the threshold of 50 000 tonnes in a give year (y), and also in year (y+1), the aeroplane operator may change monitoring method on 1 January of year (y+3); and

(d) if an aeroplane operator chooses to change its monitoring method, it shall submit an updated EMP by 30 September of year (y+2).

(8) Recommendations

An aeroplane operator shall use the same monitoring method during the 2019-2020 compliance period that it expects to use during the 2021-2023 compliance period, taking into account its expected annual CO_2 emissions during the 2021-2023 compliance period. If an aeroplane operator needs to change monitoring method, an aeroplane operator shall submit a revised EMP by 30 September 2020 in order to implement the new monitoring method from 1 January 2021.

91.10.7 EMP

(1) An aeroplane operator shall develop and submit an EMP to the Executive Director, containing the following information:

(a) Identification of the Aeroplane Operator-

(i) Name and address of the aeroplane operator with legal responsibility;

(ii) Information for attributing the aeroplane operator to a State:

(aa) ICAO Designator(s) used for air traffic control purposes, as listed in ICAO Doc 8585;

(bb) if an aeroplane operator does not have an ICAO Designator, an aeroplane operator shall include a copy of the air operator certificate; and

(cc) if an aeroplane operator does not have an ICAO Designator or an air operator certificate, an aeroplane operator shall submit its place of juridical registration.

(iii) details of the ownership structure relative to any other aeroplane operator with international flights, including identification of whether the aeroplane operator is a parent company to other aeroplane operators with international flights or subsidiaries that are aeroplane operators with international flights;

(iv) if an aeroplane operator, in a parent-subsidiary relationship, seeks to be considered a single aeroplane operator for purposes of this Subpart, then confirmation shall be provided that the parent and subsidiary are attributed to Namibia and that the subsidiary is wholly-owned by the parent;

(v) Contact information for a person responsible for an aeroplane operator's Emissions Monitoring Plan; and

(vi) description of an aeroplane operator's activities.

Note: A template of an EMP is provided on the ICAO CORSIA website.

(b) Fleet and operations data

(i) an aeroplane operator shall list all aeroplane types and the type of fuel used in aeroplanes operated for international flights, at the time of submission of the Emissions Monitoring Plan. The list shall include:

(aa) Aeroplane types of a maximum certificated take-off mass of 5700kg or greater and the number of aeroplane per type, including owned and leased aeroplanes;

Note: An aeroplane operator using the ICAO CORSIA CERT could use the functionality of the CERT to identify applicable aeroplane types.

(bb) Type of fuel(s) used by an aeroplane

Note: The aeroplane operator using the ICAO CORSIA CERT does not need to specify the type of petroleum-based fuel used for aeroplanes.

(ii) The information to be used for attributing international flights, as defined in regulation CAR 91 Subpart 10, to an aeroplane operator shall be:

(aa) list of the ICAO Designator(s) used in Item 7 of an aeroplane operator's flight plans;

(bb) if an aeroplane operator does not have an ICAO Designator, then a list of the nationality or common mark, or registration mark of aeroplanes that are explicitly stated in the air operator certificate and used in Item 7 of an aeroplane operator's flight plans; and

(cc) if an aeroplane operator does not have an ICAO Designator or an air operator certificate, then the aeroplane operator shall propose an alternative means for flight attribution based on what it reports in Item 7 of an aeroplane operator's flight plans.

(iii) Procedures on how changes in an aeroplane fleet and fuel used will be tracked, and integrated into the Emissions Monitoring Plan;

(iv) Procedures on how to track specific flights on an aeroplane to ensure completeness of monitoring;

(v) Procedures for determining which aeroplane flights comply with the definition of "international" flights and are subject to the requirements prescribed in CAR 91 Subpart 10;

(vi) List of States to where an aeroplane operator operates international flights, at the time of initial submission of the Emissions Monitoring Plan;

Note – An aeroplane operator using the estimation functionality of the ICAO CORSIA CERT to assess its eligibility to use the CERT, could use the output of the tool as input to the Emissions Monitoring Plan submission. An aeroplane operator using the applicable ICAO CORSIA CERT, could use the functionality of the CERT to identify flights subject to offsetting requirements, in a given year of compliance.

(vii) Procedures for identifying domestic flights and/or humanitarian, medical or firefighting international flights that may not be subject to the requirements of regulation Part 91 Subpart 10.

(c) Methods and means of calculating emissions from international flights

(i) For the methods and means for establishing the average Emissions during the 2019-2020 Period-

(aa) If the aeroplane operator meets the eligibility criteria in regulation CAR 91 Subpart 10 and chooses to use the ICAO CORSIA CERT as described in Document NAM-CATS 91, then the following information shall be provided:

(A) An estimate of CO_2 emissions for all international flights, for 2019 with supporting information on how the estimation was calculated;

(B) The type of input method used in the ICAO CORSIA CERT:

- Great Circle Distance input method; or
- Block Time input method.

Note – Guidance on estimating CO_2 emissions for 2019 is provided in the Procedures for demonstrating compliance with the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) available on the ICAO CORSIA website.

(bb) If the aeroplane operator meets the eligibility criteria in regulation CAR 91 Subpart 10, or chooses to use a Fuel Use Monitoring method as described in Document NAM-CATS 91, then the following information shall be provided:

(A) The Fuel Use Monitoring Method that will be used:

- Method A;
- Method B;
- Block-off / Block-on;
- Fuel Uplift; or
- Fuel Allocation with Block Hour.

(cc) If different Fuel Use Monitoring Methods are to be used for different aeroplane types, then the aeroplane operator shall specify which method applies to which aeroplane type;

(dd) Information on the procedures for determining and recording fuel density values (standard or actual) as used for operational and safety reasons and a reference to the relevant aeroplane operator documentation;

(ee) The systems and procedures to monitor fuel consumption in both owned and leased aeroplane. If the aeroplane operator chosen the Fuel Allocation with Block Hour method, information shall be provided on the systems and procedures used to establish the average fuel burn ratios as described in Document NAM-CATS 91; and

(ff) If the aeroplane operator is in a parent-subsidiary relationship and seeks to be considered as a single aeroplane operator for purposes of CAR 91 Subpart 10, then it shall provide the procedures that will be used for maintaining records of fuel used and emissions monitored during the 2019-2020 period of the various corporate entities. This shall be used to establish individual average emissions during the 2019-2020 period for the parent and subsidiary (or subsidiaries).

(ii) For the methods and means for Emissions Monitoring and Compliance on or after 1 January 2021-

(aa) If an aeroplane operator has international flights, as defined in regulation CAR 91 Subpart 10, but these are not subject to offsetting requirements as defined in regulation CAR 91 Subpart 10, then it shall confirm whether it plans to use the ICAO CORSIA CERT or the Fuel Use Monitoring Methods as described in Document NAM-CATS 91;

(bb) If an aeroplane operator meets the eligibility criteria in regulation CAR 91 Subpart 10, and it chooses to use the ICAO CORSIA CERT as described in Document NAM-CATS 91, then the following information shall be provided:

(A) An estimate of CO_2 emissions for all international flights, as defined in regulation CAR 91 Subpart 10, subject to offsetting requirements, as defined in regulation CAR 91 Subpart 10, for the year before the emissions monitoring is to occur (for example, an estimate of such emissions for 2020 for monitoring 2021), as well as information on how the estimation was calculated;

(B) The type of input method used in the ICAO CORSIA CERT:

- Great Circle Distance input method; or
- Block Time input method.

(cc) If the aeroplane operator meets the eligibility criteria in regulation CAR 91 Subpart 10, or chooses to use a Fuel Use Monitoring Method as described in Document NAM-CATS 91, then the following information shall be provided:

(A) The Fuel Use Monitoring Method that will be used:

- Method A;
- Method B;
- Block-off / Block-on;
- Fuel Uplift; or
- Fuel Allocation with Block hour.

(B) If different Fuel Use Monitoring Methods are to be used for different aeroplane types, then the aeroplane operator shall specify which method applies to which aeroplane type;

(C) Information on the procedures for determining and recording fuel density values (standard or actual) as used for operational and safety reasons and a reference to the relevant aeroplane operator documentation; and

(D) The systems and procedures to monitor fuel consumption in both owned and leased aeroplane. If the aeroplane operator has chosen the Fuel Allocation with Block hour method, information shall be provided on the systems and procedures used to establish the average fuel burn ratios as described in Document NAM-CATS 91.

(dd) If the aeroplane operator is using a Fuel Use Monitoring method, as defined in Document NAM-CATS 91, it shall state whether it plans to use the ICAO CORSIA CERT for international flights, as defined in regulation CAR 91 Subpart 10, that are subject to emissions monitoring but not offsetting requirements. If so, the aeroplane operators shall also state which input method into the ICAO CORSIA CERT is being used (i.e. Great Circle Distance Input Method, or Block Time Input Method).

(d) Data management, data flow and control

(i) An aeroplane operator shall provide the following information:

(aa) roles, responsibilities and procedures on data management;

(bb) procedures to handle data gaps and erroneous data values, including:

(A) Secondary data reference sources which would be used as an alternative;

(B) Alternative method in case the secondary data reference source is not available; and

(C) For those aeroplane operators using a Fuel Use Monitoring Method, information on systems and procedures for identifying data gaps and for assessing whether the 5 percent threshold for significant data gaps has been reached.

(cc) documentation and record keeping plan;

(dd) assessment of the risks associated with the data management processes and means for addressing significant risks;

(ee) procedures for making revisions to the Emissions Monitoring Plan and resubmitting relevant portions to the Executive Director when there are material changes;

(ff) procedures for providing notice in the Emissions Report of non-material changes that require the attention of the Executive Director;

(gg) a data flow diagram summarising the systems used to record and store data associated with the monitoring and reporting of CO_2 emissions.

91.10.9 MONITORING OF CORSIA ELIGIBLE FUEL CLAIMS

(1) The CORSIA Sustainability Criteria is defined in the ICAO document entitled 'CORSIA Sustainability Criteria for CORSIA Eligible Fuels' that is available on the ICAO CORSIA website.

(2) An aeroplane operator that intends to claim for emissions reductions from the use of CORSIA eligible fuels shall only use CORSIA eligible fuels from fuel producers that are certified by an approved Sustainability Certification

Scheme included in the ICAO document entitled "CORSIA Approved Sustainability Certification Schemes", that is available on the ICAO CORSIA website.

(3) The certification schemes shall meet the requirements included in the ICAO document, titled "CORSIA Eligibility Framework and Requirements for Sustainability Certification Schemes", that is available on the ICAO CORSIA website.

(4) Recommendations:

(a) When an audit provision is triggered, and an audit of the fuel producer is undertaken, an aeroplane operator should share the results of the audit with the fuel producer, so that the producer may then make it available to other aeroplane operators, seeking assurance on the fuel producer's internal processes, for the purposes of Annex 16 Volume IV.

(b) In order to ensure this capability exists, an aeroplane operator shall ensure that CORSIA eligible fuel procurement controls are in place, to enable audit rights for fuel purchasers, other aeroplane operators or their designated representatives.

Note. —The quality control assurances of CORSIA eligible fuel producers include declarations or process certifications, with periodic audits by verifiers, purchasers, or trusted entities. The process certifications, including the sustainability credentials, provide assurance that the CORSIA eligible fuel producer has established business processes to prevent double counting, and the periodic audits verify that the producer is following their established procedures. Purchasers and the Authority may elect to independently audit the production records of the CORSIA eligible fuel producer in order to provide further assurance.

91.10.10 REPORTING REQUIREMENTS FOR AEROPLANE OPERATOR ANNUAL CO_2 EMISSIONS

(1) Fuel use shall be reported to the nearest tonne, unless otherwise stated.

(2) An Emissions Report from an aeroplane operator shall be submitted to the Executive Director and shall contain following information:

(a) Content of aeroplane operator Emissions Report

Field #	Data Field	Details
Field 1	Aeroplane operator information	1a. Name of aeroplane operator 1b. Detailed contact information of aeroplane operator 1c. Name of a point of contact 1d. Method and identifier used to attribute an aeroplane operator to the State in accordance with regulation CAR 91 Subpart 10 1e. State
Field 2	Reference details of aeroplane operator Emissions Monitoring Plan	2. Reference to the Emissions Monitoring Plan that is the basis for emissions monitoring that year *Note – The Executive Director may require providing reference to updated Emissions Monitoring Plan, if applicable*
Field 3	Information to identify the verification body and Verification Report	3a. Name and contact information of the verification body 3b. Verification Report to be a separate report from aeroplane operator's Emissions Report

Field 4	Reporting Year	4. Year during which emissions were monitored
Field 5	Type and mass of fuel(s) used	5. Total fuel mass per type of fuel: • Jet-A (in tonnes) • Jet-A1 (in tonnes) • Jet-B (in tonnes) • AvGas (in tonnes) *Note 1 – Above totals to include CORSIA eligible fuels* *Note 2 – The aeroplane operator using the ICAO CORSIA CERT, as described in NAM-CATS 91, does not need to report Field 5*
Field 6	Total number of international flights during the reporting period	6a. Total number of international flights, during the reporting period *Note – Total (sum of values from Field 7)*
Field 7	Number of international flights per State pair or aerodrome pair	7a. Number of international flights, per State pair (no rounding); or 7b. Number of international flights, per aerodrome pair (no rounding)
Field 8	CO_2 emissions per aerodrome pair or State pair	8a. CO_2 emissions from international flights, as defined in CAR 91 Subpart 10 per State pair (in tonnes); or 8b. CO_2 emissions from international flights, as defined in regulation CAR 91 Subpart 10 per aerodrome pair (in tonnes)
Field 9	Scale of data gaps	9a. Percent of data gaps (according to criteria defined in regulation CAR 91 Subpart 10 and rounded to the nearest 0.1%) 9b. Reason for data gaps if percent of data gaps exceeds the threshold defined in regulation CAR 91 Subpart 10
Field 10	Aeroplane information	10a. List of aeroplane types 10b. Aeroplane identifiers used in flight plans' Item 7 during the year for all international flights, as defined in regulation CAR 91 Subpart 10. Where the identifier is based on an ICAO Designator, only the ICAO Designator is to be reported. 10c. Information on leased aeroplanes 10d. Average fuel burn ratio (AFBR) for each aeroplane type under 10a. in line with ICAO Aircraft Type Designator Doc. 8643 (in tonnes per hour to 3 decimal places) *Notes – 10d. is only required if the aeroplane operator is using the Fuel Allocation with Block Hour method*
Field 11	Eligibility for and use of the ICAO CORSIA CERT as per regulation CAR 91 Subpart 10	11a. Version of the ICAO CORSIA CERT used 11b. Scope of use of the ICAO CORSIA CERT i.e. on all flights or only on the international flights not subject to offsetting requirements

Field 12 *Note – if emissions reductions from the use of CORSIA eligible fuel are claimed, see paragraph (b) for supplementary information that is to be provided with the aeroplane operator's Emissions Report*	CORSIA eligible fuel Claimed	12a. Fuel type (i.e. type of fuel, feedstock and conversation process) 12b. Total mass of the neat CORSIA eligible fuel claimed (in tonnes) per fuel type
	Emissions information (per fuel type)	12c. Approved Life Cycle Emissions values 12d. Emission reductions claimed from a CORSIA eligible fuel, as calculated in accordance with equations prescribed in CAR 91 Subpart 10 and reported in tonnes
	Emissions Reductions (total)	12e. Total emissions reductions claimed from the use of all CORSIA eligible fuels (in tonnes) *Note – During the 2019-2020 period, fields 12a. to 12e. are not required as the applicability of offsetting regulations start on 1 January 2021*
Field 13	Total CO_2 emissions	13a. Total CO_2 emissions (based on total mass of fuel in tonnes from Field 5 and reported in tonnes) 13b. Total CO_2 emissions from flights subject to offsetting requirements. 13c. Total CO_2 emissions from international flights that are not subject to offsetting requirements. *Note – During the 2019-2020 period, only fields 13a. is required as the applicability of offsetting regulations start on 1 January 2021*

Note – The Executive Director may expand on this list to include additional or more detailed data from aeroplane operators registered under Part 47.

(3) The content of the Emissions Report from the Executive Director to ICAO shall contain the following information:

(a) The list of aeroplane operators attributed to Namibia and the verification bodies accredited in Namibia as per the below table:

Field #	Data Field	Details
Field 1	List of aeroplane operators attributed to Namibia	1a. Name and contact information of aeroplane operator 1b. Aeroplane operator Code 1c. Method and identifier used to attribute aeroplane operator to Namibia in accordance with regulation CAR 91 Subpart 10
Field 2	List of verification bodies accredited in the State (for a given year of compliance)	2a. State 2b. Name of verification body

Note – Information on the following fields can be found in the ICAO document entitled "CORSIA Central Registry (CCR): Information and Data for Transparency" that is available from the ICAO CORSIA website.

(b) The Emissions Report from the Executive Director to ICAO for 2019 and 2020 as per below table:

Field #	Data Field	Details
Field 1	Total annual CO_2 emissions per State pair aggregated for all aeroplane operators attributed to Namibia (in tonnes)	*Note – Include emissions from CORSIA eligible fuels calculated using fuel conversion factor(s) from corresponding conventional aviation fuels, in accordance with regulation CAR 91 Subpart 10*

(c) The Emissions Report from the Executive Director to ICAO annually after 2021 as per below table:

Field #	Data Field	Details
Field 1	Total annual CO_2 Emissions on each State pair aggregated for all aeroplane operators attributed to Namibia	1a. Total annual CO_2 emissions on each State pair subject to offsetting requirements as defined in regulation CAR 91 Subpart 10, aggregated for all aeroplane operators attributed to Namibia (in tonnes) 1b. Total annual CO_2 emissions on each State pair not subject to offsetting requirements as defined in regulation CAR 91 Subpart 10, aggregated for all aeroplane operators attributed to Namibia (in tonnes)
Field 2	Total annual CO_2 emissions for each aeroplane operator attributed to Namibia	2a. Total annual CO_2 emissions for each aeroplane operator attributed to Namibia 2b. Indicate whether the ICAO CORSIA CERT, as defined in Document NAM-CATS 91 is used
Field 3	Total aggregated annual CO_2 emissions for all State pairs subject to offsetting requirements for each aeroplane operator attributed to Namibia	
Field 4	Total aggregated annual CO_2 emissions for all State pairs not subject to offsetting requirements for each aeroplane operator attributed to Namibia	

Note 1 – Information on the following fields can be found in the ICAO document entitled "CORSIA Central Registry (CCR): Information and Data for Transparency" that is available from the ICAO CORSIA website

Note 2 – Where CO_2 emissions are based on the ICAO CORSIA CERT as described in Document NAM-CATS 91, this will be indicated

Note 3 – All data recognised as confidential in accordance with regulation CAR 91 Subpart 10 will be aggregated and published by ICAO without attribution to a specific aeroplane operator or State pair but with distinction between State pairs subject to offsetting requirements and those not subject to offsetting requirements

(4) Where an aeroplane operator operates a very limited number of State pairs that are subject to offset requirements and a very limited number of State pairs that are not subject to offset requirements, an aeroplane operator may request in writing to the Executive Director that such data not be published at an aeroplane operator level, explaining the reasons why disclosure may harm its commercial interests.

Note – the annual CO_2 emissions of an aeroplane operator on a given State pair are considered as commercially sensitive if they are determined using a fuel use monitoring method.

(5) Where aggregated State pair data may be attributed to an identified aeroplane operator as a result of a very limited number of aeroplane operators conducting flights on a State pair, an aeroplane operator may request in writing to the Executive Director that such data not be published at State pair level, explaining the reasons why disclosure may harm their commercial interests.

91.10.11 REPORTING OF CORSIA ELIGIBLE FUEL

(1) An aeroplane operator's Emissions Report may, when claiming emissions reductions from the use of each CORSIA eligible fuel, contain the following supplementary information:

Field #	Data Field	Details
Field 1	Purchase date of the CORSIA eligible fuel	
Field 2	Identification of the producer of the CORSIA eligible fuel	2a. Name of producer of the CORSIA eligible fuel 2b. Contact information of the producer of the CORSIA eligible fuel
Field 3	Fuel Production	3a. Production date of the CORSIA eligible fuel 3b. Production location of the neat CORSIA eligible fuel 3c. Batch number of each batch of CORSIA eligible fuel 3d. Mass of each batch of CORSIA eligible fuel produced
Field 4	Fuel type	4a. Type of fuel (i.e. Jet-A, Jet-A1, Jet-B, AvGas) 4b. Feedstock used to create the CORSIA eligible fuel 4c. Conversion process used to create the CORSIA eligible fuel
Field 5	Fuel Purchased	5a. Proportion of neat CORSIA eligible fuel batch purchased rounded to the nearest %) *Note – If less than an entire batch of CORSIA eligible fuel is purchased* 5b. Total mass of each batch of CORSIA eligible fuel purchased (in tonnes) 5c. Mass of neat CORSIA eligible fuel purchased (in tonnes) *Note – Field 5c is equal to the total for all batches of CORSIA eligible fuels reported in Field 5b*
Field 6	Evidence that fuel satisfies the CORSIA Sustainability Criteria	i.e. valid sustainability certification document
Field 7	Life cycle emissions values of the CORSIA eligible fuel	7a. Default or Actual Life Cycle Emission Value (LSf) value for given CORSIA eligible fuel f, which is equal to the sum of 7b and 7c (in gCO_2e/MJ rounded to the nearest whole number)

		7b. Default or Actual Core Life Cycle Assessment (LCA) value for given CORSIA eligible fuel f (in gCO_2e/MJ rounded to the nearest whole number) 7c. Default Induced Land Use Change (ILUC) value for given CORSIA eligible fuel f (in gCO_2e/MJ rounded to the nearest whole number)
Field 8	Intermediate purchaser	8a. Name of the intermediate purchaser 8b. Contact information of the intermediate purchaser *Note – This information would be included in the event that the aeroplane operator claiming emissions reductions from the use of CORSIA eligible fuels was not the original purchaser of the fuel from the Producer (e.g. the aeroplane operator purchased fuel from a broker or a distributor). In such cases, the information is needed to demonstrate the complete chain of custody from production to blend point.*
Field 9	Party responsible for shipping of the neat CORSIA eligible fuel to the fuel blender	9a. Name of party responsible for shipping of the neat CORSIA eligible fuel to the fuel blender 9b. Contact information of party responsible for shipping of the neat CORSIA eligible fuel to the fuel blender
Field 10	Fuel Blender	10a. Name of the party responsible for blending neat CORSIA eligible fuel with conventional aviation fuel 10b. Contact information of the party responsible for blending neat CORSIA eligible fuel with convention aviation fuel
Field 11	Location where neat CORSIA eligible fuel is blended with conventional aviation fuel	
Field 12	Date the neat CORSIA eligible fuel was received by blender	
Field 13	Mass of neat CORSIA eligible fuel received (in tonnes)	This number may differ from the number in Field 5c in cases where only a portion of a batch or batches are claimed by an aeroplane operator.
Field 14	Blend ratio of CORSIA eligible fuel and conventional aviation fuel (rounded to the nearest %)	
Field 15	Documentation demonstrating that the batch or batches of CORSIA eligible fuel were blended into conventional aviation fuel (e.g. the subsequent Certificate of Analysis of the blended fuel)	
Field 16	Mass of neat CORSIA eligible fuel claimed (in tonnes)	

(2) The information referred to in sub-section (1) shall be provided through to the blend point, and shall include information received from both the unblended fuel producer and the fuel blender.

(3) An aeroplane operator has the option to decide when to make a CORSIA eligible fuel claim within a given compliance period for all CORSIA eligible fuel received by a blender within that compliance period. For blending that occurs in the second half of the final year of a compliance period, the aeroplane operator and the Executive Director may determine what, if any, flexibility is needed in terms of submitting reports.

(4) If an aeroplane operator purchases fuel from a supplier downstream from the fuel blender, a fuel supplier shall provide all of the requisite documentation in order for an aeroplane operator to claim the emissions reductions from the use of CORSIA eligible fuels.

(5) The CORSIA eligible fuels supplementary information to the Emissions Report from the Executive Director to ICAO shall contain the following information:

Field #	Data Field	Details	Notes
Field 1	Production	1a. Production year of CORSIA eligible fuel claimed 1b. Producer of CORSIA eligible fuel	
Field 2	Batch of Fuel of CORSIA eligible Fuel	2a. Batch number(s) of each CORSIA eligible fuel claimed 2b. Total mass of each batch of CORSIA eligible fuel claimed (in tonnes)	
Field 3	CORSIA eligible Fuel Claimed	3a. Fuel types (i.e. type of fuel, feedstock and conversion process) 3b. Total mass of the neat CORSIA eligible fuel (in tonnes) per fuel type being claimed by all the aeroplane operators attributed to Namibia	This would provide a total mass for each fuel type being claimed by aeroplane operators attributed to Namibia
Field 4	Emissions Information (per fuel type)	4. Total emissions reductions claimed from the use of a CORSIA eligible fuel (in tonnes)	
Field 5	Emissions Reductions (total)	5. Total emission reductions claimed by all aeroplane operators attributed to Namibia from the use of all CORSIA eligible fuel use (in tonnes)	

Note – In order to avoid double claiming of CORSIA eligible fuels, information on the following fields can be found in the ICAO document entitled: "CORSIA Central Registry (CCR): Information and Data for Transparency" that is available from the ICAO CORSIA website.

91.10.12 VERIFICATION OF CO2 EMISSIONS

(1) A verification body shall be accredited to ISO 14065:2013, and shall comply with the following requirements in order to be eligible to verify an Emissions Report, and Emissions Unit Cancellation Report of an aeroplane operator:

(a) if a leader of a verification team undertakes six annual verifications for one aeroplane operator, then a leader of a verification team shall take three consecutive year breaks from providing verification services to that same aeroplane operator. The six-year maximum period includes any greenhouse gas verifications performed for an aeroplane operator prior to it requiring verification services under CAR 91 Subpart 10;

(b) a verification body, and any part of the same legal entity, shall not be an aeroplane operator, an owner of an aeroplane operator or owned by an aeroplane operator;

(c) a verification body shall also be independent from bodies that trade emission units;

(d) a relationship between a verification body and an aeroplane operator shall not be based on common ownership, common governance, common management or personnel, shared resources, common finances and common contracts or marketing;

(e) a verification body shall not take over any delegated activities from the aeroplane operator with regard to the preparation of the Emissions Monitoring Plan, the Emissions Report (including monitoring fuel use and calculation of CO_2 emissions) and the Emissions Unit Cancellation Report where applicable;

(f) to enable an assessment of impartiality and independence by the national accreditation body, the verification body shall document how it relates to other parts of the same legal entity;

(g) a verification body shall establish, implement and document a method for evaluating the competence of the verification team personnel against the competence requirements outlined in respective ISO documents;

(h) a verification body shall maintain records to demonstrate the competency of the verification team and personnel in accordance with paragraph (g) above;

(i) a verification body shall:

(i) identify and select competent team personnel for each engagement;

(ii) ensure appropriate verification team composition for an aviation engagement;

(iii) ensure that a verification team includes a team leader who is responsible for the engagement planning and management of the team;

(iv) ensure continued competence of all personnel conducting verification activities, including continual professional development and training for verifiers to maintain and/or develop competencies; and

(v) conduct regular evaluations of the competence assessment process to ensure continued relevance for CAR 91 Subpart 10.

(j) a verification team and an independent reviewer, shall demonstrate knowledge of CAR 91 Subpart 10 and relevant ICAO CORSIA documents;

(k) a verification team and an independent reviewer, shall demonstrate knowledge in the following technical competencies:

(i) general technical processes in the field of civil aviation;

(ii) aviation fuels and their characteristics, including CORSIA eligible fuel;

(iii) fuel related processes including flight planning and fuel calculation;

(iv) relevant aviation sector trends or situations that may impact the CO_2 emissions estimate;

(v) CO_2 emissions quantification methodologies as outlined in this standard, including assessment of Emissions Monitoring Plans;

(vi) fuel use monitoring and measurement devices, and related procedures for monitoring of fuel use related to greenhouse gas emissions, including procedures and practices for operation, maintenance and calibration of such measurement devices;

(vii) greenhouse gas information and data management systems and controls, including quality management systems and quality assurance / quality control techniques;

(viii) aviation related IT systems such as flight planning software or operational management systems; and

(ix) knowledge of approved CORSIA Sustainability Certification Schemes relevant for CORSIA eligible fuels, including certification scopes.

(l) evidence of the technical competencies shall include previous and direct professional experience in a technical capacity within the aviation sector, complemented by appropriate training and education credentials;

(m) a verification team shall demonstrate knowledge of ISO 14064-3:2006, including demonstrated ability to develop a risk-based verification approach, perform verification procedures including assessing data and information systems and controls, collect sufficient and appropriate evidence and draw conclusions based on that evidence;

(n) evidence of data and information auditing expertise and competencies shall include previous professional experience in auditing and assurance activities, complemented by appropriate training and education credentials;

(o) a verification body shall document the roles and responsibilities of the verification personnel including contracted persons involved in the verification activity;

(p) a verification body shall not outsource the final decision on a verification and the issuance of a verification statement;

(q) an independent review shall only be outsourced as long as the outsourced service is appropriate, competent, and covered by the accreditation;

(r) a verification body shall ensure it has the express consent of an aeroplane operator prior to submission of a Verified Emissions Report, Emissions Unit Cancellation Report where applicable, and a Verification Report to the Executive Director. The mechanism for authorising this content shall be specified in the contract between a verification body and an aeroplane operator;

(s) a verification body shall keep records on the verification process for a minimum of ten years, including:

(i) client's Emissions Monitoring Plan, Emissions Report and Emissions Unit Cancellation Report where applicable;

(ii) Verification Report and related internal documentation;

(iii) identification of team members and criteria for selection of team; and

(iv) working papers with data and information reviewed by the team in order to allow for an independent party to assess the quality of the verification activities and conformance with verification requirements.

(t) a contract between a verification body and an aeroplane operator shall specify the conditions for verification by stating:

(i) the scope of verification, verification objectives, level of assurance, materiality threshold and relevant verification standards (ISO 14065, ISO 14064-3, CAR 91 Subpart 10 and the Environment Technical Manual);

(ii) amount of time allocated for verification;

(iii) flexibility to change time allocation if this proves necessary because of findings during the verification;

(iv) conditions which have to be fulfilled to conduct the verification such as access to all relevant documentation, personnel and premises;

(v) requirement of the aeroplane operator to accept the audit as a potential witness audit by national accreditation body's assessors;

(vi) requirement of the aeroplane operator to authorise the release of the Emissions Report, the Emissions Unit Cancellation Report, where applicable, and the Verification Report by the verification body to the Executive Director; and

(vii) liability coverage.

(2) A verification team shall conduct the Verification of Emissions Report and where applicable, the Emissions Unit Cancellation Report according to ISO 14064-3:2006, and the following additional requirements:

(a) When conducting the verification of an Emissions Report, a verification body shall perform sufficient procedures to conclude whether:

(i) greenhouse gas assertion is materially fair and an accurate representation of emissions over the period of the Emissions Report and is supported by sufficient and appropriate evidence;

(ii) an aeroplane operator has monitored, quantified and reported its emissions over the period of the Emissions Report in accordance with regulation CAR 91 Subpart 10 and the approved Emissions Monitoring Plan;

(iii) an aeroplane operator has correctly applied the method of flight attribution documented in the approved Emissions Monitoring Plan and in accordance with regulation CAR 91 Subpart 10, to ensure a correct attribution of leased aeroplane and international flights, as defined in regulation CAR 91 Subpart 10, operated by other aeroplane operators under the same corporate structure;

(iv) the state amount of emission reductions from the use of CORSIA eligible fuels is materially fair and an accurate representation of emissions reductions over the reporting period, and is supported by sufficient and appropriate internal and external evidence;

(v) the claimed batches of CORSIA eligible fuels have not also been claimed by the aeroplane operator under any other voluntary or mandatory schemes it has participated in (where the emission reductions from CORSIA eligible fuels may be claimed), during the current compliance period, as well as the compliance period immediately preceding it; and

(vi) the aeroplane operator has monitored, calculated and reported its emission reductions associated from the use of CORSIA eligible fuels over the period of the reporting period in accordance with this standard.

(b) When conducting the Verification of an Emissions Report, the scope of the verification shall reflect the period of time and information covered by the Report and the CORSIA eligible fuels claim(s) where applicable. This includes:

(i) CO_2 emissions from aeroplane fuel monitoring methods, calculated in accordance with regulation CAR 91 Subpart 10; and

(ii) Emissions reductions from the use of CORSIA eligible fuel.

(c) A verification boundary associated with the review of the CORSIA eligible fuel claim(s) shall include the following in an Emissions Report:

(i) any internal aeroplane operator procedures for CORSIA eligible fuels, including aeroplane operator controls to ensure the claimed CORSIA eligible fuels satisfies the CORSIA Sustainability Criteria;

(ii) checks for double claiming are limited to the specific aeroplane operator. Any findings outside of this scope are not relevant for the verification statement however they should still be included in the Verification Report for further consideration by the Executive Director;

(iii) assessment of verification risk with appropriate changes to the verification plan; and

(iv) assessment of whether there is sufficient access to relevant internal and external information to obtain sufficient confidence in each CORSIA eligible fuel claim

(v) where evidence of the sustainability or the size of the CORSIA eligible fuels claim is considered either inappropriate or insufficient, further information should be sought directly from the fuel producer with direct access facilitated through an aeroplane operator.

(d) When conducting the verification of an Emissions Report, the verification body shall apply the following materiality thresholds of:

(i) 2 percent for an aeroplane operator with annual emissions on international flights above 500 000 tonnes; and

(ii) 5 percent for an aeroplane operator with annual emissions on international flights equal or less than 500 000 tonnes of CO_2;

(iii) when conducting the verification of an Emissions Report, the over and understatements in sub-paragraph (i) shall be allowed to balance out in both cases.

(e) prior to the development of the verification approach, a verification body shall assess the risk of misstatements and non-conformities and their likelihood of a material effect on the basis of a strategic analysis of an aeroplane operator's greenhouse gas emissions information. A verification body shall revise the risk assessment and modify or repeat the verification activities to be performed;

(f) a verification team shall prepare a verification plan on the basis of the strategic analysis and assessment of risks. A verification plan shall include a description of the verification activities for each variable that has a potential impact on the reported emissions. The verification team shall consider the assessment of risk, and the requirement to deliver a verification opinion with reasonable assurance, when determining sample size;

(g) a verification plan shall include the following:

(i) verification team members, roles, responsibilities and qualifications;

(ii) any external resources required;

(iii) schedule of verification activities; and

(iv) sampling plan, including the processes, controls and information to be verified and details of the risk assessment conducted to identify these.

(h) an Emissions Report sampling plan shall include the following:

(i) number and type of records and evidence to be examined;

(ii) methodology used to determine a representative sample; and

(iii) justification for the selected methodology.

(i) when conducting the verification of an Emissions Unit Cancellation Report, the verification body shall not rely on sampling;

(j) a verification team shall confirm that the Emissions Report data has been collected in accordance with the approved Emissions Monitoring Plan and monitoring requirements specified in this technical standard;

(k) verification body shall carry out substantive data testing consisting of analytical procedures and data verification to assess the plausibility and completeness of data in accordance with the Emissions Report sampling plan;

(l) a verification team shall, as a minimum, assess the plausibility of fluctuations and trends over time or between comparable data items as well as identify and assess immediate outliers, unexpected data, anomalies, and data gaps;

(m) verification and sampling plans shall be amended, depending on the outcome of Emissions Report data testing and assessment, the assessment of risk, where necessary;

(n) a verification body shall use an independent reviewer not involved in the verification activities to assess the internal verification documentation, and the Verification Report, prior to its submission to an aeroplane operator and the Executive Director;

(o) the scope of the independent review includes the complete verification process and shall be recorded in the internal verification documentation;

(p) an independent review shall be performed to ensure that the verification process has been conducted in accordance with provisions of Technical Standard 91 and ISO 14065:2013, ISO 14064-3:2006 and that the evidence gathered is appropriate and sufficient to enable a verification body to issue a Verification Report with reasonable assurance;

(q) a verification body shall submit a copy of the Verification Report to an aeroplane operator and upon authorisation by an aeroplane operator, a verification body shall forward a copy of the Verification Report together with the Emissions Report, where applicable, the Emissions Unit Cancellation Report, or both, to the Executive Director;

(r) a Verification Report shall include:

  (i) names of the verification body and verification team members;

  (ii) time allocation (including any revisions and dates);

  (iii) scope of the verification;

  (iv) main results of impartiality and avoidance of conflict of interest assessment;

  (v) criteria against which the Emissions Report was verified;

  (vi) aeroplane operator information and data used by the verification body to cross-check data and carry out other verification activities;

  (vii) main results of the strategic analysis and assessment of risk;

  (viii) description of verification activities undertaken, where each was undertaken (on-site vs off-site) and results of checks made on the CO_2 emissions information system and controls;

  (ix) description of data sampling and testing conducted, including records or evidence sampled, sample size, and sampling method(s) used;

(x) the results of all data sampling and testing, including cross-checks;

(xi) compliance with the Emissions Monitoring Plan;

(xii) any non-compliances of the Emissions Monitoring Plan with this standard;

(xiii) non-conformities and misstatements identified (including a description of how these have been resolved);

(xiv) conclusions on data quality and materiality;

(xv) conclusions on the verification of the Emissions Report;

(xvi) where applicable, conclusions on the verification of the Emissions Unit Cancellation Report;

(xvii) justifications for the verifications opinion made by the verification body;

(xviii) results of the independent review and the name of the independent reviewer; and

(xix) concluding verification statement.

(s) a verification body shall provide a conclusion on each of the verification objectives listed, as applicable, in the concluding verification statement;

(t) when conducting the verification of an Emissions Report or an Emissions Unit Cancellation Report, the verification body shall choose between two types of verification opinion statements, either ‘verified as satisfactory’ or ‘verified as not satisfactory’;

(u) if a Report includes non-material misstatements and/or non-material non-conformities, the Report shall be ‘verified as satisfactory with comments’, specifying the misstatements and non-conformities;

(v) if a Report contains material misstatements and/or material non-conformities, or if the scope of the verification is too limited or a verification body is not able to obtain sufficient confidence in the data, then the Report shall be ‘verified as not satisfactory’;

(w) on request of the Executive Director, a verification body shall disclose the internal verification documentation on a confidential basis; and

(x) a verification body shall notify the Executive Director where a previously issued Verification Statement is rendered invalid or inaccurate.

(3) The list of verification bodies, accredited in each State, is included within the ICAO document, titled: “CORSIA Central Registry (CCR): Information and Data for Transparency”, that is available on the ICAO CORSIA website.

(4) When verifying the production records of CORSIA eligible fuels, that an aeroplane operator purchases:

(a) an aeroplane operator shall share the results of the audit with the fuel producer, so that the producer may make it available to other aeroplane operators seeking assurance on the fuel producer’s internal processes.

(b) the quality control assurances of CORSIA eligible fuel producers, shall include declarations and process certifications, with periodic audits by verifiers, purchasers, or trusted entities. The process certifications, including the sustainability credentials, shall provide assurance that the CORSIA eligible fuel producer has established business processes to prevent double counting, and the periodic audits shall verify that the producer is following their established procedures. Purchasers may elect to independently audit the production records of the CORSIA eligible fuel producer in order to provide further assurance.

91.10.15 CO_2 OFFSETTING REQUIREMENTS

(1) The Minister of Works and Transport shall notify ICAO of any change in the decision of Namibia to voluntarily participate or to discontinue its voluntary participation in CORSIA, for the purpose of the inclusion of Namibia in the ICAO document titled "CORSIA States for Chapter 3 State Pairs", according to the timeline described in Appendix 1.

(2) The amount of CO_2 emissions, required to be offset by an aeroplane operator in a given year, from 1 January 2021 to 31 December 2035, prior to the consideration of the CORSIA eligible fuels, shall be calculated by the Authority, as follows:

$$OR_y = OE * SGF_y$$

Where:

OR_y = aeroplane operator's offsetting requirements in the given year y;

OE = aeroplane operator's CO_2 emissions covered by sub regulation (1) in the given year *y* or aeroplane operator's CO_2 emissions covered by sub regulation (1) in 2020, depending upon the option selected by the Authority which will be applied to all aeroplane operators that have been attributed to it; and SGF_y = Sector's Growth Factor, calculated as follows:

$$\textit{Sectoral growth factor in a given year y (from 2021)} = \frac{SE_y - SE_B}{SE_y}$$

(3) The amount of CO_2 emissions, required to be offset by an aeroplane operator in a given year, from 1 January 2024 to 31 December 2035, prior to the consideration of the CORSIA eligible fuels, shall be calculated by the Authority every year as follows:

$$OR_y = \%S_y * (OE_y * SGF_y) + \%O_y * (OE_y * OGF_y)$$

Where:

OR_y = aeroplane operator's offsetting requirements in a given year *y*;

OE_y = aeroplane operator's CO_2 emissions covered by sub regulation (1) in the given year *y*;

$\%S_y$ = percent Sectoral in the given year *y*;

$\%O_y$ – percent individual in the given year *y* where $\%O_y = (100\%-\%S_y)$;

SGF_y = Sector's Growth Factor; and

OGF_y = aeroplane operator's Growth Factor.

(4) An aeroplane operator's Growth Factor for a given year (OGF_y) shall be calculated by the Authority, in accordance with the CO_2 emissions, from the aeroplane operator's verified Emissions Report, as follows:

$$OGF_y = \frac{OEy - OE_{B,y}}{OEy}$$

Where:

OE_y = Total aeroplane operator's CO_2 emissions covered by sub regulation (1) in the given year *y*; and

$OE_{B,Y}$ = Average total annual aeroplane operator's CO_2 emissions during 2019 and 2020 covered by sub regulation (1) in the given year *y*;

(5) An aeroplane operator shall be informed by the Authority, of its offsetting requirements, according to the timeline defined in NAM-CATS 91 Subpart 10.

Note. – The ICAO document entitled "CORSIA States for Chapter 3 State Pairs", that is available on the ICAO CORSIA website, includes:

(a) States that have volunteered to participate during the compliance period 1 January 2021 to 31 December 2026;

(b) States, with the exception of Least Developed Countries (LDCs), Small Island Developing States (SIDS) and Landlocked Developing Countries (LLDCs), which meet the following criteria, during the compliance periods from 1 January 2027 to 31 December 2035 having –

(i) an individual share of international aviation activities in RTKs in the year 2018 above 0.5 per cent of total RTKs; or

(ii) whose cumulative share in the list of States from the highest to the lowest amount of RTKs reaches 90 per cent of total RTKs in the year 2018; and

(c) States which are not within the applicability scope of paragraph (b), but who have volunteered to participate.

91.10.16 TOTAL FINAL CO2 OFFSETTING REQUIREMENTS FOR A GIVEN COMPLIANCE PERIOD WITH EMISSIONS REDUCTIONS FROM THE USE OF CORSIA ELIGIBLE FUELS

(1) The amount of CO_2 emissions, required to be offset by an aeroplane operator, after taking into account emissions reductions from the use of CORSIA eligible fuels, in a given compliance period, from 1 January 2021 to 31 December 2035, shall be calculated by the Authority as follows:

$$FOR_c = (OR_{1,c} + OR_{2,c} + OR_{3,c}) – (ER_{1,c} + ER_{2,c} + ER_{3,c})$$

Where:

FOR_c = Aeroplane operator's total final offsetting requirements in the given compliance period *c*;

$OR_{y,c}$ = Aeroplane operator's offsetting requirements in the given year *y* (where *y* = 1, 2 or 3) of the compliance period *c*; and

$ER_{Y,C}$ = Emissions reductions from the use of CORSIA eligible fuels in the given year *y* (where *y* = 1, 2 or 3) of the compliance period *c*.

(2) If the total final offsetting requirements of an aeroplane operator, during a compliance period FOR_c, is negative, then the aeroplane operator has no offsetting requirements for the compliance period. These negative offsetting requirements shall not be carried forward to subsequent compliance periods.

(3) The total final offsetting requirements of an aeroplane operator, during a compliance period FOR_c, shall be rounded up to the nearest tonne of CO_2.

(4) An aeroplane operator shall be informed by the Authority, of its total final offsetting requirements, for a given compliance period, according to the timeline defined in Document NAM-CATS 91;

(5) An aeroplane operator who intends to claim for emissions reductions from the use of CORSIA eligible fuels, in a given year, shall compute reductions as follows:

$$\mathrm{ERy} = \mathrm{FCF} * \left[\sum_{f} \mathrm{MS}f, y * \left(1 - \frac{\mathrm{LSf}}{LC}\right) \right]$$

Where:

ER_y = Emissions reductions from the use of CORSIA eligible fuels in the given year *y* (in tonnes);

FCF = Fuel conversion factor, equal to 3.16 kg CO_2/kg fuel for Jet-A fuel / Jet-A1 fuel and 3.10 kg CO_2/kg fuel for AvGas or Jet-B fuel;

$MS_{f,y}$ = Total mass of a neat CORSIA eligible fuel claimed in the given year *y* (in tonnes), as described and reported in the Emissions Report as prescribed in Document NAM-CATS 91;

LS_f = Life cycle emissions value for a CORSIA eligible fuel (in gCO_2e/MJ);

LC = Baseline life cycle emissions values for aviation fuel, equal to 89 gCO_2e/MJ for jet fuel and equal to 95 gCO_2e/MJ for AvGas; and

The ratio $1 - \frac{LS_f}{LC}$ is also referred to as the emissions reduction factor (ERF_f) of a CORSIA eligible fuel.

(6) An aeroplane operator, using a Default Life Cycle Emissions value, shall use the ICAO document entitled "CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels", that is available on the ICAO CORSIA website, for the calculation in sub regulation (1).

(7) An aeroplane operator using an Actual Life Cycle Emissions value, shall engage an approved Sustainability Certification Scheme to ensure that the methodology, as defined in the ICAO document entitled "CORSIA Methodology for Calculating Actual Life Cycle Emissions Values" that is available on the ICAO CORSIA website, has been applied correctly.