



Republic of the Philippines
CIVIL AVIATION REGULATIONS (CAR)
PART 7
INSTRUMENT AND EQUIPMENT

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Republic of the Philippines
 Department of Transportation and Communications
CIVIL AVIATION AUTHORITY OF THE PHILIPPINES
 1300 MIA Road, Pasay City, Metro Manila
 www.caap.gov.ph

BOARD RESOLUTION NO. 2011-025

WHEREAS, the Civil Aviation Authority of the Philippines (CAAP) was created by virtue of Republic Act 9497 which took effect on 23 March 2008;

WHEREAS, under Section 23, paragraph (j) of the same law, the Board is empowered to promulgate rules and regulations as may be necessary in the interest of safety in air commerce pertaining to the issuance of the airman's certificate including the licensing of operating and mechanical personnel, type certificate for aircraft, aircraft engines, propellers and appliances, airworthiness certificates, air carrier operating certificates, air agency certificates, navigation facility and aerodrome certificates; air traffic routes; radio and aeronautical telecommunications and air navigation aids; aircraft accident inquiries; aerodromes, both public and private-owned; construction of obstructions to aerodromes; height of buildings, antennae and other edifices; registration of aircraft; search and rescue; facilitation of air transports; operations of aircraft, both for domestic and international, including scheduled and non-scheduled; meteorology in relation to civil aviation; rules of the air; air traffic services; rules for prevention of collision of aircraft, identification of aircraft; rules for safe altitudes of flight; and such other rules and regulations, standards, governing other practices, methods and/or procedures as the Director General may find necessary and appropriate to provide adequately for safety regularity and efficiency in air commerce and air navigation;

WHEREAS, in the October 2009 ICAO-USOAP and 2010 EASA Audits, it was noted that portion of the Philippine Civil Aviation Regulations (PCAR) of 2008 is outdated and requires amendments/revisions;

WHEREAS, the CAAP Board of Directors, in its 03 March 2011 Board Meeting, approved the request of the Director General to initiate amendments and or revision of the Philippine Civil Aviation Regulations of 2008, subject to public consultations/hearings;

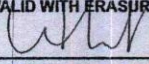
WHEREAS, the proposed PCARs cover the following regulatory/oversight functions:

- Part I General Policies, Procedures, Definitions
- Part II Personnel Licensing
- Part III Approved Training Organizations
- Part IV Aircraft Registration and Markings

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[Signature] 05-27-2011
AIDA S. ROMULO
 Chief, Central Records
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|-----------|---|
| Part V | Airworthiness |
| Part VI | Approved Maintenance Organizations |
| Part VII | Instruments and Organization |
| Part VIII | Operations |
| Part IX | Air Operator Certification and Administration |
| Part X | Commercial Air Transport by Foreign Air Carriers within Republic of the Philippines |
| Part XI | Aerial Work and Non-certificated Aircraft: Operating Limitations |

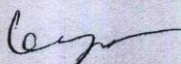
WHEREAS, the Board finds the 2011 Revised Philippine Civil Aviation Regulation (PCAR) sufficient in form and substance, and fully comply with the standards set forth by FAA/ICAO/EASA;

WHEREFORE, RESOLVE, as it is hereby **RESOLVED**, that the 2011 Revised Philippine Civil Aviation Regulations Parts I to XI be **APPROVED**, and shall be valid and effective upon completion of the requisite publication and a copy filed with the University of the Philippines Law Center-Office of the National Administrative Register (UP-ONAR);

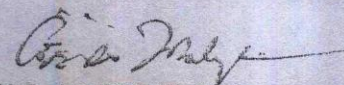
RESOLVED further that the Director General shall fully implement the approved, 2011 Revised PCAR Parts I to XI with the accompanying information campaign to the Philippine civil aviation industry.

Adopted this 11th day of April 2011 at the Department of Transportation and Communications, Columbia Tower, Mandaluyong City.

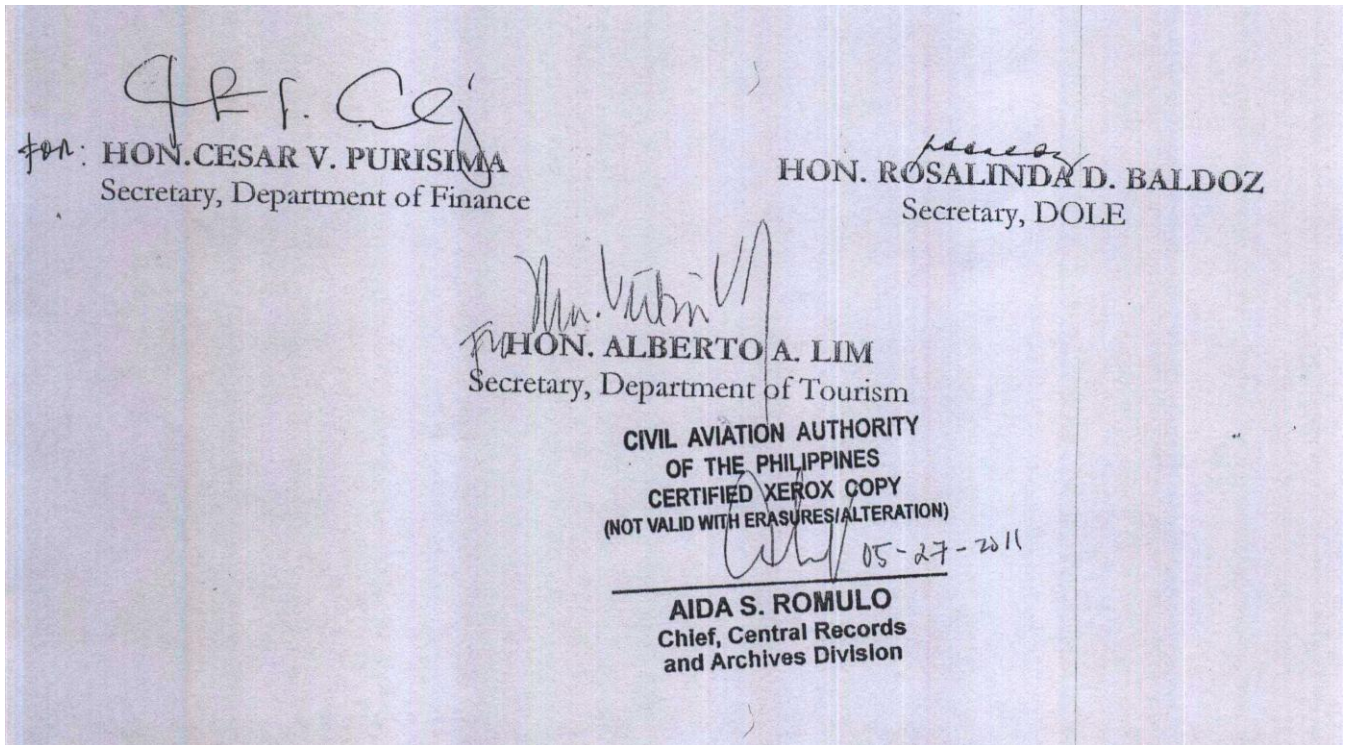
HON. JOSE P. DE JESUS
Chairman/Secretary, DOTC


HON. RAMON S. GUTIERREZ
Vice-Chairman/Director General, CAAP

HON. LEILA M. DE LIMA
Secretary, Department of Justice


HON. ALBERT F. DEL ROSARIO
Secretary, Department of Foreign Affairs

HON. JESSE M. ROBREDO
Secretary, DILG



RECORD OF AMENDMENTS

| Amendment No. | Date | Subject | Incorporated By |
|------------------|-----------------|--|--|
| Original Issue | 23 June 2008 | | Ruben F. Ciron |
| First Amendment | 21 March 2011 | 1. 7.2.9 Navigation Equipment | Ramon S. Gutierrez |
| Second Amendment | 01 August 2013 | Inserted vertical bars on the previous amendments | LT GEN William K Hotchkiss III AFP (Ret) |
| Third Amendment | 31 October 2013 | <ol style="list-style-type: none"> 1. Abbreviations <ul style="list-style-type: none"> • EVS – Enhanced Vision System • HUD – Head-up Display 2. 7.2.8 Navigation equipment for operations in RVSM airspace. 3. 7.2.11 Airplanes equipped with head-up displays (HUD) and/or enhanced vision system (EVS). (New Subtitle base on Annex 6 amendment 33, 34, 35 and 36.) 4. 7.7 Flight Recorders, 7.7.1 General Requirement, 7.7.1.1 Construction and installation, 7.7.1.2 Operation, 7.7.1.3 Continued Serviceability and inspection of flight recorder systems, 7.7.1.4 Flight recorder electronic documentation, and 7.7.1.5 Combination recorders. (New Subtitle base on Annex 6 amendment 33, 34, 35 and 36.) 5. 7.7.2 Flight data recorders (FDR) and aircraft data recording systems (ADRS), 7.7.2.1 Types and parameters, 7.7.2.2 Aircraft equipment for operation, 7.7.2.3 Discontinuation, and 7.7.2.4 Duration. (New | LT GEN William K Hotchkiss III AFP (Ret) |

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|--|--|--|--|
| | | <p>Subtitle base on Annex 6 amendment 33, 34, 35 and 36.)</p> <p>6. 7.7.3 Cockpit voice recorders (CVR) and cockpit audio recording systems (CARS), 7.7.3.1 Signals to be recorded – CVR and CARS, 7.7.3.2 Aircraft equipment for operations, 7.7.3.3 Discontinuation, 7.7.3.4 Duration, and 7.7.3.5 Cockpit voice recorder alternate power. (New Subtitle base on Annex 6 amendment 33, 34, 35 and 36.)</p> <p>7. 7.7.4 Data link recorders (DLR) and data link recording systems (DLRS), 7.7.4.1 Applicability, 7.7.4.2 Duration, and 7.7.4.3 Correlation. (New Subtitle base on Annex 6 amendment 33, 34, 35 and 36.)</p> <p>8. 7.7.5 Airborne image recorder (AIR) and airborne image recording system (AIRS) (New Subtitle base on Annex 6 amendment 33, 34, 35 and 36.)</p> <p>9. 7.8.6 Portable fire extinguishers.</p> <p>10. 7.8.11 First-aid kit, universal precaution kit and emergency medical kit.</p> <p>11. 7.8.17 Life raft</p> <p>12. IS: 7.7.1.3 Continued Serviceability and inspection of flight recorder systems</p> <p>13. IS: 7.7.2.1 (A) Flight data recorders – type and parameters – airplane (new</p> | |
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|-------------------|-----------------|--|--|
| | | <p>Subtitle base on Annex 6 amendment 33, 34, 35 and 36.)</p> <p>14. IS: 7.7.2.1 (B) Flight data recorders – type and parameters – helicopters (new Subtitle base on Annex 6 amendment 33, 34, 35 and 36.)</p> <p>15. IS: 7.7.2.2 Aircraft equipment for operation – Aircraft data recording systems (ADRS) (New Subtitle base on Annex 6 amendment 33, 34, 35 and 36.)</p> <p>16. IS 7.7.4.1 Data link recorder applicability. (New Subtitle base on Annex 6 amendment 33, 34, 35 and 36.)</p> <p>17. IS: 7.8.11 First-aid kit, universal precaution kit and emergency medical kit. (New Subtitle base on Annex 6 amendment 33, 34, 35 and 36.)</p> | |
| Fourth Amendment | 13 January 2014 | 1. 7.3.1 Radio Equipment | LT GEN William K Hotchkiss III AFP (Ret) |
| Fifth Amendment | 17 August 2016 | <p>1. 7.8.6 Portable Fire Extinguishers (c) (1) and (2)</p> <p>2. 7.8.7 Lavatory Fire Extinguisher (c) (1) and (2)</p> | Capt. Antonio G. Buendia, Jr. |
| Sixth Amendment | 18 October 2016 | 1. 7.6.7 Airborne Collision Avoidance System II (ACAS II) | Captain Jim C. Sydiongco |
| Seventh Amendment | 01 July 2016 | <p>1. 7.8.6 Portable and Equipment</p> <p>2. 7.1.3 Abbreviations</p> <ul style="list-style-type: none"> • CVS • COMAT • EFB • EUROCAE • LED | Captain Jim C. Sydiongco |

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|--------------------|------------------|---|-------------------------|
| | | <ul style="list-style-type: none"> • NVIS • RTCA • SVS <ol style="list-style-type: none"> 3. 7.2.11 Airplanes Equipped with automatic landing system, a head-up displays (HUD) or equipment displays, enhanced vision system (EVS), synthetic vision system (SVS) and/or combined vision system (CVS) 4. 7.3.3 Altitude reporting transponder (c) 5. 7.4.1 Aircraft lights and instrument illumination (a) (7) 6. 7.7 Flight recorders 7. 7.7.1 General requirements 8. 7.7.1.1 Construction and installation 9. 7.7.2.2 Aircraft equipment for operation 10. 7.7.5 Airborne image recorder (AIR) and airborne image recording system (AIRS) 11. IS: 7.7.1.3 Continued serviceability and inspection of flight recorder system 12. 7.8.19 Aircraft underwater locator beacon (new) | |
| Eighth Amendment | 23 November 2017 | <ol style="list-style-type: none"> 1. 7.8.11 First-aid kit, Universal precaution kit and emergency medical kit 2. 7.8.19 Aircraft Underwater Locator Beacon | Captain Jim C. Sydiongo |
| Ninth Amendment | 23 March 2018 | <ol style="list-style-type: none"> 1. 7.6.7 Airborne Collision Avoidance System II (ACAS) (d) | Captain Jim C. Sydiongo |
| Tenth Amendment | 20 March 2019 | <ol style="list-style-type: none"> 1. 7.8.11 First-aid Kit, Universal Precaution Kit and Emergency Medical Kit (c) (1) | Captain Jim C. Sydiongo |
| Eleventh Amendment | 29 January 2020 | <ol style="list-style-type: none"> 1. 7.3 Communication and | Captain Jim C. |

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|-----------------------|------------------|--|----------------------------------|
| | | Surveillance Equipment 2. 7.3.1 Radio Equipment (i) | Sydiongco |
| Twelfth Amendment | 24 February 2020 | 1. 7.2.10.1 Electronic Flight Bag (EFB) 2. 7.2.10.1.1 EFB Equipment 3. 7.2.10.1.2 EFB Functions 4. 7.2.10.1.3 EFB Operational Approval | Captain Jim C. Sydiongco |
| Thirteenth Amendment | 09 June 2020 | 1. 7.7.5 Airborne Image Recorder (AIR) and Airborne Image Recording System (AIRS) (a) (3) 2. 7.8.11 First-Aid Kit, Universal Precaution Kit and Emergency Medical Kit (a) (1) | Captain Jim C. Sydiongco |
| Fourteenth Amendment | 09 February 2022 | 1. 7.2.9 Navigation Equipment - General (a), (c), (d) and (e) 2. 7.3.1 Radio Equipment (i), (j) and (k) 3. 7.3.2 Crew Member Interphone System 4. 7.3.4 Surveillance Equipment 5. 7.3.5 Installation 6. 7.7.3.2 Aircraft Equipage for Operations 7. 7.7.3.4 Duration 8. 7.7.6 Flight Recorder Data Recovery | Captain Jim C. Sydiongco |
| Fifteenth Amendment | 28 April 2022 | 1. 7.7.3.4 Duration (b) | Captain Jim C. Sydiongco |
| Sixteenth Amendment | 06 May 2022 | 1. 7.2.10.1 Electronic Flight Bag (EFB) Note 1 and 2 | Captain Jim C. Sydiongco |
| Seventeenth Amendment | 21 November 2022 | 1. 7.2.2 Minimum Flight and Navigational Instruments (c) | Captain Manuel Antonio L. Tamayo |
| Eighteenth Amendment | 21 February 2023 | 1. 7.6.9 Location of an Airplane in Distress | Captain Manuel Antonio L. Tamayo |
| Nineteenth Amendment | 29 August 2023 | 1. 7.2.11 Airplanes Equipped with Automatic Landing Systems, A Head-Up Displays (HUD) or Equivalent Displays, Enhanced Vision Systems (EVS), Synthetic Vision | Captain Manuel Antonio L. Tamayo |

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| | | <p>Systems (SVS) and/or Combined Vision Systems (CVS) (a) and delete (b)</p> <ol style="list-style-type: none"> 2. 7.2.12 Turbine Aeroplane – Runway Overrun Awareness and Alerting System (ROAAS) 3. 7.6.5 Ground Proximity Warning System (a) (1) 4. 7.7.1.1 Construction and Installation (e) and (f) 5. 7.8.16 Individual Flotation Devices Note 6. IS: 7.7.1.3 Continued Serviceability and Inspection of Flight Recorder Systems (e) (1) and (2) | |
| Twentieth Amendment | 12 December 2025 | <ol style="list-style-type: none"> 1. 7.2.8 Navigation Equipment for Operations in RVSM Airspace 2. IS: 7.2.8 Navigation Equipment for Operations in RVSM Airspace | LT GEN Raul L Del Rosario AFP (Ret) |

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INTRODUCTION

CAR Part 7 presents standards and recommended practices as regulatory requirements for instruments and equipment on aircraft expected to operate in the Republic of the Philippines.

The requirements in Part 7 address two categories of aircraft operations. The sections of Part 7 applicable to all aircraft address minimum requirements, and are noted by the key [AAC] preceding the particular section. It is important to note that the AAC designation applies to all aircraft and AOC Holder [AOC] categories unless other, more specific regulations supplant the [AAC] requirement. In some instances, certain items such as Mach meters or sea anchors apply only to aircraft with performance characteristics requiring such items. Some [AAC] requirements apply to passenger-carrying aircraft. In such instances, the requirement addresses the operation of any passenger-carrying aircraft, most particularly corporate aircraft, that may have performance and range capabilities matching the type of aircraft operated by commercial air transport entities or AOC holders. Similarly, some equipment specified for [AOC] aircraft have sections keyed as [AAC]. In such instances, if a non- [AOC] aircraft is fitted with such equipment, the equipment characteristics must comply with the applicable sections designated [AAC].

The key [AOC] applies to AOC holders operating in the Republic of the Philippines, whether on domestic or international flights.

Certain sections, such as those addressing MNPS airspace, may not address airspace contiguous to the Republic of the Philippines, but anticipate that the Republic of the Philippines AOC holder's aircraft may operate through such airspace in the course of commerce. Such requirements are intended to facilitate the integration of the Republic of the Philippines AOC holders into such operations.

As in other Parts of these Regulations, operators of aircraft operated in the Republic of the Philippines but registered in another Contracting State must notify the Authority in the Republic of the Philippines when alterations, major repairs or major alterations are made to the aircraft. The Republic of the Philippines may have unique territorial or geographic features that may affect the operation of aircraft, and must be kept informed of the condition of aircraft operated within its borders. Part 7 includes survival equipment requirements that may apply to the Republic of the Philippines.

7.1 GENERAL**7.1.1 APPLICABILITY**

- (a) Part 7 prescribes the minimum instrument and equipment requirements for all aircraft in all operations.
- (b) Part 7 requirements use the following key designators—
 - (1) AAC: all aircraft, including AOC holders appropriate to the subject of the regulations, e.g., an AAC, all aircraft regulation may only refer to seaplanes, but will include AOC seaplanes;
 - (2) AOC: Where AOC requirements are redundant to AAC requirements, or more detailed, the AOC requirements will be followed.
- (c) The statement, “Individual Certificate of Airworthiness First Issued” shall mean individual certificate of airworthiness of the first production aircraft under the type certificate.

7.1.2 RESERVED**7.1.3 ABBREVIATIONS**

The following abbreviations are used in Part 7:

ADF – Automatic Direction Finder

AOC - Air Operator Certificate

DH – Decision Height

DME – Distance Measuring Equipment

CVS – Combined Vision System

COMAT – Operator Material

EFB – Electronic Flight Bag

ELT – Emergency Locator Transmitter

EUROCAE – European Organization for Civil Aviation Equipment

EVS – Enhanced Vision System

HUD – Head-up Display

ILS – Instrument Landing System

IFR – Instrument Flight Rating

IMC - Instrument Meteorological Conditions

LED – Light Emitting Diode

LRNS - Long Range Navigation Systems

MEL – Minimum Equipment List (Part 1)

MHz - Megahertz

MLS – Microwave Landing System

MNPS - Minimal Navigation Performance Specifications

NDB – Non-Directional Beacon

NVIS – Night Vision Imaging Systems
PBE - Protective Breathing Equipment
RCP - Required Communication Performance
RVSM – Reduced Vertical Separation Minimum
RTCA – Radio Technical Commission for Aeronautics
SSR – Secondary Surveillance Radar
SVS – Synthetic Vision System
VFR – Visual Flight Rules
VMC - Visual Meteorological Conditions
VOR – VHF Omnidirectional Range
VSM – Vertical Separation Minimum

7.1.4 GENERAL INSTRUMENT AND EQUIPMENT REQUIREMENTS

- (a) [AAC] In addition to the minimum equipment necessary for the issuance of a certificate of airworthiness, the instruments, equipment and flight documents prescribed in Part 7 shall be installed or carried, as appropriate, in aircraft according to the aircraft used and to the circumstances under which the flight is to be conducted.
- (b) [AAC] All required instruments and equipment shall be approved and installed in accordance with applicable airworthiness requirements.
- (c) [AAC] Prior to operation in the Republic of the Philippines of any aircraft not registered in the Republic of the Philippines that uses an airworthiness inspection program approved or accepted by the State of Registry, the owner/operator shall ensure that instruments and equipment required by the Republic of the Philippines but not installed in the aircraft are properly installed and inspected in accordance with the requirements of the State of Registry.
- (d) [AAC] An operator shall ensure that a flight does not commence unless the required equipment—
 - (1) Meets the minimum performance standard and the operational and airworthiness requirements;
 - (2) Is installed such 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; and
 - (3) Is in operable condition for the kind of operation being conducted, except as provided in the MEL.
- (e) [AAC] If equipment is to be used by one flight crew member at his station during flight, it shall be installed so as to be readily operable from his or her station.
- (f) [AAC] When a single item of equipment is required to be operated by more than one flight crew member, it shall be installed so that the equipment is readily operable from any station at which the equipment is required to be operated.

7.2 FLIGHT AND NAVIGATIONAL INSTRUMENTS

7.2.1 GENERAL REQUIREMENTS

- (a) [AAC] All aircraft shall be equipped with flight and navigational instruments which will enable the flight crew to—
 - (1) Control the flight path of the aircraft;
 - (2) Carry out any required procedural maneuvers;
 - (3) Observe the operating limitations of the aircraft in the expected operating conditions; and
 - (4) In the event of the failure of one item of equipment at any stage of the flight operate the aircraft with the remaining navigation equipment in accordance with its operational flight plan and the requirements of ATS.
- (b) [AAC] When a means is provided for transferring an instrument from its primary operating system to an alternative system, the means shall include a positive positioning control and shall be marked to indicate clearly which system is being used.
- (c) [AAC] Those instruments that are used by any one flight crew member shall be so arranged as to permit the flight crew member to see the indications readily from his station, with the minimum practicable deviation from the position and line of vision which he normally assumes when looking forward along the flight path.

7.2.2 MINIMUM FLIGHT AND NAVIGATIONAL INSTRUMENTS

- (a) [AAC] No person may operate any aircraft unless it is equipped with the following flight and navigational instruments:
 - (1) An airspeed indicator;
 - (2) A sensitive pressure altimeter, adjustable for any barometric pressure likely to be set during flight;
 - (3) A vertical speed indicator;
 - (4) A turn and slip indicator, or a turn coordinator incorporating a slip indicator;
 - (5) A magnetic compass;
 - (6) A means of indicating in the flight crew compartment the outside air temperature;
 - (7) An accurate timepiece indicating the time in hours, minutes and seconds (approval not required).
- (b) [AAC] Whenever an aircraft is operating at night or when two pilots are required, each pilot's station shall have separate flight instruments as listed in (a) and additionally as follows:
 - (1) An attitude indicator (artificial horizon); and
 - (2) A stabilized direction indicator (directional gyroscope).
- (c) Aircraft solely used for agricultural air operations, classified under restricted category, may not fully comply with the required instruments provided in the preceding paragraphs as long as its flight and navigational instruments are present per its type definition.

Note: These flight and navigational instruments are listed in the aircraft flight manual or equivalent issued by the aircraft manufacturer or type design approval holder.

7.2.3 IFR INSTRUMENTS

- (a) [AAC] All aircraft when operated in IFR, or at night, or when the aircraft cannot be maintained in a desired attitude without reference to one or more flight instruments, shall be equipped with the flight instruments as listed in 7.2.2 and additionally as follows —
- (1) An airspeed indicating system with a means of preventing malfunctioning due to either condensation or icing;
 - (2) A sensitive pressure altimeter with counter drum-pointer or equivalent presentation, calibrated in feet with a sub-scale setting calibrated in hectopascals/millibars, adjustable for any barometric pressure likely to be set during flight;
 - (3) A means of indicating whether the supply of power to the gyroscopic instruments is adequate.
- (b) [AAC] No person may 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 navigation equipment in accordance with the requirements of air traffic services in the area(s) of operation, but not less than:
- (1) One VOR receiving system, one ADF system, one DME and one Marker Beacon receiving system;
 - (2) One ILS or MLS where ILS or MLS is required for approach navigation purposes;
 - (3) An Area Navigation System when area navigation is required for the route being a flown;
 - (4) An additional VOR receiving system on any route, or part thereof, where navigation is based only on VOR signals; and
 - (5) An additional ADF system on any route, or part thereof, where navigation is based only on NDB signals.
- (c) [AAC] All aircraft intended to land in IMC or at night shall be provided with radio navigation equipment capable of receiving signals providing guidance to—
- (1) A point from which a visual landing can be effected; or
 - (2) Each aerodrome at which it is intended to land in IMC; and
 - (3) Any designated alternate aerodromes.
- (d) [AOC] No person may conduct single pilot IFR operations unless the aircraft is equipped with an autopilot with at least altitude hold and heading mode.

7.2.4 STANDBY ATTITUDE INDICATOR

- (a) [AAC] No person may operate an airplane with a maximum certified take-off mass exceeding 5,700 kg, aircraft having a maximum approved passenger seating configuration of more than 9 seats and all helicopters when operating in accordance with IFR, unless it is equipped with a single standby attitude indicator (artificial horizon) that—
- (1) Operates independently of any other attitude indicating system;
 - (2) Is powered continuously during normal operation; and

- (3) After a total failure of the normal electrical generating system, is automatically powered for the purpose of operating and illuminating for a minimum of 30 minutes from a source independent of the normal electrical generating system.
- (b) [AAC] When the standby attitude indicator is being operated by emergency power, it shall be clearly evident to the flight crew.
- (c) [AAC] Where the standby attitude indicator has its own dedicated power supply there shall be an associated indication, either on the instrument or on the instrument pane when this supply is in use.
- (d) [AAC] If the standby attitude instrument system is installed and usable through flight attitudes of 360° of pitch and roll, the turn and slip indicators may be replaced by slip indicators

7.2.5 INSTRUMENTS AND EQUIPMENT FOR CATEGORY II OPERATIONS

- (a) The instruments and equipment listed in this subsection shall be installed, approved and maintained in accordance with IS: 7.2.5 for each aircraft operated in a Category II operation:

Note: This subsection does not require duplication of instruments and equipment required by subpart 7.2.2 or any other provisions of Part 7.

(1) Group I

Is comprised of the following equipment and this equipment must be inspected both within three calendar months of the previous inspection and must also have a bench inspection within 12 months of the previous bench inspection using procedures contained in the approved maintenance program.

- (i) Two localizer and glide slope receiving systems.

Note: Each system shall provide a basic ILS display and each side of the instrument panel must have a basic ILS display. However, a single localizer antenna and a single glide slope antenna may be used.

- (ii) A communications system that does not affect the operation of at least one of the ILS systems.
- (iii) A marker beacon receiver that provides distinctive aural and visual indications of the outer and the middle markers.
- (iv) Two gyroscopic pitch and bank indicating systems.
- (v) Two gyroscopic direction indicating systems.
- (vi) Two airspeed indicators.
- (vii) Two sensitive altimeters adjustable for barometric pressure, having markings at 20 foot intervals and each having a placarded correction for altimeter scale error and for the wheel height of the aircraft.
- (viii) One self-monitoring radio altimeter with dual display.
- (ix) Two vertical speed indicators.
- (x) A flight control guidance system that consists of either an automatic approach coupler or a flight director system.

Note: A flight director system must display computed information as steering command in relation to an ILS localizer and, on the same instrument, either computed information as pitch command in relation to an ILS glide slope or

basic ILS glide slope information. An automatic approach coupler must provide at least automatic steering in relation to an ILS localizer. The flight control guidance system may be operated from one of the receiving systems required by paragraph (a)(1)(i).

- (xi) For Category II operations with decision heights below 150 feet a radio altimeter is required.

(2) Group II

Is comprised of the following equipment and this equipment which, with the exception of the static system, does not require special maintenance procedures other than those necessary to retain the original approval condition. Group II equipment must be inspected within 12 months of the previous inspection using procedures contained in the approved maintenance program.

- (i) Warning systems for immediate detection by the pilot of system faults in items (a)(1)(i), (a)(1)(iv), (a)(1)(vi) and (a)(1)(ix), of Group I
- (ii) Dual controls.
- (iii) An externally vented static pressure system with an alternate static pressure source.
- (iv) A windshield wiper or equivalent means of providing adequate cockpit visibility for a safe visual transition by either pilot to touchdown and rollout.
- (v) A heat source for each airspeed system pitot tube installed or an equivalent means of preventing malfunctioning due to icing of the pitot system.

Note: See ICAO DOC 9635, Manual of All Weather Operations and the current edition of FAA Advisory Circular (AC) 120-29, Criteria for Approval of Category I and Category II Weather Minima for Approach, for further guidance.

7.2.6 INSTRUMENTS AND EQUIPMENT FOR CATEGORY III OPERATIONS

- (a) The instruments and equipment listed in this subsection shall be installed, approved and maintained in accordance with international acceptable criteria, a schedule approved in accordance with IS: 7.2.5 and the AFM in each aircraft operated in a Category III operation:

Note 1: This subsection does not require duplication of instruments and equipment required by 7.2.2, and 7.2.5 or any other provisions of Part 7.

Note 2: Acceptable international criteria may include: ICAO Doc 9365, Manual on All Weather Operations; the current edition of FAA AC 120-28 or JAR AWO

- (b) **Airborne systems for CAT IIIA minima not less than RVR 200 m (600 ft).** The following equipment in addition to the instrument and navigation equipment required by this Part for IFR flight and CAT II operations is the minimum aircraft equipment required for CAT IIIA:

- (1) A redundant flight control or guidance system demonstrated in accordance with international acceptable criteria. Acceptable flight guidance or control systems include the following—
 - (i) A Fail Operational or Fail Passive automatic landing system at least to touchdown;
 - (ii) A Fail Operational or Fail Passive manual flight guidance system providing suitable head-up or head-down command guidance, and suitable monitoring capability at least to touchdown;

- (iii) A hybrid system, using automatic landing capability as the primary means of landing at least to touchdown; or
 - (iv) Other system that can provide an equivalent level of performance and safety.
- (2) An automatic throttle or automatic thrust control system that meets approved criteria as specified in the AFM. However, for operations with a 15 m (50 ft) DH, or other operations that have been specifically evaluated such as for engine inoperative landing capability, automatic throttles may not be required if it has been demonstrated that operations can be safely conducted, with an acceptable work load, without their use.
 - (3) At least two independent navigation receivers/sensors providing lateral and vertical position or displacement information, typically with the first pilot's station receiving the information from one and the second pilot's station receiving the information from the other. The navigation receivers/sensors shall meet the criteria specified for CAT IIIA operations.
 - (4) At least two approved radio altimeter systems that meet the performance requirements criteria as specified in the AFM, typically with the first pilot's station receiving information from one and the second pilot's station receiving information from the other.
 - (5) Failure detection, annunciation, and warning capability, as determined acceptable by criteria in the AFM.
 - (6) Missed approach guidance provided by one or more of the following means:
 - (i) Attitude displays that include suitable pitch attitude markings, or a pre-established computed pitch command display.
 - (ii) An approved flight path angle display, or
 - (iii) An automatic or flight guidance go-around capability.
 - (7) Suitable forward and side flight deck visibility for each pilot as specified in the AFM.
 - (8) Suitable windshield rain removal, ice protection, or defog capability as specified in the AFM.
- (c) **Airborne systems for CAT IIIB minima less than RVR 200 m (600 ft) but not less than RVR 125 m (400 ft).** The following equipment in addition to the instrument and navigation equipment required by this Part for IFR flight and CAT II and CAT IIIA operations is the minimum aircraft equipment required for CAT IIIB plus the following extra equipment requirements:
- (1) A redundant flight control or guidance system demonstrated in accordance with international acceptable criteria. Acceptable flight guidance or control systems include the following –
 - (i) A Fail Operational landing system with a Fail Operational or Fail Passive automatic rollout system; or
 - (ii) A Fail Passive landing system, limited to touchdown zone RVR not less than RVR 200 m (600 ft), with Fail Passive rollout provided automatically or by a flight guidance system providing suitable head-up or head-down guidance, and suitable monitoring capability, or
 - (iii) A Fail Operational hybrid automatic landing and rollout system with comparable manual flight guidance system, using automatic landing capability as the primary means of landing; or
 - (iv) Other system that can provide an equivalent level of performance and safety.

- (2) An automatic throttle or automatic thrust control that meets the appropriate criteria as specified in the AFM. However for operations with a 15 m (50 ft) DH, automatic throttles may not be required if it has been demonstrated that operations can safely be conducted, with an acceptable work load, without their use.
 - (3) At least two independent navigation receivers/sensors providing lateral and vertical position or displacement information, typically with the first pilot's station receiving information from one and the second pilot's station receiving information from the other. The navigation receivers/sensors shall meet the criteria specified in the AFM.
 - (4) At least two approved radio altimeter systems that meet the performance criteria outlined in the AFM, typically with the first pilot's station receiving information from one and the second pilot's station receiving information from the other.
 - (5) Failure detection, annunciation and warning capability as specified in the AFM.
 - (6) Missed approach guidance provided by one or more of the following means:
 - (i) Attitude displays that include calibrated pitch attitude markings, or a pre-established computed pitch command display; or
 - (ii) An approved flight path angle display, or
 - (iii) An automatic or flight guidance go-around capability.
 - (7) Suitable forward and side flight deck visibility for each pilot, as specified in the AFM.
 - (8) Suitable windshield rain removal, ice protection, or defog capability as specified in the AFM.
- (d) **Airborne systems for CAT IIIC minima less than RVR 75 m (300 ft).** The following equipment in addition to the instrument and navigation equipment required by this Part for IFR flight and CAT II, CAT IIIA and CAT IIIB operations is the minimum aircraft equipment required for CAT IIIC:
- (1) A Fail Operational Automatic Flight Control System, or manual flight guidance system designed to meet fail operational system criteria, or a hybrid system in which both the fail-passive automatic system and the monitored manual flight guidance components provide approach and flare guidance to touchdown, and in combination provide full fail operational capability, and
 - (2) A fail operational automatic, manual, or hybrid rollout control system.

7.2.7 NAVIGATION EQUIPMENT FOR OPERATIONS IN MNPS AIRSPACE

- (a) [AAC] No person may operate an aircraft in MNPS airspace unless it is equipped with navigation equipment that-
- (1) Continuously provides indications to the flight crew of adherence to or departure from track to the required degree of accuracy at any point along that track; and
 - (2) Be authorized by the State of Registry for operations in such airspace.
- Note: Equipment shall comply with Minimum Navigation Performance Specifications (MNPS) prescribed in ICAO Doc 7030 in the form of Regional Supplementary Procedures.*
- (b) The navigation equipment required for operations in MNPS airspace shall be visible and usable by either pilot seated at his duty station.
- (c) For unrestricted operation in MNPS airspace an aircraft shall be equipped with two independent Long-Range Navigation Systems (LRNS).

- (d) For operation in MNPS airspace along notified special routes, an aircraft shall be equipped with one LRNS, unless otherwise specified.

7.2.8 NAVIGATION EQUIPMENT FOR OPERATIONS IN RVSM AIRSPACE

- (a) [AAC] For flights in defined portions of airspace where, based on Regional Air Navigation Agreement, a reduced vertical separation minimum (RVSM) of 300 m (1,000 ft) is applied between FL 290 and FL 410 inclusive, an aircraft:

- (1) Shall be provided with equipment that is capable of:

- (i) Indicating to the flight crew the flight level being flown;
- (ii) Automatically maintaining a selected flight level;
- (iii) Providing an alert to the flight crew when a deviation occurs from the selected flight level. The threshold for the alert shall not exceed + or – 90 m (300 ft); and
- (iv) Automatically reporting pressure-altitude;

- (2) shall be authorized by the Authority for operation in the airspace concerned; and

- (i) The State of Operator for AOC holders through operations specifications, or
- (ii) The State of Registry for non-AOC holders through letter of authorization.

- (b) Prior to granting an RVSM approval required by paragraph (a)(2), the Republic of the Philippines shall be satisfied that:

- (1) The vertical navigation performance capability of the aircraft satisfies the requirements specified in IS: 7.2.8 and holds an airworthiness approval.
- (2) The operator has instituted appropriate procedures in respect of continued airworthiness (maintenance and repair) practices and programs; and
- (3) The operator has instituted appropriate flight crew procedures for operations in RVSM airspace.

Note: An RVSM approval is valid globally on the understanding that any operating procedures specific to a given region will be stated in the operations manual or appropriate crew guidance.

- (c) The Republic of the Philippines in consultation with the State of Registry, if appropriate, shall ensure that, in respect of those aircrafts mentioned in item (a)(2) above, adequate provisions exist for:

- (1) Receiving the reports of height-keeping performance issued by the monitoring agencies established in accordance with Annex 11, 3.3.4.2; and
- (2) Taking immediate corrective action for individual aircraft, or aircraft type groups, identified in such reports as not complying with the height-keeping requirements for operations in airspace where RVSM is applied.

- (d) The Authority will take appropriate action in respect of aircraft and operators found to be operating in RVSM airspace in the Philippines without a valid RVSM approval.

Note 1: These provisions and procedures need to address both the situation where the aircraft in question is operating without approval in the airspace of the State, and the situation where an operator for which the State has regulatory oversight responsibility is found to be operating without the required approval in the airspace of another State.

Note 2: See ICAO Doc 9574, Manual on Implementation of a 300 m (1,000 ft) Vertical Separation Minimum between FL 290 and FL 410 Inclusive, for guidance relating to the approval for operations in RVSM airspace.

- (e) An operator with RVSM approval shall ensure that a minimum of two airplanes of each aircraft type grouping of the operator have their height-keeping performance monitored, at least once every two years or within intervals of 1 000 flight hours per airplane, whichever period is longer. If an operator aircraft type grouping consists of a single airplane, monitoring of that airplane shall be accomplished within the specified period.

Note: Monitoring data from any regional monitoring program established in accordance with ICAO Annex 11.3.3.5.2, may be used to satisfy the requirement.

- (f) An operator shall ensure that each airplane shall be sufficiently provided with navigation equipment to ensure that, in the event of the failure of one item of equipment at any stage of the flight, the remaining equipment will enable the airplane to navigate in accordance with paragraphs (a), (b) and (c) of 7.2.8.

Note: Guidance material relating to aircraft equipment necessary for flight I airspace where RVSM is applied is contained in the Manual on Implementation of a 300 m (1 000ft) Vertical Separation minimum Between FL 290 and FL 410 Inclusive (ICAO Doc 9574).

- (g) On flights in which it is intended to land in instrument meteorological conditions, an airplane shall be provided with radio equipment capable of receiving signals providing guidance to a point from which a visual landing can be effected. This equipment shall be capable of providing such guidance for each aerodrome at which it is intended to land in instrument meteorological conditions and for any designated alternate aerodromes.

7.2.9 NAVIGATION EQUIPMENT — GENERAL

- (a) [AAC] No person may operate an aircraft unless it is equipped with navigation equipment that will enable it to proceed in accordance with:

- (1) its operational flight plan,
- (2) the requirements of air traffic services.

- (b) No person may operate an aircraft in Performance-Based Navigation specification airspace unless authorized by CAAP for such operations.

Note: See ICAO Doc 9613 for information on the approval process for operations in RNP airspace.

- (c) For operations where a navigation specification for performance-based navigation (PBN) has been prescribed, an aircraft shall, in addition to the requirements specified in 7.2.9 (a):

- (1) Be provided with navigation equipment which will enable it to operate in accordance with the prescribed navigation specification(s); and
- (2) have information relevant to the aircraft navigation specification capabilities listed in the flight manual or other aircraft documentation approved by the State of the Design or State of Registry; and
- (3) have information relevant to the aircraft navigation specification capabilities included in the MEL.

Note. – Guidance on aircraft documentation is contained in the Performance-based Navigation (PBN) Manual (ICAO Doc 9613).

- (d) An Operator shall, for operations where a navigation specification for PBN has been prescribed, ensure that the operator has established and documented:
- (1) normal and abnormal procedures including contingency procedures;
 - (2) flight crew qualification and proficiency requirements in accordance with the appropriate navigation specifications;
 - (3) a training programme for relevant personnel consistent with the intended operations; and
 - (4) appropriate maintenance procedures to ensure continued airworthiness in accordance with the appropriate navigation specifications.

Note 1. – Guidance on safety risks and mitigations for PBN operations, in accordance with Annex 19, are contained in the Performance-based Navigation (PBN) Operational Approval Manual (ICAO Doc 9997).

Note 2. – Electronic navigation data management is an integral part of normal and abnormal procedures.

- (e) An Operator shall issue a specific approval for operations based on PBN authorization required (AR) navigation specifications.

Note. – Guidance on specific approvals for PBN authorization required (AR) navigation specifications is contained in the Performance-based Navigation (PBN) Operational Approval Manual (ICAO Doc 9997).

7.2.10 ELECTRONIC NAVIGATION DATA MANAGEMENT

- (a) [AAC] No person shall employ electronic navigation data products that have been processed for application in the air and on the ground unless the Authority has approved:

- (1) The operator's procedures for ensuring that the process applied and the products delivered have acceptable standards of integrity and that the products are compatible with the intended function of the equipment that will use them;
- (2) The operator's program for continual monitoring of both process and products; and
- (3) The operator's procedures to ensure the timely distribution and insertion of current and unaltered electronic navigation data to all aircraft that require it.

Note: Guidance relating to the processes that data suppliers may follow is contained in RTCA DO -200A/EUROCAE ED-76 and RTCA DO – 201A/EUROCAE ED- 77.

7.2.10.1 ELECTRONIC FLIGHT BAG (EFB)

Note 1: Guidance on EFB equipment, functions and operational approval is contained in the ICAO Doc 10020.

Note 2: Guidance on Cabin – Electronic Flight Bag (C-EFB) equipment, functions and operational approval is contained in the CAAP Cabin Advisory Circular 07-004.

7.2.10.1.1 EFB EQUIPMENT

- (a) Where portable EFBs are used on board an airplane, the operator shall ensure that they do not affect the performance of the airplane systems, equipment or the ability to operate the airplane.

7.2.10.1.2 EFB FUNCTIONS

- (a) Where EFBs are used on board an airplane the operator shall:
- (1) assess the safety risk(s) associated with each EFB function;

- (2) establish and document the procedures for the use of, and training requirements for, the device and each EFB function; and
- (3) ensure that, in the event of an EFB failure, sufficient information is readily available to the flight crew for the flight to be conducted safely.

Note: Guidance on safety risk assessments is contained in the Safety Management Manual (SMM) Doc 9859.

- (b) The Authority shall approve the operational use of EFB functions to be used for the safe operation of airplanes.

7.2.10.1.3 EFB OPERATIONAL APPROVAL

- (a) In approving the use of EFBs, the Authority will ensure that:

- (1) the EFB equipment and its associated installation hardware, including interaction with airplane systems if applicable, meet the appropriate airworthiness certification requirements;
- (2) the operator has assessed the safety risks associated with the operations supported by the EFB function(s);
- (3) the operator has established requirements for redundancy of the information (if appropriate) contained in and displayed by the EFB function(s);
- (4) the operator has established and documented procedures for the management of the EFB function(s) including any database it may use; and
- (5) the operator has established and documented the procedures for the use of, and training requirements for, the EFB and the EFB function(s).

Note: Guidance on safety risk assessments is contained in the Safety Management Manual (SMM) (Doc 9859).

7.2.11 AIRPLANES EQUIPPED WITH AUTOMATIC LANDING SYSTEMS, A HEAD-UP DISPLAYS (HUD) OR EQUIVALENT DISPLAYS, ENHANCED VISION SYSTEMS (EVS), SYNTHETIC VISION SYSTEMS (SVS) AND/OR COMBINED VISION SYSTEMS (CVS)

- (a) Where airplanes are equipped with automatic landing systems, a HUD or equivalent displays, EVS, SVS or CVS, or any combination of those systems into a hybrid system, criteria for the use of such systems for the safe operation of an airplane shall be established by the Authority.

Note.-Information regarding, automatic landing systems, HUD or equivalent displays, EVS, SVS, or CVS, is contained in the Manual of All-Weather Operations (Doc 9365).

7.2.12 TURBINE AEROPLANE – RUNWAY OVERRUN AWARENESS AND ALERTING SYSTEM (ROAAS)

- (a) All turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 5700 kg, for which the individual certificate of airworthiness is first issued on or after 1 January 2026, shall be equipped with a runway overrun awareness and alerting system (ROAAS).

Note.- Guidance material for ROAAS design is contained in EUROCAE ED-250, Minimum Operation Performance Specification (MOPS) for Runway Overrun Awareness and Alerting System (ROAAS), or equivalent documents.

7.3 COMMUNICATION AND SURVEILLANCE EQUIPMENT

7.3.1 RADIO EQUIPMENT

- (a) [AAC] No person may operate an aircraft unless it is equipped with radio equipment required for the kind of operation being conducted and capable of receiving meteorological information at any time during flight.
- (b) [AAC] All aircraft operated in VFR as a controlled flight or in IFR shall be provided with radio communication equipment capable of conducting two-way communication with those aeronautical stations and on those frequencies prescribed by the Authority, including the aeronautic emergency frequency 121.5 MHz

Note: This requirement is considered fulfilled if the ability to conduct the communications specified therein is established during radio propagation conditions which are normal for the route.

- (c) [AOC] No person may operate an aircraft in IFR, or in VFR over routes that cannot be navigated by reference to visual landmarks, unless the aircraft is equipped with communication and navigation equipment in accordance with the requirements of air traffic services in the area(s) of operation, but not less than—

- (1) 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.

Note: Each system shall have an independent antenna installation except that, where rigidly supported non-wire antennae or other antenna installations of equivalent reliability are used, only one antenna is required.

- (2) Secondary Surveillance Radar transponder equipment as required for the route being flown.
- (d) [AOC] When more than one communications equipment unit is required, each shall be independent of the other or others to the extent that a failure in any one will not result in failure of any other.
- (e) [AAC] No person may operate an aircraft under IFR unless it is equipped with an audio selector panel accessible to each required flight crewmember.
- (f) [AOC] No person may conduct single pilot IFR or night operations unless the aircraft is equipped with;
 - (1) a serviceable autopilot that has at least altitude hold and heading select modes,
 - (2) a headset with boom microphone or equivalent,
 - (3) a transmit button on the control wheel and,
 - (4) a means to display charts to be readable in all ambient light conditions.
- (g) [AAC] All flight crew members required to be on flight deck duty should communicate through boom or throat microphones below the transition level/altitude.
- (h) For Helicopter operations all flight crew members required to be on flight deck duty shall communicate through boom or throat microphones.
- (i) [AAC] For operations where communication equipment is required to meet an RCP specification for performance-based communication (PBC), in addition to 7.3.1(a) and (b) and 7.3.3, an aircraft shall:
 - (1) be provided with communication equipment that will enable it to operate in accordance with the prescribed RCP specification(s);

- (2) have information relevant to the aircraft RCP and/or RSP specification capabilities listed in the flight manual or other aircraft documentation approved by the State of Design or State of Registry;
- (3) have information relevant to the aircraft RCP and/or RSP specification capabilities included in the MEL; and

Note.- Information on the performance-based communication and surveillance (PBCS) concept and guidance material on its implementation are contained in the Performance-based Communication and Surveillance (PBCS) Manual (Doc 9869).

- (4) be authorized by the Authority for operations in such airspace.

Note.- Information on the required elements for operations to be granted PBCS operational authorization by the Authority may be found in the ICAO "Operational Authorization Guidance for Performance-based Communication and Surveillance (PBCS)".

- (j) [AAC] For operations where an RCP specification for PBC has been prescribed, the operator shall ensure to establish and document the following:
 - (1) Normal and abnormal procedures, including contingency procedures;
 - (2) Flight crew qualification and proficiency requirements, in accordance with appropriate RCP specifications;
 - (3) A training programme for relevant personnel consistent with the intended operations; and
 - (4) Appropriate maintenance procedures to ensure continued airworthiness, in accordance with appropriate RCP specifications.
- (k) [AAC] The operator shall ensure to provide the following to the Authority in respect to those aircraft mentioned in 7.3.1 (i) of this subsection:
 - (1) Receiving the reports of observed communications performance issued by monitoring programs established in accordance with ICAO Annex 11, Chapter 3, 3.3.5.2; and
 - (2) Taking immediate corrective action for individual aircraft, aircraft types or operators, identified in such reports as not complying with the RCP specification.

7.3.2 CREW MEMBER INTERPHONE SYSTEM

- (a) [AOC] No AOC holder may operate an aircraft on which a flight crew of more than one is required unless it is equipped with a flight crew interphone system, including headsets and microphones, not of a handheld type, for use by all members of the flight crew.
- (b) [AOC] No AOC holder may operate an airplane with a maximum certified take-off mass exceeding 15,000 kg or having a maximum approved passenger seating configuration of more than 19 unless it is equipped with a crew member interphone system that—
 - (1) Operates independently of the public address system except for handsets, headsets, microphones, selector switches and signaling devices;
 - (2) Provides a means of two-way communication between the flight crew compartment and each—
 - (i) Passenger compartment;
 - (ii) Galley located other than on a passenger deck level; and

- (iii) Remote crew compartment that is not on the passenger deck and is not easily accessible from a passenger compartment;
- (3) Is readily accessible for use—
 - (i) From each of the required flight crew stations in the flight crew compartment; and
 - (ii) At required cabin crew member stations close to each separate or pair of floor level emergency exits;
- (4) Has an alerting system incorporating aural or visual signals for use by flight crew members to alert the cabin crew and for use by cabin crew members to alert the flight crew;
- (5) Has a means for the recipient of a call to determine whether it is a normal call or an emergency call; and
- (6) Provides on the ground a means of two-way communication between ground personnel and at least two flight crew members.

7.3.3 ALTITUDE REPORTING TRANSPONDER

- (a) [AAC] No person may operate an aircraft in airspace that requires a pressure reporting transponder unless that equipment is operative and operates in accordance with the provisions of ICAO Annex 10, Volume IV.
 - (1) The aircraft will be assigned a distinct serialized 24-bit address identity code supplied by the Authority for the transponder, this must be programmed prior to operation of the aircraft.
- (b) [AAC] No person may operate an aircraft at altitudes above FL 290 unless it is equipped with a system that is automatically reporting pressure altitudes.
- (c) [AOC] No person may operate an aircraft in commercial air transportation unless it is equipped with a data source that provides pressure-altitude information with a resolution of 7.62 m (25 ft), or better.

7.3.4 SURVEILLANCE EQUIPMENT

- (a) No person may operate an aircraft unless it is provided with surveillance equipment that will enable it to operate in accordance with the requirements of air traffic services.
- (b) For operations where surveillance equipment is required to meet an RSP specification for performance-based surveillance (PBS), an aircraft shall, in addition to the requirements specified in 7.3.4 (a):
 - (1) be provided with surveillance equipment that will enable it to operate in accordance with the prescribed RSP specification(s);
 - (2) 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
 - (3) have information relevant to the aircraft RSP specification capabilities included in the MEL.

Note 1. – Information on surveillance equipment is contained in the Aeronautical Surveillance Manual (Doc 9924).

Note 2. – Information on RSP specifications for performance-based surveillance is contained in the Performance-based Communication and Surveillance (PBCS) Manual (Doc 9869).

- (c) When and where an RSP specification for PBS has been prescribed by the Authority, the operator shall establish and document the following before using the PBS procedure:
 - (1) Normal and abnormal procedures, including contingency procedures;
 - (2) Flight crew qualification and proficiency requirements, in accordance with appropriate RSP specifications;
 - (3) A training programme for relevant personnel consistent with the intended operations; and
 - (4) Appropriate maintenance procedures to ensure continuing airworthiness, in accordance with appropriate RSP specifications.
- (d) The Operator shall:
 - (1) Provide to the Authority the reports of observed surveillance performance issued by established monitoring programs (ATS); and
 - (2) Take immediate corrective action for individual aircraft or aircraft types identified in such reports as not complying with the RSP specification(s).

7.3.5 INSTALLATION

- (a) The equipment installation shall be such that the failure of any single unit required for communication, navigation or surveillance purposes or any combination thereof will not result in the failure of another unit required for communication, navigation or surveillance purposes.

7.4 AIRCRAFT LIGHTS AND INSTRUMENT ILLUMINATION**7.4.1 AIRCRAFT LIGHTS AND INSTRUMENT ILLUMINATION**

- (a) [AAC] All aircraft operated at night shall be equipped with:
- (1) A landing light;
 - (2) An anti-collision light system;
 - (3) Navigation/position lights;
 - (4) Lights to conform to the International regulations for preventing collisions at sea if the aircraft is a seaplane or an amphibian aircraft.
 - (5) Illumination for all flight instruments and equipment that are essential for the safe operation of the aircraft;
 - (6) Lights in all passenger compartments;
 - (7) An independent portable light for each crew member station; and
 - (8) A heated pitot tube.
- (b) [AOC] No AOC holder may operate an aircraft by night unless, in addition to the equipment specified in paragraph (a) above, it is equipped with:
- (1) Two landing lights or a single light having two separately energized filaments.

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7.5 ENGINE INSTRUMENTS**7.5.1 ENGINE INSTRUMENTS**

- (a) [AAC] No person may operate any powered aircraft without the following engine instruments:
- (1) A means for indicating fuel quantity in each fuel tank to be used;
 - (2) An oil pressure indicator for each engine;
 - (3) An oil temperature indicator for each engine;
 - (4) A manifold pressure indicator for each engine with controllable pitch propellers; and
 - (5) A tachometer for each engine.
- (b) [AOC] In addition to the listed equipment requirements in paragraph (a), no AOC operator may operate any powered aircraft without the following engine instruments:
- (1) A carburetor air temperature indicator for each piston engine;
 - (2) A cylinder head temperature indicator for each air-cooled piston engine;
 - (3) A fuel pressure indicator for each engine;
 - (4) A fuel flow meter or fuel mixture indicator for each engine not equipped with an automatic altitude mixture control;
 - (5) An oil quantity indicator for each oil-tank when a transfer or separate oil reserve supply is used;
 - (6) An independent fuel pressure warning device for each engine or a master warning device for all engines with a means for isolating the individual warning circuits from the master warning device; and
 - (7) A device for each reversible propeller, to indicate to the pilot when the propeller is in reverse pitch, which complies with the following:
 - (i) The device may be actuated at any point in the reversing cycle between the normal low pitch stop position and full reverse pitch, but it may not give an indication at or above the normal low pitch stop position.
 - (ii) The source of indication shall be actuated by the propeller blade angle or be directly responsive to it.

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7.6 WARNING INSTRUMENTS AND SYSTEMS

7.6.1 MACH NUMBER INDICATOR

[AAC] All aircraft with speed limitations expressed in terms of Mach number shall be equipped with a Mach number indicator.

7.6.2 LOSS OF PRESSURIZATION INDICATOR

[AAC] All pressurized aircraft intended to be operated at altitudes at or above 25,000' above sea level shall be equipped with a device to provide positive warning to the flight crew of any dangerous loss of pressurization.

7.6.3 LANDING GEAR: AURAL WARNING DEVICE

- (a) [AOC] Each airplane with retractable landing gear shall have a landing gear aural warning device that functions continuously under the following conditions:
- (1) For airplanes with an established approach wing-flap position, whenever the wing flaps are extended beyond the maximum certified approach climb configuration position in the Airplane Flight Manual and the landing gear is not fully extended and locked.
 - (2) For airplanes without an established approach climb wing-flap position, whenever the wing flaps are extended beyond the position at which landing gear extension is normally performed and the landing gear is not fully extended and locked.
- (b) [AOC] The warning system required by paragraph (a) of this section:
- (1) May not have a manual shutoff;
 - (2) Shall be in addition to the throttle-actuated device installed under the type certification airworthiness requirements; and
 - (3) May utilize any part of the throttle-actuated system including the aural warning device.
- (c) [AOC] The flap position-sensing unit may be installed at any suitable place in the airplane.

7.6.4 ALTITUDE ALERTING SYSTEM

- (a) [AAC] No person may operate a turbine propeller powered airplane with a maximum certified take-off mass in excess of 5,700 kg or having a maximum approved passenger seating configuration of more than 9 seats, or a turbojet powered airplane, unless it is equipped with an altitude alerting system capable of—
- (1) Alerting the flight crew upon approaching pre-selected altitude in either ascent or descent; and
 - (2) Alerting the flight crew by at least an aural signal, when deviating above or below a pre-selected altitude.
- (b) [AAC] For operations in defined portions of airspace where, based on Regional Air Navigation Agreement, a RVSM of 300 m (1,000 ft.) is applied above FL 290, an aircraft shall be provided with equipment which is capable of;
- (1) indicating to the flight crew the flight level being flown
 - (2) automatically maintaining a selected flight level

- (3) Providing an alert to the flight crew when a deviation occurs from the selected flight level. The threshold for the alert may not exceed ± 90 m (300 ft.).
- (4) automatically reporting pressure-altitude, and
- (5) Shall be authorized by the State of the Operator for operation in the airspace concerned.

7.6.5 GROUND PROXIMITY WARNING SYSTEM

- (a) [AAC] No person may operate an airplane with a maximum certified take-off mass in excess of 5,700 kg, unless it is equipped with a ground proximity warning system which has a forward looking terrain avoidance function.
 - (1) All turbine-engined aeroplanes of a maximum certificated take-off mass of 5 700 kg or less and authorized to carry more than five but not more than nine passengers for which the individual certificate of airworthiness is first issued on or after 1 January 2026, shall be equipped with a ground proximity warning system which provides the warnings of Subsection 7.6.5 paragraph (c), warning of unsafe terrain clearance and a forward looking terrain avoidance function.
- (b) [AAC] Each ground proximity warning system shall automatically provide, by means of aural signals which may be supplemented by visual signals, timely and distinctive warning to the flight crew of sink rate, ground proximity, altitude loss after take-off or go around, incorrect landing configuration and downward glideslope deviation.
- (c) [AAC] A ground proximity warning system shall provide, as a minimum, warnings of the following circumstances—
 - (1) Excessive descent rate.
 - (2) Excessive terrain closure rate.
 - (3) Excessive altitude loss after take-off or go-around.
 - (4) Unsafe terrain clearance while not in landing configuration; and
 - (5) Excessive descent below the instrument glide path.

7.6.6 WEATHER RADAR

[AOC] No person may operate a helicopter carrying passengers or a pressurized airplane in commercial air transport in an area where potentially hazardous weather conditions may be expected unless it is equipped with operative weather radar.

7.6.7 AIRBORNE COLLISION AVOIDANCE SYSTEM II (ACAS II)

- (a) [AAC] Any airborne collision avoidance system installed on an aircraft shall be approved by the Authority.
- (b) [AAC] Each person operating an aircraft equipped with an airborne collision avoidance system shall have that system on and operating.
- (c) [AAC] No person may operate a turbine engine airplane for which the individual airworthiness certificate was first issued after 24 November 2005 with a maximum certificated take-off mass in excess of 15,000 kg or authorized to carry more than 30 passengers, unless it is equipped with an ACAS II.

- (d) [AAC] No person may operate a turbine engine airplane for which the individual airworthiness certificate was first issued after 1 January 2008 with a maximum certificated take-off mass in excess of 5,700 kg but not exceeding 15,000 kg or authorized to carry more than 19 passengers, unless it is equipped with an ACAS II.
- (e) [AAC] An airborne collision avoidance system shall operate as designed.
- (f) [AOC] No person may operate a turbine powered airplane with a maximum certificated takeoff mass in excess of 5700 kg or authorized to carry more than 19 passengers, unless it is equipped with an ACAS II.
- (g) After 1 January 2017, All Airborne Collision Avoidance System (ACAS) units shall comply with requirements of Part 7.6.7 through the implementation of Traffic Alert and Collision Avoidance System (TCAS) Version 7.1.

7.6.8 FORWARD LOOKING WIND SHEAR WARNING SYSTEM — TURBOJET AIRCRAFT

- (a) [AOC] All turbojet airplanes of a maximum certificated takeoff mass in excess of 5,700 kg or authorized to carry more than nine passengers should be equipped with a forward-looking wind shear warning system.
- (b) [AOC] The system should be capable of providing the pilot with a timely aural and visual warning of wind shear ahead of the aircraft and the information required to permit the pilot to safely commence and continue a missed approach or go-around or to execute an escape maneuver if necessary.
- (c) [AOC] The system should also provide an indication to the pilot when the limits specified for the certification of automatic landing equipment are being approached, when such equipment is in use.

7.6.9 LOCATION OF AN AIRPLANE IN DISTRESS

- (a) As of 1 January 2025, no person may operate an airplane with a maximum certificated take-off mass of over 27 000 kg, for which the certificate of airworthiness is first issued on or after 1 January 2024, unless the airplane is equipped to autonomously transmit information from which a position can be determined by the operator at least once every minute, when in distress.
- (b) The operator shall make position information of a flight in distress available to the appropriate organizations, as established by the Authority.
- (c) ACTIVATION/DEACTIVATION. The equipment shall:
 - (1) Automatically activate immediately or within 5 seconds after detection of an activation event;
 - (2) Be capable of manual activation; and
 - (3) Be capable of deactivation using the same mechanism that activated it.
- (d) TRANSMISSION. The equipment shall meet the following criteria:
 - (1) Location within a 6 NM radius, including after any accident;
 - (2) Timestamp of the position information; and
 - (3) The accuracy of position information shall, as a minimum, meet the position accuracy requirements established for ELTs.

Note 1: Aircraft behavior events may include, but are not limited to, unusual attitudes, unusual speed conditions, collision with terrain, total loss of thrust/propulsion on all engines, and ground proximity warnings.

Note 2: A distress alert may be triggered using criteria that may vary as a result of aircraft position and phase of flight. Further guidance regarding in-flight event detection and triggering criteria may be found in the EUROCAE ED-237, Minimum Aviation System Performance Specification (MASPS) for Criteria to Detect In-Flight Aircraft Distress Events to Trigger Transmission of Flight Information.

Note 3: A State's procedures to address aircraft in distress are typically found in government agreements implementing ICAO Annexes 12 and 13. These procedures will contain coordination information with the appropriate organizations.

7.7 FLIGHT RECORDERS

7.7.1 GENERAL REQUIREMENTS

Note 1: Crash protected flight recorders comprise one or more of the following systems: a flight data recorder (FDR), a cockpit voice recorder (CVR), an airborne image recorder (AIR) and/or a data link recorder (DLR). Image and data link information may be recorded on either the CVR or the FDR.

Note 2: Lightweight flight recorders comprise one or more of the following systems: an aircraft data recording system (ADRS), a cockpit audio recording system (CARS), an airborne image recording system (AIRS) and/or a data link recording system (DLRS). Image and data link information may be recorded on either the CARS or the ADRS.

Note 3: Combination recorders (FDR/CVR) may be used to meet the equipage requirements for helicopters.

Note 4. – For airplanes for which the application for type certification is submitted to the State of Design before 1 January 2016, specifications applicable to flight recorders may be found in EUROCAE ED-112, ED-56A, ED-55, Minimum Operational Performance Specification (MOPS), or earlier equivalent documents.

Note 5. – For airplanes for which the application for type certification is submitted to the State of Design on or after 1 January 2016, specifications applicable to flight recorders may be found in EUROCAE ED-112A, Minimum Operational Performance Specification (MOPS), or equivalent documents.

Note 6. – Specifications applicable to lightweight flight recorders may be found in EUROCAE ED 155, Minimum Operational Performance Specification (MOPS), or equivalent documents.

7.7.1.1 CONSTRUCTION AND INSTALLATION

- (a) Flight recorders systems shall be constructed, located and installed so as to provide maximum practical protection for the recordings in order that the recorded information may be preserved, recovered and transcribed.
 - (1) Non-deployable flight recorder containers shall:
 - (i) be painted a distinctive orange or yellow color;
 - (ii) carry reflective material to facilitate their location; and
 - (iii) have securely attached an automatically activated underwater locating device operating at a frequency of 37.5 kHz. At the earliest practicable date, but not later than 1 January 2018, this device shall operate for a minimum of 90 days.
 - (2) Automatic deployable flight recorder containers shall:
 - (i) be painted a distinctive orange color, however the surface visible from outside the aircraft may be of another color;
 - (ii) carry reflective material to facilitate their location; and
 - (iii) have an integrated automatically activated ELT.
- (b) Flight recorder systems shall be installed so that:
 - (1) The probability of damage to the recordings is minimized;

- (2) They receive electrical power from a bus that provides the maximum reliability for operation of the flight recorder systems without jeopardizing service to essential or emergency loads;
 - (3) There is an aural or visual means for pre-flight checking that the flight recorder systems are operating properly; and
 - (4) If the flight recorder systems have a bulk erasure device, the installation shall be designed to prevent operation of the device during flight time or crash impact.
 - (5) They meet the prescribed crashworthiness and fire protection specifications.
- (c) The flight recorder systems, when tested by methods approved by its State of Design, shall be demonstrated to be suitable for the environmental extremes over which they are designed to operate.
- (d) Means shall be provided for an accurate time correlation between the flight recorder systems recordings.

Note 1: Industry crashworthiness and fire protection specifications for ADRS and CARS are as contained in the EUROCAE ED-155, Minimum Operational Performance Specifications (MOPS) for Lightweight Flight Recording Systems, or equivalent documents.

- (e) The flight recorder system manufacturer shall provide the appropriate certifying authority with the following information in respect of the flight recorder systems:
- (1) manufacturer's operating instructions, equipment limitations and installation procedures;
 - (2) parameter origin or source and equations which relate counts to units of measurement;
 - (3) manufacturer's test reports and
 - (4) detailed information to ensure the continued serviceability of the flight recorder system.
- (f) The holder of the airworthiness approval for the installation design of the flight recorder system shall make available the relevant continuing airworthiness information to the operator of the airplane to be incorporated in the continuing airworthiness maintenance program. This continuing airworthiness information shall cover in detail all the tasks required to ensure the continued serviceability of the flight recorder system.

Note 1. – The flight recorder system is composed of the flight recorder as well as any dedicated sensors, hardware and software that provide information required per IS 7.7.2.1 (A) and IS 7.7.2.1 (B).

Note 2. – Conditions related to the continued serviceability of a flight recorder system are defined in IS 7.7.1.3. The Manual on Flight Recorder System Maintenance (FRSM) (Doc 10104) provides guidance on maintenance tasks associated with flight recorder systems.

7.7.1.2 OPERATION

- (a) Flight recorder systems shall not be switched off during flight time.
- (b) To preserve flight recorder records, flight recorders shall be deactivated upon completion of flight time following an accident or incident. The flight recorders shall not be reactivated before their disposition as determined in accordance with the accident/incident regulations of the Authority.

Note 1: The need for removal of the flight recorder records from the aircraft will be determined by the investigation authority in the State of Occurrence conducting the investigation with due regard to the seriousness of an occurrence and the circumstances, including the impact on the operation.

Note 2: The operator's responsibilities regarding the retention of flight recorder records are contained in PCAR Volume 1 Part 13.

7.7.1.3 CONTINUED SERVICEABILITY AND INSPECTION OF FLIGHT RECORDER SYSTEMS

- (a) The operator shall conduct operational checks and evaluations of recordings from the flight recorder systems to ensure the continued serviceability of the recorders.
- (b) The procedures for the inspections of the flight recorder systems are given in IS 7.7.1.3.

7.7.1.4 FLIGHT RECORDER ELECTRONIC DOCUMENTATION

- (a) Operators shall provide to accident investigation authorities the documentation of flight recording systems parameters in electronic format and in accordance with ARINC 647A, Flight Recorder Electronic Documentation or equivalent Document.

7.7.1.5 COMBINATION RECORDERS

- (a) [AAC] No person may operate an airplane of a maximum certificated take-off mass over 5 700 kg required to be equipped with an FDR and a CVR unless it is equipped with—
 - (1) An FDR and a CVR; or
 - (2) Two combination recorders (FDR/DVR).
- (b) [AOC] No person may operate an airplane of a maximum certificated take-off mass of over 5 700 kg and which is required to be equipped with both a FDR and CVR unless—
 - (1) The airplane is equipped with an FDR and a CVR or alternatively equipped with two combination recorders (FDR/CVR).
 - (2) The airplane is equipped with two combination recorders (FDR/CVR) for airplanes type certificated on or after 1 January 2016.

Note: The requirement may be satisfied by equipping the airplanes with two combination recorders (one forward and one aft) or separate devices.
- (c) [AOC] No person may operate an airplane of a maximum certificated take-off mass of over 15 000 kg which is required to be equipped with both a CVR and an FDR and type certificated on or after 1 January 2016, unless—
 - (1) The airplane is equipped with two combination recorders (FDR/CVR), and
 - (2) one recorder is located as close to the cockpit as practicable and the other recorder located as far aft as practicable.
- (d) [AOC] No person may operate a multi-engined turbine-powered airplane of a maximum certificated take-off mass of 5 700 kg or less, unless —
 - (1) The airplane is equipped with an FDR and/or a CVR, or
 - (2) The airplane is equipped with one combination recorder (FDR/CVR).

7.7.2 FLIGHT DATA RECORDERS (FDR) AND AIRCRAFT DATA RECORDING SYSTEMS (ADRS)

(Reserved)

7.7.2.1 TYPES AND PARAMETERS

- (a) Airplane. Airplane FDR shall record the parameters as listed in IS 7.7.2.1(A) for the following FDR types:
- (1) Types I and IA FDR shall record the parameters required to determine accurately the airplane flight path, speed, attitude, engine power, configuration and operation.
 - (2) Types II and IIA FDRs shall record the parameters required to determine accurately the airplane flight path, speed, attitude, engine power and configuration of lift and drag devices.
- (b) Helicopter. Helicopter FDR shall record the parameters as listed in IS 7.7.2.1 (B) for the following FDR types:
- (1) Type IV FDRs shall record the parameters required to determine accurately the helicopter flight path, speed, attitude, engine power and operation.
 - (2) Type IVA FDRs shall record the parameters required to determine accurately the helicopter flight path, speed, attitude, engine power, operations and configuration.
 - (3) Type V FDRs shall record the parameters required to determine accurately the helicopter flight path, speed, attitude and engine power.

7.7.2.2 AIRCRAFT EQUIPPAGE FOR OPERATION

- (a) No person may operate the following airplane unless it is equipped with a flight data recorder capable of recording the aural environment of the flight deck during flight time.
- (1) [AAC] All turbine-engined airplanes of a maximum certificated take-off mass of 5,700 kg or less for which the application is for a type certificate is first made to the State of Design on or after 1 January 2016; shall be equipped with:
- (i) a Type II FDR; or
 - (ii) a Class C AIR or AIRS capable of recording flight path and speed parameters displayed to the pilot(s); or
 - (iii) an ADRS capable of recording the essential parameters defined in the Table in IS 7.7.2.2.
- Note: Type certificate first issued refers to the date of issuance of the original "Type Certificate" for the airplane type, not the date of certification of particular airplane variants or derivative models.*
- (2) [AOC] All turbine-engined airplanes of a maximum certificated take-off mass of 5 700 kg or less for which the individual certificate of airworthiness is first issued on or after 1 January 2016 shall be equipped with:
- (i) a Type II FDR; or
 - (ii) a Class C AIR or AIRS capable of recording flight path and speed parameters displayed to the pilot(s); or
 - (iii) an ADRS capable of recording the essential parameters defined in the Table in IS: 7.7.2.2.

- (3) [AAC] All airplanes of a maximum certificated take-off mass of over 27 000 kg for which the individual certificate of airworthiness is first issued on or after 1 January 1989 shall be equipped with a Type I FDR.
- (4) [AAC] All airplanes of a maximum certificated take-off mass of over 5 700 kg, up to and including 27 000 kg, for which the individual certificate of airworthiness is first issued on or after 1 January 1989, shall be equipped with a Type II FDR.
- (5) [AOC] Effective 1 January 2016, all multi-engined turbine-engined airplanes of a maximum certificated take-off mass of 5 700 kg or less for which the individual certificate of airworthiness is first issued on or after 1 January 1990 shall be equipped with a Type IIA FDR.
- (6) [AOC] All turbine-engined airplanes, for which the individual certificate of airworthiness was first issued on or after 1 January 1987 but before 1 January 1989, with a maximum certificated take-off mass of over 5 700 kg, except those in paragraph 7.7.2.2(8) and 7.7.2.2(10), shall be equipped with an FDR which shall record time, altitude, airspeed, normal acceleration and heading.
- (7) [AOC] Effective 1 January 2016, all turbine-engined airplanes, for which the individual certificate of airworthiness was first issued on or after 1 January 1987 but before 1 January 1989, with a maximum certificated take-off mass of over 5 700 kg, except those in paragraph 7.7.2.2(8) and 7.7.2.2(10), shall be equipped with an FDR which shall record time, altitude, airspeed, normal acceleration, heading and such additional parameters as are necessary to determine pitch attitude, roll attitude, radio transmission keying and power on each engine.
- (8) [AOC] All turbine-engined airplanes, for which the individual certificate of airworthiness was first issued on or after 1 January 1987 but before 1 January 1989, with a maximum certificated take-off mass of over 27 000 kg that are of types of which the prototype was certificated by the appropriate national authority after 30 September 1969 shall be equipped with a Type II FDR.
- (9) [AOC] All turbine-engined airplanes, for which the individual certificate of airworthiness was first issued before 1 January 1987, with a maximum certificated take-off mass of over 5 700 kg shall be equipped with an FDR which shall record time, altitude, airspeed, normal acceleration and heading.
- (10) [AOC] Effective 1 January 2016, all turbine-engined airplanes, for which the individual certificate of airworthiness was first issued before 1 January 1987, with a maximum certificated take-off mass of over 27 000 kg that are of types of which the prototype was certificated by the appropriate national authority after 30 September 1969 shall be equipped with an FDR which shall record, in addition to time, altitude, airspeed, normal acceleration and heading, such additional parameters as are necessary to meet the objectives of determining:
 - (i) the attitude of the airplane in achieving its flight path; and
 - (ii) the basic forces acting upon the airplane resulting in the achieved flight path and the origin of such basic forces.
- (11) [AAC] All airplanes of a maximum certificated take-off mass of over 5 700 kg for which the individual certificate of airworthiness is first issued after 1 January 2005 shall be equipped with a Type IA FDR.
- (12) [AOC] All airplanes which are required to record normal acceleration, lateral acceleration and longitudinal acceleration for which the application is for a type certificate is first made to its State of Design on or after 1 January 2016 and which are required to be fitted with an FDR shall record those parameters at a maximum sampling and recording interval of 0.0625 seconds.

- (13) [AAC] All airplanes which are required to record pilot input and/or control surface position of primary controls (pitch, roll, yaw) for which the application for a type certificate is first made to its State of Design 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.

Note: For airplanes with control systems in which movement of a control surface will back drive the pilot's control, "or" applies. For airplanes with control systems in which movement of a control surface will not back drive the pilot's control, "and" applies. In airplanes with independent moveable surfaces, each surface needs to be recorded separately. In airplanes with independent pilot input on primary controls, each pilot input on primary controls needs to be recorded separately.

- (b) No person may operate the following helicopter unless it is equipped with a flight data recorder capable of recording the aural environment of the flight deck during flight time.
- (1) [AAC] All helicopters with a maximum certificated take-off mass of over 3 180 kg for which the individual certificate of airworthiness is first issued on or after 1 January 2016 shall be equipped with a Type IVA FDR.
- (2) [AAC] All helicopter with a certificated takeoff mass of over 7 000 kg, or having a passenger seating configuration of more than nineteen, for which the individual certificate of airworthiness is first issued on or after 1, January 1989 shall be equipped with a Type IV FDR.
- (3) [AAC] All helicopters with a maximum certificated take-off mass of over 3 180 kg, up to and including 7 000 kg, for which the individual certificate of airworthiness is first issued on or after 1 January 1989 shall be equipped with a Type V FDR.
- (4) [AOC] All turbine-engined helicopter of a maximum certificated take-off mass of over 2 250 kg, up to and including 3 180 kg the application for a type certificate is first made to its State of Design on or after 1 January 2018, unless is it equipped with:
- (i) A Type IVA FDR; or
 - (ii) A Class C AIR capable of recording fight path and speed parameters displayed to the pilot(s); or
 - (iii) An ADRS capable of recording the essential parameters in the Table in IS: 7.7.2.2.
- (5) [AOC] All turbine-engined helicopter of a maximum certificated take-off mass of over 3 180 kg or less for which the individual certificate of airworthiness is first issued on or after 1 January 2018, unless is it equipped with:
- (i) A Type IVA FDR; or
 - (ii) A Class C AIR capable of recording fight path and speed parameters displayed to the pilot(s); or
 - (iii) An ADRS capable of recording the essential parameters in the Table in IS: 7.7.2.2.

7.7.2.3 DISCONTINUATION

- (a) Flight data recorder media not acceptable for use in aircraft registered in the Philippines, or operated in commercial air transport operations in the Philippines, are—
- (1) Engraving metal foil;

- (2) Photographic film;
- (3) Analogue data using frequency modulation (FM);
- (4) Magnetic tape.

7.7.2.4 DURATION

- (a) FDRs shall be capable of retaining the information recorded during the last—
- (1) Type I and II -- 25 hours of operation.
 - (2) Type IIA – 30 minutes of operation.
 - (3) Type IV, IVA and V – 10 hours of operation.

7.7.3 COCKPIT VOICE RECORDERS (CVR) AND COCKPIT AUDIO RECORDING SYSTEMS (CARS)

(Reserved)

7.7.3.1 SIGNALS TO BE RECORDED – CVR AND CARS

- (a) The CVR, and CARS as applicable to airplanes, 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.
- (b) In addition to (a) above, the CVR and CARS shall 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.
- (c) The CVR shall record on four separate channels, or more, at least the following:
- (1) Voice communication transmitted from or received in the aircraft by radio;
 - (2) Aural environment on the flight deck;
 - (3) Voice communication of flight crew members on the flight deck using the aircraft's interphone system, if installed;
 - (4) Digital communications with ATS, unless recorded by the FDR.
- (d) The CARS shall record on two separate channels, or more, at least the following:
- (1) Voice communication transmitted from or received in the airplane by radio;
 - (2) Aural environment on the flight deck; and
 - (3) Voice communication of flight crewmembers on the flight deck using the airplane's interphone, if installed.
- (e) The recorder shall be capable of recording on at least four channels simultaneously, except for the recorder in paragraph 7.7.2.2(a)(4) in the preferred channel allocation as follows:
- (1) Channel 1 – co-pilot headphones and live boom microphone;
 - (2) Channel 2 – pilot headphones and live boom microphone;
 - (3) Channel 3 – area microphone;
 - (4) Channel 4 – time reference plus the third and fourth crewmembers.

Note 1: Channel 1 is located closest to the base of the recording head.

Note 2: The preferred channel allocation presumes the 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.

- (f) On a tape-based CVR, to ensure accurate time correlation between channels, the recorder shall record in an in-line format. If a bi-directional configuration is used, the in-line format and channel allocation shall be retained in both directions.

7.7.3.2 AIRCRAFT EQUIPAGE FOR OPERATIONS

- (a) No person may operate an airplane unless it is equipped with a cockpit voice recorder as listed below:

- (1) [AAC] All turbine-engined airplanes for which the application for a type certificate is first submitted to the appropriate CAA on or after 1 January 2016 and required to be operated by more than one pilot shall be equipped with either a CVR or a CARS.
- (2) [AAC] All airplanes of a maximum certificated take-off mass of over 27 000 kg for which the individual certificate of airworthiness is first issued on or after 1 January 1987 shall be equipped with a CVR.
- (3) [AAC] Effective 1 January 2016, all airplanes of a maximum certificated take-off mass of over 5 700 kg, up to and including 27 000 kg, for which the individual certificate of airworthiness is first issued on or after 1 January 1987, shall be equipped with a CVR.
- (4) [AOC] All airplanes of a maximum certificated take-off mass of over 5 700 kg for which the individual certificate of airworthiness is first issued on or after 1 January 2003, shall be equipped with a CVR capable of retaining the information recorded during at least the last two hours of its operation.
- (5) [AOC] All airplanes of a maximum certificated take-off mass of over 5 700 kg for which the individual certificate of airworthiness is first issued on or after 1 January 1987 shall be equipped with a CVR.
- (6) [AOC] All turbine-engined airplanes, for which the individual certificate of airworthiness was first issued before 1 January 1987, with a maximum certificated take-off mass of over 27 000 kg that are of types of which the prototype was certificated by the appropriate national authority after 30 September 1969 shall be equipped with a CVR.
- (7) [AOC] Effective 1 January 2016, all turbine-engined airplanes, for which the individual certificate of airworthiness was first issued before 1 January 1987, with a maximum certificated take-off mass of over 5 700 kg up to and including 27 000 kg that are of types of which the prototype was certificated by the appropriate national authority after 30 September 1969 shall be equipped with a CVR.

- (b) No person may operate a helicopter unless it is equipped with a cockpit voice recorder as listed below:

- (1) [AAC] All helicopters of a maximum certificated take-off mass of over 7 000 kg for which the individual certificate of airworthiness is first issued on or after 1 January 1987 shall be equipped with a CVR. For helicopters not equipped with an FDR, at least main rotor speed shall be recorded on the CVR.
- (2) [AAC] Effective 1 January 2016, all helicopters of a maximum certificated take-off mass of over 3 180 kg for which the individual certificate of airworthiness is first

issued on or after 1 January 1987 shall be equipped with a CVR. For helicopters not equipped with an FDR, at least main rotor speed shall be recorded on the CVR.

- (3) [AAC] All helicopters of a maximum certificated take-off mass of over 7 000 kg for which the individual certificate of airworthiness was first issued before 1 January 1987 shall be equipped with a CVR. For helicopters not equipped with an FDR, at least main rotor speed shall be recorded on the CVR.

7.7.3.3 DISCONTINUATION

- (a) CVS media not acceptable for use in aircraft registered in the Philippines, or operated in commercial air transport operations in Philippines, are—

(1) Magnetic tape and wire.

7.7.3.4 DURATION

- (a) A CVR shall be capable of retaining the information recorded during at least the last 2 hours of its operations.
- (b) All aeroplanes of a maximum certificated take-off mass of over 27 000 kg for which the individual certificate of airworthiness is first issued on or after 1 January 2022 shall be equipped with a CVR capable of retaining the information recorded during at least the last twenty-five hours of its operation.

7.7.3.5 COCKPIT VOICE RECORDER ALTERNATE POWER

- (a) [AOC] No person may operate an airplane required to be equipped with a CVR unless it is equipped with CVR alternate power that:
- (1) automatically engages and provides ten minutes, plus or minus one minute, of operation whenever airplane power to the recorder ceases, either by normal shutdown or by any other loss of power;
 - (2) powers the CVR and its associated cockpit area microphone components, and
 - (3) is located as close as practicable to the alternate power source.
- (b) [AOC] No person may operate an airplane of a maximum certificated take-off mass of over 27 000 kg for which the individual certificate of airworthiness is first issued on or after 1 January 2018 unless it is equipped with an alternate power source, as described in (a) above, that powers—
- (1) the forward CVR in the case of combination recorders, or
 - (2) at least one CVR.

Note 1: "Alternate" means separate from the power source that normally provides power to the CVR. The use of airplane batteries or other power sources is acceptable provided that the requirements are above are met and electrical power to essential and critical loads is not compromised.

Note 2: When the CVR function is combined with other recording functions within the same unit, powering the other functions is allowed.

7.7.4 DATA LINK RECORDERS (DLR) AND DATA LINK RECORDING SYSTEMS (DLRS)

(Reserved)

7.7.4.1 APPLICABILITY

- (a) No person may operate an airplane or helicopter for which the individual certificate of airworthiness is first issued on or after 1 January 2016, which utilize any of the data link communications applications listed in IS 7.7.4.1 and are required to carry a CVR, unless the aircraft records on a flight recorder the data link communications messages.
- (b) No person may operate an airplane or helicopter modified on or after 1 January 2016, which utilize any of the data link communications applications listed in IS 7.7.4.1 and are required to carry a CVR, unless the aircraft records on a flight recorder the data link communications messages.
- (c) No person may operate an airplane or helicopter where the aircraft flight path is authorized or controlled through the use of data link messages, unless all data link messages, both uplinks to the aircraft and downlinks from the aircraft are recorded on the aircraft. As far as practicable, the time the messages were displayed to the flight crew and the time of the responses shall be recorded.

Note 1: Data link communications are currently conducted by either ATN-based or FANS 1/A-equipped aircraft.

Note 2: A Class B AIR could be a means for recording data link communications applications messages to and from the aircraft where it is not practical or is prohibitively expensive to record those data link communications applications messages on FDR or CVR.

7.7.4.2 DURATION

- (a) The minimum recording duration shall be equal to the duration of the CVR.

7.7.4.3 CORRELATION

- (a) Data link recording shall be correlated to the recorded cockpit audio.

7.7.5 AIRBORNE IMAGE RECORDER (AIR) AND AIRBORNE IMAGE RECORDING SYSTEM (AIRS)

- (a) Airborne image recorders are classified as follows.
 - (1) A Class A AIR or AIRS captures the general cockpit area in order to provide data supplemental to conventional flight recorders.
 - (2) A Class B AIR or AIRS captures data link message displays.
 - (3) A Class C AIR or AIRS captures instruments and control panels.

Note 1: A Class C AIR or AIRS 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 an ADRS, or where an FDR is not required.

- (b) The AIR or AIRS must 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 or AIRS 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.

7.7.6 FLIGHT RECORDER DATA RECOVERY

- (a) All airplanes of a maximum certificated take-off mass of over 27 000 kg which are authorized to carry more than nineteen passengers for which the application for type certification is submitted to a Contracting State on or after 1 January 2021, shall be equipped with a means approved by the Authority, to recover flight recorder data and make it available in a timely manner.
- (b) In approving the means to make flight recorder data available in a timely manner, the Authority shall take into account the following:
 - (1) The capabilities of the operator;
 - (2) Overall capability of the airplane and its systems as certified by State of Design;
 - (3) The reliability of the means to recover the appropriate CVR channels and appropriate FDR data; and
 - (4) Specific mitigation measures.

Note. – *Guidance on approving the means to make flight recorder data available in a timely manner is contained in the Manual on Location of Aircraft in Distress and Flight Recorder Data Recovery (ICAO Doc 10054).*

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7.8 EMERGENCY, RESCUE, AND SURVIVAL EQUIPMENT

7.8.1 EMERGENCY EQUIPMENT: ALL AIRCRAFT

- (a) [AAC] Each item of emergency and flotation equipment shall be—
- (1) Readily accessible to the crew and, with regard to equipment located in the passenger compartment, to passengers without appreciable time for preparatory procedures;
 - (2) Clearly identified and clearly marked to indicate its method of operation;
 - (3) Marked as to date of last inspection; and
 - (4) Marked as to contents when carried in a compartment or container.

7.8.2 EMERGENCY EXIT EQUIPMENT

- (a) [AAC] Each passenger-carrying land plane emergency exit (other than over-the-wing) that is more than 6 feet from the ground with the airplane on the ground and the landing gear extended, shall have an approved means to assist the occupants in descending to the ground.
- (b) [AAC] Each passenger emergency exit, its means of access, and its means of opening shall be conspicuously marked by a sign visible to occupants approaching along the main passenger aisle.
- (c) [AOC] Each passenger carrying aircraft shall have an emergency lighting system, independent of the main lighting system that—
- (1) Illuminates each passenger exit marking and locating sign;
 - (2) Provides enough general lighting in the passenger cabin; and
 - (3) Includes floor proximity emergency escape path marking.
- (d) [AAC] Each passenger emergency exit shall have instructions for opening that exit from the outside clearly marked on the outside of the door.
- (e) [AAC] Each passenger emergency exit shall have a 2-inch colored band outlining the opening on the outer edge of the door or on the side of the fuselage.
- (f) [AAC] These markings shall be readily distinguishable from the surrounding fuselage area by contrast in color and shall comply with the following:
- (1) If the reflectance of the darker color is 15 percent or less, the reflectance of the lighter color shall be at least 45 percent.
 - (2) If the reflectance of the darker color is greater than 15 percent, at least a 30 percent difference between its reflectance and the reflectance of the lighter color shall be provided.
- Note: "Reflectance" is the ratio of the luminous flux reflected by a body to the luminous flux it receives.*
- (3) Exits that are not in the side of the fuselage shall have external means of opening and applicable instructions marked conspicuously in red or, if red is inconspicuous against the background color, in bright chrome yellow and, when the opening means for such an exit is located on only one side of the fuselage, a conspicuous marking to that effect shall be provided on the other side.
- (g) [AAC] Each passenger-carrying aircraft shall be equipped with a slip-resistant escape route that meets the requirements under which that airplane was type certified.

Implementing Standard: See IS: 7.8.2 for details of the emergency exit equipment requirements.

7.8.3 VISUAL SIGNALLING DEVICES

- (a) [AAC] No person may operate an aircraft over water or across land areas which have been designated by the Republic of the Philippines as areas in which search and rescue would be especially difficult, unless equipped with such signaling devices as may be appropriate to the area over flown, to include—
- (1) Visual signals for use by intercepting and intercepted aircraft; and
 - (2) At least one pyrotechnic signaling device for each life raft required for overwater operations.

7.8.4 SURVIVAL EQUIPMENT

- (a) Subject to subsection (b), no person shall operate an aircraft over land unless there is carried on board survival equipment, sufficient for the survival on the ground of each person on board, given the geographical area, the season of the year and anticipated seasonal climatic variations, that provides the means for
- (1) starting a fire;
 - (2) providing shelter;
 - (3) providing or purifying water; and
 - (4) visually signaling distress.
- (b) Subsection (a) does not apply in respect of
- (1) a balloon, a glider, a hang glider, a gyroplane or an ultra-light airplane;
 - (2) an aircraft that is operated within 25 nautical miles of the aerodrome of departure and that has the capability of radio communication with a surface-based radio station for the duration of the flight;
 - (3) a multi-engined aircraft that is operated south of 66° 30' north latitude or north of 66° 30' south latitude
 - (i) in IFR flight within controlled airspace, or
 - (ii) along designated air routes;
 - (4) an aircraft that is operated by an air operator, where the aircraft is equipped with equipment specified in the air operator's company operations manual, but not with the equipment required by subsection (a); or
 - (5) an aircraft that is operated in a geographical area where and at a time of year when the survival of the persons on board is not jeopardized.

7.8.5 EMERGENCY LOCATOR TRANSMITTER (ELT)

- (a) [AAC] Except for 7.8.5 (b) all aircraft on all flights shall be equipped with a 406 MHz ELT of a type and quantity as specified in **IS: 7.8.5**, meet the technical standards specified by the Authority and the relevant portions of ICAO Annex 10, Volume 3.

- (1) The ELT must be registered and programmed with a distinct Unique Identification Number (UIN) which is comprised of a 24 bit code. This code is supplied by the Authority prior to installation and use.
- (b) All aircraft should carry an ELT however an aircraft may be operated without an ELT on board where the aircraft is
 - (1) a glider, balloon, airship, ultra-light airplane, gyroplane, restricted or non-Type Certificated aircraft;
 - (2) operated by the holder of a flight training unit operating certificate, engaged in flight training and operated within 25 nautical miles of the aerodrome of departure;
 - (3) engaged in a flight test.
- (c) Batteries used in ELTs shall be replaced (or recharged if the battery is rechargeable) when—
 - (1) The transmitter has been in use for more than one cumulative hour; or
 - (2) 50 percent of their useful life (or for rechargeable batteries, 50 percent of their useful life of charge) has expired.
- (d) The expiration date for a replacement or recharged ELT battery shall be legibly marked on the outside of the transmitter.

Note: The battery useful life (or useful life of charge) requirements do not apply to batteries (such as water-activated batteries) that are essentially unaffected during probable storage intervals.

7.8.6 PORTABLE FIRE EXTINGUISHERS

- (a) [AAC] No person may operate an aircraft unless it is equipped with portable fire extinguishers of a type which, when discharged, will not cause dangerous contamination of the air within the aircraft. At least one shall be located in —
 - (1) The pilot's compartment; and
 - (2) Each passenger compartment that is separate from the pilot's compartment and not readily accessible to the flight crew.

Note: Any portable fire extinguisher so fitted in accordance with the certificate of airworthiness of the airplane may count as one prescribed.
- (b) [AOC] No person may operate an aircraft unless it is equipped with portable fire extinguishers accessible for use in crew, passenger, and cargo compartments as follows:
 - (1) The type and quantity of extinguishing agent shall be suitable for the kinds of fires likely to occur in the compartment where the extinguisher is intended to be used.
 - (2) At least one portable fire extinguisher shall be provided and conveniently located for use in each Class E cargo compartment which is accessible to crew members during flight, and at least one shall be located in each upper and lower lobe galley.
 - (3) At least one portable fire extinguisher shall be conveniently located on the flight deck for use by the flight crew.

- (4) At least one portable fire extinguisher shall be conveniently located in the passenger compartment if the passenger compartment is separate from the flight deck and not readily accessible to the flight crew.
- (5) For each airplane having a passenger seating capacity of more than 30, there shall be at least the following number of portable fire extinguishers conveniently located and uniformly distributed throughout the compartment.

| Minimum Number of Hand Fire Extinguishers Passenger Seating Capacity | |
|---|---|
| 7 through 29 | 1 |
| 30 through 60 | 2 |
| 61 through 200 | 3 |
| 201 through 300 | 4 |
| 301 through 400 | 5 |
| 401 through 500 | 6 |
| 501 through 600 | 7 |
| 601 or more | 8 |

- (c) [AAC] Any agent used in a portable fire extinguisher in an aircraft for which the individual certificate of airworthiness is first issued on or after 31 December 2011, and any extinguishing agent used in a portable fire extinguisher in an aircraft for which the individual certificate of airworthiness is first issued on or after 31 December 2018, shall:
- (1) Meet the applicable minimum performance requirements of the Authority; an
 - (2) Not contain Halon 1211, Halon 1301, or Halon 2402.

7.8.7 LAVATORY FIRE EXTINGUISHER

- (a) [AOC] No person may operate a passenger-carrying transport category airplane unless each lavatory in the airplane is equipped with a built-in fire extinguisher for each disposal receptacle for towels, paper, or waste located within the lavatory.
- (b) [AOC] Built-in lavatory fire extinguishers shall be designed to discharge automatically into each disposal receptacle upon occurrence of a fire in the receptacle.
- (c) [AAC] After 31 December 2016, any agent used in a built-in fire extinguisher for each lavatory disposal receptacle for towels, or waste in an aircraft for which the individual certificate of airworthiness is first issued on or after 31 December 2011 shall:
- (1) Meet the applicable minimum performance requirements of this Authority; and
 - (2) not be of a type listed in the 1987 *Montreal Protocol on Substances that Deplete the Ozone Layer* as it appears in the Eighth Edition of the *Handbook for the Montreal Protocol on Substances that Deplete the Ozone Layer*, Annex A, Group II.

Note.— Information concerning extinguishing agents is contained in the UNEP Halons Technical Options Committee Technical Note No. 1 – New Technology Halon Alternatives and FAA Report No. DOT/FAA/AR-99-63, Options to the Use of Halons for Aircraft Fire Suppression Systems.

7.8.8 LAVATORY SMOKE DETECTOR

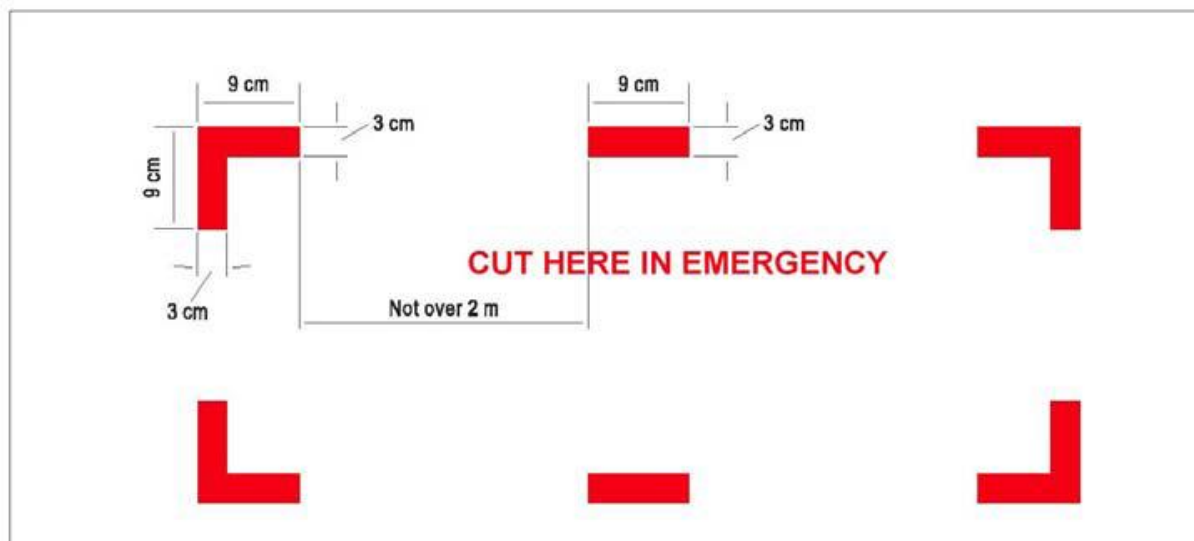
- (a) [AOC] No person may operate a passenger-carrying transport category airplane unless each lavatory in the airplane is equipped with a smoke detector system or equivalent that provides—
- (1) A warning light in the cockpit; or
 - (2) A warning light or audio warning in the passenger cabin which would be readily detected by a flight attendant, taking into consideration the positioning of flight attendants throughout the passenger compartment during various phases of flight.

7.8.9 CRASH AXE

[AOC] No AOC holder shall operate a large airplane unless it is equipped with a crash axe appropriate to effective use in that type of airplane, stored in a place not visible to passengers on the airplane.

7.8.10 MARKING OF BREAK-IN POINTS

- (a) [AAC] If areas of the fuselage suitable for break-in by rescue crews in an emergency are marked on an aircraft, such areas shall be marked as shown below, and the color of the markings shall be red or yellow and, if necessary, they shall be outlined in white to contrast with the background.
- (b) If the corner markings are more than 2 meters apart, intermediate lines 9 cm x 3 cm shall be inserted so that there is no more than 2 m between adjacent markings.
- (c) The words “CUT HERE IN EMERGENCY” shall be marked across the centre of each break-in area in Capital Letters.
- (d) The application of these markings is not mandatory.



7.8.11 FIRST-AID KIT, UNIVERSAL PRECAUTION KIT AND EMERGENCY MEDICAL KIT

(a) First Aid Kits.

- (1) No person may operate the following aircraft unless it is equipped with an accessible, approved first-aid kit(s):
 - (i) [AAC - Airplane] Airplanes with a maximum certificated take-off weight of over 5 700 kg;
 - (ii) [AOC] - All AOC holders.
- (2) The contents of first-aid kits to be carried shall comply with IS: 7. 8.11.
- (3) Each aircraft shall carry first-aid kits in accordance with at least the following schedule:

| Number of Passenger Seats | Number of First-Aid Kits |
|---------------------------|--------------------------|
| 0-100 | 1 |
| 101-200 | 2 |
| 201-300 | 3 |
| 301-400 | 4 |
| 401-500 | 5 |
| More than 500 | 6 |

- (4) The location of first aid kits should be:
 - (i) Distributed evenly throughout the aircraft

- (ii) Readily accessible to cabin crew members, if cabin crew members are required for flight, and
 - (iii) Located near the aircraft exits should their use be required outside the aircraft in an emergency situation.
- (b) Universal Precaution Kit.
- (1) No person shall operate an aircraft that requires a cabin crew member unless it is equipped with at least one universal precaution kit.
 - (2) The contents of universal precaution kits to be carried shall comply with IS: 7. 8.11.
 - (3) Each aircraft shall carry additional universal precaution kits in accordance with the following:
 - (i) Two kits for aircraft Authorized to carry more than 250 passengers; and
 - (ii) Additional kits, as determined by the Authority, at times of increased public health risk, such as during an outbreak of a serious communicable disease having pandemic potential.
- (c) Emergency Medical Kit.
- (1) [AOC] No person may operate a passenger flight in an aeroplane with 100 seats or more on a sector length of more than two hours unless the aeroplane is equipped with an approved emergency medical kit for treatment of injuries or medical emergencies that might occur during flight time or in minor accidents.
 - (2) [AOC] The contents of emergency medical kits to be carried shall comply with IS: 7. 8.11.
 - (3) [AOC] The medical kit shall be stored in a secure location.

7.8.12 OXYGEN STORAGE AND DISPENSING APPARATUS

- (a) [AAC] All aircraft intended to be operated at altitudes requiring the use of supplemental oxygen shall be equipped with adequate oxygen storage and dispensing apparatus.
- (b) [AAC] The oxygen apparatus, the minimum rate of oxygen flow, and the supply of oxygen shall meet applicable airworthiness standards for type certification in the transport category as specified by the Authority.
- (c) [AAC] No person may operate an aircraft at altitudes above 10,000 feet unless it is equipped with oxygen masks, located so as to be within the immediate reach of flight crew members while at their assigned duty station.
- (d) [AAC] No person may operate a pressurized aircraft at altitudes above 25,000 feet unless:
 - (1) Flight crew member oxygen masks are of a quick donning type;
 - (2) An automatically deployable oxygen-dispensing unit is connected to oxygen supply terminals installed so as to be immediately available to each occupant, wherever seated.
 - (3) Sufficient spare outlets and masks and/or sufficient portable oxygen units with masks are distributed evenly throughout the cabin to ensure immediate availability of oxygen to each required cabin crew member regardless of his location at the time of cabin pressurization failure.
 - (4) The total number of dispensing units and outlets shall exceed the number of seats by at least 10%. The extra units are to be evenly distributed throughout the cabin.

- (e) [AAC] The amount of supplemental oxygen for sustenance required for a particular operation shall 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.

Implementing Standard: See IS: 7.8.12 to determine the amount of supplemental oxygen needed for non-pressurized and pressurized aircraft.

7.8.13 PROTECTIVE BREATHING EQUIPMENT (PBE)

- (a) [AAC] No person may operate an airplane with a maximum certified takeoff mass exceeding 5,700 kg. or having a maximum approved seating configuration of more than 19 seats unless—
- (1) It has PBE 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 not less than 15 minutes; and
 - (2) It has sufficient portable PBE to protect the eyes, nose and mouth of all required cabin crew members and to provide breathing gas for a period of not less than 15 minutes.
- (b) The oxygen supply for PBE may be provided by the required supplemental oxygen system.
- (c) The PBE intended for flight crew use shall be conveniently located on the flight deck and be easily accessible for immediate use by each required flight crew member at their assigned duty station.
- (d) The PBE intended for cabin crew use shall be installed adjacent to each required cabin crew member duty station.
- (e) Easily accessible portable PBE shall be provided and located at or adjacent to the required hand fire extinguishers except that, where the fire extinguisher is located inside a cargo compartment, the PBE shall be stowed outside but adjacent to the entrance to that compartment.
- (f) The PBE while in use shall not prevent required communication.

7.8.14 FIRST AID OXYGEN DISPENSING UNITS

- (a) [AOC] No AOC holder may conduct a passenger carrying operation in a pressurized aircraft at altitudes above 25,000 feet, when a cabin crew member is required to be carried, unless it is equipped with—
- (1) Undiluted first-aid oxygen for passengers who, for physiological reasons, may require oxygen following a cabin depressurization; and
 - (2) A sufficient number of dispensing units, but in no case less than two, with a means for cabin crew to use the supply.
- (b) [AOC] The amount of first-aid oxygen required in paragraph (a) for a particular operation and route shall be determined on the basis of—
- (1) Flight duration after cabin depressurization at cabin altitudes of more than 8,000 feet;
 - (2) An average flow rate of at least 3 liters Standard Temperature Pressure Dry/minute/person; and

- (3) At least 2% of the passengers carried, but in no case for less than one person.

7.8.15 MEGAPHONES

- (a) [AOC] Each person operating a passenger-carrying airplane shall have a portable battery-powered megaphone or megaphones readily accessible to the crew members assigned to direct emergency evacuation.
- (b) [AOC] The number and location of megaphones required in paragraph (a) shall be determined as follows:
- (1) On airplanes with a seating capacity of more than 60 and less than 100 passengers, one megaphone shall be located at the most rearward location in the passenger cabin where it would be readily accessible to a normal flight attendant seat; and
- (2) On airplanes with a seating capacity of more than 99 passengers, two megaphones in the passenger cabin on each airplane one installed at the forward end and the other at the most rearward location where it would be readily accessible to a normal flight attendant seat.

Note: The Authority may grant a deviation from the requirements of paragraph (b) if the Authority finds that a different location would be more useful for evacuation of persons during an emergency.

7.8.16 INDIVIDUAL FLOTATION DEVICES

- (a) Landplanes including helicopters.
- (1) [AAC] Shall carry the equipment prescribed in paragraph (2):
- (i) When flying en-route over water beyond gliding distance from the shore;
- (ii) When flying over water at a distance of more than 93 km (50 NM) away from the shore for aircraft capable of maintaining safe altitude after the failure of one engine for two-engine aircraft and the failure of two engines for three or four-engine aircraft.; or
- (iii) When taking off or landing at an aerodrome where the (Authority) has determined the takeoff or approach path is so disposed over water that in the event of a mishap there would be the likelihood of a ditching.
- (2) [AAC] One life-jacket or equivalent flotation device equipped with a means of electric illumination shall be carried for each person on board, stowed in a position easily accessible from the seat or berth of the person for whose use it is provided.
- Note 1. – Information regarding the acceptable means of compliance with this Standard, particularly in the case of infants, can be found, in the Guidance on the preparation of an Operations Manual (Doc 10153), Chapter 11 Attachment D.*
- (b) Seaplanes.
- (1) [AAC] For all flights, seaplanes shall be equipped with the equipment prescribed in paragraph (2).
- (c) Helicopters.
- (1) For offshore operations the life jacket shall be worn unless the occupant is wearing an integrated survival suit.

7.8.17 LIFE RAFT

- (a) [AAC] In addition to the equipment prescribed in 7.8.16 and 7.8.18 of this Part, lifesaving rafts in sufficient numbers to carry all persons on board shall be installed in:
- (1) All airplanes when operating in “Extended over-water operations” as defined in Subpart 8.1.1.2 (b).
 - (2) Class 1 and 2 helicopters when they are operated over water at a distance from land corresponding to more than 10 minutes at normal cruise speed.
 - (3) Class 3 helicopters when they are operated over water beyond auto-rotational or safe forced landing distance from land.
- (b) An aircraft shall have lifesaving rafts with a sufficient capacity to carry all persons on board in the event of the loss of one raft of the largest capacity.
- (c) All lifesaving rafts shall be stowed so as to facilitate their ready use in an emergency.
- (d) Life rafts shall be equipped with the following life sustaining equipment—
- (1) A electric survivor locator light;
 - (2) A survival kit equipped in accordance with the requirements of subsection 7.8.4;
 - (3) A pyrotechnical signaling device.
- (e) [AOC] In helicopters, life rafts which are not deployable by remote control and which have a mass of more than 40 kg shall be equipped with a means of mechanically assisted deployment.

7.8.18 FLOTATION DEVICE FOR HELICOPTER DITCHING

- (a) [AAC] All helicopters flying over water at a distance from land corresponding to more than 10 minutes at normal cruise speed in the case of performance Class 1 or 2 helicopters, or flying over water beyond auto-rotational or safe forced landing distance from land in the case of performance Class 3 helicopters, shall be fitted with a permanent or rapidly deployable means of floatation so as to ensure a safe ditching of the helicopter.

7.8.19 AIRCRAFT UNDERWATER LOCATOR BEACON

- (a) [AOC] at the earliest practicable date but not later than 1 January 2019, no aircraft with a maximum certificated take-off mass of 27,000 kg may engage in “ Extended over-water operations” as defined in Subpart 8.1.1.2(b) without a securely attached underwater locating device operating at a frequency of 8.8kHz. This automatically activated underwater locating device shall operate for a minimum of 30 days and shall not be installed in wings or empennage.

Note: Underwater Locator Beacon (ULB) performance requirements are as contained in the SAE AS6254, Minimum Performance Standard for Underwater Locating Devices (Acoustic) (Self-Powered), or equivalent documents.

7.9 MISCELLANEOUS SYSTEMS AND EQUIPMENT

7.9.1 SEATS, SAFETY BELTS, AND SHOULDER HARNESSSES

- (a) [AAC] Each aircraft used in passenger carrying operations shall be equipped with the following seats, safety belts, and shoulder harnesses that meet the airworthiness requirements for type certification of that aircraft:
- (1) A seat with safety belt for each person on board over the age of two (2) years old; and a restraining belt for each berth on board the aircraft
 - (2) A safety harness for each flight crewmember seat.
 - (i) The safety harness for each pilot seat shall incorporate a device, which will automatically restrain the occupant's torso in the event of rapid deceleration.
 - (ii) The safety harness for each pilot seat, which includes shoulder straps and a seat belt, should incorporate a device to prevent a suddenly incapacitated pilot from interfering with the flight controls.
 - (3) A forward or rearward facing (within 15 degrees of the longitudinal axis of the airplane) seat equipped with a safety harness for each cabin crew member station in the passenger compartment.
 - (4) The cabin crew member's seats shall be located near floor level and other emergency exits for emergency evacuation.

7.9.2 PASSENGER AND PILOT COMPARTMENT DOORS

- (a) [AOC] All aircraft which are equipped with a flight crew compartment door, door shall be capable of being locked, and means shall be provided by which cabin crew can discreetly notify the flight crew in the event of suspicious activity or security breaches in the cabin.
- (b) [AOC] All passenger-carrying aircraft of a maximum certificated take-off mass in excess of 45500 kg or with a passenger seating capacity greater than 60 shall be equipped with an approved flight crew compartment door that is designed to resist penetration by small arms fire and grenade shrapnel, and to resist forcible intrusions by unauthorized persons. This door shall be capable of being locked and unlocked from either pilot's station.
- (c) All aircraft which are equipped with a flight crew compartment door in accordance with (b):
- (1) shall be closed and locked from the time all external doors are closed following embarkation until any such door is opened for disembarkation, except when necessary to permit access and egress by authorized persons; and
 - (2) a means shall be provided for monitoring from either pilot's station the entire door area outside the flight crew compartment to identify persons requesting entry and to detect suspicious behavior or potential threat.

7.9.3 PASSENGER INFORMATION SIGNS

- (a) [AOC] No AOC holder may operate a passenger carrying aircraft unless it is equipped with—
- (1) At least one passenger information sign (using either letters or symbols) notifying when smoking is prohibited and one sign (using either letters or symbols) notifying when safety belts should be fastened shall, when illuminated, be legible to each

person seated in the passenger cabin under all probable conditions of cabin illumination;

- (2) Signs which notify when safety belts should be fastened and when smoking is prohibited shall be so constructed that the crew can turn them on and off;
- (3) At least one legible sign or placard that reads "Fasten Seat Belt While Seated" is visible from each passenger seats;
- (4) A sign or placard in each lavatory that reads: "Philippine law provides for a penalty for tampering with the smoke detector installed in this lavatory";
- (5) Each seat that is equipped with passenger floatation devices or life vests will be placarded, with instructions on where they are located.

7.9.4 PUBLIC ADDRESS SYSTEM

- (a) [AOC] No AOC holder may operate a passenger carrying airplane with a maximum approved passenger seating configuration of more than 19 unless a public address system is installed that—
 - (1) Operates independently of the interphone systems except for handsets, headsets, microphones, selector switches and signaling devices;
 - (2) For each required floor level passenger emergency exit which has an adjacent cabin crew seat, has a microphone which is readily accessible to the seated cabin crew member, except that one microphone may serve more than one exit, provided the proximity of the exits allows unassisted verbal communication between seated cabin crew members; and
 - (3) Is capable of operation within 10 seconds by a cabin crew member at each of those stations in the compartment from which its use is accessible; and
 - (4) Is audible and intelligible at all passenger seats, toilets, and cabin crew seats and workstations.

7.9.5 MATERIALS FOR CABIN INTERIORS

- (a) [AOC] Upon the first major overhaul of an aircraft cabin or refurbishing of the cabin interior, all materials in each compartment used by the crew or passengers that do not meet the current airworthiness requirements pertaining to materials used in the interior of the cabin for type certification in the transport category as cited by the Authority, shall be replaced with materials that meet the requirements specified by the Authority.
- (b) [AOC] Seat cushions, except those on flight crew member seats, in any compartment occupied by crew or passengers shall meet requirements pertaining to fire protection as specified by the Authority.

7.9.6 MATERIALS FOR CARGO AND BAGGAGE COMPARTMENTS

- (a) [AOC] Each Class C or D cargo compartment greater than 200 cubic feet in volume in a transport category aircraft type certified after January 1, 1958 shall have ceiling and sidewall liner panels which are constructed of—
 - (1) Glass fiber reinforced resin;
 - (2) Materials which meet the test requirements for flame resistance of cargo compartment liners as prescribed for type certification; or

- (3) In the case of installations approved prior to 20 March 1989, aluminum.

Note: The term "liner" includes any design feature, such as a joint or fastener, which would affect the capability of the liner to safely contain fire.

7.9.7 POWER SUPPLY, DISTRIBUTION, AND INDICATION SYSTEM

- (a) [AOC] No AOC holder may operate an airplane unless it is equipped with—
- (1) A power supply and distribution system that meets the airworthiness requirements for certification of an airplane in the transport category, or
 - (2) A power supply and distribution system that is able to produce and distribute the load for the required instruments and equipment, with use of an external power supply if any one power source or component of the power distribution system fails.
- Note: The use of common elements in the power system may be approved if the Authority finds that they are designed to be reasonably protected against malfunctioning.*
- (3) A means for indicating the adequacy of the power being supplied to required flight instruments.
- (b) [AOC] Engine-driven sources of energy, when used, shall be on separate engines.

7.9.8 PROTECTIVE CIRCUIT FUSES

[AAC] No person may operate an aircraft in which protective fuses are installed unless there are spare fuses available for use in flight equal to at least 10% of the number of fuses of each rating or three of each rating whichever is the greater.

7.9.9 ICING PROTECTION EQUIPMENT

- (a) [AAC] No person may operate an aircraft in icing conditions unless it is certified and equipped for the prevention or removal of ice on windshields, wings, empennage, propellers, and other parts of the aircraft where ice formation will adversely affect the safety of the aircraft.
- (b) [AAC] A flight to be planned or expected to operate in suspected or known ground icing conditions shall not be commenced unless the aircraft has been inspected for icing and, if necessary, has been given appropriate de-icing/anti-icing treatment. Accumulation of ice or other naturally occurring contaminants shall be removed so that the aircraft is kept in an airworthy condition prior to take-off.
- Note: Guidance material can be found in ICAO Manual of Aircraft Ground De-icing/Anti-icing Operations (Doc 9640).*
- (c) [AOC] No AOC holder may operate an aircraft in expected or actual icing conditions at night unless it is equipped with a means to illuminate or detect the formation of ice.
- Note: Any illumination that is used shall be of a type that will not cause glare or reflection that would handicap crew members in the performance of their duties.*

7.9.10 PITOT HEAT INDICATION SYSTEMS

(a) [AOC] No AOC holder may operate a transport category aircraft equipped with a flight instrument pitot heating system unless the aircraft is also equipped with an operable pitot heat indication system that complies with the following requirements:

- (1) The indication provided shall incorporate an amber light that is in clear view of a flight crew member.
- (2) The indication provided shall be designed to alert the flight crew if either the pitot heating system is switched "off," or the pitot heating system is switched "on" and any pitot tube heating element is inoperative.

7.9.11 STATIC PRESSURE SYSTEM

[AOC] No person may operate an aircraft unless two independent static pressure systems, vented to the outside atmospheric pressure so that they will be least affected by airflow variation or moisture or other foreign matter, and installed so as to be airtight except for the vent.

7.9.12 WINDSHIELD WIPERS

[AOC] No AOC holder may operate an airplane with a maximum certified take-off mass of more than 5,700 kg unless it is equipped at each pilot station with a windshield wiper or equivalent means to maintain a clear portion of the windshield during precipitation.

7.9.13 CHART HOLDER

[AOC] No AOC holder may operate an aircraft unless a chart holder is installed in an easily readable position which can be illuminated for night operations.

7.9.14 COSMIC RADIATION DETECTION EQUIPMENT

(a) [AOC] No person shall operate an airplane in commercial air transport operations in an airplane intended to be operated above 15,000 m (49,000 ft.) unless it is equipped with—

- (1) an instrument to measure and indicate continuously the dose rate of total cosmic radiation being received (i.e., the total of ionizing and neutron radiation of galactic and solar origin) and the cumulative dose on each flight or
- (2) A system of on-board quarterly radiation sampling acceptable to the Authority as described in IS: 7.9.14.

7.9.15 MARITIME SOUND SIGNALLING DEVICE

[AAC] All seaplanes for all flights shall be equipped with equipment for making the sound signals prescribed in the International Regulations for Preventing Collisions at Sea, where applicable.

7.9.16 ANCHORS

[AAC] All seaplanes for all flights shall be equipped with one anchor, and one sea anchor (drogue), when necessary to assist in maneuvering (approval for the anchors not required).

Note. - "Seaplanes" includes amphibians operated as seaplanes.

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REPUBLIC OF THE PHILIPPINES
CIVIL AVIATION REGULATIONS (CAR)

Part 7: IS
INSTRUMENTS AND EQUIPMENT:
IMPLEMENTING STANDARDS

IS: 7.2.5 CATEGORY II AND III: INSTRUMENTS AND EQUIPMENT APPROVAL AND MAINTENANCE REQUIREMENTS

- (a) **General.** The instruments and equipment required by subpart 7.2.5 and 7.2.6 shall be approved as provided in this implementing standard before being used in Category II and/or Category III operations. Before presenting an aircraft for approval of the instruments and equipment, it must be shown that since the beginning of the 12th calendar month before the date of submission—
- (1) The ILS localizer and glide slope equipment were bench checked according to the manufacturer's instructions and found to meet those standards specified in RTCA Paper 23-63/DO-177 dated March 14, 1963, "Standards Adjustment Criteria for Airborne Localizer and Glideslope Receivers."
 - (2) The altimeters and the static pressure systems were tested and inspected; and
 - (3) All other instruments and items of equipment specified in subpart 7.2.5 that are listed in the proposed maintenance program were bench checked and found to meet the manufacturer's specifications.
- (b) **Flight control guidance system.** All components of the flight control guidance system shall be approved as installed by the evaluation program specified in paragraph (e) if they have not been approved for Category III and/or Category III operations under applicable type or supplemental type certification procedures. In addition, subsequent changes to make, model, or design of the components must be approved under this paragraph. Related systems or devices, such as the autothrottle and computed missed approach guidance system, shall be approved in the same manner if they are to be used for Category II and/or Category III operations.
- (c) **Radio altimeter.** A radio altimeter must meet the performance criteria of this paragraph for original approval and after each subsequent alteration.
- (1) It shall display to the flight crew clearly and positively the wheel height of the main landing gear above the terrain.
 - (2) It shall display wheel height above the terrain to an accuracy of ± 5 feet or 5 percent, whichever is greater, under the following conditions:
 - (i) Pitch angles of zero to $\pm 5^\circ$ about the mean approach attitude.
 - (ii) Roll angles of zero to 20° in either direction.
 - (iii) Forward velocities from minimum approach speed up to 200 knots.
 - (iv) Sink rates from zero to 15 feet per second at altitudes from 100 to 200 feet.
 - (3) Over level ground, it must track the actual altitude of the aircraft without significant lag or oscillation.
 - (4) With the aircraft at an altitude of 200 feet or less, any abrupt change in terrain representing no more than 10 percent of the aircraft's altitude must not cause the altimeter to unlock, and indicator response to such changes must not exceed 0.1 seconds and, in addition, if the system unlocks for greater changes, it must reacquire the signal in less than 1 second.
 - (5) Systems that contain a push to test feature must test the entire system (with or without an antenna) at a simulated altitude of less than 500 feet.
 - (6) The system must provide to the flight crew a positive failure warning display any time there is a loss of power or an absence of ground return signals within the designed range of operating altitudes.

- (d) **Other instruments and equipment.** All other instruments and items of equipment required by subpart 7.2.5 or 7.2.6 shall be capable of performing as necessary for Category II and/or Category III operations. Approval is also required after each subsequent alteration to these instruments and items of equipment.
- (e) **Evaluation program.**
- (1) **Application.** Approval by evaluation is requested as a part of the application for approval of the Category II manual.
- (2) **Demonstrations.** Unless otherwise authorized by the Authority, the evaluation program for each aircraft requires the demonstrations specified in this paragraph. At least 50 ILS approaches shall be flown with at least five approaches on each of three different ILS facilities and no more than one half of the total approaches on any one ILS facility. All approaches shall be flown under simulated instrument conditions to a 30 m (100 foot) decision height and 90 percent of the total approaches made shall be successful. A successful approach is one in which—
- (i) At the 30 m (100 foot) decision height, the indicated airspeed and heading are satisfactory for a normal flare and landing (speed must be ± 5 knots of programmed airspeed, but may not be less than computed threshold speed if auto-throttles are used);
 - (ii) The aircraft at the 30 m (100 foot) decision height, is positioned so that the cockpit is within, and tracking so as to remain within, the lateral confines of the runway extended;
 - (iii) Deviation from glide slope after leaving the outer marker does not exceed 50 percent of full-scale deflection as displayed on the ILS indicator;
 - (iv) No unusual roughness or excessive attitude changes occur after leaving the middle marker; and
 - (v) In the case of an aircraft equipped with an approach coupler, the aircraft is sufficiently in trim when the approach coupler is disconnected at the decision height to allow for the continuation of a normal approach and landing.
- (3) **Records.** During the evaluation program the following information shall be maintained by the applicant for the aircraft with respect to each approach and made available to the Authority upon request:
- (i) Each deficiency in airborne instruments and equipment that prevented the initiation of an approach.
 - (ii) The reasons for discontinuing an approach, including the altitude above the runway at which it was discontinued.
 - (iii) Speed control at the 30 m (100 foot) DH if autothrottles are used.
 - (iv) Trim condition of the aircraft upon disconnecting the auto coupler with respect to continuation to flare and landing.
 - (v) Position of the aircraft at the middle marker and at the decision height indicated both on a diagram of the basic ILS display and a diagram of the runway extended to the middle marker. Estimated touchdown point shall be indicated on the runway diagram.
 - (vi) Compatibility of flight director with the auto coupler, if applicable.
 - (vii) Quality of overall system performance.
- (4) **Evaluation.** A final evaluation of the flight control guidance system is made upon successful completion of the demonstrations. If no hazardous tendencies have

been displayed or are otherwise known to exist, the system is approved as installed.

- (f) Each maintenance program for Category II and/or Category III instruments and equipment shall contain the following:
- (1) A list of each instrument and item of equipment specified in subpart 7.2.5 or 7.2.6 that is installed in the aircraft and approved for Category II and/or Category III operations, including the make and model of those specified in subpart 7.2.5 or 7.2.6.
 - (2) A schedule that provides for the performance of inspections under subparagraph (5) of this paragraph within 3 calendar months after the date of the previous inspection. The inspection shall be performed by a person authorized by Part 5, except that each alternate inspection may be replaced by a functional flight check. This functional flight check shall be performed by a pilot holding a Category II and/or Category III pilot authorization for the type aircraft checked.
 - (3) A schedule that provides for the performance of bench checks for each listed instrument and item of equipment that is specified in subpart 7.2.5 and 7.2.6 within 12 calendar months after the date of the previous bench check.
 - (4) A schedule that provides for the performance of a test and inspection of each static pressure system within 12 calendar months after the date of the previous test and inspection.
 - (5) The procedures for the performance of the periodic inspections and functional flight checks to determine the ability of each listed instrument and item of equipment specified in subpart 7.2.5 or 7.2.6 to perform as approved for Category II and/or Category III operations including a procedure for recording functional flight checks.
 - (6) A procedure for assuring that the pilot is informed of all defects in listed instruments and items of equipment.
 - (7) A procedure for assuring that the condition of each listed instrument and item of equipment upon which maintenance is performed is at least equal to its Category II and/or Category III approval condition before it is returned to service for Category II and/or Category III operations.
 - (8) A procedure for an entry in the maintenance records that shows the date, airport, and reasons for each discontinued Category II and/or Category III operation because of a malfunction of a listed instrument or item of equipment.
- (g) **Bench check.** A bench check required by this section shall comply with this paragraph.
- (1) It shall be performed by an AMO holding one of the following ratings as appropriate to the equipment checked:
 - (i) An instrument rating.
 - (ii) An avionics rating.
 - (2) It shall consist of removal of an instrument or item of equipment and performance of the following:
 - (i) A visual inspection for cleanliness, impending failure, and the need for lubrication, repair, or replacement of parts;
 - (ii) Correction of items found by that visual inspection; and

- (iii) Calibration to at least the manufacturer's specifications unless otherwise specified in the approved Category II and/or Category III manual for the aircraft in which the instrument or item of equipment is installed.
- (h) **Extensions.** After the completion of one maintenance cycle of 12 calendar months, a request to extend the period for checks, tests, and inspections is approved if it is shown that the performance of particular equipment justifies the requested extension.

IS: 7.2.8 NAVIGATION EQUIPMENT FOR OPERATIONS IN RVSM AIRSPACE

- (a) With respect to groups of airplanes that are nominally of identical design and build with respect to all details that may influence the accuracy of height-keeping performance, the height-keeping performance capability shall be such that the TVE for the group of airplanes shall have a mean no greater than 25 m (80 ft) in magnitude and shall have a standard deviation no greater than $28 - 0.013z^2$ for $0 \leq z \leq 25$ when z is the magnitude of the mean TVE in meters, or $92 - 0.004z^2$ for $0 \leq z \leq 80$ where z is in feet. In addition, the components of TVE shall have the following characteristics:
 - (1) The mean ASE of the group shall not exceed 25 m (80 ft) in magnitude;
 - (2) The sum of the absolute value of the mean ASE and of three standard deviations of ASE shall not exceed 75 m (245 ft); and
 - (3) The differences between cleared flight level and the indicated pressure altitude actually flown shall be symmetric about a mean of 0 m, with a standard deviation no greater than 13.3 m (43.7 ft), and, in addition, the decrease in the frequency of differences with increasing difference magnitude shall be at least exponential.
- (b) With respect to airplanes for which the characteristics of the airframe and altimetry system fit are unique and so cannot be classified as belonging to a group of airplanes encompassed by paragraph (a) of this IS, the height-keeping performance capability shall be such that the components of the TVE of the airplane have the following characteristics:
 - (1) The ASE of the airplane shall not exceed 60 m (200 ft) in magnitude under all flight conditions; and
 - (2) The differences between the cleared flight level and the indicated pressure altitude actually flown shall be symmetric about a mean of 0 m, with a standard deviation no greater than 13.3 m (43.7 ft), and, in addition, the decrease in the frequency of differences with increasing difference magnitude shall be at least exponential.

IS: 7.7.1.3 CONTINUED SERVICEABILITY AND INSPECTION OF FLIGHT RECORDER SYSTEMS

- (a) The operator shall, prior to the first flight of the day, monitor the built-in test features for the flight recorders and flight data acquisition unit (FDAU), when installed, by monitored by manual and/or automatic checks.
- (b) FDR systems or ADRS, CVR systems or CARS and AIR systems or AIRS shall have recording system inspection intervals of one year; subject to the approval from the Authority, this period may be extended to two years provided these systems have demonstrated a high integrity of serviceability and self-monitoring. DLR systems or DLRS shall have recording system inspection intervals of two years; subject to the approval from the Authority, this period may be extended to four years provided these systems have demonstrated high integrity of serviceability and self-monitoring.

- (c) The operator shall carry out annual inspections as follows:
- (1) an analysis of the recorded data from the flight recorders shall ensure that the recorder operates correctly for the nominal duration of the recording;
 - (2) the analysis of the FDR or the ADRS shall evaluate the quality of the recorded data to determine if the bit error rate (including those errors introduced by recorder, the acquisition unit, the source of the data on the airplane and by the tools used to extract the data from the recorder) is within acceptable limits and to determine the nature and distribution of the errors;
 - (3) a complete flight from the FDR or the ADRS shall be examined in engineering units to evaluate the validity of all recorded parameters. Particular attention shall be given to parameters from sensors dedicated to the FDR or the ADRS. Parameters taken from the aircraft's electrical bus system need not be checked if their serviceability can be detected by other aircraft systems;
 - (4) the readout facility shall have the necessary software to accurately convert the recorded values to engineering units and to determine the status of discrete signals;
 - (5) an examination of the recorded signal on the CVR or the CARS shall be carried out by replay of the CVR or the CARS recording. While installed in the aircraft, the CVR or the CARS shall record test signals from each aircraft source and from relevant external sources to ensure that all required signals meet intelligibility standards;
 - (6) where practicable, during the examination, a sample of in-flight recordings of the CVR or CARS shall be examined for evidence that the intelligibility of the signal is acceptable; and
 - (7) an examination of the recorded images on the AIR or AIRS shall be carried out by replay of the AIR or AIRS recording. While installed in the aircraft, the AIR or AIRS shall record test images from each aircraft source and from relevant external sources to ensure that all required images meet recording quality standards.
- (d) A flight recorder system 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.
- (e) The operator shall make available a report of the recording system inspection upon request by the CAAP for monitoring purposes.
- (1) Calibration of the FDR system: for those parameters which have sensors dedicated only to the FDR and are not checked by other means, recalibration shall be carried out at an interval determined by the continuing airworthiness information for the FDR system. In the absence of such information, a recalibration shall be carried out at least every five years. The recalibration shall determine any discrepancies in the engineering conversion routines for the mandatory parameters and to ensure that parameters are being recorded within the calibration tolerances; and
 - (2) when the parameters of altitude and airspeed are provided by sensors that are dedicated to the FDR system, there shall be a recalibration performed at an interval determined by the continuing airworthiness information for the FDR system. In the absence of such information, a recalibration shall be carried out at least every two years.

IS: 7.7.2.1(A) FLIGHT DATA RECORDERS—TYPE AND PARAMETERS - AIRPLANE

- (a) Flight data recorders shall be classified as Type I, Type IA, Type II and Type IIA depending upon the number of parameters to be recorded and the duration required for retention of the recorded information.
- (1) Type IA FDR. This FDR shall be capable of recording, as appropriate to the airplane, at least the 78 parameters in Table A.
 - (2) Type I FDR. This FDR shall be capable of recording, as appropriate to the airplane, at least the first 32 parameters in Table A
 - (3) Types II and IIA FDRs. These FDRs shall be capable of recording, as appropriate to the airplane, at least the first 16 parameters in Table A.
- (b) *Parameters – General.* .
- (1) The parameters that satisfy the requirements for FDRs are listed in the paragraphs below.
 - (2) The number of parameters to be recorded shall depend on airplane complexity.
 - (3) The parameters without an asterisk (*) are mandatory parameters which shall be recorded regardless of airplane complexity.
 - (4) In addition, the parameters designated by an asterisk (*) shall be recorded if an information data source for the parameter is used by airplane systems or the flight crew to operate the airplane.
 - (5) However, other parameters may be substituted with due regard to the airplane type and the characteristics of the recording equipment.
- (c) *Parameter – Flight Path and Speed.* The following parameters satisfy the requirements for flight path and speed:
- (1) Pressure altitude
 - (2) Indicated or calibrated airspeed.
 - (3) Air-ground status and each landing gear air-ground sensor when practicable.
 - (4) Total or outside air temperature.
 - (5) Heading (primary flight crew reference)
 - (6) Normal acceleration
 - (7) Lateral acceleration.
 - (8) Longitudinal acceleration (body axis)
 - (9) Time or relative time count
 - (10) Navigation data*: drift angle, wind speed, wind direction, latitude/longitude.
 - (11) Groundspeed*
 - (12) Radio altitude*
- (d) *Parameters – Altitude.* The following parameters satisfy the requirements for altitude:
- (1) Pitch altitude.
 - (2) Roll altitude.
 - (3) Yaw or sideslip angle*.
 - (4) Angle of attack*

- (e) *Parameters – Engine Power.* The following parameters satisfy the requirements for engine power:
- (1) Engine thrust power: propulsive thrust/power on each engine, cockpit thrust/power lever position.
 - (2) Thrust reverse status*.
 - (3) Engine thrust command*.
 - (4) Engine thrust target*.
 - (5) Engine bleed valve position*
 - (6) Additional engine parameters*: EPR, N1, indicated vibration level, N2, EGT, TLA, fuel flow, fuel cut-off lever position, N3.
- (f) *Parameters – Configuration.* The following parameters satisfy the requirements for configuration:
- (1) Pitch trim surface position.
 - (2) Flaps*: trailing edge flap position, cockpit control selection.
 - (3) Slats*: leading edge flap (slat) position, cockpit control selection.
 - (4) Landing Gear*: landing gear, gear selector position.
 - (5) Yaw trim surface position*.
 - (6) Roll trim surface position*
 - (7) Cockpit trim control input position pitch*.
 - (8) Cockpit trim control input position roll*
 - (9) Cockpit trim control input position yaw*
 - (10) Ground spoiler and speed brake*: Ground spoiler position, ground spoiler selection, speed brake position, speed brake selection.
 - (11) De-icing and/or anti-icing systems selection*
 - (12) Hydraulic pressure (each system)*
 - (13) Fuel quantity*
 - (14) AC electrical bus status*
 - (15) DC electrical bus status*
 - (16) APU bleed valve position*
 - (17) Computed centre of gravity*
- (g) *Parameters – Operation.* The following parameters satisfy the requirements for operation:
- (1) Warnings
 - (2) Primary flight control surface and primary flight control pilot input: pitch axis, roll axis, yaw axis.
 - (3) Marker beacon passage
 - (4) Each navigation receiver frequency selection
 - (5) Manual radio transmission keying and CVR/FDR synchronization reference
 - (6) Autopilot/autothrottle/AFCS mode and engagement status*

- (7) Selected barometric setting*: pilot first officer (co-pilot)
- (8) Selected altitude (all pilot selectable modes of operation)*
- (9) Selected speed (all pilot selectable modes of operation)*
- (10) Selected MACH (all pilot selectable modes of operation)*.
- (11) Selected vertical speed (all pilot selectable modes of operation)*
- (12) Selected heading (all pilot selectable modes of operation)*.
- (13) Selected flight path (all pilot selectable modes of operation)*; course/DSTRK, path angle.
- (14) Selected decision height*
- (15) EFIS display format*: pilot, first officer (co-pilot).
- (16) Multi-function/engine/alerts display format *
- (17) GPWS/TAWS/GCAS status*: selection of terrain display mode including pop-up display status, terrain alerts, both cautions and warning, and advisories, on/off switch position.
- (18) Low pressure warning*: hydraulic pressure, pneumatic pressure.
- (19) Computer failure*
- (20) Loss of cabin pressure*
- (21) TCAS/ACAS (traffic alert and collision avoidance system/airborne collision avoidance system)*
- (22) Ice detection*
- (23) Engine warning each engine vibration*
- (24) Engine warning each engine overtemperature*
- (25) Engine warning each engine oil pressure low*
- (26) Engine warning each engine overspeed*
- (27) Wind shear warning*
- (28) Operational stall protection, stick shaker and pusher activation*.
- (h) All cockpit flight control forces*: control wheel, control column, rudder pedal cockpit input forces.
- (i) Vertical deviation*: ILS glide path, MLS elevation, and GNSS approach path.
- (j) Horizontal deviation*: ILS localizer, MLS azimuth, and GNSS approach path.
- (k) DME 1 and 2 distances*
- (l) Primary navigation system reference*: GNSS, INS, VOR/DME, MLS, Loran C, ILS.
- (m) Brakes*: left and right brake pressure, left and right brake pedal position.
- (n) Date*
- (o) Event marker*
- (p) Head up display in use*.
- (q) Para visual display on*

Note 1: It is not intended that airplanes issued with an individual certificate of airworthiness before 1 January 2016 be modified to meet the range, sampling, accuracy or resolution guidance detailed in this Appendix.

- (r) *Parameters – Flight Path and Speed as Displayed to the Pilot.* The parameters that satisfy the requirements for flight path and speed as displayed to the pilot(s) are listed below. The parameters without an (*) are mandatory parameters which shall be recorded. In addition, the parameters designed by an (*) shall be recorded if an information source for the parameter is displayed to the pilot and is practicable to record:
- (1) Pressure altitude
 - (2) Indicated airspeed or calibrated airspeed
 - (3) Heading (primary flight crew reference)
 - (4) Pitch altitude
 - (5) Roll altitude
 - (6) Engine thrust/power
 - (7) Landing-gear status*
 - (8) Total or outside air temperature*
 - (9) Time*
 - (10) Navigation data*: drift angle, wind speed, wind direction, latitude/longitude
 - (11) Radio altitude*

Table — Parameter Guidance for Crash Protected Flight Data Recorders – Airplanes

Notes:

- 1) *The first 15 parameters satisfy the requirements for a Type II and Type IIA FDR.*
- 2) *The first 32 parameters satisfy the requirements for a Type I FDR.*
- 3) *The total 78 parameters satisfy the requirements for a Type IA FDR.*

| Serial number | Parameter | 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 sync) | 24 hours | 4 | ±0.125% per hour | 1 second |
| 2 | Pressure-altitude— | -300 m (-1 000 ft) to maximum certificated altitude of aircraft +1 500 m (+5 000 ft) | 1 | ±30 m to ±200 m (±100 ft to ±700 ft) | 1.5 m (5 ft) |

| Serial number | Parameter | Measurement range | Maximum Sampling and Recording interval (seconds) | Accuracy limits (sensor input compared to FDR read-out) | Recording resolution |
|---------------|---|---|---|---|---|
| 3 | Indicated airspeed or calibrated airspeed | 95 km/h (50 kt) to max V _{So} (Note 1) V _{So} to 1.2 V _D (Note 2) | 1 | ±5% ±3% | 1 kt (0.5 kt recommended) |
| 4 | Heading (primary flight crew reference) | 360 degrees | 1 | ±2° | 0.5° |
| 5 | Normal acceleration (Note 3)– | -3 g to +6 g | 0.125 | ±1% of maximum range excluding datum error of ±5% | 0.004 g |
| 6 | Pitch attitude | ±75° or usable range whichever is greater | ±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 4) | Full range | 1 (per engine) | ±2% | 0.2% of full range or the resolution required to operate the aircraft |
| 10* | Trailing edge flap and cockpit control selection | 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 selection | 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 |

| Serial number | Parameter | Measurement range | Maximum Sampling and Recording interval (seconds) | Accuracy limits (sensor input compared to FDR read-out) | Recording resolution |
|---------------|---|--------------------------------------|---|--|---|
| 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 discrettes | 1 | | |
| 16 | Longitudinal acceleration (Note 3) | +/-1 g | 0.25 | ±0.015 g excluding a datum error of ±0.05 g | 0.004 g |
| 17 | Lateral acceleration (Note 3) | ±1 g | 0.25 | ±0.015 g excluding a datum error of ±0.05 g | 0.004 g |
| 18 | Pilot input and/or control surface position-primary controls (pitch, roll, yaw) (Note 5) (Note 6) | Full range | ±0.25 | ±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— | -6 m to 750 m (-20 ft to 2500 ft) | 1 | ±0.6 m (±2 ft) or ±3% whichever is greater below 150 m (500 ft) and ±5% above 150 m (500 ft) | 0.3 m (1 ft) below 150 m (500 ft); 0.3 m (1 ft) + 0.5% of full range above 150 m (500 ft) |
| 21* | Vertical beam deviation (ILS/GPS/GLS glide path, MLS elevation, IRNAV/IAN vertical deviation) | Signal range | 1 | ±3% | 0.3% of full range |
| 22* | Horizontal beam deviation (ILS/GPS/GLS localizer, MLS azimuth, IRNAV/IAN lateral deviation) | Signal range | 1 | ±3% | 0.3% of full range |

| Serial number | Parameter | Measurement range | Maximum Sampling and Recording interval (seconds) | Accuracy limits (sensor input compared to FDR read-out) | Recording resolution |
|---------------|---|-----------------------|---|---|----------------------|
| 23 | Marker beacon passage | Discrete | 1 | | |
| 24 | Master warning | Discrete | 1 | | |
| 25 | NAV receiver frequency selection (Note 7) | Full range | 4 | As installed | |
| 26* | DME 1 and 2 distance (includes Distance to runway threshold (GLS) and Distance to missed approach point (IRNAV/IAN) (Notes 7 and 8) | 0 – 370 km (0-200 NM) | 4 | As installed | 1852 m (1 NM) |
| 27 | Air/ground status | Discrete | 1 | | |
| 28* | GPWS/TAWS/GCAS status (selection of terrain display mode including pop-up display status) and (Terrain alerts, both cautions and warnings, and advisories) and (on/off switch position) | Discrete | 1 | | |
| 29* | Angle of attack | Full range | 0.5 | As installed | 0.3% of full range |
| 30* | Hydraulics, each system (low pressure) | Discrete | 2 | | 0.5% of full range |
| 31* | Navigation data (latitude/longitude, ground speed and drift angle) (Note 9) | As installed | 1 | As installed | |
| 32* | Landing gear and gear selector position | Discrete | 4 | As installed | |
| 33* | Groundspeed | As installed | 1 | Data should be obtained from the most accurate system | 1 kt |

| Serial number | Parameter | Measurement range | Maximum Sampling and Recording interval (seconds) | Accuracy limits (sensor input compared to FDR read-out) | Recording resolution |
|---------------|--|--|---|---|--|
| 34 | Brakes (left and right brake pressure, left and right brake pedal position) | (Maximum metered brake range, discretized or full range) | 1 | 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* | TCAQS/ACAS (traffic alert and collision avoidance system) | Discretized | 1 | As installed | |
| 37* | Windshear warning | Discrete | 1 | As installed | |
| 38* | Selected barometric setting (pilot, co-pilot) | As installed | 64 | As installed | 0.1 mb (0.01 in-Hg) |
| 39* | Selected altitude (all pilot selectable modes of operation) | As installed | 1 | As installed | Sufficient to determine crew selection |
| 40* | Selected speed (all pilot selectable modes of operations) | 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) | | 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 |
|---------------|--|-------------------|---|---|--|
| | (course/DSTRK, path angle; final approach path (IRNAV/IAN)) | | | | |
| 45* | Selected Decision Height | As installed | 64 | As installed | Sufficient to determine crew selection |
| 46* | EFIS display format (pilot, co-pilot) | Discrete(s) | 4 | As installed | |
| 47* | Multi-function/engine/alerts display format | Discrete(s) | 4 | As installed | |
| 48* | AC electrical bus status | Discrete(s) | 4 | As installed | |
| 49* | DC electrical bus status | Discrete(s) | 4 | As installed | |
| 50* | Engine bleed valve position | Discrete(s) | 4 | As installed | |
| 51* | APU bleed valve position | Discrete(s) | 4 | As installed | |
| 52* | Computer failure | Discrete(s) | 4 | As installed | |
| 53* | Engine thrust command | As installed | 2 | As installed | |
| 54* | Engine thrust target | As installed | 4 | As installed | 2% of full range |
| 55* | Computed centre of gravity | As installed | 64 | As installed | 1% of full range |
| 56* | Fuel quantity in CG trim tank | As installed | 64 | As installed | 1% of full range |
| 57* | Head up display in use | As installed | 4 | As installed | |
| 58* | Para visual display on/off | As installed | 1 | As installed | |
| 59* | Operational stall protection, stick shaker and pusher activation | As installed | 1 | As installed | |

| Serial number | Parameter | Measurement range | Maximum Sampling and Recording interval (seconds) | Accuracy limits (sensor input compared to FDR read-out) | Recording resolution |
|---------------|--|-------------------|---|---|------------------------------------|
| 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 | | |
| 70* | Hydraulic pressure (each system) | Full range | 2 | ±5% | 100 psi |
| 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 |

| Serial number | Parameter | Measurement range | Maximum Sampling and Recording interval (seconds) | Accuracy limits (sensor input compared to FDR read-out) | Recording resolution |
|---------------|---|--|---|---|------------------------------------|
| 75* | All cockpit flight control input forces (control wheel, control column, rudder pedal) | Full range (± 311 N (± 70 lbf), ± 378 N (± 85 lbf), ± 734 N (± 165 lbf)) | 1 | $\pm 5\%$ | 0.2% of full range or as installed |
| 76* | Event marker | Discrete | 1 | | |
| 77* | Date | 365 days | 64 | | |
| 78* | ANP or EPE or EPU | As installed | 4 | As installed | |

Note 1: V_{so} stalling speed or minimum steady flight speed in the landing configuration.

Note 2: V_D design diving speed.

Note 3: Refer to IS: 7.7.2.2(a) (12) for increased recording requirements.

Note 4: Record sufficient inputs to determine power.

Note 5: For airplanes with control systems in which movement of a control surface will back drive the pilot's control, "or" applies. For airplanes with control systems in which movement of a control surface will not back drive the pilot's control, "and" applies. In airplanes with split surfaces, a suitable combination of inputs is acceptable in lieu of recording each surface separately.

Note 6: Refer to IS: 7.7.2.2(a) (13) for increased recording requirements.

Note 7: If signal available in digital form.

Note 8: Recording of latitude and longitude from INS or other navigation system is a preferred alternative.

Note 9: If signals readily available.

If further recording capacity is available, recording of the following additional information should be considered:

- (a) operational information from electronic display systems, such as electronic flight instrument systems (EFIS), electronic centralized aircraft monitor (ECAM) and engine indication and crew alerting system (EICAS). Use the following order of priority:
 - (1) 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;
 - (2) display system selection/status, e.g. SECTOR, PLAN, ROSE, NAV, WXR, COMPOSITE, COPY, ETC.;
 - (3) warnings and alerts;
 - (4) 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.

IS: 7.7.2.1(B) FLIGHT DATA RECORDERS—TYPE AND PARAMETERS – HELICOPTERS

- (a) Flight data records shall be classified as Type IV, Type IVA, and Type V depending upon the number of parameters to be recorded.
 - (1) Type IV FDRs shall be capable of recording, as appropriate to the helicopter, at least the first 30 parameters in Table B below.
 - (2) Type IVA FDRs shall be capable of recording, as appropriate to the helicopter, at least the first 48 parameters in Table B below.
 - (3) Type V FDRs shall be capable of recording, as appropriate to the helicopter, at least the first 15 parameters in Table B below.
 - (4) For all FDR types, if further recording capability is available, recording of the following additional information shall be considered:
 - (5) Additional operational information from electronic displays, such as electronic flight instrument systems (EFIS), electronic centralized aircraft monitor (ECAM) and engine indication and crew alerting system (EICAS); and
 - (6) Additional engine parameters (EPR, N1, fuel flow, etc.).
- (b) The parameters that satisfy the requirements for a Type IV; Type IVA, and Type V FDRs are listed below. The number of parameters to be recorded shall depend on helicopter complexity. The parameters without an asterisk (*) are mandatory parameters that shall be recorded. The parameters designated by an asterisk (*) shall also be recorded if an information data source for an asterisked parameter is used by helicopter systems or the flight crew to operate the helicopter. However, other parameters may be substituted with due regard to the helicopter type and the characteristics of the recording equipment.
- (c) The following parameters satisfy the requirements for flight path and speed:
 - (1) Pressure altitude
 - (2) Indicated airspeed
 - (3) Total or outside air temperature.
 - (4) Heading (primary flight crew reference)

- (5) Normal acceleration
 - (6) Lateral acceleration.
 - (7) Longitudinal acceleration (body axis)
 - (8) Time or relative time count
 - (9) Navigation data*: drift angle, wind speed, wind direction, latitude/longitude.
 - (10) Radio altitude*
- (d) The following parameters satisfy the requirements for altitude:
- (1) Pitch altitude.
 - (2) Roll altitude.
 - (3) Yaw rate.
- (e) The following parameters satisfy the requirements for engine power:
- (1) Power on each engine: free power turbine speed (Nf), engine torque, engine gas generator speed (Ng), cockpit power control position.
 - (2) Rotor: main rotor speed, rotor brake.
 - (3) Main gearbox oil pressure*
 - (4) Gearbox oil temperature*, main gearbox oil temperature, tail rotor gearbox oil temperature
 - (5) Engine exhaust gas temperature (T4)*
 - (6) Turbine inlet temperature (TIT)*
- (f) The following parameters satisfy the requirements for configuration:
- (1) Landing gear or gear selector position*.
 - (2) Fuel quality*
 - (3) Ice detector liquid water content*
- (g) The following parameters satisfy the requirements for operation:
- (1) Hydraulics low pressure
 - (2) Warnings
 - (3) 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.
 - (4) Marker beacon passage
 - (5) Each navigation receiver frequency selection
 - (6) AFCS mode and engagement status*
 - (7) Stability augmentation system engagement*
 - (8) Indicated sling load force*
 - (9) Vertical deviation*: ILS glide path, GNSS approach path.
 - (10) Horizontal deviation*: ILS localizer, GNSS approach path.
 - (11) DME 1 and 2 distances*
 - (12) Altitude rate*

- (13) Ice detector liquid water content*
- (14) Helicopter health and usage monitor system (HUMUS)* engine data, chip detectors, track timing, exceedance discretes, broadband average engine vibration.

Note: Parameter requirements, including range, sampling, accuracy and resolution are as contained in the Minimum Operational Performance Specification (MOPS) for Crash Protected Airborne Recorder Systems, or equivalent documents.

Table— Parameters for Flight Data Recorders – Helicopters

| Serial number | Parameter | 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% per hour | 1s |
| 2 | Pressure-altitude— | -300 m (-1 000 ft) to maximum certificated altitude of aircraft +1 500 m (+5 000 ft) | 1 | ±30 m to ±200 m (±100 ft to ±700 ft) | 1.5 m (5 ft) |
| 3 | Indicated airspeed | As the installed measuring system | 1 | ±3% | 1 kt |
| 4 | Heading | 360 degrees | 1 | ± 2° | 0.5° |
| 5 | Normal acceleration— | -3 g to +6 g | 0.125 | ±0-.9 g excluding a datum error of ±g | 0.004 g |
| 6 | Pitch altitude | ±75 ° or 100% of usable range whichever is greater | 0.5 | ± 2° | 0.5° |
| 7 | Roll altitude | ±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 |

| Serial number | Parameter | Measurement range | Maximum Sampling and Recording interval (seconds) | Accuracy limits (sensor input compared to FDR read-out) | Recording resolution |
|---------------|--|--------------------------------------|---|---|---------------------------------|
| 10 | Main rotor : | | | | |
| | Main rotor speed | 50-130% | 0.51 | ±2% | 0.3% of full range |
| | Rotor brake | Discrete | | --- | --- |
| 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 discrettes | 1 | --- | --- |
| 15* | Stability augmentation system engagement | Discrete | 1 | --- | --- |
| 16* | Main gearbox oil pressure | As installed | 1 | As installed | 6.895 kN/m ² (1 psi) |
| 17* | Main gearbox oil temperature | As installed | 2 | As installed | 1°C |
| 18 | Yaw acceleration (or yaw rate) | ±400°/second | 0.25 | ±1.5% max range excluding datum error of ±5% | ±2°/s |
| 19* | Sling load force | 0-200% of certified load | 0.5 | ±3% of max range | 0.5% for maximum certified load |
| 20 | Longitudinal acceleration | ±1 g | 0.25 | ±0.015 g excluding datum error of ± 0.05 g | 0.0004 g |

| Serial number | Parameter | Measurement range | Maximum Sampling and Recording interval (seconds) | Accuracy limits (sensor input compared to FDR read-out) | Recording resolution |
|---------------|---|--|---|--|--|
| 21 | Lateral acceleration | ±1 g | 0.25 | ±0.015 g excluding datum error of ± 0.05 g | 0.0004 g |
| 22* | Radio altitude— | -6 m to 750 m (-20 ft to 2500 ft) | 1 | ±0.6 m (±2 ft) or ±3% whichever is greater below 150 m (500 ft) and ±5% above 150 m (500 ft) | 0.3 m (1ft) below 150 m (500 ft), 0.3 m (1 ft) = 0.5% of full range above 150 m (500 ft) |
| 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 selection | Sufficient to determine selected frequency | 4 | As installed | ---- |
| 28* | DME 1 and 2 distance | 0-370 km (0-200 NM) | 4 | As installed | 1.852 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 or gear selector position | Discrete | 4 | --- | --- |
| 31* | Engine exhaust gas temperature (T4) | As installed | 1 | As installed | |
| 32* | Turbine inlet temperature (ITI/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 | |

| Serial number | Parameter | Measurement range | Maximum Sampling and Recording interval (seconds) | Accuracy limits (sensor input compared to FDR read-out) | Recording resolution |
|---------------|---|-------------------|---|---|--|
| 36* | Helicopter health and usage monitor system | As installed | 1 | As installed | |
| 37 | Engine control modes | Discrete | 1 | ---- | ---- |
| 38* | Selected barometric setting (pilot and co-pilot) | As installed | 64 | As installed | 0.1 mb (0.01 in Hg) ^{39*} |
| 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) | 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 | --- | --- |

| Serial number | Parameter | Measurement range | Maximum Sampling and Recording interval (seconds) | Accuracy limits (sensor input compared to FDR read-out) | Recording resolution |
|---------------|--------------|-------------------|---|---|----------------------|
| 48* | Event marker | Discrete | 1 | --- | --- |

IS 7.7.2.2 AIRCRAFT EQUIPPAGE FOR OPERATIONS – AIRCRAFT DATA RECORDING SYSTEM (ADRS)

- (a) ADRS shall be capable of recording, as appropriate to the aircraft, at least the essential (E) parameters in the Table below.
- (b) The measurement range, recording interval and accuracy of parameters on installed equipment is usually verified by methods approved by the State of Design.
- (c) Documentation concerning parameter allocation, conversion equations, periodic calibration and other serviceability/maintenance information shall be maintained by the operator. The documentation shall be sufficient to ensure that accident investigation authorities have the necessary information to read out the data in engineering units.

Table—Parameter Guidance for Aircraft Data Recording Systems

| No. | Parameter Name | Parameter Category | Minimum Recording Range | Maximum Recording Interval in Seconds | Minimum Recording Accuracy | Minimum Recording Resolution | Remarks |
|-----|----------------------------|--------------------|-------------------------|---------------------------------------|----------------------------|------------------------------|---|
| 1 | Heading (Magnetic or True) | R* | ±180° | 1 | ±2° | 0.5° | *If not available, record rates |
| 2 | Pitch altitude | E* | ±90° | 0.25 | ±2° | 0.5° | *If not available, record rates |
| 3 | Roll altitude | E* | ±180° | 0.25 | ±2° | 0.5° | *If not available, record rates |
| 4 | Yaw rate | E* | ±300° | 0.25 | ±1% + drift of 360°/hr | 2° | *Essential if no heading available |
| 5 | Pitch rate | E* | ±300° | 0.25 | ±1% + drift of 360°/hr | 2° | *Essential if no pitch altitude available |
| 6 | Roll rate | E* | ±300° | 0.25 | ±1% + drift of 360°/hr | 2° | *Essential if no roll rate available |
| 7 | Positioning system: | E | Latitude: ±90°; | 2 (1 if available) | As installed (0.00015°) | 0.00005° | -- |

| No | Parameter Name | Parameter Category | Minimum Recording Range | Maximum Recording Interval in Seconds | Minimum Recording Accuracy | Minimum Recording Resolution | Remarks |
|----|-------------------------------------|--------------------|--|---------------------------------------|---|------------------------------|-------------------------------------|
| | latitude/longitude | | Longitude: $\pm 180^\circ$ | | recommended | | |
| 8 | Positioning system: estimated error | E* | Available range | 2 (1 if available) | As installed | As installed | *If available |
| 9 | Positioning system: altitude | E | -300 m (-1 000 ft) to maximum certified altitude of airplane +1 500 m (5 000 ft) | 2 (1 if available) | As installed (± 15 m (± 50 ft) recommended) | 1.5 m (5 ft) | -- |
| 10 | Positioning system: time | E | 24 hours | 1 | ± 0.5 second | 0.1 second | *UTC time preferred where available |
| 11 | Positioning system: ground speed | E | 0-1 000 kt | 2 (1 if available) | As installed (± 5 kt recommended) | 1 kt | -- |
| 12 | Positioning system: channel | E | 0-360° | 2 (1 if available) | As installed ($\pm 2^\circ$ recommended) | 0.5° | -- |
| 13 | Normal acceleration | E | -3 g to +6 g(*) | 0.25 (0.125 if available) | As installed (± 0.09 g excluding a datum error of ± 45 g recommended) | 0.004 g | -- |
| 14 | Longitudinal acceleration | E | ± 1 g(*) | 0.25 (0.125 if available) | As installed (± 0.015 g excluding a datum error of ± 0.05 g recommended) | 0.004 g | -- |

| No | Parameter Name | Parameter Category | Minimum Recording Range | Maximum Recording Interval in Seconds | Minimum Recording Accuracy | Minimum Recording Resolution | Remarks |
|----|--|--------------------|---|---------------------------------------|---|-------------------------------------|---------|
| 15 | Lateral acceleration | E | ±1 g(*) | 0.25 (0.125 if available) | As installed (±0.015 g excluding a datum error of ±0.05 g recommended) | 0.004 g | -- |
| 16 | External static pressure (or pressure altitude) | R | 34.4 mb (3.44 in-Hg) to 310.2 mb (31.03 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) | -- |
| 17 | Outside air temperature (or total air temperature) | R | -50° to +90°C or available sensor range | 2 | As installed (±2°C recommended) | 1°C | -- |
| 18 | Indicated air speed | R | As the installed pilot display measuring system or available sensor range | 1 | As installed (±3% recommended) | 1 kt (0.5 kt recommended) | -- |
| 19 | Engine RPM | R | Full range including overspeed condition | Each engine each second | As installed | 0.2% of full range | -- |
| 20 | Engine oil pressure | R | Full range | Each engine each second | As installed (5% of full range) | 2% of full range | -- |

| No | Parameter Name | Parameter Category | Minimum Recording Range | Maximum Recording Interval in Seconds | Minimum Recording Accuracy | Minimum Recording Resolution | Remarks |
|----|---|--------------------|-------------------------|---------------------------------------|---|------------------------------|--|
| 21 | Engine oil temperature | R | Full range | Each engine each second | As installed (5% of full range) | 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 | 0.1% of full range | *Sufficient parameters e.g. EPRN/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 ($\pm 5^{\circ}\text{C}$ recommended) | 1 $^{\circ}\text{C}$ | -- |
| 28 | Main voltage | R | Full range | Each engine | As installed | 1 Volt | -- |

| No . | Parameter Name | Parameter Category | Minimum Recording Range | Maximum Recording Interval in Seconds | Minimum Recording Accuracy | Minimum Recording Resolution | Remarks |
|------|---|--------------------|--------------------------------------|---------------------------------------|----------------------------|------------------------------|---|
| | | | | each second | | | |
| 29 | Cylinder head temperature | R | Full range | Each cylinder each second | As installed | 2% of full range | -- |
| 30 | Flaps position | R | Full range or each discrete position | 2 | As installed | 0.5° | -- |
| 31 | Primary flight control surface position | R | Full range | 0.25 | As installed | 0.2% of full range | -- |
| 32 | Fuel quantity | R | Full range | 4 | As installed | 1% of full range | -- |
| 33 | Exhaust gas temperature | R | Full range | Each engine each second | As installed | 2% of full range | -- |
| 34 | Emergency voltage | R | Full range | Each engine each second | As installed | 1 Volt | -- |
| 35 | Trim surface position | R | Full range or each discrete position | 1 | As installed | 0.3% of full range | -- |
| 36 | Landing gear position | R | Each discrete position* | Each gear every 2 seconds | As installed | -- | *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 | -- |

Key:**E Essential parameters****R Recorded parameters****IS 7.7.4.1 DATA LINK RECORDER APPLICABILITY**

(a) Messages applying to the applications listed below shall be recorded. Applications without the asterisk (*) are mandatory applications which shall be recorded regardless of the system complexity. Applications with an (*) shall be recorded only as far as is practicable given the architecture of the system.

- (1) Data link initiation capability;
- (2) Controller-pilot data link communications;
- (3) Data link –flight information services;
- (4) Automatic dependent surveillance- contract;
- (5) Automatic dependent surveillance- broadcast*;
- (6) Aeronautical operational control*.

(b) Descriptions of the applications for data link recorders are contained in the table below.

Table—Description of Applications for Data Link Recorders

| Item No. | Application Type | Application Description | Recording Content |
|-----------------|--------------------------------|---|--------------------------|
| 1 | Data link Initiation | This includes any applications used to logon to or initiate data link service. In FANS-1/A and ATN, these are ATS Facilities Notification (AFN) and Context Management (CM) respectively. | C |
| 2 | Controller/Pilot Communication | This includes any application used to exchange requests, clearances, instructions and reports between the flight crew and controllers on the ground. In FANS-1/A and ATN, this includes the CPDLC application. It also includes applications used for the exchange of oceanic (OCL) and departure clearances (DCL) as well as data link delivery of taxi clearances. | C |
| 3 | Addressed Surveillance | This includes any surveillance application in which the ground sets up contracts for delivery of surveillance data. In FANS-1/A and ATn, this includes the Automatic Dependent Surveillance (ADS-C) application. Where parametric data are reported within the message they shall be recorded within the message they shall be recorded unless data from the same source are recorded on the FDR. | C |
| 4 | Flight Information | This includes any service used for delivery of flight information to specific aircraft. This | C |

| Item No. | Application Type | Application Description | Recording Content |
|----------|---------------------------------------|--|-------------------|
| | | includes, for example, D-METAR, D-ATIS, D-NOTAM and other textual data link services. | |
| 5 | Aircraft Broadcast Surveillance | This includes Elementary and Enhanced Surveillance Systems, as well as ADS-B output data. Where parametric data sent by the aircraft are reported within the message they shall be recorded unless data from the same sources are recorded on the FDR. | M* |
| 6 | Aeronautical Operational Control Data | This includes any application transmitting or receiving data used for AOC purposes. | M* |

Key:

C Complete contents recorded.

M Information that enables correlation to any associated records stored separately from the aircraft.

*** Applications to be recorded only as far as is practicable given the architecture of the system.**

IS: 7.8.2 EMERGENCY EXIT EQUIPMENT

- (a) The assisting means for a floor level emergency exit shall meet the requirements under which the airplane was type certified.
- (b) The location of each passenger emergency exit shall be—
 - (1) Recognizable from a distance equal to the width of the cabin.
 - (2) Indicated by a sign visible to occupants approaching along the main passenger aisle.
- (c) There shall be an emergency exit locating sign—
 - (1) Above the aisle near each over-the-wing passenger emergency exit, or at another ceiling location if it is more practical because of low headroom;
 - (2) Next to each floor level passenger emergency exit, except that one sign may serve two such exits if they both can be seen readily from that sign; and
 - (3) On each bulkhead or divider that prevents fore and aft vision along the passenger cabin, to indicate emergency exits beyond and obscured by it, except that if this is not possible, the sign may be placed at another appropriate location.
 - (4) Each passenger emergency exit marking and each locating sign shall be manufactured to meet the interior emergency exit marking requirements under which the aircraft was type certified, unless the Authority cites different requirements for compliance with this paragraph.

Note: No sign may continue to be used if its luminescence (brightness) decreases to below 250 micr- lamberts.
- (d) Sources of general cabin illumination may be common to both the emergency and the main lighting systems if the power supply to the emergency light system is independent of the power supply to the main lighting system.

- (e) The emergency lighting system shall provide enough general lighting in the passenger cabin so that the average illumination, when measured at 40-inch intervals at seat armrest height, on the centerline of the main passenger aisle, is at least 0.05 foot-candles.
- (f) Each emergency light shall—
 - (1) Be operable manually both from the flight crew station and from a point in the passenger compartment that is readily accessible to a normal flight attendant seat;
 - (2) Have a means to prevent inadvertent operation of the manual controls; and
 - (3) When armed or turned on at either station, remain lighted or become lighted upon interruption of the aircraft's normal electric power.
 - (4) Provide the required level of illumination for at least 10 minutes at the critical ambient conditions after emergency landing.
 - (5) Have a cockpit control device that has an "on", "off", and "armed" position.
- (g) The location of each passenger emergency exit operating handle and instructions for opening the exit shall be shown in accordance with the requirements under which the aircraft was type certified, unless the Authority cites different requirements for compliance with this paragraph.
- (h) No operating handle or operating handle cover may continue to be used if its luminescence (brightness) decreases to below 100 micro-lamberts.
- (i) Access to emergency exits shall be provided as follows for each passenger carrying airplane:
 - (1) Each passageway between individual passenger areas, or leading to a Type I or Type II emergency exit, shall be unobstructed and at least 20 inches wide.
 - (2) There shall be enough space next to each Type I or Type II emergency exit to allow a crew member to assist in the evacuation of passengers without reducing the unobstructed width of the passageway below that required in paragraph (j) 1, of this section.
 - (3) There shall be access from the main aisle to each Type III and Type IV exit. The access from the aisle to these exits shall not be obstructed by seats, berths, or other protrusions in a manner that would reduce the effectiveness of the exit. In addition, the access shall meet the emergency exit access requirements under which the airplane was type certificated.
 - (4) If it is necessary to pass through a passageway between passenger compartments to reach any required emergency exit from any seat in the passenger cabin, the passageway shall not be obstructed. However, curtains may be used if they allow free entry through the passageway.
 - (5) No door may be installed in any partition between passenger compartments.
 - (6) If it is necessary to pass through a doorway separating the passenger cabin from other areas to reach any required emergency exit from any passenger seat, the door shall have a means to latch it in open position, and the door shall be latched open during each takeoff and landing. The latching means shall be able to withstand the loads imposed upon it when the door is subjected to the ultimate inertia forces, relative to the surrounding structure, prescribed in the airworthiness standards for type certification in the transport category.
- (j) Each passenger-carrying aircraft shall be equipped with exterior lighting that meets the requirements under which that aircraft was type certificated.

- (k) Each passenger-carrying aircraft shall be equipped with a slip-resistant escape route that meets the requirements under which that aircraft was type certificated.
- (l) Each floor level door or exit in the side of the fuselage (other than those leading into a cargo or baggage compartment that is not accessible from the passenger cabin) that is 44 or more inches high and 20 or more inches wide, but not wider than 46 inches, each passenger ventral exit and each tail cone exit, shall meet the requirements of this section for floor level emergency exits.

Note: The Authority may grant a deviation from this paragraph if he finds that circumstances make full compliance impractical and that an acceptable level of safety has been achieved.

- (m) Approved emergency exits in the passenger compartments that are in excess of the minimum number of required emergency exits shall meet all of the applicable provisions of this subsection section and shall be readily accessible.
- (n) On each large passenger-carrying turbojet powered airplane each ventral exit and tail cone exit shall be —
 - (1) Designed and constructed so that it cannot be opened during flight; and
 - (2) Marked with a placard readable from a distance of 30 inches and installed at a conspicuous location near the means of opening the exit, stating that the exit has been designed and constructed so that it cannot be opened during flight.

IS: 7.8.4 SURVIVAL EQUIPMENT

FLIGHTS OVER LAND

- (a) For flights over land the following standard shall be met:
 - (1) the company operations manual shall show how compliance with subpart 7.8.4 is to be achieved;
 - (i) a list of survival equipment shall be carried on board with information on how to use it;
 - (ii) a survival manual appropriate for the season and climate; and
 - (iii) crew member training.

FLIGHTS OVER WATER

- (b) Where life rafts are required to be carried in accordance with subpart 7.8.17 (d), they shall be equipped with an attached survival kit containing at least the following:
 - (1) a pyrotechnic signaling device;
 - (2) a radar reflector;
 - (3) a life raft repair kit;
 - (4) a bailing bucket and sponge;
 - (5) a signaling mirror;
 - (6) a whistle;
 - (7) a raft knife;
 - (8) an inflation pump;
 - (9) dye marker;

- (10) a waterproof flashlight;
- (11) a two day supply of water, calculated using the overload capacity of the raft, consisting of one pint of water per day for each person or a means of desalting or distilling salt water sufficient to provide an equivalent amount;
- (12) a fishing kit;
- (13) a book on sea survival; and
- (14) a first aid kit containing antiseptic swabs, burn dressing compresses, bandages and anti-motion sickness pills.

IS: 7.8.5 EMERGENCY LOCATOR TRANSMITTER (ELT)

The following requirements shall be used to determine the quantity and type of 406 MHz ELT which must be carried.

- (a) Except as provided for in (b), all airplanes authorized to carry more than 19 passengers shall be equipped with at least one automatic ELT or two ELTs of any type.
- (b) All airplanes authorized to carry more than 19 passengers for which the individual certificate of airworthiness is first issued after 1 July 2008 shall be equipped with at least two ELTs, one of which shall be automatic.
- (c) Except as provided for in (d), all airplanes authorized to carry 19 passengers or less shall be equipped with at least one ELT of any type.
- (d) All airplanes authorized to carry 19 passengers or less for which the individual certificate of airworthiness is first issued after 1 July 2008 shall be equipped with at least one automatic ELT.
- (e) Except as provided for in (f) all helicopters operating in performance Class 1, 2 and 3 shall be equipped with at least one automatic ELT or,
- (f) when engaged in offshore operations, or other overwater operations, with at least one automatic ELT and one ELT(S) in a raft or life jacket.

IS: 7.8.11 FIRST-AID KIT, UNIVERSAL PRECAUTION KIT AND EMERGENCY MEDICAL KIT

The following provides guidance on typical contents of first-aid, universal precaution and medical kits.

- (a) The required first-aid kits shall include at least the following:
 - Antiseptic swabs (10/pack)
 - Bandage: adhesive strips
 - Bandage: gauze 7.5 cm × 4.5 m
 - Bandage: triangular, safety pins
 - Dressing: burn 10 cm × 10 cm
 - Dressing: compress, sterile 7.5 cm × 12 cm
 - Dressing: gauze, sterile 10.4 cm × 10.4 cm
 - Tape: adhesive 2.5 cm (roll)

- Steri-strips (or equivalent adhesive strip)
 - Hand cleanser or cleansing towelettes
 - Pad with shield, or tape, for eye
 - Scissors. 10 cm (if allowed by national regulations)
 - Tape: adhesive, surgical 1.2 cm × 4.6 m
 - Tweezers splinter
 - Disposable gloves (multiple pairs)
 - Thermometers (non-mercury)
 - Mouth to mouth resuscitation mask with one-way valve
 - First-aid manual, current edition
 - Incident record form
 - Mild to moderate analgesic [as allowed by national regulation]
 - Antiemetic [as allowed by national regulation]
 - Nasal decongestant [as allowed by national regulation]
 - Antacid [as allowed by national regulation]
 - Antihistamine [as allowed by national regulation]
- (b) The required universal precaution kits shall include at least the following:
- Dry powder that can convert small liquid spill into a sterile granulated gel
 - Germicidal disinfectant for surface cleaning
 - Skin wipes
 - Face/eye mask (separate or combined)
 - Gloves (disposable)
 - Protective apron
 - Large absorbent towel
 - Pick-up scoop with scraper
 - Bio-hazard disposal waste bag
 - Instruction
- (c) The required medical kits shall include at least the following:
- Stethoscope
 - Sphygmomanometer (electronic preferred)
 - Airways, oropharyngeal (3 sizes)
 - Syringes (appropriate range sizes)
 - Needles (appropriate range sizes)
 - Intravenous catheters (appropriate range of sizes)
 - Antiseptic wipes
 - Gloves (disposable)

- Needle disposal box
 - Urinary catheter
 - System for delivering intravenous fluids
 - Venous tourniquet
 - Sponge gauze
 - Tape – adhesive
 - Surgical mask
 - Emergency tracheal catheter (or large gauge intravenous cannula)
 - Umbilical cord clamp
 - Thermometers (non mercury)
 - Basic life support cards
 - Bag-valve mask
 - Flashlight and batteries
- (d) [AOC] The required medical kits shall include the following medication:
- Epinephrine 1 : 1000
 - Antihistamine – injectable
 - Dextrose 50% (or equivalent) – injectable: 50ml
 - Nitroglycerin tablets, or spray
 - Major analgesic
 - Sedative anticonvulsant – injectable
 - Antiemetic – injectable
 - Bronchial dilator – inhaler
 - Atropine – injectable
 - Adrenocortical steroid – injectable
 - Diuretic – injectable
 - Medication for postpartum bleeding
 - Sodium chloride 0.9% (minimum 259ml)
 - Acetyl salicylic acid (aspirin) for oral use
 - Oral beta blocker
 - Epinephrine 1 : 10000 (can be a dilution of epinephrine 1 : 1000)

Note: If a cardiac monitor is available (with or without an AED) add to the above list.

IS: 7.8.12 OXYGEN STORAGE AND DISPENSING APPARATUS

- (a) The supplemental oxygen supply requirements for non-pressurized aircraft are as follows:
- (1) Flight crew members. Each member of the flight crew on flight deck duty shall be supplied with supplemental oxygen in accordance with Table 1. If all occupants of

flight deck seats are supplied from the flight crew source of oxygen supply then they shall be considered as flight crew members on flight deck duty for the purpose of oxygen supply.

- (2) Cabin crew members, additional crew members and passengers. Cabin crew members and passengers shall be supplied with oxygen in accordance with Table 1. Cabin crew members carried in addition to the minimum number of cabin crew members required, and additional crew members, shall be considered as passengers for the purpose of oxygen supply.

Table 1- Supplemental Oxygen for Non-Pressurized Aircrafts

| (a) | (b) |
|---|--|
| SUPPLY FOR: | DURATION AND PRESSURE ALTITUDE |
| 1. All occupants of flight deck seats on flight deck duty | Entire flight time at pressure altitudes above 10,000 feet |
| 2. All required cabin crew members | Entire flight time at pressure altitudes above 13,000 ft and for any period exceeding 30 minutes at pressure altitudes above 10,000 ft but not exceeding 13,000 ft |
| 3. 100% of passengers | Entire flight time at pressure altitudes above 13,000 ft |
| 4. 10% of passengers | Entire flight time after 30 minutes at pressure altitudes greater than 10,000 ft but not exceeding 13,000 ft |

(b) The supplemental oxygen supply requirements for pressurized aircraft are as follows:

- (1) The amount of supplemental oxygen required shall be determined on the basis of cabin pressure altitude, flight duration and the assumption that a cabin pressurization 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.
- (2) Following a cabin pressurization failure, the cabin pressure altitude shall be considered the same as the aircraft altitude, unless it is demonstrated to the Authority that no probable failure of the cabin or pressurization 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.
- (3) Flight crew members.
 - (i) Each member of the flight crew on flight deck duty shall be supplied with supplemental oxygen in accordance with Table 2. If all occupants of flight deck seats are supplied from the flight crew source of oxygen supply then they shall be considered as flight crew members on flight deck duty for the purpose of oxygen supply. Flight deck seat occupants, not supplied by the flight crew source, are to be considered as passengers for the purpose of oxygen supply.
- (4) Cabin crew members, additional crew members, and passengers
 - (i) Cabin crew members and passengers shall be supplied with supplemental oxygen in accordance with Table 2. Cabin crew members carried in addition to the minimum number of cabin crew members required, and additional crew members, shall be considered as passengers for the purpose of oxygen supply.

- (ii) The oxygen supply requirements, as specified in Table 2, for aircraft not certificated to fly at altitudes above 25,000 ft., may be reduced to the entire flight time between 10,000 ft. and 14,000 ft. 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 ft.

Table 2 - Requirements for Supplemental Oxygen - Pressurized Aircraft During and Following Emergency Descent (Note 1)

| SUPPLY FOR: | DURATION AND CABIN PRESSURE ALTITUDE |
|--|---|
| 1. All occupants of flight deck seats on flight deck duty flight | Entire flight time when the cabin pressure altitude exceeds 13,000 and entire time when the cabin pressure altitude exceeds 10,000 ft but does not exceed 13,000 ft after the first 30 minutes at those altitudes, but in no case less than: (i) 30 minutes for aircraft certificated to fly at altitudes not exceeding 25,000 ft (Note 2) (ii) 2 hours for aircraft certificated to fly at altitudes more than 25,000 ft (Note 3). |
| 2. All required cabin crew members | Entire flight time when cabin pressure altitude exceeds 13,000 ft but not less than 30 minutes (Note 2), and entire flight time when cabin pressure altitude is greater than 10,000 ft but does not exceed 13,000 ft after the first 30 minutes at these altitudes. |
| 3. 100% of passengers | 10 minutes or the entire flight time when the cabin pressure altitude exceeds 15,000 ft whichever is the greater (Note 4) |
| 4. 30% of passengers | Entire flight time when the cabin pressure altitude exceeds 14,000 ft but does not exceed 15,000 ft |
| 5. 10% of passengers | Entire flight time when the cabin pressure altitude exceeds 10,000 ft but does not exceed 14,000 ft after the first 30 minutes at these altitudes. |

Notes:

1. The supply provided shall 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 ft. in 10 minutes and followed by 20 minutes at 10,000 ft.
 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 ft. in 10 minutes and followed by 110 minutes at 10,000 ft. The oxygen required to meet the Crew Protective Breathing Equipment provisions of this Part 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 ft.
- (c) The supplemental oxygen supply requirements for non-pressurized helicopters are as follows:

- (1) An operator shall not operate a non-pressurized helicopter at pressure altitudes above 10,000 ft 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 shall 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.
- (3) A helicopter intended to be operated above 10,000 ft. pressure altitude shall be provided with equipment capable of storing and dispensing the oxygen supplies required.
- (4) Oxygen supply requirements:
 - (i) Flight crew members. Each member of the flight crew on flight deck duty shall be supplied with supplemental oxygen in accordance with Table 3. If all occupants of flight deck seats are supplied from the flight crew source of oxygen supply then they shall be considered as flight crew members on flight deck duty for the purpose of oxygen supply.
 - (ii) Cabin crew members, additional crew members and passengers. Cabin crew members and passengers shall be supplied with oxygen in accordance with Table 3. Cabin crew members carried in addition to the minimum number of cabin crew members required, and additional crew members, shall be considered as passengers for the purpose of oxygen supply.

Table 3- Supplemental Oxygen for Non-Pressurized Helicopters

| SUPPLY FOR: | DURATION AND PRESSURE ALTITUDE |
|---|--|
| 1. All occupants of flight deck seats on flight deck duty | Entire flight time at pressure altitudes above 10,000 feet |
| 2. All required cabin crew members | Entire flight time at pressure altitudes above 13,000 ft and for any period exceeding 30 minutes at pressure altitudes above 10,000 ft but not exceeding 13,000 ft |
| 3. 100% of passengers (see note) | Entire flight time at pressure altitudes above 13,000 ft |
| 4.. 10% of passengers (see note) | Entire flight time after 30 minutes at pressure altitudes greater than 10,000 ft but not exceeding 13,000 ft |

Note: For the purpose of this table “passengers” means passengers actually carried, including infants.

IS: 7.9.14 COSMIC RADIATION DETECTION EQUIPMENT

- (a) Compliance with the sampling requirements in subpart 7.9.14 (a)(2) may be accomplished as follows:
 - (1) The sampling shall be carried out in conjunction with a Radiological Agency or similar organization acceptable to the Authority.
 - (2) Sixteen route sectors, which include flight above 15,000 m (49,000 ft.), shall be sampled every quarter (three months). Where less than sixteen route sectors which

include flight above 15,000 m (49,000 ft.) are achieved each quarter, then all sectors above 15,000 m (49,000 ft.) shall be sampled.

- (3) The cosmic radiation recorded should include both the neutron and non-neutron components of the radiation field.
- (4) The results of the sampling, including a cumulative summary quarter on quarter, should be reported to the Authority under arrangements acceptable to the Authority.