CIVIL AVIATION REGULATIONS

Part 7 — INSTRUMENTS AND EQUIPMENT

VERSION 2.8

AUGUST 2015

[THIS PAGE INTENTIONALLY LEFT BLANK]

AMENDMENTS

Location	Date	Description
Part 7	11/2012	Changes to ICAO Annex 6, Part II references due to ICAO renumbering
Introduction	11/2011	Paragraph added at the end to indicate primary ICAO references used in CAR 7
Introduction	11/2014	Updated the amendment number of the ICAO Annexes used
Amendments	11/2012	Corrects typographical error in 7.1.3.3
7.1.1	8/6/2006	Note added
7.1.1.2	10/27/2004	"Extended Overwater Operation" changed to "Long Range Overwater Flights" and definition rewritten
7.1.1.2	8/6/2006	Definitions added at 7.1.1.2(a)(2) –(14)
7.1.1.2(a)	11/2011	Added definitions for: Airborne Image Recorder, Aircraft Data Recording System; Airworthy; Area Navigation; added note to Category III;; Cockpit Audio Recording System; Continuing airworthiness; Datalink Recording System; Automatic Deployable ELT; Engine; Enhanced Vision System; Flight Manual; Head-up Display; Maintenance Programme; Navigation Specification; Performance-based navigation.
		Added notes for RNAV; Cat III C: Navigation Specification; PBN.
		For Category operations, changed words "one", "two" and "three" to Roman numerals "I", "II" and "III"
	11/2012	Adds words missing from previous version in (a)(27)
	11/2012	Corrects typographical error in Note
7.1.1.2	11/2014	Moved definitions to CAR Part 1
7.1.1.3	10/27/2004	"Acronyms" changed to "Abbreviations"
7.1.1.3	8/6/2006	Abbreviations added: CAT I; CAT II; CAT IIIA; CAT IIIB; CAT IIIC; CVR; FDR; GPS; GPWS; MACH; RNAV; RNP; RVR;
7.1.1.3	10/27/2011	Abbreviations added: ADRS; AIR; CARS; DLR; DLRS; EVS; HUD
7.1.1.3(7)	10/27/2004	"Rating" changed to "Rules"
7.1.1.3(10)	10/27/2004	"Part 1" deleted
7.1.1.3(13)	10/27/2004	"Minimal" changed to "Minimum"
7.1.1.3(15)	10/27/2004	"Pressure" changed to "Protective"
7.1.1.3(18)	10/27/2004	Reference deleted
7.1.1.3(20)	10/27/2004	"Range" changed to "Radiorange"
7.1.1.4(c)(1)	10/27/2004	Addition of requirement to satisfy ICAO Annex 10 Vol. IV
7.1.1.4(c)	8/6/2006	Changed "AOC" to "CAT"
7.1.1.4(e)	10/27/2004	Gender-inclusive language
7.1.2.1(c)		
7.1.2	8/6/2006	Deleted "navigation" from title and moved navigation equipment requirements to a new section 7.1.4

Location	Date	Description
7.1.2.1(a)	8/6/2006	Deleted “navigation”
7.1.2.1(a)(4)	10/27/2004	Sentence added to require that aeroplane be equipped to operate in the event of the failure of one item of equipment.
7.1.2.1(a)(4)	8/6/2006	Deleted and moved to 7.1.4.1(c)
7.1.2.2	8/6/2006	Deleted “navigation from title and text;
		Added “powered” to aircraft;
		Added new item (5) and note
7.1.2.3	8/6/2006	Added “in day VFR” to title;
		Added new item (7)
7.1.2.4(a)	8/6/2006	Added reference to requirements in 7.1.2.2
7.1.2.4(a)(2)	10/27/2004	Requirement for additional sensitive pressure altimeter
7.1.2.4(a)(2)	8/6/2006	Added “AOC”
7.1.2.4(a)(3)	8/6/2006	Added language to clarify equipment for aeroplanes and helicopters
7.1.2.4(a)(4)	8/6/2006	New requirements added for aeroplane and helicopters and AAC and AOC
7.1.2.4(a)(9)(10)	8/6/2006	New requirements added and former (9) renumbered to (11); note added
7.1.2.4(e)	8/6/2006	Moved from 7.1.3.1(e)
7.1.2.4(f)	8/6/2006	Moved from 7.1.3.1(g)
7.1.2.5(a)	8/6/2006	Re-written for aeroplane and helicopters added
7.1.2.6(a)	10/27/2004	Addition of requirement that equipment be approved and maintained in accordance with IS 7.1.2.6.
7.1.2.6(a)(1)	8/6/2006	Addition of inspection requirements for Group I
7.1.2.6(a)(2)	8/6/2006	Addition of inspection requirements for Group II
7.1.2.7	8/6/2006	New section added for CAT III instruments and equipment;
		Text for MNPS Airspace in earlier versions moved to 7.1.4.2
7.1.2.8	10/27/2004	New section: “Navigation Equipment – General”
7.1.2.8	8/6/2006	Deleted and text moved to 7.1.4.1
7.1.3.1(a)	8/6/2006	Added “communication” to radio equipment
7.1.3.1(b)	8/6/2006	Re-written and additional requirements added
7.1.3.1(c)	10/27/2004	Paragraph rewritten to require systems that are capable of receiving meteorological information, two-way radio communications and such other frequencies that may be required by the CAA.
7.1.3.1(c)	8/6/2006	Rewritten and applied to CAT
7.1.3.1(d)	8/6/2006	“AOC” changed to “CAT”
7.1.3.1(e)	8/6/2006	Moved to 7.1.2.4(e) and renumbered (f) to (e)
7.1.3.1(f)	10/27/2004	Requirement for boom or throat microphone at each flight crewmember’s station.
7.1.3.1(g)	10/27/2004	Phrase “in commercial air transport operations” added.
7.1.3.1(g)	8/6/2006	Moved to 7.1.2.4(f)

Location	Date	Description
7.1.3.2	8/6/2006	Title revised
7.1.3.2(a)	8/6/2006	“AOC” changed to “CAT”
7.1.3.2(b)	8/6/2006	“AOC” changed to “CAT”
7.1.3.2(b)	10/27/2004	Replaced “maximum approved passenger seating configuration of more than 19” with “flightcrew compartment door.”
7.1.3.2(b)	8/6/2006	Added “maximum approved passenger seating configuration of more than 19”
7.1.3.2(b)(4)	10/27/2004	Added “in the event of suspicious activity or security breaches in the cabin.”
7.1.3.3	10/27/2004	New Section: “Altitude Reporting Transponder”
7.1.3.3	8/6/2006	Public address system moved to 7.1.3.3 from 7.1.9.4 in previous versions;
		Altitude Reporting Transponder text moved to 7.1.4.5 in this version
7.1.3.3	8/6/2006	Added “AOC” to title
7.1.3.3(a)(2)	8/6/2006	New item (2) added and remaining items renumbered
7.1.3.3(b)(c)	8/6/2006	New paragraphs added
7.1.4.1(a)(1)	10/27/2004	Added “The equipment specified in §7.1.2.1, 7.1.2.2 and §7.1.2.4(a) of this part.”
7.1.4	8/6/2006	New navigation section added and remaining sections renumbered
7.1.4.1(a)	8/6/2006	Moved from 7.1.2.8 in previous versions; RNP requirement moved to 7.1.4.1(b)
7.1.4.1(b)	8/6/2006	RNP requirement expanded
7.1.4.1(c)	8/6/2006	Moved from 7.1.2.1(a)(4) in previous versions and expanded
7.1.4.1(d)	8/6/2006	New
7.1.4.1(e)	8/6/2006	Moved from 7.1.2.1(b) in previous versions and updated
7.1.4.1(f)	8/6/2006	Moved from 7.1.2.1(c) in previous versions
7.1.4.2	8/6/06	Moved from 7.1.2.7 in previous versions and “AOC” changed to “AAC”
7.1.4.3	8/6/2006	New requirements added for RVSM
7.1.4.4	8/6/2006	New requirements added for electronic navigation data management
7.1.4.5	8/6/2006	Moved from 7.1.3.3 in previous versions
7.1.4.5(c)	8/6/2006	“AOC” changed to “CAT” and reference added to ICAO Annex 10, Vol. 4
7.1.5	8/6/2006	Section moved from 7.1.4 in previous versions
7.1.5.1	8/6/2006	Paragraph moved from 7.1.4.1(a) in previous versions and reworded to address AAC; new requirement added for anti-collision lights
7.1.5.2	8/6/2006	Paragraph moved from 7.1.4.1(b) and (c) in previous versions and reworded to address CAT; helicopter lights added
7.1.6.2	10/27/2004	Replaced “atmospheric pressure less than 376 hPa” with “above 25,000 feet.”
7.1.6.5(a)	10/27/2004	Added “or piston-engined aeroplane of a maximum certificated take-off mass in excess of 5,700 kg or authorised to carry more than nine passengers.”
7.1.6.6	10/27/2004	Added “thunderstorms or other”
7.1.6.7	10/27/2004	New Section: “Airborne Collision Avoidance System (ACAS)”
7.1.6.8	10/27/2004	New Section: “Forward Looking Wind Shear Warning System – Turbojet Aircraft”

Location	Date	Description
7.1.6	8/6/2006	Moved from 7.1.5 in previous versions
7.1.6.1(a)(b)	8/6/2006	"CAT" changed to "AAC"; powered aircraft added; some rewording of requirements
7.1.7.1	10/27/2004	New §7.1.7.1(a) and (b) added. Old §7.1.7.1(a) deleted. Old §7.1.7.1(b) now §7.1.7.1(c)
7.1.7.2(a)	10/27/2004	Replaced "large" with "of 5,700 kg or more." Added sentence referencing Implementing Standard 7.1.7.2.
7.1.7.2(b)	10/27/2004	Replaced "that" with "that may be."
7.1.7.2(c) & (d)	10/27/2004	New Subsections
7.1.7.3	10/27/2004	New Section: "Recording of Data Link Communications"
7.1.7	8/6/2006	Moved from 7.1.6 in previous versions
7.1.7.3(a)	8/6/2006	New item added to address AAC and remaining items renumbered
7.1.7.3(b)	8/6/2006	"Retractable" added to landing gear
7.1.7.3(d)	8/6/2006	Language added to refer to 7.1.7.3(b)
7.1.7.4(a)	8/6/2006	"AOC" changed to "AAC"
7.1.7.5	8/6/2006	"AOC" changed to "AAC"
7.1.7.5(c)(4)	8/6/2006	Two requirements added
7.1.7.6	8/6/2006	Entire subsection rewritten and updated with new ICAO Annex 6 requirements
7.1.7.7	8/6/2006	Title edited to reflect "aeroplane"; "AOC" changed to "CAT"
7.1.8.5(b)	Oct-04	Replaced "extended" with "long-range." Replaced "a" with "at least two…one of which shall be automatic."
7.1.8.5(c)	10/27/2004	Capitalised "Life raft."
7.1.8.6(a)(1)	10/27/2004	Old note replaced with "When discharged, the portable fire extinguisher shall not cause dangerous contamination of the air within the aircraft."
7.1.8.6(a)(4)	10/27/2004	Replaced "of aeroplanes having a passenger seating capacity of 30 or less" with "if the passenger compartment is separate from the flight deck and not readily accessible to the flightcrew."
7.1.8.11(b)	10/27/2004	Table of required first aid kits moved to IS 7.1.8.11(a)(2)(i)
7.1.8.12(d)(1)	10/27/2004	Added "available at the flight duty station and are."
7.1.8.16	10/27/2004	New subsections (a) and (b). Subsections (c) and (d) deleted.
7.1.8.17(a) and (b)	10/27/2004	New subsections. Note to subsection (a) and old subsection (b) deleted.
7.1.8.17(c)	10/27/2004	Added "the following life sustaining equipment."
7.1.8.17(c)(1)	10/27/2004	Added "electronic."
7.1.8.117(d)	10/27/2004	Replaced "some" with "a."
7.1.8	8/6/2006	Moved from 7.1.7 in previous versions
7.1.8.1	8/6/2006	Entire subpart rewritten to reflect new ICAO Annex 6 requirements
7.1.8.2	8/6/2006	Entire subpart rewritten to reflect new ICAO Annex 6 requirements
7.1.8.3	8/6/2006	"Aeroplane" changed to "powered aircraft"; requirement for helicopter added at

Location	Date	Description
		7.1.8.3(d)(3)
7.1.9.1(a)	10/27/2004	Added “carrying.”
7.1.9.1(a)(1)	Oct-04	Deleted “or berth.” Added “to be determined by FSM; and a restraining belt for each berth on board the aircraft.” Deleted note.
7.1.9.1(a)(2-4)	10/27/2004	7.1.9.1(a) rewritten and a new item 4 added.
7.1.9.2	10/27/2004	Deleted old §7.1.9.2(a). Added new §7.1.9.2(a) and (b) due to Annex change
7.1.9	8/6/2006	Moved from 7.1.8 in previous versions
7.1.9.2	8/6/2006	Moved from 7.1.8.2 in previous versions; “Passengers” added to the title
7.1.9.2(a)	8/6/2006	Text in 7.1.8.2 (a)-(e) in previous versions combined into a paragraph (a) to address aeroplanes and made applicable to AAC
7.1.9.2(b)-(h)	8/6/2006	New requirements added
7.1.9.5	8/6/2006	Moved from 7.1.8.5 in previous versions
7.1.9.5(a)	8/6/2006	Text in 7.1.8.5 (a)-(e) in previous versions combined into a paragraph (a) to address aeroplanes; requirements updated including adding 406 MHz and additional areas where ELT is required
7.1.9.5(b)	8/6/2006	New requirements added to address helicopters
7.1.9.6	8/6/2006	New paragraph (a) added and remaining paragraphs renumbered
7.1.9.6(b)(5)	8/6/2006	New requirement added to table for fire extinguishers for passenger seating capacity of 7 through 29
7.1.9.9	8/6/2006	“AOC” changed to “AAC”
7.1.9.11	8/6/2006	Moved from 7.1.8.11 in previous versions;
		Emergency medical kit requirements deleted and moved to new 7.1.9.12;
		New language added to require approved first aid kits for AAC
7.1.9.12	8/6/2006	Emergency medical kit requirements moved to this new subsection;
		“AOC” changed to “CAT”;
		requirements indicated for aeroplanes
7.1.9.13	8/6/2006	Moved from 7.1.8.12 in previous versions;
		“AOC” changed to “AAC”
7.1.9.14	8/6/2006	Moved from 7.1.8.13 in previous versions
7.1.9.15	8/6/2006	Moved from 7.1.8.14 in previous versions;
		Abbreviation of STPD added to paragraph (b);
		New paragraphs (c) and (d) added
7.1.9.16	8/6/2006	Moved from 7.1.8.15 in previous versions;
		New paragraph (b)(3) added
7.1.9.17	8/6/2006	Moved from 7.1.8.16 in previous versions;
		“AOC” changed to “AAC”
7.1.9.18	8/6/2006	Moved from 7.1.8.17 in previous versions;
		Paragraph (a) rewritten to reflect AAC, new aeroplane and helicopter requirements;

Location	Date	Description
		New Paragraph (b) added
7.1.9.19	8/6/2006	Moved from 7.1.8.18 in previous versions
7.1.10	8/6/2006	Moved from 7.1.9 in previous versions and subsections renumbered
7.1.10.1	8/6/2006	Moved from 7.1.9.1 in previous versions;
		“AOC” changed to “AAC”
7.1.10.2	8/6/2006	Moved from 7.1.9.2 in previous versions;
		“Aeroplane” added to the title;
		7.1.10.2(b)(1)(iii) “key” changed to “means”
7.1.10.3	8/6/2006	Moved from 7.1.9.3 in previous versions;
		Paragraph (a) “AOC” changed to “CAT” and aeroplane weight requirements added;
		New paragraph (b) added
7.1.10.4	8/6/2006	Moved from 7.1.9.5 in previous versions;
		Entire subsection re-written to reflect new ICAO Annex 6 requirements
7.1.10.5	8/6/2006	Moved from 7.1.9.6 in previous versions;
		Entire subsection rewritten to reflect new ICAO Annex 6 requirements
7.1.10.6	8/6/2006	Moved from 7.1.9.7 in previous versions;
		7.1.10.6(a)(2) “external” changed to “auxiliary”
7.1.10.7	8/6/2006	Moved form 7.1.9.8 in previous versions;
		“AOC” changed to “CAT”
7.1.10.8	8/6/2006	Moved from 7.1.9.9 in previous versions;
		Entire subsection rewritten to reflect new ICAO Annex 6 requirements
7.1.10.9	8/6/2006	Moved from 7.1.9.10 in previous versions;
		“And” added to the title;
		New paragraph (a) added and remaining paragraphs renumbered;
		New requirement added at paragraph (b)(3)
7.1.10.10	8/6/2006	Moved from 7.1.9.11;
		New paragraphs (a) and (b) added and remaining paragraph renumbered
7.1.10.11	8/6/2006	Moved form 7.1.9.12;
7.1.10.12	8/6/2006	Moved from 7.1.9.13;
		Entire subsection rewritten to reflect new ICAO Annex 6 requirement
7.1.10.13	8/6/2006	Moved from 7.1.9.14;
		“AOC” changed to “CAT”;
		New IS added
7.1.10.14	8/6/2006	Moved from 7.1.9.15
7.1.10.15	8/6/2006	Moved from 7.1.9.16;

Location	Date	Description
		Entire subsection rewritten
7. 2	4/2007	Flight Instruments subpart of 7.1.2 renumbered as 7.2 and remaining paragraphs renumbered
7.2.1.2	11/2011	Added new (b) based on ICAO Annex change for VFR equipment
7.2.1.2(a)(3)	11/2013	Added new (i) per ICAO Annex change
7.2.1.3(a)	11/2011	Changed AAC to AOC to indicate requirement is for AOC holders
7.2.1.4	11/2011	Entire 7.2.1.4 revised based on ICAO Annex change
7.2.1.4(a)(1)(ii)	11/2013	Added new (A) per ICAO Annex change
7.2.1.4(d)(1)(ii)	11/2013	Added new (A) per ICAO Annex change
7.2.1.5	11/2011	New subsection added based on ICAO Annex change and remaining sections renumbered.
7.2.1.6	11/2011	Renumbered from 7.2.1.5 in CAR Version 2.5
7.2.1.7	11/2011	Renumbered from 7.2.1.6 in CAR Version 2.5
7.2.1.8	11/2011	Renumbered from 7.2.1.7 in CAR Version 2.5
7.2.1.9	11/2011	New subsection based on ICAO Annex change
7.3	4/2007	Communications Equipment subpart of 7.1.3 renumbered as 7.3 and remaining paragraphs renumbered
7.3.1.1	11/2011	New (c) added based on ICAO Annex change; previous (c) combined with (d); (e) the term AOC was changed to AAC to denote requirements for all aircraft
7.3.1.4	11/2011	Microphone requirements for flight crew moved to new subsection and updated with new ICAO Annex change
7.4	4/2007	Navigation Equipment subpart of 7.1.3 renumbered as 7.4 and remaining paragraphs renumbered
7.4.1.1(b)	11/2011	Deleted RNP required navigational performance; added PBN
7.4.1.1(b)(1)	11/2011	Deleted operations specifications for AOC holders or letter of authorisation for non AOC holders
7.4.1.1(b)(2)	11/2011	Deleted RNP type; added navigation specification
7.4.1.1(d) note	11/2011	Text change to reflect change in title of ICAO Doc
7.4.1.3(a)(3)	11/2011	New (a)(3) added based on ICAO Annex change
7.4.1.3(b)(1)	11/2011	New IS based on ICAO Annex change
7.4.1.3(d)(e)(f)	11/2011	New (d) and (e) added, previous (d) becomes new (f)
7.4.1.5	11/2011	(a) was previously (c) in CAR Version 2.5; changed AOC to AAC to apply to all aircraft
		(b) was previously (a) in CAR Version 2.5
		(c) and (d) new and replaces the previous (b) in CAR Version 2.5
7.5	4/2007	Aircraft Lights and Instrument Illumination subpart of 7.1.5 renumbered as 7.5 and remaining paragraphs renumbered
7.6	4/2007	Engine instruments subpart of 7.1.6 renumbered to 7.6 and remaining paragraphs renumbered

Location	Date	Description
7.7	4/2007	Warning instruments and systems subpart of 7.1.7 renumbered to 7.7 and remaining paragraphs renumbered
7.7.1.1(a)	11/2011	Changed “aircraft” to “aeroplane”
7.7.1.7(f)	11/2012	Corrects typographical error
7.8	4/2007	Flight and Cockpit Voice Recorder subpart of 7.1.8 renumbered to 7.8 and remaining paragraphs renumbered
7.8	11/2011	Entire 7.8 is revised and new material added based on ICAO Annex change
7.8	11/2012	Annex 6, Part 2 references changed throughout Subpart 7.8 and corresponding IS references due to renumbering of ICAO Annex 6, Part 2 in Amendment 31.
7.8.1.1	11.2012	(a) and (a)(3); and (b) and (b)(3) text changes made per ICAO Annex change
7.8.2.2	11/2012	(a)(1), (a)(12) and (a)(13); text change made per ICAO Annex change; Added (b)(4) and (b)(5) per ICAO Annex change.
7.8.2.3(a)	11/2012	Corrects typographical error
7.8.3.2	11/2012	(a)(1) text change made per ICAO Annex change.
7.8.3.4	11/2012	(a) editorial change to correct abbreviation to CVR
7.8.3.5	11/2012	New paragraph added per ICAO Annex change.
7.9	4/2007	Emergency, Rescue and Survival Equipment subpart of 7.1.9 renumbered to 7.9 and remaining paragraphs renumbered
7.9.1.2	11/2012	Corrects typographical error
7.9.1.5(a)	11/2011	(a)(1) updated frequency requirement
		(a)(2) and (3) new; previous (2) and (3) in CAR Version 2.5 are moved to new 7.9.1.5(c)
7.9.1.5(b)	11/2011	(b)(1) updated frequency requirement
		(b)(2) updated and combined with previous (5) in CAR Version 2.5
		Battery information in previous (2) and (3) in CAR Version 2.5 moved to new (c)
7.9.1.5(c)	11/2011	New (c) but moved from previous CAR Version 2.5: 7.9.1.5(a)(2-3) and (b)(2-3)
7.9.1.6(a)	11/2011	New note added
7.9.1.6(c)	11/2011	New (c) added to reflect ICAO amendment
7.9.1.6(c)	11/2012	Text changed to reflect ICAO Amendment
7.9.1.7	11/2011	(a) – AOC changed to AAC, and aeroplane changed to aircraft to reflect ICAO Annex change
		(b) – AOC changed to AAC to reflect ICAO Annex change
		New (c) added to reflect ICAO amendment
7.9.1.7(c)	11/2012	Date change per ICAO
7.9.1.12	11/2011	(b) removed the “location” of the emergency medical kit and addressed it in a new (c)
7.9.1.13	11/2013	Split (f) into (f) and a new (g)
7.10	4/2007	Miscellaneous Systems and Equipment subpart of 7.1.10 renumbered to 7.10 and remaining paragraphs renumbered.

Location	Date	Description
7.10..1.1	11/2011	(a)(2)(ii) added “restraining” to “device”
7.10.1.2	11/2011	(a) (1) and (2) replaced 45,000 kg with 45,500 kg
		(b) changed “AAC” to “AOC”
7.10.1.13	11/2011	(a) AOC changed to “AAC” and added new text as ICAO has now extended requirement to all aeroplanes
		(a)(3) added new requirement
		(b) new
7.10.1.13(a)(2)	11/2013	Added the word “and” to indicate all requirements are to be met
IS 7.1.7.2	11/9/2004	Deleted old IS §7.1.7.2(a). Added new IS §7.1.7.2(a)-(d) and Tables A and B
IS: 7.1.8.2	8/6/2006	Renumbered from IS: 7.1.7.2 in previous versions;
		“Data” added to title;
		New paragraph (a)(2) added and remaining paragraphs renumbered;
		New note added to paragraph (a)(3);
		New paragraph (a)(5) added and remaining paragraphs renumbered;
		New paragraph (a)(7) added and remaining paragraphs renumbered;
		New paragraph (a)(9) added and remaining paragraphs renumbered;
		New paragraph (a)(11) added;
		Paragraph (b) deleted.
IS 7.1.8.12	11/9/2004	In Table 2, lines 4 and 5, changed “14000 ft” to “13000 ft.”
IS: 7.1.9.2		Renumbered from IS:7.1.8.2 in previous versions;
		New paragraph (a)(20) added
IS 7.1. 9.11	11/9/2004	New Section: “First-Aid and Emergency Medical Kit”
IS: 7.1.9.11	8/6/2006	Renumbered from IS 7.1.8.11 in previous versions;
		Requirements added for AAC;
		Emergency medical kit requirements deleted and moved to new IS: 7.1.9.12
IS: 7.1.9.12	8/6/2006	Text moved from IS: 7.1.8.11 in previous versions
IS: 7.1.9.13	8/6/2006	Renumbered from IS: 7.1.8.12 in previous versions;
		Paragraph (a) “aircraft” changed to “aeroplane”;
		New Paragraphs (a)(1)-(3) added;
		Original text moved to Paragraph (a)(4);
		Note added to table;
		Paragraph (b) “aircraft” changed to “aeroplane”;
		Paragraph (b) (1) and (3) added and other paragraphs renumbered;
		Oxygen requirements for crew and passengers moved to paragraph (b)(4);
		Paragraph (b)(4)(i)(C)(D) – new requirements added for flightcrew;
		Paragraph (b)(4)(ii)(B)(C)(D) – new requirements added for cabin crew, additional

Location	Date	Description
		crew, and passengers;
		New note 5 added to table;
		Paragraph (c) – new requirements added for helicopters
IS: 7.1.10.13	8/6/2006	New IS added for cosmic radiation detection equipment
IS: 7.2.1.6	4/2007	Renumbered from IS: 7.1.2.6
IS: 7.4.1.3	11/2011	New IS added
IS: 7.8.1.2	4/2007	Renumbered from IS: 7.1.8.2
IS: 7.8.1.4	11/2011	New IS added
IS: 7.8.2.2(A)	11/2011	Revised based on new ICAO requirements. Was previously IS: 7.8.1.2 in CAR Version 2.5
IS: 7.8.2.2(B)	11/2011	Revised based on new ICAO requirements. Was previously IS: 7.8.1.2 in CAR Version 2.5
IS: 7.8.4.1	11/2011	New IS added
IS: 7.9.1.2	4/2007	Renumbered from IS: 7.1.9.2
IS: 7.9.1.11	4/2007	Renumbered from IS: 7.1.9.11
IS: 7.9.1.12	4/2007	Renumbered from IS: 7.1.9.12
IS: 7.9.1.13	4/2007	Renumbered from IS: 7.1.9.13
IS: 7.10.1.13	4/2007	Renumbered from IS: 7.1.10.13

INTRODUCTION

Part 7 of these Model Regulations presents standards and recommended practices as regulatory requirements for instruments and equipment on aircraft expected to operate in FSM. As with the other Parts of this Model Regulation, Part 7 presents the standards and recommended practices in ICAO Annex 6 supplemented by sections from the United States Title 14 of the Code of Federal Regulations (14 CFR) and/or the European Joint Aviation Regulations (JAR). Supplementation by 14 CFR or JAR regulations allows for more efficient implementation of the basic ICAO standards and recommended practices, based upon the experience gained by the Federal Aviation Administration (FAA) and the former Joint Aviation Authorities (JAA).

The requirements in Part 7 address two categories of aircraft operations – AOC holder and non-AOC holder 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 also applies to all aircraft. Additional aircraft requirements relating to commercial air transport are noted by the key [AOC] for air operator certificate holders. Note: ICAO Annex 6, Part 1: 4.2.1.1 and Part III, Section II: 2.2.1.1 requires that operators in commercial air transport have an air operator certificate.

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 turbine powered aircraft, which may have performance and range capabilities matching the type of aircraft operated by AOC holders. Similarly, some equipment specified for the [AOC] aircraft have sections keyed as [AAC].

The key [AAC] applies to all aircraft, whether on domestic or international flights. The key [AOC] applies to AOC holders operating in FSM, whether on domestic or international flights. Certain sections, such as those addressing MNPS airspace, may not address airspace contiguous to FSM, but anticipate that FSM AOC holder's aircraft may operate through such airspace in the course of commerce. Such requirements are intended to facilitate the integration of FSM AOC holders into such operations.

Part 7 includes survival equipment requirements that apply for operation in FSM as listed in ICAO Annex 6. The Authority is encouraged to review geographic areas within FSM, and designate those areas requiring additional, specific types of survival equipment.

The primary sources for CAR Part 7 are: ICAO Annex 6, Part I, Chapters 6 and 7; ICAO Annex 6, Part II, Section II: Chapters 2.4 and 2.5 and Section III, Chapters 3.6 and 3.7; and ICAO Annex 6, Part III, Section II, Chapters 4 and 5, and Section III, Chapters 4 and 5. The following ICAO amendments to Annex 6 have been used in CAR Version 2.7: ICAO Annex 6, Part I – Amendment 37-A and B; ICAO Annex 6, Part II – Amendment 32-A and B; ICAO Annex 6, Part III – Amendment 18-A and B.

CONTENTS

PART 7— INSTRUMENTS AND EQUIPMENT 1

7.1 General 1

7.1.1.1 Applicability 1
7.1.1.2 Definitions 1
7.1.1.3 Abbreviations 1
7.1.1.4 General Instrument and Equipment Requirements 3

7.2 Flight Instruments 3

7.2.1.1 General Requirements 3
7.2.1.2 Minimum Flight Instruments 4
7.2.1.3 Instruments for Operations Requiring Two Pilots in Day VFR 4
7.2.1.4 Instruments Required for IFR Operations 5
7.2.1.5 Instruments for Operation at Night 8
7.2.1.6 Standby Attitude Indicator 8
7.2.1.7 Instruments and Equipment for Category II Operations 9
7.2.1.8 Instruments and Equipment for Category III Operations 10
7.2.1.9 Aeroplanes Equipped with Head-Up Displays (HUD) and/or Enhanced Vision Systems (EVS) 12

7.3 Communications Equipment 13

7.3.1.1 Radio Equipment 13
7.3.1.2 Flightcrew and Crew member Interphone System for Aeroplanes 14
7.3.1.3 Public Address System – AOC Holders 14
7.3.1.4 Microphones 15

7.4 Navigation Equipment 16

7.4.1.1 General 16
7.4.1.2 MNPS 17
7.4.1.3 Reduced Vertical Separation Minimum 17
7.4.1.4 Electronic Navigation Data Management 19
7.4.1.5 Altitude Reporting Transponder 19

7.5 Aircraft Lights and Instrument Illumination 19

7.5.1.1 Required Aircraft Lights and Instrument Illumination 19
7.5.1.2 Required Aircraft Lights and Instrument Illumination for Commercial Air Transport Operations 20

7.6 Engine Instruments 20

7.6.1.1 Engine Instruments 20

7.7 Warning Instruments and Systems 22

7.7.1.1 MACH Number Indicator 22
7.7.1.2 Loss of Pressurisation Indicator 22
7.7.1.3 Landing Gear Indicator Position and Aural Warning Device 22
7.7.1.4 Altitude Alerting System 22
7.7.1.5 Ground Proximity Warning System 23
7.7.1.6 Weather Radar 23
7.7.1.7 Airborne Collision Avoidance System (ACAS) 24
7.7.1.8 Forward Looking Wind Shear Warning System—Turbojet Aeroplanes 24

7.8 Flight Recorders 24
7.8.1.1 Flight Recorders Systems 24
7.8.1.2 Construction and Installation 25
7.8.1.3 Operation 26
7.8.1.4 Continued Serviceability and Inspection of Flight Recorder Systems 26
7.8.1.5 Flight Recorder Electronic Documentation 27
7.8.1.6 Combination Recorders 27
7.8.2 Flight Data Recorders (FDR) and Aircraft Data Recording Systems (ADRS) 28
7.8.2.1 Types and Parameters 28
7.8.2.2 Aircraft Equippage for Operation 28
7.8.2.3 Discontinuation 31
7.8.2.4 Duration 31
7.8.3 Cockpit Voice Recorders (CVR) and Cockpit Audio Recording Systems (CARS) 31
7.8.3.1 Signals to be Recorded – CVR and CARs 32
7.8.3.2 Aircraft Equippage for Operations 33
7.8.3.3 Discontinuation 34
7.8.3.4 Duration 34
7.8.3.5 Cockpit Voice Recorder Alternate Power 34
7.8.4 Data Link Recorders (DLR) and Data Link Recording Systems (DLRS) 35
7.8.4.1 Applicability 35
7.8.4.2 Duration 35
7.8.4.3 Correlation 35
7.8.5 Airborne Image Recorder (Air) and Airborne Image Recording System (AIRS) 36
7.9 Emergency, Rescue, and Survival Equipment 36
7.9.1.1 Emergency Equipment: All Aircraft 36
7.9.1.2 Emergency Exit Equipment - Passengers 36
7.9.1.3 Visual Signalling Devices 43
7.9.1.4 Survival Kits 43
7.9.1.5 Emergency Locator Transmitter 44
7.9.1.6 Portable Fire Extinguishers 45
7.9.1.7 Lavatory Fire Extinguisher 46
7.9.1.8 Lavatory Smoke Detector 47
7.9.1.9 Crash Axe 47
7.9.1.10 Marking of Break-in Points 48
7.9.1.11 First-Aid Kit and Universal Precaution Kit 48
7.9.1.12 Emergency Medical Kit - Aeroplanes 49
7.9.1.13 Oxygen Storage and Dispensing Apparatus 49
7.9.1.14 Protective Breathing Equipment 50
7.9.1.15 First Aid Oxygen Dispensing Units 51
7.9.1.16 Megaphones 51
7.9.1.17 Individual Flotation Devices 52
7.9.1.18 Life Rafts 52
7.9.1.19 Flotation Device for Helicopter Ditching 53
7.10 Miscellaneous Systems and Equipment 53
7.10.1.1 Seats, Safety Belts, and Shoulder Harnesses 53
7.10.1.2 Passenger and Pilot Compartment Doors –Aeroplanes 54
7.10.1.3 Passenger Information Signs 55
7.10.1.4 Materials for Cabin Interiors 55

7.10.1.5 Materials for Cargo and Baggage Compartments 55
7.10.1.6 Power Supply, Distribution, and Indication System 56
7.10.1.7 Protective Circuit Fuses 56
7.10.1.8 Icing Protection Equipment 56
7.10.1.9 Pitot Heat and Indication Systems 56
7.10.1.10 Static Pressure System 57
7.10.1.11 Windshield Wipers 57
7.10.1.12 Chart Holder 57
7.10.1.13 Cosmic Radiation Detection Equipment 58
7.10.1.14 Maritime Sound Signalling Device 58
7.10.1.15 Anchors 58

PART 7 — IMPLEMENTING STANDARDS 61

IS: 7.2.1.6 Category II: Instruments and Equipment Approval and Maintenance Requirements 61
IS: 7.4.1.3 Reduced Vertical Separation Minimum—Altimetry System Performance Requirements for Operations in RVSM Airspace 64
IS: 7.8.1.4 Continued Serviceability and Inspection of Flight Recorder Systems 65
IS: 7.8.2.1(a) Flight Data Recorders—Type And Parameters - Aeroplane 66
IS: 7.8.2.1(b) Flight Data Recorders—Type And Parameters – Helicopters 75
IS 7.8.2.2 Aircraft Equippage for Operations – Aircraft Data Recording System (ADRS) 80
IS 7.8.4.1 Data Link Recorder Applicability 84
IS: 7.9.1.2 Emergency Exit Equipment - Passengers 86
IS: 7.9.1.11 First- Aid Kits and Universal Precaution Kits 88
IS: 7.9.1.12 Emergency Medical Kit – Aeroplanes 90
IS: 7.10.1.13 Oxygen Storage and Dispensing Apparatus 91
IS: 7.9.1.32 Cosmic Radiation Detection Equipment 95

Part 7— Instruments and Equipment

7.1 GENERAL

Note: Part 7 has been written so that approvals to AOC holder are done through operations specifications and approvals to non-AOC holders, such as general aviation, are done through letters of authorisation.

7.1.1.1 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 — non-AOC Holders and AOC Holders appropriate to the subject of the regulations, e.g., an all aircraft regulation may only refer to seaplanes, but will include seaplanes operated by non-AOC Holders and AOC seaplanes.

(2) AOC: AOC Holders are operators engaged in commercial air transport. Where AOC requirements are more detailed, the AOC requirements will be followed.

7.1.1.2 DEFINITIONS

(a) Definitions are contained in CAR Part 1.

7.1.1.3 ABBREVIATIONS

(a) The following acronyms are used in Part 7:

(1) **AAC** – All Aircraft

(2) **ADF** – Automatic Direction Finder

(3) **ADRS** – Aircraft Data Recording Systems (ADRS)

(4) **AFM** – Aeroplane Flight Manual

(5) **AIR** – Airborne Image Recorder

(6) **AOC** - Air Operator Certificate

(7) **CARS** – Cockpit Audio Recording System

(8) **DLR** – Data-link Recorder

(9) **DLRS** – Data-link Recording Systems

(10) **ELT (AD**) - Automatically Deployable ELT

(11) **ELT(AF)** -. Automatic Fixed ELT

(12) **ELT(AP)** - Automatic Portable ELT

(13) **ELT(S)** – Survival ELT

(14) **CAT** - Commercial Air Transport

(15) **CAT I** – Category One

(16) **CAT II** – Category Two

(17) **CAT IIIA** – Category Three A

(18) **CAT IIIB** – Category Three B

(19) **CAT IIIC** – Category Three C

(20) **CFIT** -- Controlled Flight Into Terrain

(21) **CVR** – Cockpit Voice Recorder

(22) **DH** – Decision Height

(23) **DME** – Distance Measuring Equipment

(24) **ELT** – Emergency Locator Transmitter

(25) **EVS** – Enhanced Vision Systems

(26) **FDR** – Flight Data Recorder

(27) **GPS** – Global Positioning System

(28) **GPWS** – Ground Proximity Warning System

(29) **HUD** – Head Up Display

(30) **ILS** – Instrument Landing System

(31) **IFR** – Instrument Flight Rules

(32) **IMC** - Instrument Meteorological Conditions

(33) **LRNS** - Long Range Navigation Systems

(34) **MACH** – Mach Number Indicator

(35) **MEL** – Minimum Equipment List

(36) **MHz** – Megahertz

(37) **MLS** – Microwave Landing System

(38) **MNPS** - Minimum Navigation Performance Specifications

(39) **NDB** – Nondirectional Beacon

(40) **PBE** - Protective Breathing Equipment

(41) **RNAV** – Area Navigation

(42) **RNP** – Required Navigation Performance

(43) **RVR** – Runway Visual Range

(44) **RVSM** – Reduced Vertical Separation Minimum

(45) **SSR** – Secondary Surveillance Radar

(46) **TAWS** – Terrain Awareness Warning System

(47) **VFR** – Visual Flight Rules

(48) **VMC** - Visual Meteorological Conditions

(49) **VOR** – VHF Omnidirectional Radiorange

(50) **VSM** – Vertical Separation Minimum

7.1.1.4 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 FSM of any aircraft not registered in FSM that uses an airworthiness inspection programme approved or accepted by the State of Registry, the owner/operator shall ensure that instruments and equipment required by FSM but not installed in the aircraft are properly installed and inspected in accordance with the requirements of the State of Registry.

(d) [AOC] No person shall commence a flight in commercial air transport operations unless the required equipment—

(1) Meets the minimum performance standard, all operational and airworthiness requirements and the relevant provisions of ICAO Annex 10, Volume IV.

(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.

(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 crewmember at his or her station during flight, it shall be installed so as to be readily operable from that flight crewmember's station.

(f) [AAC] When a single item of equipment is required to be operated by more than one flight crewmember, it shall be installed so that the equipment is readily operable from any station at which the equipment is required to be operated.

ICAO Annex 6 Part I: 6.1.1, 6.1.2, 6.2.1
ICAO Annex 6, Part II: 6.1.1;
ICAO Annex 6, Part III, Section II: 4.1.1; 4.1.2
ICAO Annex 6, Part III, Section III: 4.1.1
ICAO Doc. 9388: Chapter 4, Section II: 2.4.1.1, 2.4.2.1
14 CFR: 91.205;121.301; 121.303, 121.305; 121.309
JAR-OPS 1: 1 1.650 (m), 1.652(p-q), 1.630, 1.845

7.2 FLIGHT INSTRUMENTS

7.2.1.1 GENERAL REQUIREMENTS

(a) [AAC] All aircraft shall be equipped with flight instruments which will enable the flight crew to—

(1) Control the flight path of the aircraft;

(2) Carry out any required procedural manoeuvres; and

(3) Observe the operating limitations of the aircraft in the expected operating conditions.

(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 pilot shall be so arranged as to permit the pilot to see the indications readily from his or her station, with the minimum practicable deviation from the position and line of vision which he normally assumes when looking forward along the flight path.

ICAO Annex 6 Part I: 6.2.1, 6.9.2.2
ICAO Annex 6, Part II: Section II: 2.4.2.1
ICAO Annex 6, Part II, Section III: 3.6.5.2.3
ICAO Annex 6, Part III, Section II: 4.2.1
ICAO Annex 6, Part III, Section III: 4.1.2
ICAO Doc. 9388: Chapter 4, Section II: 2.4.1.1; 2.4.1.2; 2.4.2.2
14 CFR: 25.1333; 121.305

7.2.1.2 MINIMUM FLIGHT INSTRUMENTS

(a) [AAC] No person may operate any powered aircraft unless it is equipped with the following flight instruments:

(1) An airspeed indicating system calibrated in knots, miles per hour or kilometers per hour.

(2) Sensitive pressure altimeter calibrated in feet with a sub-scale setting calibrated in hectopascals/millibars, adjustable for any barometric pressure likely to be set during flight.

(3) An accurate timepiece indicating time in hours, minutes, and seconds.

(i) For non-AOC operations, either equipage or carriage is acceptable.

(4) A magnetic compass.

(5) Any other equipment as prescribed by the Authority, and

Note: This applies to both VFR and IFR operation in addition to the additional requirements for IFR elsewhere in this Part.

(b) [AAC] No person may operate an aeroplane in VFR flight as a controlled flight unless it is equipped in with the instruments in 7.2.1.4.

ICAO Annex 6, Part I: 6.4.1, 6.4.2; 6.9.
ICAO Annex 6, Part II, Section II: 2.4.3; 2.4.2.1; 2.4.3.2R
ICAO Annex 6, Part III, Section II: 4.4.1
ICAO Annex 6, Part III, Section III: 4.2.1
ICAO Doc, 9388, Chapter 4, Section II: 2.4.2.5
14 CFR: 91.205; 121.305
JAR-OPS 1: 1.650(a-d)

7.2.1.3 INSTRUMENTS FOR OPERATIONS REQUIRING TWO PILOTS IN DAY VFR

(a) [AOC] Whenever two pilots are required, each pilot's station shall have separate flight instruments as follows:

(1) An airspeed indicator calibrated in knots, miles per hour or kilometers per hour;

(2) A sensitive pressure altimeter 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 vertical speed indicator;

(4) A turn and slip indicator, or a turn co-coordinator incorporating a slip indicator;

(5) An attitude indicator;

(i) A stabilised direction indicator, and

(ii) Any other equipment as required by the Authority.

JAR-OPS 1: 1.650(K)

7.2.1.4 INSTRUMENTS REQUIRED FOR IFR OPERATIONS

(a) [AAC] All aeroplanes when operated in IFR, or when the aircraft cannot be maintained in a desired altitude without reference to one or more flight instruments, shall be equipped with--

(1) A means of measuring and displaying:

(i) Magnetic heading (standby compass);

(ii) the time in hours, minutes and seconds;

(A) for non-AOC operations, either equipage or carriage is acceptable.

(iii) Pressure altitude;

(iv) Indicated airspeed, with a means of preventing malfunctioning due to either condensation or icing;

(v) Turn and slip;

(vi) Aircraft attitude; and

(vii) Stabilised aircraft heading, and

Note: The requirements of (v), (vi), and (vii) may be met by combinations of instruments or by integrated flight director systems, provided that the safeguards against total failure, inherent in the three separate instruments, are retained.

(viii) Whether the supply of power to the gyroscopic instruments is adequate;

(ix) The outside air temperature;

(x) Rate-of-climb and descent; and

(2) In addition, for aeroplanes with a maximum certificated take-off mass exceeding 5 700 kg or equipped with one or more turbojet engines—

(i) An emergency power supply for electrically operated attitude indicating instruments

(A) Independent of the main electrical generating system for the purpose of operating and illuminating, for a minimum period of 30 minutes, an attitude indicating instrument (artificial horizon), clearly visible to the pilot-in-command, and

(B) Automatically operative after the total failure of the main electrical generating system and clear indication given on the instrument panel that the attitude indicator(s) is being operated by emergency power; and

(ii) For aeroplanes with advanced cockpit automation systems (glass cockpits), system redundancy that provides the flight crew with attitude, heading, airspeed and altitude indications in case of failure of the primary system or display; and

(3) Such additional instruments or equipment as may be prescribed by the appropriate authority.

ICAO Annex 6, Part II, Section II: 2.4.7

ICAO Annex 6, Part II, Section III: 3.6.5; 3.6.5.1; 3.6.5.2; 3.6.5.2.1; 3.6.5.2.2R

(b) [AOC] All aeroplanes when operated in IFR, or when the aircraft cannot be maintained in a desired attitude without reference to one or more flight instruments, shall be equipped with—

(1) For all aeroplanes:

(i) A magnetic compass;

(ii) An accurate timepiece indicating the time in hours, minutes and seconds;

(iii) Two sensitive pressure altimeters with counter drum-pointer or equivalent presentation:

Note: Neither three-pointer nor drum-pointer altimeters satisfy this requirement.

(iv) An airspeed indicating system with a means of preventing malfunctioning due to either condensation or icing;

(v) A turn and slip indicator aeroplanes or a slip indicator for helicopters;

(vi) Attitude indicator (artificial horizon);

(vii) A heading indicator (directional gyroscope);

Note: The requirements of items (v), (vi) and (vii) may be met by combinations of instruments or by integrated flight director systems provided that the safeguards against total failure, inherent in the separate instruments are retained;

(viii) A means of indicating whether the supply of power to the gyroscopic instruments is adequate;

(ix) A means of indicating in the flightcrew compartment the outside air temperature;

(x) A rate-of-climb and descent indicator;

(2) In addition, for aeroplanes with a maximum certificated take-off mass exceeding 5 700 kg—

(i) An emergency power supply for electrically operated attitude indicating instruments

(ii) Independent of the main electrical generating system for the purpose of operating and illuminating, for a minimum period of 30 minutes, an attitude indicating instrument (artificial horizon), clearly visible to the pilot-in-command, and

(iii) Automatically operative after the total failure of the main electrical generating system and clear indication given on the instrument panel that the attitude indicator(s) is being operated by emergency power; and

(3) Such additional instruments or equipment as may be prescribed by the Authority.

(c) [AOC] No person may operate an aeroplane under IFR, or under VFR over routes that cannot be navigated by reference to visual landmarks, unless the aeroplane is equipped with navigation equipment in accordance with the requirements of air traffic services in the area(s) of operation.

(1) [AOC] No person may conduct single pilot IFR operations unless the aeroplane is equipped with an autopilot with at least altitude hold and heading mode.

(2) [AAC] No person may operate an aeroplane under IFR unless it is equipped with an audio selector panel accessible to each required flight crewmember.

(3) [AOC] No person may conduct single pilot IFR or night operations in commercial air transport operations unless the aeroplane is equipped with a headset with boom microphone or equivalent and a transmit button on the control wheel.

ICAO Annex 6, Part I: 6.9; 6.9.1; 6.9.2; 6.9.2.1; 6.9.2.2
ICAO Doc. 9388, Chapter 4, Section II: 2.4.1.6, 2.4.2.6
14 CFR: 121.305
JAR-OPS 1: 1.652; 1.655

(d) [AAC] All helicopters, unless otherwise indicated, when operated in IFR, or when the aircraft cannot be maintained in a desired attitude without reference to one or more flight instruments, shall be equipped with—

(1) All helicopters:

(i) A magnetic compass;

(ii) The time in hours, minutes and seconds;

(A) for non-AOC operations, either equipage or carriage is acceptable.

(iii) Pressure altimeter:

(A) [AAC] a sensitive pressure altimeter;

(B) [AOC] two sensitive pressure altimeters;

Note: Due to the long history of misreadings, the use of drum-pointer altimeters is not recommended..

(iv) An airspeed indicating system with a means of preventing malfunctioning due to either condensation or icing;

(v) A slip indicator;

(vi) Attitude indicator (artificial horizon) for each required pilot and one additional attitude indicator;

(vii) A heading indicator (directional gyroscope);

(viii) A means of indicating whether the supply of power to the gyroscopic instruments is adequate;

(ix) A means of indicating in the flightcrew compartment the outside air temperature;

(x) A rate-of-climb and descent indicator;

(xi) A stabilisation system, unless it has been demonstrated to the satisfaction of the certifying Authority that the helicopter possesses, by nature of its design, adequate stability without such a system; and

(2) [[AOC] An emergency power supply for electrically operated attitude indicating instruments

(i) Independent of the main electrical generating system for the purpose of operating and illuminating, for a minimum period of 30 minutes, an attitude indicating instrument (artificial horizon), clearly visible to the pilot-in-comment, and

(ii) Automatically operative after the total failure of the main electrical generating system and clear indication given on the instrument panel that the attitude indicator(s) is being operated by emergency power; and

(3) Such additional instruments or equipment as may be prescribed by the Authority.

ICAO Annex 6, Part III, Section II: 4.4.3; 4.4.3.1; 4.4.4R
ICAO Annex 6, Part III, Section III: 4.2.1; 4.2.3

7.2.1.5 INSTRUMENTS FOR OPERATION AT NIGHT

(a) [AAC] No person may operate an aeroplane at night unless it is equipped with the following:

(1) the instruments in §7.2.1.4 appropriate to the aircraft and operation;

(2) the lights specified in §7.5:

ICAO Annex 6, Part II, Section II: 2.4.8

(b) [AOC] No person may operate an aeroplane at night unless it is equipped with the following:

(1) the instruments in §7.2.1.4 appropriate to the aircraft and operation;

(2) the lights in §7.5.:

ICAO Annex 6, Part I: 6.10

(c) [AAC] No person may operate a helicopter at night unless it is equipped with the following:

(1) the instruments in 7.2.1.4 appropriate to the aircraft and operation;

(2) an attitude indicator (artificial horizon) for each required pilot;

(3) a slip indicator;

(4) a heading indicator (directional gyroscope);

(5) a rate of climb and descent indicator;

(6) the lights in §7.5:

(7) Such additional instruments or equipment as may be prescribed by the Authority.

ICAO Annex 6, Part III, Section II: 4.4.24.4.2.1R
ICAO Annex 6, Part III, Section III: 4.2.2; 4.2.2.1R

7.2.1.6 STANDBY ATTITUDE INDICATOR

(a) [AAC] No person may operate an aeroplane with a maximum certified take-off mass exceeding 5,700 kg or a performance Class 1 or 2 helicopter 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 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 operating and illuminated 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 panel 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.

ICAO Annex 6, Part I: 6.9.2.1; 6.9.2.2
ICAO Annex 6, Part II, Section III: 3.6.5.2.1; 3.6.5.2.2R
ICAO Annex 6, Part III, Section II: 4.4.3.1
14 CFR: 91.205(d)(3)(i); 121.305(k), 121.313
JAR-OPS 1: 1.652(l)(m)(o)

7.2.1.7 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: 7.2.1.7 for each aircraft operated in a Category II operation:

Note: This subsection does not require duplication of instruments and equipment required by § 7.2.1.2 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 programme.

(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 programme.

(i) Warning systems for immediate detection by the pilot of system faults in items (a)(1)(I), (a)(1)(iv), (a)(1)(iv) 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 also 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.

14 CFR: Part 91, Appendix A
FAA AC 91-61

7.2.1.8 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 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 § 7.2.1.2, and § 7. 2.1.7 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 as 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 need 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.

Note: See also: ICAO PANS-OPS Doc. 8168-OPS/611, Vol. 11; ICAO Doc 9365; and JAR AWO.

FAA AC 120-28D

7.2.1.9 AEROPLANES EQUIPPED WITH HEAD-UP DISPLAYS (HUD) AND/OR ENHANCED VISION SYSTEMS (EVS)

(a) Where aircraft are equipped with HUD and/or EVS, the use of such systems to gain operational benefit shall be approved by the State of the Operator.

Note - Guidance on HUD and EVS is contained in ICAO Annex 6, Part I, Attachment J.

ICAO Annex 6, Part I: 6.2.3
ICAO Annex 6, Part II, Section II: 2.4.15
ICAO Annex 6, Part III, Section II: 4.16
ICAO Annex 6, Part III, Section III: 4.11

7.3 COMMUNICATIONS EQUIPMENT

7.3.1.1 RADIO EQUIPMENT

(a) [AAC] No person may operate an aircraft unless it is equipped with radio communication equipment required for the kind of operation being conducted.

(b) [AAC] All aircraft operated in VFR as a controlled flight, in IFR, at night, extended flight over water, or over land designated by the Authority as especially difficult for search and rescue, shall be equipped with radio communication equipment—

(1) Capable of conducting two-way communication at any time with air traffic services or aeronautical stations;

(2) Capable of conducting communications on those frequencies prescribed by the Authority,

(3) Capable of receiving meteorological information at any time during the flight;

(4) Capable of conducting communications on the aeronautical emergency frequency 121.5 MHz;

(5) Approved and installed in accordance with the requirements applicable to them, including the minimum performance requirements;

(6) Installed such that the failure of any single unit required for communication equipment, will not result in the failure of another unit required for communications purposes; and

(7) Meeting any other requirements as prescribed by the Authority.

Note: The requirements in (b)(1)-(3) are considered fulfilled if the ability to conduct the communications specified therein is established during radio propagation conditions which are normal for the route.

(c) [AAC] For flights in defined portions of airspace or on routes where a Required Communications Performance (RCP) type has been prescribed, the aeroplane shall, in addition to the requirements in (a) and (b) above:

(1) Be provided with communication equipment which will enable it to operate in accordance with the prescribe RCP type(s); and

(2) Be authorised by FSM for operations in such airspace.

Note: Information on RCP and associated procedures, and guidance concerning the approval process, are contained in ICAO Doc 9869, Manual on Required Communications Performance (RCP). This document also contains references to other documents produced by States and international bodies concerning communication systems and RCP.

(d) [AOC] No person may operate an aircraft in commercial air transport operations, or as otherwise specified by the Authority, unless it is equipped with two independent radio communications systems, appropriate to the route and airspace used.

(e) [AAC] 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.

ICAO Annex 6. Part I: 7.1.1; 7.1.2; 7.1.3; 7.3
ICAO Annex 6, Part II, Section II: 2.5.1; 2.5.1.1; 2.5.1.2; 2.5.1.3; 2.5.1.4; 2.5.1.5; 2.5.1.6
ICAO Annex 6, Part II, Section III: 3.7.1; 3.7.2
ICAO Annex 6. Part III, Section II: 5.1.1; 5.1.2; 5.1.3; 5.3
ICAO Annex 6. Part III, Section III: 5.1.1; 5.1.2; 5.1.3; 5.1.4; 5.1.5R; 5.1.6
14 CFR: 91.183; 91.185; 121.345
JAR-OPS 1: 1.845;1.850; 1.855; 1.860; 1.865

7.3.1.2 FLIGHTCREW AND CREW MEMBER INTERPHONE SYSTEM FOR AEROPLANES

(a) [CAT] No person may operate an aeroplane in commercial air transport operations 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) [CAT] No person may operate an aeroplane in commercial air transport operations with a maximum certified take-off mass exceeding 15,000 kg, or having an approved passenger seating capacity of 19 or more, or having a flight crew compartment door, 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 signalling 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 crewmember 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 crewmembers to alert the cabin crew, and for use by cabin crewmembers to alert the flight crew in the event of suspicious activity or security breaches in the cabin.

(5) Has a means for the recipient of a call to determine whether it is a normal call or an emergency call.

(6) Provides on the ground a means of two-way communication between ground personnel and at least two flight crewmembers.

14 CFR: 121.319, 135.150
JAR-OPS 1: 1.685; 1.690

7.3.1.3 PUBLIC ADDRESS SYSTEM – AOC HOLDERS

(a) [AOC] No AOC holder may operate a passenger carrying aeroplane 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 signalling devices.

(2) Be readily accessible for immediate use from each required flight crewmember station.

(3) 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.

(4) Is capable of operation within 10 seconds by a cabin crewmember at each of those stations in the compartment from which its use is accessible.

(5) Is audible and intelligible at all passenger seats, toilets, and cabin crew seats and workstations.

(b) [AOC] No AOC holder may operate a passenger carrying helicopter 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 signalling devices.

(2) Be readily accessible for immediate use from each required flight crewmember station.

(3) 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.

(4) Is capable of operation within 10 seconds by a cabin crewmember at each of those stations in the compartment from which its use is accessible.

(5) Is audible and intelligible at all passenger seats, toilets, and cabin crew seats and workstations.

(6) Following a total failure of the normal electrical generating system, provide reliable operation for a minimum of 10 minutes.

(c) [AOC] No AOC holder may operate a passenger carrying helicopter with a maximum approved passenger seating configuration of more than 9 but less than 19 without a public address system installed unless—

(1) The helicopter is designed without a bulkhead between pilot and passengers; and

(2) The operator is able to demonstrate in a manner acceptable to the Authority that when in flight, the pilot's voice is audible and intelligible at all passenger seats.

14 CFR: 25.1423; 121.318, 135.150
JAR-OPS 1: 1.695
JAR-OPS 3: 3.695

7.3.1.4 MICROPHONES

(a) Equippage. No person may operate the following aircraft or in the following conditions unless the aircraft is equipped with a boom or throat microphone available at each required flight crew member flight duty station

(1) [AAC- Aeroplane] Any aeroplane in IFR conditions;

(2) [AOC- Aeroplane] Any aeroplane in commercial air transport operations;

(3) [AAC-Helicopter] Any helicopter.

(b) Usage. All flight crew members required to be on flight deck duty shall communicate through boom or throat microphones under the following operations or conditions:

(1) [AAC-Aeroplane] During IFR operations;

(2) [AOC- Aeroplane] Below the transition level/altitude;

(3) [AAC – Helicopter] At all times.

ICAO Annex 6, Part I: 6.20
ICAO Annex 6, Part II, Section II: 2.4.14R
ICAO Annex 6, Part III, Section II: 4.14
ICAO Annex 6, Part III, Section III: 4.10R

7.4 NAVIGATION EQUIPMENT

7.4.1.1 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; and

(2) The requirements of air traffic services.

(b) No person may operate flights in defined portions of airspace, including MNPS, RVSM, or any other routes where a navigation specification for performance-based navigation (PBN) has been prescribed unless it—

(1) Has received authorisation by the FSM for such operations; and

(2) Is equipped with the navigation equipment to enable it to operate in accordance with the prescribed navigation specification(s); and

(3) Is equipped with navigation equipment that continuously provides information to the flightcrew of adherence to or departure from track with respect to the required degree of accuracy at any point along that track

(c) No person may operate an aircraft unless it has sufficient navigation equipment that will enable the aircraft to navigate in accordance with paragraphs (a) and (b) above, such that—

(1) In the event of the failure of any piece of navigation equipment at any stage of flight, the remaining equipment will enable the aircraft to continue to navigate; and

(2) The failure of any single unit required for either communications or navigation purposes or both will not result in the failure of another unit required for communications or navigation purposes.

ICAO Annex 6, Part I: 7.2.1; 7.2.2; 7.2.9; 7.3
ICAO Annex 6, Part II: Section II: 2.5.2.1; 2.5.2.2; 2.5.2.9
ICAO Annex 6, Part III, Section II: 5.2.1; 5.2.2; 5.2.3; 5.3
ICAO Annex 6, Part III, Section III: 5.2.1; 5.2.2; 5.2.3

(d) The equipment requirements in paragraph (a) do not apply in instances where the Authority has authorised VFR by visual reference to landmarks.

Note: See ICAO Doc 9613, Performance-Based Navigation Manual, for information on the implementation and approval process for performance-based navigation and a list of references to other documents produced by States and international bodies concerning navigation systems.

ICAO Annex 6, Part I: 7.2.1
ICAO Annex 6, Part II: Section II: 2.5.2.1
ICAO Annex 6, Part III, Section II: 5.2.1
ICAO Annex 6, Part III, Section III: 5.2.1

(e) [AAC] No person may operate an aeroplane under IFR, or under VFR over routes that cannot be navigated by reference to visual landmarks, unless the aeroplane is equipped with navigation equipment in accordance with the requirements of air traffic services in the area(s) of operation.

14 CFR: 121.305
JAR OPS 1: 1.865(c)

(f) [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;

(2) Each aerodrome at which it is intended to land in IMC; and

(3) Any designated alternate aerodromes.

ICAO Annex 6, Part I: 7.2.10
ICAO Annex 6, Part II Section II: 2.5.2.10:
ICAO Annex 6, Part III, Section II: 5.2.4
ICAO Annex 6, Part III, Section III: 5.2.4

7.4.1.2 MNPS

(g) [AAC] No person may operate an aeroplane in MNPS airspace unless it is equipped with navigation equipment that-

(1) Continuously provides indications to the flightcrew of adherence to or departure from track to the required degree of accuracy at any point along that track; and

(2) Has been authorised by the FSM for MNPS operations concerned through either operations specifications for AOC holders or letter of authorisation for general aviation.

Note: Equipment shall comply with minimum navigation performance specifications prescribed in ICAO Doc 7030 in the form of Regional Supplementary Procedures.

(h) [AAC] The navigation equipment required for operations in MNPS airspace shall be visible and usable by either pilot seated at his duty station.

(i) [AAC] For unrestricted operation in MNPS airspace, an aeroplane shall be equipped with two independent Long-Range Navigation Systems (LRNS).

(j) [AAC] For operation in MNPS airspace along notified special routes, an aeroplane shall be equipped with one LRNS, unless otherwise specified.

ICAO Annex, Part I: 7.2.3
ICAO Annex 6, Part II: Section II: 2.5.2.3
14 CFR: 91.705 and Appendix C
JAR-OPS 1: 1.870

7.4.1.3 REDUCED VERTICAL SEPARATION MINIMUM

(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 aeroplane:

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

(i) Indicating to the flightcrew the flight level being flown;

(ii) Automatically maintaining a selected flight level;

(iii) Providing an alert to the flightcrew 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 and

(2) Shall be authorised for operations in the airspace concerned by –

(i) The State of Operator for AOC holders through operations specifications, or

(ii) The State of Registry for non-AOC holders through letter of authorisation.

(3) Shall satisfy the demonstration requirements specified in IS 7.4.1.3 as to the altimetry system performance requirements for vertical navigation performance capability.

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

(1) The vertical navigation performance capability of the aeroplane satisfies the requirements specified in IS 7.4.1.3

(2) The operator has instituted appropriate procedures in respect of continued airworthiness (maintenance and repair) practices and programmes; and

(3) The operator has instituted appropriate flightcrew 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) RVSM. The FSM in consultation with the State of Registry, if appropriate, shall ensure that, in respect of those aeroplanes 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 ICAO Annex 11, 3.3.4.1; 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) An operator with RVSM approval shall ensure that a minimum of two aeroplanes 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 aeroplane, whichever period is longer. If an operator aircraft type grouping consists of a single aeroplane, monitoring of that aeroplane shall be accomplished within the specified period.

(e) An operator shall ensure that each aeroplane 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 aeroplane to navigate in accordance with paragraphs (a), (b) and (c) of 7.4.1.3.

(f) RVSM. The Authority will take appropriate action in respect of aircraft and operators found to be operating in RVSM airspace in FSM 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.

ICAO Annex 6, Part I: 7.2.4; 7.2.5; 7.2.6; 7.2.7; 7.2.8; 7.2.9; 7.2.10 and note, and Appendix 4.
ICAO Annex 6, Part II: Section II: 2.5.2.4; 2.5.4.3; 2.5.4.4; 2.5.4.6; 2.5.4.7; 2.5.4.8; 2.5.4.9; 2.5.2.10 and notes
14 CFR: 91.180; 91.706 and Appendix G
JAR OPS 1: 1.872

7.4.1.4 ELECTRONIC NAVIGATION DATA MANAGEMENT

(a) Electronic navigation data management. [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 programme 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.

ICAO Annex 6, Part I: 7.4.1; 7.4.2
ICAO Annex 6, Part II, Section III: 3.7.3

7.4.1.5 ALTITUDE REPORTING TRANSPONDER

(a) [AAC] No person may operate an aeroplane or helicopter unless it is equipped with an operative pressure-altitude reporting transponder that operates in accordance with the requirements of FSM air traffic services and the relevant provisions of ICAO Annex 10, Volume 4.

(b) [AAC] No person may operate an aircraft in airspace that requires a pressure reporting transponder unless that equipment is operative.

(c) [AOC] No person may operate an aeroplane unless it is equipped with a data source that provides pressure-altitude information with a resolution of 7.62 m (25 ft) or better.

(d) [AOC] No person may operate an aeroplane that is equipped with an automatic means of detecting airborne/on-the-ground status unless it is equipped with a Mode S transponder.

Note 1: These provisions will improve the effectiveness of airborne collision avoidance systems as well as air traffic services that employ Mode S radar. In particular, tracking processes are significantly enhanced with a resolution of 7.62 m (25 ft), or better.

Note 2: Mode C replies of transponders always report pressure altitude in 30.50 m (100 ft) increments irrespective of the resolution of the data service.

ICAO Annex 6. Part I: 6.19; 6.19.1; 6.19.2; 6.19.3; 6.19.4R
ICAO Annex 6, Part II: Section II: 2.4.13; 2.4.13.1; 2.4.13.2
ICAO Annex 6, Part III, Section II: 4.13
ICAO Annex 6, Part III, Section III: 4.9.1 ; 4.9.2
14 CFR: 91.215

7.5 AIRCRAFT LIGHTS AND INSTRUMENT ILLUMINATION

7.5.1.1 REQUIRED AIRCRAFT LIGHTS AND INSTRUMENT ILLUMINATION

(a) [AAC] All aircraft operated at night by, shall be equipped with:

(1) A landing light;

(2) Navigation/position lights;

(3) Illumination for all flight instruments and equipment that are essential for the safe operation of the aircraft;

(4) Lights in all passenger compartments; and

(5) A flashlight for each crewmember station (approval not required).

(b) All aircraft type certificated with aviation red or aviation white anti-collision system shall have the anti-collision system operative in both day and night. In the event of the failure of any light of the anti-collision light system, operation of the aircraft may continue to a location where repairs or replacement can be made.

7.5.1.2 REQUIRED AIRCRAFT LIGHTS AND INSTRUMENT ILLUMINATION FOR COMMERCIAL AIR TRANSPORT OPERATIONS

(a) [AOC] No person may operate an aircraft in commercial air transport operations unless it is equipped with:

(b) Two landing lights or a single light having two separately energised filaments;

(c) An anti-collision light system;

(d) Illumination for all flight instruments and equipment that are essential for the safe operation of the aircraft;

(e) Lights in all passenger compartments;

(f) A flashlight for each crew member station;

(g) Navigation/position lights; and

(h) Lights to conform to the International regulations for preventing collisions at sea if the aircraft is a seaplane or an amphibian aircraft.

(i) For helicopters — a landing light that is trainable, at least in the vertical plane.

ICAO Annex 2: 3.2.3.1
ICAO Annex 6, Part I: 6.10
ICAO Annex 6, Part II, Section II: 2.4.8
ICAO Annex 6, Part III, Section II: 4.4.2; 4.4.2.R
ICAO Annex 6, Part III, Section III: 4.2.2
ICAO Doc. 9388: 2.4.1.6(l); 2.4.2.6(n)
14 CFR: 91.205(b)(11), (c(1))(3); 91.209, 91.507; 121.323, 121.549
JAR-OPS 1: 1.640

7.6 ENGINE INSTRUMENTS

7.6.1.1 ENGINE INSTRUMENTS

(a) [AAC] Unless the Authority allows or requires different instrumentation for turbine engine powered aeroplanes to provide equivalent safety, 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 altitude engine.

(5) A tachometer for each engine.

(b) [AOC] Unless the Authority allows or requires different instrumentation for turbine engine powered aeroplanes to provide equivalent safety, in addition to the listed equipment requirements in paragraph (a), no person may operate any powered aircraft without the following engine instruments:

(1) A carburettor 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 flowmeter 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.

(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.

14 CFR Part: 91.205; 121.307

7.7 WARNING INSTRUMENTS AND SYSTEMS

7.7.1.1 MACH NUMBER INDICATOR

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

ICAO Annex 6, Part I: 6.14
ICAO Annex 6, Part II,\ Section II: 2.4.10
ICAO Doc. 9388: 2.4.1.6(k)
14 CFR: 91.817(b)
JAR-OPS 1: 1.650

7.7.1.2 LOSS OF PRESSURISATION INDICATOR

(a) [AAC] All pressurised aircraft intended to be operated at flight altitudes above 25,000 feet shall be equipped with a device to provide positive warning to the flightcrew of any dangerous loss of pressurisation.

ICAO Annex 6; Part I: 6.7.3
ICAO Annex 6, Part II: Section II: 2.4.6.1; 2.4.6.2
ICAO Annex 6, Part II, Section III: 3.6.3.6.1
14 CFR: 25.1309 (general equipment requirement for warning devices)

7.7.1.3 LANDING GEAR INDICATOR POSITION AND AURAL WARNING DEVICE

(b) [AAC] Each powered civil aircraft with retractable landing gear shall have a landing gear position indicator.

(c) [AOC] Each aeroplane with retractable landing gear shall have an aural warning device that functions continuously under the following conditions:

(1) For aeroplanes with an established approach wing-flap position, whenever the wing flaps are extended beyond the maximum certified approach climb configuration position in the Aeroplane Flight Manual and the landing gear is not fully extended and locked.

(2) For aeroplanes 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.

(d) [AOC] The warning system required by paragraph (b) 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 utilise any part of the throttle-actuated system including the aural warning device.

(e) [AOC] The flap position-sensing unit required in paragraph (b) may be installed at any suitable place in the aeroplane.

14 CFR: 91.205(b);121.289

7.7.1.4 ALTITUDE ALERTING SYSTEM

(a) [AAC] No person may operate a turbine powered aeroplane 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 aeroplane, unless it is equipped with an altitude alerting system capable of—

(1) Alerting the flightcrew upon approaching preselected altitude in either ascent or descent; and

(2) Alerting the flightcrew by at least an aural signal, when deviating above or below a preselected altitude.

(b) [AAC] For operations in defined portions of airspace where, based on Regional Air Navigation Agreement, a VSM of 300 m (1,000 ft) is applied above FL 290, an aircraft shall be provided with equipment which is capable of providing an alert to the flightcrew when a deviation occurs from the selected flight level. The threshold for the alert may not exceed ±90 m (300 ft).

ICAO Annex 6, Part I: Appendix 2.1: 2.1.6
ICAO Annex 6, Part II, Section II: 2.5.2.5; 2.5.2.6; 2.5.2.7
14 CFR: 91.219
JAR-OPS 1: 1.660

7.7.1.5 GROUND PROXIMITY WARNING SYSTEM

(a) [AAC] No operator may operate a turbine-powered aeroplane, or piston-engined aeroplane of a maximum certificated take-off mass in excess of 5,700kg or authorised to carry more than nine passengers, unless it is equipped with a ground proximity warning system that has 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 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;

(i) Gear not locked down;

(ii) Flaps not in a landing position; and

(5) Excessive descent below the instrument glide path.

ICAO Annex 6, Part I: 6.15.1; 6.15.2; 6.15.3; 6.15.4; 6.15.5; 6.15.6; 6.15.7; 6.15.8
ICAO Annex 6, Part II, Section II: 3.6.8
ICAO Annex 6, Part II, Section III: 2.4.11; 2.4.11.5; 2.4.11.6; 2.4.11.7
14 CFR: 91.223; 121.360, 135.153
JAR-OPS 1: 1.665

7.7.1.6 WEATHER RADAR

(a) [AOC] No person may operate an aeroplane in commercial air transport in an area where thunderstorms or other potentially hazardous weather conditions may be expected unless it is equipped with a weather radar.

(b) [AOC] No person may operate a helicopter in commercial air transport when carrying passengers in an area where thunderstorms or other potentially hazardous weather conditions may be expected unless it is equipped with a weather radar.

ICAO Annex 6, Part I: 6.11R
ICAO Annex 6, Part II, Section III: 3.6.6
ICAO Annex 6, Part III, Section II: 4.10R
ICAO Doc. 9388: 2.4.1.8

14 CFR: 121.357, 135.173;135.175
JAR-OPS 1: 1.670

7.7.1.7 AIRBORNE COLLISION AVOIDANCE SYSTEM (ACAS)

(a) [AAC] Any airborne collision avoidance system installed on an aircraft in FSM 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 aeroplane 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 authorised to carry more than 30 passengers, unless it is equipped with an ACAS II.

(d) [AAC] No person may operate a turbine engine aeroplane for which the individual airworthiness certificate was first issued after 1 January 2007 with a maximum certificated take-off mass in excess of 5,700 kg but not exceeding 15,000 kg or authorised to carry more than 19 passengers, unless it is equipped with an ACAS II.

(e) [AAC] An airborne collision avoidance system shall operate in accordance with the relevant provisions of ICAO Annex 10, Volume IV.

(f) [AOC] No person may operate a turbine powered aeroplane with a maximum certificated takeoff mass in excess of 5700 kg or authorised to carry more than 19 passengers, unless it is equipped with an ACAS II.

ICAO Annex 6, Part I: 6.18.1, 6.18.2, 6.18.3; 6.18.4
ICAO Annex 6, Part II, Section III: 3.6.10.1; 3.6.10.2; 3.6.10.3
14 CFR: 91.221; 121:356
JAR OPS 1: 1.668

7.7.1.8 FORWARD LOOKING WIND SHEAR WARNING SYSTEM—TURBOJET AEROPLANES

(a) [AOC] All turbojet aeroplanes of a maximum certificated takeoff mass in excess of 5700 kg or authorised 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 manoeuvre 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.

ICAO Annex 6, Part I: 6.21.1R, 6.21.2R
14 CFR: 121.358

7.8 FLIGHT RECORDERS

7.8.1.1 FLIGHT RECORDERS SYSTEMS

(a) Crash protected flight recorders, for both aeroplanes and helicopters, comprise one or more of the following systems:

(1) A flight data recorder (FDR);

(2) A cockpit voice recorder (CVR);

(3) An airborne image recorder (AIR); and/or

(4) A data-link recorder (DLR).

Note: Image and data link information may be recorded on either the CVR or the FDR.

(b) Lightweight flight recorders for aeroplanes comprise one or more of the following systems:

(1) An aircraft data recording system (ADRS);

(2) A cockpit audio recording system (CARS);

(3) An airborne image recording system (AIRS); and/or

(4) A data link recording system (DLRS).

Note: Image and data link information may be recorded on either the CARS or the ADRS.

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

ICAO Annex 6, Part I: 6.3. Notes
ICAO Annex 6, Part II, Section III: 2.4.16: Notes
ICAO Annex 6, Part III, Section III: 4.7 Notes
ICAO Annex 6, Part III, Section II: 4.3 Notes

7.8.1.2 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) The flight recorder systems containers shall:

(i) Be painted a distinctive orange or yellow colour;

(ii) Carry reflective material to facilitate their location; and

(iii) Have securely attached an automatically activated underwater locating device.

(b) Flight recorder systems shall be installed so that:

(1) The probability of damage to the recordings is minimised;

(2) They receive electrical power from a bus that provides the maximum reliability for operation of the flight recorder systems without jeopardising service to essential or emergency loads;

(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 the [appropriate certificating authority], 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.

(e) The manufacturer shall provide the [appropriate certificating authority] with the following information in respect of the flight recording systems:

(1) manufacturer's operating instructions, equipment limitations and installation procedures;

(2) manufacturer's test reports; and

(3) for aeroplane flight recording systems, parameter origin or source and equations which relate counts to units of measurement; and

Note 1: The term "appropriate certificating authority" refers to the State of Design.

Note 2: Industry crashworthiness and fire protection specifications for FDR, CVR, AIR and DLR are as contained in the EUROCAE ED-112, Minimum Operational Performance Specifications (MOPS) for Crash Protected Airborne Recorder Systems, or equivalent documents.

Note 3: 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.

ICAO Annex 6, Part I: 6.3.4.1; Appendix 8: 1.1;1.2;1.3;1.4;1.5
ICAO Annex 6, Part II, Section II: 2.4.16.4.1; Appendix 2.3: 1.1; 1.2; 1.3; 1.4; 1.5
Annex 6, Part III, Section II: 4.3.4.1 ; Appendix 5: 1.1; 1.2; 1.3; 1.4; 1.5.
ICAO Annex 6, Part III, Section III: 4.7.1 Notes
FAA TSO-C124b (implements EUROCAE ED-112)
FAA TSO-C197 (implements EUROCAE ED-155)

7.8.1.3 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 FSM.

Note 1: The need for removal of the flight recorder records from the aircraft will be determined by the investigation authority in the State 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 the accident/incident regulations of FSM

ICAO Annex 6, Part I: 6.3.4.2
ICAO Annex 6, Part II, Section II: 2.4.16.2; 2.4.16.2.1; 2.4.16.2.2 and notes
ICAO Annex 6, Part III, Section II: 4.3.4.2; 4.3.4.2.1; 4.3.4.2.2

7.8.1.4 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 7.8.1.4.

ICAO Annex 6, Part I: 6.3.4.3
ICAO Annex 6, Part II, Section II: 2.4.16.4.4
ICAO Annex 6, Part III, Section II: 4.3.4.3

7.8.1.5 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 [industry specifications].

Note: Industry specification for documentation concerning flight recorder parameters may be found in the ARINC 647A, Flight Recorder Electronic Documentation, or equivalent document.

ICAO Annex 6, Part I: 6.3.4.4R
ICAO Annex 6, Part II, Section II: 2.4.16.4.42.4.16.4.5E
ICAO Annex 6, Part III, Section II: 4.3.4.4

7.8.1.6 COMBINATION RECORDERS

(a) [AAC] No person may operate an aeroplane of a maximum certificated take-off mass over 5 700 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 aeroplane 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 aeroplane is equipped with an FDR and a CVR or alternatively equipped with two combination recorders (FDR/CVR).

(2) The aeroplane is equipped with two combination recorders (FDR/CVR) for aeroplanes type certificated on or after 1 January 2016.

Note: The requirement may be satisfied by equipping the aeroplanes with two combination recorders (one forward and one aft) or separate devices.

(c) [AOC] No person may operate an aeroplane 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 aeroplane 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 aeroplane of a maximum certificated take-off mass of 5 700 kg or less, unless –

(1) The aeroplane is equipped with an FDR and/or a CVR, or

(2) The aeroplane is equipped with one combination recorder (FDR/CVR).

ICAO Annex 6, Part I: 6.3.4.5; 6.3.4.5.1R; 6.3.4.5.2; 6.3.4.5.3R; 6.3.4.5.4R
ICAO Annex 6, Part II, Section III: 3.6.3.3R
ICAO Annex 6, Part III, Section II; 4.3, Note 2
ICAO Annex 6, Part III, Section III:4.7, Note

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

Note 1: FDR and AIR performance requirements are as contained in the EUROCAE ED-112, Minimum Operational Performance Specification (MOPS) for Crash Protected Airborne Recorder Systems, or equivalent documents.

Note 2: ADRS performance requirements are as contained in the EUROCAE ED-155, Minimum Operational Performance Specification (MOPS) for Lightweight Flight Recording Systems, or equivalent documents.

ICAO Annex 6, Part I: 6.3.1 Notes
ICAO Annex 6, Part II: 2.4.16.1 Notes
ICAO Annex 6, Part III, Section II: 4.3.1 Notes
ICAO Annex 6, Part III, Section III: 4.7.1 Notes

7.8.2.1 TYPES AND PARAMETERS

(a) Aeroplane. Aeroplane FDR shall record the parameters as listed in IS 7.8.2.1(A) for the following FDR types:

(1) Types I and IA FDR shall record the parameters required to determine accurately the aeroplane flight path, speed, attitude, engine power, configuration and operation.

(2) Types II and IIA FDRs shall record the parameters required to determine accurately the aeroplane 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 7.8.2.1 (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.

ICAO Annex 6, Part I: 6.3.1.1
ICAO Annex 6, Part II, Section II: 2.4.16.1.1; 2.4.16.1.1.1; 2.4.16.1.2
ICAO Annex 6, Part III, Section II, 4.3.1.1; 4.3.1.1.1; 4.3.1.1.2; 4.3.1.1.3
ICAO Annex 6, Part III, Section III: 4.7.1.1; 4.7.1.1.1; 4.7.1.1.2; 4.7.1.1.3

7.8.2.2 AIRCRAFT EQUIPPAGE FOR OPERATION

(a) No person may operate the following aeroplane 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 aeroplanes 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 appropriate CAA on or after 1 January 2016; shall be equipped with:

(i) a Type II FDR; or

(ii) a Class C AIR 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 7.8.2.2.

Note: Type certificate first issued refers to the date of issuance of the original "Type Certificate" for the aeroplane type, not the date of certification of particular aeroplane variants or derivative models.

(2) [AOC] All turbine-engined aeroplanes 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 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: 7.8.2.2.

(3) [AAC] 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 1989 shall be equipped with a Type I FDR.

(4) [AAC] All aeroplanes 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] All multi-engined turbine-engined aeroplanes 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 should be equipped with a Type IIA FDR.

(6) [AOC] All turbine-engined aeroplanes, 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 §7.8.1.2.(h), shall be equipped with an FDR which shall record time, altitude, airspeed, normal acceleration and heading.

(7) [AOC] All turbine-engined aeroplanes, 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 §7.8.1.2(h), should 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 aeroplanes, 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 aeroplanes, 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] All turbine-engined aeroplanes, 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 should be equipped with an FDR which should 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 aeroplane in achieving its flight path; and

(ii) the basic forces acting upon the aeroplane resulting in the achieved flight path and the origin of such basic forces.

(11) [AAC] All aeroplanes 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 aeroplanes 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 the appropriate CAA 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 aeroplanes 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 the appropriate CAA 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 aeroplanes with control systems in which movement of a control surface will back drive the pilot's control, "or" applies. For aeroplanes with control systems in which movement of a control surface will not back drive the pilot's control, "and" applies. In aeroplanes with independent moveable surfaces, each surface needs to be recorded separately. In aeroplanes 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 kb, 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 kb for which the which the application for a type certificate is first made to the appropriate CAA 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: 7.8.2.2.

(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: 7.8.2.2.

ICAO Annex 6, Part 1: 6.3.1.2.1; 6.3.1.2.2R; 6.3.1.2.3; 6.3.1.2.4; 6.3.1.2.5; 6.3.1.2.6; 6.3.1.2.7; 6.3.1.2.8; 6.3.2.1.9; 6.3.1.2.10R; 6.3.1.2.11; 6.3.2.1.12; 6.3.1.2.13
ICAO Annex 6, Part II, Section II: 2.4.16.1.2.1; 2.4.16.2.2
ICAO Annex 6, Part II, Section III: 3.6.3.1.1.1; 3.6.3.2.2.1; 3.6.3.1.1.3
ICAO Annex 6, Part III, Section II: 4.3.1.2; 4.3.1.2.1; 4.3.1.2.3; 4.3.1.2.4;4.3.1.2.5R
ICAO Annex 6, Part III, Section III: 4.7.1.2; 4.7.1.2.1; 4.7.1.2.2; 4.7.1.2.3

7.8.2.3 DISCONTINUATION

(a) Flight data recorder media not acceptable for use in aircraft registered in FSM, or operated in commercial air transport operations in FSM, are –

(1) Engraving metal foil;

(2) Photographic film;

(3) Analogue data using frequency modulation (FM);

(4) Magnetic tape.

ICAO Annex 6, Part I: 6.3.1.3
ICAO Annex 6, Part II,2.4.16.1.3; 2.4.16.1.3.1; 2.4.16.1.3.2R; 2.4.16.1.3.3; 2.4.16.1.3.4; 2.4.16.1.3.5R;
ICAO Annex 6, Part III, Section II: 4.3.1.3; 4.3.1.3.1; 4.3.1.3.2; 4.3.1.3.3; 4.3.1.3.4; 4.3.1.3.5; 4.3.1.3.6
ICAO Annex 6, Part III, Section III: 4.7.1.3; 4.7.1.3.1; 4.7.1.3.2; 4.7.1.3.3; 4.7.1.3.4; 4.7.1.3.5; 4.7.1.3.6

7.8.2.4 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.

ICAO Annex 6, Part I: 6.3.1.4
ICAO Annex 6, Part II, 2.4.16.1.4
ICAO Annex 6, Part III, Section II: 4.3.1.4
ICAO Annex 6, Part III, Section III: 4.7.1.4

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

Note 1: CVR performance requirements are as contained in the EUROCAE ED-112, Minimum Operational Performance Specification (MOPS) for Crash Protected Airborne Recorder Systems, or equivalent documents.

Note 2: CARS performance requirements are as contained in the EUROCAE ED-155, Minimum Operational Performance Specification (MOPS) for Lightweight Flight Recording Systems, or equivalent documents.

ICAO Annex 6, Part I: 6.3.2 Notes

ICAO Annex 6, Part II, Section II: 2.4.16.2 Notes
ICAO Annex 6, Part III, Section II: 4.3.2 Note
ICAO Annex 6, Part III, Section III: 4.7.2 Note

7.8.3.1 SIGNALS TO BE RECORDED – CVR AND CARS

(a) The CVR, and CARS as applicable to aeroplanes, 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 aeroplane by radio;

(2) Aural environment on the flight deck; and

(3) Voice communication of flight crewmembers on the flight deck using the aeroplane's interphone, if installed.

(e) The recorder shall be capable of recording on at least four channels simultaneously, except for the recorder in paragraph 7.8.2.2(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-tine format. If a bi-directional configuration is used, the in-line format and channel allocation shall be retained in both directions.

ICAO Annex 6, Part II: Appendix 3.1, paragraph 3.1, 3.1.1; 3.1.2;; 3.1.3 ; 3.1.4
ICAO Annex 6, Part III, Appendix 5, paragraph 3, 3.1 ;3.1.1 ;3.1.2 ; 3.1.3 ; 3.1.4

7.8.3.2 AIRCRAFT EQUIPPAGE FOR OPERATIONS

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

(1) [AAC] All turbine-engined aeroplanes 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 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 1987 shall be equipped with a CVR.

(3) [AAC] All aeroplanes 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, should be equipped with a CVR.

(4) [AOC] All aeroplanes 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 aeroplanes 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 aeroplanes, 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] All turbine-engined aeroplanes, 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 should be equipped with a CVR.

ICAO Annex 6, Part I: 6.3.2.1
ICAO Annex 6, Part II, Section II: 2.4.16.2.1.1
ICAO Annex 6, Part II, Section III: 3.6.3.2.1; 3.6.3.2.1.1; 3.6.3.2.1.2; 3.6.3.2.1.3
III: 3.6.3.2; 3.6.3.2.1; 3.6.3.2.1.2; 3.6.3.2.1.3; 3.6.3.2.1.4

(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] All helicopters of a maximum certificated take-off mass of over 3 180 kg for which the individual certificate of worthiness is first issued on or after 1 January 1987 should be equipped with a CR. 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 worthiness is first issued on or after 1 January 1987 should be equipped with a CR. For helicopters not equipped with an FDR, at least main rotor speed shall be recorded on the CVR.

ICAO Annex 6, Part III, Section II: 4.3.2.1; 4.3.2.1.1; 4.3.2.1.2; 4.3.2.1.3
ICAO Annex 6, Part III, Section III: 4.7.2.1; 4.7.2.1.1; 4.7.2.1.2; 4.7.2.1.3

7.8.3.3 DISCONTINUATION

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

(1) Magnetic tape and wire.

ICAO Annex 6, Part I: 6.3.2.2; 6.3.2.2.1; 6.3.2.22
ICAO Annex 6, Part II: Section II: 2.4.16.2.2; 2.4.16.2.2.1; 2.4.16.2.2.2R
ICAO Annex 6, Part III, Section II: 4.3.2.2; 4.3.2.2.1; 4.3.2.2.2R
ICAO Annex 6, Part III, Section III: 4.7.2.2; 4.7.2.2.1; 4.7.2.2.2

7.8.3.4 DURATION

(a) A CVR shall be capable of retaining the information recorded during at least the last—

(1) 30 minutes of its operation; or

(2) 2 hours, beginning no later than 1 January 2016.

ICAO Annex 6, Part I: 6.3.2.3; 6.3.2.3.2; 6.3.2.3.3
ICAO Annex 6, Part II, Section II: 2.4.16.2.3; 2.4.16.2.3.1; 2.4.16.2.3.2; 2.4.16.2.3.3R
ICAO Annex 6, Part III, Section II: 4.3.2.3; 4.3.2.3.1; 4.3.2.3.2; 4.3.2.3.3R
ICAO Annex 6, Part III, Section II: 4.7.2.3; 4.7.2.3.1; 4.7.2.3.2; 4.7.2.3.3R

7.8.3.5 COCKPIT VOICE RECORDER ALTERNATE POWER

(a) [AOC] No person may operate an aeroplane 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 aeroplane 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 aeroplane 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 is it 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 aeroplane 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.

ICAO Annex 6, Part I: 6.3.2.4; 6.3.2.4.1; 6.3.2.4.2; 6.3.2.4.3R and notes

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

Note: Data link recorders performance requirements are as contained in the EUROCAE ED-112, Minimum Operational Performance Specifications (MOPS) for Crash Protected Airborne Recorder Systems, or equivalent documents.

ICAO Annex 6, Part I: 6.3.3 Note
ICAO Annex 6, Part II, Section II: 2.4.16.3 Note

7.8.4.1 APPLICABILITY

(a) No person may operate an aeroplane or helicopter for which the individual certificate of airworthiness is first issued on or after 1 January 2016, which utilise any of the data link communications applications listed in IS 7.8.4.1 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 aeroplane or helicopter modified on or after 1 January 2016, which utilise any of the data link communications applications listed in IS 7.8.4.1 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 aeroplane or helicopter where the aircraft flight path is authorised 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.

ICAO Annex 6, Part I: 6.3.3.1; 6.3.3.1.1; 6.3.3.1.2 and Appendix 8: paragraph 5: 5.1.1
ICAO Annex 6, Part II, Section II: 2.4.16.3.1.1; 2.4.16.3.1.2, and notes and Appendix 2.3 paragraph 5: 5.1.2
ICAO Annex 6, Part III, Section II: 4.3.3.1; 4.3.3.1.1; 4.3.3.1.2; and Section III: 4.7.3.1; 4.7.3.1.1; 4.7.3.1.1.1; and Appendix 5, Paragraph 5: 5.1.1

7.8.4.2 DURATION

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

ICAO Annex 6, Part 1: 6.3.3.2
ICAO Annex 6, Part II, Section II: 2.4.16.3.2
ICAO Annex 6, Part III, Section II: 4.3.3.2 and Section III: 4.7.3.2

7.8.4.3 CORRELATION

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

ICAO Annex 6, Part 1: 6.3.3.3
ICAO Annex 6, Part II, Section II: 2.4.16.3.3
ICAO Annex 6, Part III, Section II: 4.3.3.3 and Section III: 4.7.3.3
FAA AC 120-70B, Operational Authorisation Process for use of data Link Communication System

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

(a) Airborne image recorders are classified as follows.

(1) A Class A AIR captures the general cockpit area in order to provide data supplemental to conventional flight recorders.

(2) A Class B AIR captures data link message displays.

(3) A Class C AIR captures instruments and control panels.

Note 1: To respect crew privacy, the cockpit area view may be designed as far as practical to exclude the head and shoulders of crewmembers whilst seated in their normal operating position.

Note 2: A Class C AIR may be considered as a means for recording flight data where it is not practical or is prohibitively expensive to record on an FDR, or where an FDR is not required.

(b) When AIRs are used, the AIR 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 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.

ICAO Annex 1, Part I: Appendix 8, paragraph 4, 4.1; 4.1.1; 4.1.2; 4.1.3; 4.2
ICAO Annex 6, Part II: Appendix 2.3, paragraph 4; 4.1; 4.1.1; 4.1.2; 4.1.3; 4.1.4
ICAO Annex 6, Part III: Appendix 5, paragraph 4; 4.1; 4.1.1; 4.1.2 ; 4.1.3 ; 4.2

7.9 EMERGENCY, RESCUE, AND SURVIVAL EQUIPMENT

7.9.1.1 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.

14 CFR: 91.513; 121.309; 135.177

7.9.1.2 EMERGENCY EXIT EQUIPMENT - PASSENGERS

(a) No person shall operate an aeroplane without the following emergency exit equipment:

(1) [AAC] Each passenger-carrying land plane emergency exit (other than over-the-wing) that is more than 6 feet from the ground with the aeroplane on the ground and the landing gear extended, shall have an approved means to assist the occupants in descending to the ground.

(2) [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.

(3) [AAC] Each passenger-carrying aeroplane shall have an emergency lighting system, independent of the main lighting system that—

(i) Illuminates each passenger exit marking and locating sign;

(ii) Provides enough general lighting in the passenger cabin; and

(iii) [AOC] Includes floor proximity emergency escape path marking.

(4) [AAC] Each passenger emergency exit and the means of opening that exit from the outside shall be marked on the outside of the aeroplane.

(5) [AAC] Each passenger-carrying aeroplane shall be equipped with a slip-resistant escape route that meets the requirements under which that aeroplane was type certified.

(6) Each passenger carrying aeroplane shall meet the detailed requirements contained in IS: 7.9.1.2.

14 CFR: 23.807; 23. 811 23.812; 25.811; 25.812; 25.897; 91.607; 121.310; 135.178
JAR-OPS 1: 1.805

(b) No person shall operate a helicopter certificated with a maximum take-off mass of 7 000 pounds or less and nine or less passenger seats without the following emergency exit equipment:

(1) Number and location.

(i) There must be at least one emergency exit on each side of the cabin readily accessible to each passenger. One of these exits must be usable in any probable attitude that may result from a crash.

(ii) Doors intended for normal use may also serve as emergency exits, provided that they meet the requirements of this section.

(iii) If emergency flotation devices are installed, there must be an emergency exit accessible to each passenger on each side of the cabin that is shown by test, demonstration, or analysis to—

(A) Be above the waterline; and

(B) Be open without interference from flotation devices, whether stowed or deployed.

(2) Type and operation. Each emergency exit prescribed by paragraph (a) of this section must—

(i) Consist of a movable window or panel, or additional external door, providing an unobstructed opening that will admit a 19-by 26-inch ellipse;

(ii) Have simple and obvious methods of opening, from the inside and from the outside, which do not require exceptional effort;

(iii) Be arranged and marked so as to be readily located and opened even in darkness; and

(iv) Be reasonably protected from jamming by fuselage deformation.

(3) Ditching emergency exits for passengers. If certification with ditching provisions is requested, the markings required by (1)(iii) of this paragraph must be designed to remain visible if the rotorcraft is capsized and the cabin is submerged.

14 CFR: 27.807

(c) No person shall operate a helicopter certificated with a maximum take-off mass of more than 20 000 pounds and ten or more passenger seats without the following emergency exit equipment:

(1) Passenger emergency exits and openings. Openings with dimensions larger than those specified below may be used, regardless of shape, if the base of the opening has a flat surface of not less than the specified width. For the purpose of this part, the types of passenger emergency exit shall be as follows:

(i) Type I. This type shall have a rectangular opening of not less than 24 inches wide by 48 inches high, with corner radii not greater than one-third the width of the exit, in the passenger area in the side of the fuselage at floor level and as far away as practicable from areas that might become potential fire hazards in a crash.

(ii) Type II. This type is the same as Type I, except that the opening shall be at least 20 inches wide by 44 inches high.

(iii) Type III. This type is the same as Type I, except that—

(A) The opening shall be at least 20 inches wide by 36 inches high; and

(B) The exits need not be at floor level.

(iv) Type IV. This type shall have a rectangular opening of not less than 19 inches wide by 26 inches high, with corner radii not greater than one-third the width of the exit, in the side of the fuselage with a step-up inside the rotorcraft of not more than 29 inches.

(2) Passenger emergency exits; side-of-fuselage. Emergency exits shall be accessible to the passengers and, except as provided in (c)(4) of this paragraph, must be provided in accordance with the following table: Emergency exits for each side of the fuselage

Passenger seating capacity	Emergency exits for each side of the fuselage			
	Type I	Type II	Type III	Type IV
1 through 10				1
11 through 19			1 or	2
20 through 39		1		1
40 through 59	1			1
60 through 79	1		1 or	2

(3) Passenger emergency exits; other than side-of-fuselage. In addition to the requirements of item (2) of this paragraph—

(i) There shall be enough openings in the top, bottom, or ends of the fuselage to allow evacuation with the rotorcraft on its side; or

(ii) The probability of the rotorcraft coming to rest on its side in a crash landing must be extremely remote.

(4) Ditching emergency exits for passengers. If the helicopter was certificated with ditching provisions, ditching emergency exits shall be provided in accordance with the following:

(i) For rotorcraft that have a passenger seating configuration, excluding pilots seats, of nine seats or less, one exit above the waterline in each side of the rotorcraft, meeting at least the dimensions of a Type IV exit.

(ii) For rotorcraft that have a passenger seating configuration, excluding pilots seats, of 10 seats or more, one exit above the waterline in a side of the rotorcraft meeting at least the dimensions of a Type III exit, for each unit (or part of a unit) of 35 passenger seats, but no less than two such exits in the passenger cabin, with one on each side of the rotorcraft. However, where it has been shown through analysis, ditching demonstrations, or any other tests found necessary, that the evacuation capability of the rotorcraft during ditching is improved by the use of larger exits, or by other means, the passenger seat to exit ratio may be increased.

(iii) Flotation devices, whether stowed or deployed, may not interfere with or obstruct the exits.

(5) Ramp exits. One Type I exit only, or one Type II exit only, that is required in the side of the fuselage under paragraph (b) of this section, may be installed instead in the ramp of floor ramp rotorcraft if—

(i) Its installation in the side of the fuselage is impractical; and

(ii) Its installation in the ramp meets emergency exit access requirements in paragraph (g) below.

(d) Emergency exit arrangement.

(1) Each emergency exit shall consist of a movable door or hatch in the external walls of the fuselage and must provide an unobstructed opening to the outside.

(2) Each emergency exit shall be openable from the inside and from the outside.

(3) The means of opening each emergency exit shall be simple and obvious and may not require exceptional effort.

(4) There shall be means for locking each emergency exit and for preventing opening in flight inadvertently or as a result of mechanical failure.

(5) There shall be means to minimise the probability of the jamming of any emergency exit in a minor crash landing as a result of fuselage deformation under the ultimate inertial forces –

(i) Upward – 1.5g;

(ii) Forward – 4.0g;

(iii) Sideward – 2.0g;

(iv) Downward – 4.0g.

(6) Except as provided in item (8) of this paragraph, each land-based rotorcraft emergency exit must have an approved slide as stated in paragraph (g) of this subsection, or its equivalent, to assist occupants in descending to the ground from each floor level exit and an approved rope, or its equivalent, for all other exits, if the exit threshold is more than 6 feet above the ground—

(i) With the rotorcraft on the ground and with the landing gear extended;

(ii) With one or more legs or part of the landing gear collapsed, broken, or not extended; and

(iii) With the rotorcraft resting on its side, provided this was accomplished during the emergency evacuation test during type certification of the helicopter.

(7) The slide for each passenger emergency exit shall be a self-supporting slide or equivalent, and shall be designed to meet the following requirements:

(i) It shall be automatically deployed, and deployment shall begin during the interval between the time the exit opening means is actuated from inside the rotorcraft and the time the exit is fully opened. However, each passenger emergency exit which is also a passenger entrance door or a service door shall be provided with means to prevent deployment of the slide when the exit is opened from either the inside or the outside under non-emergency conditions for normal use.

(ii) It shall be automatically erected within 10 seconds after deployment is begun.

(iii) It shall be of such length after full deployment that the lower end is self-supporting on the ground and provides safe evacuation of occupants to the ground after collapse of one or more legs or part of the landing gear.

(iv) It shall have the capability, in 25-knot winds directed from the most critical angle, to deploy and, with the assistance of only one person, to remain usable after full deployment to evacuate occupants safely to the ground.

(v) For helicopters having 30 or fewer passenger seats and having an exit threshold more than 6 feet above the ground, a rope or other assist means may be used in place of the slide specified in item (6) of this paragraph, provided this was accomplished during the emergency evacuation test during type certification of the helicopter.

(8) If a rope, with its attachment, is used for compliance with items (6), (7), or (8) of this paragraph, it shall—

(i) Withstand a 400-pound static load; and

(ii) Attach to the fuselage structure at or above the top of the emergency exit opening, or at another approved location if the stowed rope would reduce the pilot's view in flight.

(e) Emergency exit marking.

(1) Each passenger emergency exit, its means of access, and its means of opening shall be conspicuously marked for the guidance of occupants using the exits in daylight or in the dark. Such markings shall be designed to remain visible for rotorcraft equipped for overwater flights if the rotorcraft is capsized and the cabin is submerged.

(2) The identity and location of each passenger emergency exit shall be recognisable from a distance equal to the width of the cabin.

(3) The location of each passenger emergency exit shall be indicated by a sign visible to occupants approaching along the main passenger aisle. There shall be a locating sign—

(i) Next to or above the aisle near each floor emergency exit, except that one sign may serve two exits if both exists can be seen readily from that sign; and

(ii) 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 have white letters 1 inch high on a red background 2 inches high, be self or electrically illuminated, and have a minimum luminescence (brightness) of at least 160 micro lamberts. The colors may be reversed if this will increase the emergency illumination of the passenger compartment.

(5) The location of each passenger emergency exit operating handle and instructions for opening shall be shown—

(i) For each emergency exit, by a marking on or near the exit that is readable from a distance of 30 inches; and

(ii) For each Type I or Type II emergency exit with a locking mechanism released by rotary motion of the handle, by—

(A) A red arrow, with a shaft at least three-fourths inch wide and a head twice the width of the shaft, extending along at least 70 degrees of arc at a radius approximately equal to three-fourths of the handle length; and

(B) The word "open" in red letters 1 inch high, placed horizontally near the head of the arrow.

(6) Each emergency exit, and its means of opening, shall be marked on the outside of the rotorcraft. In addition, the following apply—

(i) There shall be a 2-inch colored band outlining each passenger emergency exit, except small rotorcraft with a maximum weight of 12,500 pounds or less may have a 2-inch colored band outlining each exit release lever or device of passenger emergency exits which are normally used doors.

(ii) Each outside marking, including the band, shall have color contrast to be readily distinguishable from the surrounding fuselage surface. The contrast shall be such that, if the reflectance of the darker color is 15 percent or less, the reflectance of the lighter color must be at least 45 percent. "Reflectance" is the ratio of the luminous flux reflected by a body to the luminous flux it receives. When 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 must be provided.

(f) Emergency lighting. The following apply:

(1) A source of light with its power supply independent of the main lighting system shall be installed to—

(i) Illuminate each passenger emergency exit marking and locating sign; and

(ii) 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 center line of the main passenger aisle, is at least 0.05 foot- candle.

(2) Exterior emergency lighting shall be provided at each emergency exit. The illumination may not be less than 0.05 foot-candle (measured normal to the direction of incident light) for minimum width on the ground surface, with landing gear extended, equal to the width of the emergency exit where an evacuee is likely to make first contact with the ground outside the cabin. The exterior emergency lighting may be provided by either interior or exterior sources with light intensity measurements made with the emergency exits open.

(3) Each light required by item (1) or (2) of this paragraph shall be operable manually from the cockpit station and from a point in the passenger compartment that is readily accessible. The cockpit control device must have an "on," "off," and "armed" position so that when turned on at the cockpit or passenger compartment station or when armed at the cockpit station, the emergency lights will either illuminate or remain illuminated upon interruption of the rotorcraft's normal electric power.

(4) Any means required to assist the occupants in descending to the ground shall be illuminated so that the erected assist means is visible from the rotorcraft.

(i) The assist means must be provided with an illumination of not less than 0.03 foot-candle (measured normal to the direction of the incident light) at the ground end of the erected assist means where an evacuee using the established escape route would normally make first contact with the ground, with the rotorcraft in each of the attitudes corresponding to the collapse of one or more legs of the landing gear.

(ii) If the emergency lighting subsystem illuminating the assist means is independent of the rotorcraft's main emergency lighting system, it—

(A) Will automatically be activated when the assist means is erected;

(B) Will provide the illumination required by (4)(i) above; and

(C) Will not be adversely affected by stowage

(5) The energy supply to each emergency lighting unit shall provide the required level of illumination for at least 10 minutes at the critical ambient conditions after an emergency landing.

(6) If storage batteries are used as the energy supply for the emergency lighting system, they may be recharged from the rotorcraft's main electrical power system provided the charging circuit is designed to preclude inadvertent battery discharge into charging circuit faults.

(g) Emergency exit access.

(1) Each passageway between passenger compartments, and each passageway leading to Type I and Type II emergency exits, shall be—

(i) Unobstructed; and

(ii) At least 20 inches wide.

(2) For each emergency exit covered by (d)(6) in this paragraph, there shall be enough space adjacent to that exit to allow a crewmember to assist in the evacuation of passengers without reducing the unobstructed width of the passageway below that required for that exit.

(3) There shall be access from each aisle to each Type III and Type IV exit, and

(i) For rotorcraft that have a passenger seating configuration, excluding pilot seats, of 20 or more, the projected opening of the exit provided shall not be obstructed by seats, berths, or other protrusions (including seatbacks in any position) for a distance from that exit of not less than the width of the narrowest passenger seat installed on the rotorcraft;

(ii) For rotorcraft that have a passenger seating configuration, excluding pilot seats, of 19 or less, there may be minor obstructions in the region described in (g)(3) (i) of this paragraph, if there are compensating factors to maintain the effectiveness of the exit.

(h) Main aisle width. The main passenger aisle width between seats must equal or exceed the values in the following table:

Passenger seating capacity	Minimum main passenger aisle width	
	Less than 25 inches from floor (inches)	25 Inches and more from floor (inches)
10 or less	12	15
11 through 19	12	20
20 or more	15	20

Note: A narrower width not less than 9 inches may be approved when substantiated by tests found necessary by the State of Manufacturer.

14 CFR: 29.807; 29.808; 29.811; 29.812; 29.813; 29.815

7.9.1.3 VISUAL SIGNALLING DEVICES

(a) [AAC] No person may operate an aircraft over water or across land areas which have been designated by FSM as areas in which search and rescue would be especially difficult, unless equipped with such signaling devices as may be appropriate to the area overflown, to include—

(1) At least one pyrotechnic signaling device for each life raft required for overwater operations; and

(2) Any other requirements specified by FSM.

ICAO Annex 6, Part I: 6.5.3.1 (b), 6.6
ICAO Annex 6, Part II:, Section II: 2.4.4.3
ICAO Annex 6: Part III, Section II: 4.5.2.1 and Section III: 4.3.2.1
14 CFR: 91.509; 121.339(a)(3), 121.353
JAR-OPS 1: 1.835(a) and (c)

7.9.1.4 SURVIVAL KITS

(a) [AAC] No person may operate an aircraft across land areas which have been designated by FSM as areas in which search and rescue would be especially difficult, unless equipped with enough survival kits for the number of occupants of the aeroplane appropriate for the route to be flown.

ICAO Annex 6, Part I: 6.5.3; 6.6
ICAO Annex 6, Part II: Section II: 2.4.5
ICAO Annex 6, Part III, Section II: 4.5.2.1; 4.10
ICAO Annex 6, Part III, Section III: 4.4
ICAO Doc. 9388: 2.4.1.10

14 CFR: 91.509(e); 121.339(c), 121.353(c)
JAR-OPS 1: 1.830(b)

7.9.1.5 EMERGENCY LOCATOR TRANSMITTER

(a) No person shall operate an aeroplane without the following emergency locator equipment:

(1) [AAC] All aeroplanes on all flights shall be equipped with an automatically activated ELT that transmits simultaneously on both 406 MHz and 121.5 MHz, and meets the technical standards specified by the Authority and the relevant portions of ICAO Annex 10, Volume 3.

(2) (AAC) All aeroplanes authorised to carry more than 19 passengers shall be equipped with at least one automatic ELT or two ELTs of any type.

(3) (AAC) All aeroplanes authorised 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.

(4) [AOC] No person may operate an aeroplane in long-range overwater operations or over designated land areas where search and rescue would be especially difficult, without having on the aeroplane at least two ELTs, one of which shall be automatic.

(5) [AOC] At least one survival type ELT shall be located with each life-raft carried (Note: See § 7.9.1.18).

Note: 7.9.1.5(a)(5) is an FAA requirement and not an ICAO standard. Most transport category aircraft come equipped with this equipment.

(b) No person shall operate a helicopter without the following emergency locator equipment:

(1) [AAC] All helicopters on all flights shall be equipped with an automatically activated ELT that transmit simultaneously on both 406 MHz and 121.5, and meet the technical standards specified by the Authority and the relevant portions of ICAO Annex 10, Volume 3.

(2) [AAC] All helicopters operating on flights over water or a hostile environment, designated as a land area where search and rescue would be especially difficult shall be equipped with at least one automatic ELT and one ELT(s) in each life raft carried on board. (See § 7.9.1.18).

Note 1: When operating in a hostile environment, a safe ditching requires a helicopter to be designed for landing on water or certificated in accordance with ditching provisions.

Note 2: The judicious choice of number of ELTs, their type and placement on aircraft and associated floatable life support systems will ensure the greatest chance of ELT activation in the event of an accident for aircraft operating over water or land including areas especially difficult for search and rescue. Placement of transmitter units is a vital factor in ensuring optimal crash and fire protection. The placement of the control and switching devices (activation monitors of automatic fixed ELTs and their associated operational procedures will also take into consideration the need for rapid detection of inadvertent activation and convenient manual switching by crew members.

ICAO Annex 6, Part I: 6.17.7; 6.17.8; 6.17.9; 6.17.10; 6.17.11; 6.17.12
ICAO Annex 6, Part II, Section II: 2.4.12.1; 2.4.12.2; 2.4.12.3; 2.4.12.4
ICAO Annex 6, Part III, Section II: 4.7.7, 4.7.8, 4.7.9
ICAO Annex 6, Part III, Section III: 4.8.1; 4.8.2, 4.8.3
ICAO Annex 10, Volume 3, Chapter 5
14 CFR: 91.207; 121.339(c); 135.167(c)
JAR-OPS 1: 1.820, 1.830(c), 1.835(b)

JAR OPS 3: 3.830

(c) [AAC] Batteries used in ELTs shall be replaced (or recharged if the battery is rechargeable) and marked 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.

(3) The date for a replacement of the battery in the ELT shall be legibly marked on the outside of the transmitter.

Note 1: 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.

Note 2: 7.9.1.5(a)(5) is an FAA requirement and not an ICAO standard. Most transport category aircraft come equipped with this equipment.

ICAO Annex 6, Part I: 6.17.1; 6.17.2; 6.17.3; 6.17.4; 6.17.5; 6.17.6; 6.17; 6.17.8
ICAO Annex 6, Part II, Section II: 2.4.12.1; 2.4.12.2; 2.4.12.3; 2.4.12.4
ICAO Annex 6, Part III, Section II: 4.7.1; 4.7.2;4,7,3; 4.7.4; 4.7.5; 4.7.6; 4.7.7R; 4.7.8
ICAO Annex 6, Part III, Section III: 4.8.1; 4.8.2; 4.8.3
ICAO Annex 10, Volume 3, Chapter 5
14 CFR: 91.207; 121.339(c); 135.167(c)
JAR-OPS 1: 1.820, 1.830(c), 1.835(b)
JAR OPS 3: 3.830

7.9.1.6 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 aeroplane 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 aeroplane 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 2016, shall:

(1) Meet the applicable minimum performance requirements of the Authority; and

(2) Not contain Halon 1211, Halon 1301, or Halon 2402.

Note 1: The substances listed in (a)(2) above of Halon 1211, Halon 1301, and Halon 2402 are listed Annex A, Group II of the Montreal Protocol on Substances that Deplete the Ozone Layer, 8th Edition, 2009, which is listed in ICAO Annex 6, Part I: 6.2.2.1; ICAO Annex 6, Part II, Section II: 2.4.2.3, and ICAO Annex 6, Part III, Section III: 4.1.3.2.

Note 2: Information concerning extinguishing agents is contained in the UNEP Halons Options Committee Technical Note Number 1 – New Technology Halon Alternatives and FAA Report Number DOT/FAA/AR-99-63, Options to the Use of Halons for Aircraft Fire Suppression Systems.

ICAO Annex 6, Part I: 6.2.2(b); 6.2.2.1
ICAO Annex 6, Part II, Section II: 2.4.2.2(b); 2.4.2.3
ICAO Annex 6, Part III, Section II: 4.2.2(b)
ICAO Annex 6, Part III, Section III: 4.1.3.1(b); 4.1.3.2
ICAO Annex 8, Part II, Chapter 1: 1.2.5
14 CFR: 91.513(c)(2);121.309(c), 135.155
JAR-OPS 1: 1.790
JAR OPS 3: 3.790

7.9.1.7 LAVATORY FIRE EXTINGUISHER

(a) [AAC] No person may operate an aircraft unless each lavatory in the aircraft is equipped with a built-in fire extinguisher for each disposal receptacle for towels, paper, or waste located within the lavatory.

(b) [AAC] 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] 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 the Authority; and

(2) Not contain Halon 1211, Halon 1301, or Halon 2402.

Note 1: The substances listed in (a)(2) above of Halon 1211, Halon 1301, and Halon 2402 are listed Annex A, Group II of the Montreal Protocol on Substances that Deplete the Ozone Layer, 8th Edition, 2009, which is listed in ICAO Annex 6, Part I: 6.2.2.1; ICAO Annex 6, Part II, Section II: 2.4.2.3, and ICAO Annex 6, Part III, Section III: 4.1.3.2.

Note 2: Information concerning extinguishing agents is contained in the UNEP Halons Options Committee Technical Note No1 – New Technology Halon Alternatives and FAA Report no. Dot/FAA/AR-99-63, Options to the Use of Halons for Aircraft Fire Suppression Systems.

ICAO Annex 6, Part I: 6.2.2.1
ICAO Annex 6, Part II, Section II: 2.4.2.3
ICAO Annex 6, Part III, Section III: 4.1.3.2
ICAO Annex 8, Part II, Chapter 1: 1.2.5
14 CFR: 25.854; 121.308(b)

7.9.1.8 LAVATORY SMOKE DETECTOR

(a) [AOC] No person may operate a passenger-carrying transport category aeroplane unless each lavatory in the aeroplane 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 cabin crew member, taking into consideration the positioning of cabin crew members throughout the passenger compartment during various phases of flight.

14 CFR: 25.854; 121.308(a)

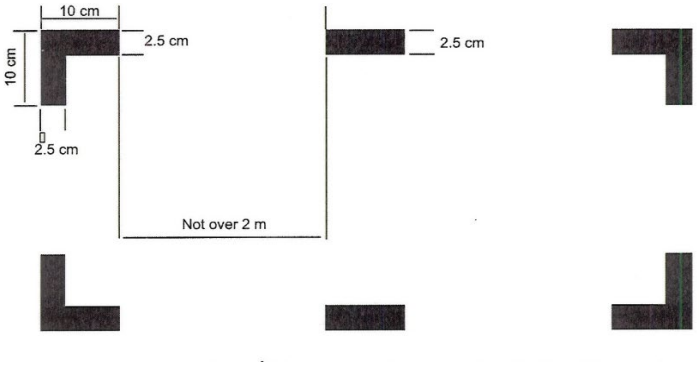
7.9.1.9 CRASH AXE

(a) [AAC] No person shall operate an aeroplane certificated with a take-off mass of 5 700 kg or more unless it is equipped with a crash axe appropriate for effective use in that type of aeroplane, stored in a place not visible to passengers on the aeroplane.

14 CFR: 91.513(e); 121.309, 135.177
JAR-OPS 1: 1.795

7.9.1.10 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 aeroplane, such areas shall be marked as shown below, and the colour 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 m apart, intermediate lines 9 cm x 3 cm shall be inserted so that there is no more than 2 m between adjacent markings.

ICAO Annex 6, Part I: 6.2.4.1; 6.2.4.2
ICAO Annex 6, Part II, Section II: 2.4.2.2(b)
ICAO Annex 6, Part III, Section II: 4.2.4
ICAO Annex 6, Part III, Section III: 4.1.4.1; 4.1.4.2
14 CFR: 121.310(g)
JAR-OPS 1: 1.800
JAR OPS 3: 3.800

7.9.1.11 FIRST-AID KIT AND UNIVERSAL PRECAUTION KIT

(a) First Aid Kits.

(1) No person may operate the following aircraft unless it is it is equipped with an accessible, approved first-aid kit(s):

(i) [AAC - Aeroplane] Aeroplanes 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: 7.9.1.11.

(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: 7.9.1.11.

(3) Each aircraft shall carry universal precaution kits in accordance with the following:

(i) Two kits; 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.

ICAO Annex 6, Part I: 6.2.2(a); Attachment B: 2.1; 2.2
ICAO Annex 6, Part II, Section III: 3.6.2.1(b)
ICAO Annex 6, Part III, Section II: 4.2.2(a)
ICAO Annex 6, Part III, Section III: 4.1.3.1(a)
ICAO Doc. 9388: 2.4.1.7
14 CFR: 121.803(c)(1); 121 Appendix A; 135.177
JAR-OPS 1: 1.745
JAR OPS 3: 3.745

7.9.1.12 EMERGENCY MEDICAL KIT - AEROPLANES

(a) [AOC] No person may operate a passenger flight in an aeroplane with 30 seats or more 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.

(b) [AOC] The contents of emergency medical kits to be carried shall comply with IS: 7.9.1.12.

(c) [AOC] The medical kit shall be stored in a secure location.

ICAO Annex 6, Part I: 6.2.2(a)
14 CFR: 121.803(c)(2)(3); 121, Appendix A; 135.177
JAR-OPS 1: 1.755

7.9.1.13 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 flightcrew members while at their assigned duty station.

(d) [AAC] No person may operate a pressurised aeroplane at altitudes above 25,000 feet unless:

(1) Flightcrew member oxygen masks are available at the flight duty station and are of a quick donning type;

(2) 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 pressurisation failure

(e) [AAC] An oxygen-dispensing unit connected to oxygen supply terminals is installed so as to be immediately available to each occupant, wherever seated. 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.

(f) [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.

(g) [AAC] The process to determine the amount of supplemental oxygen needed for non-pressurised and pressurised aircraft is contained in IS: 7.9.1.13.

ICAO Annex 6, Part I: 4.3.8; 4.3.8.1; 4.3.8.2; 4.4.5.2, 4.4.6, 6.7; 6.7.1, 6.7.2; 6.7.3; 6.7.4R; 6.7.5; 6.7.6R
ICAO Annex 6, Part II, Section II: 2.4.6.1; 2.4.6.2
ICAO Annex 6, Part II, Section III: 3.6.3.6.2; 3.6.3.6.3, Attachment 2A
ICAO Annex 6, Part III, Section II: 2.3.8; 2.3.8.1; 2.3.8.2; 4.8.1; 4.8.2; 4.8.3; 4.8.4R
ICAO Annex 6, Part III, Section III: 2.9; 2.9.1; 2.9.2; 4.5.1; 4.5.2R
ICAO Doc. 9388: 2.4.1.15, 2.4.1.16(a)
14 CFR: 91.211;121.327-329, 135.157
JAR-OPS 1: 1.770, 1.775
JAR OPS 3: 3.775

7.9.1.14 PROTECTIVE BREATHING EQUIPMENT

(a) [AOC] No AOC holder may operate an aeroplane with a maximum certified takeoff mass exceeding 5700 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) [AOC] The oxygen supply for PBE may be provided by the required supplemental oxygen system.

(c) [AOC] 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) [AOC] The PBE intended for cabin crew use shall be installed adjacent to each required cabin crew member duty station.

(e) [AOC] 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) [AOC] The PBE while in use shall not prevent required communication.

14 CFR: 121.337
JAR-OPS 1: 1.780

7.9.1.15 FIRST AID OXYGEN DISPENSING UNITS

(a) [AOC] No AOC holder may conduct a passenger carrying operation in a pressurised aeroplane 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 depressurisation; 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 depressurisation at cabin altitudes of more than 8,000 feet;

(2) An average flow rate of at least 3 litres Standard Temperature Pressure Dry (STPD)/minute/person; and

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

(c) The amount of first-aid oxygen required for a particular operation shall be determined on the basis of cabin pressure altitudes and flight duration, consistent with the operating procedures established for each operation and route.

(d) The oxygen equipment provided shall be capable of generating a mass flow to each user of at least four litres per minute, STPD. Means may be provided to decrease the flow to not less than two litres per minutes, STPD, at any altitude.

14 CFR: 121.333(e)(3), 135.91
JAR-OPS 1: 1.760

7.9.1.16 MEGAPHONES

(a) [AOC] Each person operating a passenger-carrying aeroplane 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 aeroplanes 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 cabin crew member seat; and

(2) On aeroplanes with a seating capacity of more than 99 passengers, two megaphones in the passenger cabin on each aeroplane one installed at the forward end and the other at the most rearward location where it would be readily accessible to a normal cabin crew member seat.

(3) For aeroplanes with more than one passenger deck, in all cases when the total passenger seating configuration of a deck is more than 60, at least one megaphone is required on the deck.

Note: The Authority may grant an exemption 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.

14 CFR: 91.513(f); 121.309(f)
JAR-OPS 1: 1.810

7.9.1.17 INDIVIDUAL FLOTATION DEVICES

(a) Landplanes.

(1) [AAC] Landplanes 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.

(b) Seaplanes.

(1) [AAC] For all flights, seaplanes shall be equipped with the equipment prescribed in paragraph 2.

ICAO Annex 6: Part 1: 6.5.1(a), 6.5.2.1, 6.5.2.2, 6.5.3.2
ICAO Annex 6, Part II, Section II: 2.4.4.3.1; 2.4.4.3.2
ICAO Annex 6, Part III, Section III: 3.6.2.1
ICAO Doc. 9388: 2.4.1.12,
14 CFR: 121.339(a), 121.340(b)
JAR-OPS 1: 1.825, 1.830, 1.835(c)

7.9.1.18 LIFE RAFTS

(a) [AAC] In addition to the equipment prescribed in § 7. 9.1.17 and § 7. 9.1.19 of this Part, lifesaving rafts in sufficient numbers to carry all persons on board shall be installed in:

(1) Aeroplanes operated on long range over-water flights, and

(2) All other aeroplanes when they are operated over water away from land suitable for making an emergency landing at a distance of more than 185 km (100 NM) in the case of single-engine aeroplanes, and more than 370 km (200 NM) in the case of multi-engine aeroplanes capable of continuing flight with one engine inoperative.

Note: Both 14 CFR and JAR OPS 1 set the limit at 30 minutes or 100 NM away from land suitable for making an emergency landing.

(3) 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.

(4) Class 3 helicopters when they are operated over water beyond autorotational or safe forced landing distance from land.

(b) [AOC] 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;

(3) A pyrotechnic signaling device; and

(4) An ELT (See § 7.9.1.5).

(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.

Note: The ELT requirement in 7.9.1.18(d)(4) is an FAA requirement and not an ICAO requirement.

ICAO Annex 6, Part I: 6.5.3.1
ICAO Annex 6, Part II, Section II: 2.4.4.3.2
ICAO Annex 6, Part III, Section II: 4.5.2.1(b)
ICAO Annex 6, Part III, Section III: 4.3.2.1(b)
ICAO Doc. 9388: 2.4.2.7, 2.4.2.8
14 CFR: 91.509; 121.339(a); 135.167
JAR-OPS 1: 1.830(b)
JAR OPS 3:3.380

7.9.1.19 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.

ICAO Annex 6, Part III, Section II: 4.5.1
ICAO Annex 6, Part III, Section III: 4.3.1
JAR-OPS 3: 3.843

7.10 MISCELLANEOUS SYSTEMS AND EQUIPMENT

7.10.1.1 SEATS, SAFETY BELTS, AND SHOULDER HARNESSES

(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 an age to be determined by FSM; 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 restraining 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 aeroplane) 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 as required by the Authority for emergency evacuation.

ICAO Annex 6, Part 1: 6.2.2, 6.16.1, 6.16.2, 6.16.3
ICAO Annex 6, Part II, Section II: 2.4.2.2(c);2.4.2.4R
ICAO Annex 6, Part II, Section III: 3.6.2.1; 3.6.9.1;3.6.9.2R
ICAO Annex 6, Part III, Section II, 4.2.2; 4.12.1; 4.12.2
ICAO Annex 6: Part III, Section III: 4.1.3.1(c); 4.1.3.3R
14 CFR: 23.785; 25,785; 91.521, 121.311
JAR-OPS 1: 1.730
JAR-OPS 3: 3.730

7.10.1.2 PASSENGER AND PILOT COMPARTMENT DOORS –AEROPLANES

(a) [AOC] Pilot compartment door —

(1) No person may operate a passenger carrying aeroplane of a maximum certificated takeoff mass in excess of 45 500 kg or with a passenger seating capacity greater than 60 unless that aircraft is 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 unauthorised persons.

(2) No person may operate a passenger carrying aeroplane having a certificated takeoff mass of less than 45 500 kg or with a passenger seating capacity of less than 60 unless that aircraft is equipped with an approved flight crew compartment door, where practicable, that is designed to resist penetration by small arms fire and grenade shrapnel, and to resist forcible intrusions by unauthorised persons.

(3) Each pilot compartment door shall be capable of being locked and unlocked from either pilot's station.

(4) A means shall be provided for monitoring from either pilot station the entire door area outside the pilot compartment to identify persons requesting entry and to detect suspicious behaviour or potential threat.

(b) [AOC] Passenger compartment doors —

(1) Each passenger compartment door shall have:

(i) A means for the crew, in an emergency, to unlock each door that leads to a compartment that is normally accessible to passengers and that can be locked by passengers;

(ii) A placard on each door used to access a required passenger emergency exit, indicating that such door shall be open during takeoff and landing; and

(iii) A means readily available for each crewmember to unlock any door that separates a passenger compartment from another compartment that has emergency exit provisions.

ICAO Annex 6, Part I: 13.2.1; 13.2.2; 13.2.3, 13.2.4R; 13.2.5R
14 CFR: 25.795;121.217, 121.313(f-h)
JAR-OPS 1: 1.735

7.10.1.3 PASSENGER INFORMATION SIGNS

(a) [AOC] No person shall operate a passenger carrying aeroplane with a maximum certificated take-off weight of 5,700 kg (12,500 lbs) or more 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, which 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) A sign or placard affixed to each forward bulkhead and each passenger seat back that reads "Fasten Seat Belt While Seated."

(b) [AAC] Notwithstanding paragraph (a), no person shall operate an aircraft in which all passenger seats are not visible from the flight deck, unless it is equipped with a means of indicating to all passengers and cabin crew when seat belts shall be fastened and when smoking is not allowed.

ICAO Annex 6, Part I: 6.2.2
14 CFR: 23.791; 25.791; 91.517(a);121.317
JAR-OPS 1: 1.731
JAR-OPS 3: 3.731

7.10.1.4 MATERIALS FOR CABIN INTERIORS

(a) No person shall operate an aircraft unless each compartment used by the crew or passengers meet the following requirements of the State of Design—

(1) Materials must be at least flash resistant;

(2) The wall and ceiling linings and the covering of upholstering, floors and furnishings must be flame resistant;

(3) Each compartment where smoking is to be allowed must be equipped with self-contained ash trays that are completely removable and other compartments must be placarded against smoking; and

(4) Each receptacle for used towels, papers and wastes must be of fire-resistant material and must have a cover or other means of containing possible fires started in the receptacles.

(b) For aircraft for which the State of Design has developed new airworthiness requirements for cabin interiors since original type certification, the owner of the aircraft shall ensure that all materials that do not meet current State of Design requirement shall have them replaced upon the first major overhaul of the aircraft cabin or refurbishing of the cabin interior with materials that meet the new requirements.

14 CFR: 121.215, 121.312, 135.170

7.10.1.5 MATERIALS FOR CARGO AND BAGGAGE COMPARTMENTS

(a) [AAC] Each cargo compartment shall have ceiling and sidewall liner panels which are constructed of materials which meet the test requirements for flame resistance of cargo compartment liners as prescribed for type certification.

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.

14 CFR: 25.857; 121.314

7.10.1.6 POWER SUPPLY, DISTRIBUTION, AND INDICATION SYSTEM

(a) [AOC] No AOC holder may operate an aeroplane unless it is equipped with—

(1) A power supply and distribution system that meets the airworthiness requirements for certification of an aeroplane in the transport category, as specified by the Authority, 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 auxiliary 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 redundant.

14 CFR: 121.313(c)

7.10.1.7 PROTECTIVE CIRCUIT FUSES

(a) [AOC] No person may operate an aeroplane in which protective fuses are installed unless there are spare fuses available of appropriate ratings for replacement of those accessible in flight.

ICAO Annex 6, Part I: 6.2.2(e)
14 CFR: 121.313(a)
JAR-OPS 1: 1.635

7.10.1.8 ICING PROTECTION EQUIPMENT

(a) [AAC] No person may operate an aircraft in expected or actual icing conditions unless it is equipped for the prevention or removal of ice on windshields, wings, control surfaces, empennage, propellers, rotor blades, or other parts of the aircraft where ice formation will adversely affect the safety of the aircraft.

(b) [AAC] No person 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. 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.

ICAO Annex 6, Part I: 4.3.5.3; 6.8; 6.10(d)
ICAO Annex 6, Part II, Section III: 3.6.4
ICAO Annex 6, Part III, Section III: 2.6.4
14 CFR: 121.341; 135.227
JAR-OPS 1: 1.675
JAR-OPS 3: 3.675

7.10.1.9 PITOT HEAT AND INDICATION SYSTEMS

(a) [AAC] No person may operate an aircraft in instrument flight conditions unless it is equipped with a pitot heat system.

(b) [AOC] No AOC holder may operate an aeroplane equipped with a flight instrument pitot heating system unless the aeroplane 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 flightcrew member. The indication provided shall be designed to alert the flightcrew if either:

(i) The pitot heating system is switched "off," and

(ii) The pitot heating system is switched "on" and any pitot tube heating element is inoperative, or

(2) An integrated flightcrew alerting system that will notify the crew if the pitot system is malfunctioning.

ICAO Annex 6, Part I: 6.9.1(d)
ICAO Annex 6, Part II: Section II: 2.4.7(a)(4)
ICAO Annex 6, Part III, Section II: 4.4.3(d)
ICAO Annex 6, Part III, Section III: 4.2.3(d)
14 CFR: 25.1326; 121.342, 135.158

7.10.1.10 STATIC PRESSURE SYSTEM

(a) [AAC] No person may operate an aircraft unless it is equipped with a static pressure system 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.

(b) [AAC] No person may operate an aircraft in IFR or VFR at night unless it is equipped with a static pressure system 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 and a means of selecting an alternative source of static pressure.

(c) [AOC] No person may operate an aircraft unless it is equipped with 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.

14 CFR: 23.1325; 25. 1325; 29.1325;121.313(e);135.163
JAR-OPS 1: 1.652(j)

7.10.1.11 WINDSHIELD WIPERS

(a) [AOC] No AOC holder may operate an aeroplane with a maximum certified take-off mass of more than 5700 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.

14 CFR: 121.313(b)
JAR-OPS 1: 1.645

7.10.1.12 CHART HOLDER

(a) [AOC] No person may operate an aeroplane in commercial air transport operations under single pilot IFR or at night unless a chart holder is installed in an easily readable position that can be illuminated for night operations.

ICAO Annex 6, Part I: 6.22(c)
JAR-OPS 1: 1.652(n)

7.10.1.13 COSMIC RADIATION DETECTION EQUIPMENT

(a) [AAC] No person shall operate an aeroplane intended to be operated above 15000 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 ionising and neutron radiation of galactic and solar origin) and the cumulative dose on each flight;

(2) A system of on-board quarterly radiation sampling acceptable to the Authority as described in IS 7.10.1.13; and

(3) A display unit readily visible to a flight crew member.

(b) The operator shall have the equipment in (a) above calibrated on the basis of assumptions acceptable to the Authority.

ICAO Annex 6. Part I: 6.12
ICAO Annex 6, Part II, Section III: 3.6.7
JAR-OPS 1: 1.680

7.10.1.14 MARITIME SOUND SIGNALLING DEVICE

(a) [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.

ICAO Annex 6, Part I: 6.5.1(b)
ICAO Annex 6, Part II, Section II: 2.4.4.1(b)
JAR-OPS 1: 1.840(a)(2)

7.10.1.15 ANCHORS

(b) [AAC]. No person shall operate a seaplane unless it is equipped with—

(1) One anchor, and

(2) One sea anchor (drogue)

Note: "Seaplanes" includes amphibians operated as seaplanes.

ICAO Annex 6, Part I: 6.5.1(c)
ICAO Annex 6 Part II, Section II: 2.4.4.1(c)(d)
JAR-OPS 1: 1.840(a)(1)

CIVIL AVIATION REGULATIONS

PART 7 — IMPLEMENTING STANDARDS

VERSIONS 2.8

AUGUST 2015

For ease of reference the number assigned to each implementing standard corresponds to its associated regulation. For example IS: 1.2.1.8 would reflect a standard required in subsection 1.2.1.8.

[THIS PAGE INTENTIONALLY LEFT BLANK]

PART 7 — IMPLEMENTING STANDARDS

IS: 7.2.1.6 CATEGORY II: INSTRUMENTS AND EQUIPMENT APPROVAL AND MAINTENANCE REQUIREMENTS

(a) *General.* The instruments and equipment required by § 7.2.1.6 shall be approved as provided in this implementing standard before being used in Category II 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 § 7.2.1.6 that are listed in the proposed maintenance programme 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 programme specified in paragraph (e) if they have not been approved for 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 auto-throttle and computed missed approach guidance system, shall be approved in the same manner if they are to be used for Category II 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 ±5° 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; or

(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 §7.2.1.6 shall be capable of performing as necessary for Category II operations. Approval is also required after each subsequent alteration to these instruments and items of equipment.

(e) *Evaluation programme*.

(1) *Application*. Approval by evaluation is requested as a part of the application for approval of the Category II manual.

(2) *Demonstrations*. Unless otherwise authorised by the Authority, the evaluation programme 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 autothrottles 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 programme 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 auto throttles 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 programme for Category II instruments and equipment shall contain the following:

(1) A list of each instrument and item of equipment specified in § 7. 2.1.6 that is installed in the aircraft and approved for Category II operations, including the make and model of those specified in § 7. 2.1.6 (a)(1).

(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 authorised 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 pilot authorisation 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 § 7.2.1.6 (a)(1) 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 § 7.2.1.6 (a)(1) to perform as approved for Category II 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 approval condition before it is returned to service for Category II operations.

(8) A procedure for an entry in the maintenance records that shows the date, airport, and reasons for each discontinued Category II 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) Except as specified in paragraph (g)(2) of this subsection, it shall be performed by a certificated repair station holding one of the following ratings as appropriate to the equipment checked:

(i) An instrument rating

(ii) An avionics rating

(2) It shall be performed by a certificated air operator on aircraft identified in its approved specific operating provisions with the approved authorisations to perform maintenance and approve for return to service its own aircraft maintained under a continuous maintenance programme under an equivalent system identified in Part 9.

(3) 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 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.

14 CFR: Appendix A, Part 91

IS: 7.4.1.3 REDUCED VERTICAL SEPARATION MINIMUM—ALTIMETRY SYSTEM PERFORMANCE REQUIREMENTS FOR OPERATIONS IN RVSM AIRSPACE

(a) In respect of groups of aeroplanes that are nominally of identical design and build with respect to all details that could influence the accuracy of height-keeping performance, the height-keeping performance capability shall be such that the total vertical error (TVE) for the group of aeroplanes shall have a mean no greater than 25 m (80 ft) in magnitude and shall have a standard deviation no greater than $28 – 0.013z2$ for $0 \leq z \leq 25$ when z is the magnitude of the mean TVE in metres, or $92 – 0.004z2$ 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 altimetry system error (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) In respect of aeroplanes for which the characteristics of the airframe and altimetry system fit are unique and so cannot be classified as belonging to a group of aeroplanes encompassed by paragraph 1, the height-keeping performance capability shall be such that the components of the TVE of the aeroplane have the following characteristics:

(1) the ASE of the aeroplane 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.

ICAO Annex 6, Part I, Appendix 4
ICAO Annex 6, Part II, Appendix 2.2

IS: 7.8.1.4 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) 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 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 aeroplane 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 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. 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 annual examination of the recorded signal on the CVR shall be carried out by replay of the CVR recording. While installed in the aircraft, the CVR 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 annual examination, a sample of in-flight recordings of the CVR shall be examined for evidence that the intelligibility of the signal is acceptable; and

(7) an annual examination of the recorded images on the AIR shall be carried out by replay of the AIR recording. While installed in the aircraft, the AIR shall record test images from each aircraft source and from relevant external sources to ensure that all required images meet recording quality standards.

(c) Flight recorder systems shall be considered unserviceable if there is a significant period of poor quality data, unintelligible signals, or if one or more of the mandatory parameters is not recorded correctly.

(d) The operator shall make available a report of the annual inspection on request to [the regulatory authorities] 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 least every five years or in accordance with the recommendations of the sensor manufacturer to determine any discrepancies in the engineering conversion routines for the mandatory parameters and to ensure that parameters are being recorded within the calibration tolerances; 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 as recommended by the sensor manufacturer, or at least every two years.

ICAO Annex 6, Part I: Appendix 8, paragraph 7; 7.1; 7.2; 7.3; 7.4; 7.5
ICAO Annex 6, Part II, Appendix 2.3, paragraph 7; 7.1; 7.2; 7.3; 7.4; 7.5
ICAO Annex 6, Part III, Appendix 5: paragraph 6, 6.1; 6.2; 6.3; 6.4 ;6.5

IS: 7.8.2.1(A) FLIGHT DATA RECORDERS—TYPE AND PARAMETERS - AEROPLANE

(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 aeroplane, at least the 78 parameters in Table A.

(2) Type I FDR. This FDR shall be capable of recording, as appropriate to the aeroplane, 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 aeroplane, at least the first 16 parameters in Table A.

Note This (the number 16) is from ICAO Annex I, Part 6, Appendix 8: 2.2.2.8. ICAO Annex 6, Part II, Appendix 2.3: 2.2.2.8 says a Type II FDR shall be capable of recording at least the first 15 parameters.

(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 aeroplane complexity.

(3) The parameters without an asterisk (*) are mandatory parameters which shall be recorded regardless of aeroplane complexity.

(4) In addition, the parameters designated by an asterisk (*) shall be recorded if an information data source for the parameter is used by aeroplane systems or the flight crew to operate the aeroplane.

(5) However, other parameters may be substituted with due regard to the aeroplane 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 attitude.

(2) Roll attitude.

(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 synchronisation 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, GNSS approach path.

(j) Horizontal deviation*: ILS localizer, MLS azimuth, 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: Parameter guidance for range, sampling, accuracy and resolution are as contained in the EUROCAE ED-112, Minimum Operational Performance Specification (MOPS) for Crash Protected Airborne Recorder Systems, or equivalent documents.

Note 2: It is not intended that aeroplanes 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 attitude

(5) Roll attitude

(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*

ICAO Annex 6, Part I; Appendix 8: .2.2; 2.2.1; 2.2.2; 2.2.2.1; 2.2.2.2; 2.2.2.3; 2.2.2.4; 2.2.2.5; 2.2.2.6;2.2.2.7;2.2.2.8;2.2.2.9.; ICAO Annex 6, Part I, Section II: Appendix 2.3: 2.2; 2.2.1; 2.2.2; 2.2.2.1; 2.2.2.2; 2.2.2.3; 2.2.2.4; 2.2.2.5; 2.2.2.6: 2.2.2.7; 2.2.2.8; 2.2.2.9.

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

The first 16 (or 15) parameters satisfy the requirements for a Type II and Type IIA FDR.
The first 32 parameters satisfy the requirements for a Type I FDR.
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)
3	Indicated airspeed or calibrated airspeed	95 km/h (50 kt) to max VSo (Note 1) VSo to 1.2 VD (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

Serial number	Parameter	Measurement range	Maximum Sampling and Recording interval *(seconds)*	Accuracy limits *(sensor input compared to FDR read-out)*	Recording resolution
12*	Thrust reverser position	Stowed, in transit, and reverse	1 (per engine)		
13*	Ground spoiler/speed brake selection (selection and position)	Full range or each discrete position	1	±2% unless higher accuracy uniquely required	0.2% of full range
14	Outside air temperature	Sensor range	2	±2˚ C	0.3˚C
15*	Autopilot/auto throttle/AFCS mode and engagement status	A suitable combination of discretes	1		
16	Longitudinal acceleration (Note 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 2 500 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
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)	0 – 370 km (0-200 NM)	4	As installed	1852 m (1 NM)

Serial number	Parameter	Measurement range	Maximum Sampling and Recording interval *(seconds)*	Accuracy limits *(sensor input compared to FDR read-out)*	Recording resolution
	(Notes 7 and 8				
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
34	Brakes (left and right brake pressure, left and right brake pedal position)	(Maximum metered brake range, discretes 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)	Discretes	1	As installed	
37*	Windshear warning	Discrete	1	As installed	
38*	Selected barometric setting (pilot, co-pilot)	As installed	64	As installed	0.1 mh (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

Serial number	Parameter	Measurement range	Maximum Sampling and Recording interval *(seconds)*	Accuracy limits *(sensor input compared to FDR read-out)*	Recording resolution
41*	Selected Mach (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
42*	Selected vertical speed (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
43*	Selected heading (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
44*	Selected flight path (all pilot selectable modes of operation) (course/DSTRK, path angle; final approach path (IRNAV/IAN))		1	As installed	
45*	Selected Decision Height	As installed	64	As installed	Sufficient to determine crew selection
46*	EFIS display format (pilot, co-pilot)	Discrete(s)	4	As installed	
47*	Multi-function/engine/ alerts display format	Discrete(s)	4	As installed	
48*	AC electrical bus status	Discrete(s)	4	As installed	
49*	DC electrical bus status	Discrete(s)	4	As installed	
50*	Engine bleed valve position	Discrete(s)	4	As installed	
51*	APU bleed valve position	Discrete(s)	4	As installed	
52*	Computer failure	Discrete(s)	4	As installed	
53*	Engine thrust command	As installed	2	As installed	
54*	Engine thrust target	As installed	4	As installed	2% of full range
55*	Computed centre of gravity	As installed	64	As installed	1% of full range
56*	Fuel quantity in CG trim tank	As installed	64	As installed	1% of full range
57*	Head up display in use	As installed	4	As installed	
58*	Para visual display on/off	As installed	1	As installed	
59*	Operational stall protection, stick shaker and pusher activation	As installed	1	As installed	
60*	Primary navigation system reference (GNSS, INS, VOR/DME, MLS, Loran C, localizer glideslope)	As installed	4	As installed	
61*	Ice detection	As installed	4	As installed	

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

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

Note 2: VD design diving speed.

Note 3: Refer to §7.8.2.2(a)(12) for increased recording requirements.

Note 4: Record sufficient inputs to determine power.

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

Note 6: Refer to §7.8.2.2(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 centralised aircraft monitor (ECAM) and engine indication and crew alerting system (EICAS). Use the following order of priority:

(1) parameters selected by the flightcrew 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.

ICAO Annex I, Part I, Appendix 8, Table A8-1
ICAO Annex I, Part II Section III: Appendix 2.3 Table A2.3 -1

IS: 7.8.2.1(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 or 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 centralised 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 flightcrew 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 flightcrew 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 attitude:

(1) Pitch attitude.

(2) Roll attitude.

(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 petal, 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.

ICAO Annex 6, Part III, Appendix 5 : 2.2 ; 2.2.1 ; 2.2.2 ; 2.2.3 ; 2.2.4 ; 2.2.5 ; 2.2.6 ; 2.2.7' 2.2.8 ; 2.2.9 ; 2.2.10 ; 2.2.11.

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 attitude	±75 ˚ or 100% of usable range whichever is greater	0.5	± 2˚	0.5˚
7	Roll attitude	±180˚	0.5	±2˚	0.5˚

Serial number	Parameter	Measurement range	Maximum Sampling and Recording interval (seconds)	Accuracy limits (sensor input compared to FDR read-out)	Recording resolution
8	Radio transmission keying	On-off (one discrete)	1	---	---
9	Power on each engine	Full range	1 (per engine)	±2%	0.1% of full range
10	Main rotor :				
	Main rotor speed	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 discretes	1	---	---
15*	Stability augmentation system engagement	Discrete	1	---	---
16*	Main gearbox oil pressure	As installed	1	As installed	6.895 kN/m2 (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
21	Lateral 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
22*	Radio altitude–	-6 m to 750 m (–20 ft to 2 500 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	
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

Serial number	Parameter	Measurement range	Maximum Sampling and Recording interval (seconds)	Accuracy limits (sensor input compared to FDR read-out)	Recording resolution
42*	Selected vertical speed (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
43*	Selected heading (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
44*	Selected flight path (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection
45*	Selected decision height	As installed	4	As installed	Sufficient to determine crew selection
46*	EFIS display format (pilot and co-pilot)	Discrete(s)	4	---	---
47*	Multi-function/engine/ alerts display format	Discrete(s)	4	---	---
48*	Event marker	Discrete	1	---	---

IS 7.8.2.2 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 [appropriate certificating Authority].

(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 attitude	E*	±90˚	0.25	±2˚	0.5˚	*If not available, record rates
3	Roll attitude	E*	±180˚	0.25	±2˚	0.5˚	*If not available, record rates

No.	Parameter Name	Parameter Category	Minimum Recording Range	Maximum Recording Interval in Seconds	Minimum Recording Accuracy	Minimum Recording Resolution	Remarks
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 attitude available
6	Roll rate	E*	±300˚	0.25	±1% + drift of 360˚/hr	2˚	*Essential if no roll rate available
7	Positioning system: latitude/ longitude	E	Latitude: ±90˚; Longitude: ±180˚	2 (1 if available)	As installed (0.00015˚ recommended	0.00005˚	--
8	Positioning system: estimated error	E*	Available range	2 (1 if available)	As installed	As installed	*If available
9	Positioning system: altitude	E	-300 m (-1 000 ft) to maximum certificated altitude of aeroplane +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 (±2˚ 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	--
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	--

No.	Parameter Name	Parameter Category	Minimum Recording Range	Maximum Recording Interval in Seconds	Minimum Recording Accuracy	Minimum Recording Resolution	Remarks
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	--
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	--

No.	Parameter Name	Parameter Category	Minimum Recording Range	Maximum Recording Interval in Seconds	Minimum Recording Accuracy	Minimum Recording Resolution	Remarks
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 (±5˚C recommended)	1˚C	--
28	Main voltage	R	Full range	Each engine each second	As installed	1 Volt	--
29	Cylinder head temperature	R	Full range	Each 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	--

No.	Parameter Name	Parameter Category	Minimum Recording Range	Maximum Recording Interval in Seconds	Minimum Recording Accuracy	Minimum Recording Resolution	Remarks
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

ICAO Annex 6, Part I: Appendix 8, Paragraph 4, 4.1.1; 4.1.2; 4.1.3 and Table A8-3
ICAO Annex 6, Part II: Appendix 2.3, Paragraph 6, 6.1; 6.2; 6.2.1; 6.2.2 and Table A3.1-3
ICAO Annex, 6, Part III: Appendix 5, Table A2.3-33

IS 7.8.4.1 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*.

ICAO Annex 6, Part I: Appendix 8: 5.1.2
ICAO Annex 6, Part II: Appendix 2.3, Paragraph 5: 5.1.2
ICAO Annex 6, Part III : Appendix 5, Paragraph 5 : 5.1.2

(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 includes, for example, D-METAR, D-ATIS, D-NOTAM and other textual data link services.	C
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.***

ICAO Annex 6, Part I: Appendix 8, Table A8-2
ICAO Annex 6, Part II: Appendix 2.3, Table A2.3-3
ICAO Annex 6, Part III: Appendix 5: Table A5-2

IS: 7.9.1.2 EMERGENCY EXIT EQUIPMENT - PASSENGERS

(a) The emergency exit equipment for aeroplanes in 7. 9.1.2(a) shall meet the following requirements.

(1) The assisting means for a floor level emergency exit shall meet the requirements under which the aeroplane was type certified.

(2) The location of each passenger emergency exit shall be—

(i) Recognisable from a distance equal to the width of the cabin.

(ii) Indicated by a sign visible to occupants approaching along the main passenger aisle.

(3) There shall be an emergency exit locating sign—

(i) 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;

(ii) 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

(iii) 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 aeroplane 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 micro lamberts.

(5) 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.

(6) 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.

(7) Each emergency light shall—

(i) Be operable manually both from the flightcrew station and from a point in the passenger compartment that is readily accessible to a normal cabin crew member seat;

(ii) Have a means to prevent inadvertent operation of the manual controls; and

(iii) When armed or turned on at either station, remain lighted or become lighted upon interruption of the aeroplane's normal electric power.

(iv) Provide the required level of illumination for at least 10 minutes at the critical ambient conditions after emergency landing.

(v) Have a cockpit control device that has an "on", "off", and "armed" position.

(8) 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 aeroplane was type certified, unless the Authority cites different requirements for compliance with this paragraph.

(9) No operating handle or operating handle cover may continue to be used if its luminescence (brightness) decreases to below 100 micro lamberts.

(10) Access to emergency exits shall be provided as follows for each passenger carrying aeroplane:

(i) 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.

(ii) 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.

(iii) 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 aeroplane was type certificated, unless the Authority cites different requirements for compliance with this paragraph.

(iv) 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.

(v) No door may be installed in any partition between passenger compartments.

(vi) 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 as cited by the Authority.

(11) Each passenger emergency exit and the means of opening that exit from the outside shall be marked on the outside of the aeroplane with a 2-inch coloured band outlining the exit on the side of the fuselage.

(12) Each passenger emergency exit marking, including the band, shall be readily distinguishable from the surrounding fuselage area by contrast in colour and shall comply with the following:

(i) If the reflectance of the darker colour is 15 percent or less, the reflectance of the lighter colour shall be at least 45 percent.

(ii) If the reflectance of the darker colour is greater than 15 percent, at least a 30 percent difference between its reflectance and the reflectance of the lighter colour shall be provided.

Note: "Reflectance" is the ratio of the luminous flux reflected by a body to the luminous flux it receives.

(iii) 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 colour, 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.

(13) Each passenger-carrying aeroplane shall be equipped with exterior lighting that meets the requirements under which that aeroplane was type certificated, unless the Authority cites different requirement for compliance with this paragraph.

(14) Each passenger-carrying aeroplane shall be equipped with a slip-resistant escape route that meets the requirements under which that aeroplane was type certificated, unless the Authority cites different requirements for compliance with this paragraph.

(15) 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.

(16) 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.

(17) On each large passenger-carrying aeroplane with a ventral exit and tail cone exit shall be—

(i) Designed and constructed so that it cannot be opened during flight; and

(ii) 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.

(18) Portable lights. No person may operate a passenger carrying aeroplane unless it is equipped with flight stowage provisions accessible from each cabin crew member seat.

14 CFR: 121.310

IS: 7.9.1.11 FIRST- AID KITS AND UNIVERSAL PRECAUTION KITS

(a) The required first-aid kits shall include at least the following:

(1) Antiseptic swabs (10/pack)

(2) Bandage: adhesive strips

(3) Bandage: gauze 7.5 cm × 4.5 m

(4) Bandage: triangular; safety pins

(5) Dressing: burn 10 cm × 10 cm

(6) Dressing: compress, sterile 7.5 cm × 12 cm

(7) Dressing: gauze, sterile 10.4 cm × 10.4 cm

(8) Tape: adhesive 2.5 cm (roll)

(9) Steri-strips (or equivalent adhesive strip)

(10) Hand cleanser or cleansing towelettes

(11) Pad with shield, or tape, for eye

(12) Scissors: 10 cm [as allowed by national regulations]

(13) Tape: Adhesive, surgical 1.2 cm × 4.6 m

(14) Tweezers: splinter

(15) Disposable gloves (multiple pairs)

(16) Thermometers (non-mercury)

(17) Mouth-to-mouth resuscitation mask with one-way valve

(18) First-aid manual, current edition

(19) Incident record form

(20) Mild to moderate analgesic [as allowed by national regulations]

(21) Antiemetic [as allowed by national regulations]

(22) Nasal decongestant [as allowed by national regulations]

(23) Antacid [as allowed by national regulations]

(24) Antihistamine [as allowed by national regulations]

(b) The required universal precaution kits shall include at least the following:

(1) Dry powder that can convert small liquid spill into a sterile granulated gel

(2) Germicidal disinfectant for surface cleaning

(3) Skin wipes

(4) Face/eye mask (separate or combined)

(5) Gloves (disposable)

(6) Protective apron

(7) Large absorbent towel

(8) Pick-up scoop with scraper

(9) Bio-hazard disposal waste bag

(10) Instructions.

Note: The carriage of automated external defibrillators (AED) should be determined by operators or the Authority on the basis of a risk assessment taking into account the particular needs of the operation.

ICAO Annex 6, Part I: Attachment B
ICAO Annex 6, Part III, Attachment C

IS: 7.9.1.12 EMERGENCY MEDICAL KIT – AEROPLANES

(a) The required medical kit shall include the following equipment:

(1) Stethoscope

(2) Sphygmomanometer (electronic preferred)

(3) Airways, oropharyngeal (three sizes)

(4) Syringes (appropriate range of sizes)

(5) Needles (appropriate range of sizes)

(6) Intravenous catheters (appropriate range of sizes)

(7) Antiseptic wipes

(8) Gloves (disposable)

(9) Needle disposal box

(10) Urinary catheter

(11) System for delivering intravenous fluids

(12) Venous tourniquet

(13) Sponge gauze

(14) Tape – adhesive

(15) Surgical mask

(16) Emergency tracheal catheter (or large gauge intravenous cannula)

(17) Umbilical cord clamp

(18) Thermometers (non-mercury)

(19) Basic life support cards

(20) Bag-valve mask

(21) Flashlight and batteries

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

(b) [AOC] The required medical kit shall include the following medication:

(1) Epinephrine 1:1 000

(2) Antihistamine – injectable

(3) Dextrose 50% (or equivalent) – injectable: 50 ml

(4) Nitroglycerin tablets, or spray

(5) Major analgesic

(6) Sedative anticonvulsant – injectable

(7) Antiemetic – injectable

(8) Bronchial dilator – inhaler

(9) Atropine – injectable

(10) Adrenocortical steroid – injectable

(11) Diuretic – injectable

(12) Medication for postpartum bleeding

(13) Sodium chloride 0.9% (minimum 250 ml)

(14) Acetyl salicylic acid (aspirin) for oral use

(15) Oral beta blocker

Note 1: Epinephrine 1:10 000 (can be a dilution of epinephrine 1:1 000)

Note 2: The United Nations Conference for the Adoption of a Single Convention on Narcotic Drugs in March 1961 adopted such a Convention, article 32 of which contains special provisions concerning the carriage of drugs in medical kits of aircraft engaged in international flight.

ICAO Annex 6, Part I: Attachment B: 4.1.3

IS: 7.10.1.13 OXYGEN STORAGE AND DISPENSING APPARATUS

(a) The supplemental oxygen supply requirements for non-pressurised aeroplanes are as follows:

(1) An operator shall not operate a non-pressurised aeroplane 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) An aeroplane 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) Flightcrew 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.

(ii) 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-Pressurised Aeroplanes

(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 (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 and includes infants.

(b) The supplemental oxygen supply requirements for pressurised aeroplanes are as follows:

(1) An operator shall not operate a pressurised aeroplane at pressure altitudes above 10 000 ft unless supplemental oxygen equipment, capable of storing and dispensing the oxygen supplies required by this paragraph, is provided.

(2) The amount of supplemental oxygen required shall be determined on the basis of cabin pressure altitude, flight duration and the assumption that a cabin pressurisation failure will occur at the altitude or point of flight that is most critical from the standpoint of oxygen need, and that, after the failure, the aeroplane will descend in accordance with emergency procedures specified in the Aeroplane Flight Manual to a safe altitude for the route to be flown that will allow continued safe flight and landing.

(3) Following a cabin pressurisation failure, the cabin pressure altitude shall be considered the same as the aeroplane pressure altitude, unless it is demonstrated to the Authority that no probable failure of the cabin or pressurisation system will result in a cabin pressure altitude equal to the aeroplane pressure altitude. Under these circumstances, the demonstrated maximum cabin pressure altitude may be used as a basis for determination of oxygen supply.

(4) Oxygen equipment and supply requirements

(i) Flight crew members

(A) 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.

(B) Flight deck seat occupants, not supplied by the flight crew source, are to be considered as passengers for the purpose of oxygen supply.

(C) Oxygen masks shall be located so as to be within the immediate reach of flight crew members whilst at their assigned duty station.

(D) Oxygen masks for use by flight crew members in pressurised aeroplanes operating at pressure altitudes above 25 000 ft, shall be a quick donning type mask.

(ii) Cabin crew members, additional crew members, and passengers

(A) 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.

(B) Aeroplanes intended to be operated at pressure altitudes above 25 000 ft shall be provided sufficient spare outlets and masks and/or sufficient portable oxygen units with masks for use by all required cabin crew members. The spare outlets and/or portable oxygen units are to be 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 pressurisation failure.

(C) Aeroplanes intended to be operated at pressure altitudes above 25 000 ft shall be provided an oxygen dispensing unit connected to oxygen supply terminals immediately available to each occupant, whenever seated. The total number of dispensing units and outlets shall exceed the number of seats by at least 10 percent. The extra units shall be evenly distributed throughout the cabin.

(D) Aeroplanes intended to be operated at pressure altitudes above 25 000 ft or which, if operated at or below 25 000 ft, cannot descend safely within four minutes to 13 000 ft, and for which the individual certificate of airworthiness was first issued on or after 9 November 1998, shall be provided with automatically deployable oxygen equipment immediately available to each occupant, wherever seated. The total number dispensing units and outlets shall exceed the number of seats by at least 10 percent. The extra units shall be evenly distributed throughout the cabin.

(E) The oxygen supply requirements, as specified in Table 2, for aeroplanes not certificated to fly at altitudes above 25,000 ft, may be reduced to the entire flight time between 10,000 ft and 13,000 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 aeroplane is able to descend safely within 4 minutes to a cabin pressure altitude of 13,000 ft.

Table 2 – Requirements for Supplemental Oxygen - Pressurised Aeroplane During and Following Emergency Descent (Note)

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 aeroplanes certificated to fly at altitudes not exceeding 25,000 ft (Note 2) (ii) 2 hours for aeroplanes 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 13,000 ft whichever is the greater (Note 4)
4. 10% of passengers	Entire flight time when the cabin pressure altitude exceeds 10,000 ft but does not exceed 13,000 ft after the first 30 minutes at these altitudes.

Note 1: The supply provided shall take account of the cabin pressure altitude and descent profile for the routes concerned.

Note 2: The required minimum supply is that quantity of oxygen necessary for a constant rate of descent from the aeroplane's maximum certificated operating altitude to 10,000 ft in 10 minutes and followed by 20 minutes at 10,000 ft.

Note 3: The required minimum supply is that quantity of oxygen necessary for a constant rate of descent from the aeroplane'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.

Note 4: The required minimum supply is that quantity of oxygen necessary for a constant rate of descent from the aeroplane's maximum certificated operating altitude to 15,000 ft.

Note 5: For the purpose of this table "passengers" means passengers actually carried and includes infants.

(c) The supplemental oxygen supply requirements for non-pressurised helicopters are as follows:

(1) An operator shall not operate a non-pressurised 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-Pressurised Helicopters

(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 (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 and includes infants.

JAR OPS 1: 1.770 and Appendix 1 to 1.770; 1.775 and Appendix 1 to 1.775
JAR OPS 3: 3.775 and Appendix 1 to 3.775

IS: 7.9.1.32 COSMIC RADIATION DETECTION EQUIPMENT

(a) Compliance with the sampling requirements in 7.9.1.32(a)(2)may be accomplished as follows:

(1) The sampling shall be carried out in conjunction with a Radiological Agency or similar organisation 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.

JAR OPS 1: ACJ OPS 1.680(a)(2)

[THIS PAGE INTENTIONALLY LEFT BLANK]