*Statutory Instrument No. 1 of 2013*

CIVIL AVIATION ACT
(Cap. 71:01)

# CIVIL AVIATION (EQUIPMENT AND INSTRUMENTS) REGULATIONS, 2013

(*Published on 4th January, 2013*)

ARRANGEMENT OF REGULATIONS

REGULATION

PART VI — *Aircraft Lights and Instrument Illumination*



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IN EXERCISE of the powers conferred on the Minister of Transport and Communications by section 89 of the Civil Aviation Act and on the recommendation of the Civil Aviation Authority, the following Regulations are hereby made —

PART I — *Preliminary*

Citation

**1.** These Regulations may be cited as the Civil Aviation (Equipment and Instruments) Regulations, 2013.

Interpretation

**2.** In these Regulations, unless the context otherwise requires —

"aeroplane" means a power-driven heavier-than-air aircraft deriving its lift in flight chiefly from aerodynamic reactions on surfaces which remain fixed under given conditions of flight;

"air operator certificate (AOC)" means a certificate issued by the Authority which authorises an operator to carry out specified commercial air transport operations;

"airborne collision avoidance system (ACAS)" means an aircraft system which —

(*a*) conforms to the requirements prescribed for the purpose;

(*b*) is based on secondary surveillance radar transponder signals; and

(*c*) operates independently of ground based equipment,

designed to provide advice and appropriate avoidance manoeuvres to the pilot in relation to other aircrafts which are equipped with secondary surveillance radar and are in undue proximity;

"appropriate aeronautical radio station" means, in relation to an aircraft, an aeronautical radio station serving the area in which the aircraft is, for the time being;

"automatic direction finding equipment" means radio navigation equipment which automatically indicates the bearing of any radio station transmitting the signals received by such equipment;

"area navigation" means a method of navigation that permits aircraft operations on any desired flight path within the coverage of station-referenced navigation aids or within the limits of the capability of self-contained aids, or a combination of these;

"category I operation (CAT I)" means a precision instrument approach and landing with a decision height not lower than 60 metres (200 ft) and with either a visibility of not less than 800 metres or a runway visual range not less than 550 metres;

"category II operation (CAT II)" means a precision instrument approach and landing with a decision height lower than 60 metres (200 ft) but not lower than 30 metres (100 ft) and a visual range not less 350 metres;

"category IIIA operation (CAT IIIA)" means a precision approach and landing with —

(*a*) a decision height lower than 30 metres (100 ft) or no decision height; and

(*b*) a runway visual range not less than 200 metres;

"category IIIB operation (CAT IIIB)" means a precision approach and landing with —

(*a*) a decision height lower than 15 metres (50 ft) or no decision height; and

(*b*) a runway visual range less than 200 m but not less than 50 metres;

"category IIIC operation (CAT IIIC)" means a precision instrument approach and landing with no decision height and no runway visual range limitations;

"controlled flight into terrain (CFIT)" means when an airworthy aircraft is flown, under the control of a qualified pilot, into terrain, water or obstacles, with inadequate awareness on the part of the pilot of the impending collision;

"distance measuring equipment (DME)" means radio equipment capable of providing a continuous indication of the aircraft's distance from the appropriate aeronautical radio stations;

"emergency locator transmitter (ELT)" means any equipment capable of broadcasting distinctive signals on designated frequencies and, depending on application, may be automatically activated by impact or be manually activated;

"enhanced ground proximity warning system (EGPWS)" means a forward looking warning system that uses the terrain data base for terrain avoidance;

"flash resistant" means not susceptible to burning when ignited;

"flight recorder" means any type of recorder installed in the aircraft for the purpose of complementing accident or incident investigation and includes the cockpit voice recorder or flight data recorder;

"ground proximity warning system (GPWS)" means a warning system that uses radar altimeters to alert the pilots of hazardous flight conditions;

"high speed aural warning" means a speed warning that is required for turbine-engined airplanes and airplanes with a $^{V}$mo/$^{M}$mo greater than 0.80 $^{V}$df/$^{M}$df or $^{V}$d/Md;

"IFR" means Instrument Flight Rules;

"long range overwater flights" means routes on which an aeroplane may be over water and at more than a distance corresponding to 120 minutes at cruising speed or 740 km (400 NM), whichever is the lesser, away from land suitable for making an emergency landing;

"low altitude wind shear warning and guidance system" means a system that issues a warning of low altitude wind shear and may provide the pilot with guidance information of the escaper manoeuvre;

"Mach number indicator" means an indicator that shows airspeed as a function of the Mach number;

"Minimum Equipment List (MEL)" means a list approved by the Authority which provides for the operation of the aircraft, subject to specified conditions, with particular equipment inoperative, prepared by an operator in conformity with, or more restrictive than, the master minimum equipment list established for the aircraft type;

"operator" means a person, organisation or enterprise engaged in or offering to engage in an aircraft operation;

"PBE" means protective breathing equipment;

"required navigation performance" means a statement of the navigation performance necessary for operations with a defined airspace;

"reduced vertical separation minimum (RVSM)" means defined portions of airspace where, based on a Regional Air Navigation Agreement, a reduced vertical separation minimum of 300 m (1000 ft) is applied between FL 290 and FL 410 inclusive;

"runway visual range (RVR)" means the range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the light delineating the runway or identifying its centre line;

"State of Operator" means the state in which the operator's principal place of business is located, or if there is no such business, the operator's permanent place of residence;

"State of Registry" means the state on whose register the aircraft is entered;

"terrain awareness warning system" means a system that provides the flight crew with sufficient information and alerting to detect a potentially hazardous terrain situation and so the flight crew may take effective action to prevent a controlled flight into terrain event; and

"VFR" means Visual Flight Rules.

## PART II — *Equipment of Aircraft*

General equipment and instruments requirement

**3.** (1) In addition to the minimum equipment necessary for the issuance of a certificate of airworthiness under the Civil Aviation, (Airworthiness) Regulations, a person shall not fly an aircraft unless the aircraft is installed with equipment and instruments specified in these Regulations.

(2) The owner or operator of any aircraft which is operated in Botswana but not registered in Botswana which uses an airworthiness inspection program approved or accepted by the State of Registry, shall ensure that equipment and instruments installed in the aircraft are properly installed and inspected in accordance with the requirements of the State of Registry.

(3) The Authority may specify other additional or special equipment as may be required in the Schedules to these Regulations.

(4) All required equipment and instruments shall be approved and installed in accordance with applicable airworthiness requirements specified under the Civil Aviation (Airworthiness) Regulations.

Equipment for commercial air operations

**4.** A person shall not commence a flight in commercial air transport operations unless the required equipment —

(*a*) meets the minimum performance standard, all operational and airworthiness requirements and the relevant provisions of ICAO Annex 10, Volume IV;

(*b*) 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 or navigate, or communicate and navigate safely on the route being flown; and

(*c*) is capable of being operated for the kind of operation being conducted, except as provided in the Minimum Equipment List.

## PART III — *Flight Instruments*

General requirement – flight instruments

**5.** (1) An aircraft shall be equipped with flight instruments which enable the flight crew to —

(*a*) control the flight path of the aircraft;

(*b*) carry out any required procedural manoeuvres; and

(*c*) observe the operating limitations of the aircraft in the expected operating conditions.

(2) Where a method is provided for transferring an instrument from its primary operating system to an alternative system, the method shall include a positive positioning control and shall be marked so as to indicate clearly which system is being used.

(3) The instruments used by any one pilot shall be so arranged as to allow 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 or she normally assumes when looking forward along the flight path.

Minimum flight instruments

**6.** A person may not operate any powered aircraft unless it is equipped with the following flight instruments —

(*a*) an airspeed indicating system calibrated in knots, miles per hour or kilometres per hour;

(*b*) a sensitive pressure altimeter calibrated in feet with a sub-scale setting calibrated in hectopascals per millibars, adjustable for any barometric pressure likely to be set during flight;

(*c*) an accurate time-piece indicating the time in hours, minutes, and seconds;

(*d*) a magnetic compass; and

(*e*) any other equipment as may be specified by the Authority.

Instruments for operations requiring two pilots in day VFR

**7.** In any flight where two pilots are required, each pilot's station shall have separate flight instruments as follows —

(*a*) an airspeed indicator calibrated in knots, miles per hour or kilometres per hour;

(*b*) a sensitive pressure altimeter calibrated in feet with a sub-scale setting calibrated in hectopascals per millibars, adjustable for any barometric pressure likely to be set during flight;

(*c*) a vertical speed indicator;

(*d*) a turn and slip indicator, or a turn co-coordinator incorporating a slip indicator;

(*e*) an attitude indicator;

(*f*) a stabilised direction indicator; and

(*g*) any other equipment as may be specified by the Authority.

Instruments required for IFR operations

**8.** (1) In addition to the requirements under regulation 5, all aircraft 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 —

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

(*b*) for commercial air transport operations, an additional sensitive pressure altimeter calibrated in feet with a sub-scale setting calibrated in hectopascals per millibars, adjustable for any barometric pressure likely to be set during flight;

(*c*) a turn and slip indicator for aeroplanes or a slip indicator for helicopters;

(*d*) attitude indicator (artificial horizon) —

(i) one attitude indicator for aeroplanes,

(ii) three attitude indicators for a commercially operated helicopter, one of which may be replaced by a turn indicator, or

(iii) two attitude indicators for a non-commercially operated helicopter, one of which may be replaced by a turn indicator;

(*e*) a heading indicator (directional gyroscope);
(*f*) a means of indicating whether the supply of power to the gyroscopic instruments is adequate;
(*g*) a means of indicating the outside air temperature in the flight crew compartment;
(*h*) a rate-of-climb and descent indicator;
(*i*) for a commercial operated helicopter, a stabilisation system operations, unless it has been demonstrated to the satisfaction of the Authority that the helicopter possesses, by nature of its design, adequate stability without such a system; and
(*j*) such additional equipment or instruments as may be specified by the Authority.

(2) The requirements of subregulation (1) (*c*), (*d*) and (*e*) 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.

(3) A person shall not operate an aeroplane commercially 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 or areas of operation.

(4) A person shall not conduct single pilot IFR operations for commercial air operations unless the aeroplane is equipped with an autopilot with at least altitude hold and heading mode.

(5) A person shall not operate an aeroplane under IFR unless it is equipped with an audio selector panel accessible to each required flight crewmember.

(6) A person shall not conduct single pilot IFR or night operations in commercial air transport operations unless the aeroplane is equipped with a headset with boom microphone or an equivalent and a transmit button on the control wheel.

Standby attitude indicator

**9.** (1) A person shall not 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 —

(*a*) operates independently of any other attitude indicating system;
(*b*) is powered continuously during normal operation; and
(*c*) 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.

(2) Where the standby attitude indicator is being operated by emergency power, it shall be clearly operating and illuminated to the flight crew.

(3) 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.

(4) Where the standby attitude instrument system is installed and usable through flight attitudes of $360^0$ of pitch and roll, the turn and slip indicators may be replaced by slip indicators.

Equipment and instruments for category II operations

**10.** (1) The instruments and equipment listed in this regulation shall be installed, approved and maintained in accordance with the manufacturer's specification and as specified under Schedule 1 for each aircraft operated in a category II operation.

(2) Group I of a category II operation shall be equipped with the following equipment which shall be inspected both within three calendar months of the previous inspection and shall also have a bench inspection within 12 months of the previous bench inspection using procedures contained in the approved maintenance program —

(*a*) two localizer and glide slope receiving systems and each system shall provide —

(i) a basic Instrument Landing Systems display, and

(ii) an instrument panel capable of showing a basic Instrument Landing Systems display:

Provided a single localiser antenna and a single glide slope antenna may be used;

(*b*) a communications system that does not affect the operation of at least one of the Instrument Landing Systems;

(*c*) a marker beacon receiver that provides distinctive aural and visual indications of the outer and the middle markers;

(*d*) two gyroscopic pitch and bank indicating systems;

(*e*) two gyroscopic direction indicating systems;

(*f*) two airspeed indicators;

(*g*) two sensitive altimeters adjustable for barometric pressure, having markings at 20 foot intervals and each having a placard displaying the correction for altimeter scale error and for the wheel height of the aircraft;

(*h*) one self-monitoring radio altimeter with dual display;

(*i*) two vertical speed indicators; and

(*j*) a flight control guidance system that consists of either an automatic approach coupler or a flight director system.

(3) Category II operations with decision heights below 150 feet shall be equipped with a radio altimeter.

(4) Group II of a category II operation shall be equipped with the following 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 —

(*a*) warning systems for immediate detection by the pilot of system faults in items under subregulation (2) (*a*), (*d*), and (*i*);

(*b*) dual controls;

(*c*) an externally vented static pressure system with an alternate static pressure source;

(*d*) a windshield wiper or equivalent means of providing adequate cockpit visibility for a safe visual transition by either pilot to touchdown and rollout; and

(*e*) a heat source for each airspeed system pitot tube installed or an equivalent means of preventing malfunctioning due to icing of the pitot system.

(5) Group II of a category II operation equipment shall be inspected within 12 months of the previous inspection using procedures contained in the approved maintenance program.

Equipment and instruments for category III operations

**11.** (1) The equipment and instruments listed in this regulation shall be installed, approved and maintained in accordance with internationally acceptable criteria and the Aircraft Flight Manual in each aircraft operated in a category III operation.

(2) Airborne systems for category IIIA minima not less than RVR 200 m (600 ft) shall be equipped with the following equipment in addition to the instrument and navigation equipment required by this Part for IFR flight and category II operations —

(*a*) a redundant flight control or guidance system demonstrated in accordance with internationally acceptable criteria which include —

(i) a Fail Operational or Fail Passive automatic landing system at least to touchdown,

(ii) a Fail Operational or Fail Passive manual flight guidance system providing suitable head-up or head-down command guidance, and suitable monitoring capability at least to touchdown,

(iii) a hybrid system, using automatic landing capability as the primary means of landing at least to touchdown, or

(iv) other systems that can provide an equivalent level of performance and safety;

(*b*) an automatic throttle or automatic thrust control system that meets approved criteria as specified in the Aircraft Flight Manual except that for operations with a 15 m (50 ft) Decision Height, 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;

(*c*) at least two independent navigation receivers or 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;

(*d*) at least two approved radio altimeter systems that meet the performance requirements criteria as specified in the Aircraft Flight Manual, typically with the first pilot's station receiving information from one and the second pilot's station receiving information from the other;

(*e*) failure detection, annunciation, and warning capability, as determined to be acceptable by criteria specified in the Aircraft Flight Manual;

(*f*) 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;

(*g*) suitable forward and side flight deck visibility for each pilot as specified in the Aircraft Flight Manual; and

(*h*) suitable windshield rain removal, ice protection, or defog capability as specified in the Aircraft Flight Manual.

(3) The navigation receivers or sensors referred to under subregulation (2) (*c*) shall meet the criteria specified for category IIIA operations.

(4) Airborne systems for category IIIB minima less than RVR 200 m (600 ft) but not less than RVR 125 m (400 ft) shall be equipped with the following equipment in addition to the instrument and navigation equipment required by this Part for IFR flight, category II and category IIIA operations —

(*a*) a redundant flight control or guidance system demonstrated in accordance with internationally acceptable criteria which include —

(i) a Fail Operational landing system with a Fail Operational or Fail Passive automatic rollout system,

(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,

(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;

(*b*) an automatic throttle or automatic thrust control that meets the appropriate criteria as specified in the Aircraft Flight Manual except that for operations with a 15 m (50 ft) Decision Height, 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;

(*c*) at least two independent navigation receivers or 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;

(*d*) at least two approved radio altimeter systems that meet the performance criteria specified in the Aircraft Flight Manual, typically with the first pilot's station receiving information from one and the second pilot's station receiving information from the other;

(*e*) failure detection, annunciation and warning capability as specified in the Aircraft Flight Manual;

(*f*) 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,

(ii) an approved flight path angle display, or

(iii) an automatic or flight guidance go-around capability;

(*g*) suitable forward and side flight deck visibility for each pilot, as specified in the Aircraft Flight Manual; and

(*h*) suitable windshield rain removal, ice protection, or defog capability as specified in the Aircraft Flight Manual.

(5) The navigation receivers or sensors referred to under subregulation (4) (*c*) shall meet the criteria specified in the Aircraft Flight Manual.

(6) Airborne systems for category IIIC minima less than RVR 75 m (250 ft) shall be equipped with the following equipment in addition to the instrument and navigation equipment required by this Part for IFR flight and category II, category IIIA and category IIIB operations —

(*a*) 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

(*b*) a Fail Operational automatic, manual, or hybrid Rollout Control System.

Equipment of aeroplanes operated by a single pilot under IFR or at night

**12.** An aeroplane operated by a single pilot under IFR or at night shall be equipped with —

(*a*) a serviceable autopilot that has at least altitude hold and heading select modes;

(*b*) a headset with a boom microphone or equivalent; and

(*c*) means of displaying charts that enables them to be readable in all ambient light conditions.

## PART IV — *Communication Equipment*

Radio equipment

**13.** (1) A person shall not operate an aircraft unless it is equipped with radio communication equipment required for the kind of operation being conducted.

(2) An aircraft operated in VFR as a controlled flight, in IFR, at night, as an 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 —

(*a*) capable of conducting two-way communication at any time with air traffic services or aeronautical stations;

(*b*) capable of conducting communications on those frequencies prescribed by the Authority;

(*c*) capable of receiving meteorological information at any time during the flight;

(*d*) capable of conducting communications on the aeronautical emergency frequency 121.5 MHz;

(*e*) approved and installed in accordance with the requirements applicable to them, including the minimum performance requirements;

(*f*) installed such that the failure of any single unit required for communication equipment, will not result in the failure of another unit required for communication purposes; and

(*g*) meeting any other requirements as may be specified by the Authority.

(3) A person shall not operate an aircraft in commercial air transport operations, or as otherwise specified by the Authority, unless the aircraft is equipped with two independent radio communications systems, appropriate to the route and airspace used.

(4) Where 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.

(5) A person shall not operate an aircraft in commercial air transport operations unless the aircraft is equipped with a boom or throat microphone available at each required flight crew member flight duty station.

Flight crew and cabin crew member interphone system for aeroplanes

**14.** (1) A person shall not operate an aeroplane in commercial air transport operations on which a flight crew of more than one is required unless the aeroplane 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.

(2) A person shall not 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 the aeroplane is equipped with a crew member interphone system that —

(*a*) operates independently of the public address system except for handsets, headsets, microphones, selector switches and signalling devices;

(*b*) 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;

(*c*) is readily accessible for use —

(i) from each of the required flight crew stations in the flight crew compartment, and

(ii) at required cabin crew member stations close to each separate or pair of floor level emergency exits;

(*d*) has an alerting system incorporating aural or visual signals for use by flight crew members to alert the cabin crew, and for use by cabin crew members to alert the flight crew in the event of suspicious activity or security breaches in the cabin;

(*e*) has a means for the recipient of a call to determine whether it is a normal call or an emergency call; and

(*f*) provides on the ground a means of two-way communication between ground personnel and at least two flight crew members.

Public address system – air operator certificate holders

**15.** (1) An air operator certificate holder shall not operate a passenger carrying aeroplane with a maximum approved passenger seating configuration of more than 19 unless it is equipped with a public address system that —

(*a*) operates independently of the interphone systems except for handsets, headsets, microphones, selector switches and signalling devices;

(*b*) is readily accessible for immediate use from each required flight crew member station;

(*c*) for each required floor level passenger emergency exit which has an adjacent cabin crew seat, is further equipped with 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;

(*d*) is capable of operation within 10 seconds by a cabin crew member at each of those stations in the compartment from which its use is accessible; and

(*e*) is audible and intelligible at all passenger seats, toilets, and cabin crew seats and workstations.

(2) An air operator certificate holder shall not operate a passenger carrying helicopter with a maximum approved passenger seating configuration of more than 19 unless it is equipped with a public address system that —

(*a*) operates independently of the interphone systems except for handsets, headsets, microphones, selector switches and signalling devices;

(*b*) is readily accessible for immediate use from each required flight crew member station;

(*c*) for each required floor level passenger emergency exit which has an adjacent cabin crew seat, is further equipped with 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;

(*d*) is capable of operation within 10 seconds by a cabin crew member at each of those stations in the compartment from which its use is accessible;

(*e*) is audible and intelligible at all passenger seats, toilets, and cabin crew seats and workstations; and

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

(3) An air operator certificate holder shall not operate a passenger carrying helicopter with a maximum approved passenger seating configuration of more than 9 but less than 19 unless it is equipped with a public address system.

(4) Subregulation (3) shall not apply where —

(*a*) the helicopter is designed without a bulkhead between pilot and passengers; and

(*b*) 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.

## PART V — *Navigation Equipment*

Navigation equipment – general

**16.** (1) A person shall not operate an aircraft unless it is equipped with navigation equipment that enables it to proceed in accordance with —

(*a*) its operational flight plan; and

(*b*) the requirements of air traffic services.

(2) A person shall not operate a flight in defined portions of airspace, including Minimum Navigation Performance Specifications, Reduced Vertical Separation Minimum, or on routes where a Required Navigational Performance Type has been prescribed unless —

(*a*) the person has received authorisation from the Authority in either operations specifications for air operator certificate holders or letter of authorisation for non-air operator certificate holders;

(*b*) the aircraft is equipped with navigation equipment which enables it to operate in accordance with the prescribed Required Navigation Performance Type; and

(*c*) the aircraft is equipped with navigation equipment that continuously provides information to the flight crew of adherence to or departure from track with respect to the required degree of accuracy at any point along that track.

(3) A person shall not operate an aircraft unless it is equipped with sufficient navigation equipment that will enable the aircraft to navigate in accordance with subregulations (1) and (2), such that —

(*a*) in the event of the failure of any piece of navigation equipment at any stage of flight, the remaining equipment enables the aircraft to continue to navigate; and

(*b*) the failure of any single unit required for either communications or navigation purposes, or both does not result in the failure of another unit required for communications or navigation purposes.

(4) The equipment requirements specified under subregulation (3) (*a*) shall not apply in instances where the Authority authorises VFR by visual reference to landmarks.

(5) A person shall not 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 or areas of operation.

(6) An aircraft intended to land in Instrument Meteorological Conditions or at night shall be provided with radio navigation equipment capable of receiving signals providing guidance to —

(*a*) a point from which a visual landing can be effected; or

(*b*) each aerodrome at which it is intended to land in Instrument Meteorological Conditions; and

(*c*) any designated alternate aerodromes.

Minimum Navigation Performance Specifications

**17.** (1) A person shall not operate an aeroplane in Minimum Navigation Performance Specification airspace unless it is equipped with navigation equipment that —

(*a*) continuously provides indications to the flight crew of adherence to or departure from track to the required degree of accuracy at any point along that track; and

(*b*) is authorised by the Authority for Minimum Navigation Performance Specification operations concerned through either operations specifications for air operator certificate holders or letter of authorisation for general aviation.

(2) The navigation equipment required for operations in Minimum Navigation Performance Specification airspace shall be visible and usable by the pilot seated at his or her duty station.

(3) For unrestricted operation in Minimum Navigation Performance Specification airspace an aeroplane shall be equipped with two independent Long-Range Navigation Systems.

(4) For operation in Minimum Navigation Performance Specification airspace along notified special routes, an aeroplane shall be equipped with one Long-Range Navigation System, unless otherwise specified.

Reduced Vertical Separation Minimum

**18.** (1) For flights in defined portions of airspace where, based on a 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 shall be —

(*a*) equipped such that the equipment is capable of —

(i) indicating to the flight crew the flight level being flown,

(ii) automatically maintaining a selected flight level,

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

(iv) automatically reporting pressure-altitude; and

(*b*) authorised for operations in the airspace concerned by —

(i) the State of Operator for air operator certificate holders through operations specifications, or

(ii) the State of Registry for non-air operator certificate holders through a letter of authorisation.

(2) An application for Reduced Vertical Separation Minimum approval or authorisation shall be made to the Authority in the form set out in Part I of Schedule 2 and shall be accompanied by a fee of P2 000.

(3) Prior to granting a Reduced Vertical Separation Minimum approval required under subregulation (1), the Authority shall first satisfy itself that —

(*a*) the vertical navigation performance capability of the aeroplane satisfies the requirements specified in Part II of Schedule 2;

(*b*) the operator has instituted appropriate procedures in respect of continued airworthiness including maintenance and repair practices and programmes; and

(*c*) the operator has instituted appropriate flight crew procedures for operations in Reduced Vertical Separation Minimum airspace.

(4) The Authority shall, in consultation with the State of Registry, where appropriate, ensure that adequate provisions exist, in respect of those aeroplanes referred to under subregulation (1), for —

(*a*) receiving the reports of height-keeping performance issued by the monitoring agencies established in accordance with ICAO Annex 11; and

(*b*) 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 a Reduced Vertical Separation Minimum is applied.

(5) An aeroplane shall be sufficiently equipped 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 enables the aeroplane to navigate in a reduced vertical separation minimum space.

(6) The threshold for the alert referred to under subregulation (1) (*a*) (iii) shall not exceed + or - 90m (300 ft).

Electronic navigation data management

**19.** A person shall not employ electronic navigation data products that have been processed for application in the air and on the ground unless the Authority has approved —

(*a*) 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;

(*b*) the operator's program for continual monitoring of both process and products; and

(*c*) the operator's procedures to ensure the timely distribution and insertion of current and unaltered electronic navigation data to all aircraft.

Altitude reporting transponder

**20.** (1) A person shall not operate an aircraft in airspace that requires a pressure reporting transponder unless the pressure reporting transponder is operative and functional.

(2) A person shall not operate an aircraft at altitudes above FL 290 unless it is equipped with a system that automatically reporting pressure altitudes.

(3) A person shall not operate an aircraft in commercial air transport operations unless it is equipped with a pressure-altitude reporting transponder that operates in accordance with the requirements of Botswana air traffic services and ICAO Annex 10, Volume 4.

(4) An aeroplane for which the individual certificate of airworthiness was first issued after 1 January 2009 shall be equipped with a data source that provides pressure-altitude information with a resolution of 7.62 m (25 ft), or better.

(5) After 1 January 2012, all aeroplanes flying in Botswana shall be equipped with a data source that provides pressure-altitude information with a resolution of 7.62 m (25 ft), or better.

(6) Where an aeroplane is equipped with a Mode S transponder the Mode S transponder shall be provided with an airborne or on-the-ground status if the aeroplane is equipped such that it is capable of detecting such status automatically.

## PART VI — *Aircraft Lights and Instruments Illumination*

Required aircraft lights and instruments illumination

**21.** (1) An aircraft operated at night shall be equipped with —

(*a*) a landing light;

(*b*) navigation or position lights;

(*c*) illumination for all flight equipment and instruments that are essential for the safe operation of the aircraft;

(*d*) lights in all passenger compartments; and

(*e*) a flashlight for each crew member station.

(2) An aircraft type certificated with aviation red or aviation white anti-collision system shall be equipped with an anti-collision system operative in both day and night and in the event of the failure of any light of the anti-collision light system, operation of the aircraft shall continue to a location where repairs or replacements can be made.

Required aircraft lights and instruments illumination for commercial air transport operations

**22.** A person shall not operate an aircraft in commercial air transport operations unless it is equipped with —

(*a*) two landing lights or a single light having two separately energised filaments;
(*b*) an anti-collision light system;
(*c*) illumination for all flight equipment and instruments that are essential for the safe operation of the aircraft;
(*d*) lights in all passenger compartments;
(*e*) a flashlight for each crew member station;
(*f*) navigation or position lights;
(*g*) lights to conform to the international regulations for preventing collisions at sea if the aircraft is a seaplane or an amphibian aircraft; and
(*h*) a landing light that is trainable, at least in the vertical plane for helicopters.

PART VII — *Engine Instruments*

Engine instruments

**23.** (1) Unless the Authority allows or requires different instrumentation for turbine engine powered aeroplanes to provide equivalent safety, a person shall not operate any powered aircraft unless it is equipped with the following engine instruments —

(*a*) a means for indicating fuel quantity in each fuel tank to be used;
(*b*) an oil pressure indicator for each engine;
(*c*) an oil temperature indicator for each engine;
(*d*) a manifold pressure indicator for each engine; and
(*e*) a tachometer for each engine.

(2) Unless the Authority allows or requires different instrumentation for turbine engine powered aeroplanes to provide equivalent safety, in addition to the listed equipment requirements under subregulation (1), a person shall not operate any powered aircraft unless it is equipped with the following engine instruments —

(*a*) a carburettor air temperature indicator for each piston engine;
(*b*) a cylinder head temperature indicator for each air-cooled piston engine;
(*c*) a fuel pressure indicator for each engine;
(*d*) a fuel flowmeter or fuel mixture indicator for each engine not equipped with an automatic altitude mixture control;
(*e*) an oil quantity indicator for each oil-tank when a transfer or separate oil reserve supply is used;
(*f*) 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;
(*g*) 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; or
  (ii) the source of indication shall be actuated by the propeller blade angle or be directly responsive to it.

PART VIII — *Warning Instruments and Systems*

Mach number indicator

**24.** An aircraft with speed limitations expressed in terms of Mach number shall be equipped with a Mach number indicator.

Loss of pressurisation indicator

**25.** A 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 flight crew of any dangerous loss of pressurisation.

Landing gear indicator position and aural warning device

**26.** (1) A powered civil aircraft with retractable landing gear shall be equipped with a landing gear position indicator.

(2) An aeroplane with retractable landing gear shall be equipped with an aural warning device that functions continuously under the following conditions —

(*a*) 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; and

(*b*) 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.

(3) The warning system required under subregulation (2) —

(*a*) may not have a manual shutoff;

(*b*) shall be in addition to the throttle-actuated device installed under the type certification airworthiness requirements; and

(*c*) may utilise any part of the throttle-actuated system including the aural warning device.

(4) The flap position-sensing unit referred to under subregulation (2) may be installed at any suitable place in the aeroplane.

Altitude alerting system

**27.** (1) A person shall not operate a turbine powered aeroplane in Botswana 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 —

(*a*) alerting the flight crew upon approaching preselected altitude in either ascent or descent; and

(*b*) alerting the flight crew by an aural signal, when deviating above or below a preselected altitude.

(2) For operations in defined portions of airspace where, based on Regional Air Navigation Agreement, a vertical separation minimum of 300 m (1000 ft) is applied above FL 290, an aircraft shall be equipped with equipment which is capable of providing an alert to the flight crew when a deviation occurs from the selected flight level.

(3) The threshold for the alert referred to under subregulation (2) may not exceed ±90 m (300 ft).

Ground proximity warning system

**28.** (1) An operator in Botswana shall not operate a turbine-powered aeroplane, or piston-engined aeroplane of a maximum certificated take-off mass in excess of 5,700 kg or authorised to carry more than 9 passengers, unless it is equipped with a Ground Proximity Warning System that has a forward looking terrain avoidance function.

(2) A Ground Proximity Warning System referred to under subregulation (1) 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 —

(*a*) excessive descent rate;

(*b*) excessive terrain closure rate;

(*c*) excessive altitude loss after take-off or go-around;

(*d*) unsafe terrain clearance while not in landing configuration such as —

(i) gear not locked down, or

(ii) flaps not in a landing position; and

(*e*) excessive descent below the instrument glide path.

Weather radar

**29.** (1) A person shall not operate an aeroplane in commercial transport in an area where thunderstorms or other potentially hazardous weather conditions may be expected unless it is equipped with a weather radar.

(2) A person shall not 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.

Airborne collision avoidance system

**30.** (1) An aircraft shall be equipped with such Airborne Collision Avoidance System as may be approved by the Authority.

(2) A person operating an aircraft equipped with an Airborne Collision Avoidance System shall have that system on and operating.

(3) A person shall not 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 Airborne Collision Avoidance System II.

(4) A person shall not operate a turbine engine aeroplane of 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, for which the individual airworthiness certificate was first issued after 1 January 2008 unless it is equipped with an Airborne Collision Avoidance System II.

(5) A person shall not commercially operate a turbine powered aeroplane with a maximum certificated take-off mass in excess of 5700 kg or authorised to carry more than 19 passengers, unless it is equipped with an Airborne Collision Avoidance System II.

(6) The Authority shall approve an Airborne Collision Avoidance System that operates in accordance with the relevant provisions of ICAO Annex 10, Volume IV.

Forward looking wind shear warning system – turbojet aeroplanes

**31.** (1) A turbojet aeroplane engaged in commercial air transport operations with a maximum certificated take-off mass in excess of 5700 kg or authorised to carry more than 9 passengers shall be equipped with a forward-looking wind shear warning system.

(2) The forward-looking wind shear warning system referred to under subregulation (1)shall be capable of —

(*a*) 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; and

(*b*) providing 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.

## PART IX — *Flight and Cockpit Voice Recorders*

Cockpit voice recorders

**32.** (1) A person shall not operate the following aircraft unless it is equipped with a cockpit voice recorder capable of recording the aural environment of the flight deck during flight time —

(*a*) all commercially operated aeroplanes with a maximum certificated take-off mass of over 5 700 kg;

(*b*) all aeroplanes with a maximum certificated take-off mass of more than 27 000 kg;

(*c*) all commercially operated helicopters with a maximum certificated take-off mass of over 3 180 kg; and

(*d*) all helicopters with a certificated take-off mass of over 7 000 kg.

(2) Where a helicopter is not equipped with a flight data recorder, at least a main rotor speed shall be recorded on one track of the cockpit voice recorder.

(3) A cockpit voice recorder referred to in subregulation (1) shall be capable of retaining the information recorded during at least the last 30 minutes of its operation or 2 hours, for aeroplanes of a maximum certificated take-off mass of over 5 700 kg or that received their individual certificate of airworthiness after 1 January 2003.

Cockpit voice recorders performance requirements

**33.** (1) A cockpit voice recorder shall be capable of recording on at least four tracks simultaneously —

(*a*) in an in-line format in one direction if a one directional configuration is used; or

(*b*) in both directions if a bi-directional configuration is used.

(2) The track allocation for a cockpit voice recorder shall be as follows —

(*a*) Track 1 — co-pilot headphones and live boom microphone;

(*b*) Track 2 — pilot headphones and live boom microphone;

(*c*) Track 3 — area microphone; and

(*d*) Track 4 — time reference plus the third and fourth crew members' headphone and live microphone, if applicable.

(3) To preserve the cockpit voice recorder recordings —

(*a*) a person shall not turn off a cockpit voice recorder during flight time;

(*b*) the cockpit voice recorder shall be de-activated upon completion of flight time following an accident or incident; and

(*c*) following an accident or incident, the cockpit voice recorder shall not be re-activated before their disposition as determined in accordance with ICAO Annex 13.

(4) To facilitate location and identification in case of an accident, the cockpit voice recorder shall —

(*a*) be either bright orange or bright yellow;

(*b*) have reflective tape affixed to the external surface to facilitate its location under water;

(*c*) have an approved underwater locating device on or adjacent to the recorder, which is secured in such a manner that it is not likely to be separated during a crash impact and is automatically activated; and

(*d*) 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.

Flight data recorders

**34.** (1) A person shall not operate the following aircraft unless it is equipped with a flight data recorder —

(*a*) an aeroplane in commercial air transport operations with 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 was first issued on or after 01 January 1989 shall be equipped with a Type II Flight Data Recorder;

(*b*) an aeroplane with a maximum certificated take-off mass of more than 27 000 kg for which the individual certificate of airworthiness was first issued on or after 01 January 1989 shall be equipped with a Type I Flight Data Recorder;

(*c*) a turbine powered aeroplane in commercial air transport operations with a maximum certificated take-off mass of more than 5,700 kg for which the individual certificate of airworthiness was first issued on or after 01 January 1987 but before 01 January 1989 shall be equipped with a Type I Flight Data Recorder which shall record time, altitude, airspeed, normal acceleration and heading;

(*d*) a turbine powered aeroplane with a maximum certificated take-off mass of more than 27 000 kg for which the individual certificate of airworthiness was first issued on or after 01 January 1987 but before 01 January 1989 and 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 Flight Data Recorder;

(*e*) a turbine powered aeroplane with a maximum certificated take-off mass of more than 5,700 kg for which the individual certificate of airworthiness was first issued before 01 January 1987 shall be equipped with a Type I Flight Data Recorder which shall record time, altitude, airspeed, normal acceleration and heading;

(*f*) an aeroplane with a maximum certificated take-off mass of more than 5, 700 kg for which the individual certificate of airworthiness was first issued after 01 January 2005 shall be equipped with a Type IA Flight Data Recorder;

(*g*) a turbine powered aeroplane in commercial air transport operations with a maximum certificated take-off mass of 5,700 kg or less for which the individual certificate of airworthiness was first issued on or after 01 January 1990 shall be equipped with a Type IIA Flight Data Recorder;

(*h*) a helicopter with a certificated take-off mass of over 7 000 kg shall be equipped with a Type IV Flight Data Recorder; and

(*i*) a helicopter with a certificated take-off mass of over 3 180 kg shall be equipped with a Type IVA Flight Data Recorder.

(2) A flight data recorder referred to in subregulation (1) shall —

(*a*) 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;

(*b*) be calibrated as required by the Authority;

(*c*) have an approved device to assist in locating a recorder that may be under water and can be automatically activated; and

(*d*) be capable of retaining the information recorded during the last —

(i) 25 hours of operation, in the case of a Type I and II,

(ii) 30 minutes of operation, in the case of a Type IIA, and

(iii) 10 hours of operation, in the case of a Type IV and V; and

(*e*) comply with the requirements specified in Schedule 3.

(3) The following flight data recorder media shall not be acceptable for use in aircraft registered in Botswana, or operated in commercial air transport operations in Botswana —

(*a*) engraving metal foil;

(*b*) photographic film; or

(*c*) analogue data using frequency modulation.

(4) A person shall not —

(*a*) turn off a flight data recorder during flight time;

(*b*) deactivate the flight data recorder upon completion of flight time following an accident or incident; or

(*c*) following an accident or incident, reactivate the flight data recorder before the flight disposition is determined in accordance with ICAO Annex 13.

Recording of data link communications

**35.** (1) A powered aircraft that uses data link communications and is required to carry a cockpit voice recorder shall record on a flight recorder all data link communications to and from the aeroplane.

(2) The minimum recording duration shall be equal to the duration of the cockpit voice recorder and shall be correlated to the recorded cockpit audio.

(3) The recording shall contain sufficient information to derive the content of the data link communications message and, whenever practical, the time the message was displayed to or generated by the crew shall be recorded.

PART X — *Emergency, Rescue and Survival Equipment*

Emergency equipment – all aircraft

**36.** Each item of emergency and flotation equipment referred to under this Part shall be —

(*a*) readily accessible to the crew and, with regard to equipment located in the passenger compartment, to passengers without appreciable time for preparatory procedures;

(*b*) clearly identified and clearly marked to indicate its method of operation;

(*c*) marked as to date of last inspection; and

(*d*) marked as to contents when carried in a compartment or container.

Emergency exit equipment – passengers

**37.** (1) A person shall not operate an aeroplane in Botswana unless it is equipped with the following emergency exit equipment —

(*a*) each passenger-carrying landplane 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;

(*b*) each passenger emergency exit, its means of access, and its means of opening shall be conspicuously marked by a sign visible to occupants approaching along the main passenger aisle;

(*c*) 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) includes floor proximity emergency escape path marking;

(*d*) each passenger emergency exit and the means of opening that exit from the outside shall be marked on the outside of the aeroplane;

(*e*) each passenger-carrying aeroplane shall be equipped with a slip-resistant escape route that meets the requirements under which that aeroplane was type certified; and

(*f*) each passenger carrying aeroplane shall meet the detailed requirements for emergency exits for passengers as set out in Schedule 4.

(2) A person shall not operate a helicopter certificated with a maximum take-off mass of 3 180 kg or less and nine or less passenger seats unless it is equipped with the following emergency exit equipment —

(*a*) at least one emergency exit on each side of the cabin readily accessible to each passenger and one of these exits shall be usable in any probable attitude that may result from a crash;

(*b*) doors intended for normal use may also serve as emergency exits, provided that they meet the requirements of this regulation; and

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

(i) be above the waterline, and

(ii) be open without interference from flotation devices, whether stowed or deployed.

(3) Each emergency exit specified under subsection (1) shall —

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

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

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

(*d*) be reasonably protected from jamming by fuselage deformation.

(4) A person shall not operate a helicopter certificated with a maximum take-off mass of more than 9 072 kg and 10 or more passenger seats unless it is equipped with the following emergency exit equipment —

(*a*) Type I exit: 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;

(*b*) Type II exit: this type is the same as Type I except that the opening shall be at least 20 inches wide by 44 inches high;

(*c*) Type III exit: this type is the same as Type I except that the opening shall be at least 20 inches wide by 36 inches high and the exit need not be at floor level; and

(*d*) Type IV exit: 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.

(5) Emergency exits shall be accessible to all passengers and except as provided in regulation 38 (2), shall be provided for as set out in Schedule 5.

(6) In addition to the requirements set out in subregulation (5), there shall be enough openings in the top, bottom or ends of the fuselage to allow evacuation with the rotorcraft on its side.

Ditching emergency exits for passengers

**38.** (1) Where certification with ditching provisions is requested, the markings required under regulation 37 shall be designed to remain visible if the rotorcraft is capsized and the cabin is submerged.

(2) Where a helicopter was certificated with ditching provisions, ditching emergency exits shall be provided in accordance with the following —

(*a*) for rotorcraft that have a passenger seating configuration, excluding pilots seats, of 9 seats or less, one exit above the waterline in each side of the rotorcraft, meeting at least the dimensions of a Type IV exit;

(*b*) 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; and

(*c*) flotation devices, whether stowed or deployed, may not interfere with or obstruct the exits.

Ramp exits

**39.** One Type I exit only, or one Type II exit only, that is required in the side of the fuselage referred to under regulation 37 may be installed instead in the ramp of floor ramp rotorcraft if —

(*a*) its installation in the side of the fuselage is impractical; and

(*b*) its installation in the ramp meets emergency exit access requirements specified in regulation 43.

Emergency exit arrangement

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

(2) An emergency exit shall be capable of being opened from the inside and from the outside.

(3) The means of opening each emergency exit shall be simple, obvious and 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.

(6) Except as provided in these Regulations, each land-based rotorcraft emergency exit shall have an approved slide 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 that 6 feet above the ground —

(*a*) with the rotorcraft on the ground and with the landing gear extended;

(*b*) with one or more legs or part of the landing gear collapsed, broken, or not extended; and

(*c*) 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 —

(*a*) a slide shall be automatically deployed and the 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 and where a passenger emergency exit is also a passenger entrance door or service door, it 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;

(*b*) a slide shall be automatically erected within 10 seconds after deployment is begun;

(*c*) a slide shall be of such length after full deployment such 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; and

(*d*) a slide shall have the capacity, 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.

(8) A helicopter which has 30 or fewer passenger seats and has an exit threshold more than 6 feet above the ground, may have a rope or other assist means used in place of the slide referred to under subregulation (7), provided this was accomplished during the emergency evacuation test during type certification of the helicopter.

(9) Where a rope, with its attachment, is used for compliance with subregulations (6) and (8) it shall be able to —

(*a*) withstand a 400 pound static load; and

(*b*) 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.

Emergency exit marking

**41.** (1) A passenger emergency exit of an aircraft, 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.

(2) The markings of an emergency exit of an aircraft shall be designed to remain visible for rotorcraft equipped for overwater flights if the rotorcraft is capsized and the cabin is submerged.

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

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

(*a*) 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

(*b*) 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.

(5) The emergency exit markings specified under subregulations (1) to (4) shall apply in addition to those requirements set out in Part II of Schedule 4.

Emergency lighting

**42.** (1) A source of light with its power supply independent of the main lighting system shall be installed in an aircraft to —

(*a*) illuminate each passenger emergency exit marking and locating sign; and

(*b*) 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 of an aircraft shall be provided at each emergency exit and 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 under subregulation (1) or (2) shall be operable manually from the cockpit station and from a point in the passenger compartment that is readily accessible.

(4) The cockpit control device shall 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.

(5) 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.

Emergency exit access

**43.** (1) A passageway between passenger compartments, and each passageway leading to Type I and Type II emergency exits in an aircraft shall be —

(*a*) unobstructed; and

(*b*) at least 20 inches wide.

(2) There shall be enough space adjacent to an 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 for that exit.

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

(*a*) for rotorcraft that have a passenger seating configuration of 20 or more, excluding pilot seats, 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; and

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

Main aisle width

**44.** The main passenger aisle width between seats of an aircraft shall be as set out in Schedule 6.

Visual signalling devices

**45.** A person shall not operate an aircraft over water or across land areas which have been designated by the Authority as areas in which search and rescue is difficult unless the aircraft is equipped with such signalling devices as may be appropriate to the area over flown, to include —

(*a*) at least one pyrotechnic signalling device for each life raft required for overwater operations; and

(*b*) any other requirements specified by the Authority.

Survival kits

**46.** A person shall not operate an aircraft across land areas which have been designated by the Authority as areas in which search and rescue is difficult unless the aircraft is equipped with enough survival kits for the number of occupants of the aeroplane appropriate for the route to be flown.

Emergency locator transmitter

**47.** (1) A person shall not operate an aeroplane for commercial air transport unless it is equipped with emergency locator transmitter equipment as follows —

(*a*) an aeroplane authorised to carry more than 19 passengers shall be equipped with at least one automatic ELT or two ELTs of any type;

(*b*) an aeroplane authorised to carry more than 19 passengers for which the individual certificate of airworthiness was first issued after 1 July 2008 shall be equipped with at least two ELTs, one of which shall be automatic;

(*c*) an aeroplane authorised to carry 19 passengers or less for which the individual certificate of airworthiness is first issued after 1 July 2008 shall be equipped with at least one automatic ELT;

(*d*) except as provided for under paragraph (*c*), from 1 July 2008, an aeroplane authorised to carry 19 passengers or less shall be equipped with at least one ELT of any type; and

(*e*) at least one survival type ELT shall be located with each life-raft carried.

(2) A person shall not operate a helicopter unless it is equipped with emergency locator transmitter equipment as follows —

(*a*) a helicopter operating in performance Class 1 and 2 shall be equipped with at least one automatic ELT and, when operating on flights over water, with at least one automatic ELT and one ELT in a raft or life jacket; and

(*b*) a helicopter operating in performance Class 3 shall be equipped with at least one automatic ELT and, when operating on flights over water, with at least one automatic ELT and one ELT in a raft or life jacket.

(3) A person shall not operate an aeroplane for general aviation purposes unless it is equipped with emergency locator transmitter equipment as follows —

(*a*) an aeroplane shall be equipped with at least one ELT of any type; and

(*b*) an aeroplane for which the individual certificate of airworthiness is first issued after 1 July 2008 shall be equipped with at least one automatic ELT.

(4) Any ELT equipment carried on an aeroplane in accordance with subregulation (1) and (3) shall be capable of transmitting on the frequencies 121.5 MHz and 406 MHz simultaneously.

(5) The manner in which the ELTs shall be registered, carried, the specifications to which they shall adhere, the frequencies on which they shall be able to transmit and the manner in which they are to be maintained shall be as set out in Schedule 7.

Portable fire extinguishers

**48.** (1) A person shall not operate an aircraft unless it is equipped with portable fire extinguishers of a type which, when discharged, does not cause dangerous contamination of the air within the aircraft.

(2) At least one portable fire extinguisher shall be located in —

(*a*) the pilot's compartment; and

(*b*) each passenger compartment that is separate from the pilot's compartment and not readily accessible to the flight crew.

(3) A person shall not operate an aircraft unless it is equipped with portable fire extinguishers accessible for use in crew, passenger, and cargo compartments as follows —

(*a*) 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;

(*b*) 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;

(*c*) at least one portable fire extinguisher shall be conveniently located on the flight deck for use by the flight crew;

(*d*) 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; and

(*e*) for each aeroplane having a passenger seating capacity of more than 30, there shall be at least a number of portable fire extinguishers as set out in Schedule 8 which shall be conveniently located and uniformly distributed throughout the compartment.

Lavatory fire extinguisher

**49.** (1) A person shall not operate a passenger-carrying transport category aeroplane unless each lavatory in the aeroplane is equipped with a built-in fire extinguisher for each disposal receptacle for towels, paper, or waste located within the lavatory.

(2) A built-in lavatory fire extinguisher referred to in subregulation (1) shall be designed to discharge automatically into each disposal receptacle upon occurrence of a fire in the receptacle.

Lavatory smoke detector

**50.** A person shall not operate a passenger-carrying transport category aeroplane unless each lavatory in the aeroplane is equipped with a smoke detector system or equivalent that provides —

(*a*) a warning light in the cockpit; or

(*b*) a warning light or audio warning in the passenger cabin which is 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.

Crash axe

**51.** A person shall not 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.

Marking of break-in points

**52.** Where 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 set out in Schedule 9.

First-aid kit

**53.** (1) A person shall not operate an aircraft unless it is equipped with an accessible, approved first-aid kit with medical supplies adequate to the number of passengers the aircraft is authorised to carry.

(2) The type, number, location and contents of first-aid kits to be carried in an aircraft referred to in subregulation (1) shall be asset out in Schedule 10.

Emergency medical kit — aeroplanes

**54.** (1) A person shall not 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.

(2) The location and contents of emergency medical kits to be carried in an aircraft referred to in subregulation (1) shall be as set out in Schedule 11.

Oxygen storage and dispensing apparatus

**55.** (1) An aircraft intended to be operated at altitudes requiring the use of supplemental oxygen shall be equipped with adequate oxygen storage and dispensing apparatus.

(2) The oxygen storage and dispensing 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 set out in Schedule 12.

(3) A person shall not operate an aircraft at altitudes above 10,000 feet unless it is equipped with oxygen masks, located so as to be within the immediate reach of flight crew members while at their assigned duty station.

(4) A person shall not operate a pressurised aeroplane at altitudes above 25,000 feet unless —

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

(*b*) sufficient spare outlets and masks 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 or her location at the time of cabin pressurisation failure.

(5) An oxygen-dispensing unit connected to oxygen supply masks shall be installed so as to be immediately available to each occupant, wherever seated.

(6) The total number of oxygen dispensing units and oxygen supply terminals shall exceed the number of seats by at least 10% and the extra oxygen portable units are to be evenly distributed throughout the cabin.

(7) 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.

Protective breathing equipment

**56.** (1) Any air operator certificate holder shall not operate an aeroplane with a maximum certified take-off mass exceeding 5700 kg or having a maximum approved seating configuration of more than 19 seats unless it is equipped with —

(*a*) protective breathing equipment (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

(*b*) sufficient portable protective breathing equipment (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.

(2) The oxygen supply for protective breathing equipment (PBE) in an aircraft may be provided by the required supplemental oxygen system.

(3) The protective breathing equipment (PBE) intended for flight crew member's use shall —

(*a*) be conveniently located on the flight deck; and

(*b*) be easily accessible for immediate use by each required flight crew member at their assigned duty station.

(4) The protective breathing equipment (PBE) intended for cabin crew member's use shall be installed adjacent to each required cabin crew member duty station.

(5) In any aeroplane, easily accessible portable protective breathing equipment (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 protective breathing equipment (PBE) shall be stowed outside but adjacent to the entrance to that compartment.

(6) The protective breathing equipment (PBE) in an aeroplane shall, while in use, not prevent any required communication.

First-aid oxygen dispensing units

**57.** (1) An air operator certificate holder shall not 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 the aeroplane is equipped with —

(*a*) undiluted first-aid oxygen for passengers who, for physiological reasons, may require oxygen following a cabin depressurisation; and

(*b*) a sufficient number of oxygen dispensing units, but in no case less than two, with a means for cabin crew members to use the supply.

(2) The amount of first-aid oxygen required for an operation referred to in subregulation (1) (*a*) shall be determined on the basis of —

(*a*) flight duration after cabin depressurisation at cabin altitudes of more than 8,000 feet;

(*b*) an average flow rate of at least 3 litres Standard Temperature Pressure Dry per minute per person; and

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

(3) The amount of first-aid oxygen required for an operation referred to in subregulation (1) shall be determined on the basis of cabin pressure altitudes and flight duration, consistent with the operating procedures established for each operation and route.

(4) The oxygen equipment referred to in subregulation (1) shall be capable of generating a mass flow to each user of at least 4 litres per minute, Standard Temperature Pressure Dry and means may be provided to decrease the flow to not less than 2 litres per minutes, at a Standard Temperature Pressure Dry at any altitude.

Megaphones

**58.** (1) An air operator certificate holder shall equip an aeroplane with a portable battery-powered megaphone or megaphones readily accessible to the crew members assigned to direct emergency evacuation.

(2) The number and location of megaphones required under subregulation (1) shall be determined as follows —

(*a*) 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;

(*b*) 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; and

(*c*) 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.

Individual flotation devices

**59.** (1) Landplanes shall be equipped with one life-jacket or equivalent flotation device equipped with a means of electric illumination 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 —

(*a*) when flying en-route over water beyond gliding distance from the shore;

(*b*) 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

(*c*) when taking off or landing at an aerodrome where the State of the Operator has determined the take off or approach path is so disposed over water that in the event of a mishap there would be a likelihood of ditching.

(2) All seaplanes for all flights shall be equipped with —

(*a*) one life-jacket, or equivalent individual flotation Device, 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*) equipment for making the sound signals prescribed in the International Regulations for preventing Collisions at Sea, where applicable; and

(*c*) one sea anchor (drogue).

Life rafts

**60.** (1) In addition to the equipment specified under regulations 59 and 61, the following shall be equipped with life saving rafts in sufficient numbers to carry all persons on board —

(*a*) aeroplanes operated on long range over-water flights;

(*b*) 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;

(*c*) 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; and

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

(2) An aircraft shall be equipped with life saving rafts with a sufficient capacity to carry all persons on board in the event of the loss of one raft of the largest capacity.

(3) All life saving rafts referred to under subregulation (1) and (2) shall be stowed so as to facilitate their ready use in an emergency and shall be equipped with the following life sustaining equipment —

(*a*) an electric survivor locator light;

(*b*) a survival kit;

(*c*) a pyrotechnic signalling device; and

(*d*) an ELT.

(4) In helicopters, life saving 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.

Flotation device for chelicopter ditching

**61.** A helicopter 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 autorotational or safe forced landing distance from land in the case of performance Class 3 helicopters, shall be equipped with a permanent or rapidly deployable means of floatation so as to ensure a safe ditching of the helicopter.

## PART XI — *Miscellaneous Systems and Equipment*

Seats, safety belts and shoulder harnesses

**62.** An 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 —

(*a*) a seat with safety belt for each person on board over 2 years of age; and a restraining belt for each berth on board the aircraft;

(*b*) a safety harness for each flight crew member seat;

(*c*) a safety harness for each pilot seat which —

(i) shall incorporate a device which can automatically restrain the occupant's torso in the event of rapid deceleration,

(ii) includes shoulder straps and a seat belt with a device to prevent an incapacitated pilot from interfering with the flight controls;

(*d*) 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; and

(*e*) the cabin crew member's seats shall be located near floor level and other emergency exits as required by the Authority for emergency evacuation.

Pilot and passenger compartment doors – aeroplanes

**63.** (1) A person shall not operate a passenger carrying aeroplane of a maximum certificated take-off mass in excess of 45 000 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) A person shall not operate a passenger carrying aeroplane having a certificated takeoff mass of less than 45 000 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) A pilot compartment door shall be capable of being locked and unlocked from either pilot's station.

(4) An operator shall equip an aeroplane with a means for monitoring from the pilot station the entire door area outside the pilot compartment to identify persons requesting entry and to detect suspicious behaviour or potential threat.

(5) An operator shall equip an aeroplane with a passenger compartment door designed to have —

(*a*) a means for a crew member, 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;

(*b*) a placard on each door used to access a required passenger emergency exit, indicating that such door shall be open during take-off and landing; and

(*c*) a means readily available for each crew member to unlock any door that separates a passenger compartment from another compartment that has emergency exit provisions.

Passenger information signs

**64.** (1) Subject to subregulation (2), a person shall not operate a signs passenger carrying aeroplane with a maximum certificated take-off weight of 5,700 kg or more unless it is equipped with —

(*a*) 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;

(*b*) 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; and

(*c*) a sign or placard affixed to each forward bulkhead and each passenger seat back that reads "Fasten Seat Belt While Seated".

(2) Notwithstanding subregulation (1), a person shall not 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 members when seat belts shall be fastened and when smoking is not allowed.

Materials for cabin interiors, cargo and baggage compartments

**65.** (1) A person shall not operate an aircraft unless each compartment used by the crew or passengers is equipped with the following requirements of the State of Design —

(*a*) materials shall be at least flash resistant;

(*b*) the wall and ceiling linings and the covering of upholstering, floors and furnishings shall be flame resistant;

(*c*) each compartment where smoking is to be allowed shall be equipped with self-contained ash trays that are completely removable and other compartments shall be placarded against smoking; and

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

(2) A cargo compartment shall be equipped with ceiling and sidewall liner panels which are constructed of materials which meet the test requirements for flame resistance of cargo compartment liners as specified for type certification.

(3) 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 refurbishing of the cabin interior with materials that comply with subregulation (1) and (2).

Power supply, distribution and indication system

**66**. (1) An air operator certificate holder shall not operate an aeroplane unless it is equipped with —

(*a*) 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;

(*b*) 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; or

(*c*) a means for indicating the adequacy of the power being supplied to required flight instruments.

(2) All engine-driven sources of energy, when used, shall make provision for back-up in emergencies.

Protective circuit fuses

**67.** A person shall not 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.

Icing protection equipment

**68.** (1) A person shall not 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.

(2) A person shall not 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.

(3) Any illumination referred to under subregulation (2) shall be of a type that will not cause glare or reflection that would handicap crew members in the performance of their duties.

Pitot heat and indication systems

**69.** (1) A person shall not operate an aircraft in instrument flight conditions unless it is equipped with a pitot heat system.

(2) An air operator certificate holder shall not 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 —

(*a*) the indication incorporates an amber light that is in clear view of a flight crew member;

(*b*) the indication is designed to alert the flight crew members if —

(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

(*c*) an integrated flight crew alerting system that will notify the crew if the pitot system is malfunctioning.

Static pressure system

**70.** (1) A person shall not 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.

(2) A person shall not 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.

(3) A person shall not 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.

Windshield wipers

**71.** An air operator certificate holder shall not 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.

Chart holder

**72.** A person shall not operate an aeroplane in commercial air transport operations under single pilot IFR or at night unless the aeroplane is equipped with a chart holder installed in an easily readable position that can be illuminated for night operations.

Cosmic radiation detection equipment

**73.** (1) A person shall not operate an aeroplane in commercial air transport operations in an aeroplane intended to be operated above 15000 m unless it is equipped with —

(*a*) an instrument to measure and indicate continuously the dose rate of total cosmic radiation being received and the cumulative dose on each flight; or

(*b*) a system of on-board quarterly radiation sampling acceptable to the Authority.

Offences and penalties

**74.** (1) Any person who operates an aircraft which is not fitted with the equipment or instruments required under these regulations commits an offence and is liable, for a first offence to a fine not exceeding P15 000, or to imprisonment to a term not exceeding 3 years, for a second offence to a fine not exceeding P20 000, or to imprisonment to a term not exceeding 4 years and for a subsequent offence to a fine not exceeding P30 000, or to imprisonment for a term not exceeding 6 years.

(2) Where an offence under subregulation (1) is committed by a body corporate the fine shall not exceed P50 000 for a first offence, P100 000 for a second offence and P150 000 for any subsequent offence.

(3) Any person who —

(*a*) hinders or obstructs a person authorised by the Authority in the exercise of his or her powers or the performance of his or her duties;

(*b*) makes or causes to be made, either orally or in writing —

(i) any fraudulent, misleading or false statement for the purpose of obtaining any rating, approval, authorisation or other document in terms of these Regulations,

(ii) any fraudulent, misleading or false entry in any logbook, record or report which is required to be kept, maintained, made or used to show compliance with any provision of these Regulations;

(*c*) falsifies, counterfeits, alters, defaces or mutilates, or adds anything to, any rating, approval, authorisation or other document issued in terms of these Regulations; or

(*d*) does or causes, or permits to be done or caused, any act contrary to, or who fails to comply with any provision of these Regulations, or a direction given or a prohibition made or a condition imposed in terms thereof,

commits an offence and is liable to a fine not exceeding P5 000 000, or to imprisonment to a term not exceeding 10 years.

(4) Any person who contravenes any of the provisions of these Regulations for which a penalty is not prescribed is liable to a fine not exceeding P5 000 000, or to imprisonment to a term not exceeding 10 years.

Administrative penalties

**75.** Any person authorised by the Authority may impose an administrative penalty of an amount not exceeding that specified in regulation 74 where a person contravenes any of the provisions of these Regulations.

SCHEDULE 1
*(regulation 10 (1))*

CATEGORY II - INSTRUMENTS AND EQUIPMENT APPROVAL AND MAINTENANCE REQUIREMENTS

GENERAL
The instruments and equipment required by regulation 10 shall be approved as provided in this Schedule 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 —

(*a*) 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.";

(*b*) the altimeters and the static pressure systems were tested and inspected; and

(*c*) all other instruments and items of equipment specified in regulation 10 that are listed in the proposed maintenance program were bench checked and found to meet the manufacturer's specifications.

**1. Flight control guidance system**
All components of the flight control guidance system shall be approved as installed by the evaluation program specified in paragraph (*e*) if they have not been approved for Category III 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.

**2. Radio altimeter**
A radio altimeter must meet the performance criteria of this paragraph for original approval and after each subsequent alteration —

(*a*) it shall display to the flight crew clearly and positively the wheel height of the main landing gear above the terrain;

(*b*) it shall display wheel height above the terrain to an accuracy of ±5 feet or 5 percent, which ever is greater, under the following conditions —
  (i) Pitch angles of zero to $\pm 5^0$ about the mean approach attitude,
  (ii) Roll angles of zero to $20^0$ in either direction,
  (iii) Forward velocities from minimum approach speed up to 200 knots, and
  (iv) Sink rates from zero to 15 feet per second at altitudes from 100 to 200 feet.

(*c*) over level ground, it must track the actual altitude of the aircraft without significant lag or oscillation;

(*d*) 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;

(*e*) 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; and

(*f*) 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.

**3. Other instruments and equipment**.
All other instruments and items of equipment required by regulation 10 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.

**4. Evaluation program.**

(*a*) ***Application***

Approval by evaluation is requested as a part of the application for approval of the Category II manual.

(*b*) ***Demonstrations***

Unless otherwise authorised by the Authority, the evaluation program for each aircraft requires the demonstrations specified in this paragraph. At least 50 ILS approaches shall be flown with at least five approaches on each of three different ILS facilities and no more than one half of the total approaches on any one ILS facility. All approaches shall be flown under simulated instrument conditions to a 30 m (100 foot) decision height and 90 percent of the total approaches made shall be successful. A successful approach is one in which —

(i) at the 30 m (100 foot) decision height, the indicated airspeed and heading are satisfactory for a normal flare and landing (speed must be ±5 knots of programmed airspeed, but may not be less than computed threshold speed if auto throttles are used),

(ii) the aircraft at the 30 m (100 foot) decision height, is positioned so that the cockpit is within, and tracking so as to remain within, the lateral confines of the runway extended,

(iii) deviation from glide slope after leaving the outer marker does not exceed 50 percent of full-scale deflection as displayed on the ILS indicator,

(iv) no unusual roughness or excessive attitude changes occur after leaving the middle Marker, and

(v) in the case of an aircraft equipped with an approach coupler, the aircraft is sufficiently in trim when the approach coupler is disconnected at the decision height to allow for the continuation of a normal approach and landing.

(*c*) ***Records***

During the evaluation program the following information shall be maintained by the applicant for the aircraft with respect to each approach and made available to the Authority upon request —

(i) each deficiency in airborne instruments and equipment that prevented the initiation of an approach,

(ii) the reasons for discontinuing an approach, including the altitude above the runway at which it was discontinued,

(iii) speed control at the 30 m (100 foot) DH if 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, and

(vii) quality of overall system performance.

(*d*) **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.

Each maintenance program for Category II instruments and equipment shall contain the following —

(i) a list of each instrument and item of equipment specified in regulation 10 that is installed in the aircraft and approved for Category II operations, including the make and model of those specified in regulation 10 (2),

(ii) 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 under the Civil Aviation (Airworthiness) Regulations, 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,

(iii) a schedule that provides for the performance of bench checks for each listed instrument and item of equipment that is specified in regulation 10 (2) within 12 calendar months after the date of the previous bench check,

(iv) 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,

(v) 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 regulation 10 (2) to perform as approved for Category II operations including a procedure for recording functional flight checks,

(vi) a procedure for assuring that the pilot is informed of all defects in listed instruments and items of equipment,

(vii) 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, and
(viii) 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.

(*e*) ***Bench check***

(1) A bench check required by this section shall comply with this paragraph. Except as specified in (2) of this paragraph, 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, and
(ii) an avionics rating.

(2) It shall be performed by a certificated air operator on aircraft identified in its approved Operations Specifications with the approved authorisations to perform maintenance and approve for return to service its own aircraft maintained under a continuous maintenance program under an equivalent system identified in Civil Aviation (Air Operator Certification and Administration) Regulations.

(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.

(*f*) ***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.

SCHEDULE 2

PART 1 — *Application for Reduced Vertical Separation Minimum (regulation 18 (2))*

Applications for RVSM shall be made using CAAB Form FSD 133. Submit forms and application package referenced in paragraph 4 of RVSM application form to:

DIRECTOR, FLIGHT SAFETY
CIVIL AVIATION AUTHORITY OF BOTSWANA
P. O. BOX 250
GABORONE, BOTSWANA

GENERAL

| General Information | | | | |
|---|---|---|---|---|
| Applicant's Name and Address | | | | |
| Aeroplane Registration | | Serial Number | | |
| Aeroplane Manufacturer | | | | |
| Aeroplane Type Designation/Model | | | | |
| Aeroplane Address (Hexadecimal) | | | | |
| **Scope of Application** | | | **YES** | **NO** |
| Application for AFI RVSM operations? | | | ☐ | ☐ |
| Other? | | | ☐ | ☐ |
| Initial request for RVSM approval for aeroplane type referenced in 1.5? | | | ☐ | ☐ |

AIRWORTHINESS

Type Design Approval for referenced Aeroplane Type Designation

The RVSM type design approval is reflected in:

☐ AFM ☐ AFM ☐ Type Certification Data

☐ Supplemental Type ☐ Other

Aeroplane Flight Manual (AFM) or AFM Supplement refers to the following airworthiness approval basis for RVSM system installation:

☐ Temporary Guidance Leaflet(TGL) No. 6 ☐ FAA Document 91-RVSM

☐ Other:

| | YES | NO |
|---|---|---|
| Group aeroplane? | ☐ | ☐ |
| Non-group aeroplane? | ☐ | ☐ |
| Basic RVSM flight envelope? | ☐ | ☐ |
| Full RVSM envelope? | ☐ | ☐ |

Airworthiness performance requirements in the form of a Minimum Aeroplane Systems Performance Specification (MASPS):

MASPS compliance demonstrated by:

Manufacturer:

Design organisation:

MASPS compliance data package:

Reference number:

Navigation System Eligibility for referenced Aeroplane Serial Number

Equipment for RVSM operations:

Altitude measurement systems: Make: Model:

SSR Transponder: Make: Model:

Altitude Alerting System: Make: Model:

Automatic altitude control system: Make: Model:

The approval of the RVSM systems installation is based on:

☐ Type Design ☐ FAA STC ☐ EASA STC ☐ Service Bulletin

☐ Major ☐ Other:

| Maintenance Program (*) | YES | NO |
|---|---|---|

| | | |
|---|---|---|
| Note: The applicant should have an established Maintenance Programme that contains all RVSM requirements prescribed by manufacturer or design organisation. | | ☐ ☐ |
| Minimum Equipment List (*) | | |
| Note: The applicant should have revised parts of the Minimum Equipment List to reflect system requirements (e.g. redundancy levels) appropriate to the intended RVSM operations. | | ☐ ☐ |
| Maintenance Practices and Procedures (*) | | |
| Note: The applicant must institute procedures in respect of continuing airworthiness practices for RVSM. These procedures should cover the following subjects. | *To be completed by applicant*<br><br>RVSM Maintenance Practices and Procedures are described in (Add manual reference, chapter and sub-chapter) | |
| Maintenance of RVSM equipment (adherence to manufacturer's maintenance instructions, modification procedures, system calibration policy, leak check policy, skin waviness checks, autopilot/automatic altitude control maintenance practices, handling on-board systems, etc.) | | |
| Action for non-compliant aeroplane (down-grading reporting to CAAB, response to inquiries from AFI RMA, corrective actions, upgrading, etc.) | | |
| Maintenance Training (training of applicant's maintenance management staff, training of contractor's maintenance personnel, initial training, recurrent training, training syllabi, etc.) | | |
| Test Equipment (use of test equipment, handling, calibration, etc.) | | |

| OPERATION | |
|---|---|
| Operating Practices and Procedures (*) | |
| Note: The applicant must institute RVSM Operating Practices and Procedures. These practices and procedures should cover the following subjects: | *To be completed by applicant*<br><br>RVSM Operating Practices and Procedures are described in (Add manual reference, chapter and sub-chapter) |
| Flight planning procedures for operations in RVSM airspace (RVSM approval of aeroplane, reported and forecast weather, use of minimum equipment list (MEL), airframe or operating restrictions, etc.) | |
| Pre-flight procedures for each flight in RVSM airspace (review of technical log, external inspection), functional check of altitude measurement & control systems, etc.). | |
| RVSM in-flight procedures (prior to RVSM in-flight entry, serviceability of required equipment, altimeter settings, adherence to ATC instructions, phraseology, changing flight levels, use of altitude control and alerting systems, altimeter cross-checks, ACAS procedures, specific regional operating procedures (MNPS, AFI RVSM, etc.), reporting of wake turbulence encounters in AFI RVSM airspace, etc.) | |
| Procedures with respect to flight crew response to abnormal situations (reporting of altitude deviations and altimetry system errors, contingency procedures after entering RVSM airspace, etc.). | |
| Post-flight procedures (technical log entries, defects description, reporting of altitude deviations and altimetry system errors, etc.). | |

| Flight Crew Training and Qualification (*) | |
|---|---|
| Note: The applicant is required to establish the following (covering subjects under 3.1 to 3.5): | *To be completed by applicant*<br><br>Description in (Add manual reference, chapter and sub-chapter) |
| Flight crew qualification requirements. | |
| Description of initial and recurrent training, checking-and training syllabi. | |
| APPLICATION PACKAGE | |

| Documentation to be submitted to the CAAB | Submitted? | |
|---|---|---|
| | YES | NO |
| Compliance statement which shows how the criteria of JAA Temporary Guidance Leaflet No. 6 have been satisfied (*). | ☐ | ☐ |
| Sections of the AFM or AFM supplements that document RVSM airworthiness approval | ☐ | ☐ |
| Sections of the AFM or AFM supplements that document RVSM airworthiness approval | ☐ | ☐ |
| MASPS compliance data package (*) | ☐ | ☐ |
| Flight crew RVSM training programmes and syllabi for initial and recurrent training (*) | ☐ | ☐ |
| Operation manuals and checklists that include RVSM operating practices and procedures (OM-A, OMB, OM-D, AOM, FCOM, Route Manuals, stand-alone RVSM manual, etc.) (*) | ☐ | ☐ |
| Minimum Equipment List (MEL) that include items pertinent to RVSM operations (*) | ☐ | ☐ |
| Maintenance program or revision thereof that include items pertinent to RVSM equipment (*). | ☐ | ☐ |
| RVSM maintenance practices & procedures (MME, maintenance program, stand-alone document) (*) | ☐ | ☐ |
| Service Bulletin, STC or Major Modification Approval documentation, if approval is based on documents as detailed in 2.9 above (except if based on approved type design) | ☐ | ☐ |
| Plan for participation in the RVSM monitoring program (*) | ☐ | ☐ |

APPLICANT'S STATEMENT

The undersigned certifies the above information to be correct and true and that aeroplane system installation, continuing airworthiness of systems, minimum equipment for dispatch, operating procedures and flight crew training comply with the requirements of the Botswana Civil Aviation Regulations, JAA Temporary Guidance Leaflet No. 6 and FAA Document 91-RVSM.

| | | |
|---|---|---|
| Name of Post Holder Maintenance: | Signature: | Date: |
| Name of Post Holder Operations: | Signature: | Date: |
| Name of Post Holder Training: | Signature: | Date: |

PART II — REDUCED VERTICAL SEPARATION MINIMUM ALTIMETRY SYSTEM PERFORMANCE REQUIREMENTS FOR OPERATIONS IN RVSM AIRSPACE
*(regulation 18 (3))*

(*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.

SCHEDULE 3
*(regulation 34 (2))*

FLIGHT DATA RECORDERS

(*a*) No person may operate the following aircraft unless it is equipped with a flight data recorder capable of recording the aural environment of the flight deck during flight time.

(1) [AOC] All aeroplanes with a maximum certificated takeoff mass of over 5 700 kg up to and including 27 000 kg shall be equipped with a Type II FDR.

(2) [AOC] All aeroplanes with a maximum certificated take off mass of more than 27 000 kg shall be equipped with a Type I FDR.

(3) [AOC] All turbine powered aeroplanes with a maximum certificated takeoff mass of less than 5,700 kg shall be equipped with a Type IIA FDR.

(4) [AAC] All aeroplanes with a maximum certificated take off mass of more than 27 000 kg shall be equipped with a Type I FDR.

(5) [AAC] All aeroplanes with a maximum certificated take off mass of more than 5 700 kg shall be equipped with a Type IA FDR.

(6) [AOC] All helicopters with a certificated takeoff mass of over 7 000 kg shall have a Type IV FDR.

(7) [AOC] All helicopters with a certificated takeoff mass of over 3 180 kg shall have a Type IVA FDR.

(8) [AAC] All helicopters with a certificated takeoff mass of over-7 000 kg shall have a Type IV FDR.

(9) [AAC] All helicopters with a certificated takeoff mass of over 3 180 kg shall have a Type IVA FDR.

(*b*) [AOC] Flight data recorders shall —

(1) 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;

(2) be calibrated as required by the Authority; and

(3) have an approved device to assist in locating a recorder that may be under water and can be automatically activated.

(*c*) Flight data recorders 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 and V — 10 hours of operation.

(*d*) Flight data recorder media not acceptable for use in aircraft registered in Botswana, or operated in commercial air transport operations in Botswana, are —

(1) Engraving metal foil;
(2) Photographic film; or
(3) Analogue data using frequency modulation.

PART II — Flight Data Recorders : Specific Requirements

(*a*) [AOC] Types of flight data recorders.

(1) Types I and IA FDRs shall record the parameters required to determine accurately —

(i) The aeroplane flight path.
(ii) Speed.
(iii) Altitude.
(iv) Engine power.
(v) Configuration and operation.

(2) The parameters that satisfy the requirements for a Type I FDR are contained in Table A below.

(3) The parameters that satisfy the requirements for a Type IA FDR are listed below. 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 aeroplane systems or the flightcrew to operate the aeroplane.

(i) The following parameters satisfy the requirements for flight path and speed —

(*a*) Pressure altitude.
(*b*) Indicated or calibrated airspeed.
(*c*) Air-ground status and each landing gear air-ground sensor when practicable.
(*d*) Total or outside air temperature.
(*e*) Heading (primary flight crew reference).
(*f*) Normal acceleration.
(*g*) Lateral acceleration.
(*h*) Longitudinal acceleration (body axis).
(*i*) Time or relative time count.

(*j*) Navigation data*: drift angle, wind speed, wind direction, latitude/longitude.
(*k*) Groundspeed*.
(*l*) Radio altitude*.

(ii) The following parameters satisfy the requirements for altitude —

(*a*) Pitch attitude.
(*b*) Roll attitude.
(*c*) Yaw or sideslip angle*.
(*d*) Angle of attack*.

(iii) The following parameters satisfy the requirements for engine power —

(*a*) Engine thrust power: propulsive thrust/power on each engine, cockpit thrust/power lever position.
(*b*) Thrust reverse status*.
(*c*) Engine thrust command*.
(*d*) Engine thrust target*.
(*e*) Engine bleed valve position*.
(*f*) Additional engine parameters*: EPR, N1, indicated vibration level, N2, EGT, TLA, fuel flow, fuel cut-off lever position, N3.

(iv) The following parameters satisfy the requirements for configuration —

(*a*) Pitch trim surface position.
(*b*) Flaps*: trailing edge flap position, cockpit control selection.
(*c*) Slats*: leading edge flap (slat) position, cockpit control selection.
(*d*) Landing Gear*: landing gear, gear selector position.
(*e*) Yaw trim surface position*.
(*f*) Roll trim surface position*.
(*g*) Cockpit trim control input position pitch*.
(*h*) Cockpit trim control input position roll*.
(*i*) Cockpit trim control input position yaw*.
(*j*) Ground spoiler and speed brake*: Ground spoiler position, ground spoiler selection, speed brake position, speed brake selection.
(*k*) De-icing and/or anti-icing systems selection*.
(*l*) Hydraulic pressure (each system)*.
(*m*) Fuel quantity*.
(*n*) AC electrical bus status*.
(*o*) DC electrical bus status*.
(*p*) APU bleed valve position*.
(*q*) Computed centre of gravity*.

(v) The following parameters satisfy the requirements for operation —

(*a*) Warnings.
(*b*) Primary flight control surface and primary flight control pilot input: pitch axis, roll axis, yaw axis.
(*c*) Marker beacon passage.
(*d*) Each navigation receiver frequency selection.
(*e*) Manual radio transmission keying and CVR/FDR synchronization reference.
(*f*) Autopilot/autothrottle/AFCS mode and engagement status*.
(*g*) Selected barometric setting*: pilot first officer (co-pilot).
(*h*) Selected altitude (all pilot selectable modes of operation)*.
(*i*) Selected speed (all pilot selectable modes of operation)*.
(*j*) Selected MACH (all pilot selectable modes of operation)*.
(*k*) Selected vertical speed (all pilot selectable modes of operation)*.
(*l*) Selected heading (all pilot selectable modes of operation)*.
(*m*) Selected flight path (all pilot selectable modes of operation)*; course/DSTRK, path angle.
(*n*) Selected decision height*.
(*o*) EFIS display format*: pilot, first officer (co-pilot).
(*p*) Multi function/engine/alerts display format *.
(*q*) GPWS/TAWS/GCAS status*: selection of terrain display mode including pop-up display status, terrain alerts, both cautions and warning, and advisories, on/off switch position.
(*r*) Low pressure warning*: hydraulic pressure, pneumatic pressure.
(*s*) Computer failure*.
(*t*) Loss of cabin pressure*.
(*u*) TCAS/ACAS (traffic alert and collision avoidance system/airborne collision avoidance system)*.
(*v*) Ice detection*.
(*w*) Engine warning each engine vibration*.
(*x*) Engine warning each engine overtemperature*.
(*y*) Engine warning each engine oil pressure low*.
(*z*) Engine warning each engine overspeed*.

(*aa*) Wind shear warning*.
(*bb*) Operational stall protection, stick shaker and pusher activation*.
(*cc*) All cockpit flight control forces*: control wheel, control column, rudder pedal cockpit input forces.
(*dd*) Vertical deviation*: ILS glide path, MLS elevation, GNSS approach path.
(*ee*) Horizontal deviation*: ILS localizer, MLS azimuth, GNSS approach path.
(*ff*) DME 1 and 2 distances*
(*gg*) Primary navigation system reference*: GNSS, INS, VOR/DME, MLS, Loran C, ILS.
(*hh*) Brakes*: left and right brake pressure, left and right brake pedal position.
(*ii*) Date*.
(*jj*) Event marker*.
(*kk*) Head up display in use*.
(*ll*) Para visual display on*.

*Note : Parameter requirements, including range, sampling, accuracy and resolution, as contained in the Minimum Operational Performance Specification (MOPS) document for Flight Recorder Systems of the European Organization for Civil Aviation Equipment (EUROCAE) or equivalent documents.*

*Note : The number of parameters to be recorded will depend on aeroplane complexity. Parameters without an (*) are to be recorded regardless of aeroplane complexity. Those parameters designated by an (*) are to be recorded if an information source for the parameter is used by aeroplane systems and/or flightcrew to operate the aeroplane.*

*ICAO Annex 6, Part I: 6.3.1.1; 6.3.1.8; 6.3.1.8.1; 6.3.1.8.2; 6.3.1.8.3; 6.3.1.8.4; 6.3.1.8.5*
*ICAO Annex 6, Part II: 6.10.1.1; 6.10.1.7; 6.10.1.7.1; 6.10.1.7.2; 6.10.1.7.3; 6.10.1.7.4; 6.10.1.7.5*

(4) Types II and IIA FDRs shall record the parameters specified in paragraph (*a*) (1) (i) through (iv) of this section, and those parameters required to accurately determine the configuration of lift and drag devices:

*ICAO Annex 6, Part I: 6.3.1.2*
*ICAO Annex 6, Part II: 6.10.1.2*

(5) The parameters that satisfy the requirements for a Type II and Type IIA FDR are contained in Table A below.

*Note: The differences between Type II and Type IIA parameters is the duration of the recording. Type II has a duration of 25 hours and Type IIA has a duration of 30 minutes.*

*ICAO Annex 6, Part I: Attachment D, Introduction and Paragraph 1.2*

(6) Type IV FDRs shall record the parameters required to determine accurately —

(i) The helicopter flight path.
(ii) Speed.
(iii) Altitude.
(iv) Engine power and operation.

*ICAO Annex 6, Part III, Section II: 4.3.1.1*
*ICAO Annex 6, Part III, Section III: 4.9.1.1*

(7) The parameters that satisfy the requirements for a Type IV FDR are contained in Table B below.

(8) Type IVA FDRs shall record the parameters specified in paragraph (a) (6) of this section, and the parameter required to accurately determine configuration.

*ICAO Annex 6, Part III, Section II: 4.3.1.7*
*ICAO Annex 6, Part III, Section III: 4.9.1.7*

(9) The parameters that satisfy the requirements for a Type IVA FDR are listed below. 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 aeroplane systems or the flightcrew to operate the helicopter.

(i) The following parameters satisfy the requirements for flight path and speed —

(*a*) Pressure altitude.
(*b*) Indicated airspeed.
(*c*) Total or outside air temperature.
(*d*) Heading (primary flightcrew reference).
(*e*) Normal acceleration.
(*f*) Lateral acceleration.
(*g*) Longitudinal acceleration (body axis).
(*h*) Time or relative time count.
(*i*) Navigation data*: drift angle, wind speed, wind direction, latitude/longitude.
(*j*) Radio altitude*.

(ii) The following parameters satisfy the requirements for attitude —

(*a*) Pitch attitude.
(*b*) Roll attitude.
(*c*) Yaw rate.

(iii) The following parameters satisfy the requirements for engine power —

(*a*) Power on each engine: free power turbine speed (Nf), engine torque, engine gas generator speed (Ng), cockpit power control position.
(*b*) Rotor: main rotor speed, rotor brake.
(*c*) Main gearbox oil pressure*.
(*d*) Gearbox oil temperature*, main gearbox oil temperature, tail rotor gearbox oil temperature.
(*e*) Engine exhaust gas temperature (T4)*.
(*f*) Turbine inlet temperature (TIT)*.

(10) The following parameters satisfy the requirements for configuration —

(i) Landing gear or gear selector position*.
(*a*) Fuel quality*.
(*b*) Ice detector liquid water content*.

(ii) The following parameters satisfy the requirements for operation —

(*a*) Hydraulics low pressure.
(*b*) Warnings.
(*c*) 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.
(*d*) Marker beacon passage.
(*e*) Each navigation receiver frequency selection.
(*f*) AFCS mode and engagement status*.
(*g*) Stability augmentation system engagement*.
(*h*) Indicated sling load force*.
(*i*) Vertical deviation*: ILS glide path, GNSS approach path.
(*j*) Horizontal deviation*: ILS localizer, GNSS approach path.
(*k*) DME 1 and 2 distances*.
(*l*) Altitude rate*.
(*m*) Ice detector liquid water content*.
(*n*) 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, as contained in the Minimum Operational Performance Specification (MOPS) document for Flight. Recorder Systems of the European Organization for Civil Aviation Equipment (EUROCAE) or equivalent documents.*

*Note: The number of parameters to be recorded will depend on helicopter complexity. Parameters without an (*) are to be recorded regardless of helicopter complexity. Those parameters designated by an (*) are to be recorded if an information source for the parameter is used by helicopter systems and/or flightcrew to operate the helicopter.*

*ICAO Annex 6, Part III, Section II: 4.3.1.7; 4.3.1. 7.1; 4.3.1.7.2; 4.3.1.7.3; 4.3.1.7.4; 4.3.1.7.5*
*ICAO Annex 6, Part III, Section II: 4.9.1.7; 4.9.1.7.1; 4.9.1.7.2; 4.9.1.7.3; 4.9.1.7.4; 4.9.1.7.5*

(11) Type V FDRs shall record the parameters specified in paragraph (*a*) (6) (i) through (iii) of this section, and the parameter required to accurately determine engine power.

*ICAO Annex 6, Part III, Section II: 4.3.1.2*
*ICAO Annex 6, Part III, Section III: 4.9.1.2*

(12) The parameters that satisfy the requirements for a Type V FDR are contained in Table B below.

## Table A — Aeroplanes
## Parameters for Flight Data Recorders

| Serial number | Parameter | Measurement range | Recording interval (seconds) | Accuracy limits (sensor input compared to FDR read-out) |
|---|---|---|---|---|
| 1 | Time (UTC when available, otherwise elapsed time) | 24 hours | 4 | +/-0.125% per hour |
| 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) |
| 3 | Indicated airspeed | 95 km/h (50 kt) to 1 max $V_{So}$ (Note 1)<br>$V_{So}$ to 1.2 $V_D$ (Note 2) | +/-5%<br>+/-3% | |
| 4 | Heading | 360 degrees | 1 | +/-2% |
| 5 | Normal acceleration — | -3 g to +6 g | 0.125 | +/-1% of maximum range excluding datum error of +/-5% |
| 6 | Pitch attitude | +/-75 degrees | 1 | +/-2 degrees |
| 7 | Roll attitude | +/-180 degrees | 1 | +/-2 degrees |
| 8 | Radio transmission keying | On-off (one discrete) | 1 | |
| 9 | Power on each engine (Note 3) | Full range | 1 (per engine) | +/-2% |
| 10 | Trailing edge flap or cockpit control selection | Full range or each discrete position | 2 | +/-5% or as pilot's indicator |
| 11 | Leading edge flap or cockpit control selection | Full range or each discrete position | 2 | +/-5% or as pilot's indicator |
| 12 | Thrust reverser position | Stowed, in transit, and reverse | 1 (per engine) | |
| 13 | Ground spoiler/speed brake selection | Full range or each discrete position | 1 | +/-2% unless higher accuracy uniquely required |
| 14 | Outside air temperature | Sensor range | 2 | +/-2 degrees C |
| 15 | Autopilot/auto throttle/AFCS mode and engagement status | A suitable combination of discretes | 1 | |

Note— The preceding 15 parameters satisfy the requirements for a Type II FDR.

| | | | | |
|---|---|---|---|---|
| 16 | Longitudinal acceleration | +/-1 g | 0.25 | +/-1.5% max range excluding datum error of +/-5% |
| 17 | Lateral acceleration | +/-1 g | 0.25 | +/-1.5% max range excluding datum error of +/-5% |
| 18 | Pilot input and/or control surface position-primary controls (pitch, roll, yaw) (Note 4) | Full range | 1 | +/-2 degrees unless higher accuracy uniquely required |
| 19 | Pitch trim position | Full range | 1 | +/-3% unless higher accuracy uniquely required |
| 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) |
| 21 | Glide path deviation | Signal range | 1 | +/-3% |
| 22 | Localizer deviation | Signal range | 1 | +/-3% |
| 23 | Marker beacon passage | Discrete | 1 | |
| 24 | Master warning | Discrete | 1 | |
| 25 | NAV 1 and 2 frequency selection (Note 5) | Full range | 4 | As installed |
| 26 | DME 1 and 2 distance (Notes 5 and 6) | 0 — 370 km | 4 | As installed |
| 27 | Landing gear squat switch status | Discrete | 1 | |
| 28 | GPWS (ground proximity warning system) | Discrete | 1 | |
| 29 | Angle of attack | Full range | 05 | As installed |
| 30 | Hydraulics, each system (low pressure) | Discrete | 2 | |
| 31 | Navigation data (latitude/longitude, ground speed and drift angle) (Note 7) | As installed | 1 | As installed |
| 32 | Landing gear or gear selector position | Discrete | 4 | As installed |
| Note — The preceding 32 parameters satisfy the requirements for a Type I FDR. | | | | |

Notes —

1. $V_{So}$ stalling speed or minimum steady flight speed in the landing configuration.
2. $V_D$ design diving speed.
3. Record sufficient inputs to determine power.
4. For aeroplanes with conventional control systems "or"applies. For aeroplanes with non-mechanical control systems "and" applies. In aeroplanes with split surfaces, a suitable combination of inputs is acceptable in lieu of recording each surface separately.
5. If signal available in digital form.
6. Recording of latitude and longitude from INS or other navigation system is a preferred alternative.
7. If signals readily available.

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

(*a*) operational information from electronic display systems, such as electronic flight instrument systems (EFIS), electronic centralized aircraft monitor (ECAM) and engine indication and crew alerting system (EICAS). Use the following order of priority:

(1) parameters selected by the 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; and

(*c*) additional engine parameters (EPR, N1, EGT, fuel flow, etc.).

*ICAO Annex I, Part I, Attachment D, Table D-1*
*ICAO Annex I, Part II, Attachment A, Table A-1*

## Table B — Helicopters
## Parameters for Flight Data Recorders

| Serial number | Parameter | Measurement range | Recording interval (seconds) | Accuracy limits (sensor input compared to FDR read-out) |
|---|---|---|---|---|
| 1 | Time (UTC when available, otherwise elapsed time) | 24 hours | 4 | +/-0.125% per hour |
| 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) |
| 3 | Indicated airspeed | As the installed measuring system | 1 | +/-3% |
| 4 | Heading | 360 degrees | 1 | +/-2 degrees |
| 5 | Normal acceleration — | -3 g to +6 g | 0.125 | +/-1% |
| 6 | Pitch attitude | +/-75 degrees | 0.5 | +/-2 degrees |
| 7 | Roll attitude | +/-180 degrees | 0.5 | +/-2 degrees |
| 8 | Radio transmission keying | On-off (one discrete) | 1 | |
| 9 | Power on each engine (Note 1) | Full range | 1 (per engine) | +/-2% |
| 10 | Main rotor speed | 50-130% | 0.5 | +/-2% |
| 11 | Pilot input and/or control surface position-primary controls (Collective pitch, longitudinal cyclic pitch, lateral cyclic pitch, tail rotor pedal) (Note 2) | Full range | 1 | +/-2% unless higher accuracy uniquely required. |
| 12 | Hydraulics, each system (low pressure) | Discrete | 2 | |
| 13 | Outside air temperature | Sensor range | 2 | +/-2 degrees C |
| 14 | Autopilot/auto throttle/AFCS mode and engagement status | A suitable combination of discretes | 1 | |
| 15 | Stability augmentation system engagement | Discrete | 1 | |
| Note: The preceding 15 parameters satisfy the requirements for a Type V FDR. | | | | |

| | | | | |
|---|---|---|---|---|
| 16 | Main gearbox oil pressure | As installed | 1 | As installed |
| 17 | Main gearbox oil temperature | As installed | 2 | As installed |
| 18 | Yaw acceleration (or yaw rate) | +/-1 g | 0.25 | +/-1.5% max range excluding datum error of +/-5% |
| 19 | Sling load force | 0-200% of certified load | 0.5 | +/-3% of max range |
| 20 | Longitudinal acceleration | +/-1 g | 0.25 | +/-1.5% max range excluding datum error of +/-5% |
| 21 | Lateral acceleration | +/-1 g | 0.25 | +/-1.5% max range excluding datum error of +/-5% |
| 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) |
| 23 | Glide path deviation | Signal range | 1 | +/-3% |
| 24 | Localizer deviation | Signal range | 1 | +/-3% |
| 25 | Marker beacon passage | Discrete | 1 | |
| 26 | Master warning | Discrete | 1 | |
| 27 | NAV 1 and 2 frequency selection (Note 3) | Full range | 4 | As installed |
| 28 | DME 1 and 2 distance (Notes 3 and 4) | 0-370 km | 4 | As installed |
| 29 | Navigation data (latitude/longitude, ground speed) (Note 5) | As installed | 2 | As installed |
| 30 | Landing gear or gear selector position | Discrete | 4 | As installed |

Note: The preceding 30 parameters satisfy the requirements for a Type IV FDR.

Notes —

1. Record sufficient inputs to determine power.
2. For helicopters with conventional control systems “or” applies. For helicopters with non-mechanical control systems “and” applies.
3. If signal available in digital form.
4. Recording of latitude and longitude from INS or other navigation system is a preferred alternative.
5. 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 instrment systems (EFIS), electronic centralized aircraft monitor (ECAM) and engine indication and crew alerting system (EICAS). Use the following order of priority:

(1) parameters selected by the flightcrew relating to the desired flight path, e.g. barometric pressure setting, selected altitude, selected airspeed, decision height, and auto flight 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 data; and

(4) the identity of displayed pages for emergency procedures and checklists; and

(*b*) additional engine parameters (EPR, N1, EGT, fuel flow, etc.).

SCHEDULE 4
*(regulations 37 (1) (f), 41 (5))*

EMERGENCY EXIT EQUIPMENT - PASSENGERS

PART I — The emergency exit equipment required under Regulation 37(1) shall meet the following requirements —

(*a*) The assisting means for a floor level emergency exit shall meet the requirements under which the aeroplane was type certified.
(*b*) The location of each passenger emergency exit shall be —

(1) recognisable from a distance equal to the width of the cabin; and
(2) indicated by a sign visible to occupants approaching along the main passenger aisle.

(*c*) There shall be an emergency exit locating sign —

(1) above the aisle near each over-the-wing passenger emergency exit, or at another ceiling location if it is more practical because of low headroom;

(2) next to each floor level passenger emergency exit, except that one sign may serve two such exits if they both can be seen readily from that sign; and

(3) on each bulkhead or divider that prevents fore and aft vision along the passenger cabin, to indicate emergency exits beyond and obscured by it, except that if this is not possible, the sign may be placed at another appropriate location.

(*d*) 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.*

(*e*) 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.
(*f*) 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 center-line of the main passenger aisle, is at least 0.05 foot-candles.
(*g*) Each emergency light shall —

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

(2) have a means to prevent inadvertent operation of the manual controls;

(3) when armed or turned on at either station, remain lighted or become lighted upon interruption of the aeroplane's normal electric power:

Provide the required level of illumination for at least 10 minutes at the critical ambient conditions after emergency landing; and

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

(*h*) 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.

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

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

(*k*) 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.

(*l*) 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.

(*m*) 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.

(*n*) 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.

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

(*p*) 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 take-off 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.

(*q*) 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.

(*r*) 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 —

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

(2) 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.*

(*s*) 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.

(*t*) 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 requirements for compliance with this paragraph.

(*u*) 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.

(*v*) 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.*

(*w*) 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.

(*x*) Each large passenger-carrying aeroplane with a ventral exit and tail cone exit shall be —

(1) designed and constructed so that it cannot be opened during flight; and

(2) marked with a placard readable from a distance of 30 inches and installed at a conspicuous location near the means of opening the exit, stating that the exit has been designed and constructed so that it cannot be opened during flight.

(*y*) 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.

PART II — The emergency exit marking in Regulation 41 shall meet the following requirements —

(*a*) 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 colours may be reversed if this will increase the emergency illumination of the passenger compartment.

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

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

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

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

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

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

(2) each outside marking, including the band, shall have colour contrast to be readily distinguishable from the surrounding fuselage surface. The contrast shall be such that, if the reflectance of the darker colour is 15 percent or less, the reflectance of the lighter colour 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 colour is greater than 15 percent, at least a 30 percent difference between its reflectance and the reflectance of the lighter colour must be provided.

SCHEDULE 5
*(regulation 37 (5))*

PASSENGER EMERGENCY EXITS: SIDE — OF-FUSELAGE

Emergency exits for each side of the fuselage

| **Passenger Seating Capacity** | **Emergency exits for each side of thefuselage** | | | |
|---|---|---|---|---|
| | **Type I** | **Type II** | **Type III** | **Type IV** |
| 1 through 10 | | | | 1 |
| 11 through 19 | | | 1 or | 2 |
| 20 through 39 | | 1 | | |
| 40 through 59 | 1 | | | 1 |
| 59 through 79 | 1 | | 1 or | 2 |

SCHEDULE 6
*(regulation 44)*

MAIN AISLE WIDTH

*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 |

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

SCHEDULE 7
*(regulation 47 (5))*

EMERGENCY LOCATOR TRANSMITTER (ELT)

(*a*) Types of emergency locator transmitters

(1) It is an ICAO recommendation that all ELTs should be automatic.

(2) The ELT equipment required shall meet the minimum performance standard defined in FAA's TSO C91a or TSO C126:

Provided that any ELT installed prior to 1 January 1997 may meet the minimum performance standard defined in FAA's TSO C90 until such time as it becomes unserviceable other than through the need for routine maintenance, and furthermore provided that the ELT shall not be fitted with a lithium-sulphur dioxide battery that does not meet the requirements of FAA's TSO C97.

(3) The following are types of ELTs in use —

(i) Automatic Fixed — ELT/AF
This type of ELT is intended to be permanently attached to the aircraft before and after a crash and is designed to aid search and rescue teams in locating a crash site.

(ii) Automatic Portable — ELT/AP
This type of ELT is intended to be rigidly attached to the aircraft before a crash, but readily removable from the aircraft after a crash. It functions as an ELT during the crash sequence. If the ELT does not employ an integral antenna, the aircraft-mounted antenna may be disconnected and an auxiliary antenna (stored on the ELT case) attached to the ELT. The ELT can be tethered to a survivor or a life raft. This type of ELT is intended to aid search and rescue teams in locating the crash site or survivor/s.

(iii) Automatic Deployable — ELT/AD
This type of ELT is intended to be rigidly attached to the aircraft before the crash and automatically ejected and deployed after the crash sensor has determined that a crash has occurred. This type of ELT should float in water and is intended to aid search and rescue teams in locating the crash site.

(iv) Portable — ELT/P
This type of ELT is not intended to be rigidly attached to the aircraft before a crash, but carried in such a way that it is readily removable from the aircraft after a crash. The ELT employs an integral antenna, and can be tethered to a survivor or a life raft. This type of ELT is intended to aid search and rescue teams in locating the crash site or survivor/s.

(v) ELT (S) or (W) — ELT (survival) or ELT (water-activated)
This type of ELT is not affixed to the aircraft and transmits automatically when immersed in water. It is waterproof, floats and operates on the surface of the water. It has no fixed mounting. It should be tethered to survivors or life rafts.

(*b*) Specification

Information on technical characteristics and operational performance of 121,5 MHz ELTs is contained in RTCA Document DO-183 and EUROCAE Document ED.62.

(1) Specification for the 121.5 MHz component of ELT for search and rescue —

(i) the ELT shall operate on 121,5 MHz. The frequency tolerance shall not exceed plus or minus 0,005%;
(ii) the emission from an ELT under normal conditions and attitudes of the antenna shall be vertically polarised and essentially omni-directional in the horizontal plane;
(iii) over a period of 48 hours of continuous operation, at an operating temperature of minus $20^0$ Celsius, the peak effective radiated power (PERP) shall at no time be less than 50 mW;
(iv) the type of emission shall be A3X. Any other type of modulation that meets the requirements of subparagraphs (*e*), (*f*) and (*g*) below may be used, provided that it will not prejudice precise location of the beacon by homing equipment;

*Note — some ELTs are equipped with an optional voice capability (A3E) in addition to the A3X emission.*

(v) the carrier shall be amplitude modulated at a modulation factor of at least 0,85;
(vi) the modulation applied to the carrier shall have a minimum duty cycle of 33%;
(vii) the emission shall have distinctive audio characteristics achieved by amplitude modulating the carrier with an audio frequency sweeping downward over a range of not less than 700 Hz within the range 1600 Hz to 300 Hz and with a sweep repetition rate of between 2 Hz and 4Hz; and
(viii) the emission shall include a clearly defined carrier frequency distinct from the modulation sideband components. In particular, at least 30% of the power shall be contained at all times within plus or minus 30Hz of the carrier frequency on 121,5 MHz.

(2) Specification for the 406 MHz component of ELT for search and rescue —

(i) transmission characteristics for ELTs operating on 406 MHz are contained in ITU M633/1;
(ii) information on technical characteristics and operational performance of 406 MHz ELTs is contained in RTCA Document DO-204 and EUROCAE Document ED.62;
(iii) ELTs shall operate on a frequency of 406,025 MHz plus or minus 2 kHz. The transmitted frequency shall not vary more than plus or minus 5 kHz in five years including the initial frequency offset. It shall not vary more than 2 parts in 109 milliseconds;
(iv) the period between transmissions shall be 50 seconds plus or minus 5%;
(v) over a period of 24 hours of continuous operation at an operating temperture of minus $20^0$ Celsius, the transmitter power output shall be within the limits of 5 W plus or minus 2 dB; and
(vi) the 406 MHz ELT shall be capable of transmitting a digital message.

(3) Transmitter identification coding —

(i) ELTs operating on 406 MHz shall be assigned a unique coding for identification of the transmitter or aircraft on which it is carried; and
(ii) the ELT shall be coded in accordance with the aviation user protocol or one of the serialised user protocols and shall be registered with the Authority.

(*c*) Installation

(1) Each ELT, required to be carried in terms of SGR 7.9.1.5, must be attached to the aircraft in such a manner that the probability of damage to the transmitter in the event of crash impact is minimised. Fixed and deployable automatic ELTs must be attached to an aeroplane as far aft as possible. The installation of an ELT constitutes a modification of an aircraft and must therefore be completed in accordance with acceptable technical data. The acceptable standards should produce reliable and effective ELT systems, and keep unwanted activations to a minimum. Acceptable standards are based on those set out in the following sources —

(i) FAA AC91-44A (as amended); and
(ii) RTCA papers DO-182 and DO-183.

(2) Except where otherwise stated, the following installation requirements shall apply to ELT installations in any aeroplane —

(i) when installed in an aeroplane, the ELT shall be mounted with its sensitive axis pointing in the direction of flight;
(ii) the ELT shall be installed to withstand ultimate inertia forces of 10g upward, 22.5g downward, 45g forward and 7.5g sideward;
(iii) the location chosen for the ELT must be sufficiently free from vibration to prevent involuntary activation of the transmitter;
(iv) the ELT shall be located and mounted so as to minimize the probability of damage to the transmitter and antenna by fire or crushing as a result of crash impact; and
(v) the ELT shall be accessible for manual activation and deactivation.

(3) If it is equipped with an antenna for portable operation, the ELT shall be easily detachable from inside the aeroplane and —

(i) the external surface of the aeroplane shall be marked to indicate the location of the ELT; and
(ii) the ELT shall not use the antenna of another avionics system.

(4) The external antenna location shall be chosen considering the following factors
- (i) the ELT antenna shall be mounted as far away as possible from other Very High Frequency (VHF) antennas;
- (ii) the distance between the transmitter and antenna shall be in accordance with the ELT manufacturer's installation instructions or other approved data;
- (iii) the position of the antenna shall be such as to ensure essentially omni-directional signal transmissions when the aeroplane is in its normal ground or water attitude;
- (iv) the antenna shall be mounted as far aft as possible;
- (v) the ELT antenna shall not foul other antennas in flight; and
- (vi) the ELT shall be subjected to an operational test as specified in ELT testing standards.

(5) An ELT with a lithium or magnesium battery shall not be packed inside a life raft in an aeroplane.

(6) Where the ELT system includes a remote control system for activating and deactivating the transmitter, provision shall be made to prevent inadvertent operation of the remote control and a placard displaying the following warning shall be placed near each remote control —

"FOR AVIATION EMERGENCY USE ONLY. UNAUTHORIZED OPERATION PROHIBITED."

(7) When an aeroplane is upright, an antenna located externally on top of the rear fuselage provides better overall efficiency than an internal cockpit area antenna.

(8) When an aeroplane is inverted —

- (i) an internal antenna exhibits the best overall efficiency in a high-wing aeroplane; and
- (ii) neither antenna location has a significant advantage in a low-wing aeroplane.

(9) In helicopter installations, care needs to be taken to site the antenna so as to minimise vibratory response which could lead to premature fatigue failure.

(10) The presence of an ELT whip antenna in close proximity to a second antenna can cause some detuning and distortion of the radiation pattern of the second antenna and possible interference by re-radiation of other signals. e.g. there have been reports of an ELT radiating a weak harmonic signal to VHF transmissions, causing interference with GPS equipment.

(11) The ELT mount must provide a load path from aircraft primary structural elements directly to the automatic activation system. The attachment should also be free and clear of cables and pulleys, etc., and be designed to minimise vibration. Excessive vibration may prevent satisfactory crash impact detection or may generate false crash signals. Attachments to thin partitions or to panels, such as the sides of baggage compartments, should be avoided. Attachments solely by means of velcro strips and other flexible material, such as tie-wrap, are not acceptable.

(12) As approximately one fifth of light aircraft accidents result in fire, the coaxial cable between the ELT and its external antenna should be sleeved with fire-resistant materials.

(13) Automatic fixed-type, inertially-activated ELTs are activated by an inertial force parallel to the longitudinal axis of the aircraft. However, many inadvertent activations have been caused by inertial switches actuating in other directions. For portable ELTs, the manufacturer's installation instructions must be followed precisely since placement and orientation may be critical.

(14) The interaction of components in the ELT is often critical in arriving at acceptable overall performance. Component parts from other sources such as batteries, coaxial cables and antennae, should not be substituted for the original manufacturer's parts.

(15) Tests after installation and tests and inspections of ELTs shall be performed.

(16) On completion of the modification to install the ELT the certifying person shall —

(i) ensure that the installation is recorded in the aircraftís logbook; and
(ii) place the ELT manufacturer's operating instructions in the aircraft flight manual, unless the relevant information is already given in a flight manual supplement.

(17) A release to service statement for the modification must be issued.

(*d*) Batteries

(1) Battery types in ELTs are as follows —

(i) most commonly: zinc-manganese dioxide (alkaline);
(ii) magnesium-manganese dioxide (magnesium); and
(iii) early models: lithium-sulphur dioxide (lithium).

(2) Lithium-sulphur dioxide batteries may be used only if they meet the requirements of FAA's TSO C97.

(3) The ELT battery expiration date must be visible without having to remove the ELT from its mount in the aircraft.

(4) Where ELT batteries can be charged during flight, provision shall be made to —

(i) indicate to the flight crew that charging is taking place; and
(ii) prevent battery discharge resulting from wiring short circuits occurring during normal service or from crash damage.

SCHEDULE 8
*(regulation 48 (3))*

PORTABLE FIRE EXTINGUISHER

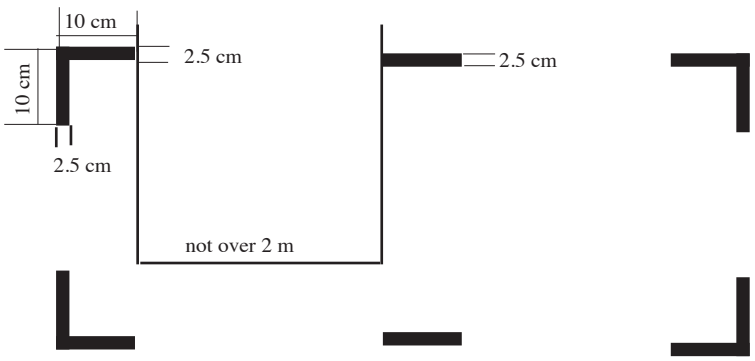
Minimum Number of Hand Fire Extinguishers
Passenger Seating Capacity

| | |
|---|---|
| 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 |

SCHEDULE 9
*(regulation 52)*

MARKING OF BREAK-IN POINTS

[All Aircraft (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.




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.

SCHEDULE 10
*(regulation 53 (2))*

FIRST-AID KIT

(*a*) First - Aid Kits [All Aircraft] Types. One type of first-aid kit shall be provided for carriage in all aircraft.

(1) [AIRCRAFT IN COMMERCIAL OPERATIONS]
The required first-aid kits shall include at least the following equipment —

Contents

Antiseptic swabs (10/pack)
Bandage: adhesive strips
Bandage: gauze 7.5 cm x 4.5 m
Bandage: triangular; safety pins
Dressing: burn 10 cm x 10 cm
Dressing: compress, sterile 7.5 cm x 12 cm
Dressing: gauze, sterile 10.4 cm x 10.4 cm
Tape: adhesive 2.5 cm (roll)
Steri-strips (or equivalent adhesive strip)
Hand cleanser or cleansing towelettes
Pad with shield, or tape, for eye
Scissors: 10 cm (if allowed by national regulations)
Tape: Adhesive, surgical 1.2 cm x 4.6 m
Tweezers: splinter
Disposable gloves (multiple pairs)
Thermometers (non-mercury)
Mouth-to-mouth resuscitation mask with one-way valve
First-aid manual, current edition
Incident record form

(2) [AIRCRAFT IN COMMERCIAL OPERATIONS]

Contents.

The required first-aid kits may include the following medications where permitted by national regulations —

Mild to moderate analgesic;
Antiemetic;
Nasal decongestant;
Antacid;
Antihistamine.

(3) [AIRCRAFT IN COMMERCIAL OPERATIONS]
Number of first-aid kits.

Each aircraft shall carry first-aid kits in accordance with the following table —

| 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) [AIRCRAFT IN COMMERCIAL OPERATIONS]

Location.

The required first-aid kits be distributed evenly throughout the aircraft, and shall be readily accessible to cabin crew members, if cabin crew members are required for the flight; and
The first-aid kits shall be located near the aircraft exits should their use be required outside the aircraft in an emergency situation.

## SCHEDULE 11
*(regulation 54 (2))*

## EMERGENCY MEDICAL KIT – AEROPLANES

(*a*) [Air Operator Certificate (AOC)]
The required emergency medical kit shall include the following equipment —

Airways, oropharyngeal (three sizes)
Antiseptic wipes.
Bag-valve mask.
Basic life support cards.
Disposable scalpel handle and blade.
Disposable syringes and needles;
Emergency tracheal catheter (or large gauge intravenous cannula).
Flashlight and batteries.
Haemostatic bandages or tourniquet.
Haemostatic forceps.
Intravenous catheters (appropriate range of sizes).
Needle disposal box.
One pair of sterile surgical gloves.

Sphygmomanometer.
Sponge gauze.
Sterile equipment for suturing wounds.
Sterile scissors.
Stethoscope.
Surgical mask.
System for delivering intravenous fluids.
Tape — adhesive.
Thermometers (non-mercury).
Umbilical cord clamp.
Urinary catheter.

(*b*) [AOC]
The required emergency medical kit shall include the following medications —

Acetyl salicylic acid (aspirin) for oral use
Adrenocortical steroid — injectable
Antiemetic — injectable
Antihistamine — injectable anti-allergic
Atropine — injectable
Bronchial dilator — inhaler
Dextrose 50% (or equivalent) — injectable: 50 ml Sedatives.
Diuretic — injectable
Epinephrine 1:1 000 Analgesics.
Sedative anticonvulsant — injectable
Major analgesic
Medication for postpartum bleeding
Nitro-glycerine tablets, or spray
Oral beta blocker
Sodium chloride 0.9% (minimum 250 ml)

(*c*) [AOC]
The required universal precaution kit shall include the following equipment —

Bio-hazard disposal waste bag
Dry powder that can convert small liquid spill into a sterile granulated gel
Face/eye mask (separate or combined)
Germicidal disinfectant for surface cleaning
Gloves (disposable)
Instructions:
Large absorbent towel
Pick-up scoop with scraper
Protective apron
Skin wipes

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

SCHEDULE 12
*(regulation 55 (2))*

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) Flight crew members - Each member of the flight crew on flight deck duty shall be supplied with supplemental oxygen in accordance with Table 1. If all occupants of flight deck seats are supplied from the flight crew source of oxygen supply then they shall be considered as flight crew members on flight deck duty for the purpose of oxygen supply.

(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)<br>(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.*

MADE this 18th day of December, 2012.

HON. NONOFO MOLEFHI,
*Minister for Transport and Communications.*