Comment Response Document (CRD) to Notice of Proposed Amendment (NPA) 2009-02b

for a draft Agency Opinion on a Commission Regulation establishing the Implementing Rules for air operations of Community operators

and

a draft Decision of the Executive Director of the European Aviation Safety Agency on Acceptable Means of Compliance and Guidance Material related to the Implementing Rules for air operations of Community operators

'Part-SPO'

CRD b.2 — Resulting text of Part-SPO

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1) A new Annex VIII to Regulation (EC) No xx/xxxx is introduced as follows:

Annex VIII

Part-SPO (Specialised Operations)

Subpart A – General requirements

SPO.GEN.100 Competent authority

(a) The competent authority shall be the authority designated by the Member State in which the operator has its principle place of business.

(b) If the aircraft is registered in a third country, the competent authority shall be the authority designated by the Member State where the operator is established or residing.

SPO.GEN.101 Scope

(a) This Part establishes the requirements to be met by an operator when operating an aircraft with crew members and task specialists in specialised operations.

(b) Specialised operations include, but are not limited to, the following activities: helicopter external loads operations, helicopter survey operations, human external cargo operations, parachute operations, agricultural flights, aerial photography operations, aerial mapping operations, glider towing, aerial advertising, calibration flights, oil spill work, stringing power line operations, pollution control activity, survey operations, news media flights, flying displays, aerial entertainment, competition flights, clearing saw operations, animal herding and rescue, maritime funeral operations, veterinary vaccine dropping flights, scientific research flights, avalanche mining operations, construction work flights, television and movie flights.

SPO.GEN.102 Touring motor glider and powered sailplanes

(a) A touring motor glider shall be operated following the requirements for:

(1) aeroplanes when it is power-driven by its engine; and

(2) sailplanes when operated without using its engine.

(b) A touring motor glider shall be equipped in compliance with the requirements applicable to aeroplanes.

(c) Powered sailplanes shall be operated and equipped in compliance with the requirements applicable to sailplanes.

SPO.GEN.105 Crew member responsibilities

(a) The crew member shall be responsible for the proper execution of his/her duties that are specified in the standard operating procedures (SOPs).

(b) During critical phases of flight or whenever deemed necessary by the pilot-in-command in the interest of safety, the crew member shall be seated at his/her assigned station and shall not perform any activities other than those required for the safe operation of the aircraft.

(c) During flight, the flight crew member shall keep his/her safety belt fastened while at his/her station.

(d) During flight, at least one qualified flight crew member shall remain at the controls of the aircraft at all times.

(e) The crew member shall not undertake duties on an aircraft:

(1) if he/she knows or suspects that he/she is suffering from fatigue as referred to in 7.f. of Annex IV to Regulation (EC) No 216/2008[1] or feels otherwise unfit to perform his/her duties; or

(2) when under the influence of psychoactive substances or alcohol or for other reasons as referred to in 7.g. of Annex IV to Regulation (EC) No 216/2008.

(f) The crew member who undertakes duties for more than one operator shall:

(1) maintain his/her individual records regarding flight and duty times and rest periods as referred to in the applicable Flight Time Limitation (FTL) requirements, if applicable; and

(2) provide each operator with the data needed to schedule activities in accordance with the applicable FTL requirements.

(g) A crew member shall report to the pilot-in-command:

(1) any fault, failure, malfunction or defect, which he/she believes may affect the airworthiness or safe operation of the aircraft, including emergency systems; and

(2) any incident that was endangering, or could endanger, the safety of the operation.

SPO.GEN.106 Pilot-in-command responsibilities and authority

(a) The pilot-in-command shall be responsible for:

(1) the safety of the aircraft and of all crew members and task specialists on board during aircraft operations;

(2) the initiation, continuation, termination or diversion of a flight in the interest of safety;

[1] Regulation (EC) No 216/2008 of the European Parliament and of the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC (OJ L 79, 19.3.2008, p. 1). Regulation as last amended by Regulation (EC) No 1108/2009 of the European Parliament and of the Council of 21 October 2009 (OJ L 309, 24.11.2009, p. 51).

(3) ensuring that all operational procedures and checklists are complied with in accordance with the appropriate manual;

(4) only commencing a flight if he/she is satisfied that all operational limitations referred to in 2.a.3 of Annex IV to Regulation (EC) No 216/2008, are complied with, as follows:

(i) the aircraft is airworthy;

(ii) the aircraft is duly registered;

(iii) instruments and equipment required for the execution of that flight are installed in the aircraft and are operative, unless operation with inoperative equipment is permitted by the minimum equipment list (MEL) or equivalent document, if applicable;

(iv) the mass of the aircraft and, except in the case of balloons, the centre of gravity location are such that the flight can be conducted within limits prescribed in the airworthiness documentation;

(v) all equipment and baggage is properly loaded and secured; and

(vi) the aircraft operating limitations as specified in the aircraft flight manual (AFM) will not be exceeded at any time during the flight;

(5) not commencing a flight if he/she, or any other crew member or any task specialist is incapacitated from performing duties by any cause such as injury, sickness, fatigue or the effects of any psychoactive substance;

(6) not continuing a flight beyond the nearest weather-permissible aerodrome or operating site when his/her or any other crew member or any task specialist's capacity to perform duties is significantly reduced from causes such as fatigue, sickness or lack of oxygen;

(7) deciding on acceptance of the aircraft with unserviceabilities in accordance with the configuration deviation list (CDL) or minimum equipment list (MEL), as applicable;

(8) recording utilisation data and all known or suspected defects in the aircraft at the termination of the flight, or series of flights, in the aircraft technical log or journey log for the aircraft; and

(9) ensuring that, when installed, flight recorders:

(i) are not disabled or switched off during flight; and

(ii) in the event of an accident or an incident that is subject to mandatory reporting:

(A) are not intentionally erased;

(B) are deactivated immediately after the flight is completed; and

(C) are reactivated only with the agreement of the investigating authority.

(b) The pilot-in-command shall have the authority to refuse carriage of or disembark any person or cargo that may represent a potential hazard to the safety of the aircraft or its occupants.

(c) The pilot-in-command shall, as soon as possible, report to the appropriate air traffic services (ATS) unit any hazardous weather or flight conditions encountered that are likely to affect the safety of other aircraft.

(d) The pilot-in-command shall, in an emergency situation that requires immediate decision and action, take any action he/she considers necessary under the circumstances in accordance with 7.d. of Annex IV to Regulation (EC) No 216/2008. In such cases he/she may deviate from rules, operational procedures and methods in the interest of safety.

SPO.GEN.107 Pilot-in-command responsibilities and authority - balloons

The pilot-in-command of a balloon shall, in addition to SPO.GEN.106, be responsible for:

(a) the pre-flight briefing of those persons assisting in the inflation and deflation of the envelope; and

(b) ensuring that persons assisting in the inflation and deflation of the envelope wear appropriate protective clothing.

SPO.GEN.110 Compliance with laws, regulations and procedures

(a) The pilot-in-command shall comply with the laws, regulations and procedures of those States where operations are conducted.

(b) The pilot-in-command shall be familiar and comply with the laws, regulations and procedures, pertinent to the performance of his/her duties, prescribed for the areas to be traversed, the aerodromes or operating sites to be used and the related air navigation facilities as referred to in 1.a. of Annex IV to Regulation (EC) No 216/2008.

SPO.GEN.115 Common language

The operator shall ensure that crew members and task specialists are able to communicate with each other in a common language.

SPO.GEN.120 Taxiing of aeroplanes

The operator shall ensure that an aeroplane is only taxied on the movement area of an aerodrome if the person at the controls:

(a) is an appropriately qualified pilot; or

(b) has been designated by the operator and:

(1) is trained to taxi the aeroplane;

(2) is trained to use the radio telephone;

(3) has received instruction in respect of aerodrome layout, routes, signs, marking, lights, air traffic control (ATC) signals and instructions, phraseology and procedures; and

(4) is able to conform to the operational standards required for safe aeroplane movement at the aerodrome.

SPO.GEN.125 Rotor engagement

A helicopter rotor shall only be turned under power for the purpose of flight with a qualified pilot at the controls.

SPO.GEN.130 Portable electronic devices

The operator shall not permit any person to use a portable electronic device (PED) on board an aircraft that could adversely affect the performance of the aircraft's systems and equipment.

SPO.GEN.135 Information on emergency and survival equipment carried – commercial operations and non-commercial operations with complex motor-powered aircraft

The operator shall, at all times, have available for immediate communication to rescue coordination centres (RCCs) lists containing information on the emergency and survival equipment carried on board.

SPO.GEN.140 Documents, manuals and information to be carried

(a) The following documents, manuals and information shall be carried on each flight as originals or copies unless otherwise specified below:

(1) the AFM, or equivalent document(s);

(2) the original certificate of registration;

(3) the original certificate of airworthiness (CofA);

(4) the noise certificate, if applicable;

(5) the declaration as specified in ORO.DEC.100, if applicable;

(6) the list of specific approvals, if applicable;

(7) the aircraft radio licence, if applicable;

(8) the third party liability insurance certificate(s);

(9) the journey log, or equivalent, for the aircraft;

(10) the aircraft technical log, in accordance with Part-M, if applicable;

(11) details of the filed ATS flight plan, if applicable;

(12) current and suitable aeronautical charts for the route of the proposed flight and all routes along which it is reasonable to expect that the flight may be diverted;

(13) procedures and visual signals information for use by intercepting and intercepted aircraft;

(14) information concerning search and rescue services for the area of the intended flight;

(15) the current parts of the operations manual and/or SOPs or AFM that are relevant to the duties of flight crew members and task specialists, which shall be easily accessible to them;

(16) the MEL or CDL, if applicable;

(17) appropriate notices to airmen (NOTAMs) and aeronautical information service (AIS) briefing documentation;

(18) appropriate meteorological information, if applicable;

(19) cargo manifests, if applicable; and

(20) any other documentation that may be pertinent to the flight or is required by the States concerned with the flight.

(b) Notwithstanding (a), on flights:

(1) intending to take off and land at the same aerodrome or operating site; or

(2) remaining within a distance or area determined by the competent authority, the documents and information in (a) may be retained at the aerodrome or operating site.

(c) Notwithstanding (a), on flights with balloons or sailplanes, excluding touring motor gliders (TMGs), the documents and information in (a)(2) to (a)(9) and (a)(13) to (a)(20) may be carried in the retrieve vehicle.

(d) In case of loss or theft of documents specified in (a)(2) to (a)(8), the operation may continue until the flight reaches its destination or a place where replacement documents can be provided.

(e) The operator shall make available, within a reasonable time of being requested to do so by the competent authority, the documentation required to be carried on board.

SPO.GEN.145 Journey log – non-commercial operations with other-than-complex motor-powered aircraft

Particulars of the aircraft, its crew and each journey shall be retained for each flight, or series of flights, in the form of a journey log, or equivalent.

SPO.GEN.150 Preservation, production and use of flight recorder recordings – operations with complex motor-powered aircraft

(a) Following an accident or an incident that is subject to mandatory reporting, the operator of an aircraft shall preserve the original recorded data for a period of 60 days, unless otherwise directed by the investigating authority.

(b) The operator shall conduct operational checks and evaluations of flight data recorder (FDR) recordings, cockpit voice recorder (CVR) recordings and data link recordings to ensure the continued serviceability of the recorders.

(c) The operator shall save the recordings for the period of operating time of the FDR as required by SPO.IDE.A.145 or SPO.IDE.H.145, except that, for the purpose of

testing and maintaining the FDR, up to 1 hour of the oldest recorded material at the time of testing may be erased.

(d) The operator shall keep and maintain up-to-date documentation that presents the necessary information to convert FDR raw data into parameters expressed in engineering units.

(e) The operator shall make available any flight recorder recording that has been preserved, if so determined by the competent authority.

(f) CVR recordings shall only be used for purposes other than for the investigation of an accident or an incident subject to mandatory reporting, if all crew members and maintenance personnel concerned consent.

(g) FDR recordings or data link recordings shall only be used for purposes other than for the investigation of an accident or an incident that is subject to mandatory reporting, if such records are:

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

(2) de-identified; or

(3) disclosed under secure procedures.

SPO.GEN.155 Transport of dangerous goods

(a) The transport of dangerous goods by air shall be conducted in accordance with Annex 18 to the Chicago Convention as last amended and amplified by the Technical Instructions for the Safe Transport of Dangerous Goods by Air (ICAO Doc 9284-AN/905), including its attachments, supplements and any other addenda or corrigenda.

(b) Dangerous goods shall only be transported by an operator approved in accordance with SPA.DG, except when:

(1) they are not subject to the Technical Instructions in accordance with Part 1 of those Instructions;

(2) they are carried by task specialists or crew members or are in baggage which has been separated from its owner, in accordance with Part 8 of the Technical Instructions; or

(3) required on board the aircraft for specialised purposes.

(c) The operator transporting dangerous goods to unmanned sites or remote locations shall apply to the competent authority for an exemption from the provisions of the Technical Instructions if they intend not to comply with those Instructions.

(d) The operator shall establish procedures to ensure that all reasonable measures are taken to prevent dangerous goods from being carried on board inadvertently.

(e) The operator shall provide personnel with the necessary information enabling them to carry out their responsibilities, as required by the Technical Instructions.

(f) The pilot-in-command shall, in accordance with the Technical Instructions, report without delay on any dangerous goods accident or incident to the competent authority and the appropriate authority of the State of occurrence.

(g) The operator shall ensure that task specialists are provided with information about dangerous goods.

(h) The operator shall ensure that notices giving information about the transport of dangerous goods are provided at acceptance points for cargo as required by the Technical Instructions.

SPO.GEN.160 Releasing of dangerous goods

The operator shall not operate an aircraft over congested areas of cities, towns or settlements or over an open-air assembly of persons when releasing dangerous goods.

SPO.GEN.165 Carriage and use of weapons

(a) The operator may carry weapons on a flight for the purpose of a specialised task provided that the weapons are secured when not in use.

(b) The operator shall take all necessary measures to prevent the aircraft and persons on board or on the ground being endangered when weapons are used.

SPO.GEN.170 Immediate reaction to a safety problem

The operator shall implement:

(a) any safety measures mandated by the competent authority in accordance with ARO.GEN.135; and

(b) any relevant mandatory safety information issued by the Agency, including airworthiness directives.

SPO.GEN.175 Minimum equipment list – non-commercial operations with other-than-complex motor-powered aircraft

A minimum equipment list (MEL) may be established as specified under 8.a.3. of Annex IV to Regulation (EC) No 216/2008. In that case, the MEL and any amendment thereto shall be approved by the competent authority or, in case of aircraft registered in a third country, the State of Registry.

Subpart B - Operational procedures

SPO.OP.100 Use of aerodromes and operating sites

The operator shall only use aerodromes and operating sites that are adequate for the type of aircraft and operation concerned.

SPO.OP.105 Specification of isolated aerodromes - aeroplanes

For the selection of alternate aerodromes and the fuel policy, the operator shall consider an aerodrome as an isolated aerodrome if the fuel required to the nearest adequate destination alternate aerodrome is more than:

(a) for aeroplanes with reciprocating engines, fuel to fly for 60 minutes; or

(b) for aeroplanes with turbine engines, fuel to fly for 90 minutes.

SPO.OP.110 Aerodrome operating minima – aeroplanes and helicopters

(a) For IFR flights, the operator of a complex motor-powered aircraft and any aircraft operated commercially shall specify aerodrome operating minima for each departure, destination and alternate aerodrome to be used.

(b) For IFR flights, the pilot-in-command of an other-than-complex aircraft when operated non-commercially shall select and use aerodrome operating minima for each departure, destination and alternate aerodrome to be used.

(c) Such minima shall, for (a) and (b):

  (1) not be lower than those established by the State in which the aerodrome is located, except when specifically approved by that State; and

  (2) when low visibility operations are being undertaken, be approved by the competent authority in accordance with SPA.LVO.

(d) When establishing or selecting the aerodrome operating minima, the operator or the pilot-in-command shall take the following into account:

  (1) the type, performance and handling characteristics of the aircraft;

  (2) the competence and experience of the flight crew and, if applicable, its composition;

  (3) the dimensions and characteristics of the runways and final approach and take-off areas (FATOs) that may be selected for use;

  (4) the adequacy and performance of the available visual and non-visual ground aids;

  (5) the equipment available on the aircraft for the purpose of navigation and/or control of the flight path, during the take-off, the approach, the flare, the landing, the rollout and the missed approach;

(6) the obstacles in the approach, the missed approach and the climb-out areas required for the execution of contingency procedures;

(7) the obstacle clearance altitude/height for the instrument approach procedures;

(8) the means to determine and report meteorological conditions; and

(9) the flight technique to be used during the final approach.

(e) The minima for a specific type of approach and landing procedure shall be used if:

(1) the ground equipment required for the intended procedure is operative;

(2) the aircraft systems required for the type of approach are operative;

(3) the required aircraft performance criteria are met; and

(4) the flight crew is qualified appropriately.

SPO.OP.111 Aerodrome operating minima – NPA, APV, CAT I operations

(a) The decision height (DH) to be used for a non-precision approach (NPA) flown with the continuous descent final approach (CDFA) technique, approach procedure with vertical guidance (APV) or category I (CAT I) operation shall not be lower than the highest of:

(1) the minimum height to which the approach aid can be used without the required visual reference;

(2) the obstacle clearance height (OCH) for the category of aircraft;

(3) the published approach procedure DH where applicable;

(4) the system minimum specified in Table 1; or

(5) the minimum DH specified in the AFM or equivalent document, if stated.

(b) The minimum descent height (MDH) for an NPA operation flown without the CDFA technique shall not be lower than the highest of:

(1) the OCH for the category of aircraft;

(2) the system minimum specified in Table 1; or

(3) the minimum MDH specified in the AFM, if stated.

Table 1: System minima

Facility	**Lowest DH/MDH (ft)**
Instrument landing system (ILS)	200
Global navigation satellite system (GNSS)/ satellite-based augmentation system (SBAS) (lateral precision with vertical guidance approach (LPV))	200
GNSS (lateral navigation (LNAV))	250

Facility	**Lowest DH/MDH (ft)**
GNSS/Baro-vertical navigation (VNAV) (LNAV/ VNAV)	250
Localiser (LOC) with or without distance measuring equipment (DME)	250
Surveillance radar approach (SRA) (terminating at ½ NM)	250
SRA (terminating at 1 NM)	300
SRA (terminating at 2 NM or more)	350
VHF omnidirectional radio range (VOR)	300
VOR/DME	250
Non-directional beacon (NDB)	350
NDB/DME	300
VHF direction finder (VDF)	350

SPO.OP.112 Aerodrome operating minima – circling operations with aeroplanes

(a) The MDH for a circling operation with aeroplanes shall not be lower than the highest of:

(1) the published circling OCH for the aeroplane category;

(2) the minimum circling height derived from Table 2; or

(3) the DH/MDH of the preceding instrument approach procedure.

(b) The minimum visibility for a circling operation with aeroplanes shall be the highest of:

(1) the circling visibility for the aeroplane category, if published;

(2) the minimum visibility derived from Table 2; or

(3) the runway visual range / converted meteorological visibility (RVR/CMV) of the preceding instrument approach procedure.

Table 2: MDH and minimum visibility for circling vs. aeroplane category

	Aeroplane category			
	A	**B**	**C**	**D**
MDH (ft)	400	500	600	700
Minimum meteorological visibility (m)	1 500	1 600	2 400	3 600

SPO.OP.113 Aerodrome operating minima – circling operations with helicopters

The MDH for an onshore circling operation with helicopters shall not be lower than 250 ft and the meteorological visibility not less than 800 m.

SPO.OP.115 Departure and approach procedures – aeroplanes and helicopters

(a) The pilot-in-command shall use the departure and approach procedures established by the State of the aerodrome, if such procedures have been published for the runway or FATO to be used.

(b) The pilot-in-command may deviate from a published departure route, arrival route or approach procedure:

(1) provided obstacle clearance criteria can be observed, full account is taken of the operating conditions and any ATC clearance is adhered to; or

(2) when being radar-vectored by an ATC unit.

SPO.OP.120 Noise abatement procedures

The pilot-in-command shall take into account published noise abatement procedures to minimise the effect of aircraft noise while ensuring that safety has priority over noise abatement.

SPO.OP.121 Noise abatement procedures - balloons

The pilot-in-command shall make use of operating procedures, where established, to minimise the effect of heating-system noise while ensuring that safety has priority over noise abatement.

SPO.OP.125 Minimum obstacle clearance altitudes — IFR flights

(a) The operator shall specify a method to establish minimum flight altitudes that provide the required terrain clearance for all route segments to be flown in IFR.

(b) The pilot-in-command shall establish minimum flight altitudes for each flight based on this method. The minimum flight altitudes shall not be lower than those published by the State overflown.

SPO.OP.130 Fuel and oil supply - aeroplanes

(a) The pilot-in-command shall only commence a flight if the aeroplane carries sufficient fuel and oil for the following:

(1) for visual flight rules (VFR) flights:

(i) by day, to fly to the aerodrome of intended landing and thereafter to fly for at least 30 minutes at normal cruising altitude; or

(ii) by night, to fly to the aerodrome of intended landing and thereafter to fly for at least 45 minutes at normal cruising altitude;

(2) for instrument flight rules (IFR) flights:

(i) when no destination alternate is required, to fly to the aerodrome of intended landing and thereafter to fly for at least 45 minutes at normal cruising altitude; or

(ii) when a destination alternate is required, to fly to the aerodrome of intended landing, to an alternate aerodrome and thereafter to fly for at least 45 minutes at normal cruising altitude.

(b) In computing the fuel required, the following shall be taken into consideration:

(1) forecast meteorological conditions;

(2) anticipated ATC routings and traffic delays;

(3) procedures for loss of pressurisation or failure of one engine while en-route, where applicable; and

(4) any other condition that may delay the landing of the aeroplane or increase fuel and/or oil consumption.

(c) Nothing shall preclude amendment of a flight plan in-flight, in order to re-plan the flight to another destination, provided that all requirements can be complied with from the point where the flight is re-planned

SPO.OP.131 Fuel and oil supply - helicopters

(a) The pilot-in-command shall only commence a flight if the helicopter carries sufficient fuel and oil for the following:

(1) for VFR flights, to fly to the aerodrome/operating site of intended landing and thereafter to fly for at least 20 minutes at best-range-speed; and

(2) for IFR flights:

(i) to fly to the aerodrome/operating site of intended landing, and thereafter to fly for 30 minutes at holding speed at 450 m (1 500 ft) above the destination aerodrome/operating site under standard temperature conditions and approach and land, when no alternate is required or no weather-permissible alternate aerodrome is available; or

(ii) when an alternate is required, to fly to and execute an approach and a missed approach at the aerodrome/operating site of intended landing, and thereafter:

(A) to fly to the specified alternate; and

(B) to fly for 30 minutes at holding speed at 450 m (1 500 ft) above the alternate aerodrome/operating site under standard temperature conditions and approach and land.

(b) In computing the fuel required, including to provide for contingency, the following shall be taken into consideration:

(1) forecast meteorological conditions;

(2) anticipated ATC routings and traffic delays;

(3) procedures for loss of pressurisation or failure of one engine while en-route, where applicable; and

(4) any other condition that may delay the landing of the aircraft or increase fuel and/or oil consumption.

(c) Nothing shall preclude amendment of a flight plan in-flight, in order to re-plan the flight to another destination, provided that all requirements can be complied with from the point where the flight is re-planned.

SPO.OP.132 Fuel and ballast supply and planning - balloons

(a) The pilot-in-command shall only commence a flight if the reserve fuel, gas or ballast is sufficient for 30 minutes of flight.

(b) Fuel, gas or ballast supply calculations shall be based upon at least the following operating conditions:

(1) data provided by the balloon manufacturer;

(2) anticipated masses;

(3) expected meteorological conditions; and

(4) air navigation services provider procedures and restrictions.

SPO.OP.135 Carriage of crew members and task specialists

(a) Except for balloons, during critical phases of flight, or whenever deemed necessary by the pilot-in-command in the interest of safety, crew members and task specialists on board shall occupy a seat or a station with restraining devices properly secured.

(b) Task specialists shall be restrained when carrying out specialised tasks with external doors opened or removed.

SPO.OP.140 Safety briefing

(a) The pilot-in-command shall ensure that, prior to take-off task specialists are given a briefing on emergency equipment and procedures.

(b) Each task specialist shall be briefed on operational procedures associated with the specialised task before each flight or series of flights.

(c) The briefing referred to in (b) may be replaced by an initial and recurrent training programme. In such case the operator shall also define recency requirements.

SPO.OP.145 Flight preparation

(a) Before commencing a flight, the pilot-in-command shall ascertain by every reasonable means available that the ground and/or water facilities, including communication facilities and navigation aids, available and directly required on such flight, for the safe operation of the aircraft are adequate for the type of operation under which the flight is to be conducted.

(b) Before commencing a flight, the pilot-in-command shall be familiar with all available meteorological information appropriate to the intended flight. Preparation for a flight away from the vicinity of the place of departure, and for every flight under IFR, shall include:

(1) a study of available current weather reports and forecasts; and

(2) the planning of an alternative course of action to provide for the eventuality that the flight cannot be completed as planned, because of weather conditions.

SPO.OP.150 Take-off alternate aerodromes – complex motor-powered aeroplanes

(a) For IFR flights, the pilot-in-command shall specify at least one weather-permissible take-off alternate aerodrome in the flight plan if the weather conditions at the aerodrome of departure are at or below the applicable aerodrome operating minima or it would not be possible to return to the aerodrome of departure for other reasons.

(b) The take-off alternate aerodrome shall be located within the following distance from the aerodrome of departure:

(1) for aeroplanes having two engines, not more than a distance equivalent to a flight time of 1 hour at the single-engine cruise speed; and

(2) for aeroplanes having three or more engines, not more than a distance equivalent to a flight time of 2 hours at the one-engine-inoperative (OEI) cruise speed.

(c) For an aerodrome to be selected as a take-off alternate aerodrome the available information shall indicate that, at the estimated time of use, the conditions will be at or above the aerodrome operating minima for that operation.

SPO.OP.155 Destination alternate aerodromes – aeroplanes

For IFR flights, the pilot-in-command shall specify at least one weather-permissible destination alternate aerodrome in the flight plan, unless:

(a) the available current meteorological information indicates that, for the period from 1 hour before until 1 hour after the estimated time of arrival, or from the actual time of departure to 1 hour after the estimated time of arrival, whichever is the shorter period, the approach and landing may be made under visual meteorological conditions (VMC); or

(b) the place of intended landing is isolated and:

(1) an instrument approach procedure is prescribed for the aerodrome of intended landing; and

(2) available current meteorological information indicates that the following meteorological conditions will exist from 2 hours before to 2 hours after the estimated time of arrival:

(i) a cloud base of at least 300 m (1 000 ft) above the minimum associated with the instrument approach procedure; and

(ii) visibility of at least 5.5 km or of 4 km more than the minimum associated with the procedure.

SPO.OP.156 Destination alternate aerodromes – helicopters

For IFR flights, the pilot-in-command shall specify at least one weather-permissible destination alternate aerodrome in the flight plan, unless:

(a) available current meteorological information indicates that the following meteorological conditions will exist from 2 hours before to 2 hours after the estimated time of arrival, or from the actual time of departure to 2 hours after the estimated time of arrival, whichever is the shorter period:

(1) a cloud base of at least 120 m (400 ft) above the minimum associated with the instrument approach procedure; and

(2) visibility of at least 1 500 m more than the minimum associated with the procedure;

or

(b) the place of intended landing is isolated and:

(1) an instrument approach procedure is prescribed for the aerodrome of intended landing;

(2) the cloud base is at least 120 m (400 ft) above the minimum associated with the instrument approach procedure;

(3) visibility is at least 1 500 m more than the minimum associated with the procedure; and

(4) a point of no return (PNR) is determined in case of an offshore destination.

SPO.OP.160 Refuelling with persons embarking, on board or disembarking

(a) The aircraft shall not be refuelled with aviation gasoline (AVGAS) or wide-cut type fuel or a mixture of these types of fuel, when persons are embarking, on board or disembarking.

(b) For all other types of fuel, necessary precautions shall be taken and the aircraft shall be properly manned by qualified personnel ready to initiate and direct an evacuation of the aircraft by the most practical and expeditious means available.

SPO.OP.165 Use of headset

Each flight crew member required to be on duty in the flight crew compartment shall wear a headset with boom microphone, or equivalent, and use it as the primary device to communicate with ATS and task specialists.

SPO.OP.170 Smoking on board

The pilot-in-command shall not allow smoking on board or during refuelling of the aircraft.

SPO.OP.175 Meteorological conditions

(a) The pilot-in-command shall only commence or continue a VFR flight if the latest available meteorological information indicates that the weather conditions along the route and at the intended destination at the estimated time of use will be at or above the applicable VFR operating minima.

(b) The pilot-in-command shall only commence or continue an IFR flight towards the planned destination aerodrome if the latest available meteorological information indicates that, at the estimated time of arrival, the weather conditions at the destination or at least one destination alternate aerodrome are at or above the applicable aerodrome operating minima.

(c) If a flight contains VFR and IFR segments, the meteorological information referred to in (a) and (b) shall be applicable as far as relevant.

SPO.OP.180 Ice and other contaminants — ground procedures

The pilot-in-command shall only commence take-off if the aircraft is clear of any deposit that might adversely affect the performance or controllability of the aircraft, except as permitted in the AFM.

SPO.OP.181 Ice and other contaminants — flight procedures

(a) The pilot-in-command shall only commence a flight or intentionally fly into expected or actual icing conditions if the aircraft is certified and equipped to cope with such conditions as referred to in 2.a.5 of Annex IV to Regulation (EC) No 216/2008.

(b) If icing exceeds the intensity of icing for which the aircraft is certified or if an aircraft not certified for flight in known icing conditions encounters icing, the pilot-in-command shall exit the icing conditions without delay, by a change of level and/or route, and if necessary by declaring an emergency to ATC.

(c) In the case of operations with complex motor-powered aircraft, the operator shall establish procedures for flights in expected or actual icing conditions.

SPO.OP.185 Take-off conditions – aeroplanes and helicopters

Before commencing take-off, the pilot-in-command shall be satisfied that:

(a) according to the information available, the weather at the aerodrome or operating site and the condition of the runway or FATO intended to be used will not prevent a safe take-off and departure; and

(b) applicable aerodrome operating minima will be complied with.

SPO.OP.186 Take-off conditions - balloons

Before commencing take-off, the pilot-in-command shall be satisfied that, according to the information available, the weather at the operating site or aerodrome will not prevent a safe take-off and departure.

SPO.OP.190 Simulated abnormal situations in flight

The pilot-in-command shall, when carrying task specialists, not simulate:

(a) abnormal or emergency situations that require the application of abnormal or emergency procedures; or

(b) flight in instrument meteorological conditions (IMC) by artificial means.

SPO.OP.195 In-flight fuel management

The pilot-in-command shall check at regular intervals that the amount of usable fuel remaining in flight is not less than the fuel required to proceed, with the planned final reserve fuel remaining, to a weather-permissible aerodrome or operating site.

SPO.OP.200 Use of supplemental oxygen

The pilot-in-command shall ensure that task specialists and crew members use supplemental oxygen continuously whenever the cabin altitude exceeds 10 000 ft for a period of more than 30 minutes and whenever the cabin altitude exceeds 13 000 ft.

SPO.OP.205 Ground proximity detection

(a) When undue proximity to the ground is detected by a flight crew member or by a ground proximity warning system (GPWS), the pilot flying shall take corrective action immediately in order to establish safe flight conditions.

(b) The GPWS may be disabled during those specialised tasks, which by their nature require the aircraft to be operated within a distance from the ground below that would trigger the GPWS.

SPO.OP.210 Use of airborne collision avoidance system (ACAS) II – complex motor-powered aeroplane

The operator shall establish procedures to ensure that when ACAS II is installed and serviceable, it shall be used in accordance with Regulation (EU) No […]/2011.SPO.OP.211 Use of airborne collision avoidance system (ACAS) II – complex motor-powered helicopter

Without prejudice to Regulation (EU) No […]/2011, the operator shall establish procedures to ensure that when ACAS is installed and serviceable, it shall be used during flight in a mode that enables traffic advisory to be displayed.

SPO.OP.215 Approach and landing conditions – aeroplanes and helicopters

Before commencing an approach to land, the pilot-in-command shall be satisfied that, according to the information available, the weather at the aerodrome or the operating site and the condition of the runway or FATO intended to be used would not prevent a safe approach, landing or missed approach.

SPO.OP.216 Approach and landing conditions – balloons and sailplanes

Before commencing an approach to land, the pilot-in-command shall be satisfied that, according to the information available, the weather at the intended operating site and the condition of the surface intended to be used would not prevent a safe approach and landing.

SPO.OP.220 Commencement and continuation of approach – aeroplanes and helicopters

(a) The pilot-in-command may commence an instrument approach regardless of the reported runway visual range/visibility (RVR/VIS).

(b) If the reported RVR/VIS is less than the applicable minimum, the approach shall not be continued:

  (1) below 1 000 ft above the aerodrome; or

  (2) into the final approach segment in the case where the decision altitude/height (DA/H) or minimum descent altitude/height (MDA/H) is more than 1 000 ft above the aerodrome,

(c) Where the RVR is not available, RVR values may be derived by converting the reported visibility.

(d) If, after passing 1 000 ft above the aerodrome, the reported RVR/VIS falls below the applicable minimum, the approach may be continued to DA/H or MDA/H.

(e) The approach may be continued below DA/H or MDA/H and the landing may be completed provided that the visual reference adequate for the type of approach and for the intended runway is established at the DA/H or MDA/H and is maintained.

(f) The touchdown zone RVR shall always be controlling.

SPO.OP.225 Operational limitations – hot-air balloons

A hot-air balloon may take-off during night, provided sufficient fuel is carried for a landing during day.

SPO.OP.230 Standard operating procedures

(a) Specialised operations shall be performed in accordance with SOPs.

(b) Before commencing any specialised operation, the operator shall carry out a risk assessment and shall develop appropriate SOPs. The risk assessment and SOPs should address at least the following:

(1) scope and complexity of the activity;

(2) aircraft and equipment;

(3) crew composition, training and experience;

(4) the duties of task specialists;

(5) aircraft performance;

(6) normal, abnormal and emergency procedures;

(7) ground equipment; and

(8) record keeping.

(c) SOPs developed by commercial operators shall be approved by the competent authority.

Subpart C – Aircraft performance and operating limitations

SPO.POL.100 Operating limitations

(a) During any phase of operation, the loading, the mass and, except for balloons, the centre of gravity (CG) position of the aircraft shall comply with any limitation specified in the appropriate manual.

(b) Placards, listings, instrument markings, or combinations thereof, containing those operating limitations prescribed by the AFM for visual presentation, shall be displayed in the aircraft.

SPO.POL.105 Mass and balance

(a) The operator shall ensure that the mass and CG of the aircraft have been established by actual weighing prior to initial entry into service. The accumulated effects of modifications and repairs on the mass and balance shall be accounted for and properly documented. Such information shall be available to the pilot-in-command.

(b) The weighing shall be accomplished by the manufacturer of the aircraft or by an approved maintenance organisation.

(c) The operator shall ensure that the aircraft is reweighed if the effect of modifications on the mass and balance is not accurately known.

SPO.POL.110 Mass and balance system – complex motor-powered aircraft

(a) The operator shall establish a mass and balance system specifying how the following items are determined for each flight or series of flights:

(1) aircraft dry operating mass;

(2) mass of the traffic load;

(3) mass of the fuel load;

(4) aircraft load and load distribution;

(5) take-off mass, landing mass and zero fuel mass; and

(6) applicable aircraft CG positions.

(b) The flight crew shall be provided with a means of replicating and verifying any mass and balance computation based on electronic calculations.

(c) The operator shall establish procedures to enable the pilot-in-command to determine the mass of the fuel load by using the actual density or, if not known, the density calculated in accordance with a method specified in the operations manual.

(d) The pilot-in-command shall ensure that the loading of:

(1) the aircraft is performed under the supervision of qualified personnel; and

(2) traffic load is consistent with the data used for the calculation of the aircraft mass and balance.

(e) The operator shall specify, in the operations manual, the principles and methods involved in the loading and in the mass and balance system that meet the requirements contained in (a) to (d). This system shall cover all types of intended operations.

SPO.POL.115 Mass and balance data and documentation – complex motor-powered aircraft and commercial operations

(a) The operator shall establish mass and balance data and produce mass and balance documentation prior to each flight, or series of flights, specifying the load and its distribution in such a way that the mass and balance limits of the aircraft are not exceeded. The mass and balance documentation shall contain the following information:

(1) aircraft registration and type;

(2) flight identification, number and date, as applicable;

(3) name of the pilot-in-command;

(4) name of the person who prepared the document;

(5) dry operating mass and the corresponding CG of the aircraft;

(6) mass of the fuel at take-off and the mass of trip fuel;

(7) mass of consumables other than fuel, if applicable;

(8) load components;

(9) take-off mass, landing mass and zero fuel mass;

(10) applicable aircraft CG positions; and

(11) the limiting mass and CG values.

(b) Where mass and balance data and documentation is generated by a computerised mass and balance system, the operator shall verify the integrity of the output data.

(c) Notwithstanding (a)(5), the CG position need not be included in the mass and balance documentation, if the load distribution is in accordance with a pre-calculated balance table or if it can be shown that for the planned operations a correct balance can be ensured, whatever the real load is.

SPO.POL.120 Performance - general

(a) The pilot-in-command shall only operate the aircraft if the performance is adequate to comply with the applicable rules of the air and any other restrictions applicable to the flight, the airspace or the aerodromes or operating sites used, taking into account the charting accuracy of any charts and maps used.

(b) The pilot-in-command shall not operate an aircraft over the congested environment of cities, towns or settlements or over an open-air assembly of persons, if in the event of an engine failure a landing cannot be made without causing undue hazard to persons or property on the ground.

SPO.POL.125 Take-off mass limitations – complex motor-powered aeroplanes

The operator shall ensure that:

(a) the mass of the aeroplane at the start of take-off shall not exceed the mass limitations:

(1) at take-off, as required in SPO.POL.130;

(2) en-route with one engine inoperative (OEI), as required in SPO.POL.135; and

(3) at landing, as required in SPO.POL.140, allowing for expected reductions in mass as the flight proceeds, and for fuel jettisoning;

(b) the mass at the start of take-off shall never exceed the maximum take-off mass specified in the AFM for the pressure altitude appropriate to the elevation of the aerodrome or operating site, and if used as a parameter to determine the maximum take-off mass, any other local atmospheric condition; and

(c) the estimated mass for the expected time of landing at the aerodrome or operating site of intended landing and at any destination alternate aerodrome shall never exceed the maximum landing mass specified in the AFM for the pressure altitude appropriate to the elevation of those aerodromes or operating sites and if used as a parameter to determine the maximum landing mass, any other local atmospheric condition.

SPO.POL.130 Take-off – complex motor-powered aeroplanes

(a) When determining the maximum take-off mass, the pilot-in-command shall take the following into account:

(1) the calculated take-off distance shall not exceed the take-off distance available with a clearway distance not exceeding half of the take-off run available;

(2) the calculated take-off run shall not exceed the take-off run available;

(3) a single value of V1 shall be used for the rejected and continued take-off, where a V1 is specified in the AFM; and

(4) on a wet or contaminated runway, the take-off mass shall not exceed that permitted for a take-off on a dry runway under the same conditions.

(b) In the event of an engine failure during take-off, the pilot-in-command shall ensure that:

(1) for the aeroplane where a V1 is specified in the AFM, the aeroplane shall be able to discontinue the take-off and stop within the accelerate-stop distance available; and

(2) for the aeroplane where a net take-off flight path is specified in the AFM, the aeroplane shall be able to continue the take-off and clear all obstacles along the flight path by an adequate margin until the aeroplane is in a position to comply with SPO.POL.135.

SPO.POL.135 En-route - one engine inoperative – complex motor-powered aeroplanes

The pilot-in-command shall ensure that in the event of an engine becoming inoperative at any point along the route, a multi-engined aeroplane shall be able to continue the flight to an adequate aerodrome or operating site without flying below the minimum obstacle clearance altitude at any point.

SPO.POL.140 Landing – complex motor-powered aeroplanes

The pilot-in-command shall ensure that at any aerodrome or operating site, after clearing all obstacles in the approach path by a safe margin, the aeroplane shall be able to land and stop, or a seaplane to come to a satisfactory low speed, within the landing distance available. Allowance shall be made for expected variations in the approach and landing techniques, if such allowance has not been made in the scheduling of performance data.

SPO.POL.145 Performance criteria - aeroplanes

When operating an aeroplane at a height of less than 150 m (500 ft) outside a congested environment, for operations of aeroplanes that are not able to sustain level flight in the event of a critical engine failure, the operator shall:

(a) establish operational procedures to minimise the consequences of an engine failure;

(b) establish a training programme for crew members; and

(c) ensure that all crew members and task specialists on board are briefed on the procedures to be carried out in the event of a forced landing.

SPO.POL.146 Performance criteria - helicopters

(a) A helicopter operating over a congested hostile environment shall be:

(1) certified in category A or equivalent as determined by the Agency; and

(2) operated at a mass and in conditions that, in the event of a critical engine failure, the helicopter is capable of sustaining level flight and continue to a site where a safe landing can be made.

(b) The operator shall:

(1) establish operational procedures to minimise the consequences of an engine failure;

(2) establish a training programme for crew members; and

(3) ensure that all persons on board are briefed on the procedures to be carried out in the event of a forced landing.

(c) The operator shall ensure that the mass at take-off, landing or hover shall not exceed the maximum mass specified for:

(1) a hover out of ground effect (HOGE) with all engines operating at the appropriate power rating; or

(2) if conditions prevail that a HOGE is not likely to be established, the helicopter mass shall not exceed the maximum mass specified for a hover in ground effect (HIGE) with all engines operating at the appropriate power rating, provided prevailing conditions allow a hover in ground effect at the maximum specified mass.

Subpart D - Instruments, data and equipment

Section 1 - Aeroplanes

SPO.IDE.A.100 Instruments and equipment – general

(a) Instruments and equipment required by this Part shall be approved in accordance with the applicable airworthiness requirements if they are:

(1) used by the flight crew to control the flight path, to comply with SPO.IDE.A.215 and SPO.IDE.A.220; or

(2) installed in the aeroplane.

(b) The following items, when required by this Part, do not need an equipment approval:

(1) spare fuses,

(2) independent portable lights,

(3) an accurate time piece,

(4) chart holder,

(5) first-aid kits,

(6) survival and signalling equipment, and

(7) sea anchor and equipment for mooring.

(c) Instruments and equipment not required by this Part that do not fall under the requirements of (a) as well as any other equipment that is not required by other Parts, but is carried on a flight, shall comply with the following:

(1) the information provided by these instruments, equipment or accessories shall not be used by the flight crew to comply with Annex I to Regulation (EC) No 216/20082 or SPO.IDE.A.215 and SPO.IDE.A.220;

(2) the instruments and equipment shall not affect the airworthiness of the aeroplane, even in the case of failures or malfunction.

(d) Instruments and equipment shall be readily operable or accessible from the station where the flight crew member that needs to use it is seated.

(e) All required emergency equipment shall be easily accessible for immediate use.

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[2] Regulation (EC) No 216/2008 of the European Parliament and of the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC. OJ L 79, 19.3.2008, p. 1, as amended by Regulation (EC) No 1108/2009 of the European Parliament and of the Council of 21 October 2009, OJ L 309, 24.11.2009, p. 51.

SPO.IDE.A.105 Minimum equipment for flight

A flight shall not be commenced when any of the aeroplane instruments, items of equipment or functions required for the intended flight are inoperative or missing, unless:

(a) the aeroplane is operated in accordance with the minimum equipment list (MEL), if established; or

(b) the operator is approved by the competent authority to operate the aeroplane within the constraints of the master minimum equipment list (MMEL); or

(c) the aeroplane is subject to a permit to fly issued in accordance with the applicable airworthiness requirements.

SPO.IDE.A.110 Spare electrical fuses

Aeroplanes shall be equipped with spare electrical fuses, of the ratings required for complete circuit protection, for replacement of those fuses that are allowed to be replaced in flight.

SPO.IDE.A.115 Operating lights

Aeroplanes operated at night shall be equipped with:

(a) an anti-collision light system;

(b) navigation/position lights;

(c) a landing light;

(d) lighting supplied from the aeroplane's electrical system to provide adequate illumination for all instruments and equipment essential to the safe operation of the aeroplane;

(e) lighting supplied from the aeroplane's electrical system to provide illumination in all cabin compartments;

(f) an independent portable light for each crew member station; and

(g) lights to conform with the International Regulations for Preventing Collisions at Sea if the aeroplane is operated as a seaplane.

SPO.IDE.A.120 Operations under VFR – flight and navigational instruments and associated equipment

(a) Aeroplanes operated under VFR by day shall be equipped with a means of measuring and displaying:

(1) magnetic heading,

(2) time, in hours, minutes and seconds,

(3) pressure altitude,

(4) indicated airspeed,

(5) Mach number, whenever speed limitations are expressed in terms of Mach number, and

(6) for complex motor-powered aeroplanes, slip.

(b) Aeroplanes operating under visual meteorological conditions (VMC) at night, or in conditions where the aeroplane cannot be maintained in a desired attitude without reference to one or more additional instruments, shall be, in addition to (a), equipped with:

(1) a means of measuring and displaying:

(i) turn and slip,

(ii) attitude,

(iii) vertical speed, and

(iv) stabilised heading; and

(2) a means of indicating when the supply of power to the gyroscopic instruments is not adequate;

(3) a means of preventing malfunction of the airspeed indicating system required in (a)(4) due to condensation or icing.

(c) Whenever two pilots are required for the operation, aeroplanes shall be equipped with an additional separate means of displaying:

(1) pressure altitude,

(2) indicated airspeed,

(3) slip, or turn and slip, as applicable,

(4) attitude, if applicable,

(5) vertical speed, if applicable, and

(6) stabilised heading, if applicable.

SPO.IDE.A.125 Operations under IFR – flight and navigational instruments and associated equipment

Aeroplanes operated under IFR shall be equipped with:

(a) A means of measuring and displaying:

(1) magnetic heading,

(2) time in hours, minutes and seconds,

(3) pressure altitude,

(4) indicated airspeed,

(5) vertical speed,

(6) turn and slip,

(7) attitude,

(8) stabilised heading.

(9) outside air temperature, and

(10) Mach number, whenever speed limitations are expressed in terms of Mach number.

(b) A means of indicating when the supply of power to the gyroscopic instruments is not adequate.

(c) Whenever two pilots are required for the operation, an additional separate means of displaying for the second pilot:

(1) pressure altitude,

(2) indicated airspeed,

(3) vertical speed,

(4) turn and slip,

(5) attitude,

(6) stabilised heading, and

(7) Mach number whenever speed limitations are expressed in terms of Mach number, if applicable.

(d) A means of preventing malfunction of the airspeed indicating system required in (a)(4) and (c)(2) due to condensation or icing.

(e) The following equipment for complex motor-powered aeroplanes:

(1) An alternate source of static pressure.

(2) A chart holder in an easily readable position that can be illuminated for night operations.

(3) A second independent means of measuring and displaying altitude unless already installed to comply with (1).

(4) An emergency power supply, independent of the main electrical generating system, for the purpose of operating and illuminating an attitude indicating system for a minimum period of 30 minutes. The emergency power supply shall be automatically operative after the total failure of the main electrical generating system and clear indication shall be given on the instrument that the attitude indicator is being operated by emergency power.

SPO.IDE.A.126 Additional equipment for single-pilot operation under IFR

Complex motor-powered aeroplanes operated under IFR with a single pilot shall be equipped with an autopilot with at least altitude hold and heading mode.

SPO.IDE.A.130 Terrain awareness warning system (TAWS)

Turbine-powered aeroplanes with a maximum operational passenger seating configuration (MOPSC) of more than nine shall be equipped with a TAWS that meets the requirements for:

(a) class A equipment, as specified in an acceptable standard, in the case of aeroplanes for which the individual certificate of airworthiness (CofA) was first issued after 1 January 2011; or

(b) class B equipment, as specified in an acceptable standard, in the case of aeroplanes for which the individual CofA was first issued on or before 1 January 2011.

SPO.IDE.A.131 Airborne collision avoidance system (ACAS)

Turbine-powered aeroplanes with an MCTOM of more than 5 700 kg or an MOPSC of more than 19 shall be equipped with ACAS II.

SPO.IDE.A.132 Airborne weather detecting equipment

The following aeroplanes shall be equipped with airborne weather detecting equipment when operated at night or in IMC in areas where thunderstorms or other potentially hazardous weather conditions, regarded as detectable with airborne weather detecting equipment, may be expected to exist along the route:

(a) pressurised aeroplanes;

(b) non-pressurised aeroplanes with an MCTOM of more than 5 700 kg; and

(c) non-pressurised aeroplanes with an MOPSC of more than nine.

SPO.IDE.A.133 Additional equipment for operations in icing conditions at night

(a) Aeroplanes operated in expected or actual icing conditions at night shall be equipped with a means to illuminate or detect the formation of ice.

(b) The means to illuminate the formation of ice shall not cause glare or reflection that would handicap flight crew members in the performance of their duties.

SPO.IDE.A.135 Flight crew interphone system

Aeroplanes operated by more than one flight crew member shall be equipped with a flight crew interphone system, including headsets and microphones for use by all flight crew members.

SPO.IDE.A.140 Cockpit voice recorder

(a) The following aeroplanes shall be equipped with a cockpit voice recorder (CVR):

  (1) aeroplanes with an MCTOM of more than 27 000 kg and first issued with an individual CofA on or after 1 January 2016; and

  (2) aeroplanes with an MCTOM of more than 2 250 kg:

    (i) certified for operation with a minimum crew of at least two pilots;

    (ii) equipped with turbojet engine(s) or more than one turboprop engine; and

    (iii) for which a type certificate is first issued on or after 1 January 2016.

(b) The CVR shall be capable of retaining data recorded during at least the preceding 2 hours.

(c) The CVR shall record with reference to a timescale:

(1) voice communications transmitted from or received in the flight crew compartment by radio;

(2) flight crew members' voice communications using the interphone system and the public address system, if installed;

(3) the aural environment of the flight crew compartment, including, without interruption, the audio signals received from each boom and mask microphone in use; and

(4) voice or audio signals identifying navigation or approach aids introduced into a headset or speaker.

(d) The CVR shall start automatically to record prior to the aeroplane moving under its own power and shall continue to record until the termination of the flight when the aeroplane is no longer capable of moving under its own power.

(e) In addition to (d), depending on the availability of electrical power, the CVR shall start to record as early as possible during the cockpit checks prior to engine start at the beginning of the flight until the cockpit checks immediately following engine shutdown at the end of the flight.

(f) The CVR shall have a device to assist in locating it in water.

SPO.IDE.A.145 Flight data recorder

(a) Aeroplanes with an MCTOM of more than 5 700 kg and first issued with an individual CofA on or after 1 January 2016 shall be equipped with an FDR that uses a digital method of recording and storing data and for which a method of readily retrieving that data from the storage medium is available.

(b) The FDR shall record the parameters required to determine accurately the aeroplane flight path, speed, attitude, engine power, configuration and operation and be capable of retaining data recorded during at least the preceding 25 hours.

(c) Data shall be obtained from aeroplane sources that enable accurate correlation with information displayed to the flight crew.

(d) The FDR shall start automatically to record the data prior to the aeroplane being capable of moving under its own power and shall stop automatically after the aeroplane is incapable of moving under its own power.

(e) The FDR shall have a device to assist in locating it in water.

SPO.IDE.A.150 Data link recording

(a) Aeroplanes first issued with an individual CofA on or after 1 January 2016 that have the capability to operate data link communications and are required to be equipped with a CVR shall record on a recorder, where applicable:

(1) data link communication messages related to ATS communications to and from the aeroplane, including messages applying to the following applications:

(i) data link initiation;

(ii) controller–pilot communication;

(iii) addressed surveillance;

(iv) flight information;

(v) as far as is practicable, given the architecture of the system, aircraft broadcast surveillance;

(vi) as far as is practicable, given the architecture of the system, aircraft operational control data; and

(vii) as far as is practicable, given the architecture of the system, graphics;

(2) information that enables correlation to any associated records related to data link communications and stored separately from the aeroplane; and

(3) information on the time and priority of data link communications messages, taking into account the system's architecture.

(b) The recorder shall use a digital method of recording and storing data and information and a method for readily retrieving that data. The recording method shall allow the data to match the data recorded on the ground.

(c) The recorder shall be capable of retaining data recorded for at least the same duration as set out for CVRs in SPO.IDE.A.140.

(d) The recorder shall have a device to assist in locating it in water.

(e) The requirements applicable to the start and stop logic of the recorder are the same as the requirements applicable to the start and stop logic of the CVR contained in SPO.IDE.A.140 (d) and (e).

SPO.IDE.A.155 Combination recorder

Compliance with CVR requirements and FDR requirements may be achieved by:

(a) one flight data and cockpit voice combination recorder if the aeroplane has to be equipped with a CVR or an FDR; or

(b) two flight data and cockpit voice combination recorders if the aeroplane has to be equipped with a CVR and an FDR.

SPO.IDE.A.160 Seats, seat safety belts and restraint systems

Aeroplanes shall be equipped with:

(a) a seat or berth for each person on board, or, in the case of task specialists, a station for each task specialist on board;

(b) a seat belt on each seat, restraining belts for each berth, and restraining devices for each station;

(c) for other-than-complex motor powered aeroplanes, a seat belt with upper torso restraint system on each flight crew seat, having a single point release.

(d) for complex motor-powered aeroplanes, a seat belt with upper torso restraint system, having a single point release and incorporating a device that will automatically restrain the occupant's torso in the event of rapid deceleration:

(1) on each flight crew seat and on any seat alongside a pilot's seat; and

(2) on each observer's seat located in the flight crew compartment.

SPO.IDE.A.165 First-aid kit

(a) Aeroplanes shall be equipped with a first-aid kit.

(b) The first-aid kit shall be:

(1) readily accessible for use; and

(2) kept up-to-date.

SPO.IDE.A.170 Supplemental oxygen – pressurised aeroplanes

(a) Pressurised aeroplanes operated at flight altitudes for which the oxygen supply is required in accordance with (b) shall be equipped with oxygen storage and dispensing apparatus capable of storing and dispensing the required oxygen supplies.

(b) Pressurised aeroplanes operated above flight altitudes at which the pressure altitude in the cabin compartments is above 10 000 ft shall carry enough breathing oxygen to supply all crew members and task specialists at least:

(1) for any period when, in the event of loss of pressurisation and taking into account the circumstances of the flight, the pressure altitude in the flight crew and cabin compartment will be between 14 000 ft and 15 000 ft; and

(2) for the remainder of the flight time when the pressure altitude in the flight crew and cabin compartment will be between 10 000 ft and 14 000 ft, after the initial 30 minutes at these altitudes;

(c) Pressurised aeroplanes operated at flight altitudes above 25 000 ft shall, in addition, be equipped with:

(1) a device to provide a warning indication to the flight crew of any loss of pressurisation; and

(2) in the case of complex motor-powered aeroplanes, quick donning masks for flight crew members.

SPO.IDE.A.175 Supplemental oxygen – non-pressurised aeroplanes

(a) Non-pressurised aeroplanes operated at flight altitudes when the oxygen supply is required in accordance with (b) shall be equipped with oxygen storage and dispensing apparatus capable of storing and dispensing the required oxygen supplies.

(b) Non-pressurised aeroplanes operated above flight altitudes at which the pressure altitude in the cabin compartments is above 10 000 ft shall carry enough breathing oxygen to supply:

(1) all crew members and task specialists for any period in excess of 30 minutes when the pressure altitude in the cabin compartment will be between 10 000 ft and 13 000 ft; and

(2) all crew members and task specialists for any period that the pressure altitude in the cabin compartment will be above 13 000 ft.

SPO.IDE.A.180 Hand fire extinguishers

(a) Aeroplanes, except touring motor gliders (TMG), shall be equipped with at least one hand fire extinguisher:

(1) in the flight crew compartment; and

(2) in each cabin compartment that is separate from the flight crew compartment, except if the compartment is readily accessible to the flight crew.

(b) The type and quantity of extinguishing agent for the required fire extinguishers shall be suitable for the type of fire likely to occur in the compartment where the extinguisher is intended to be used and to minimise the hazard of toxic gas concentration in compartments occupied by persons.

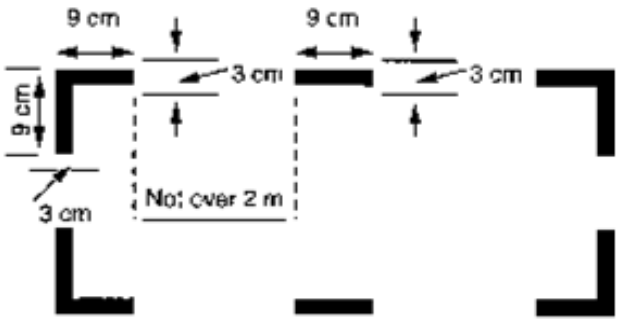
SPO.IDE.A.181 Crash axe and crowbar

Aeroplanes with an MCTOM of more than 5 700 kg or with an MOPSC of more than nine shall be equipped with at least one crash axe or crowbar located in the flight crew compartment.

SPO.IDE.A.185 Marking of break-in points

If areas of the aeroplane's fuselage suitable for break-in by rescue crews in an emergency are marked, such areas shall be marked as shown in Figure 1.

Figure 1: Marking of break-in points



SPO.IDE.A.190 Emergency locator transmitter (ELT)

(a) Aeroplanes shall be equipped with:

(1) an ELT of any type, when first issued with an individual CofA on or before 1 July 2008;

(2) an automatic ELT, when first issued with an individual CofA after 1 July 2008; or

(3) a personal locator beacon (PLB), carried by the pilot-in-command or a task specialist, when having a MOPSC of six or less.

(b) ELTs of any type and PLBs shall be capable of transmitting simultaneously on 121.5 MHz and 406 MHz.

SPO.IDE.A.195 Flight over water

(a) The following aeroplanes shall be equipped with a life-jacket for each person on board, stowed in a position that is readily accessible from the seat or berth of the person for whose use it is provided:

(1) single-engine landplanes when:

(i) flying over water beyond gliding distance from the shore; or

(ii) taking off or landing at an aerodrome or operating site where, in the opinion of the pilot-in-command, the take-off or approach path is so disposed over water that there would be a likelihood of a ditching;

(2) seaplanes operated over water; and

(3) aeroplanes operated at a distance away from land where an emergency landing is possible greater than that corresponding to 30 minutes at normal cruising speed or 50 NM, whichever is less.

(b) Seaplanes operated over water shall be equipped with:

(1) a sea anchor and other equipment necessary to facilitate mooring, anchoring or manoeuvring the aeroplane on water, appropriate to its size, weight and handling characteristics; and

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

(c) The pilot-in-command of an aeroplane operated at a distance away from land where an emergency landing is possible greater than that corresponding to 30 minutes at normal cruising speed or 50 NM, whichever is the lesser, shall determine the risks to survival of the occupants of the aeroplane in the event of a ditching, based on which he/she shall determine the carriage of:

(1) equipment for making the distress signals;

(2) life-rafts in sufficient numbers to carry all persons on board, stowed so as to facilitate their ready use in emergency; and

(3) life-saving equipment, to provide the means of sustaining life, as appropriate to the flight to be undertaken.

SPO.IDE.A.200 Survival equipment

(a) Aeroplanes operated over areas in which search and rescue would be especially difficult shall be equipped with:

(1) signalling equipment to make the distress signals;

(2) at least one survival ELT (ELT(S)); and

(3) additional survival equipment for the route to be flown taking account of the number of persons on board.

(b) The additional survival equipment specified in (a)(3) does not need to be carried when the aeroplane:

(1) remains within a distance from an area where search and rescue is not especially difficult corresponding to:

(i) 120 minutes at one-engine-inoperative (OEI) cruising speed for aeroplanes capable of continuing the flight to an aerodrome with the critical engine(s) becoming inoperative at any point along the route or planned diversion routes; or

(ii) 30 minutes at cruising speed for all other aeroplanes;

or

(2) remains within a distance no greater than that corresponding to 90 minutes at cruising speed from an area suitable for making an emergency landing, for aeroplanes certified in accordance with the applicable airworthiness standard.

SPO.IDE.A.205 Individual protective equipment

Each person on board shall wear individual protective equipment which is adequate for the type of operation.

SPO.IDE.A.206 Crash mitigation equipment

(a) Aeroplanes with a certificate of airworthiness issued on or after 8 April 2012 shall be equipped with crash mitigation equipment which is adequate for the type of operation and the type of aircraft.

(b) Aeroplanes with a certificate of airworthiness issued before 8 April 2012 shall be equipped with crash mitigation equipment which is adequate for the type of operation and the type of aircraft if certified equipment is provided by the manufacturer.

SPO.IDE.A.210 Headset

(a) Aeroplanes shall be equipped with a headset with a boom microphone or equivalent for each flight crew member at their assigned station in the flight crew compartment.

(b) Aeroplanes operated under IFR or at night shall be equipped with a transmit button on the manual pitch and roll control for each required flight crew member.

SPO.IDE.A.215 Radio communication equipment

(a) Aeroplanes operated under IFR or at night, or when required by the applicable airspace requirements, shall be equipped with radio communication equipment that, under normal radio propagating conditions, shall be capable of:

(1) conducting two-way communication for aerodrome control purposes;

(2) receiving meteorological information at any time during flight;

(3) conducting two-way communication at any time during flight with those aeronautical stations and on those frequencies prescribed by the appropriate authority; and

(4) providing for communication on the aeronautical emergency frequency 121.5 MHz.

(b) When more than one communication 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.

SPO.IDE.A.220 Navigation equipment

(a) Aeroplanes shall be equipped with navigation equipment that will enable them to proceed in accordance with:

(1) the ATS flight plan, if applicable; and

(2) the applicable airspace requirements.

(b) Aeroplanes shall have sufficient 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 shall allow safe navigation in accordance with (a).

(c) Aeroplanes operated on flights in which it is intended to land in IMC shall be equipped with suitable equipment capable of providing guidance to a point from which a visual landing can be performed for each aerodrome at which it is intended to land in IMC and for any designated alternate aerodromes.

SPO.IDE.A.225 Transponder

Where required by the airspace being flown, aeroplanes shall be equipped with a secondary surveillance radar (SSR) transponder with all the required capabilities.

Section 2 - Helicopters

SPO.IDE.H.100 Instruments and equipment – general

(a) Instruments and equipment required by this Part shall be approved in accordance with the applicable airworthiness requirements if they are:

(1) used by the flight crew to control the flight path, to comply with SPO.IDE.H.215 and SPO.IDE.H.220; or

(2) installed in the helicopter.

(b) The following items, when required by this Part, do not need an equipment approval:

(1) independent portable light,

(2) an accurate time piece,

(3) chart holder,

(4) first-aid kit,

(5) survival and signalling equipment, and

(6) sea anchor and equipment for mooring.

(c) Instruments and equipment not required by this Part that do not fall under the requirements of (a), as well as any other equipment that is not required by other Parts, but is carried on a flight, shall comply with the following:

(1) the information provided by these instruments, equipment or accessories shall not be used by the flight crew to comply with Annex I to Regulation (EC) No 216/2008 or SPO.IDE.H.215 and SPO.IDE.H.220; and

(2) the instruments and equipment shall not affect the airworthiness of the helicopter, even in the case of failures or malfunction.

(d) Instruments and equipment shall be readily operable or accessible from the station where the flight crew member that needs to use it is seated.

(e) All required emergency equipment shall be easily accessible for immediate use.

SPO.IDE.H.105 Minimum equipment for flight

A flight shall not be commenced when any of the helicopter's instruments, items of equipment or functions required for the intended flight are inoperative or missing, unless:

(a) the helicopter is operated in accordance with the minimum equipment list (MEL), if established; or

(b) the operator is approved by the competent authority to operate the helicopter within the constraints of the master minimum equipment list (MMEL); or

(c) the helicopter is subject to a permit to fly issued in accordance with the applicable airworthiness requirements.

SPO.IDE.H.115 Operating lights

Helicopters operated at night shall be equipped with:

(a) an anti-collision light system;

(b) navigation/position lights;

(c) a landing light;

(d) lighting supplied from the helicopter's electrical system to provide adequate illumination for all instruments and equipment essential to the safe operation of the helicopter;

(e) lighting supplied from the helicopter's electrical system to provide illumination in all cabin compartments;

(f) an independent portable light for each crew member station; and

(g) lights to conform with the International Regulations for Preventing Collisions at Sea if the helicopter is amphibious.

SPO.IDE.H.120 Operations under VFR – flight and navigational instruments and associated equipment

(a) Helicopters operated under VFR by day shall be equipped with a means of measuring and displaying:

(1) magnetic heading,

(2) time in hours, minutes and seconds,

(3) pressure altitude,

(4) indicated airspeed, and

(5) slip.

(b) Helicopters operated under VMC overwater and out of sight of the land, under VMC at night, when the visibility is less than 1 500 m, or in conditions where the helicopter cannot be maintained in a desired attitude without reference to one or more additional instruments, shall be, in addition to (a), equipped with:

(1) a means of measuring and displaying:

(i) attitude,

(ii) vertical speed, and

(iii) stabilised heading; and

(2) a means of indicating when the supply of power to the gyroscopic instruments is not adequate;

(3) a means of preventing malfunction of the airspeed indicating system required in (a)(4) due to condensation or icing.

(c) Whenever two pilots are required for the operation, helicopters shall be equipped with an additional separate means of displaying:

(1) pressure altitude,

(2) indicated airspeed,

(3) slip,

(4) attitude, if applicable,

(5) vertical speed, if applicable, and

(6) stabilised heading, if applicable.

SPO.IDE.H.125 Operations under IFR – flight and navigational instruments and associated equipment

Helicopters operated under IFR shall be equipped with:

(a) a means of measuring and displaying:

(1) magnetic heading,

(2) time in hours, minutes and seconds,

(3) pressure altitude,

(4) indicated airspeed,

(5) vertical speed,

(6) slip,

(7) attitude,

(8) stabilised heading, and

(9) outside air temperature;

(b) indication of when the supply of power to the gyroscopic instruments is not adequate;

(c) Whenever two pilots are required for the operation, an additional separate means of displaying:

(1) pressure altitude,

(2) indicated airspeed,

(3) vertical speed,

(4) slip,

(5) attitude, and

(6) stabilised heading.

(d) a means of preventing malfunction of the airspeed indicating system required by (a)(4) and (c)(2) due to condensation or icing;

(e) The following equipment for complex motor-powered helicopters:

(1) An alternate source of static pressure.

(2) A chart holder in an easily readable position that can be illuminated for night operations.

(3) An additional means of measuring and displaying attitude as a standby instrument.

SPO.IDE.H.126 Additional equipment for single pilot operation under IFR

Helicopters operated under IFR with a single pilot shall be equipped with an autopilot with at least altitude hold and heading mode.

SPO.IDE.H.132 Airborne weather detecting equipment

Helicopters with an MOPSC of more than nine and operated under IFR or at night shall be equipped with airborne weather detecting equipment when current weather reports indicate that thunderstorms or other potentially hazardous weather conditions, regarded as detectable with airborne weather detecting equipment, may be expected to exist along the route to be flown.

SPO.IDE.H.133 Additional equipment for operations in icing conditions at night

(a) Helicopters operated in expected or actual icing conditions at night shall be equipped with a means to illuminate or detect the formation of ice.

(b) The means to illuminate the formation of ice shall not cause glare or reflection that would handicap flight crew members in the performance of their duties.

SPO.IDE.H.135 Flight crew interphone system

Helicopters operated by more than one flight crew member shall be equipped with a flight crew interphone system, including headsets and microphones for use by all flight crew members.

SPO.IDE.H.140 Cockpit voice recorder

(a) Helicopters with a maximum certified take-off mass (MCTOM) of more than 7 000 kg and first issued with an individual CofA on or after 1 January 2016 shall be equipped with a cockpit voice recorder (CVR).

(b) The CVR shall be capable of retaining data recorded during at least the preceding 2 hours.

(c) The CVR shall record with reference to a timescale:

(1) voice communications transmitted from or received in the flight crew compartment by radio;

(2) flight crew members' voice communications using the interphone system and the public address system, if installed;

(3) the aural environment of the cockpit, including, without interruption, the audio signals received from each crew microphone; and

(4) voice or audio signals identifying navigation or approach aids introduced into a headset or speaker.

(d) The CVR shall start automatically to record prior to the helicopter moving under its own power and shall continue to record until the termination of the flight when the helicopter is no longer capable of moving under its own power.

(e) In addition to (d), depending on the availability of electrical power, the CVR shall start to record as early as possible during the cockpit checks prior to engine start at the beginning of the flight until the cockpit checks immediately following engine shutdown at the end of the flight.

(f) The CVR shall have a device to assist in locating it in water.

SPO.IDE.H.145 Flight data recorder

(a) Helicopters with an MCTOM of more than 3 175 kg and first issued with an individual CofA on or after 1 January 2016 shall be equipped with an FDR that uses a digital method of recording and storing data and for which a method of readily retrieving that data from the storage medium is available.

(b) The FDR shall record the parameters required to determine accurately the helicopter flight path, speed, attitude, engine power, configuration and operation and be capable of retaining data recorded during at least the preceding 10 hours.

(c) Data shall be obtained from helicopter sources that enable accurate correlation with information displayed to the flight crew.

(d) The FDR shall start automatically to record the data prior to the helicopter being capable of moving under its own power and shall stop automatically after the helicopter is incapable of moving under its own power.

(e) The FDR shall have a device to assist in locating it in water.

SPO.IDE.H.150 Data link recording

(a) Helicopters first issued with an individual CofA on or after 1 January 2016 that have the capability to operate data link communications and are required to be equipped with a CVR shall record on a recorder, where applicable:

(1) data link communication messages related to ATS communications to and from the helicopter, including messages applying to the following applications:

(i) data link initiation;

(ii) controller–pilot communication;

(iii) addressed surveillance;

(iv) flight information;

(v) as far as is practicable, given the architecture of the system, aircraft broadcast surveillance;

(vi) as far as is practicable, given the architecture of the system, aircraft operational control data; and

(vii) as far as is practicable, given the architecture of the system, graphics;

(2) information that enables correlation to any associated records related to data link communications and stored separately from the helicopter; and

(3) information on the time and priority of data link communications messages, taking into account the system's architecture.

(b) The recorder shall use a digital method of recording and storing data and information and a method for readily retrieving that data. The recording method shall allow the data to match the data recorded on the ground.

(c) The recorder shall be capable of retaining data recorded for at least the same duration as set out for CVRs in SPO.IDE.H.140.

(d) The recorder shall have a device to assist in locating it in water.

(e) The requirements applicable to the start and stop logic of the recorder are the same as the requirements applicable to the start and stop logic of the CVR contained in SPO.IDE.H.140 (d) and (e).

SPO.IDE.H.155 Combination recorder

Compliance with CVR and FDR requirements may be achieved by one flight data and cockpit voice combination recorder.

SPO.IDE.H.160 Seats, seat safety belts, restraint systems

(a) Helicopters shall be equipped with:

(1) a seat or berth for each person on board, or, in the case of task specialists, a station for each task specialist on board;

(2) a seat belt on each seat, -restraining belts for each berth, and restraining devices for each station;

(3) for helicopters first issued with an individual CofA after 31 July 1999, a seat belt with an upper torso restraint system for each seat;

(4) a seat belt with upper torso restraint system incorporating a device that will automatically restrain the occupant's torso in the event of rapid deceleration on each flight crew seat.

(b) A seat belt with upper torso restraint system shall have a single point release.

SPO.IDE.H.165 First-aid kit

(a) Helicopters shall be equipped with a first-aid kit.

(b) The first-aid kit shall be:

(1) readily accessible for use; and

(2) kept up-to-date.

SPO.IDE.H.175 Supplemental oxygen – non-pressurised helicopters

(a) Non-pressurised helicopters operated at flight altitudes when the oxygen supply is required in accordance with (b) shall be equipped with oxygen storage and dispensing apparatus capable of storing and dispensing the required oxygen supplies.

(b) Non-pressurised helicopters operated above flight altitudes at which the pressure altitude in the cabin compartments is above 10 000 ft shall carry enough breathing oxygen to supply:

(1) all crew members and task specialists for any period in excess of 30 minutes when the pressure altitude in the cabin compartment will be between 10 000 ft and 13 000 ft; and

(2) all crew members and task specialists for any period that the pressure altitude in the cabin compartment will be above 13 000 ft.

SPO.IDE.H.180 Hand fire extinguishers

(a) Helicopters shall be equipped with at least one hand fire extinguisher:

(1) in the flight crew compartment; and

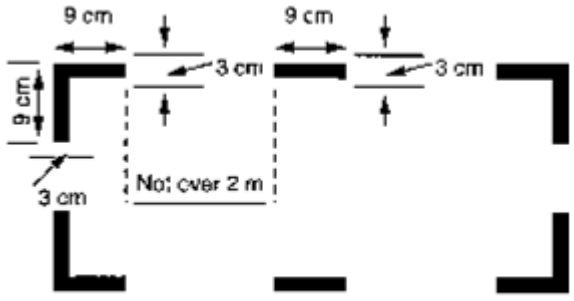
(2) in each cabin compartment that is separate from the flight crew compartment, except if the compartment is readily accessible to the flight crew.

(b) The type and quantity of extinguishing agent for the required fire extinguishers shall be suitable for the type of fire likely to occur in the compartment where the extinguisher is intended to be used and to minimise the hazard of toxic gas concentration in compartments occupied by persons.

SPO.IDE.H.185 Marking of break-in points

If areas of the helicopter's fuselage suitable for break-in by rescue crews in an emergency are marked, such areas shall be marked as shown in Figure 1.

Figure 1: Marking of break-in points



SPO.IDE.H.190 Emergency locator transmitter (ELT)

(a) Helicopters having an MOPSC above six shall be equipped with:

(1) an automatic ELT; and

(2) one survival ELT (ELT(S)) in a life-raft or life-jacket when the helicopter is operated at a distance from the shore corresponding to more than 3 minutes flying time at normal cruising speed.

(b) Helicopters having a MOPSC of six or less shall be equipped with a personal locator beacon (PLB), carried by the pilot-in-command or a task specialist.

(c) ELTs of any type and PLBs shall be capable of transmitting simultaneously on 121.5 MHz and 406 MHz.

SPO.IDE.H.195 Flight over water – other than complex motor-powered helicopters

(a) Helicopters shall be equipped with a life-jacket for each person on board stowed in a position that is readily accessible from the seat or berth of the person for whose use it is provided, when:

(1) flying over water beyond autorotational distance from the shore; or

(2) taking off or landing at an aerodrome/operating site where the take-off or approach path is over water.

(b) Each life-jacket or equivalent individual flotation device shall be equipped with a means of electric illumination for the purpose of facilitating the location of persons.

(c) The pilot-in-command of a helicopter operated on a flight over water at a distance from land corresponding to more than 30 minutes flying time at normal cruising speed or 50 NM, whichever is less, shall determine the risks to survival of the occupants of the helicopter in the event of a ditching, based on which he/she shall determine the carriage of:

(1) equipment for making the distress signals;

(2) life-rafts in sufficient numbers to carry all persons on board, stowed so as to facilitate their ready use in emergency; and

(3) life-saving equipment, to provide the means of sustaining life, as appropriate to the flight to be undertaken.

(d) The pilot-in-command of a helicopter shall determine the risks to survival of the occupants of the helicopter in the event of a ditching, when deciding if the life-jackets required in (a) shall be worn by all occupants.

SPO.IDE.H.197 Life-jackets – complex motor-powered helicopters

(a) Helicopters shall be equipped with a life-jacket for each person on board stowed in a position that is readily accessible from the seat or berth of the person for whose use it is provided, when:

(1) operated on a flight over water at a distance from land corresponding to more than 10 minutes flying time at normal cruising speed, where in the case of the critical engine failure, the helicopter is able to sustain level flight;

(2) operated on a flight over water beyond autorotational distance from the land, where in the case of the critical engine failure, the helicopter is not able to sustain level flight; or

(3) taking off or landing at an aerodrome or operating site where the take-off or approach path is so disposed over water that in the event of a mishap there would be the likelihood of a ditching.

(b) Each life-jacket or equivalent individual flotation device shall be equipped with a means of electric illumination for the purpose of facilitating the location of persons.

SPO.IDE.H.198 Survival suits

Each person on board shall wear a survival suit when operating:

(a) on a flight over water in support of offshore operations, at a distance from land corresponding to more than 10 minutes flying time at normal cruising speed, where in the case of the critical engine failure, the helicopter is able to sustain level flight and when:

(1) the weather report or forecasts available to the pilot-in-command indicate that the sea temperature will be less than plus 10 °C during the flight; or

(2) the estimated rescue time exceeds the estimated survival time;

or

(b) on a flight over water beyond autorotational distance or safe forced landing distance from land, where in the case of the critical engine failure, the helicopter is not able to sustain level flight, when the weather report or forecasts available to the pilot-in-command indicate that the sea temperature will be less than plus 10 C during the flight.

SPO.IDE.H.199 Life-rafts, survival ELTs and survival equipment on extended overwater flights –complex motor-powered helicopters

Helicopters operated:

(a) on a flight over water at a distance from land corresponding to more than 10 minutes flying time at normal cruising speed where in the case of the critical engine failure, the helicopter is able to sustain level flight; or

(b) on a flight over water at a distance corresponding to more than 3 minutes flying time at normal cruising speed, where in the case of the critical engine failure, the helicopter is not able to sustain level flight, shall be equipped with:

(1) at least two life-rafts, stowed sufficiently together to facilitate their ready use in an emergency, to accommodate all persons capable of being carried on board and, if the life-raft having the largest rated capacity is lost, to ensure that the overload capacity of the remaining life-raft shall be sufficient to accommodate all persons on the helicopter;

(2) at least one survival ELT (ELT(S)) for each required life-raft; and

(3) life-saving equipment, including means of sustaining life, as appropriate to the flight to be undertaken.

SPO.IDE.H.200 Survival equipment

Helicopters operated over areas in which search and rescue would be especially difficult shall be equipped with:

(a) signalling equipment to make distress signals;

(b) at least one survival ELT (ELT(S)); and

(c) additional survival equipment for the route to be flown taking account of the number of persons on board.

SPO.IDE.H.201 Additional requirements for helicopters conducting offshore operations in a hostile sea area

Helicopters operated in offshore operations in a hostile sea area, at a distance from land corresponding to more than 10 minutes flying time at normal cruising speed, shall comply with the following:

(a) When the weather report or forecasts available to the commander indicate that the sea temperature will be less than plus 10 °C during the flight, or when the estimated rescue time exceeds the calculated survival time, or the flight is planned to be conducted at night, all persons on board are wearing a survival suit.

(b) All life-rafts carried in accordance with SPO.IDE.H.199 shall be installed so as to be usable in the sea conditions in which the helicopter's ditching, flotation and trim characteristics were evaluated in order to comply with the ditching requirements for certification.

(c) The helicopter shall be equipped with an emergency lighting system with an independent power supply to provide a source of general cabin illumination to facilitate the evacuation of the helicopter.

(d) All emergency exits, including crew emergency exits, and the means of opening them shall be conspicuously marked for the guidance of occupants using the exits in daylight or in the dark. Such markings shall be designed to remain visible if the helicopter is capsized and the cabin is submerged.

(e) All non-jettisonable doors that are designated as ditching emergency exits shall have a means of securing them in the open position so that they do not interfere with occupants' egress in all sea conditions up to the maximum required to be evaluated for ditching and flotation.

(f) All doors, windows or other openings in the cabin compartment assessed as suitable for the purpose of underwater escape shall be equipped so as to be operable in an emergency.

(g) Life-jackets shall be worn at all times, unless the task specialist or crew member is wearing an integrated survival suit that meets the combined requirement of the survival suit and life-jacket.

SPO.IDE.H.202 Helicopters certified for operating on water — miscellaneous equipment

Helicopters certified for operating on water shall be equipped with:

(a) a sea anchor and other equipment necessary to facilitate mooring, anchoring or manoeuvring the helicopter on water, appropriate to its size, weight and handling characteristics; and

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

SPO.IDE.H.203 All helicopters on flights over water - ditching

Helicopters flying over water in a hostile environment beyond a distance of 50 NM from the shore shall be:

(a) designed for landing on water in accordance with the relevant airworthiness code;

(b) certified for ditching in accordance with the relevant airworthiness code; or

(c) fitted with emergency flotation equipment.

SPO.IDE.H.205 Individual protective equipment

Each person on board shall wear individual protective equipment which is adequate for the type of operation.

SPO.IDE.H.206 Crash mitigation equipment

(a) Helicopters with a certificate of airworthiness issued on or after 8 April 2012 shall be equipped with crash mitigation equipment which is adequate for the type of operation and the type of aircraft.

(b) Helicopters with a certificate of airworthiness issued before 8 April 2012 shall be equipped with crash mitigation equipment which is adequate for the type of operation and the type of aircraft if certified equipment is provided by the manufacturer.

SPO.IDE.H.210 Headset

Whenever a radio communication and/or radio navigation system is required, helicopters shall be equipped with a headset with boom microphone or equivalent and a transmit button on the flight controls for each required pilot, crew member and/or task specialist at his/her assigned station.

SPO.IDE.H.215 Radio communication equipment

(a) Helicopters operated under IFR or at night, or when required by the applicable airspace requirements, shall be equipped with radio communication equipment that, under normal radio propagating conditions, shall be capable of:

(1) conducting two-way communication for aerodrome control purposes;

(2) receiving meteorological information;

(3) conducting two-way communication at any time during flight with those aeronautical stations and on those frequencies prescribed by the appropriate authority; and

(4) providing for communication on the aeronautical emergency frequency 121.5 MHz.

(b) When more than one communications equipment unit is required, each shall be independent of the other or others to the extent that a failure in any one will not result in failure of any other.

(c) When a radio communication system is required, and in addition to the flight crew interphone system required in SPO.IDE.H.135, helicopters shall be equipped with a transmit button on the flight controls for each required pilot and crew member at his/her assigned station.

SPO.IDE.H.220 Navigation equipment

(a) Helicopters shall be equipped with navigation equipment that will enable them to proceed in accordance with:

(1) the ATS flight plan, if applicable; and

(2) the applicable airspace requirements.

(b) Helicopters shall have sufficient 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 shall allow safe navigation in accordance with (a).

(c) Helicopters operated on flights in which it is intended to land in IMC shall be equipped with navigation equipment capable of providing guidance to a point from which a visual landing can be performed for each aerodrome at which it is intended to land in IMC and for any designated alternate aerodromes.

SPO.IDE.H.225 Transponder

Where required by the airspace being flown, helicopters shall be equipped with a secondary surveillance radar (SSR) transponder with all the required capabilities.

Section 3 - Sailplanes

SPO.IDE.S.100 Instruments and equipment – general

(a) Instruments and equipment required by this Part shall be approved in accordance with the applicable airworthiness requirements if they are:

(1) used by the flight crew to control the flight path, to comply with SPO.IDE.S.145 and SPO.IDE.S.150; or

(2) installed in the sailplane.

(b) The following items, when required by this Part, do not need an equipment approval:

(1) independent portable light,

(2) accurate time piece,

(3) survival and signalling equipment.

(c) Instruments and equipment not required by this Part that do not fall under the requirements of (a) as well as any other equipment that is not required by other Parts, but is carried on a flight, shall comply with the following:

(1) the information provided by these instruments, equipment or accessories shall not be used by the flight crew to comply with Annex I to Regulation (EC) No 216/2008; and

(2) the instruments and equipment shall not affect the airworthiness of the sailplane, even in the case of failures or malfunction.

(d) Instruments and equipment shall be readily operable or accessible from the station where the flight crew member that needs to use it is seated.

(e) All required emergency equipment shall be easily accessible for immediate use.

SPO.IDE.S.105 Minimum equipment for flight

A flight shall not be commenced when any of the sailplane instruments, items of equipment or functions required for the intended flight are inoperative or missing, unless:

(a) the sailplane instrument, item of equipment or function is not required by the AFM; or

(b) the sailplane is subject to a permit to fly issued in accordance with the applicable airworthiness requirements.

SPO.IDE.S.115 Operations under VFR – flight and navigational instruments

(a) Sailplanes operated under VFR by day shall be equipped with a means of measuring and displaying:

(1) in the case of powered sailplanes, magnetic heading,

(2) time in hours, minutes and seconds,

(3) pressure altitude, and

(4) indicated airspeed.

(b) Sailplanes operating in conditions where the sailplane cannot be maintained in a desired attitude without reference to one or more additional instruments, shall be, in addition to (a), equipped with a means of measuring and displaying:

(1) vertical speed,

(2) attitude or turn and slip, and

(3) magnetic heading.

SPO.IDE.S.120 Cloud flying – flight and navigational instruments

Sailplanes performing cloud flying shall be equipped with a means of measuring and displaying:

(a) magnetic heading,

(b) time in hours, minutes and seconds,

(c) pressure altitude,

(d) indicated airspeed,

(e) vertical speed, and

(f) attitude or turn and slip.

SPO.IDE.S.125 Seats and restraint systems

(a) Sailplanes shall be equipped with:

(1) a seat for each person on board; and

(2) a seat belt with upper torso restraint system for each seat according to the AFM.

(b) A seat belt with upper torso restraint system shall have a single point release.

SPO.IDE.S.130 Supplemental oxygen

Sailplanes operated at pressure altitudes above 10 000 ft shall be equipped with an oxygen storage and dispensing apparatus carrying enough breathing oxygen to supply:

(a) crew members for any period in excess of 30 minutes when the pressure altitude will be between 10 000 ft and 13 000 ft; and

(b) all crew members and task specialists for any period that the pressure altitude will be above 13 000 ft.

SPO.IDE.S.135 Flight over water

The pilot-in-command of a sailplane operated over water shall determine the risks to survival of the occupants of the sailplane in the event of a ditching, based on which he/she shall determine the carriage of:

(a) a life-jacket, or equivalent individual floatation device, for each person on board, stowed in a position that is readily accessible from the seat of the person for whose use it is provided;

(b) an emergency locator transmitter (ELT) or a personal locator beacon (PLB), carried by the pilot-in-command or a task specialist, capable of transmitting simultaneously on 121.5 MHz and 406 MHz; and

(c) equipment for making distress signals, when operating a flight:

(1) over water beyond gliding distance from the shore; or

(2) where 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.

SPO.IDE.S.140 Survival equipment

Sailplanes operated over areas in which search and rescue would be especially difficult shall be equipped with such signalling devices and life-saving equipment as appropriate to the area overflown.

SPO.IDE.S.145 Radio communication equipment

(a) Sailplanes shall be equipped with radio communication equipment capable of conducting two-way communication with those aeronautical stations or those frequencies to meet airspace requirements.

(b) Radio communication equipment, if required by (a), shall provide for communication on the aeronautical emergency frequency 121.5 MHz.

SPO.IDE.S.150 Navigation equipment

Sailplanes shall be equipped with any navigation equipment necessary to proceed in accordance with:

(a) the ATS flight plan if applicable; and

(b) the applicable airspace requirements.

SPO.IDE.S.155 Transponder

When required by the airspace being flown, sailplanes shall be equipped with a secondary surveillance radar (SSR) transponder with all the required capabilities.

Section 4 - Balloons

SPO.IDE.B.100 Instruments and equipment – general

(a) Instruments and equipment required by this Part shall be approved in accordance with the applicable airworthiness requirements if they are:

(1) used by the flight crew to determine the flight path, to comply with SPO.IDE.B.145; or

(2) installed in the balloon.

(b) The following items, when required by this Part, do not need an equipment approval:

(1) independent portable light,

(2) accurate time piece,

(3) first-aid-kit,

(4) survival and signalling equipment,

(c) Instruments and equipment not required by this Part that do not fall under the requirements of (a) as well as any other equipment that is not required by other Parts, but is carried on a flight, shall comply with the following:

(1) the information provided by these instruments, equipment or accessories shall not be used by the flight crew to comply with Annex I to Regulation (EC) No 216/2008; and

(2) the instruments and equipment shall not affect the airworthiness of the balloon, even in the case of failures or malfunction.

(d) Instruments and equipment shall be readily operable or accessible from the station where the flight crew member that needs to use it is assigned.

(e) All required emergency equipment shall be easily accessible for immediate use.

SPO.IDE.B.105 Minimum equipment for flight

A flight shall not be commenced when any of the balloon instruments, items of equipment or functions required for the intended flight are inoperative, unless:

(a) the balloon is operated in accordance with the minimum equipment list (MEL), if established; or

(b) the balloon is subject to a permit to fly issued in accordance with the applicable airworthiness requirements.

SPO.IDE.B.110 Operating lights

Balloons operated at night shall be equipped with:

(a) position lights;

(b) a means to provide adequate illumination for all instruments and equipment essential to the safe operation of the balloon;

(c) an independent portable light.

SPO.IDE.B.115 Operations under VFR – flight and navigational instruments and associated equipment

Balloons operated under VFR shall be equipped with:

(a) a means of displaying drift direction; and

(b) a means of measuring and displaying:

(1) time in hours, minutes and seconds;

(2) vertical speed; and

(3) pressure altitude, if applicable.

SPO.IDE.B.120 First-aid kit

(a) Balloons shall be equipped with a first-aid kit.

(b) The first-aid kit shall be:

(1) readily accessible for use; and

(2) kept up-to-date.

SPO.IDE.B.121 Supplemental oxygen

Balloons operated at pressure altitudes above 10 000 ft shall be equipped with an oxygen storage and dispensing apparatus carrying enough breathing oxygen to supply:

(a) crew members for any period in excess of 30 minutes when the pressure altitude will be between 10 000 ft and 13 000 ft; and

(b) all crew members and task specialists for any period that the pressure altitude will be above 13 000 ft.

SPO.IDE.B.125 Hand fire extinguishers

(a) Hot air balloons shall be equipped with at least one hand fire extinguisher.

SPO.IDE.B.130 Flight over water

The pilot-in-command of a balloon operated over water shall determine the risks to survival of the occupants of the balloon in the event of a ditching, based on which he/she shall determine the carriage of:

(a) a life-jacket for each person on board stowed in a position that is readily accessible from the station of the person for whose use it is provided;

(b) an emergency locator transmitter (ELT) or a personal locator beacon (PLB), carried by the pilot-in-command or a task specialist, capable of transmitting simultaneously on 121.5 MHz and 406 MHz; and

(c) equipment for making the distress signals.

SPO.IDE.B.135 Survival equipment

Balloons operated over areas in which search and rescue would be especially difficult shall be equipped with such signalling devices and life-saving equipment as appropriate to the area overflown.

SPO.IDE.B.140 Miscellaneous equipment

Hot-air balloons and mixed balloons shall be equipped with:

(a) an alternative source of ignition;

(b) a means of indicating excessive envelope temperature;

(c) a means of measuring and indicating fuel quantity;

(d) protective gloves for each crew member;

(e) a hook knife;

(f) a fire blanket or fire resistant cover; and

(g) a drop line of at least 25 metres (m) in length.

SPO.IDE.B.145 Radio communication equipment

(a) Balloons shall be equipped with radio communication equipment at the pilot's station, capable of conducting two-way communication with those aeronautical stations or those frequencies to meet airspace requirements.

(b) Radio communication equipment, if required by (a), shall provide for communication on the aeronautical emergency frequency 121.5 MHz.

SPO.IDE.B.150 Transponder

When required by the airspace being flown, balloons shall be equipped with a secondary surveillance radar (SSR) transponder with all the required capabilities.

Subpart E – Specific requirements

Section 1 – Helicopter external sling load operations (HESLO)

SPO.SPEC.HESLO.100 Standard operating procedures

Helicopter External Sling Load Operations shall be performed in accordance with Standard Operating Procedures.

SPO.SPEC.HESLO.105 Equipment

The helicopter shall be equipped with at least:

(a) one cargo safety mirror or alternative means to see the hook(s)/load; and

(b) one load meter, unless there is another method of determining the weight of the load.

Section 2 – Human external cargo operations (HEC)

SPO.SPEC.HEC.100 Standard operating procedures

Human external cargo operations class A, B and C shall be performed in accordance with Standard Operating Procedures.

SPO.SPEC.HEC.105 Equipment

The helicopter performing HEC shall be equipped with at least:

(a) one cargo safety mirror or alternative means to see the hook(s); and

(b) one load meter, unless there is another method of determining the weight of the load;

(c) A proper double hook system with two independent release systems or;

(d) A certified HEC system with a supplemental type certificate.

Section 3 – Parachute operations (PAR)

SPO.SPEC.PAR.100 Standard operating procedures

Parachute operations shall be performed in accordance with Standard Operating Procedures.

SPO.SPEC.PAR.105 Carriage of crew members and task specialists

The requirement laid down in SPO.OP.135(b) is not applicable for task specialists performing parachute jumping.

SPO.SPEC.PAR.110 Seats

Notwithstanding SPO.IDE.A.160(a) and SPO.IDE.H.160(a)(1), the floor may be used as a seat, provided means are available for the parachutists to hold on.

Section 4 – Flying displays operations (FDO)

SPO.SPEC.FDO.100 Standard operating procedures

Flying displays operations shall be performed in accordance with Standard Operating Procedures and shall be approved by the authority where the activity is conducted.

SPO.SPEC.FDO.105 Documents, manuals and information to be carried

The requirements laid down in SPO.GEN.140(11) to (14) are not applicable to flying displays flights.

SPO.SPEC.FDO.110 Airborne collision avoidance system (ACAS)

The requirements laid down in SPO.OP.210 on the use of ACAS system are not applicable to flying displays flights.

SPO.SPEC.FDO.115 First-aid kits

The requirements laid down in SPO.IDE.H.165 and SPO.IDE.A.165 are not applicable to flying displays flights.

SPO.SPEC.FDO.120 Hand-fire extinguisher

The requirements laid down in SPO.IDE.210.A are not applicable to flying displays flights.

Annex VIII

Part-SPO (Specialised Operations)

The Annex VIII ('Part-SPO') to draft ED Decision of the Executive Director of the European Aviation Safety Agency on Acceptable Means of Compliance and Guidance Material related to the Implementing Rules for air operations of Community operators ('AMC and GM to Part-SPO') is introduced as follows:

Subpart A – General Requirements

GM1-SPO.GEN.105(b)(2) Crew member responsibilities

GENERAL

In accordance with 7.g. of Annex IV to Regulation (EC) No 216/2008[3] (Essential Requirements for air operations), a crew member must not perform duties on board an aircraft when under the influence of psychoactive substances or alcohol or when unfit due to injury, fatigue, medication, sickness or other similar causes. This should be understood as including the following:

(a) effects of deep water diving and blood donation, and allowing for a certain time period between these activities and returning to flying; and

(b) without prejudice to more restrictive national regulations, the consumption of alcohol while on duty or less than 8 hours prior to the commencement of duties, and commencing a flight duty period with a blood alcohol level in excess of 0.2 per mille.

GM1-SPO.GEN.106 Pilot-in-command responsibilities and authority

GENERAL

In accordance with 1.c. of Annex IV to Regulation (EC) No 216/2008 (Essential Requirements for air operations), the pilot-in-command is responsible for the operation and safety of the aircraft and for the safety of all crew members, task specialists and cargo on board. This includes the following:

(a) the safety of all persons and cargo on board, as soon as he/she arrives on board, until he/she leaves the aircraft at the end of the flight; and

(b) the operation and safety of the aircraft:

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[3] Regulation (EC) No 216/2008 of the European Parliament and of the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC (OJ L 79, 19.3.2008, p. 1). Regulation as last amended by Regulation (EC) No 1108/2009 of the European Parliament and of the Council of 21 October 2009 (OJ L 309, 24.11.2009, p. 51).

(1) from the moment it is first ready to move for the purpose of flight until the moment it comes to rest at the end of the flight and the engine(s) used as primary propulsion unit(s) is/are shut down, for aeroplanes;

(2) when the rotors start turning for the purpose of flight until the rotors come to a complete stop after flight, for helicopters;

(3) from the moment the launch procedure is started until the aircraft comes to rest at the end of the flight, for sailplanes; and

(4) from the moment the inflating of the envelope is started until the envelope is deflated, for balloons.

GM2-SPO.GEN.106(a)(8) Pilot-in-command responsibilities and authority

RECORDING UTILISATION DATA

Where an aircraft conducts a series of flights of short duration – such as a helicopter doing a series of lifts – and the aircraft is operated by the same pilot-in-command, the utilisation data for the series of flights may be recorded in the aircraft technical log or journey log as a single entry.

AMC1-SPO.GEN.106(c) Pilot-in-command responsibilities and authority

REPORTING OF HAZARDOUS FLIGHT CONDITIONS

(a) These reports should include any detail that may be pertinent to the safety of other aircraft.

(b) Such reports should be made whenever any of the following conditions are encountered or observed:

(1) severe turbulence;

(2) severe icing;

(3) severe mountain wave;

(4) thunderstorms, with or without hail, that are obscured, embedded, widespread or in squall lines;

(5) heavy dust storm or heavy sandstorm;

(6) volcanic ash cloud; and

(7) unusual and/or increasing volcanic activity or a volcanic eruption.

(c) When other meteorological conditions not listed above, e.g. wind shear, are encountered that, in the opinion of the pilot-in-command, may affect the safety or the efficiency of other aircraft operations, the pilot-in-command should advise the appropriate air traffic services (ATS) unit as soon as practicable.

GM1-SPO.GEN.107(c) Pilot-in-command responsibilities and authority - balloons

PROTECTIVE CLOTHING

Protective clothing includes:

(a) long sleeves and trousers made out of natural fibres or mixed fibres;

(b) stout footwear; and

(c) gloves.

AMC1-SPO.GEN.110 Compliance with laws, regulations and procedures

GENERAL

If required by the State in which the incident occurs, the pilot-in-command should submit a report on any such violation to the appropriate authority of such a State. In that event, the pilot-in-command should also submit a copy of the report to the competent authority. Such reports should be submitted as soon as possible and normally within 10 days.

GM1-SPO.GEN.125 Rotor engagement

INTENT OF THE RULE

(a) The following two situations where it is allowed to turn the rotor under power should be distinguished:

  (1) for the purpose of flight, this is described in the Implementing Rule;

  (2) for maintenance purposes.

(b) Rotor engagement for the purpose of flight: it should be noted that the pilot should not leave the controls when the rotors are turning. For example, the pilot is not allowed to get out of the aircraft in order to welcome persons and adjust their seat belts with the rotors turning.

(c) Rotor engagement for the purpose of maintenance: the Implementing Rule should not prevent ground runs being conducted by qualified personnel other than pilots for maintenance purposes.

  The following conditions should be applied:

  (1) The operator should ensure that the qualification of personnel, other than pilots, who are authorised to conduct maintenance runs, is described in the appropriate manual.

  (2) Ground runs should not include taxiing the helicopter.

  (3) There should be no persons on board.

  (4) Maintenance runs should not include collective increase or autopilot engagement (because of the risk of ground resonance).

GM1-SPO.GEN.130 Portable electronic devices

GENERAL

Interference can result in:

(a) malfunctioning of multiple systems;

(b) false warnings of unsafe conditions;

(c) increased work load for the flight crew and the possibility of invoking emergency drills;

(d) reduced crew confidence in protection systems which may then be ignored during a genuine warning;

(e) distraction of the flight crew from their normal duties;

(f) noise in the flight crew headphones; and/or

(g) hidden failures of safety systems with loss of protection.

AMC1-SPO.GEN.135 Information on emergency and survival equipment carried

CONTENT OF INFORMATION

The information should include, as applicable, the number, colour and type of life-rafts and pyrotechnics, details of emergency medical supplies, water supplies and the type and frequencies of the emergency portable radio equipment.

AMC1-SPO.GEN.140 Documents, manuals and information to be carried

GENERAL

(a) The documents, manuals and information may be available in a form other than on printed paper. Accessibility, usability and reliability should be assured.

(b) 'Aircraft flight manual (AFM) or equivalent document' means the flight manual for the aircraft or other documents containing information required for the operation of the aircraft within the terms of its certificate of airworthiness, unless these data are available in the parts of the operations manual carried on board.

(c) 'Journey log or equivalent' means that the required information may be recorded in documentation other than a log book, such as the operational flight plan or the aircraft technical log.

(d) The procedures and the visual signals information for use by intercepting and intercepted aircraft should reflect those contained in the International Civil Aviation Organisation's (ICAO) Annex 2. This may be part of the operations manual.

(e) Any other documents that may be pertinent to the flight or required by the States concerned with the flight may include forms to comply with reporting requirements.

CURRENT AND SUITABLE AERONAUTICAL CHARTS

(a) The aeronautical charts carried should contain data appropriate to the applicable air traffic regulations, rules of the air, flight altitudes, area/route and nature of the

operation. Due consideration should be given to carriage of textual and graphic representations of:

(1) aeronautical data including, as appropriate for the nature of the operation:

(i) airspace structure;

(ii) significant points, navigation aids (navaids) and air traffic services (ATS) routes;

(iii) navigation and communication frequencies;

(iv) prohibited, restricted and danger areas; and

(v) sites of other relevant activities that may hazard the flight; and

(2) topographical data, including terrain and obstacle data.

(b) A combination of different charts and textual data may be used to provide adequate and current data.

(c) The required aeronautical data should be appropriate for the current aeronautical information regulation and control (AIRAC) cycle.

(d) The required topographical data should be reasonably recent, having regard to the nature of the planned operation.

GM1-SPO.GEN.140 Documents, manuals and information to be carried

DOCUMENTS THAT MAY BE PERTINENT TO THE FLIGHT

Any other documents that may be pertinent to the flight or required by the States concerned with the flight may include, for example, forms to comply with reporting requirements.

STATES CONCERNED WITH THE FLIGHT

The states concerned are those of origin, transit, overflight and destination of the flight.

SEARCH AND RESCUE INFORMATION

This information is usually to be found in the State aeronautical information publication (AIP).

AMC1-SPO.GEN.145 Journey log – non-commercial operations with other-than-complex motor-powered aircraft

GENERAL

(a) The aircraft journey log, or equivalent, should include the following items, where applicable:

(1) aircraft nationality and registration;

(2) date;

(3) name/s of crew member/s;

(4) duty assignments of crew members, if applicable;

(5) place of departure;

(6) place of arrival;

(7) time of departure;

(8) time of arrival;

(9) hours of flight;

(10) nature of flight;

(11) incidents, observations (if any); and

(12) signature of the pilot-in-command.

(b) The information, or parts thereof, may be recorded in a form other than on printed paper. Accessibility, usability and reliability should be assured.

AMC1-SPO.GEN.150 Preservation, production and use of flight recorder recordings – operations with complex motor-powered aircraft

OPERATIONAL CHECKS

Whenever a recorder is required to be carried, the operator should:

(a) perform an annual inspection of flight data recorder (FDR) recording, cockpit voice recorder (CVR) recording, and, if applicable, data link recording; and

(b) check every 5 years or according to a periodicity determined by the sensor manufacturer, that the parameters dedicated to the FDR and not monitored by other means are being recorded within the calibration tolerances.

GM1-SPO.GEN.150 Preservation, production and use of flight recorder recordings - operations with complex motor-powered aircraft

PROCEDURES FOR THE INSPECTIONS AND MAINTENANCE PRACTICES

Procedures for the inspections and maintenance practices of the FDR and CVR systems are given in EUROCAE Document ED-112 (Minimum Operational Performance Specification for Crash Protected Airborne Recorder Systems) dated March 2003, including amendments n°1 and 2.

REMOVAL OF RECORDERS

The need for removal of the recorders from the aircraft will be determined by the investigating authority with due regard to the seriousness of an occurrence and the circumstances, including the impact on the operation.

AMC1-SPO.GEN.155(c) Transport of dangerous goods

EXEMPTIONS BY THE COMPETENT AUTHORITY

The competent authority may grant to the operator exemptions with extended validity from the provisions of the Technical Instructions provided the operator demonstrates to the competent authority that:

(a) an overall level of safety which is at least equivalent to that provided by the Technical Instructions is achieved;

(b) procedures are included within the relevant standard operating procedure (SOPs) based on a risk assessment and the Technical Instructions where applicable; and

(c) the classes of dangerous goods that are intended to be carried are specified in the SOP.

AMC1-SPO.GEN.155(f) Transport of dangerous goods

DANGEROUS GOODS ACCIDENT AND INCIDENT REPORTING

(a) Any type of dangerous goods incident or accident should be reported. For this purpose, the Technical Instructions consider that reporting of undeclared and misdeclared dangerous goods found in cargo also applies to items of operators' stores that are classified as dangerous goods.

(b) The first report should be dispatched within 72 hours of the event. It may be sent by any means, including e-mail, telephone or fax. This report should include the details that are known at that time, under the headings identified in (c). If necessary, a subsequent report should be made as soon as possible giving all the details that were not known at the time the first report was sent. If a report has been made verbally, written confirmation should be sent as soon as possible.

(c) The first and any subsequent report should be as precise as possible and contain such of the following data that are relevant:

(1) date of the incident or accident or the finding of undeclared or misdeclared dangerous goods;

(2) location, the flight number, if any, and flight date;

(3) description of the goods;

(4) proper shipping name (including the technical name, if appropriate) and United Nations (UN)/identification (ID) number, when known;

(5) class or division and any subsidiary risk;

(6) type of packaging, and the packaging specification marking on it;

(7) quantity;

(8) any other relevant details;

(9) suspected cause of the incident or accident;

(10) action taken;

(11) any other reporting action taken; and

(12) name, title, address and telephone number of the person making the report.

(d) Copies of relevant documents and any photographs taken should be attached to the report.

(e) A dangerous goods accident or incident may also constitute an aircraft accident, serious incident or incident. The criteria for reporting both types of occurrence should be met.

(f) The following dangerous goods reporting form should be used, but other forms, including electronic transfer of data, may be used provided that at least the minimum information of this AMC is supplied:

<table>
<tr><td colspan="3">DANGEROUS GOODS OCCURRENCE REPORT</td><td>DGOR No:</td></tr>
<tr><td>1. Operator:</td><td colspan="2">2. Date of Occurrence:</td><td>3. Local time of occurrence:</td></tr>
<tr><td colspan="2">4. Flight date:</td><td colspan="2">5. Flight No:</td></tr>
<tr><td colspan="2">6. Departure aerodrome:</td><td colspan="2">7. Destination aerodrome:</td></tr>
<tr><td colspan="2">8. Aircraft type:</td><td colspan="2">9. Aircraft registration:</td></tr>
<tr><td colspan="2">10. Location of occurrence:</td><td colspan="2">11. Origin of the goods:</td></tr>
<tr><td colspan="4">12. Description of the occurrence, including details of injury, damage, etc.
(if necessary continue on the reverse of this form):</td></tr>
<tr><td colspan="3">13. Proper shipping name (including the technical name):</td><td>14. UN/ID No (when known):</td></tr>
<tr><td>15.Class/Division (when known):</td><td>16. Subsidiary risk(s):</td><td>17. Packing group:</td><td>18. Category (Class 7 only):</td></tr>
<tr><td>19. Type of packaging:</td><td>20.Packaging specification marking:</td><td>21. No of packages:</td><td>22. Quantity (or transport index, if applicable):</td></tr>
<tr><td colspan="4">23. Other relevant information (including suspected cause, any action taken):</td></tr>
<tr><td colspan="2">24. Name and title of person making report:</td><td colspan="2">25. Telephone No:</td></tr>
<tr><td colspan="2">26. Company:</td><td colspan="2">27. Reporters ref:</td></tr>
</table>

28. Address:	29. Signature:
	30. Date:
Description of the occurrence (continuation)	

Notes for completion of the form:

(a) Any type of dangerous goods occurrence should be reported.

(b) For this purpose serious injury is an injury which is sustained by a person in an accident and which:

(1) requires hospitalisation for more than 48 hours, commencing within 7 day from the date the injury was received;

(2) results in a fracture of any bones (except simple fractures of fingers, toes or nose);

(3) involves lacerations which cause severe haemorrhage, nerve, muscle or tendon damage;

(4) involves injury to any internal organ;

(5) involves second or third degree burns, or any burns affecting more than 5 % of the body surface; or

(6) involves verified exposure to infectious substances or injurious radiation.

A dangerous goods accident may also be an aircraft accident; in which case the normal procedure for reporting of air accidents should be followed.

(c) An initial report, which may be made by any means, should be dispatched within 72 hours of the occurrence, to the competent authority; and to the authority of the State in which the incident occurred, unless exceptional circumstances prevent this. This occurrence report form, duly completed, should be sent as soon as possible, even if all the information is not available.

(d) Any further information, or any information not included in the initial report, should be sent as soon as possible to authorities identified in paragraph 4.

(e) Providing it is safe to do so, all dangerous goods, packagings, documents, etc., relating to the occurrence should be retained until after the initial report has been sent to the authorities identified in accordance with SPO.GEN.155 (f) and they have indicated whether or not these should continue to be retained.

GM1-SPO.GEN.155(a) Transport of dangerous goods

GENERAL

(a) The requirement to transport dangerous goods by air in accordance with the Technical Instructions is irrespective of whether:

(1) the flight is wholly or partly within or wholly outside the territory of a State; or

(2) an approval to carry dangerous goods in accordance with SPA.DG is held.

(b) The Technical Instructions provide that in certain circumstances dangerous goods, which are normally forbidden on an aircraft, may be carried. These circumstances include cases of extreme urgency, when other forms of transport are inappropriate or when full compliance with the prescribed requirements is contrary to the public interest. In these circumstances all the States concerned may grant exemptions from the provisions of the Technical Instructions provided that an overall level of safety that is at least equivalent to that provided by the Technical Instructions is achieved. Although exemptions are most likely to be granted for the carriage of dangerous goods that are not permitted in normal circumstances, they may also be granted in other circumstances, such as when the packaging to be used is not provided for by the appropriate packing method or the quantity in the packaging is greater than that permitted. The Technical Instructions also make provision for some dangerous goods to be carried when an approval has been granted only by the State of Origin and the competent authority.

(c) When an exemption is required, the States concerned are those of origin, transit, overflight and destination of the consignment and that of the operator. For the State of overflight, if none of the criteria for granting an exemption are relevant, an exemption may be granted based solely on whether it is believed that an equivalent level of safety in air transport has been achieved.

(d) The Technical Instructions provide that exemptions and approvals are granted by the 'competent authority', which is intended to be the authority responsible for the particular aspect against which the exemption or approval is being sought. The Technical Instructions do not specify who should seek exemptions and, depending on the legislation of the particular State, this may mean the operator, the shipper or an agent. If an exemption or approval has been granted to other than the operator, the operator should ensure a copy has been obtained before the relevant flight. The operator should ensure that all relevant conditions on an exemption or approval are met.

(e) The exemption or approval referred to in (b) to (d) is in addition to the approval required by SPA.DG.100.

AMC1-SPO.GEN.175 Minimum equipment list – non-commercial operations with other-than-complex motor-powered aircraft

CONTENT AND APPROVAL OF THE MEL

(a) When a minimum equipment list (MEL) is established, the operator should amend the MEL after any applicable change to the master minimum equipment list (MMEL) within the acceptable timescales.

(b) The MEL should contain:

(1) a preamble, including guidance and definitions for flight crews and maintenance personnel using the MEL;

(2) the revision status of the MMEL upon which the MEL is based and the revision status of the MEL; and

(3) the scope, extent and purpose of the MEL.

(c) The operator should:

(1) establish rectification intervals for each inoperative instrument, item of equipment or function listed in the MEL. The rectification interval in the MEL should not be less restrictive than the corresponding rectification interval in the MMEL;

(2) establish an effective rectification programme; and

(3) only operate the aircraft after expiry of the rectification interval specified in the MEL when:

(i) the defect has been rectified; or

(ii) the rectification interval has been extended in accordance with (d).

(d) Subject to approval of the competent authority, or the State of Registry of the aircraft as applicable, the operator may use a procedure for the one time extension of category B, C and D rectification intervals, provided that:

(1) the extension of the rectification interval is within the scope of the MMEL for the aircraft type;

(2) the extension of the rectification interval is, as a maximum, of the same duration as the rectification interval specified in the MEL;

(3) the rectification interval extension is not used as a normal means of conducting MEL item rectification and is used only when events beyond the control of the operator have precluded rectification;

(4) a description of specific duties and responsibilities for controlling extensions is established by the operator;

(5) the competent authority is notified of any extension of the applicable rectification interval; and

(6) a plan to accomplish the rectification at the earliest opportunity is established.

(e) The operator should establish the operational and maintenance procedures referenced in the MEL taking into account the operational and maintenance procedures referenced in the MMEL. These procedures should be part of the operator's manuals or the MEL.

(f) The operator should amend the operational and maintenance procedures referenced in the MEL after any applicable change to the operational and maintenance procedures referenced in the MMEL.

(g) Unless otherwise specified in the MEL, the operator should complete:

(1) the operational procedures referenced in the MEL when planning for and/or operating with the listed item inoperative; and

(2) the maintenance procedures referenced in the MEL prior to operating with the listed item inoperative.

Subpart B – Operational procedures

AMC1-SPO.OP.100 Use of aerodromes and operating sites

USE OF OPERATING SITES - OPERATIONS WITH COMPLEX MOTOR-POWERED AIRCRAFT

(a) The pilot-in-command should have available from a pre-survey or other publication, for each operating site to be used, diagrams or ground and aerial photographs, depiction (pictorial) and description of:

(1) the overall dimensions of the operating site;

(2) location and height of relevant obstacles to approach and take-off profiles and in the manoeuvring area;

(3) approach and take-off flight paths;

(4) surface condition (blowing dust/snow/sand);

(5) provision of control of third parties on the ground, if applicable;

(6) lighting, if applicable;

(7) procedure for activating the operating site in accordance with national regulations, if applicable;

(8) other useful information, for example the appropriate ATS agency and frequency; and

(9) site suitability with reference to available aircraft performance.

(b) Where the operator specifically permits operation from sites that are not pre-surveyed, the pilot-in-command should make, from the air a judgment on the suitability of a site. At least (a)(1) to (a)(5) inclusive and (a)(9) should be considered.

AMC2-SPO.OP.100 Use of aerodromes and operating sites

USE OF OPERATING SITES – COMMERCIAL OPERATIONS WITH COMPLEX MOTOR-POWERED AIRCRAFT

(a) When defining adequate operating sites for use for the type(s) of aircraft and operation(s) concerned, the operator should take account of the following:

(1) An adequate site is a site that the operator considers to be satisfactory, taking account of the applicable performance requirements and site characteristics.

(2) The operator should have in place a procedure for the survey of operating sites by a competent person. Such a procedure should take account for possible changes to the operating site characteristics that may have taken place since last surveyed.

(3) Operating sites that are pre-surveyed should be documented and referenced in the operations manual, if applicable. The operations manual should contain

diagrams and/or ground and aerial photographs, depictions (pictorial) and descriptions of:

(i) the overall dimensions of the operating site;

(ii) location and height of relevant obstacles to approach and take-off profiles, and in the manoeuvring area;

(iii) approach and take-off flight paths;

(iv) surface condition (blowing dust/snow/sand);

(v) adequacy with reference to aircraft performance;

(vi) provision of control of third parties on the ground (if applicable);

(vii) procedure for activating the operating site with the land owner or controlling authority;

(viii) other useful information, for example the appropriate ATS agency and frequency; and

(ix) lighting (if applicable).

(b) Operations to non-pre-surveyed operating sites by night should not be conducted.

AMC1-SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

COMMERCIALLY AVAILABLE INFORMATION

An acceptable method of specifying aerodrome operating minima is through the use of commercially available information.

AMC2-SPO.OP.110 Aerodrome operating minima – aeroplanes and helicopters

VISUAL APPROACH

For a visual approach operation, the runway visual range (RVR) should not be less than 800 m.

AMC3-SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

GENERAL - OPERATIONS WITH COMPLEX MOTOR POWERED AIRCRAFT

(a) The aerodrome operating minima should not be lower than as specified in SPO.OP.111 or AMC4-SPO.OP.110 (c).

(b) Whenever practical approaches should be flown as stabilised approaches (SAps). Different procedures may be used for a particular approach to a particular runway.

(c) Whenever practical, non-precision approaches should be flown using the continuous descent final approach (CDFA) technique. Different procedures may be used for a particular approach to a particular runway.

(d) For approaches not flown using the CDFA technique: when calculating the minima in accordance with SPO.OP.111, the applicable minimum runway visual range (RVR) should be increased by 200 m for Category A and B aeroplanes and by 400 m for Category C and D aeroplanes, provided the resulting RVR/converted

meteorological visibility (CMV) value does not exceed 5 000 m. SAp or CDFA should be used as soon as facilities are improved to allow these techniques.

AMC4-SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

TAKE-OFF OPERATIONS WITH COMPLEX MOTOR-POWERED AIRCRAFT

(a) General:

(1) Take-off minima should be expressed as visibility (VIS) or RVR limits, taking into account all relevant factors for each aerodrome planned to be used and aircraft characteristics. Where there is a specific need to see and avoid obstacles on departure and/or for a forced landing, additional conditions, e.g. ceiling, should be specified.

(2) The pilot-in-command should not commence take-off unless the weather conditions at the aerodrome of departure are equal to or better than applicable minima for landing at that aerodrome, unless a weather-permissible take-off alternate aerodrome is available.

(3) When the reported meteorological visibility is below that required for take-off and RVR is not reported, a take-off should only be commenced if the pilot-in-command can determine that the visibility along the take-off runway/area is equal to or better than the required minimum.

(4) When no reported meteorological visibility or RVR is available, a take-off should only be commenced if the pilot-in-command can determine that the RVR/VIS along the take-off runway/area is equal to or better than the required minimum.

(b) Visual reference:

(1) The take-off minima should be selected to ensure sufficient guidance to control the aircraft in the event of both a rejected take-off in adverse circumstances and a continued take-off after failure of the critical engine.

(2) For night operations, ground lights should be available to illuminate the runway/final approach and take-off area (FATO) and any obstacles.

(c) Required RVR/visibility:

(1) Aeroplanes:

(i) For aeroplanes, the take-off minima specified by the operator should be expressed as RVR/VIS values not lower than those specified in Table 1.A.

(ii) When reported RVR or meteorological visibility is not available, the pilot-in-command should not commence take-off unless he/she can determine that the actual conditions satisfy the applicable take-off minima.

(2) Helicopters:

(i) For performance class 1 operations, the operator should specify an RVR/VIS as take-off minima in accordance with Table 1.H.

(ii) For performance class 2 operations onshore, the pilot-in-command should operate to take-off minima of 800 m RVR/VIS and remain clear of

cloud during the take-off manoeuvre until reaching performance class 1 capabilities.

(iii) For performance class 2 operations offshore, the pilot-in-command should operate to minima not less than that for performance class 1 and remain clear of cloud during the take-off manoeuvre until reaching performance class 1 capabilities.

(iv) Table 1 of AMC9-SPO.OP.110, for converting reported meteorological visibility to RVR, should not be used for calculating take-off minima.

Table 1.A: Take-off — aeroplanes (without LVTO approval) - RVR/VIS

Facilities	**RVR/VIS (m)***
Day only: Nil**	500
Day: at least runway edge lights or runway centreline markings Night: at least runway edge lights or runway centreline lights and runway end lights	400

*: The reported RVR/VIS value representative of the initial part of the take-off run can be replaced by pilot assessment.

**: The pilot is able to continuously identify the take-off surface and maintain directional control.

Table 1.H: Take-off — helicopters (without LVTO approval) - RVR/Visibility

Onshore aerodromes with instrument flight rules (IFR) departure procedures	**RVR/VIS (m)**
No light and no markings (day only)	400 or the rejected take-off distance, whichever is the greater
No markings (night)	800
Runway edge/FATO light and centreline marking	400
Runway edge/FATO light, centreline marking and relevant RVR information	400
Offshore helideck *	
Two-pilot operations	400
Single-pilot operations	500

*: The take-off flight path to be free of obstacles.

AMC5-SPO.OP.110 Aerodrome operating minima – aeroplanes and helicopters

TAKE-OFF OPERATIONS WITH OTHER-THAN-COMPLEX MOTOR-POWERED AIRCRAFT

(a) General:

(1) Take-off minima should be expressed as VIS or RVR limits, taking into account all relevant factors for each aerodrome planned to be used and aircraft characteristics. Where there is a specific need to see and avoid obstacles on departure and/or for a forced landing, additional conditions, e.g. ceiling, it should be specified.

(2) When the reported meteorological visibility is below that required for take-off and RVR is not reported, a take-off should only be commenced if the pilot-in-command can determine that the visibility along the take-off runway/area is equal to or better than the required minimum.

(3) When no reported meteorological visibility or RVR is available, a take-off should only be commenced if the pilot-in-command can determine that the RVR/VIS along the take-off runway/area is equal to or better than the required minimum.

(b) Visual reference:

(1) The take-off minima should be selected to ensure sufficient guidance to control the aircraft in the event of both a rejected take-off in adverse circumstances and a continued take-off after failure of the critical engine.

(2) For night operations, ground lights should be available to illuminate the runway/final approach and take-off area (FATO) and any obstacles.

AMC6-SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

CRITERIA FOR ESTABLISHING RVR/CMV – OPERATIONS WITH COMPLEX MOTOR-POWERED AIRCRAFT

(a) In order to qualify for the lowest allowable values of RVR/CMV specified in Table 3 of AMC7-SPO.OP.110, the instrument approach should meet at least the following facility requirements and associated conditions:

(1) Instrument approaches with designated vertical profile up to and including 4.5° for Category A and B aeroplanes, or 3.77° for Category C and D aeroplanes, where the facilities are instrument landing system (ILS)/microwave landing system (MLS)/GBAS landing system (GLS)/precision approach radar (PAR) or approach procedure with vertical guidance (APV) and where the final approach track is offset by not more than 15° for Category A and B aeroplanes or by not more than 5° for Category C and D aeroplanes.

(2) Instrument approach operations flown using the CDFA technique with a nominal vertical profile, up to and including 4.5° for Category A and B aeroplanes, or 3.77° for Category C and D aeroplanes, where the facilities are non-directional beacon (NDB), NDB/distance measuring equipment (DME), VHF omnidirectional radio range (VOR), VOR/DME, localiser (LOC), LOC/DME, VHF direction finder (VDF), surveillance radar approach (SRA) or Global navigation satellite system (GNSS)/lateral precision with vertical guidance

approach (LNAV), with a final approach segment of at least 3 NM, which also fulfil the following criteria:

(i) the final approach track is offset by not more than 15° for Category A and B aeroplanes or by not more than 5° for Category C and D aeroplanes;

(ii) the final approach fix (FAF) or another appropriate fix where descent is initiated is available, or distance to threshold (THR) is available by flight management system (FMS)/area navigation (NDB/DME) or DME; and

(iii) the missed approach point (MAPt) is determined by timing, the distance from FAF to THR is ≤ 8 NM.

(3) Instrument approaches where the facilities are NDB, NDB/DME, VOR, VOR/DME, LOC, LOC/DME, VDF, SRA or GNSS/LNAV, not fulfilling the criteria in (a)(2), or with an minimum descent height (MDH) ≥ 1 200 ft.

(b) The missed approach operation, after an approach operation has been flown using the CDFA technique, should be executed when reaching the decision height/altitude (DH/A) or the MAPt, whichever occurs first. The lateral part of the missed approach procedure should be flown via the MAPt unless otherwise stated on the approach chart.

AMC7-SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

DETERMINATION OF RVR/CMV/VIS MINIMA FOR NPA, APV, CAT I – COMPLEX MOTOR-POWERED AEROPLANES

(a) The minimum RVR/CMV/VIS should be the highest of the values specified in Table 2 and Table 3 but not greater than the maximum values specified in Table 3, where applicable.

(b) The values in Table 2 should be derived from the formula below:

required RVR/VIS (m) = [(DH/MDH (ft) x 0.3048) / tanα] – length of approach lights (m);

where α is the calculation angle, being a default value of 3.00° increasing in steps of 0.10° for each line in Table 2 up to 3.77° and then remains constant.

(c) If the approach is flown with a level flight segment at or above MDA/H, 200 m should be added for Category A and B aeroplanes and 400 m for Category C and D aeroplanes to the minimum RVR/CMV/VIS value resulting from the application of Table 2 and Table 3.

(d) An RVR of less than 750 m as indicated in Table 2 may be used:

(1) for category I (CAT I) operations to runways with full approach light system (FALS), runway touchdown zone lights (RTZL) and runway centreline lights (RCLL);

(2) for CAT I operations to runways without RTZL and RCLL when using an approved head-up guidance landing system (HUDLS), or equivalent approved system, or when conducting a coupled approach or flight-director-flown approach to a DH. The ILS should not be published as a restricted facility; and

(3) for APV operations to runways with FALS, RTZL and RCLL when using an approved head-up display (HUD).

(e) Lower values than those specified in Table 2 may be used for HUDLS and auto-land operations if approved in accordance with SPA.LVO.

(f) The visual aids should comprise standard runway day markings and approach and runway lights as specified in Table 1. The competent authority may approve that RVR values relevant to a basic approach light system (BALS) are used on runways where the approach lights are restricted in length below 210 m due to terrain or water, but where at least one cross-bar is available.

(g) For night operations or for any operation where credit for runway and approach lights is required, the lights should be on and serviceable, except as provided for in Table 1 of AMC10-SPO.OP.110.

(h) For single-pilot operations, the minimum RVR/VIS should be calculated in accordance with the following additional criteria:

(1) an RVR of less than 800 m as indicated in Table 2 may be used for CAT I approaches provided any of the following is used at least down to the applicable DH:

(i) a suitable autopilot, coupled to an ILS, MLS or GLS that is not published as restricted; or

(ii) an approved HUDLS, including, where appropriate, enhanced vision system (EVS), or equivalent approved system;

(2) where RTZL and/or RCLL are not available, the minimum RVR/CMV should not be less than 600 m; and

(3) an RVR of less than 800 m as indicated in Table 2 may be used for APV operations to runways with FALS, RTZL and RCLL when using an approved HUDLS, or equivalent approved system, or when conducting a coupled approach to a DH equal to or greater than 250 ft.

Table 1: Approach light systems

Class of lighting facility	**Length, configuration and intensity of approach lights**
FALS	CAT I light system (HIALS 720 m ≥) distance coded centreline, Barrette centreline
IALS	Simple approach light system (HIALS 420 – 719 m) single source, Barrette
BALS	Any other approach light system (HIALS, MIALS or ALS 210 – 419 m)
NALS	Any other approach light system (HIALS, MIALS or ALS < 210 m) or no approach lights

Note: HIALS: high intensity approach light system;

MIALS: medium intensity approach light system;

ALS: approach light system.

Table 2: RVR/CMV vs DH/MDH

DH or MDH			**Class of lighting facility**			
			FALS	**IALS**	**BALS**	**NALS**
			See (d), (e)., (h). above for RVR < 750/800 m			
ft			**RVR/CMV (m)**			
200	-	210	550	750	1 000	1 200
211	-	220	550	800	1 000	1 200
221	-	230	550	800	1 000	1 200
231	-	240	550	800	1 000	1 200
241	-	250	550	800	1 000	1 300
251	-	260	600	800	1 100	1 300
261	-	280	600	900	1 100	1 300
281	-	300	650	900	1 200	1 400
301	-	320	700	1 000	1 200	1 400
321	-	340	800	1 100	1 300	1 500
341	-	360	900	1 200	1 400	1 600
361	-	380	1 000	1 300	1 500	1 700
381	-	400	1 100	1 400	1 600	1 800
401	-	420	1 200	1 500	1 700	1 900
421	-	440	1 300	1 600	1 800	2 000
441	-	460	1 400	1 700	1 900	2 100
461	-	480	1 500	1 800	2 000	2 200
481		500	1 500	1 800	2 100	2 300
501	-	520	1 600	1 900	2 100	2 400
521	-	540	1 700	2 000	2 200	2 400
541	-	560	1 800	2 100	2 300	2 500
561	-	580	1 900	2 200	2 400	2 600
581	-	600	2 000	2 300	2 500	2 700
601	-	620	2 100	2 400	2 600	2 800

DH or MDH			**Class of lighting facility**			
			FALS	**IALS**	**BALS**	**NALS**
			See (d), (e)., (h). above for RVR < 750/800 m			
ft			**RVR/CMV (m)**			
621	-	640	2 200	2 500	2 700	2 900
641	-	660	2 300	2 600	2 800	3 000
661	-	680	2 400	2 700	2 900	3 100
681	-	700	2 500	2 800	3 000	3 200
701	-	720	2 600	2 900	3 100	3 300
721	-	740	2 700	3 000	3 200	3 400
741	-	760	2 700	3 000	3 300	3 500
761	-	800	2 900	3 200	3 400	3 600
801	-	850	3 100	3 400	3 600	3 800
851	-	900	3 300	3 600	3 800	4 000
901	-	950	3 600	3 900	4 100	4 300
951	-	1 000	3 800	4 100	4 300	4 500
1 001	-	1 100	4 100	4 400	4 600	4 900
1 101	-	1 200	4 600	4 900	5 000	5 000
1 201 and above			5 000	5 000	5 000	5 000

Table 3: CAT I, APV, NPA – aeroplanes Minimum and maximum applicable RVR/CMV (lower and upper cut-off limits)

Facility/conditions	**RVR/CMV (m)**	**Aeroplane category**			
		A	**B**	**C**	**D**
ILS, MLS, GLS, PAR, GNSS/SBAS, GNSS/VNAV	Min	According to Table 2 of this AMC			
	Max	1 500	1 500	2 400	2 400
NDB, NDB/DME, VOR,	Min	750	750	750	750

Facility/conditions	**RVR/CMV (m)**	**Aeroplane category**			
		A	**B**	**C**	**D**
VOR/DME, LOC, LOC/DME, VDF, SRA, GNSS/LNAV with a procedure that fulfils the criteria in AMC6-SPO.OP.110 (a)(2)	Max	1 500	1 500	2 400	2 400
For NDB, NDB/DME, VOR, VOR/DME, LOC, LOC/DME, VDF, SRA, GNSS/LNAV: — not fulfilling the criteria in AMC6-SPO.OP.110 (a)(2)., or — with a DH or MDH ≥ 1 200 ft	Min	1 000	1 000	1 200	1 200
	Max	According to Table 2 of this AMC if flown using the CDFA technique, otherwise an add-on of 200 m/400 m applies to the values in Table 2 but not to result in a value exceeding 5 000 m.			

AMC8-SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

DETERMINATION OF RVR/CMV/VIS MINIMA FOR NPA, CAT I — COMPLEX MOTOR-POWERED HELICOPTERS

(a) For non-precision approach (NPA) operations operated in performance class 1 (PC1) or performance class 2 (PC2), the minima specified in Table 1 should apply:

(1) where the missed approach point is within ½ NM of the landing threshold, the approach minima specified for FALS may be used regardless of the length of approach lights available. However, FATO/runway edge lights, threshold lights, end lights and FATO/runway markings are still required;

(2) for night operations, ground lights should be available to illuminate the FATO/runway and any obstacles; and

(3) for single-pilot operations, the minimum RVR is 800 m or the minima in Table 2, whichever is higher.

(b) For CAT I operations operated in PC1 or PC2, the minima specified in Table 2 should apply:

(1) for night operations, ground light should be available to illuminate the FATO/runway and any obstacles;

(2) for single-pilot operations, the minimum RVR/VIS should be calculated in accordance with the following additional criteria:

(i) an RVR of less than 800 m should not be used except when using a suitable autopilot coupled to an ILS, MLS or GLS, in which case normal minima apply; and

(ii) the DH applied should not be less than 1.25 times the minimum use height for the autopilot.

Table 1: Onshore NPA minima

MDH (ft) *	**Facilities vs. RVR/CMV (m) **, *****			
	FALS	**IALS**	**BALS**	**NALS**
250 – 299	600	800	1 000	1 000
300 – 449	800	1 000	1 000	1 000
450 and above	1 000	1 000	1 000	1 000

*: The MDH refers to the initial calculation of MDH. When selecting the associated RVR, there is no need to take account of a rounding up to the nearest 10 ft, which may be done for operational purposes, e.g. conversion to MDA.

**: The tables are only applicable to conventional approaches with a nominal descent slope of not greater than 4°. Greater descent slopes will usually require that visual glide slope guidance (e.g. precision path approach indicator (PAPI)) is also visible at the MDH.

***: FALS comprise FATO/runway markings, 720 m or more of high intensity/medium intensity (HI/MI) approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights to be on.

IALS comprise FATO/runway markings, 420 – 719 m of HI/MI approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights to be on.

BALS comprise FATO/runway markings, < 420 m of HI/MI approach lights, any length of low intensity (LI) approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights to be on.

NALs comprise FATO/runway markings, FATO/runway edge lights, threshold lights, FATO/runway end lights or no lights at all.

Table 2: Onshore CAT I minima

DH (ft) *	**Facilities vs. RVR/CMV (m) **, *****			
	FALS	**IALS**	**BALS**	**NIALS**
200	500	600	700	1 000
201 – 250	550	650	750	1 000
251 – 300	600	700	800	1 000
301 and above	750	800	900	1 000

*: The DH refers to the initial calculation of DH. When selecting the associated RVR, there is no need to take account of a rounding up to the nearest 10 ft, which may be done for operational purposes, e.g. conversion to DA.

**: The table is applicable to conventional approaches with a glide slope up to and including 4°.

***: FALS comprise FATO/runway markings, 720 m or more of HI/MI approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights to be on.

IALS comprise FATO/runway markings, 420 – 719 m of HI/MI approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights to be on.

BALS comprise FATO/runway markings, < 420 m of HI/MI approach lights, any length of LI approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights to be on.

NALS comprise FATO/runway markings, FATO/runway edge lights, threshold lights, FATO/runway end lights or no lights at all.

AMC9-SPO.OP.110 Aerodrome operating minima

CONVERSION OF REPORTED METEOROLOGICAL VISIBILITY TO RVR/CMV – COMPLEX MOTOR-POWERED AIRCRAFT

(a) A conversion from meteorological visibility to RVR/CMV should not be used when:

(1) reported RVR is available;

(2) for calculating take-off minima; and

(3) for other RVR minima less than 800 m.

(b) If the RVR is reported as being above the maximum value assessed by the aerodrome operator, e.g. 'RVR more than 1 500 m', it should not be considered as a reported value.

(c) When converting meteorological visibility to RVR in circumstances other than those in (a) above, the conversion factors specified in Table 1 should be used.

Table 1: Conversion of reported meteorological visibility to RVR/CMV

Light elements in operation	**RVR/CMV = reported meteorological visibility x**	
	Day	**Night**
HI approach and runway lights	1.5	2.0
Any type of light installation other than above	1.0	1.5
No lights	1.0	not applicable

AMC10-SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

EFFECT ON LANDING MINIMA OF TEMPORARILY FAILED OR DOWNGRADED GROUND EQUIPMENT – COMPLEX MOTOR-POWERED AIRCRAFT

(a) General

These instructions are intended for both pre-flight and in-flight use. It is however not expected that the pilot-in-command would consult such instructions after passing 1 000 ft above the aerodrome. If failures of ground aids are announced at such a late stage, the approach could be continued at the pilot-in-command's discretion. If failures are announced before such a late stage in the approach, their effect on the approach should be considered as described in Table 1 and, if considered necessary, the approach should be abandoned.

(b) Conditions applicable to Tables 1:

(1) multiple failures of runway/FATO lights other than indicated in Table 1 should not be acceptable;

(2) deficiencies of approach and runway/FATO lights are treated separately; and

(3) failures other than ILS, MLS affect RVR only and not DH.

Table 1: Failed or downgraded equipment — effect on landing minima

<table>
<tr><th rowspan="2">Failed or downgraded equipment</th><th colspan="2">Effect on landing minima</th></tr>
<tr><th>CAT I</th><th>APV, NPA</th></tr>
<tr><td>ILS/MLS standby transmitter</td><td colspan="2">No effect</td></tr>
<tr><td rowspan="3">Outer marker</td><td rowspan="3">No effect if replaced by height check at 1 000 ft</td><td>APV — not applicable</td></tr>
<tr><td>NPA with FAF: no effect unless used as FAF</td></tr>
<tr><td>If the FAF cannot be identified (e.g. no method available for timing of descent), non-precision operations cannot be conducted</td></tr>
<tr><td>Middle marker</td><td>No effect</td><td>No effect unless used as MAPt</td></tr>
<tr><td>RVR Assessment Systems</td><td colspan="2">No effect</td></tr>
<tr><td>Approach lights</td><td colspan="2">Minima as for NALS</td></tr>
<tr><td>Approach lights except the last 210 m</td><td colspan="2">Minima as for BALS</td></tr>
</table>

Failed or downgraded equipment	**Effect on landing minima**	
	CAT I	**APV, NPA**
Approach lights except the last 420 m	Minima as for IALS	
Standby power for approach lights	No effect	
Edge lights, threshold lights and runway end lights	Day — no effect Night — not allowed	
Centreline lights	No effect if flight director (F/D), HUDLS or autoland; otherwise RVR 750 m	No effect
Centreline lights spacing increased to 30 m	No effect	
Touchdown zone lights	No effect if F/D, HUDLS or autoland; otherwise RVR 750 m	No effect
Taxiway light system	No effect	

AMC11-SPO.OP.110 Aerodrome operating minima – aeroplanes and helicopters

EFFECT ON LANDING MINIMA OF TEMPORARILY FAILED OR DOWNGRADED GROUND EQUIPMENT – OTHER-THAN-COMPLEX MOTOR-POWERED AIRCRAFT

(a) Non-precision approaches requiring a final approach fix (FAF) and/or MAPt should not be conducted where a method of identifying the appropriate fix is not available.

(b) A minimum RVR of 750 m should be used for CAT I approaches in the absence of centreline lines and/or touchdown zone lights.

(c) Where approach lighting is partly unavailable, minima should take account of the serviceable length of approach lighting.

GM1-SPO.OP.110 Aerodrome operating minima – aeroplanes and helicopters

AIRCRAFT CATEGORIES

(a) Aircraft categories should be based on the indicated airspeed at threshold (VAT), which is equal to the stalling speed (VSO) multiplied by 1.3 or 1-g (gravity) stall speed (VS1g) multiplied by 1.23 in the landing configuration at the maximum certified landing mass. If both VSO and VS1g are available, the higher resulting VAT should be used.

(b) The aircraft categories specified in the Table 1 should be used.

Table 1: Aircraft categories corresponding to V_{AT} values

Aircraft category	**V_{AT}**
A	Less than 91 kt
B	from 91 to 120 kt
C	from 121 to 140 kt
D	from 141 to 165 kt
E	from 166 to 210 kt

GM2-SPO.OP.110 Aerodrome operating minima – aeroplanes and helicopters

CONTINUOUS DESCENT FINAL APPROACH (CDFA) – AEROPLANES

(a) Introduction

(1) Controlled flight into terrain (CFIT) is a major hazard in aviation. Most CFIT accidents occur in the final approach segment of non-precision approaches; the use of stabilised-approach criteria on a continuous descent with a constant, predetermined vertical path is seen as a major improvement in safety during the conduct of such approaches. The following techniques are adopted as widely as possible, for all approaches.

(2) The elimination of level flight segments at MDA close to the ground during approaches, and the avoidance of major changes in attitude and power/thrust close to the runway that can destabilise approaches, are seen as ways to reduce operational risks significantly.

(3) The term CDFA has been selected to cover a flight technique for any type of NPA operation.

(4) The advantages of CDFA are as follows:

(i) the technique enhances safe approach operations by the utilisation of standard operating practices;

(ii) the technique is similar to that used when flying an ILS approach, including when executing the missed approach and the associated missed approach procedure manoeuvre;

(iii) the aeroplane attitude may enable better acquisition of visual cues;

(iv) the technique may reduce pilot workload;

(v) the approach profile is fuel efficient;

(vi) the approach profile affords reduced noise levels;

(vii) the technique affords procedural integration with APV operations; and

(viii) when used and the approach is flown in a stabilised manner, CDFA is the safest approach technique for all NPA operations.

(b) CDFA

(1) Continuous descent final approach is defined in Annex I to the Regulation on Air Operations.

(2) An approach is only suitable for application of a CDFA technique when it is flown along a nominal vertical profile; a nominal vertical profile is not forming part of the approach procedure design, but can be flown as a continuous descent. The nominal vertical profile information may be published or displayed on the approach chart to the pilot by depicting the nominal slope or range/distance vs. height. Approaches with a nominal vertical profile are considered to be:

(i) NDB, NDB/DME;

(ii) VOR, VOR/DME;

(iii) LOC, LOC/DME;

(iv) VDF, SRA; and

(v) GNSS/LNAV.

(3) Stabilised approach (SAp) is defined in Annex I to the Regulation on Air Operations.

(i) The control of the descent path is not the only consideration when using the CDFA technique. Control of the aeroplane's configuration and energy is also vital to the safe conduct of an approach.

(ii) The control of the flight path, described above as one of the requirements for conducting an SAp, should not be confused with the path requirements for using the CDFA technique.

(iii) The predetermined approach slope requirements for applying the CDFA technique are established by the following:

(A) the published 'nominal' slope information when the approach has a nominal vertical profile; and

(B) the designated final-approach segment minimum of 3 NM, and maximum, when using timing techniques, of 8 NM.

(iv) An SAp will never have any level segment of flight at DA/H or MDA/H, as applicable. This enhances safety by mandating a prompt missed approach procedure manoeuvre at DA/H or MDA/H.

(v) An approach using the CDFA technique will always be flown as an SAp, since this is a requirement for applying CDFA. However, an SAp does not have to be flown using the CDFA technique, for example a visual approach.

Table 1: Conversion of reported meteorological visibility to RVR/CMV

Lighting elements in operation	**RVR/CMV = reported meteorological visibility x**	
	Day	**Night**
High intensity (HI) approach and runway lights	1.5	2.0
Any type of light installation other than above	1.0	1.5
No lights	1.0	not applicable

GM3-SPO.OP.110 Aerodrome operating minima – aeroplanes and helicopters

VERTICAL PATH CONTROL - OPERATIONS WITH OTHER-THAN-COMPLEX MOTOR POWERED AIRCRAFT

Due consideration should be given to the selection of an appropriate technique for vertical path control on NPAs. Where appropriate instrumentation and/or facilities are available, a CDFA technique usually offers increased safety and a lower workload compared to a step-down approach.

GM4-SPO.OP.110 Aerodrome operating minima – aeroplanes and helicopters

ONSHORE AERODROME DEPARTURE PROCEDURES –OPERATIONS WITH OTHER-THAN-COMPLEX MOTOR-POWERED HELICOPTERS

The cloud base and visibility should be such as to allow the helicopter to be clear of cloud at the take-off decision point (TDP), and for the pilot flying to remain in sight of the surface until reaching the minimum speed for flight in instrument meteorological conditions, as given in the AFM.

GM5-SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

TAKE-OFF MINIMA - OPERATIONS WITH COMPLEX MOTOR-POWERED HELICOPTERS

(a) To ensure sufficient control of the helicopter in IMC, the speed, before entering in IMC, should be above the minimum authorised speed in IMC, Vmini. This is a limitation in the AFM. Therefore, the lowest speed before entering in IMC is the highest of Vtoss (velocity take-off speed) and Vmini.

(b) As example, Vtoss is 45 kt and Vmini 60 kt. In that case, the take–off minima have to include the distance to accelerate to 60 kt. The take-off distance should be increased accordingly.

GM1-SPO.OP.112 Aerodrome operating minima — circling operations with aeroplanes

SUPPLEMENTAL INFORMATION

(a) The purpose of this Guidance Material is to provide operators with supplemental information regarding the application of aerodrome operating minima in relation to circling approaches.

(b) Conduct of flight — general:

(1) the MDH and obstacle clearance height (OCH) included in the procedure are referenced to aerodrome elevation;

(2) the MDA is referenced to mean sea level;

(3) for these procedures, the applicable visibility is the meteorological visibility; and

(4) operators should provide tabular guidance of the relationship between height above threshold and the in-flight visibility required to obtain and sustain visual contact during the circling manoeuvre.

(c) Instrument approach followed by visual manoeuvring (circling) without prescribed tracks:

(1) When the aeroplane is on the initial instrument approach, before visual reference is stabilised, but not below MDA/H — the aeroplane should follow the corresponding instrument approach procedure until the appropriate instrument MAPt is reached.

(2) At the beginning of the level flight phase at or above the MDA/H, the instrument approach track determined by radio navigation aids, GNSS, or ILS, MLS, GLS or PAR should be maintained until the pilot:

(i) estimates that, in all probability, visual contact with the runway of intended landing or the runway environment will be maintained during the entire circling procedure;

(ii) estimates that the aeroplane is within the circling area before commencing circling; and

(iii) is able to determine the aeroplane’s position in relation to the runway of intended landing with the aid of the appropriate external references.

(3) When reaching the published instrument MAPt and the conditions stipulated in (c)(2) are unable to be established by the pilot, a missed approach should be carried out in accordance with that instrument approach procedure.

(4) After the aeroplane has left the track of the initial instrument approach, the flight phase outbound from the runway should be limited to an appropriate distance, which is required to align the aeroplane onto the final approach. Such manoeuvres should be conducted to enable the aeroplane:

(i) to attain a controlled and stable descent path to the intended landing runway; and

(ii) remain within the circling area and in such way that visual contact with the runway of intended landing or runway environment is maintained at all times.

(5) Flight manoeuvres should be carried out at an altitude/height that is not less than the circling MDA/H.

(6) Descent below MDA/H should not be initiated until the threshold of the runway to be used has been appropriately identified. The aeroplane should be in a position to continue with a normal rate of descent and land within the touchdown zone.

(d) Instrument approach followed by a visual manoeuvring (circling) with prescribed track.

(1) The aeroplane should remain on the initial instrument approach procedure until one of the following is reached:

(i) the prescribed divergence point to commence circling on the prescribed track; or

(ii) the MAPt.

(2) The aeroplane should be established on the instrument approach track determined by the radio navigation aids, GNSS, or ILS, MLS, GLS, or PAR in level flight at or above the MDA/H at or by the circling manoeuvre divergence point.

(3) If the divergence point is reached before the required visual reference is acquired, a missed approach should be initiated not later than the MAPt and completed in accordance with the initial instrument approach procedure.

(4) When commencing the prescribed circling manoeuvre at the published divergence point, the subsequent manoeuvres should be conducted to comply with the published routing and published heights/altitudes.

(5) Unless otherwise specified, once the aeroplane is established on the prescribed track(s), the published visual reference does not need to be maintained unless:

(i) required by the State of the aerodrome; or

(ii) the circling MAPt (if published) is reached.

(6) If the prescribed circling manoeuvre has a published MAPt and the required visual reference has not been obtained by that point, a missed approach should be executed in accordance with (e)(2) and (e)(3).

(7) Subsequent further descent below MDA/H should only commence when the required visual reference has been obtained.

(8) Unless otherwise specified in the procedure, final descent should not be commenced from MDA/H until the threshold of the intended landing runway has been identified and the aeroplane is in a position to continue with a normal rate of descent to land within the touchdown zone.

(e) Missed approach

(1) Missed approach during the instrument procedure prior to circling:

(i) if the missed approach procedure is required to be flown when the aeroplane is positioned on the instrument approach track defined by radio navigation aids, GNSS, or ILS, MLS, GLS or PAR, and before commencing the circling manoeuvre, the published missed approach for the instrument approach should be followed; or

(ii) if the instrument approach procedure is carried out with the aid of an ILS, MLS or an SAp, the MAPt associated with an ILS or MLS procedure without glide path (GP-out procedure) or the SAp, where applicable, should be used.

(2) If a prescribed missed approach is published for the circling manoeuvre, this overrides the manoeuvres prescribed below.

(3) If visual reference is lost while circling to land after the aeroplane has departed from the initial instrument approach track, the missed approach specified for that particular instrument approach should be followed. It is expected that the pilot will make an initial climbing turn toward the intended landing runway to a position overhead of the aerodrome where the pilot will establish the aeroplane in a climb on the instrument missed approach segment.

(4) The aeroplane should not leave the visual manoeuvring (circling) area, which is obstacle protected, unless:

(i) established on the appropriate missed approach procedure; or

(ii) at minimum sector altitude (MSA).

(5) All turns should be made in the same direction and the aeroplane should remain within the circling protected area while climbing to either:

(i) the altitude assigned to any published circling missed approach manoeuvre if applicable;

(ii) the altitude assigned to the missed approach of the initial instrument approach;

(iii) the MSA;

(iv) the minimum holding altitude (MHA) applicable for transition to a holding facility or fix, or continue to climb to an MSA; or

(v) as directed by ATS.

When the missed approach procedure is commenced on the 'downwind' leg of the circling manoeuvre, an 'S' turn may be undertaken to align the aeroplane on the initial instrument approach missed approach path, provided the aeroplane remains within the protected circling area.

The pilot-in-command should be responsible for ensuring adequate terrain clearance during the above-stipulated manoeuvres, particularly during the execution of a missed approach initiated by ATS.

(6) Because the circling manoeuvre may be accomplished in more than one direction, different patterns will be required to establish the aeroplane on the prescribed missed approach course depending on its position at the time visual reference is lost. In particular, all turns are to be in the prescribed direction if this is restricted, e.g. to the west/east (left or right hand) to remain within the protected circling area.

(7) If a missed approach procedure is published for a particular runway onto which the aeroplane is conducting a circling approach and the aeroplane has commenced a manoeuvre to align with the runway, the missed approach for this direction may be accomplished. The ATS unit should be informed of the intention to fly the published missed approach procedure for that particular runway.

(8) The pilot-in-command should advise ATS when any missed approach procedure has been commenced, the height/altitude the aeroplane is climbing to and the position the aeroplane is proceeding towards and/or heading the aeroplane is established on.

AMC1-SPO.OP.120 Noise abatement procedures

NADP DESIGN - OPERATIONS WITH COMPLEX MOTOR-POWERED AIRCRAFT

(a) For each aeroplane type two departure procedures should be defined, in accordance with ICAO Doc. 8168 (Procedures for Air Navigation Services, 'PANS-OPS'), Volume I:

(1) noise abatement departure procedure one (NADP 1), designed to meet the close-in noise abatement objective; and

(2) noise abatement departure procedure two (NADP 2), designed to meet the distant noise abatement objective.

(b) For each type of NADP (1 and 2), a single climb profile should be specified for use at all aerodromes, which is associated with a single sequence of actions. The NADP 1 and NADP 2 profiles may be identical.

GM1-SPO.OP.120 Noise abatement procedures

TERMINOLOGY - OPERATIONS WITH COMPLEX MOTOR-POWERED AEROPLANES

(a) 'Climb profile' means in this context the vertical path of the NADP as it results from the pilot's actions (engine power reduction, acceleration, slats/flaps retraction).

(b) 'Sequence of actions' means the order in which the pilot's actions are done and their timing.

GENERAL

(c) The requirement addresses only the vertical profile of the departure procedure. Lateral track has to comply with the standard instrument departure (SID).

EXAMPLE

(d) For a given aeroplane type, when establishing the distant NADP, the operator should choose either to reduce power first and then accelerate, or to accelerate

first and then wait until slats/flaps are retracted before reducing power. The two methods constitute two different sequences of actions.

(e) For an aeroplane type, each of the two departure climb profiles may be defined by one sequence of actions (one for close-in, one for distant) and two above aerodrome level (AAL) altitudes/heights. These are:

(1) the altitude of the first pilot's action (generally power reduction with or without acceleration). This altitude should not be less than 800 ft AAL; or

(2) the altitude of the end of the noise abatement procedure. This altitude should usually not be more than 3 000 ft AAL.

These two altitudes may be runway specific when the aeroplane flight management system (FMS) has the relevant function that permits the crew to change thrust reduction and/or acceleration altitude/height. If the aeroplane is not FMS equipped or the FMS is not fitted with the relevant function, two fixed heights should be defined and used for each of the two NADPs.

AMC1-SPO.OP.140 Safety briefing

TASK SPECIALISTS – GENERAL

(a) The purpose of operational briefing is to ensure that task specialists are familiar with all aspects of the operation, including their responsibilities.

(b) Such briefing should include, as appropriate:

(1) behaviour on the ground and in-flight, including emergency procedures;

(2) procedures for boarding and disembarking;

(3) procedures for loading and unloading the aircraft;

(4) use of doors in normal and emergency operations;

(5) use of communication equipment and hand signals;

(6) precautions in case of a landing on sloping ground; and

(7) in addition to the items listed from (b)(1) to (b)(6) before take-off:

(i) location of emergency exits;

(ii) restrictions regarding smoking;

(iii) restrictions regarding the use of portable electronic equipment; and

(iv) stowage of tools and hand baggage.

(c) The briefing may be given as a verbal presentation or by issuing the appropriate procedures and instructions in written form. Before commencement of the flight, their understanding should be confirmed.

AMC1-SPO.OP.156 Destination alternate aerodromes — helicopters

OFFSHORE ALTERNATE AERODROMES — COMPLEX MOTOR-POWERED HELICOPTERS

(a) Weather-permissible offshore alternate aerodromes may be selected and specified subject to the following:

(1) the offshore alternate aerodrome should only be used after passing a point of no return (PNR). Prior to a PNR, onshore alternate aerodromes should be used;

(2) mechanical reliability of critical control systems and critical components should be considered and taken into account when determining the suitability of the alternate aerodrome;

(3) one-engine-inoperative (OEI) performance capability should be attainable prior to arrival at the alternate;

(4) to the extent possible, deck availability should be guaranteed; and

(5) weather information should be reliable and accurate.

(b) Offshore alternate aerodromes should not be used when it is possible to carry enough fuel to have an onshore alternate aerodrome. Offshore alternate aerodromes should not be used in a hostile environment.

(c) The landing technique specified in the AFM following control system failure may preclude the nomination of certain helidecks as alternate aerodromes.

AMC1-SPO.OP.160 Refuelling with persons embarking, on board or disembarking

OPERATIONAL PROCEDURES — AEROPLANES

(a) Operational procedures should specify that at least the following precautions are taken:

(1) one qualified person should remain at a specified location during fuelling operations with persons on board. This qualified person should be capable of handling emergency procedures concerning fire protection and fire-fighting, handling communications and initiating and directing an evacuation.

(2) two-way communication should be established and should remain available by the aeroplane's inter-communication system or other suitable means between the ground crew supervising the refuelling and the qualified personnel on board the aeroplane;

(3) Flight crew members and task specialists should be warned that refuelling will take place.

(4) 'Fasten Seat Belts' signs should be off.

(5) 'NO SMOKING' signs should be on, together with interior lighting to enable emergency exits to be identified.

(6) task specialists should be instructed to unfasten their seat belts and refrain from smoking.

(7) if the presence of fuel vapour is detected inside the aeroplane, or any other hazard arises during refuelling, fuelling should be stopped immediately.

(8) the ground area beneath the exits intended for emergency evacuation and slide deployment areas should be kept clear.

(9) provision should be made for a safe and rapid evacuation.

OPERATIONAL PROCEDURES — HELICOPTERS

(b) Operational procedures should specify that at least the following precautions are taken:

(1). door(s) on the refuelling side of the helicopter remain closed;

(2) door(s) on the non-refuelling side of the helicopter remain open, weather permitting;

(3) fire-fighting facilities of the appropriate scale be positioned so as to be immediately available in the event of a fire;

(4) sufficient personnel be immediately available to move passengers clear of the helicopter in the event of a fire;

(5) sufficient qualified personnel be on board and be prepared for an immediate emergency evacuation;

(6) if the presence of fuel vapour is detected inside the helicopter, or any other hazard arises during refuelling, fuelling be stopped immediately;

(7) the ground area beneath the exits intended for emergency evacuation and slide deployment areas be kept clear; and

(8) provision should be made for a safe and rapid evacuation.

GM1-SPO.OP.160 Refuelling with persons embarking, on board or disembarking

AIRCRAFT REFUELLING PROVISIONS AND GUIDANCE ON SAFE REFUELLING PRACTICES

Provisions concerning aircraft refuelling are contained in Volume I (Aerodrome Design and Operations) of ICAO Annex 14 (Aerodromes), and guidance on safe refuelling practices is contained in Parts 1 and 8 of the ICAO Airport Services Manual (Doc 9137).

AMC1-SPO.OP.175 Meteorological conditions

EVALUATION OF METEOROLOGICAL CONDITIONS

Pilots should carefully evaluate the available meteorological information relevant to the proposed flight, such as applicable surface observations, winds and temperatures aloft, terminal and area forecasts, air meteorological information reports (AIRMETs), significant meteorological information (SIGMET) and pilot reports. The ultimate decision whether, when, and where to make the flight rests with the pilot-in-command. Pilots should continue to re-evaluate changing weather conditions.

AMC2-SPO.OP.175 Meteorological conditions

APPLICATION OF AERODROME FORECASTS (TAF & TREND)

Where a terminal area forecast (TAF) or meteorological aerodrome or aeronautical report (METAR) with landing forecast (TREND) is used as forecast, the following criteria should be used:

(a) From the start of a TAF validity period up to the time of applicability of the first subsequent 'FM...' or 'BECMG' or, if no 'FM' or BECMG' is given, up to the end of

the validity period of the TAF, the prevailing weather conditions forecast in the initial part of the TAF should be applied.

(b) From the time of observation of a METAR up to the time of applicability of the first subsequent 'FM...' or 'BECMG' or, if no 'FM' or BECMG' is given, up to the end of the validity period of the TREND, the prevailing weather conditions forecast in the METAR should be applied.

(c) Following FM (alone) or BECMG AT, any specified change should be applied from the time of the change.

(d) Following BECMG (alone), BECMG FM, BECMG TL, BECMG FM TL:

(1) in the case of deterioration, any specified change should be applied from the start of the change; and

(2) in the case of improvement, any specified change should be applied from the end of the change.

(e) In a period indicated by TEMPO (alone), TEMPO FM, TEMPO TL, TEMPO FM TL, PROB30/40 (alone):

(1) deteriorations associated with persistent conditions in connection with e.g. haze, mist, fog, dust/sandstorm, continuous precipitation should be applied;

(2) deteriorations associated with transient/showery conditions in connection with short-lived weather phenomena, e.g. thunder storms, showers may be ignored; and

(3) improvements should in all cases be disregarded.

(f) In a period indicated by PROB30/40 TEMPO:

(1) deteriorations may be disregarded; and

(2) improvements should be disregarded.

Note: Abbreviations used in the context of this AMC is as follows:

FM: from

BECMG: becoming

AT: at

TL: till

TEMPO: temporarily

PROB: probability

GM1-SPO.OP.175 Meteorological conditions

CONTINUATION OF A FLIGHT

In the case of in-flight re-planning, continuation of a flight refers to the point from which a revised flight plan applies.

GM1-SPO.OP.180 Ice and other contaminants — ground procedures

TERMINOLOGY

Terms used in the context of de-icing/anti-icing have the meaning defined in the following subparagraphs.

(a) 'Anti-icing fluid' includes, but is not limited to, the following:

(1) Type I fluid if heated to min 60 °C at the nozzle;

(2) mixture of water and Type I fluid if heated to min 60 °C at the nozzle;

(3) Type II fluid;

(4) mixture of water and Type II fluid;

(5) Type III fluid;

(6) mixture of water and Type III fluid;

(7) Type IV fluid;

(8) mixture of water and Type IV fluid.

On uncontaminated aircraft surfaces Type II, III and IV anti-icing fluids are normally applied unheated.

(b) 'Clear ice': a coating of ice, generally clear and smooth, but with some air pockets. It forms on exposed objects, the temperatures of which are at, below or slightly above the freezing temperature, by the freezing of super-cooled drizzle, droplets or raindrops.

(c) Conditions conducive to aircraft icing on the ground (e.g. freezing fog, freezing precipitation, frost, rain or high humidity (on cold soaked wings), snow or mixed rain and snow).

(d) 'Contamination', in this context, is understood as being all forms of frozen or semi-frozen moisture, such as frost, snow, slush or ice.

(e) 'Contamination check': a check of aircraft for contamination to establish the need for de-icing.

(f) 'De-icing fluid': such fluid includes, but is not limited to, the following:

(1) heated water;

(2) Type I fluid;

(3) mixture of water and Type I fluid;

(4) Type II fluid;

(5) mixture of water and Type II fluid;

(6) Type III fluid;

(7) mixture of water and Type III fluid;

(8) Type IV fluid;

(9) mixture of water and Type IV fluid.

De-icing fluid is normally applied heated to ensure maximum efficiency.

(g) 'De-icing/anti-icing': this is the combination of de-icing and anti-icing performed in either one or two steps.

(h) 'Ground ice detection system (GIDS)': system used during aircraft ground operations to inform the personnel involved in the operation and/or the flight crew about the presence of frost, ice, snow or slush on the aircraft surfaces.

(i) 'Lowest operational use temperature (LOUT)': the lowest temperature at which a fluid has been tested and certified as acceptable in accordance with the appropriate aerodynamic acceptance test whilst still maintaining a freezing point buffer of not less than:

(1) 10 °C for a Type I de-icing/anti-icing fluid; or

(2) 7 °C for Type II, III or IV de-icing/anti-icing fluids.

(j) 'Post-treatment check': an external check of the aircraft after de-icing and/or anti-icing treatment accomplished from suitably elevated observation points (e.g. from the de-icing/anti-icing equipment itself or other elevated equipment) to ensure that the aircraft is free from any frost, ice, snow or slush.

(k) 'Pre-take-off check': an assessment normally performed by the flight crew, to validate the applied hold-over time (HoT).

(l) 'Pre-take-off contamination check': a check of the treated surfaces for contamination, performed when the HoT has been exceeded or if any doubt exists regarding the continued effectiveness of the applied anti-icing treatment. It is normally accomplished externally, just before commencement of the take-off run.

ANTI-ICING CODES

(m) The following are examples of anti-icing codes:

(1) 'Type I' at (start time) — to be used if anti-icing treatment has been performed with a Type I fluid;

(2) 'Type II/100' at (start time) — to be used if anti-icing treatment has been performed with undiluted Type II fluid;

(3) 'Type II/75' at (start time) — to be used if anti-icing treatment has been performed with a mixture of 75 % Type II fluid and 25 % water; and

(4) 'Type IV/50' at (start time) — to be used if anti-icing treatment has been performed with a mixture of 50 % Type IV fluid and 50 % water.

(n) When a two-step de-icing/anti-icing operation has been carried out, the anti-icing code should be determined by the second step fluid. Fluid brand names may be included, if desired.

GM2-NCC.OP.180 Ice and other contaminants — ground procedures

DE-ICING/ANTI-ICING — PROCEDURES

(a) De-icing and/or anti-icing procedures should take into account manufacturer's recommendations, including those that are type-specific, and should cover:

(1) contamination checks, including detection of clear ice and under-wing frost; limits on the thickness/area of contamination published in the AFM or other manufacturers' documentation should be followed;

(2) procedures to be followed if de-icing and/or anti-icing procedures are interrupted or unsuccessful;

(3) post-treatment checks;

(4) pre-take-off checks;

(5) pre-take-off contamination checks;

(6) the recording of any incidents relating to de-icing and/or anti-icing; and

(7) the responsibilities of all personnel involved in de-icing and/or anti-icing.

(b) The operator's procedures should ensure the following:

(1) When aircraft surfaces are contaminated by ice, frost, slush or snow, they are de-iced prior to take-off, according to the prevailing conditions. Removal of contaminants may be performed with mechanical tools, fluids (including hot water), infrared heat or forced air, taking account of aircraft type-specific requirements.

(2) Account is taken of the wing skin temperature versus outside air temperature (OAT), as this may affect:

(i) the need to carry out aircraft de-icing and/or anti-icing; and/or

(ii) the performance of the de-icing/anti-icing fluids.

(3) When freezing precipitation occurs or there is a risk of freezing precipitation occurring that would contaminate the surfaces at the time of take-off, aircraft surfaces should be anti-iced. If both de-icing and anti-icing are required, the procedure may be performed in a one or two-step process, depending upon weather conditions, available equipment, available fluids and the desired hold-over time (HoT). One-step de-icing/anti-icing means that de-icing and anti-icing are carried out at the same time, using a mixture of de-icing/anti-icing fluid and water. Two-step de-icing/anti-icing means that de-icing and anti-icing are carried out in two separate steps. The aircraft is first de-iced using heated water only or a heated mixture of de-icing/anti-icing fluid and water. After completion of the de-icing operation a layer of a mixture of de-icing/anti-icing fluid and water, or of de-icing/anti-icing fluid only, is sprayed over the aircraft surfaces. The second step will be applied before the first-step fluid freezes, typically within 3 minutes and, if necessary, area by area.

(4) When an aircraft is anti-iced and a longer HoT is needed/desired, the use of a less diluted Type II or Type IV fluid should be considered.

(5) All restrictions relative to OAT and fluid application (including, but not necessarily limited to, temperature and pressure) published by the fluid manufacturer and/or aircraft manufacturer, are followed and procedures, limitations and recommendations to prevent the formation of fluid residues are followed.

(6) During conditions conducive to aircraft icing on the ground or after de-icing and/or anti-icing, an aircraft is not dispatched for departure unless it has been

given a contamination check or a post-treatment check by a trained and qualified person. This check should cover all treated surfaces of the aircraft and be performed from points offering sufficient accessibility to these parts. To ensure that there is no clear ice on suspect areas, it may be necessary to make a physical check (e.g. tactile).

(7) The required entry is made in the technical log.

(8) The pilot-in-command continually monitors the environmental situation after the performed treatment. Prior to take-off he/she performs a pre-take-off check, which is an assessment of whether the applied HoT is still appropriate. This pre-take-off check includes, but is not limited to, factors such as precipitation, wind and OAT.

(9) If any doubt exists as to whether a deposit may adversely affect the aircraft's performance and/or controllability characteristics, the pilot-in-command should arrange for a pre-take-off contamination check to be performed in order to verify that the aircraft's surfaces are free of contamination. Special methods and/or equipment may be necessary to perform this check, especially at night time or in extremely adverse weather conditions. If this check cannot be performed just before take-off, re-treatment should be applied.

(10) When retreatment is necessary, any residue of the previous treatment should be removed and a completely new de-icing/anti-icing treatment should be applied.

(11) When a ground ice detection system (GIDS) is used to perform an aircraft surfaces check prior to and/or after a treatment, the use of GIDS by suitably trained personnel should be part of the procedure.

(c) Special operational considerations

(1) When using thickened de-icing/anti-icing fluids, the operator should consider a two-step de-icing/anti-icing procedure, the first step preferably with hot water and/or unthickened fluids.

(2) The use of de-icing/anti-icing fluids should be in accordance with the aircraft manufacturer's documentation. This is particularly important for thickened fluids to assure sufficient flow-off during take-off.

(3) The operator should comply with any type-specific operational requirement(s), such as an aircraft mass decrease and/or a take-off speed increase associated with a fluid application.

(4) The operator should take into account any flight handling procedures (stick force, rotation speed and rate, take-off speed, aircraft attitude etc.) laid down by the aircraft manufacturer when associated with a fluid application.

(5) The limitations or handling procedures resulting from (c)(3) and/or (c)(4) should be part of the flight crew pre-take-off briefing.

(d) Communications

(1) Before aircraft treatment. When the aircraft is to be treated with the flight crew on board, the flight and personnel involved in the operation should confirm the fluid to be used, the extent of treatment required and any aircraft

type-specific procedure(s) to be used. Any other information needed to apply the HoT tables should be exchanged.

(2) Anti-icing code. The operator's procedures should include an anti-icing code, which indicates the treatment the aircraft has received. This code provides the flight crew with the minimum details necessary to estimate a HoT and confirms that the aircraft is free of contamination.

(3) After treatment. Before reconfiguring or moving the aircraft, the flight crew should receive a confirmation from the personnel involved in the operation that all de-icing and/or anti-icing operations are complete and that all personnel and equipment are clear of the aircraft.

(e) Hold-over protection

The operator should publish in the operations manual, when required, the HoTs in the form of a table or a diagram, to account for the various types of ground icing conditions and the different types and concentrations of fluids used. However, the times of protection shown in these tables are to be used as guidelines only and are normally used in conjunction with the pre-take-off check.

(f) Training

The operator's initial and recurrent de-icing and/or anti-icing training programmes (including communication training) for flight crew and those of its personnel involved in the operation who are involved in de-icing and/or anti-icing should include additional training if any of the following is introduced:

(1) a new method, procedure and/or technique;

(2) a new type of fluid and/or equipment; or

(3) a new type of aircraft.

(g) Contracting

When the operator contracts training on de-icing/anti-icing, the operator should ensure that the contractor complies with the operator's training/qualification procedures, together with any specific procedures in respect of:

(1) de-icing and/or anti-icing methods and procedures;

(2) fluids to be used, including precautions for storage and preparation for use;

(3) specific aircraft requirements (e.g. no-spray areas, propeller/engine de-icing, auxiliary power unit (APU) operation etc.); and

(4) checking and communications procedures.

(h) Special maintenance considerations

(1) General

The operator should take proper account of the possible side effects of fluid use. Such effects may include, but are not necessarily limited to, dried and/or rehydrated residues, corrosion and the removal of lubricants.

(2) Special considerations regarding residues of dried fluids

The operator should establish procedures to prevent or detect and remove residues of dried fluid. If necessary the operator should establish appropriate inspection

intervals based on the recommendations of the airframe manufacturers and/or the operator's own experience:

(i) Dried fluid residues

Dried fluid residues could occur when surfaces have been treated and the aircraft has not subsequently been flown and has not been subject to precipitation. The fluid may then have dried on the surfaces.

(ii) Rehydrated fluid residues

Repetitive application of thickened de-icing/anti-icing fluids may lead to the subsequent formation/build-up of a dried residue in aerodynamically quiet areas, such as cavities and gaps. This residue may rehydrate if exposed to high humidity conditions, precipitation, washing, etc., and increase to many times its original size/volume. This residue will freeze if exposed to conditions at or below 0 °C. This may cause moving parts, such as elevators, ailerons, and flap actuating mechanisms to stiffen or jam in-flight. Rehydrated residues may also form on exterior surfaces, which can reduce lift, increase drag and stall speed. Rehydrated residues may also collect inside control surface structures and cause clogging of drain holes or imbalances to flight controls. Residues may also collect in hidden areas, such as around flight control hinges, pulleys, grommets, on cables and in gaps.

(iii) Operators are strongly recommended to obtain information about the fluid dry-out and rehydration characteristics from the fluid manufacturers and to select products with optimised characteristics.

(iv) Additional information should be obtained from fluid manufacturers for handling, storage, application and testing of their products.

GM3-NCC.OP.180 Ice and other contaminants — ground procedures

DE-ICING/ANTI-ICING — BACKGROUND INFORMATION

Further guidance material on this issue is given in the ICAO Manual of Aircraft Ground De-icing/Anti-icing Operations (Doc 9640) (hereinafter referred to as the ICAO Manual of Aircraft Ground De-icing/Anti-icing Operations).

(a) General

(1) Any deposit of frost, ice, snow or slush on the external surfaces of an aircraft may drastically affect its flying qualities because of reduced aerodynamic lift, increased drag, modified stability and control characteristics. Furthermore, freezing deposits may cause moving parts, such as elevators, ailerons, flap actuating mechanism etc., to jam and create a potentially hazardous condition. Propeller/engine/APU/systems performance may deteriorate due to the presence of frozen contaminants on blades, intakes and components. Also, engine operation may be seriously affected by the ingestion of snow or ice, thereby causing engine stall or compressor damage. In addition, ice/frost may form on certain external surfaces (e.g. wing upper and lower surfaces, etc.) due to the effects of cold fuel/structures, even in ambient temperatures well above 0 °C.

(2) Procedures established by the operator for de-icing and/or anti-icing are intended to ensure that the aircraft is clear of contamination so that degradation of aerodynamic characteristics or mechanical interference will not occur and, following anti-icing, to maintain the airframe in that condition during the appropriate HoT.

(3) Under certain meteorological conditions, de-icing and/or anti-icing procedures may be ineffective in providing sufficient protection for continued operations. Examples of these conditions are freezing rain, ice pellets and hail, heavy snow, high wind velocity, fast dropping OAT or any time when freezing precipitation with high water content is present. No HoT guidelines exist for these conditions.

(4) Material for establishing operational procedures can be found, for example, in:

(i) ICAO Annex 3, Meteorological Service for International Air Navigation;

(ii) ICAO Manual of Aircraft Ground De-icing/Anti-icing Operations;

(iii) International Organization for Standardization (ISO) 11075 Aircraft — De-icing/anti-icing fluids — ISO type I;

(iv) ISO 11076 Aircraft — De-icing/anti-icing methods with fluids;

(v) ISO 11077 Aerospace — Self-propelled de-icing/anti-icing vehicles — Functional requirements;

(vi) ISO 11078 Aircraft — De-icing/anti-icing fluids — ISO types II, III and IV;

(vii) Association of European Airlines (AEA) 'Recommendations for de-icing/anti-icing of aircraft on the ground';

(viii) AEA 'Training recommendations and background information for de-icing/anti-icing of aircraft on the ground';

(ix) EUROCAE ED-104A Minimum Operational Performance Specification for Ground Ice Detection Systems;

(x) Society of Automotive Engineers (SAE) AS5681 Minimum Operational Performance Specification for Remote On-Ground Ice Detection Systems;

(xi) SAE ARP4737 Aircraft — De-icing/anti-icing methods;

(xii) SAE AMS1424 De-icing/anti-Icing Fluid, Aircraft, SAE Type I;

(xiii) SAE AMS1428 Fluid, Aircraft De-icing/anti-icing, Non-Newtonian, (Pseudoplastic), SAE Types II, III, and IV;

(xiv) SAE ARP1971 Aircraft De-icing Vehicle — Self-Propelled, Large and Small Capacity;

(xv) SAE ARP5149 Training Programme Guidelines for De-icing/anti-icing of Aircraft on Ground; and

(xvi) ARP5646 Quality Program Guidelines for De-icing/anti-icing of Aircraft on the Ground.

(b) Fluids

(1) Type I fluid: Due to its properties, Type I fluid forms a thin, liquid-wetting film on surfaces to which it is applied which, under certain weather conditions, gives a very limited HoT. With this type of fluid, increasing the concentration of fluid in the fluid/water mix does not provide any extension in HoT.

(2) Type II and Type IV fluids contain thickeners that enable the fluid to form a thicker liquid-wetting film on surfaces to which it is applied. Generally, this fluid provides a longer HoT than Type I fluids in similar conditions. With this type of fluid, the HoT can be extended by increasing the ratio of fluid in the fluid/water mix.

(3) Type III fluid is a thickened fluid especially intended for use on aircraft with low rotation speeds.

(4) Fluids used for de-icing and/or anti-icing should be acceptable to the operator and the aircraft manufacturer. These fluids normally conform to specifications such as SAE AMS1424, SAE AMS1428 or equivalent. Use of non-conforming fluids is not recommended due to their characteristics being unknown. The anti-icing and aerodynamic properties of thickened fluids may be seriously degraded by, for example, inappropriate storage, treatment, application, application equipment and age.

(c) Hold-over protection

(1) Hold-over protection is achieved by a layer of anti-icing fluid remaining on and protecting aircraft surfaces for a period of time. With a one-step de-icing/anti-icing procedure, the HoT begins at the commencement of de-icing/anti-icing. With a two-step procedure, the HoT begins at the commencement of the second (anti-icing) step. The hold-over protection runs out:

(i) at the commencement of the take-off roll (due to aerodynamic shedding of fluid); or

(ii) when frozen deposits start to form or accumulate on treated aircraft surfaces, thereby indicating the loss of effectiveness of the fluid.

(2) The duration of hold-over protection may vary depending on the influence of factors other than those specified in the HoT tables. Guidance should be provided by the operator to take account of such factors, which may include:

(i) atmospheric conditions, e.g. exact type and rate of precipitation, wind direction and velocity, relative humidity and solar radiation; and

(ii) the aircraft and its surroundings, such as aircraft component inclination angle, contour and surface roughness, surface temperature, operation in close proximity to other aircraft (jet or propeller blast) and ground equipment and structures.

(3) HoTs are not meant to imply that flight is safe in the prevailing conditions if the specified HoT has not been exceeded. Certain meteorological conditions, such as freezing drizzle or freezing rain, may be beyond the certification envelope of the aircraft.

(4) References to usable HoT tables may be found in the AEA 'Recommendations for de-icing/anti-icing of aircraft on the ground'.

AMC1-SPO.OP.181 Ice and other contaminants — flight procedures

FLIGHT IN EXPECTED OR ACTUAL ICING CONDITIONS

(a) The procedures to be established by the operator should take account of the design, the equipment, the configuration of the aircraft and the necessary training. For these reasons, different aircraft types operated by the same company may require the development of different procedures. In every case the relevant limitations are those that are defined in the AFM and other documents produced by the manufacturer.

(b) The operator should ensure that the procedures take account of the following:

(1) the equipment and instruments that should be serviceable for flight in icing conditions;

(2) the limitations on flight in icing conditions for each phase of flight. These limitations may be imposed by the aircraft's de-icing or anti-icing equipment or the necessary performance corrections that have to be made;

(3) the criteria the flight crew should use to assess the effect of icing on the performance and/or controllability of the aircraft;

(4) the means by which the flight crew detects, by visual cues or the use of the aircraft's ice detection system, that the flight is entering icing conditions; and

(5) the action to be taken by the flight crew in a deteriorating situation (which may develop rapidly) resulting in an adverse effect on the performance and/or controllability of the aircraft, due to:

(i) the failure of the aircraft's anti-icing or de-icing equipment to control a build-up of ice; and/or

(ii) ice build-up on unprotected areas.

(c) Training for dispatch and flight in expected or actual icing conditions. The content of the operations manual should reflect the training, both conversion and recurrent, that flight crew and all other relevant operational personnel require in order to comply with the procedures for dispatch and flight in icing conditions:

(1) For the flight crew, the training should include:

(i) instruction on how to recognise, from weather reports or forecasts that are available before flight commences or during flight, the risks of encountering icing conditions along the planned route and on how to modify, as necessary, the departure and in-flight routes or profiles;

(ii) instruction on the operational and performance limitations or margins;

(iii) the use of in-flight ice detection, anti-icing and de-icing systems in both normal and abnormal operation; and

(iv) instruction on the differing intensities and forms of ice accretion and the consequent action which should be taken.

GM1-SPO.OP.181(c) Ice and other contaminants – flight procedures

KNOWN ICING CONDITIONS - OPERATIONS WITH OTHER-THAN-COMPLEX MOTOR-POWERED AIRCRAFT

Known icing conditions are conditions where actual ice is observed visually to be on the aircraft by the pilot or identified by on-board sensors.

GM1-SPO.OP.205 Ground proximity detection

GUIDANCE MATERIAL FOR TERRAIN AWARENESS WARNING SYSTEM (TAWS) FLIGHT CREW TRAINING PROGRAMMES

(a) Introduction

(1) This GM contains performance-based training objectives for TAWS flight crew training.

(2) The training objectives cover five areas: theory of operation; pre-flight operations; general in-flight operations; response to TAWS cautions; response to TAWS warnings.

(3) The term 'TAWS' in this GM means a ground proximity warning system (GPWS) enhanced by a forward-looking terrain avoidance function. Alerts include both cautions and warnings.

(4) The content of this GM is intended to assist operators who are producing training programmes. The information it contains has not been tailored to any specific aircraft or TAWS equipment, but highlights features that are typically available where such systems are installed. It is the responsibility of the individual operator to determine the applicability of the content of this Guidance Material to each aircraft and TAWS equipment installed and their operation. Operators should refer to the AFM and/or aircraft/flight crew operating manual (A/FCOM), or similar documents, for information applicable to specific configurations. If there should be any conflict between the content of this Guidance Material and that published in the other documents described above, then information contained in the AFM or A/FCOM will take precedence.

(b) Scope

(1) The scope of this GM is designed to identify training objectives in the areas of: academic training; manoeuvre training; initial evaluation; recurrent qualification. Under each of these four areas, the training material has been separated into those items that are considered essential training items and those that are considered to be desirable. In each area, objectives and acceptable performance criteria are defined.

(2) No attempt is made to define how the training programme should be implemented. Instead, objectives are established to define the knowledge that a pilot operating a TAWS is expected to possess and the performance expected from a pilot who has completed TAWS training. However, the guidelines do indicate those areas in which the pilot receiving the training should demonstrate his/her understanding, or performance, using a real-time,

interactive training device, i.e. a flight simulator. Where appropriate, notes are included within the performance criteria that amplify or clarify the material addressed by the training objective.

(c) Performance-based training objectives

(1) TAWS academic training

(i) This training is typically conducted in a classroom environment. The knowledge demonstrations specified in this section may be completed through the successful completion of written tests or by providing correct responses to non-real-time computer-based training (CBT) questions.

(ii) Theory of operation. The pilot should demonstrate an understanding of TAWS operation and the criteria used for issuing cautions and warnings. This training should address system operation. Objective: to demonstrate knowledge of how a TAWS functions. Criteria: the pilot should demonstrate an understanding of the following functions:

(A) Surveillance

(a) The GPWS computer processes data supplied from an air data computer, a radio altimeter, an instrument landing system (ILS)/microwave landing system (MLS)/multi-mode (MM) receiver, a roll attitude sensor, and actual position of the surfaces and of the landing gear.

(b) The forward looking terrain avoidance function utilises an accurate source of known aircraft position, such as that which may be provided by a flight management system (FMS) or global positioning system (GPS), or an electronic terrain database. The source and scope of the terrain, obstacle and airport data, and features such as the terrain clearance floor, the runway picker, and geometric altitude (where provided), should all be described.

(c) Displays required to deliver TAWS outputs include a loudspeaker for voice announcements, visual alerts (typically amber and red lights) and a terrain awareness display (that may be combined with other displays). In addition, means should be provided for indicating the status of the TAWS and any partial or total failures that may occur.

(B) Terrain avoidance. Outputs from the TAWS computer provide visual and audio synthetic voice cautions and warnings to alert the flight crew about potential conflicts with terrain and obstacles.

(C) Alert thresholds. Objective: to demonstrate knowledge of the criteria for issuing cautions and warnings. Criteria: the pilot should be able to demonstrate an understanding of the methodology used by a TAWS to issue cautions and alerts and the general criteria for the issuance of these alerts, including:

(a) basic GPWS alerting modes specified in the ICAO standard:

Mode 1: excessive sink rate;

Mode 2: excessive terrain closure rate;

Mode 3: descent after take-off or missed approach;

Mode 4: unsafe proximity to terrain; and

Mode 5: descent below ILS glide slope (caution only);

(b) an additional, optional alert mode:

Mode 6: radio altitude call-out (information only); and

(c) TAWS cautions and warnings that alert the flight crew to obstacles and terrain ahead of the aircraft in line with or adjacent to its projected flight path (forward-looking terrain avoidance (FLTA) and premature descent alert (PDA) functions).

(D) TAWS limitations. Objective: to verify that the pilot is aware of the limitations of TAWS. Criteria: the pilot should demonstrate knowledge and an understanding of TAWS limitations identified by the manufacturer for the equipment model installed, such as:

(a) navigation should not be predicated on the use of the terrain display;

(b) unless geometric altitude data is provided, use of predictive TAWS functions is prohibited when altimeter subscale settings display 'QFE' (atmospheric pressure at aerodrome elevation/runway threshold);

(c) nuisance alerts can be issued if the aerodrome of intended landing is not included in the TAWS airport database;

(d) in cold weather operations, corrective procedures should be implemented by the pilot unless the TAWS has in-built compensation, such as geometric altitude data;

(e) loss of input data to the TAWS computer could result in partial or total loss of functionality. Where means exist to inform the flight crew that functionality has been degraded, this should be known and the consequences understood;

(f) radio signals not associated with the intended flight profile (e.g. ILS glide path transmissions from an adjacent runway) may cause false alerts;

(g) inaccurate or low accuracy aircraft position data could lead to false or non-annunciation of terrain or obstacles ahead of the aircraft; and

(h) minimum equipment list (MEL) restrictions should be applied in the event of the TAWS becoming partially or completely unserviceable. (It should be noted that basic GPWS has no forward-looking capability.)

(E) TAWS inhibits. Objective: to verify that the pilot is aware of the conditions under which certain functions of a TAWS are inhibited. Criteria: the pilot should demonstrate knowledge and an understanding of the various TAWS inhibits, including means of the following:

(a) silencing voice alerts;

(b) inhibiting ILS glide path signals (as may be required when executing an ILS back beam approach);

(c) inhibiting flap position sensors (as may be required when executing an approach with the flaps not in a normal position for landing);

(d) inhibiting the FLTA and PDA functions; and

(e) selecting or deselecting the display of terrain information, together with appropriate annunciation of the status of each selection.

(2) Operating procedures. The pilot should demonstrate the knowledge required to operate TAWS avionics and to interpret the information presented by a TAWS. This training should address the following topics:

(i) Use of controls. Objective: to verify that the pilot can properly operate all TAWS controls and inhibits. Criteria: the pilot should demonstrate the proper use of controls, including the means by which:

(A) before flight, any equipment self-test functions can be initiated;

(B) TAWS information can be selected for display; and

(C) all TAWS inhibits can be operated and what the consequent annunciations mean with regard to loss of functionality.

(ii) Display interpretation. Objective: to verify that the pilot understands the meaning of all information that can be annunciated or displayed by a TAWS. Criteria: the pilot should demonstrate the ability to properly interpret information annunciated or displayed by a TAWS, including the following:

(A) knowledge of all visual and aural indications that may be seen or heard;

(B) response required on receipt of a caution;

(C) response required on receipt of a warning; and

(D) response required on receipt of a notification that partial or total failure of the TAWS has occurred (including annunciation that the present aircraft position is of low accuracy).

(iii) Use of basic GPWS or use of the FLTA function only. Objective: to verify that the pilot understands what functionality will remain following loss of the GPWS or of the FLTA function. Criteria: the pilot should demonstrate knowledge of how to recognise un-commanded loss of the:

(A) GPWS function, or how to isolate this function and how to recognise the level of the remaining controlled flight into terrain (CFIT) protection (essentially, this is the FLTA function); and

(B) FLTA function, or how to isolate this function and how to recognise the level of the remaining CFIT protection (essentially, this is the basic GPWS).

(iv) Crew co-ordination. Objective: to verify that the pilot adequately briefs other flight crew members on how TAWS alerts will be handled. Criteria: the pilot should demonstrate that the pre-flight briefing addresses procedures that will be used in preparation for responding to TAWS cautions and warnings, including the following:

(A) the action to be taken, and by whom, in the event that a TAWS caution and/or warning is issued; and

(B) how multi-function displays will be used to depict TAWS information at take-off, in the cruise and for the descent, approach, landing (and any missed approach). This will be in accordance with procedures specified by the operator, who will recognise that it may be more desirable that other data is displayed at certain phases of flight and that the terrain display has an automatic 'pop-up' mode in the event that an alert is issued.

(v) Reporting requirements. Objective: to verify that the pilot is aware of the requirements for reporting alerts to the controller and other authorities. Criteria: the pilot should demonstrate knowledge of the following:

(A) when, following recovery from a TAWS alert or caution, a transmission of information should be made to the appropriate ATC unit; and

(B) the type of written report that is required, how it is to be compiled and whether any cross reference should be made in the aircraft technical log and/or voyage report (in accordance with procedures specified by the operator), following a flight in which the aircraft flight path has been modified in response to a TAWS alert, or if any part of the equipment appears not to have functioned correctly.

(vi) Alert thresholds. Objective: to demonstrate knowledge of the criteria for issuing cautions and warnings. Criteria: the pilot should be able to demonstrate an understanding of the methodology used by a TAWS to issue cautions and warnings and the general criteria for the issuance of these alerts, including awareness of the following:

(A) modes associated with basic GPWS, including the input data associated with each; and

(B) visual and aural annunciations that can be issued by TAWS and how to identify which are cautions and which are warnings.

(3) TAWS manoeuvre training. The pilot should demonstrate the knowledge required to respond correctly to TAWS cautions and warnings. This training should address the following topics:

(i) Response to cautions:

(A) Objective: to verify that the pilot properly interprets and responds to cautions. Criteria: the pilot should demonstrate an understanding of the need, without delay:

(a) to initiate action required to correct the condition that has caused the TAWS to issue the caution and to be prepared to respond to a warning, if this should follow; and

(b) if a warning does not follow the caution, to notify the controller of the new position, heading and/or altitude/flight level of the aircraft, and what the pilot-in-command intends to do next.

(B) The correct response to a caution might require the pilot:

(a) to reduce a rate of descent and/or to initiate a climb;

(b) to regain an ILS glide path from below, or to inhibit a glide path signal if an ILS is not being flown;

(c) to select more flap, or to inhibit a flap sensor if the landing is being conducted with the intent that the normal flap setting will not be used;

(d) to select gear down; and/or

(e) to initiate a turn away from the terrain or obstacle ahead and towards an area free of such obstructions if a forward-looking terrain display indicates that this would be a good solution and the entire manoeuvre can be carried out in clear visual conditions.

(ii) Response to warnings. Objective: to verify that the pilot properly interprets and responds to warnings. Criteria: the pilot should demonstrate an understanding of the following:

(A) The need, without delay, to initiate a climb in the manner specified by the operator.

(B) The need, without delay, to maintain the climb until visual verification can be made that the aircraft will clear the terrain or obstacle ahead or until above the appropriate sector safe altitude (if certain about the location of the aircraft with respect to terrain) even if the TAWS warning stops. If, subsequently, the aircraft climbs up through the sector safe altitude, but the visibility does not allow the flight crew to confirm that the terrain hazard has ended, checks should be made to verify the location of the aircraft and to confirm that the altimeter subscale settings are correct.

(C) When workload permits, that the flight crew should notify the air traffic controller of the new position and altitude/flight level and what the pilot-in-command intends to do next.

(D) That the manner in which the climb is made should reflect the type of aircraft and the method specified by the aircraft manufacturer (which should be reflected in the operations manual) for performing the escape manoeuvre. Essential aspects will include the need for an increase in pitch attitude, selection of maximum thrust, confirmation that external sources of drag (e.g. spoilers/speed brakes) are retracted and respect of the stick shaker or other indication of eroded stall margin.

(E) That TAWS warnings should never be ignored. However, the pilot's response may be limited to that which is appropriate for a caution, only if:

(a) the aircraft is being operated by day in clear, visual conditions; and

(b) it is immediately clear to the pilot that the aircraft is in no danger in respect of its configuration, proximity to terrain or current flight path.

(4) TAWS initial evaluation:

(i) The flight crew member's understanding of the academic training items should be assessed by means of a written test.

(ii) The flight crew member's understanding of the manoeuvre training items should be assessed in a flight simulation training device (FSTD) equipped with TAWS visual and aural displays and inhibit selectors similar in appearance and operation to those in the aircraft that the pilot will fly. The results should be assessed by a flight simulation training instructor, synthetic flight examiner, type rating instructor or type rating examiner.

(iii) The range of scenarios should be designed to give confidence that proper and timely responses to TAWS cautions and warnings will result in the aircraft avoiding a CFIT accident. To achieve this objective, the pilot should demonstrate taking the correct action to prevent a caution developing into a warning and, separately, the escape manoeuvre needed in response to a warning. These demonstrations should take place when the external visibility is zero, though there is much to be learnt if, initially, the training is given in 'mountainous' or 'hilly' terrain with clear visibility. This training should comprise a sequence of scenarios, rather than be included in line orientated flight training (LOFT).

(iv) A record should be made, after the pilot has demonstrated competence, of the scenarios that were practised.

(5) TAWS recurrent training:

(i) TAWS recurrent training ensures that pilots maintain the appropriate TAWS knowledge and skills. In particular, it reminds pilots of the need to

act promptly in response to cautions and warnings and of the unusual attitude associated with flying the escape manoeuvre.

(ii) An essential item of recurrent training is the discussion of any significant issues and operational concerns that have been identified by the operator. Recurrent training should also address changes to TAWS logic, parameters or procedures and to any unique TAWS characteristics of which pilots should be aware.

(6) Reporting procedures:

(i) Verbal reports. Verbal reports should be made promptly to the appropriate ATC unit:

(A) whenever any manoeuvre has caused the aircraft to deviate from an air traffic clearance;

(B) when, following a manoeuvre that has caused the aircraft to deviate from an air traffic clearance, the aircraft has returned to a flight path that complies with the clearance; and/or

(C) when an air traffic control unit issues instructions that, if followed, would cause the pilot to manoeuvre the aircraft towards terrain or obstacle or it would appear from the display that a potential CFIT occurrence is likely to result.

(ii) Written reports. Written reports should be submitted in accordance with the operator's occurrence reporting scheme and they also should be recorded in the aircraft technical log:

(A) whenever the aircraft flight path has been modified in response to a TAWS alert (false, nuisance or genuine);

(B) whenever a TAWS alert has been issued and is believed to have been false; and/or

(C) if it is believed that a TAWS alert should have been issued, but was not.

(iii) Within this GM, and with regard to reports:

(A) the term 'false' means that the TAWS issued an alert that could not possibly be justified by the position of the aircraft in respect to terrain and it is probable that a fault or failure in the system (equipment and/or input data) was the cause;

(B) the term 'nuisance' means that the TAWS issued an alert that was appropriate, but was not needed because the flight crew could determine by independent means that the flight path was, at that time, safe;

(C) the term 'genuine' means that the TAWS issued an alert that was both appropriate and necessary.

The report terms described in 3.f.iii are only meant to be assessed after the occurrence is over, to facilitate subsequent analysis, the adequacy of the equipment and the programmes it contains. The intention is not for the flight crew to attempt to classify an alert into any of these three

categories when visual and/or aural cautions or warnings are annunciated.

GM1-SPO.OP.210 Use of airborne collision avoidance system (ACAS) II – complex motor-powered aeroplanes and GM1-SPO.OP.211 Use of airborne collision avoidance system (ACAS) II – complex motor-powered helicopters

GENERAL

(a) The ACAS operational procedures and training programmes established by the operator should take into account this Guidance Material. It incorporates advice contained in:

(1) ICAO Annex 10, Volume IV;

(2) ICAO PANS-OPS, Volume 1;

(3) ICAO PANS-ATM; and

(4) ICAO guidance material 'ACAS Performance-Based Training Objectives' (published under Attachment E of State Letter AN 7/1.3.7.2-97/77).

(b) Additional guidance material on ACAS may be referred to, including information available from such sources as EUROCONTROL.

ACAS FLIGHT CREW TRAINING

(a) During the implementation of ACAS, several operational issues were identified that had been attributed to deficiencies in flight crew training programmes. As a result, the issue of flight crew training has been discussed within the ICAO, which has developed guidelines for operators to use when designing training programmes.

(b) This Guidance Material contains performance-based training objectives for ACAS II flight crew training. Information contained here related to traffic advisories (TAs) is also applicable to ACAS I and ACAS III users. The training objectives cover five areas: theory of operation; pre-flight operations; general in-flight operations; response to TAs; and response to resolution advisories (RAs).

(c) The information provided is valid for version 7 and 7.1 (ACAS II). Where differences arise, these are identified.

(d) The performance-based training objectives are further divided into the areas of: academic training; manoeuvre training; initial evaluation and recurrent qualification. Under each of these four areas, the training material has been separated into those items which are considered essential training items and those which are considered desirable. In each area, objectives and acceptable performance criteria are defined.

(e) ACAS academic training

(1) This training is typically conducted in a classroom environment. The knowledge demonstrations specified in this section may be completed through the successful completion of written tests or through providing correct responses to non-real-time computer-based training (CBT) questions.

(2) Essential items

(i) Theory of operation. The flight crew member should demonstrate an understanding of ACAS II operation and the criteria used for issuing TAs and RAs. This training should address the following topics:

(A) System operation

Objective: to demonstrate knowledge of how ACAS functions.

Criteria: the flight crew member should demonstrate an understanding of the following functions:

(a) Surveillance

(1) ACAS interrogates other transponder-equipped aircraft within a nominal range of 14 NM.

(2) ACAS surveillance range can be reduced in geographic areas with a large number of ground interrogators and/or ACAS II-equipped aircraft.

(3) If the operator's ACAS implementation provides for the use of the Mode S extended squitter, the normal surveillance range may be increased beyond the nominal 14 NM. However, this information is not used for collision avoidance purposes.

(b) Collision avoidance

(1) TAs can be issued against any transponder-equipped aircraft that responds to the ICAO Mode C interrogations, even if the aircraft does not have altitude reporting capability.

(2) RAs can be issued only against aircraft that are reporting altitude and in the vertical plane only.

(3) RAs issued against an ACAS-equipped intruder are co-ordinated to ensure complementary RAs are issued.

(4) Failure to respond to an RA deprives own aircraft of the collision protection provided by own ACAS.

(5) Additionally, in ACAS-ACAS encounters, it also restricts the choices available to the other aircraft's ACAS and thus renders the other aircraft's ACAS less effective than if own aircraft were not ACAS equipped.

(B) Advisory thresholds

Objective: to demonstrate knowledge of the criteria for issuing TAs and RAs.

Criteria: the flight crew member should demonstrate an understanding of the methodology used by ACAS to issue TAs and RAs and the general criteria for the issuance of these advisories, including the following:

(a) ACAS advisories are based on time to closest point of approach (CPA) rather than distance. The time should be short and vertical separation should be small, or projected to be small, before an advisory can be issued. The separation standards provided by ATS are different from the miss distances against which ACAS issues alerts.

(b) Thresholds for issuing a TA or an RA vary with altitude. The thresholds are larger at higher altitudes.

(c) A TA occurs from 15 to 48 seconds and an RA from 15 to 35 seconds before the projected CPA.

(d) RAs are chosen to provide the desired vertical miss distance at CPA. As a result, RAs can instruct a climb or descent through the intruder aircraft's altitude.

(C) ACAS limitations

Objective: to verify that the flight crew member is aware of the limitations of ACAS.

Criteria: the flight crew member should demonstrate knowledge and understanding of ACAS limitations, including the following:

(a) ACAS will neither track nor display non-transponder-equipped aircraft, nor aircraft not responding to ACAS Mode C interrogations.

(b) ACAS will automatically fail if the input from the aircraft’s barometric altimeter, radio altimeter or transponder is lost.

(1) In some installations, the loss of information from other on board systems such as an inertial reference system (IRS) or attitude heading reference system (AHRS) may result in an ACAS failure. Individual operators should ensure that their flight crews are aware of the types of failure which will result in an ACAS failure.

(2) ACAS may react in an improper manner when false altitude information is provided to own ACAS or transmitted by another aircraft. Individual operators should ensure that their flight crew are aware of the types of unsafe conditions which can arise. Flight crew members should ensure that when they are advised, if their own aircraft is transmitting false altitude reports, an alternative altitude reporting source is selected, or altitude reporting is switched off.

(c) Some aeroplanes within 380 ft above ground level (AGL) (nominal value) are deemed to be ‘on ground’ and will not be displayed. If ACAS is able to determine an aircraft below this altitude is airborne, it will be displayed.

(d) ACAS may not display all proximate transponder-equipped aircraft in areas of high density traffic.

(e) The bearing displayed by ACAS is not sufficiently accurate to support the initiation of horizontal manoeuvres based solely on the traffic display.

(f) ACAS will neither track nor display intruders with a vertical speed in excess of 10 000 ft/min. In addition, the design implementation may result in some short-term errors in the tracked vertical speed of an intruder during periods of high vertical acceleration by the intruder.

(g) Ground proximity warning systems/ground collision avoidance systems (GPWSs/GCASs) warnings and wind shear warnings take precedence over ACAS advisories. When either a GPWS/GCAS or wind shear warning is active, ACAS aural annunciations will be inhibited and ACAS will automatically switch to the 'TA only' mode of operation.

(D) ACAS inhibits

Objective: to verify that the flight crew member is aware of the conditions under which certain functions of ACAS are inhibited.

Criteria: the flight crew member should demonstrate knowledge and understanding of the various ACAS inhibits, including the following:

(a) 'Increase Descent' RAs are inhibited below 1 450 ft AGL.

(b) 'Descend' RAs are inhibited below 1 100 ft AGL.

(c) All RAs are inhibited below 1 000 ft AGL.

(d) All TA aural annunciations are inhibited below 500 ft AGL.

(e) Altitude and configuration under which 'Climb' and 'Increase Climb' RAs are inhibited. ACAS can still issue 'Climb' and 'Increase Climb' RAs when operating at the aeroplane's certified ceiling. (In some aircraft types, 'Climb' or 'Increase Climb' RAs are never inhibited.)

(ii) Operating procedures

The flight crew member should demonstrate the knowledge required to operate the ACAS avionics and interpret the information presented by ACAS. This training should address the following:

(A) Use of controls

Objective: to verify that the pilot can properly operate all ACAS and display controls.

Criteria: demonstrate the proper use of controls including the following:

(a) Aircraft configuration required to initiate a self-test.

(b) Steps required to initiate a self-test.

(c) Recognising when the self-test was successful and when it was unsuccessful. When the self-test is unsuccessful, recognising the reason for the failure and, if possible, correcting the problem.

(d) Recommended usage of range selection. Low ranges are used in the terminal area and the higher display ranges are used in the en-route environment and in the transition between the terminal and en-route environment.

(e) Recognising that the configuration of the display does not affect the ACAS surveillance volume.

(f) Selection of lower ranges when an advisory is issued, to increase display resolution.

(g) Proper configuration to display the appropriate ACAS information without eliminating the display of other needed information.

(h) If available, recommended usage of the above/below mode selector. The above mode should be used during climb and the below mode should be used during descent.

(i) If available, proper selection of the display of absolute or relative altitude and the limitations of using this display if a barometric correction is not provided to ACAS.

(B) Display interpretation

Objective: to verify that the flight crew member understands the meaning of all information that can be displayed by ACAS. The wide variety of display implementations require the tailoring of some criteria. When the training programme is developed, these criteria should be expanded to cover details for the operator's specific display implementation.

Criteria: the flight crew member should demonstrate the ability to properly interpret information displayed by ACAS, including the following:

(a) Other traffic, i.e. traffic within the selected display range that is not proximate traffic, or causing a TA or RA to be issued.

(b) Proximate traffic, i.e. traffic that is within 6 NM and ± 1 200 ft.

(c) Non-altitude reporting traffic.

(d) No bearing TAs and RAs.

(e) Off-scale TAs and RAs: the selected range should be changed to ensure that all available information on the intruder is displayed.

(f) TAs: the minimum available display range that allows the traffic to be displayed should be selected, to provide the maximum display resolution.

(g) RAs (traffic display): the minimum available display range of the traffic display that allows the traffic to be displayed should be selected, to provide the maximum display resolution.

(h) RAs (RA display): flight crew members should demonstrate knowledge of the meaning of the red and green areas or the meaning of pitch or flight path angle cues displayed on the RA display. Flight crew members should also demonstrate an understanding of the RA display limitations, i.e. if a vertical speed tape is used and the range of the tape is less than 2 500 ft/min, an increase rate RA cannot be properly displayed.

(i) If appropriate, awareness that navigation displays oriented on 'Track-Up' may require a flight crew member to make a mental adjustment for drift angle when assessing the bearing of proximate traffic.

(C) Use of the TA only mode

Objective: to verify that a flight crew member understands the appropriate times to select the TA only mode of operation and the limitations associated with using this mode.

Criteria: the flight crew member should demonstrate the following:

(a) Knowledge of the operator's guidance for the use of TA only.

(b) Reasons for using this mode. If TA only is not selected when an airport is conducting simultaneous operations from parallel runways separated by less than 1 200 ft, and to some intersecting runways, RAs can be expected. If for any reason TA only is not selected and an RA is received in these situations, the response should comply with the operator's approved procedures.

(c) All TA aural annunciations are inhibited below 500 ft AGL. As a result, TAs issued below 500 ft AGL may not be noticed unless the TA display is included in the routine instrument scan.

(D) Crew coordination

Objective: to verify that the flight crew member understands how ACAS advisories will be handled.

Criteria: the flight crew member should demonstrate knowledge of the crew procedures that should be used when responding to TAs and RAs, including the following:

(a) task sharing between the pilot flying and the pilot monitoring;

(b) expected call-outs; and

(c) communications with ATC.

(E) Phraseology requirements

Objective: to verify that the flight crew member is aware of the requirements for reporting RAs to the controller.

Criteria: the flight crew member should demonstrate the following:

(a) the use of the phraseology contained in ICAO PANS-OPS;

(b) an understanding of the procedures contained in ICAO PANS-ATM and ICAO Annex 2; and

(c) the understanding that verbal reports should be made promptly to the appropriate ATC unit:

(1) whenever any manoeuvre has caused the aeroplane to deviate from an air traffic clearance;

(2) when, subsequent to a manoeuvre that has caused the aeroplane to deviate from an air traffic clearance, the aeroplane has returned to a flight path that complies with the clearance; and/or

(3) when air traffic issue instructions that, if followed, would cause the crew to manoeuvre the aircraft contrary to an RA with which they are complying.

(F) Reporting requirements

Objective: to verify that the flight crew member is aware of the requirements for reporting RAs to the operator.

Criteria: the flight crew member should demonstrate knowledge of where information can be obtained regarding the need for making written reports to various States when an RA is issued. Various States have different reporting requirements and the material available to the flight crew member should be tailored to the operator's operating environment. This responsibility is satisfied by the flight crew member reporting to the operator according to the applicable reporting requirements.

(3) Non-essential items: advisory thresholds

Objective: to demonstrate knowledge of the criteria for issuing TAs and RAs.

Criteria: the flight crew member should demonstrate an understanding of the methodology used by ACAS to issue TAs and RAs and the general criteria for the issuance of these advisories, including the following:

(i) The minimum and maximum altitudes below/above which TAs will not be issued.

(ii) When the vertical separation at CPA is projected to be less than the ACAS-desired separation, a corrective RA that requires a change to the existing vertical speed will be issued. This separation varies from 300 ft at low altitude to a maximum of 700 ft at high altitude.

(iii) When the vertical separation at CPA is projected to be just outside the ACAS-desired separation, a preventive RA that does not require a change to the existing vertical speed will be issued. This separation varies from 600 to 800 ft.

(iv) RA fixed range thresholds vary between 0.2 and 1.1 NM.

(f) ACAS manoeuvre training

(1) Demonstration of the flight crew member's ability to use ACAS displayed information to properly respond to TAs and RAs should be carried out in a full flight simulator equipped with an ACAS display and controls similar in appearance and operation to those in the aircraft. If a full flight simulator is utilised, crew resource management (CRM) should be practised during this training.

(2) Alternatively, the required demonstrations can be carried out by means of an interactive CBT with an ACAS display and controls similar in appearance and operation to those in the aircraft. This interactive CBT should depict scenarios in which real-time responses should be made. The flight crew member should be informed whether or not the responses made were correct. If the response was incorrect or inappropriate, the CBT should show what the correct response should be.

(3) The scenarios included in the manoeuvre training should include: corrective RAs; initial preventive RAs; maintain rate RAs; altitude crossing RAs; increase rate RAs; RA reversals; weakening RAs; and multi-aircraft encounters. The consequences of failure to respond correctly should be demonstrated by reference to actual incidents such as those publicised in EUROCONROL ACAS II 'safety flash' Bulletins.

(i) TA responses

Objective: to verify that the pilot properly interprets and responds to TAs.

Criteria: the pilot should demonstrate the following:

(A) Proper division of responsibilities between the pilot flying and the pilot monitoring. The pilot flying should fly the aircraft using any type-specific procedures and be prepared to respond to any RA that might follow. For aircraft without an RA pitch display, the pilot flying should consider the likely magnitude of an appropriate pitch change. The pilot monitoring should provide updates on the traffic location shown on the ACAS display, using this information to help visually acquire the intruder.

(B) Proper interpretation of the displayed information. Flight crew members should confirm that the aircraft they have visually acquired is that which has caused the TA to be issued. Use should be made of all information shown on the display, note

being taken of the bearing and range of the intruder (amber circle), whether it is above or below (data tag), and its vertical speed direction (trend arrow).

(C) Other available information should be used to assist in visual acquisition, including ATC 'party-line' information, traffic flow in use, etc.

(D) Because of the limitations described, the pilot flying should not manoeuvre the aircraft based solely on the information shown on the ACAS display. No attempt should be made to adjust the current flight path in anticipation of what an RA would advise, except that if own aircraft is approaching its cleared level at a high vertical rate with a TA present, vertical rate should be reduced to less than 1 500 ft/min.

(E) When visual acquisition is attained, and as long as no RA is received, normal right of way rules should be used to maintain or attain safe separation. No unnecessary manoeuvres should be initiated. The limitations of making manoeuvres based solely on visual acquisition, especially at high altitude or at night, or without a definite horizon should be demonstrated as being understood.

(ii) RA responses

Objective: to verify that the pilot properly interprets and responds to RAs.

Criteria: the pilot should demonstrate the following:

(A) Proper response to the RA, even if it is in conflict with an ATC instruction and even if the pilot believes that there is no threat present.

(B) Proper task sharing between the pilot flying and the pilot monitoring. The pilot flying should respond to a corrective RA with appropriate control inputs. The pilot monitoring should monitor the response to the RA and should provide updates on the traffic location by checking the traffic display. Proper CRM should be used.

(C) Proper interpretation of the displayed information. The pilot should recognise the intruder causing the RA to be issued (red square on display). The pilot should respond appropriately.

(D) For corrective RAs, the response should be initiated in the proper direction within 5 seconds of the RA being displayed. The change in vertical speed should be accomplished with an acceleration of approximately ¼ g (gravitational acceleration of 9.81 m/sec^2).

(E) Recognition of the initially displayed RA being modified. Response to the modified RA should be properly accomplished, as follows:

(a) For increase rate RAs, the vertical speed change should be started within 2½ seconds of the RA being displayed. The change in vertical speed should be accomplished with an acceleration of approximately ⅓ g.

(b) For RA reversals, the vertical speed reversal should be started within 2½ seconds of the RA being displayed. The change in vertical speed should be accomplished with an acceleration of approximately ⅓ g.

(c) For RA weakenings, the vertical speed should be modified to initiate a return towards the original clearance.

(d) An acceleration of approximately ¼ g will be achieved if the change in pitch attitude corresponding to a change in vertical speed of 1 500 ft/min is accomplished in approximately 5 seconds, and of ⅓ g if the change is accomplished in approximately 3 seconds. The change in pitch attitude required to establish a rate of climb or descent of 1500ft/min from level flight will be approximately 6° when the true airspeed (TAS) is 150 kt, 4° at 250 kt, and 2° at 500 kt. (These angles are derived from the formula: 1 000 divided by TAS).

(F) Recognition of altitude crossing encounters and the proper response to these RAs.

(G) For preventive RAs, the vertical speed needle or pitch attitude indication, should remain outside the red area on the RA display.

(H) For maintain rate RAs, the vertical speed should not be reduced. Pilots should recognise that a maintain rate RA may result in crossing through the intruder's altitude.

(I) When the RA weakens, or when the green 'fly to' indicator changes position, the pilot should initiate a return towards the original clearance, and when ‘clear of conflict’ is annunciated, the pilot should complete the return to the original clearance.

(J) The controller should be informed of the RA as soon as time and workload permit, using the standard phraseology.

(K) When possible, an ATC clearance should be complied with while responding to an RA. For example, if the aircraft can level at the assigned altitude while responding to RA (an ‘adjust vertical speed’ RA (version 7) or ‘level off’ (version 7.1) it should be done; the horizontal (turn) element of an ATC instruction should be followed.

(L) Knowledge of the ACAS multi-aircraft logic and its limitations, and that ACAS can optimise separations from two aircraft by climbing or descending towards one of them. For example, ACAS only considers intruders that it considers to be a threat when selecting an RA. As such, it is possible for ACAS to issue an RA against one intruder that results in a manoeuvre towards

another intruder that is not classified as a threat. If the second intruder becomes a threat, the RA will be modified to provide separation from that intruder.

(g) ACAS initial evaluation

(1) The flight crew member's understanding of the academic training items should be assessed by means of a written test or interactive CBT that records correct and incorrect responses to phrased questions.

(2) The flight crew member's understanding of the manoeuvre training items should be assessed in a full flight simulator equipped with an ACAS display and controls similar in appearance and operation to those in the aircraft the flight crew member will fly, and the results assessed by a qualified instructor, inspector, or check airman. The range of scenarios should include: corrective RAs; initial preventive RAs; maintain rate RAs; altitude crossing RAs; increase rate RAs; RA reversals; weakening RAs; and multi-threat encounters. The scenarios should also include demonstrations of the consequences of not responding to RAs, slow or late responses, and manoeuvring opposite to the direction called for by the displayed RA.

(3) Alternatively, exposure to these scenarios can be conducted by means of an interactive CBT with an ACAS display and controls similar in appearance and operation to those in the aircraft the pilot will fly. This interactive CBT should depict scenarios in which real-time responses should be made and a record made of whether or not each response was correct.

(h) ACAS recurrent training

(1) ACAS recurrent training ensures that flight crew members maintain the appropriate ACAS knowledge and skills. ACAS recurrent training should be integrated into and/or conducted in conjunction with other established recurrent training programmes. An essential item of recurrent training is the discussion of any significant issues and operational concerns that have been identified by the operator. Recurrent training should also address changes to ACAS logic, parameters or procedures and to any unique ACAS characteristics which flight crew members should be made aware of.

(2) It is recommended that operator's recurrent training programmes using full flight simulators include encounters with conflicting traffic when these simulators are equipped with ACAS. The full range of likely scenarios may be spread over a 2 year period. If a full flight simulator, as described above, is not available, use should be made of an interactive CBT that is capable of presenting scenarios to which pilot responses should be made in real-time.

AMC1-SPO.OP.215 Approach and landing conditions – aeroplanes and helicopters

LANDING DISTANCE/FATO SUITABILITY

The in-flight determination of the landing distance/FATO suitability should be based on the latest available meteorological report.

AMC1-SPO.OP.220 Commencement and continuation of approach

VISUAL REFERENCES FOR INSTRUMENT APPROACHES

(a) NPA, APV and CAT I operations

At DH or MDH, at least one of the visual references specified below should be distinctly visible and identifiable to the pilot:

(1) elements of the approach light system;

(2) the threshold;

(3) the threshold markings;

(4) the threshold lights;

(5) the threshold identification lights;

(6) the visual glide slope indicator;

(7) the touchdown zone or touchdown zone markings;

(8) the touchdown zone lights;

(9) runway edge lights; or

(10) other visual references specified in the operations manual.

(b) Lower than standard (LTS) CAT I operations

At DH, the visual references specified below should be distinctly visible and identifiable to the pilot:

(1) a segment of at least three consecutive lights, being the centreline of the approach lights, or touchdown zone lights, or runway centreline lights, or runway edge lights, or a combination of these; and

(2) this visual reference should include a lateral element of the ground pattern, such as an approach light crossbar or the landing threshold or a barrette of the touchdown zone light unless the operation is conducted utilising an approved HUDLS usable to at least 150 ft.

(c) CAT II or other-than standard (OTS) CAT II operations

At DH, the visual references specified below should be distinctly visible and identifiable to the pilot:

(1) a segment of at least three consecutive lights being the centreline of the approach lights, or touchdown zone lights, or runway centreline lights, or runway edge lights, or a combination of these; and

(2) this visual reference should include a lateral element of the ground pattern, such as an approach light crossbar or the landing threshold or a barrette of the touchdown zone light unless the operation is conducted utilising an approved HUDLS to touchdown.

(d) CAT III operations

(1) For CAT IIIA operations and for CAT IIIB operations conducted either with fail-passive flight control systems or with the use of an approved HUDLS: at DH, a segment of at least three consecutive lights being the centreline of the

approach lights, or touchdown zone lights, or runway centreline lights, or runway edge lights, or a combination of these is attained and can be maintained by the pilot.

(2) For CAT IIIB operations conducted either with fail-operational flight control systems or with a fail-operational hybrid landing system using a DH: at DH, at least one centreline light is attained and can be maintained by the pilot.

(3) For CAT IIIB operations with no DH there is no requirement for visual reference with the runway prior to touchdown.

(e) Approach operations utilising EVS

(1) At DH or MDH, the following visual references should be displayed and identifiable to the pilot on the EVS:

(i) elements of the approach light; or

(ii) the runway threshold, identified by at least one of the following: the beginning of the runway landing surface, the threshold lights, the threshold identification lights; and the touchdown zone, identified by at least one of the following: the runway touchdown zone landing surface, the touchdown zone lights, the touchdown zone markings or the runway lights.

(2) At 100 ft above runway threshold elevation at least one of the visual references specified below should be distinctly visible and identifiable to the pilot without reliance on the EVS:

(i) the lights or markings of the threshold; or

(ii) the lights or markings of the touchdown zone.

GM1-SPO.OP.225 Operational limitations – hot-air balloons

NIGHT LANDING

The risk of collision with overhead lines is considerable and cannot be overstated. The risk is considerably increased during night flights in conditions of failing light and visibility when there is increasing pressure to land. A number of incidents have occurred in the late evening in just such conditions, and may have been avoided had an earlier landing been planned.

AMC1-SPO.OP.230 Standard operating procedures

DEVELOPMENT OF STANDARD OPERATING PROCEDURES

(a) SOPs should be developed to a standard format in accordance with AMC2-SPO.OP.230 (SOP template) and taking into account the results of the risk assessment process.

(b) SOPs should be based on a systematic risk assessment to ensure that the risks associated with the task are acceptable. The risk assessment should describe the activity in detail, identify the relevant hazards, analyse the causes and consequences of accidental events and establish methods to treat the associated risk.

AMC2-SPO.OP.230 Standard operating procedures

TEMPLATE

(a) Nature and complexity of the activity:

(1) The nature of the activity and exposure. The nature of the flight and the risk exposure (e.g. low height) should be described.

(2) The complexity of the activity. Detail should be provided on how demanding the activity is with regard to the required piloting skills, the crew composition, the necessary level of experience, the ground support, safety and individual protective equipment that should be provided for persons involved.

(3) The operational environment and geographical area. The operational environment and geographical area over which the operation takes place should be described:

(i) congested hostile environment: aircraft performance standard, compliance with rules of the air, mitigation of third party risk;

(ii) mountain areas: altitude, performance, the use/non-use of oxygen with mitigating procedures;

(iii) sea areas: sea state and temperature, risk of ditching, availability of search and rescue, survivability, carriage of safety equipment;

(iv) desert areas: carriage of safety equipment, reporting procedures, search and rescue information; and

(v) other areas.

(4) The application of risk assessment and evaluation. The method of application of (a)(1) to (a)(3) to the particular operation so as to minimise risk should be described. The description should reference the risk assessment and the evaluation on which the procedure is based. The SOPs should:

(i) contain elements relevant to the operational risk management performed during flight;

(ii) contain limitations, where required, such as weather, altitudes, speeds, power margins, masses, landing site size; and

(iii) list functions required to monitor the operation. Special monitoring requirements in addition to the normal functions should be described in the SOPs.

(b) Aircraft and equipment:

(1) The aircraft. The category of aircraft to be used for the activity should be indicated (e.g. helicopter/aeroplane, single/multi-engined, other-than-complex motor-powered/complex motor-powered, classic tail rotor/Fenestron/no tail rotor (NOTAR) equipped). In particular, for helicopters, the necessary level of performance certification (Category A/B) should be specified.

(2) Equipment. All equipment required for the activity should be listed. This includes installed equipment certified in accordance with Part-21 as well as equipment approved in accordance with other officially recognised standards.

A large number of activities require, in addition to the standard radio communication equipment, additional air-to-ground communication equipment. This should be listed and the operational procedure should be defined.

(c) Crew members:

(1) The crew composition, including the following, should be specified:

(i) minimum flight crew (according to the appropriate manual); and

(ii) additional flight crew.

(2) In addition, for flight crew members, the following should be specified:

(i) selection criteria (initial qualification, flight experience, experience of the activity);

(ii) initial training (volume and content of the training); and

(iii) recent experience requirement and/or recurrent training (volume and content of the training).

The criteria listed in (c)(2)(i) to (c)(2)(iii) should take into account the operational environment and the complexity of the activity and should be detailed in the training programmes.

(d) Task specialists:

(1) Whenever a task specialist is required, his/her function on board should be clearly defined. In addition, the following should be specified:

(i) selection criteria (initial background, experience of the activity);

(ii) initial training (volume and content of the training); and

(iii) recent experience requirement and/or recurrent training (volume and content of the training).

The criteria listed in (d)(1) should take into account the specialisation of the task specialist and should be detailed in the training programmes.

(2) There are a large number of activities for which task specialists are required. This chapter should detail the following for such personnel:

(i) specialisation;

(ii) previous experience;

(iii) training or briefing.

Briefing or specific training for task specialists referred to in (d)(2) should be detailed in the training programmes.

(e) Performance:

This chapter should detail the specific performance requirements to be applied, in order to ensure an adequate power margin.

(f) Normal procedures:

(1) Operating procedures. The operating procedures to be applied by the flight crew, including the coordination with task specialists.

(2) Ground procedures. The procedures to be applied by the task specialists should be described, e.g. loading/unloading, cargo hook operation.

(g) Emergency procedures:

(1) Operating procedures. The emergency procedures to be applied by the flight crew, the coordination with the task specialist and coordination between the flight crew and task specialists should be described.

(2) Ground procedures. The emergency procedures to be applied by the task specialists (e.g. in the case of a forced landing) should be specified.

(h) Ground equipment:

This chapter should detail the nature, number and location of ground equipment required for the activity, such as:

(1) refuelling facilities, dispenser and storage;

(2) fire fighting equipment;

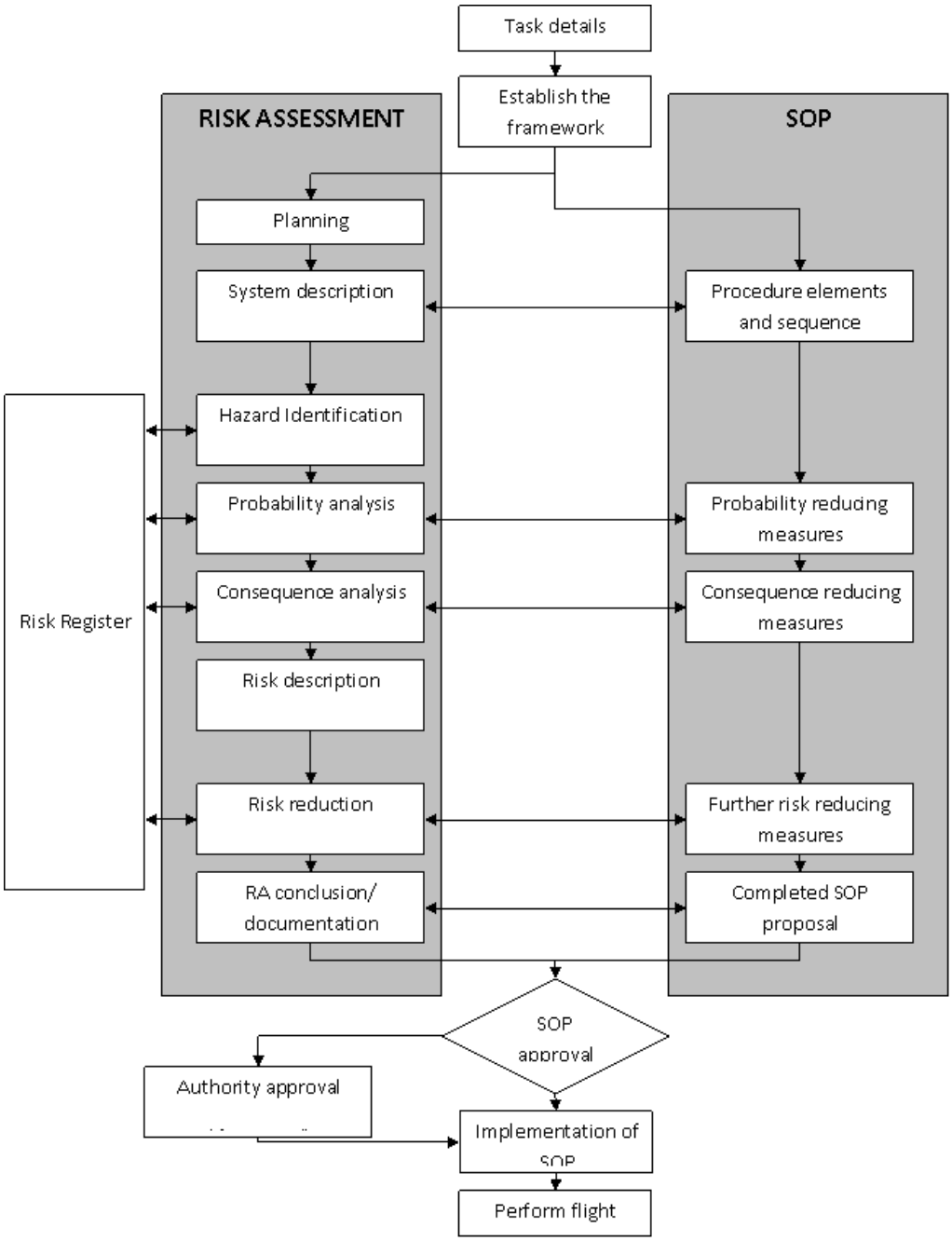
(3) size of the operating site (landing surface, loading/unloading area); and

(4) ground markings.

(i) Records:

It should be determined which records specific to these flight(s) are to be kept, such as task details, aircraft registration, pilot-in-command, flight times, weather and any remarks, including a record of occurrences affecting flight safety or the safety of persons or property on the ground.

Figure 1 – Development of a SOP based on a risk assessment



Template Form A – Risk assessment (RA)

Date: RA of Responsible:
Purpose:
Type of operation and brief description:
Participants, working group:
Preconditions, assumptions and simplifications:
Data used:

Description of the analysis method:
External context:
• Regulatory requirements • Approvals • Environmental conditions (visibility, wind, turbulence, contrast, light, elevation, etc. unless evident from the SOPs) • Stakeholders and their potential interest
Internal context:
• Type(s) of aircraft • Personnel and qualifications • Combination/similarity with other operations/SOPs • Other RA used/considered/plugged in
Existing barriers and emergency preparedness:
Monitoring and follow up:
Description of the risk:
Risk evaluation:
Conclusions:

Template Form B – Hazard identification (HI)

Date: HI of Responsible:

Phase of operation	Haz ref	Hazard / accidental event	Cause / threat	Current Treatment Measures (TM)	Further treatment required	TM ref	Comment

Note:

Haz ref: A unique number for hazards, e.g., for use in a database

TM ref: A unique number for the treatment method

Template Form C – Risk assessment

Date:.....RA of .....Responsible:.....

Phase of operation	Haz ref	Hazard/ accidental event	Current Treatment Measures (TM)/controls	TM ref	L	C	Further treatment required

Note:

Haz ref: A unique number for hazards, e.g., for use in a database

TM ref: A unique number for the treatment method

L: Likelihood (probability)

C: Consequence

Template register A – Risk register

Ref	**Operation / Procedure**	**Ref**	**Generic hazard**	**Ref**	**Accidental event**	**Treatment / control**	**L**	**C**	**Monitoring**

Note:

L: Likelihood (probability)

C: Consequence

Subpart C - Aircraft performance and operating limitations

AMC1-SPO.POL.105(b) Mass and balance

WEIGHING OF AN AIRCRAFT

(a) New aircraft that have been weighed at the factory may be placed into operation without reweighing if the mass and balance records have been adjusted for alterations or modifications to the aircraft. Aircraft transferred from one EU operator to another EU operator do not have to be weighed prior to use by the receiving operator, unless the mass and balance cannot be accurately established by calculation.

(b) The mass and centre of gravity (CG) position of an aircraft should be revised whenever the cumulative changes to the dry operating mass exceed ±0.5 % of the maximum landing mass or for aeroplanes the cumulative change in CG position exceeds 0.5 % of the mean aerodynamic chord. This should be done either by weighing the aircraft or by calculation.

(c) When weighing an aircraft, normal precautions should be taken, which are consistent with good practices such as:

(1) checking for completeness of the aircraft and equipment;

(2) determining that fluids are properly accounted for;

(3) ensuring that the aircraft is clean; and

(4) ensuring that weighing is accomplished in an enclosed building.

(d) Any equipment used for weighing should be properly calibrated, zeroed and used in accordance with the manufacturer's instructions. Each scale should be calibrated either by the manufacturer, by a civil department of weights and measures or by an appropriately authorised organisation within 2 years or within a time period defined by the manufacturer of the weighing equipment, whichever is less. The equipment should enable the mass of the aircraft to be established accurately. One single accuracy criterion for weighing equipment cannot be given. However, the weighing accuracy is considered satisfactory if the accuracy criteria in Table 1 are met by the individual scales/cells of the weighing equipment used:

Table 1: Accuracy criteria for weighing equipment

For a scale/cell load	An accuracy of
below 2 000 kg	± 1 %
from 2 000 kg to 20 000 kg	± 20 kg
above 20 000 kg	± 0.1 %

CG LIMITS — OPERATIONAL CG ENVELOPE AND IN-FLIGHT CG

In the Certificate Limitations section of the AFM, forward and aft CG limits are specified. These limits ensure that the certification stability and control criteria are met throughout the whole flight and allow the proper trim setting for take-off. The operator should ensure that these limits are respected by:

(a) defining and applying operational margins to the certified CG envelope in order to compensate for the following deviations and errors:

(1) deviations of actual CG at empty or operating mass from published values due, for example, to weighing errors, unaccounted modifications and/or equipment variations.

(2) Deviations in fuel distribution in tanks from the applicable schedule.

(3) Deviations in the distribution of cargo in the various compartments as compared with the assumed load distribution as well as inaccuracies in the actual mass of cargo.

(5) Deviations of the actual CG of cargo load within individual cargo compartments or cabin sections from the normally assumed mid position.

(6) Deviations of the CG caused by gear and flap positions and by application of the prescribed fuel usage procedure, unless already covered by the certified limits.

(7) Deviations caused by in-flight movement of crew members and task specialist.

(b) Defining and applying operational procedures in order to:

(1) take into account any significant CG travel during flight caused by persons movement; and

(2) take into account any significant CG travel during flight caused by fuel consumption/transfer.

GM1-SPO.POL.105 Mass and balance

GENERAL - OPERATIONS WITH OTHER-THAN-COMPLEX MOTOR-POWERED AIRCRAFT

(a) New aircraft that have been weighed at the factory may be placed into operation without reweighing if the mass and balance records have been adjusted for alterations or modifications to the aircraft. Aircraft transferred from one EU operator to another EU operator do not have to be weighed prior to use by the receiving operator, unless the mass and balance cannot be accurately established by calculation.

(b) The mass and, except for balloons, the centre of gravity (CG) position of an aircraft should be revised whenever the cumulative changes to the dry operating mass exceed ± 0.5 % of the maximum landing mass or for aeroplanes the cumulative change in CG position exceeds 0.5 % of the mean aerodynamic chord. This may be done by weighing the aircraft or by calculation.

AMC1-SPO.POL.110(a)(1) Mass and balance system – complex motor-powered aircraft

DRY OPERATING MASS

The dry operating mass should include:

(a) crew and equipment, and

(b) removable task specialist equipment.

AMC1-SPO.POL.110(a)(2) Mass and balance system – complex motor-powered aircraft

SPECIAL STANDARD MASSES FOR TRAFFIC LOAD

The operator should use standard mass values for other load items. These standard masses should be calculated on the basis of a detailed evaluation of the mass of the items.

AMC1-SPO.POL.110(a)(3) Mass and balance system – complex motor-powered aircraft

FUEL LOAD

The mass of the fuel load should be determined by using its actual relative density or a standard relative density.

GM1-SPO.POL.110(a) (3) Mass and balance system – complex motor-powered aircraft

FUEL DENSITY

(a) If the actual fuel density is not known, the operator may use standard fuel density values for determining the mass of the fuel load. Such standard values should be based on current fuel density measurements for the airports or areas concerned.

(b) Typical fuel density values are:

(1) Gasoline (piston engine fuel) – 0.71 ;

(2) JET A1 (Jet fuel JP 1) – 0.79 ;

(3) JET B (Jet fuel JP 4) – 0.76 ;

(4) Oil – 0.88.

AMC1-SPO.POL.110(a)(4) Mass and balance system – complex motor-powered aircraft

LOADING - STRUCTURAL LIMITS

The loading should take into account additional structural limits such as the floor strength limitations, the maximum load per running metre, the maximum mass per cargo compartment, and/or the maximum seating limits as well as in-flight changes in loading.

GM1-SPO.POL.110(b) Mass and balance system – complex motor-powered aircraft

GENERAL

The mass and balance computation may be available in flight planning documents or separate systems and may include standard load profiles.

AMC1-SPO.POL.115 Mass and balance data and documentation – complex motor-powered aircraft

GENERAL

(a) The mass and balance documentation should:

(1) enable the pilot-in-command to determine that the load and its distribution are within the mass and balance limits of the aircraft; and

(2) include advise to the pilot-in-command whenever a non-standard method has been used for determining the mass of the load.

(b) The information above may be available in flight planning documents or mass and balance systems.

(c) Any last minute change should be brought to the attention of the pilot-in-command and entered in the flight planning documents containing the mass and balance information and mass and balance systems.

(d) Where mass and balance documentation is generated by a computerised mass and balance system, the operator should verify the integrity of the output data at intervals not exceeding 6 months.

(e) A copy of the final mass and balance documentation may be sent to aircraft via data or may be made available to the pilot-in–command by other means for its acceptance.

(f) The person supervising the loading of the aircraft should confirm by hand signature or equivalent that the load and its distribution are in accordance with the mass and balance documentation given to the pilot in command. The pilot-in-command should indicate his acceptance by hand signature or equivalent.

AMC2-SPO.POL.115 Mass and balance data and documentation – complex motor-powered aircraft

INTEGRITY OF MASS AND BALANCE DATA

The operator should verify the integrity of mass and balance data and documentation generated by a computerised mass and balance system, at intervals not exceeding 6 months. The operator should establish a system to check that amendments of its input data are incorporated properly in the system and that the system is operating correctly on a continuous basis.

MASS AND BALANCE DOCUMENTATION SENT VIA DATA LINK

Whenever the mass and balance documentation is sent to the aircraft via data link, a copy of the final mass and balance documentation as accepted by the pilot-in-command should be available on the ground.

GM1-SPO.POL.115(b) Mass and balance data and documentation – complex motor-powered aircraft

ON BOARD INTEGRATED MASS AND BALANCE COMPUTER SYSTEM

An on board integrated mass and balance computer system may be an aircraft installed system capable of receiving input data either from other aircraft systems or from a mass and balance system on ground, in order to generate mass and balance data as an output.

STAND-ALONE COMPUTERISED MASS AND BALANCE SYSTEM

A stand-alone computerised mass and balance system may be a computer, either as part of an electronic flight bag (EFB) system or solely dedicated to mass and balance purposes, requiring input from the user, in order to generate mass and balance data as an output.

AMC1-SPO.POL.130(a) Take-off complex motor-powered aeroplanes

TAKE-OFF MASS

The following should be considered for determining the maximum take-off mass:

(a) the pressure altitude at the aerodrome;

(b) the ambient temperature at the aerodrome;

(c) the runway surface condition and the type of runway surface;

(d) the runway slope in the direction of take-off;

(e) not more than 50 % of the reported head-wind component or not less than 150 % of the reported tailwind component; and

(f) the loss, if any, of runway length due to alignment of the aeroplane prior to take-off.

AMC2-SPO.POL.130(a)(4) Take-off - complex motor-powered aeroplanes

CONTAMINATED RUNWAY PERFORMANCE DATA

Wet and contaminated runway performance data, if made available by the manufacturer, should be taken into account. If such data is not made available, the operator should account for wet and contaminated runway conditions by using the best information available.

GM1-SPO.POL.130(a)(4) Take-off - complex motor-powered

RUNWAY SURFACE CONDITION

Operation on runways contaminated with water, slush, snow or ice implies uncertainties with regard to runway friction and contaminant drag and therefore to the achievable performance and control of the aeroplane during take-off or landing, since the actual conditions may not completely match the assumptions on which the performance information is based. In the case of a contaminated runway, the first option for the pilot-in-command is to wait until the runway is cleared. If this is impracticable, he/she may consider a take-off or landing, provided that he/she has applied the applicable performance adjustments, and any further safety measures he/she considers justified under the prevailing conditions. The excess runway length available including the criticality of the overrun area should also be considered.

AMC1-SPO.POL.130(b)(2) Take-off - complex motor-powered

ADEQUATE MARGIN

The adequate margin should be defined in the operations manual.

AMC1-SPO.POL.140 Landing - complex motor-powered aeroplanes

ALLOWANCES

These allowances should be stated in the operations manual.

AMC1-SPO.POL.146(a)(2) Performance criteria - helicopters

SUSTAINING LEVEL FLIGHT

The helicopter should sustain level flight with any load carried.

AMC1-SPO.POL.146(c) Performance criteria - helicopters

OPERATIONAL PROCEDURES AND TRAINING PROGRAMME

(a) The operational procedures should be based on the manufacturer's recommended procedures where they exist.

(b) The crew member training programme should include briefing, demonstration or practice, as appropriate, of the operational procedures necessary to minimise the consequences of an engine failure.

GM1-SPO.POL.146(d) Performance criteria - helicopters

GENERAL

(a) Even when the surface allows a hover in ground effect (HIGE), the likelihood of, for example, dust or blowing snow may necessitate hover out of ground effect (HOGE) performance.

(b) Wind conditions on some sites (particularly in mountainous areas and including downdraft) may require a reduction in the helicopter mass in order to ensure that

an out of ground effect hover can be achieved at the operational site in the conditions prevailing.

Subpart D – Instruments, data and equipment

Section 1 - Aeroplanes

GM1-SPO.IDE.A.100(a) Instruments and equipment – general

APPLICABLE AIRWORTHINESS REQUIREMENTS

The applicable airworthiness requirements for approval of instruments and equipment required by this Part are the following:

(a) Regulation (EC) 1702/20034 for

(1) aeroplanes registered in the EU; and

(2) aeroplanes registered outside the EU but manufactured or designed by an EU organisation.

(b) Airworthiness requirements of the state of registry for aeroplanes registered, designed and manufactured outside the EU.

GM1-SPO.IDE.A.100(a)&(b) Instruments and equipment – general

INSTRUMENTS AND EQUIPMENT THAT DO NOT NEED TO BE APPROVED

(a) The provision of this paragraph does not exempt the item of equipment from complying with the applicable airworthiness requirements if the instrument or equipment is installed in the aeroplane. In this case, the installation should be approved as required in the applicable airworthiness requirements and should comply with the applicable airworthiness codes.

(b) The functionality of non-installed instruments and equipment required by this Part that does not need an equipment approval should be checked against recognised industry standards appropriate for the intended purpose. The pilot-in command is responsible for ensuring the maintenance of these instruments and equipment.

(c) The failure of additional non-installed instruments or equipment not required by this Part or by the applicable airworthiness requirements or any applicable airspace requirements should not adversely affect the airworthiness and/or the safe operation of the aeroplane. Examples are the following:

(1) instruments supplying additional flight information (e.g. stand-alone global positioning system (GPS));

(2) mission dedicated equipment (e.g. radios); and

(3) non-installed task specialist equipment.

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4 Commission Regulation (EC) No 1702/2003 of 24 September 2003 laying down implementing rules for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations, OJ L 243, 27.9.2003, p. 6.

GM1-SPO.IDE.A.110 Spare electrical fuses

FUSES

A spare electrical fuse means a replaceable fuse in the flight crew compartment, not an automatic circuit breaker or circuit breakers in the electric compartments.

AMC1-SPO.IDE.A.120&SPO.IDE.A.125 Operations under VFR & operations under IFR – flight and navigational instruments and associated equipment

INTEGRATED INSTRUMENTS

(a) Individual equipment requirements may be met by combinations of instruments, by integrated flight systems or by a combination of parameters on electronic displays. The information so available to each required pilot should not be less than that required in the applicable operational requirements, and the equivalent safety of the installation should be approved during type certification of the aeroplane for the intended type of operation.

(b) The means of measuring and indicating turn and slip, aeroplane attitude and stabilised aeroplane heading may be met by combinations of instruments or by integrated flight director systems, provided that the safeguards against total failure, inherent in the three separate instruments, are retained.

AMC2-SPO.IDE.A.120 Operations under VFR – flight and navigational instruments and associated equipment

LOCAL FLIGHTS

For flights that do not exceed 60 minutes duration, that take off and land at the same aerodrome, and that remain within 50 NM of that aerodrome, an equivalent means of complying with SPO.IDE.120.A (b)(1)(i), (b)(1)(ii) may be:

(a) a turn and slip indicator;

(b) a turn co-ordinator; or

(c) both an attitude indicator and a slip indicator.

GM1-SPO.IDE.A.120 Operations under VFR – flight and navigational instruments and associated equipment

SLIP INDICATION

Non-complex motor-powered aeroplanes should be equipped with a means of measuring and displaying slip.

GM1-SPO.IDE.A.125 Operations under IFR – flight and navigational instruments and associated equipment

ALTERNATE SOURCE OF STATIC PRESSURE

Aeroplanes should be equipped with an alternate source of static pressure.

AMC1-SPO.IDE.A.120(a)(1)&SPO.IDE.A.125(a)(1) Operations under VFR & operations under IFR – flight and navigational instruments and associated equipment

MEANS OF MEASURING AND DISPLAYING MAGNETIC HEADING

The means of measuring and displaying magnetic direction should be a magnetic compass or equivalent.

AMC1-SPO.IDE.A.120(a)(2)&SPO.IDE.A.125(a)(2) Operations under VFR & operations under IFR – flight and navigational instruments and associated equipment

MEANS OF MEASURING AND DISPLAYING THE TIME

A means of measuring and displaying the time in hours, minutes and seconds may be a wrist watch capable of the same functions.

AMC1-SPO.IDE.A.120(a)(3)&SPO.IDE.A.125(a)(3) Operations under VFR operations & operations under IFR – flight and navigational instruments and associated equipment

CALIBRATION OF THE MEANS OF MEASURING AND DISPLAYING PRESSURE ALTITUDE

The instrument measuring and displaying pressure altitude should be of a sensitive type calibrated in feet (ft), with a sub-scale setting, calibrated in hectopascals/millibars, adjustable for any barometric pressure likely to be set during flight.

GM1-SPO.IDE.A.125(a)(3) Operations under IFR – flight and navigational instruments and associated equipment

ALTIMETERS

Except for unpressurised aeroplanes operating below 10 000 ft, the altimeters of aeroplanes operating under IFR or at night should have counter drum-pointer or equivalent presentation.

AMC1-SPO.IDE.A.120(a)(4)&SPO.IDE.A.125(a)(4) Operations under VFR & operations under IFR – flight and navigational instruments and associated equipment

CALIBRATION OF THE INSTRUMENT INDICATING AIRSPEED

The instrument indicating airspeed should be calibrated in knots (kt). In the case of aeroplanes with a maximum certified take-off mass (MCTOM) below 2 000 kg, calibration in kilometres (km) per hour or in miles per hours (mph) is acceptable.

AMC1-SPO.IDE.A.120(c)&SPO.IDE.A.125(c) Operations under VFR & operations under IFR – flight and navigational instruments and associated equipment

MULTI-PILOT OPERATIONS - DUPLICATE INSTRUMENTS

Duplicate instruments include separate displays for each pilot and separate selectors or other associated equipment where appropriate.

AMC1-SPO.IDE.A.125(a)(9) Operations under IFR – flight and navigational instruments and associated equipment

MEANS OF DISPLAYING OUTSIDE AIR TEMPERATURE

(a) The means of displaying outside air temperature should be calibrated in degrees Celsius.

(b) The means of displaying outside air temperature may be an air temperature indicator that provides indications that are convertible to outside air temperature.

AMC1-SPO.IDE.A.120(b)(3)&SPO.IDE.A.125(c) Operations under VFR & operations under IFR – flight and navigational instruments and associated equipment

MEANS OF PREVENTING MALFUNCTION DUE TO CONDENSATION OR ICING

The means of preventing malfunction due to either condensation or icing of the airspeed indicating system should be a heated pitot tube or equivalent.

AMC1-SPO.IDE.A.125(f) Operations under IFR – flight and navigational instruments and associated equipment

CHART HOLDER

An acceptable means of compliance with the chart holder requirement for complex motor-powered aeroplanes would be to display a pre-composed chart on an electronic flight bag (EFB).

AMC1-SPO.IDE.A.130 Terrain awareness warning system (TAWS)

EXCESSIVE DOWNWARDS GLIDESLOPE DEVIATION WARNING FOR CLASS A TAWS

The requirement for a Class A TAWS to provide a warning to the flight crew for excessive downwards glideslope deviation should apply to all final approach glideslopes with angular vertical navigation (VNAV) guidance, whether provided by the instrument landing system (ILS), microwave landing system (MLS), satellite-based augmentation system approach procedure with vertical guidance (SBAS APV (localiser performance with vertical guidance approach LPV)), ground-based augmentation system (GBAS (GPS landing system, GLS)) or any other systems providing similar guidance. The same requirement should not apply to systems providing vertical guidance based on barometric VNAV.

GM1-SPO.IDE.A.130 Terrain awareness warning system (TAWS)

ACCEPTABLE STANDARD FOR TAWS

An acceptable standard for Class A and Class B TAWS may be the applicable European Technical Standards Order (ETSO) issued by the Agency or equivalent.

AMC1-SPO.IDE.A.135 Flight crew interphone system

TYPE OF FLIGHT CREW INTERPHONE

(a) The flight crew interphone system should not be of a handheld type.

AMC1-SPO.IDE.A.140 Cockpit voice recorder

GENERAL

The operational performance requirements for cockpit voice recorders (CVRs) should be those laid down in the European Organisation for Civil Aviation Equipment (EUROCAE) Document ED-112 (Minimum Operational Performance Specification for Crash Protected Airborne Recorder Systems), dated March 2003, including amendments n°1 and 2.

AMC1-SPO.IDE.A.145 Flight data recorder

LIST OF PARAMETERS TO BE RECORDED AND PERFORMANCE SPECIFICATIONS FOR THESE PARAMETERS

(a) The flight data recorder should record, with reference to a timescale, the list of parameters in Table 1 and Table 2, as applicable.

(b) The parameters to be recorded should meet the performance specifications (designated ranges, sampling intervals, accuracy limits and minimum resolution in read-out) as defined in the relevant tables of EUROCAE Document ED-112, dated March 2003, including amendments n°1 and 2.

Table 1: All Aeroplanes

No.*	**Parameter**
1a 1b 1c	Time; or Relative time count Global navigation satellite system (GNSS) time synchronisation
2	Pressure altitude
3	Indicated airspeed; or calibrated airspeed
4	Heading (primary flight crew reference) - when true or magnetic heading can be selected, the primary heading reference, a discrete indicating selection, should be recorded

5	Normal acceleration
6	Pitch attitude
7	Roll attitude
8	Manual radio transmission keying and CVR/FDR synchronisation reference.
9 9a 9b	Engine thrust/power Parameters required to determine propulsive thrust/power on each engine Cockpit thrust/power lever position for aeroplanes with non-mechanically linked cockpit - engine control
14	Total or outside air temperature (OAT)
16	Longitudinal acceleration (body axis)
17	Lateral acceleration
18 18a 18b 18c	Primary flight control surface and primary flight control pilot input (for multiple or split surfaces, a suitable combination of inputs is acceptable instead of recording each surface separately. For aeroplanes that have a flight control break-away capability that allows either pilot to operate the controls independently, record both inputs): Pitch axis Roll axis Yaw axis
19	Pitch trim surface position
23	Marker beacon passage
24	Warnings - in addition to the master warning each "red" warning (including smoke warnings from other compartments) should be recorded when the warning condition cannot be determined from other parameters or from the CVR
25	Each navigation receiver frequency selection
27	Air - ground status and, if the sensor is installed, each landing gear
38	Selected barometric setting - to be recorded for the aeroplane in which the parameter is displayed electronically
44	Selected flight path (all pilot selectable modes of operation) - to be recorded for the aeroplane in which the parameter is displayed electronically
45	Selected decision height - to be recorded for the aeroplane in which the parameter is displayed electronically

75	All cockpit flight control input forces (for fly-by-wire flight control systems, where control surface position is a function of the displacement of the control input device only, it is not necessary to record this parameter):
75a	Control wheel
75b	Control column
75c	Rudder pedal cockpit input forces

* The number in the left hand column reflects the serial number depicted in EUROCAE ED-112.

Table 2: Aeroplanes for which the data source for the parameter is either used by aeroplane systems or is available on the instrument panel for use by the flight crew to operate the aeroplane

No.*	**Parameter**
10	Flaps: Trailing edge flap position and cockpit control selection
11	Slats: Leading edge flap (slat) position and cockpit control selection
12	Thrust reverse status
13	Ground spoiler and speed brake
13a	Ground spoiler position
13b	Ground spoiler selection
13c	Speed brake position
13d	Speed brake selection
15	Autopilot, autothrottle, automatic flight control system (AFCS) mode and engagement status
20	Radio altitude. For autoland/CAT III operations, each radio altimeter should be recorded. It is acceptable to arrange them so that at least one is recorded every second.
21	Vertical deviation - the approach aid in use should be recorded. For autoland/CAT III operations, each system should be recorded. It is acceptable to arrange them so that at least one is recorded every second).
21a	**ILS/GPS/GLS** glide path
21b	MLS elevation
21c	GNSS approach path/integrated area navigation (IRNAV) vertical deviation
22	Horizontal deviation - the approach aid in use should be recorded. For autoland/CAT III operations, each system should be recorded. It is acceptable

No.*	**Parameter**
	to arrange them so that at least one is recorded every second).
22a	ILS/GPS/GLS localiser
22b	MLS azimuth
22c	GNSS approach path/IRNAV lateral deviation
26	Distance measuring equipment (DME) 1 and 2 distances
26a	Distance to runway threshold (GLS)
26b	Distance to missed approach Point (IRNAV/IAN)
28	Ground proximity warning system (GPWS)/TAWS/ground collision avoidance system (GCAS) status:
28a	Selection of terrain display mode, including pop-up display status
28b	Terrain alerts, including cautions and warnings and advisories
28c	On/off switch position
29	Angle of attack
30	Low pressure warning (each system):
30a	Hydraulic pressure
30b	Pneumatic pressure
31	Ground speed
32	Landing gear:
32a	Landing gear
32b	Gear selector position
33	Navigation data:
33a	Drift angle
33b	Wind speed
33c	Wind direction
33d	Latitude
33e	Longitude
33f	GNSS augmentation in use
34	Brakes:
34a	Left and right brake pressure

No.*	**Parameter**
34b	Left and right brake pedal position
35 35a 35b 35c 35d 35e 35f 35g 35h	Additional engine parameters (if not already recorded in parameter 9 of Table 1 of AMC1-SPO.IDE.A.145 and if the aeroplane is equipped with a suitable data source): Engine pressure ratio (EPR) N_1 Indicated vibration level N_2 Exhaust gas temperature (EGT) Fuel flow Fuel cut-off lever position N_3
36 36a 36b 36c 36d 36e	Traffic alert and collision avoidance system (TCAS)/ACAS - a suitable combination of discretes should be recorded to determine the status of the system: Combined control Vertical control Up advisory Down advisory Sensitivity level
37	Wind shear warning
38 38a 38b	Selected barometric setting Pilot Co-pilot
39	Selected altitude (all pilot selectable modes of operation) - to be recorded for the aeroplane where the parameter is displayed electronically
40	Selected speed (all pilot selectable modes of operation) - to be recorded for the aeroplane where the parameter is displayed electronically
41	Selected Mach (all pilot selectable modes of operation) - to be recorded for the aeroplane where the parameter is displayed electronically
42	Selected vertical speed (all pilot selectable modes of operation) - to be recorded for the aeroplane where the parameter is displayed electronically

No.*	**Parameter**
43	Selected heading (all pilot selectable modes of operation) - to be recorded for the aeroplane where the parameter is displayed electronically
44a 44b 44c	Course/desired track (DSTRK) Path angle Coordinates of final approach path (IRNAV/IAN)
46 46a 46b	Electronic flight instrument system (EFIS) display format: Pilot Co-pilot
47	Multi-function/engine/alerts display format
48	AC electrical bus status - each bus
49	DC electrical bus status - each bus
50	Engine bleed valve position
51	Auxiliary power unit (APU) bleed valve position
52	Computer failure - critical flight and engine control system
53	Engine thrust command
54	Engine thrust target
55	Computed centre of gravity (CG)
56	Fuel quantity or fuel quantity in CG trim tank
57	Head-up display in use
58	Para visual display on
59	Operational stall protection, stick shaker and pusher activation
60 60a 60b 60c 60d 60e 60f	Primary navigation system reference: GNSS Inertial navigational system (INS) VHF omnidirectional radio range (VOR)/DME MLS Loran C ILS

No.*	**Parameter**
61	Ice detection
62	Engine warning - each engine vibration
63	Engine warning - each engine over temperature
64	Engine warning - each engine oil pressure low
65	Engine warning - each engine over speed
66	Yaw trim surface position
67	Roll trim surface position
68	Yaw or sideslip angle
69	De-icing and/or anti-icing systems selection
70	Hydraulic pressure - each system
71	Loss of cabin pressure *
72	Cockpit trim control input position pitch - when mechanical means for control inputs are not available, cockpit display trim positions or trim command should be recorded
73	Cockpit trim control input position roll - when mechanical means for control inputs are not available, cockpit display trim positions or trim command should be recorded
74	Cockpit trim control input position yaw - when mechanical means for control inputs are not available, cockpit display trim positions or trim command should be recorded
76	Event marker
77	Date
78	Actual navigation performance (ANP) or estimate of position error (EPE) or estimate of position uncertainty (EPU)

* The number in the left hand column reflects the serial number depicted in EUROCAE ED-112.

AMC1-SPO.IDE.A.150 Data link recording

GENERAL

(a) As a means of compliance with SPO.IDE.A.150 (a) the recorder should be:

(1) the CVR;

(2) the FDR;

(3) a combination recorder when SPO.IDE.A.155 is applicable; or

(4) a dedicated flight recorder. In that case, the operational performance requirements for this recorder should be those laid down in EUROCAE Document ED-112 (Minimum Operational Performance Specification for Crash Protected Airborne Recorder Systems), dated March 2003, including amendments n°1 and 2.

(b) As a means of compliance with SPO.IDE.A.150 (a)(2) the operator should enable correlation by providing information that allows an accident investigator to understand what data was provided to the aircraft and, when the provider identification is contained in the message, by which provider.

(c) The timing information associated with the data link communications messages required to be recorded by SPO.IDE.A.150 (a)(3) should be capable of being determined from the airborne-based recordings. This timing information should include at least the following:

(1) the time each message was generated;

(2) the time any message was available to be displayed by the flight crew;

(3) the time each message was actually displayed or recalled from a queue; and

(4) the time of each status change.

(d) The message priority should be recorded when it is defined by the protocol of the data link communication message being recorded.

(e) The expression 'taking into account the system's architecture', in SPO.IDE.A.150 (a)(3), means that the recording of the specified information may be omitted if the existing source systems involved would require a major upgrade. The following should be considered:

(1) the extent of the modification required;

(2) the down-time period; and

(3) equipment software development.

(f) Data link communications messages that support the applications in Table 1 below should be recorded.

(g) Further details on the recording requirements can be found in the recording requirement matrix in Appendix D.2 of EUROCAE Document ED-93 (Minimum Aviation System Performance Specification for CNS/ATM Recorder Systems), dated November 1998.

Table 1: Data link recording

Item No.	**Application Type**	**Application Description**	**Required Recording Content**

Item No.	**Application Type**	**Application Description**	**Required Recording Content**
1	Data link initiation	This includes any application used to log on to, or initiate, a data link service. In future air navigation system (FANS)-1/A and air traffic navigation (ATN), these are ATS facilities notification (AFN) and context management (CM), respectively.	C
2	Controller/pilot communication	This includes any application used to exchange requests, clearances, instructions and reports between the flight crew and controllers on the ground. In FANS-1/A and ATN, this includes the controller pilot data link communications (CPDLC) application. It also includes applications used for the exchange of oceanic clearances (OCL) and departure clearances (DCL), as well as data link delivery of taxi clearances.	C
3	Addressed surveillance	This includes any surveillance application in which the ground sets up contracts for delivery of surveillance data. In FANS-1/A and ATN, this includes the automatic dependent surveillance-contract (ADS-C) application.	C, **F2**
4	Flight information	This includes any application used for delivery of flight information data to specific aeroplanes. This includes for example data link-automatic terminal information service (D ATIS), data link-operational terminal information service (D OTIS), digital weather information services (data link-meteorological aerodrome or aeronautical report (D-METAR) or terminal weather information for pilots (TWIP)), data link flight information service (D-FIS), and Notice to Airmen (electronic NOTAM) delivery.	C
5	Broadcast surveillance	This includes elementary and enhanced surveillance systems, as well as automatic dependent surveillance-broadcast (ADS-B) output data.	M*, F2
6	Aeronautical	This includes any application transmitting or	M*

Item No.	Application Type	Application Description	Required Recording Content
	operational control (AOC) data	receiving data used for AOC purposes (in accordance with the ICAO definition of AOC). Such systems may also process aeronautical administrative communication (AAC) messages, but there is no requirement to record AAC messages	
7	Graphics	This includes any application receiving graphical data to be used for operational purposes (i.e. excluding applications that are receiving such things as updates to manuals).	M* F1

GM1-SPO.IDE.A.150 Data link recording

GENERAL

(a) The letters and expressions in Table 1 of AMC1-SPO.IDE.A.150 have the following meaning:

(1) C: complete contents recorded.

(2) M: information that enables correlation with any associated records stored separately from the aeroplane.

(3) *: applications that are to be recorded only as far as is practicable, given the architecture of the system.

(4) F1: graphics applications may be considered as AOC messages when they are part of a data link communications application service run on an individual basis by the operator itself in the framework of the operational control.

(5) F2: where parametric data sent by the aeroplane, such as Mode S, is reported within the message, it should be recorded unless data from the same source is recorded on the FDR.

(b) The definitions of the applications type in Table 1 of AMC1-SPO.IDE.A.150 are described in Table 1 below.

Table 1: Definitions of the applications type

Item No.	Application Type	Messages	Comments
1	CM		CM is an ATN service
2	AFN		AFN is a FANS 1/A service
3	CPDLC		All implemented up and downlink

			messages to be recorded
4	ADS-C	ADS-C reports	All contract requests and reports recorded
		Position reports	Only used within FANS 1/A. Mainly used in oceanic and remote areas.
5	ADS-B	Surveillance data	Information that enables correlation with any associated records stored separately from the aeroplane.
6	D-FIS		D-FIS is an ATN service. All implemented up and downlink messages to be recorded
7	TWIP	TWIP messages	Terminal weather information for pilots
8	D-ATIS	ATIS messages	EUROCAE ED-89A, dated December 2003: Data Link Application System Document (DLASD) for the "ATIS" data link service
9	OCL	OCL messages	EUROCAE ED-106A, dated March 2004: Data Link Application System Document (DLASD) for "Oceanic Clearance" (OCL) data link service
10	DCL	DCL messages	EUROCAE ED-85A, dated December 2005: Data Link Application System Document (DLASD) for "Departure Clearance" data link service
11	Graphics	Weather maps & other graphics	Graphics exchanged in the framework of procedures within the operational control, as specified in Part-ORO. Information that enables correlation with any associated records stored separately from the aeroplane.
12	AOC	Aeronautical operational control messages	Messages exchanged in the framework of procedures within the operational control, as specified in Part-ORO. Information that enables correlation with any associated records stored separately from the aeroplane. Definition in EUROCAE ED-112, dated March 2003.

13	Surveillance	Downlinked aircraft parameters (DAP)	As defined in ICAO Annex 10 Volume IV (Surveillance systems and ACAS).

AMC1-SPO.IDE.A.155 Combination recorder

COMBINATION RECORDERS

When two flight data and cockpit voice combination recorders are installed, one should be located near the flight crew compartment, in order to minimise the risk of data loss due to a failure of the wiring that gathers data to the recorder. The other should be located at the rear section of the aeroplane, in order to minimise the risk of data loss due to recorder damage in the case of a crash.

GM1-SPO.IDE.A.155 Combination recorder

GENERAL

(a) A flight data and cockpit voice combination recorder is a flight recorder that records:

(1) all voice communications and the aural environment required by SPO.IDE.A.140; and

(2) all parameters and specifications required by SPO.IDE.A.145, with the same specifications required by SPO.IDE.A.140 and SPO.IDE.A.145.

(b) In addition a flight data and cockpit voice combination recorder may record data link communication messages and related information required by SPO.IDE.A.150.

AMC1-SPO.IDE.A.160 Seats, seat safety belts and restraint systems

UPPER TORSO RESTRAINT SYSTEM

The following systems are deemed to be compliant with the requirement for an upper torso restraint system:

(a) A safety belt with a diagonal shoulder strap.

(b) A restraint system having two or three straps.

SAFETY BELT

A safety belt with diagonal shoulder strap (three anchorage points) is deemed to be compliant with the requirement for safety belts (two anchorage points).

AMC1-SPO.IDE.A.165 First-aid kit

GENERAL

First-aid kits (FAKs) compliant with DIN 13164 or DIN 13157 are considered to meet the objective of SPO.IDE.A.165.

AMC2-SPO.IDE.A.165 First-aid kit

CONTENT OF FIRST-AID KITS – COMPLEX MOTOR-POWERED AEROPLANES

(a) First-aid kits should be equipped with appropriate and sufficient medications and instrumentation. However, these kits should be amended by the operator according to the characteristics of the operation (scope of operation, flight duration, number and demographics of persons on board etc.).

(b) The following should be included in the FAKs:

(1) Equipment:

(i) bandages (assorted sizes);

(ii) burns dressings (unspecified);

(iii) wound dressings (large and small);

(iv) adhesive dressings (assorted sizes);

(v) adhesive tape;

(vi) adhesive wound closures;

(vii) safety pins;

(viii) safety scissors;

(ix) antiseptic wound cleaner;

(x) disposable resuscitation aid;

(xi) disposable gloves;

(xii) tweezers: splinter; and

(xiii) thermometers (non-mercury).

(2) Medications:

(i) simple analgesic (may include liquid form);

(ii) antiemetic;

(iii) nasal decongestant;

(iv) gastrointestinal antacid, in the case of aeroplanes carrying more than nine persons;

(v) anti-diarrhoeal medication, in the case of aeroplanes carrying more than nine persons; and

(vi) antihistamine.

(3) Other:

(i) a list of contents in at least two languages (English and one other). This should include information on the effects and side effects of medications carried;

(ii) first-aid handbook, current edition;

(iii) medical incident report form; and

(iv) biohazard disposal bags.

(4) An eye irrigator, although not required to be carried in the FAK, should, where possible, be available for use on the ground.

AMC3-SPO.IDE.A.165 First-aid kit

MAINTENANCE OF FIRST-AID KIT

To be kept up-to-date, the first-aid kit should be:

(a) inspected periodically to confirm, to the extent possible, that contents are maintained in the condition necessary for their intended use; and

(b) replenished at regular intervals, in accordance with instructions contained on their labels, or as circumstances warrant.

AMC1-SPO.IDE.A.170 Supplemental oxygen – pressurised aeroplanes

DETERMINATION OF OXYGEN

(a) In the determination of oxygen for the routes to be flown, it is assumed that the aeroplane will descend in accordance with the emergency procedures specified in the AFM, without exceeding its operating limitations, to a flight altitude that will allow the flight to be completed safely (i.e. flight altitudes ensuring adequate terrain clearance, navigational accuracy, hazardous weather avoidance etc.).

(b) The amount of oxygen should be determined on the basis of cabin pressure altitude, flight duration and on the assumption that a cabin pressurisation failure will occur at the pressure altitude or point of flight that is most critical from the standpoint of oxygen need.

(c) Following a cabin pressurisation failure, the cabin pressure altitude should be considered to be the same as the aeroplane pressure altitude, unless it can be demonstrated to the competent 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.

AMC1-SPO.IDE.A.175 Supplemental oxygen – non-pressurised aeroplanes

DETERMINATION OF OXYGEN

(a) In the determination of oxygen for the routes to be flown, it is assumed that the aeroplane will descend in accordance with the emergency procedures specified in the AFM, without exceeding its operating limitations, to a flight altitude that will allow the flight to be completed safely (i.e. flight altitudes ensuring adequate terrain clearance, navigational accuracy, hazardous weather avoidance etc.).

(b) The amount of oxygen should be determined on the basis of cabin pressure altitude and flight duration.

AMC1-SPO.IDE.A.185 Marking of break-in points

COLOUR AND CORNERS' MARKING

(a) The colour of the markings should be red or yellow and, if necessary, should be outlined in white to contrast with the background.

(b) If the corner markings are more than 2 m apart, intermediate lines 9 cm x 3 cm should be inserted so that there is no more than 2 m between adjacent markings.

AMC1-SPO.IDE.A.190 Emergency locator transmitter (ELT)

ELT BATTERIES

Batteries used in the ELTs should be replaced (or recharged, if the battery is rechargeable) when the equipment has been in use for more than 1 cumulative hour, and also when 50 % of their useful life (or for rechargeable, 50 % of their useful life of charge), as established by the equipment manufacturer, has expired. The new expiry date for the replacement (or recharged) battery should be legibly marked on the outside of the equipment. The battery useful life (or useful life of charge) requirements of this paragraph do not apply to batteries (such as water-activated batteries) that are essentially unaffected during probable storage intervals.

AMC2-SPO.IDE.A.190 Emergency locator transmitter (ELT)

TYPES OF ELT AND GENERAL TECHNICAL SPECIFICATIONS

(a) The ELT required by this provision should be one of the following:

(1) Automatic fixed (ELT(AF)). An automatically activated ELT that is permanently attached to an aircraft and is designed to aid search and rescue (SAR) teams in locating the crash site.

(2) Automatic portable (ELT(AP)). An automatically activated ELT that is rigidly attached to an aircraft before a crash, but is 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 SAR teams in locating the crash site or survivor(s).

(3) Automatic deployable (ELT(AD)). An ELT that is rigidly attached to the aircraft before the crash and that is automatically ejected, deployed and activated by an impact, and, in some cases, also by hydrostatic sensors. Manual deployment is also provided. This type of ELT should float in water and is intended to aid SAR teams in locating the crash site.

(4) Survival ELT (ELT(S)). An ELT that is removable from an aircraft, stowed so as to facilitate its ready use in an emergency and manually activated by a survivor. An ELT(S) may be activated manually or automatically (e.g. by water activation). It should be designed to be tethered to a life-raft or a survivor.

(b) To minimise the possibility of damage in the event of crash impact, the automatic ELT should be rigidly fixed to the aircraft structure, as far aft as is practicable, with its antenna and connections arranged so as to maximise the probability of the signal being transmitted after a crash.

(c) Any ELT carried should operate in accordance with the relevant provisions of ICAO Annex 10, Volume III and should be registered with the national agency responsible for initiating search and rescue or other nominated agency.

AMC3-SPO.IDE.A.190 Emergency locator transmitter (ELT)

PLB TECHNICAL SPECIFICATIONS

A personal locator beacon (PLB) should have a built-in GNSS receiver with a cosmicheskaya sistyema poiska avariynich sudov - search and rescue satellite-aided tracking (COSPAS-SARSAT) type approval number. However, devices with a COSPAS-SARSAT with a number belonging to series 700 are excluded as this series of numbers identifies the special-use beacons not meeting all the technical requirements and all the tests specified by COSPAS-SARSAT.

GM1-SPO.IDE.A.190 Emergency locator transmitter (ELT)

TERMINOLOGY

(a) An ELT is a generic term describing equipment that broadcasts distinctive signals on designated frequencies and, depending on application, may be activated by impact or may be manually activated.

(b) A PLB is an emergency beacon other than an ELT that broadcasts distinctive signals on designated frequencies, is standalone, portable and is manually activated by the survivors.

AMC1-SPO.IDE.A.195 Flight over water

ACCESSIBILITY OF LIFE-JACKETS

The life-jacket should be accessible from the seat or berth of the person for whose use it is provided, with a safety belt or a restraint system fastened.

MEANS OF ILLUMINATION FOR LIFE-JACKETS

Each life-jacket or equivalent individual flotation device should be equipped with a means of electric illumination for the purpose of facilitating the location of persons.

RISK ASSESSMENT

(a) When conducting the risk assessment, the pilot-in-command should base his/her decision, as far as is practicable, on the Implementing Rules and AMCs applicable to the operation of the aeroplane.

(b) The pilot-in-command should, for determining the risk, take the following operating environment and conditions into account:

(1) sea state;

(2) sea and air temperatures;

(3) the distance from land suitable for making an emergency landing; and

(4) the availability of search and rescue facilities.

GM1-SPO.IDE.A.195 Flight over water

SEAT CUSHIONS

Seat cushions are not considered to be flotation devices.

AMC1-SPO.IDE.A.200 Survival equipment

ADDITIONAL SURVIVAL EQUIPMENT

(a) The following additional survival equipment should be carried when required:

(1) 500 ml of water for each four, or fraction of four, persons on board;

(2) one knife;

(3) first-aid equipment; and

(4) one set of air/ground codes.

(b) In addition, when polar conditions are expected, the following should be carried:

(1) a means of melting snow;

(2) one snow shovel and one ice saw;

(3) sleeping bags for use by 1/3 of all persons on board and space blankets for the remainder or space blankets for all persons on board; and

(4) one arctic/polar suit for each crew member carried.

(c) If any item of equipment contained in the above list is already carried on board the aircraft in accordance with another requirement, there is no need for this to be duplicated.

AMC1-SPO.IDE.A.200(b)(2) Survival equipment

APPLICABLE AIRWORTHINESS STANDARD

The applicable airworthiness standard should be CS-25 or equivalent.

GM1-SPO.IDE.A.200 Survival equipment

SIGNALLING EQUIPMENT

The signalling equipment for making distress signals is described in ICAO Annex 2, Rules of the Air.

GM2-SPO.IDE.A.200 Survival equipment

AREAS IN WHICH SEARCH AND RESCUE WOULD BE ESPECIALLY DIFFICULT

The expression ‘areas in which search and rescue would be especially difficult’ should be interpreted, in this context, as meaning:

(a) areas so designated by the competent authority responsible for managing search and rescue; or

(b) areas that are largely uninhabited and where:

(1) the competent authority responsible for managing search and rescue has not published any information to confirm whether search and rescue would be or would not be especially difficult; and

(2) the competent authority referred to in (a) does not, as a matter of policy, designate areas as being especially difficult for search and rescue.

GM1-SPO.IDE.A.205 Individual protective equipment

TYPES OF INDIVIDUAL PROTECTIVE EQUIPMENT

Personal protective equipment should include, but is not limited to: flying suits, gloves, helmets, protective shoes, etc.

AMC1-SPO.IDE.A.206 Crash mitigation equipment

TYPES OF CRASH MITIGATION EQUIPMENT

Crash mitigation equipment should be certified in accordance with a recognised standard. It should include items which are necessary for reducing the consequences of a crash and should include such items as crash-absorbing seats and self-sealing fuel tanks.

AMC1-SPO.IDE.A.210 Headset

GENERAL

(a) A headset consists of a communication device that includes two earphones to receive and a microphone to transmit audio signals to the aeroplane's communication system. To comply with the minimum performance requirements, the earphones and microphone should match the communication system's characteristics and the flight crew compartment environment. The headset should be adequately adjustable in order to fit the flight crew's head. Headset boom microphones should be of the noise cancelling type.

(b) If the intention is to utilise noise cancelling earphones, the operator should ensure that the earphones do not attenuate any aural warnings or sounds necessary for alerting the flight crew on matters related to the safe operation of the aeroplane.

GM1-SPO.IDE.A.210 Headset

GENERAL

The term 'headset' includes any aviation helmet incorporating headphones and microphone worn by a flight crew member.

GM1-SPO.IDE.A.215 Radio communication equipment

APPLICABLE AIRSPACE REQUIREMENTS

For aeroplanes being operated under European air traffic control, the applicable airspace requirements include the Single European Sky legislation.

AMC1-SPO.IDE.A.225 Transponder

GENERAL

(a) The SSR transponders of aeroplanes being operated under European air traffic control should comply with any applicable Single European Sky legislation.

(b) If the Single European Sky legislation is not applicable, the SSR transponders should operate in accordance with the relevant provisions of Volume IV of ICAO Annex 10.

Section 2 - Helicopters

GM1-SPO.IDE.H.100(a) Instruments and equipment – general

APPLICABLE AIRWORTHINESS REQUIREMENTS

The applicable airworthiness requirements for approval of instruments and equipment required by this Part are the following:

(a) Regulation (EC) 1702/2003 for:

(1) helicopters registered in the EU; and

(2) helicopters registered outside the EU but manufactured or designed by an EU organisation.

(b) Airworthiness requirements of the state of registry for helicopters registered, designed and manufactured outside the EU.

GM1-SPO.IDE.H.100(a)&(b) Instruments and equipment – general

INSTRUMENTS AND EQUIPMENT THAT DO NOT NEED TO BE APPROVED

(a) The provision of this paragraph does not exempt the item of equipment from complying with the applicable airworthiness requirements if the instrument or equipment is installed in the helicopter. In this case, the installation should be approved as required in the applicable airworthiness requirements and should comply with the applicable airworthiness codes.

(b) The functionality of non-installed instruments and equipment required by this Part that does not need an equipment approval should be checked against recognised industry standards appropriate for the intended purpose. The pilot-in command is responsible for ensuring the maintenance of these instruments and equipment.

(c) The failure of additional non-installed instruments or equipment not required by this Part or by the applicable airworthiness requirements or any applicable airspace requirements should not adversely affect the airworthiness and/or the safe operation of the helicopter. Examples are the following:

(1) instruments supplying additional flight information (e.g. stand-alone GPS);

(2) mission dedicated equipment (e.g. radios); and

(3) non-installed task specialists equipment.

AMC1-SPO.IDE.H.115 Operating lights

LANDING LIGHT

The landing light should be trainable, at least in the vertical plane, or optionally be an additional fixed light or lights positioned to give a wide spread of illumination.

AMC1-SPO.IDE.H.120&SPO.IDE.H.125 Operations under VFR & operations under IFR – flight and navigational instruments and associated equipment

INTEGRATED INSTRUMENTS

(a) Individual equipment requirements may be met by combinations of instruments, by integrated flight systems or by a combination of parameters on electronic displays. The information so available to each required pilot should not be less than that required in the applicable operational requirements, and the equivalent safety of the installation should be approved during type certification of the helicopter for the intended type of operation.

(b) The means of measuring and indicating turn and slip, helicopter attitude and stabilised helicopter heading may be met by combinations of instruments or by integrated flight director systems, provided that the safeguards against total failure, inherent in the three separate instruments, are retained.

AMC1-SPO.IDE.H.120(a)(1)&SPO.IDE.H.125(a)(1) Operations under VFR & operations under IFR – flight and navigational instruments and associated equipment

MEANS OF MEASURING AND DISPLAYING MAGNETIC HEADING

The means of measuring and displaying magnetic direction should be a magnetic compass or equivalent.

AMC1-SPO.IDE.H.120(a)(2)&SPO.IDE.H.125(a)(2) Operations under VFR & operations under IFR – flight and navigational instruments and associated equipment

MEANS OF MEASURING AND DISPLAYING THE TIME

A means of measuring and displaying the time in hours, minutes and seconds may be a wrist watch capable of the same functions.

AMC1-SPO.IDE.H.120(a)(3)&SPO.IDE.H.125(a)(3) Operations under VFR & operations under IFR – flight and navigational instruments and associated equipment

CALIBRATION OF THE MEANS OF MEASURING AND DISPLAYING PRESSURE ALTITUDE

The instrument measuring and displaying pressure altitude should be of a sensitive type calibrated in feet (ft), with a sub-scale setting, calibrated in hectopascals/millibars, adjustable for any barometric pressure likely to be set during flight.

GM1-SPO.IDE.H.125(a)(3) Operations under IFR – flight and navigational instruments and associated equipment

ALTIMETERS

Except for unpressurised helicopters operating below 10 000 feet, the altimeters of helicopters operating under IFR or at night should have counter drum-pointer or equivalent presentation.

AMC1-SPO.IDE.H.120(a)(4)&SPO.IDE.H.125(a)(4) Operations under VFR & operations under IFR – flight and navigational instruments and associated equipment

CALIBRATION OF THE INSTRUMENT INDICATING AIRSPEED

The instrument indicating airspeed should be calibrated in knots (kt). In the case of helicopters with an MCTOM below 2 000 kg, calibration in kilometres (km) per hour or in miles per hours (mph) is acceptable.

AMC1-SPO.IDE.H.120(a)(5) Operations under VFR & operations under IFR – flight and navigational instruments and associated equipment

SLIP INDICATION

The means of measuring and displaying slip may be a slip string for operations under VFR.

AMC1-SPO.IDE.H.125(a)(9) Operations under IFR – flight and navigational instruments and associated equipment

MEANS OF DISPLAYING OUTSIDE AIR TEMPERATURE

(a) The means of displaying outside air temperature should be calibrated in degrees Celsius.

(b) The means of displaying outside air temperature may be an air temperature indicator that provides indications that are convertible to outside air temperature.

AMC1-SPO.IDE.H.120(c)&SPO.IDE.H.125(c) Operations under VFR & operations under IFR – flight and navigational instruments and associated equipment

MULTI-PILOT OPERATIONS - DUPLICATE INSTRUMENTS

Duplicate instruments include separate displays for each pilot and separate selectors or other associated equipment where appropriate.

AMC1-SPO.IDE.H.120(b)(1)(iii)&SPO.IDE.H.125(a)(8) Operations under VFR & operations under IFR – flight and navigational instruments and associated equipment

STABILISED HEADING

Stabilised direction should be achieved for VFR flights by a gyroscopic direction indicator, whereas for IFR flights, this should be achieved through a magnetic gyroscopic direction indicator.

AMC1-SPO.IDE.H.120(b)(3)&SPO.IDE.H.125(c) Operations under VFR & operations under IFR – flight and navigational instruments and associated equipment

MEANS OF PREVENTING MALFUNCTION DUE TO CONDENSATION OR ICING

The means of preventing malfunction due to either condensation or icing of the airspeed indicating system should be a heated pitot tube or equivalent.

AMC1-SPO.IDE.H.125(f) Operations under IFR – flight and navigational instruments and associated equipment

CHART HOLDER

An acceptable means of compliance with the chart holder requirement would be to display a pre-composed chart on an electronic flight bag (EFB).

AMC1-SPO.IDE.H.135 Flight crew interphone system

TYPE OF FLIGHT CREW INTERPHONE

(a) The flight crew interphone system should not be of a handheld type.

AMC1-SPO.IDE.H.140 Cockpit voice recorder

GENERAL

The operational performance requirements for CVRs should be those laid down in EUROCAE Document ED-112 (Minimum Operational Performance Specification for Crash Protected Airborne Recorder Systems), dated March 2003, including amendments n°1 and 2.

AMC1-SPO.IDE.H.145 Flight data recorder

LIST OF PARAMETERS TO BE RECORDED

(a) The FDR should record, with reference to a timescale, the list of parameters in Table 1 and Table 2, as applicable

(b) The parameters recorded by the FDR should meet, as far as practicable, the performance specifications (designated ranges, sampling intervals, accuracy limits and minimum resolution in read-out) defined in EUROCAE ED-112, dated 2003.

Table 1: FDR parameters – All helicopters

No.*	**Parameter**
1	Time or relative time count
2	Pressure altitude
3	Indicated airspeed
4	Heading
5	Normal acceleration
6	Pitch attitude
7	Roll attitude
8	Manual radio transmission keying CVR/FDR synchronisation reference
9 9a 9b 9c 9d 9e	Power on each engine Free power turbine speed (N_F) Engine torque Engine gas generator speed (N_G) Cockpit power control position Other parameters to enable engine power to be determined
10a 10b	Main rotor speed Rotor brake (if installed)
11 11a 11b 11c 11d 11e 11f	Primary flight controls – Pilot input and/or control output position (if applicable) Collective pitch Longitudinal cyclic pitch Lateral cyclic pitch Tail rotor pedal Controllable stabilator (if applicable) Hydraulic selection
12	Hydraulics low pressure (each system should be recorded.)
13	Outside air temperature
18	Yaw rate or yaw acceleration
20	Longitudinal acceleration (body axis)

No.*	**Parameter**
21	Lateral acceleration
25	Marker beacon passage
26	Warnings - a discrete should be recorded for the master warning, gearbox low oil pressure and sas failure. Other 'red' warnings should be recorded where the warning condition cannot be determined from other parameters or from the cockpit voice recorder.
27	Each navigation receiver frequency selection
37	Engine control modes

* The number in the left hand column reflects the serial number depicted in EUROCAE ED-112.

Table 2: FDR parameters - Helicopters for which the data source for the parameter is either used by helicopter systems or is available on the instrument panel for use by the flight crew to operate the helicopter.

No.*	**Parameter**
14	AFCS mode and engagement status
15	Stability augmentation system engagement (each system should be recorded)
16	Main gear box oil pressure
17 17a 17b 17c	Gear box oil temperature Main gear box oil temperature Intermediate gear box oil temperature Tail rotor gear box oil temperature
19	Indicated sling load force (if signals readily available)
22	Radio altitude
23 23a 23b 23c	Vertical deviation - the approach aid in use should be recorded. ILS glide path MLS elevation GNSS approach path
24 24a	Horizontal deviation - the approach aid in use should be recorded. ILS localiser

No.*	**Parameter**
24b	MLS azimuth
24c	GNSS approach path
28	DME 1 & 2 distances
29	Navigation data
29a	Drift angle
29b	Wind speed
29c	Wind direction
29d	Latitude
29e	Longitude
29f	Ground speed
30	Landing gear or gear selector position
31	Engine exhaust gas temperature (T_4)
32	Turbine inlet temperature (TIT/ITT)
33	Fuel contents
34	Altitude rate (vertical speed) - only necessary when available from cockpit instruments
35	Ice detection
36	Helicopter health and usage monitor system (HUMS) - only when information from the HUMS is used by the crew or aircraft system
36a	Engine data
36b	Chip detector
36c	Track timing
36d	Exceedance discretes
36e	Broadband average engine vibration
38	Selected barometric setting - to be recorded for helicopters where the parameter is displayed electronically
38a	Pilot
38b	Co-pilot
39	Selected altitude (all pilot selectable modes of operation) - to be recorded for the helicopters where the parameter is displayed electronically

No.*	**Parameter**
40	Selected speed (all pilot selectable modes of operation) - to be recorded for the helicopters where the parameter is displayed electronically
41	Not used (selected Mach)
42	Selected vertical speed (all pilot selectable modes of operation) - to be recorded for the helicopters where the parameter is displayed electronically
43	Selected heading (all pilot selectable modes of operation) - to be recorded for the helicopters where the parameter is displayed electronically
44	Selected flight path (all pilot selectable modes of operation) - to be recorded for the helicopters where the parameter is displayed electronically
45	Selected decision height (all pilot selectable modes of operation) - to be recorded for the helicopters where the parameter is displayed electronically
46	EFIS display format
47	Multi-function/engine/alerts display format
48	Event marker

* The number in the left hand column reflects the serial number depicted in EUROCAE ED-112.

AMC1-SPO.IDE.H.150 Data link recording

GENERAL

(a) As a means of compliance with SPO.IDE.H.150, the recorder on which the data link messages are recorded should be:

(1) the CVR;

(2) the FDR;

(3) a combination recorder when SPO.IDE.H.155 is applicable; or

(4) a dedicated flight recorder. In such case, the operational performance requirements for this recorder should be those laid down in EUROCAE Document ED-112 (Minimum Operational Performance Specification for Crash Protected Airborne Recorder Systems), dated March 2003, including amendments n°1 and n°2.

(b) As a means of compliance with SPO.IDE.H.150 (a)(2), the operator should enable correlation by providing information that allows an accident investigator to understand what data was provided to the aircraft and, when the provider identification is contained in the message, by which provider.

(c) The timing information associated with the data link communications messages required to be recorded by SPO.IDE.H.150(a)(3) should be capable of being

determined from the airborne-based recordings. This timing information should include at least the following:

(1) the time each message was generated;

(2) the time any message was available to be displayed by the flight crew;

(3) the time each message was actually displayed or recalled from a queue; and

(4) the time of each status change.

(d) The message priority should be recorded when it is defined by the protocol of the data link communication message being recorded.

(e) The expression 'taking into account the system's architecture', in SPO.IDE.H.150 (a)(3), means that the recording of the specified information may be omitted if the existing source systems involved would require a major upgrade. The following should be considered:

(1) the extent of the modification required;

(2) the down-time period; and

(3) equipment software development.

(f) Data link communications messages that support the applications in Table 1 should be recorded.

(g) Further details on the recording requirements can be found in the recording requirement matrix in Appendix D.2 of EUROCAE Document ED-93 (Minimum Aviation System Performance Specification for CNS/ATM Recorder Systems), dated November 1998.

Table 1: Data link recording

Item No.	Application Type	Application Description	Required Recording Content
1	Data link initiation	This includes any application used to log on to, or initiate, a data link service. In future air navigation system (FANS)-1/A and air traffic navigation (ATN), these are ATS facilities notification (AFN) and context management (CM), respectively.	C
2	Controller/pilot communication	This includes any application used to exchange requests, clearances, instructions and reports between the flight crew and controllers on the ground. In FANS-1/A and ATN, this includes the controller pilot data link communications (CPDLC) application. It also includes applications used for the exchange of oceanic clearances (OCL) and departure clearances (DCL), as well as data link	C

Item No.	Application Type	Application Description	Required Recording Content
		delivery of taxi clearances.	
3	Addressed surveillance	This includes any surveillance application in which the ground sets up contracts for delivery of surveillance data. In FANS-1/A and ATN, this includes the automatic dependent surveillance-contract (ADS-C) application, controller access parameters (CAP) and system access parameters (SAP).	C, **F2**
4	Flight information	This includes any application used for delivery of flight information data to specific aeroplanes. This includes for example data link-automatic terminal information service (D-ATIS), data link-operational terminal information service (D-OTIS), digital weather information services (D-METAR or TWIP), data link-flight information service (D-FIS) and Notice to Airmen (electronic NOTAM) delivery.	C
5	Broadcast surveillance	This includes elementary and enhanced surveillance systems, as well as automatic dependent surveillance-broadcast (ADS-B) output data.	M*, F2
6	AOC data	This includes any application transmitting or receiving data used for AOC purposes (in accordance with the ICAO definition of AOC). Such systems may also process AAC messages, but there is no requirement to record AAC messages	M*
7	Graphics	This includes any application receiving graphical data to be used for operational purposes (i.e. excluding applications that are receiving such things as updates to manuals).	M* F1

GM1-SPO.IDE.H.150 Data link recording

GENERAL

(a) The letters and expressions in Table 1 of AMC2-SPO.IDE.H.150 have the following meaning:

(1) C: complete contents recorded.

(2) M: information that enables correlation with any associated records stored separately from the helicopter.

(3) *: applications that are to be recorded only as far as is practicable, given the architecture of the system.

(4) F1: graphics applications may be considered as AOC messages when they are part of a data link communications application service run on an individual basis by the operator itself in the framework of the operational control.

(5) F2: where parametric data sent by the helicopter, such as Mode S, is reported within the message, it should be recorded unless data from the same source is recorded on the FDR.

(b) The definitions of the applications type in Table 1 of AMC2-SPO.IDE.H.150 are described in Table 1 below.

Table 1: Definitions of the applications type

Item No.	Application Type	Messages	Comments
1	CM		CM is an ATN service
2	AFN		AFN is a FANS 1/A service
3	CPDLC		All implemented up and downlink messages to be recorded
4	ADS-C	ADS-C reports	All contract requests and reports recorded
		Position reports	Only used within FANS 1/A. Mainly used in oceanic and remote areas.
5	ADS-B	Surveillance data	Information that enables correlation with any associated records stored separately from the helicopter.
6	D-FIS		D-FIS is an ATN service. All implemented up and downlink messages to be recorded
7	TWIP	TWIP messages	Terminal weather information for pilots
8	D ATIS	ATIS messages	EUROCAE ED-89A, dated December 2003: Data Link Application System Document (DLASD) for the "ATIS" data link service
9	OCL	OCL messages	EUROCAE ED-106A, dated March 2004: Data Link Application System Document (DLASD) for "Oceanic Clearance" (OCL) data link service

Item No.	Application Type	Messages	Comments
10	DCL	DCL messages	EUROCAE ED-85A, dated March 2003: Data Link Application System Document (DLASD) for "Departure Clearance" data link service
11	Graphics	Weather maps & other graphics	Graphics exchanged in the framework of procedures within the operational control, as specified in Part-ORO. Information that enables correlation with any associated records stored separately from the helicopter.
12	AOC	Aeronautical operational control messages	Messages exchanged in the framework of procedures within the operational control, as specified in Part-ORO. Information that enables correlation with any associated records stored separately from the helicopter. Definition in EUROCAE ED-112, dated March 2003.
13	Surveillance	Downlinked Aircraft Parameters (DAP)	As defined in ICAO Annex 10 Volume IV (Surveillance systems and ACAS).

GM1-SPO.IDE.H.155 Combination recorder

COMBINATION RECORDERS

(a) A flight data and cockpit voice combination recorder is a flight recorder that records:

(1) all voice communications and the aural environment required by SPO.IDE.H.140; and

(2) all parameters and specifications required by SPO.IDE.H.145,

with the same specifications required by SPO.IDE.H.140 and SPO.IDE.H.145.

(b) In addition a flight data and cockpit voice combination recorder may record data link communication messages and related information required by the SPO.IDE.H.150.

AMC2-SPO.IDE.H.160 Seats, seat safety belts and restraint systems

UPPER TORSO RESTRAINT SYSTEM

The following systems are deemed to be compliant with the requirement for an upper torso restraint system:

(a) a safety belt with a diagonal shoulder strap; and

(b) a restraint system having two or three straps.

SAFETY BELT

A safety belt with diagonal shoulder strap (three anchorage points) is deemed to be compliant with the requirement for safety belts (two anchorage points).

AMC1-SPO.IDE.H.165 First-aid kit

GENERAL

First-aid kits (FAKs) compliant with DIN 13164 or DIN 13157 are considered to meet the objective of SPO.IDE.H.165.

AMC2-SPO.IDE.H.165 First-aid kit

CONTENT OF FIRST-AID KIT – COMPLEX MOTOR-POWERED HELICOPTERS

(a) First-aid kits should be equipped with appropriate and sufficient medications and instrumentation. However, these kits should be amended by the operator according to the characteristics of the operation (scope of operation, flight duration, number and demographics of persons on board etc.).

(b) The following should be included in the FAKs:

(1) Equipment:

(i) bandages (assorted sizes);

(ii) burns dressings (unspecified);

(iii) wound dressings (large and small);

(iv) adhesive dressings (assorted sizes);

(v) adhesive tape;

(vi) adhesive wound closures;

(vii) safety pins;

(viii) safety scissors;

(ix) antiseptic wound cleaner;

(x) disposable resuscitation aid;

(xi) disposable gloves;

(xii) tweezers: splinter; and

(xiii) thermometers (non mercury).

(2) Medications:

(i) simple analgesic (may include liquid form);

(ii) antiemetic;

(iii) nasal decongestant;

(iv) gastrointestinal antacid, in the case of helicopters carrying more than nine persons;

(v) anti-diarrhoeal medication in the case of helicopters carrying more than nine persons; and

(vi) antihistamine.

(3) Other:

(i) a list of contents in at least two languages (English and one other). This should include information on the effects and side effects of medications carried;

(ii) first-aid handbook;

(iii) medical incident report form; and

(iv) biohazard disposal bags.

(4) An eye irrigator, although not required to be carried in the FAK, should, where possible, be available for use on the ground.

AMC3-SPO.IDE.H.165 First-aid kit

MAINTENANCE OF FIRST-AID KIT

To be kept up-to-date, the first-aid kit should be:

(a) inspected periodically to confirm, to the extent possible, that contents are maintained in the condition necessary for their intended use; and

(b) replenished at regular intervals, in accordance with instructions contained on their labels, or as circumstances warrant.

AMC1-SPO.IDE.H.175 Supplemental oxygen – non-pressurised helicopters

DETERMINATION OF OXYGEN

The amount of oxygen should be determined on the basis of cabin pressure altitude and flight duration, consistent with the operating procedures, including emergency, procedures, established for each operation and the routes to be flown as specified in the AFM.

AMC1-SPO.IDE.H.185 Marking of break-in points

COLOUR AND CORNERS' MARKING

(a) The colour of the markings should be red or yellow and, if necessary, should be outlined in white to contrast with the background.

(b) If the corner markings are more than 2 m apart, intermediate lines 9 cm x 3 cm should be inserted so that there is no more than 2 m between adjacent markings.

AMC1-SPO.IDE.H.190 Emergency locator transmitter (ELT)

ELT BATTERIES

Batteries used in the ELTs should be replaced (or recharged, if the battery is rechargeable) when the equipment has been in use for more than 1 cumulative hour, and also when 50 % of their useful life (or for rechargeable, 50 % of their useful life of charge), as established by the equipment manufacturer has expired. The new expiry date for the replacement (or recharged) battery should be legibly marked on the outside of the equipment. The battery useful life (or useful life of charge) requirements of this paragraph do not apply to batteries (such as water-activated batteries) that are essentially unaffected during probable storage intervals.

AMC2-SPO.IDE.H.190 Emergency locator transmitter (ELT)

TYPES OF ELT AND GENERAL TECHNICAL SPECIFICATIONS

(a) The ELT required by this provision should be one of the following:

(1) Automatic fixed (ELT(AF)). An automatically activated ELT that is permanently attached to an aircraft and is designed to aid SAR teams in locating the crash site.

(2) Automatic portable (ELT(AP)). An automatically activated ELT that is rigidly attached to an aircraft before a crash, but is 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 SAR teams in locating the crash site or survivor(s).

(3) Automatic deployable (ELT(AD)). An ELT that is rigidly attached to the aircraft before the crash and that is automatically ejected, deployed and activated by an impact, and, in some cases, also by hydrostatic sensors. Manual deployment is also provided. This type of ELT should float in water and is intended to aid SAR teams in locating the crash site.

(4) Survival ELT (ELT(S)). An ELT that is removable from an aircraft, stowed so as to facilitate its ready use in an emergency, and manually activated by a survivor. An ELT(S) may be activated manually or automatically (e.g. by water activation). It should be designed to be tethered to a life-raft or a survivor.

(b) To minimise the possibility of damage in the event of crash impact, the automatic ELT should be rigidly fixed to the aircraft structure, as far aft as is practicable, with its antenna and connections arranged so as to maximise the probability of the signal being transmitted after a crash.

(c) Any ELT carried should operate in accordance with the relevant provisions of ICAO Annex 10, Volume III and should be registered with the national agency responsible for initiating search and rescue or other nominated agency.

AMC3-SPO.IDE.H.190 Emergency locator transmitter (ELT)

PLB TECHNICAL SPECIFICATIONS

A personal locator beacon (PLB) should have a built-in GNSS receiver with a cosmicheskaya sistyema poiska avariynich sudov - search and rescue satellite-aided tracking (COSPAS-SARSAT) type approval number. However, devices with a COSPAS-SARSAT with a number belonging to series 700 are excluded as this series of numbers identifies the special-use beacons not meeting all the technical requirements and all the tests specified by COSPAS-SARSAT.

GM1-SPO.IDE.H.190 Emergency locator transmitter (ELT)

TERMINOLOGY

(a) An ELT is a generic term describing equipment that broadcasts distinctive signals on designated frequencies and, depending on application, may be activated by impact or may be manually activated.

(b) A PLB is an emergency beacon other than an ELT that broadcasts distinctive signals on designated frequencies, is standalone, portable and is manually activated by the survivors.

AMC1-SPO.IDE.H.195&SPO.IDE.H.197 Flight over water & Life-jackets – complex motor-powered helicopters

ACCESSIBILITY OF LIFE-JACKETS

The life-jacket should be accessible from the seat or berth of the person for whose use it is provided, with a safety belt or a restraint system fastened.

AMC1-SPO.IDE.H.195 Flight over water

RISK ASSESSMENT

(a) When conducting the risk assessment, the pilot-in-command should base his/her decision, as far as is practicable, on the Implementing Rules and AMCs applicable to the operation of the helicopter.

(b) The pilot-in-command should, for determining the risk, take the following operating environment and conditions into account:

(1) sea state;

(2) sea and air temperatures;

(3) the distance from land suitable for making an emergency landing; and

(4) the availability of search and rescue facilities.

GM1-SPO.IDE.H.195&SPO.IDE.H.197 Flight over water & Life-jackets – complex and non-complex motor-powered helicopters

SEAT CUSHIONS

Seat cushions are not considered to be flotation devices.

GM1-SPO.IDE.H.198 Survival suits

ESTIMATING SURVIVAL TIME

(a) Introduction

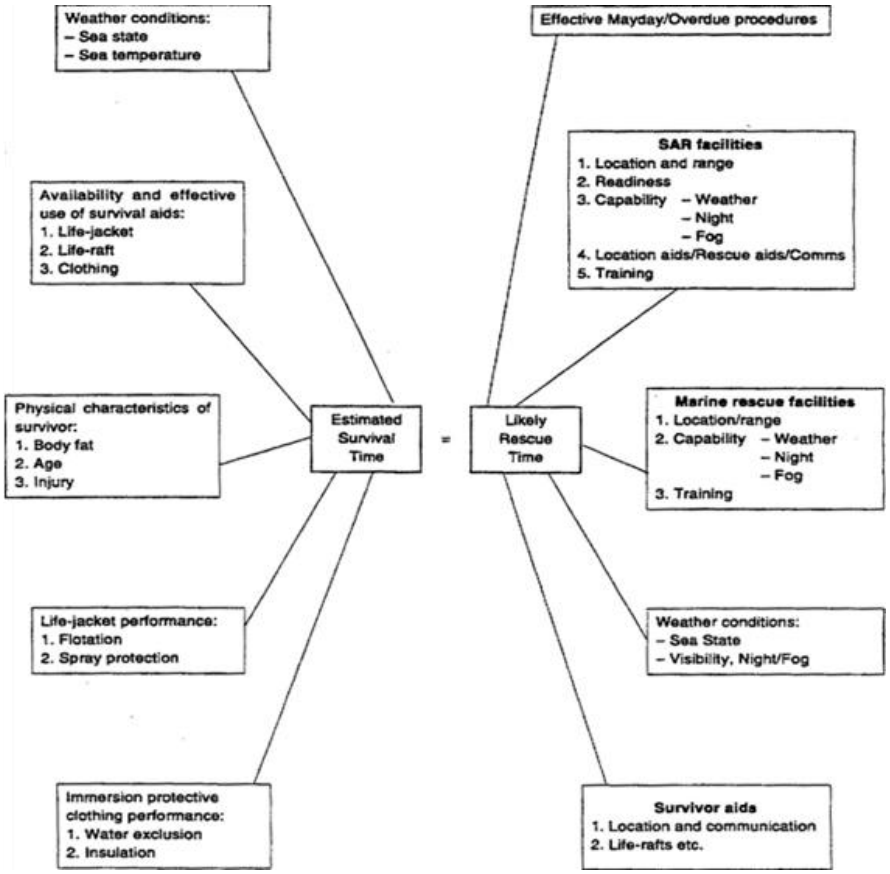
(1) A person accidentally immersed in cold seas (typically offshore Northern Europe) will have a better chance of survival if he/she is wearing an effective survival suit in addition to a life-jacket. By wearing the survival suit, he/she can slow down the rate which his/her body temperature falls and, consequently, protect himself/herself from the greater risk of drowning brought about by incapacitation due to hypothermia.

(2) The complete survival suit system – suit, life-jacket and clothes worn under the suit – should be able to keep the wearer alive long enough for the rescue services to find and recover him/her. In practice the limit is about 3 hours. If a group of persons in the water cannot be rescued within this time they are likely to have become so scattered and separated that location will be extremely difficult, especially in the rough water typical of Northern European sea areas. If it is expected that in water protection could be required for periods greater than 3 hours, improvements should, rather, be sought in the search and rescue procedures than in the immersion suit protection.

(b) Survival times

(1) The aim should be to ensure that a person in the water can survive long enough to be rescued, i.e. the survival time should be greater than the likely rescue time. The factors affecting both times are shown in Figure 1. The figure emphasises that survival time is influenced by many factors, physical and human. Some of the factors are relevant to survival in cold water and some are relevant in water at any temperature.

Figure 1: The survival equation



(2) Broad estimates of likely survival times for the thin individual offshore are given in Table 1 below. As survival time is significantly affected by the prevailing weather conditions at the time of immersion, the Beaufort wind scale has been used as an indicator of these surface conditions.

Table 1: Timescale within which the most vulnerable individuals are likely to succumb to the prevailing conditions.

Clothing assembly	**Beaufort wind force**	**Times within which the most vulnerable individuals are likely to drown**	
		(water temp 5°C)	(water temp 13°C)
Working clothes (no immersion suit)	0 – 2	Within ¾ hour	Within 1 ¼ hours
	3 – 4	Within ½ hour	Within ½ hour
	5 and above	Significantly less than ½ hour	Significantly less than ½ hour

Clothing assembly	**Beaufort wind force**	**Times within which the most vulnerable individuals are likely to drown**	
		(water temp 5°C)	(water temp 13°C)
Immersion suit worn over working clothes (with leakage inside suit)	0 -2	May well exceed 3 hours	May well exceed 3 hours
	3 – 4	Within 2 ¾ hours	May well exceed 3 hours
	5 and above	Significantly less than 2 ¾ hours. May well exceed 1 hour	May well exceed 3 hours

(3) Consideration should also be given to escaping from the helicopter itself should it submerge or invert in the water. In this case escape time is limited to the length of time the occupants can hold their breath. The breath holding time can be greatly reduced by the effect of cold shock. Cold shock is caused by the sudden drop in skin temperature on immersion, and is characterised by a gasp reflex and uncontrolled breathing. The urge to breath rapidly becomes overwhelming and, if still submerged, the individual will inhale water resulting in drowning. Delaying the onset of cold shock by wearing an immersion suit will extend the available escape time from a submerged helicopter.

(4) The effects of water leakage and hydrostatic compression on the insulation quality of clothing are well recognised. In a nominally dry system the insulation is provided by still air trapped within the clothing fibres and between the layers of suit and clothes. It has been observed that many systems lose some of their insulating capacity either because the clothes under the 'waterproof' survival suit get wet to some extent or because of hydrostatic compression of the whole assembly. As a result of water leakage and compression, survival times will be shortened. The wearing of warm clothing under the suit is recommended.

(5) Whatever type of survival suit and other clothing is provided, it should not be forgotten that significant heat loss can occur from the head.

AMC1-SPO.IDE.H.199 Life-rafts, survival ELTs and survival equipment on extended overwater flights –complex motor-powered helicopters

LIFE–RAFTS AND EQUIPMENT FOR MAKING DISTRESS SIGNALS

(a) Each required life-raft should conform to the following specifications:

(1) be of an approved design and stowed so as to facilitate their ready use in an emergency;

(2) be radar conspicuous to standard airborne radar equipment;

(3) when carrying more than one life-raft on board, at least 50 % of the rafts should be able to be deployed by the crew while seated at their normal station, where necessary by remote control; and

(4) life-rafts that are not deployable by remote control or by the crew should be of such weight as to permit handling by one person. 40 kg should be considered a maximum weight.

(b) Each required life-raft should contain at least the following:

(1) one approved survivor locator light;

(2) one approved visual signalling device;

(3) one canopy (for use as a sail, sunshade or rain catcher) or other mean to protect occupants from the elements;

(4) one radar reflector;

(5) one 20 m retaining line designed to hold the life-raft near the helicopter but to release it if the helicopter becomes totally submerged;

(6) one sea anchor; and

(7) one survival kit, appropriately equipped for the route to be flown, which should contain at least the following:

(i) one life-raft repair kit;

(ii) one bailing bucket;

(iii) one signalling mirror;

(iv) one police whistle;

(v) one buoyant raft knife;

(vi) one supplementary means of inflation;

(vii) sea sickness tablets;

(viii) one first-aid kit;

(ix) one portable means of illumination;

(x) 500 ml of pure water and one sea water desalting kit; and

xi. one comprehensive illustrated survival booklet in an appropriate language.

AMC1-SPO.IDE.H.200 Survival equipment

ADDITIONAL SURVIVAL EQUIPMENT

(a) The following additional survival equipment should be carried when required:

(1) 500 ml of water for each four, or fraction of four, persons on board;

(2) one knife;

(3) first-aid equipment; and

(4) one set of air/ground codes.

(b) In addition, when polar conditions are expected, the following should be carried:

(1) a means of melting snow;

(2) one snow shovel and one ice saw;

(3) sleeping bags for use by 1/3 of all persons on board and space blankets for the remainder or space blankets for all persons on board; and

(4) one arctic/polar suit for each crew member carried.

(c) If any item of equipment contained in the above list is already carried on board the aircraft in accordance with another requirement, there is no need for this to be duplicated.

GM1-SPO.IDE.H.200 Survival equipment

SIGNALLING EQUIPMENT

The signalling equipment for making distress signals is described in ICAO Annex 2, Rules of the Air.

GM2-SPO.IDE.H.200 Survival equipment

AREAS IN WHICH SEARCH AND RESCUE WOULD BE ESPECIALLY DIFFICULT

The expression 'areas in which search and rescue would be especially difficult' should be interpreted, in this context, as meaning:

(a) areas so designated by the competent authority responsible for managing search and rescue; or

(b) areas that are largely uninhabited and where:

(1) the competent authority responsible for managing search and rescue has not published any information to confirm whether search and rescue would be or would not be especially difficult; and

(2) the competent authority referred to in (a) does not, as a matter of policy, designate areas as being especially difficult for search and rescue.

AMC1-SPO.IDE.H.201 Additional requirements for helicopters conducting offshore operations in a hostile sea area

INSTALLATION OF THE LIFE RAFT

(a) Projections on the exterior surface of the helicopter, that are located in a zone delineated by boundaries that are 1.22 m (4 ft) above and 0.61 m (2 ft) below the established static water line could cause damage to a deployed life-raft. Examples of projections which need to be considered are aerials, overboard vents, unprotected split-pin tails, guttering and any projection sharper than a three dimensional right angled corner.

(b) While the boundaries specified in (1) are intended as a guide, the total area that should be considered should also take into account the likely behaviour of the life-raft after deployment in all sea states up to the maximum in which the helicopter is capable of remaining upright.

(c) Wherever a modification or alteration is made to a helicopter within the boundaries specified, the need to prevent the modification or alteration from causing damage to a deployed life-raft should be taken into account in the design.

(d) Particular care should also be taken during routine maintenance to ensure that additional hazards are not introduced by, for example, leaving inspection panels with sharp corners proud of the surrounding fuselage surface, or allowing door sills to deteriorate to a point where sharp edges become a hazard.

(e) The same considerations apply in respect of emergency flotation equipment.

GM1-SPO.IDE.H.202 Helicopters certificated for operating on water - Miscellaneous equipment

INTERNATIONAL REGULATIONS FOR PREVENTING COLLISIONS AT SEA

International Regulations for Preventing Collisions at Sea are those that were published by the International Maritime Organisation (IMO) in 1972.

GM1-SPO.IDE.H.205 Individual protective equipment

TYPES OF INDIVIDUAL PROTECTIVE EQUIPMENT

Personal protective equipment should include, but is not limited to: flying suits, gloves, helmets, protective shoes, etc.

AMC1-SPO.IDE.H.206 Crash mitigation equipment

TYPES OF CRASH MITIGATION EQUIPMENT

Crash mitigation equipment should be certified in accordance with a recognised standard. It should include items which are necessary for reducing the consequences of a crash and should include such items as crash-absorbing seats and self-sealing fuel tanks.

AMC1-SPO.IDE.H.210 Headset

GENERAL

(a) A headset consists of a communication device that includes two earphones to receive and a microphone to transmit audio signals to the helicopter's communication system. To comply with the minimum performance requirements, the earphones and microphone should match the communication system's characteristics and the flight crew compartment environment. The headset should be adequately adjustable in order to fit the flight crew's head. Headset boom microphones should be of the noise cancelling type.

(b) If the intention is to utilise noise cancelling earphones, the operator should ensure that the earphones do not attenuate any aural warnings or sounds necessary for alerting the flight crew on matters related to the safe operation of the helicopter.

GM1-SPO.IDE.H.210 Headset

GENERAL

The term 'headset' includes any aviation helmet incorporating headphones and microphone worn by a flight crew member.

GM1-SPO.IDE.H.215 Radio communication equipment

APPLICABLE AIRSPACE REQUIREMENTS

For helicopters being operated under European air traffic control, the applicable airspace requirements include the Single European Sky legislation.

AMC1-SPO.IDE.H.225 Transponder

GENERAL

(a) The SSR transponders of helicopters being operated under European air traffic control should comply with any applicable Single European Sky legislation.

(b) If the Single European Sky legislation is not applicable, the SSR transponders should operate in accordance with the relevant provisions of Volume IV of ICAO Annex 10.

Section 3 - Sailplanes

GM1-SPO.IDE.S.100(a) Instruments and equipment – general

APPLICABLE AIRWORTHINESS REQUIREMENTS

The applicable airworthiness requirements for approval of instruments and equipment required by this Part are the following:

(a) Regulation (EC) 1702/2003 for:

(1) sailplanes registered in the EU; and

(2) sailplanes registered outside the EU but manufactured or designed by an EU organisation.

(b) Airworthiness requirements of the state of registry for sailplanes registered, designed and manufactured outside the EU.

GM1-SPO.IDE.S.100(a)&(b) Instruments and equipment – general

INSTRUMENTS AND EQUIPMENT THAT DO NOT NEED TO BE APPROVED

(a) The provision of this paragraph does not exempt the item of equipment from complying with the applicable airworthiness requirements if the instrument or equipment is installed in the sailplane. In this case, the installation should be approved as required in the applicable airworthiness requirements and should comply with the applicable airworthiness codes.

(b) The functionality of non-installed instruments and equipment required by this Part that does not need an equipment approval should be checked against recognised industry standards appropriate for the intended purpose. The pilot-in-command is responsible for ensuring the maintenance of these instruments and equipment.

(c) The failure of additional non-installed instruments or equipment not required by this Part or by the applicable airworthiness requirements or any applicable airspace requirements should not adversely affect the airworthiness and/or the safe operation of the sailplane. Examples are instruments supplying additional flight information (e.g. GPS or anti-collision information systems).

AMC1-SPO.IDE.S.115&SPO.IDE.S.120 Operations under VFR & cloud flying – flight and navigational instruments

INTEGRATED INSTRUMENTS

(a) Individual equipment requirements may be met by combinations of instruments or by integrated flight systems or by a combination of parameters on electronic displays. The information so available to each required pilot should not be less than that required in the applicable operational requirements, and the equivalent safety of the installation should be approved during type certification of the sailplane for the intended type of operation.

(b) The means of measuring and indicating turn and slip, sailplane attitude and stabilised sailplane direction may be met by combinations of instruments or by integrated flight director systems, provided that the safeguards against total failure, inherent in the three separate instruments, are retained.

AMC1-SPO.IDE.S.115(a)(1)&SPO.IDE.S.120(a) Operations under VFR & cloud flying – flight and navigational instruments

MEANS OF MEASURING AND DISPLAYING MAGNETIC DIRECTION

The means of measuring and displaying magnetic direction should be a magnetic compass or equivalent.

AMC1-SPO.IDE.S.115(a)(2)&SPO.IDE.S.120(b) Operations under VFR & cloud flying – flight and navigational instruments

MEANS OF MEASURING AND DISPLAYING THE TIME

A means of measuring and displaying the time in hours, minutes and seconds may be a wrist watch capable of the same functions.

AMC1-SPO.IDE.S.115(a)(3)&SPO.IDE.S.120(c) Operations under VFR & cloud flying – flight and navigational instruments

CALIBRATION OF THE MEANS FOR MEASURING AND DISPLAYING PRESSURE ALTITUDE

(a) The instrument measuring and displaying pressure altitude should be of a sensitive type calibrated in feet (ft), with a sub-scale setting, calibrated in hectopascals/millibars, adjustable for any barometric pressure likely to be set during flight.

(b) Calibration in metres (m) is also acceptable.

AMC1-SPO.IDE.S.115(a)(4)&SPO.IDE.S.120(d) Operations under VFR & cloud flying – flight and navigational instruments

CALIBRATION OF THE INSTRUMENT INDICATING AIRSPEED

(a) The instrument indicating airspeed should be calibrated in knots (kt).

(b) Calibration in kilometres (km) per hour or in miles per hours (mph) is also acceptable.

AMC1-SPO.IDE.S.125 Seats and restraint systems

UPPER TORSO RESTRAINT SYSTEM

(a) A seat belt with upper torso restraint system should have four anchorage points and should include shoulder straps (two anchorage points) and a seat belt (two anchorage points), which may be used independently.

(b) A restraint system having five anchorage points is deemed to be compliant to the requirement for seat belt with upper torso restraint system with four anchorage points.

AMC1-SPO.IDE.S.135 Flight over water

MEANS OF ILLUMINATION FOR LIFE-JACKETS

Each life-jacket or equivalent individual flotation device should be equipped with a means of electric illumination for the purpose of facilitating the location of persons.

RISK ASSESSMENT

(a) When conducting the risk assessment, the pilot-in-command should base his/her decision, as far as is practicable, on the Implementing Rules and AMCs applicable to the operation of the sailplane.

(b) The pilot-in-command should, for determining the risk, take the following operating environment and conditions into account:

(1) sea state;

(2) sea and air temperatures;

(3) the distance from land suitable for making an emergency landing; and

(4) the availability of search and rescue facilities.

GM1-SPO.IDE.S.135(a) Flight over water

SEAT CUSHIONS

Seat cushions are not considered to be flotation devices.

AMC1-SPO.IDE.S.135(b) Flight over water

ELT BATTERIES

Batteries used in the ELTs should be replaced (or recharged, if the battery is rechargeable) when the equipment has been in use for more than 1 cumulative hour, and also when 50 % of their useful life (or for rechargeable, 50 % of their useful life of charge), as established by the equipment manufacturer has expired. The new expiry date for the replacement (or recharged) battery should be legibly marked on the outside of the equipment. The battery useful life (or useful life of charge) requirements of this paragraph do not apply to batteries (such as water-activated batteries) that are essentially unaffected during probable storage intervals.

AMC2-SPO.IDE.S.135(b) Flight over water

TYPES OF ELT AND GENERAL TECHNICAL SPECIFICATIONS

(a) The ELT required by this provision should be one of the following:

(1) Automatic fixed (ELT(AF)). An automatically activated ELT that is permanently attached to an aircraft and is designed to aid SAR teams in locating the crash site.

(2) Automatic portable (ELT(AP)). An automatically activated ELT that is rigidly attached to an aircraft before a crash, but is 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 SAR teams in locating the crash site or survivor(s).

(3) Automatic Deployable (ELT(AD)). An ELT that is rigidly attached to the aircraft before the crash and that is automatically ejected, deployed and activated by an impact, and, in some cases, also by hydrostatic sensors. Manual deployment is also provided. This type of ELT should float in water and is intended to aid SAR teams in locating the crash site.

(4) Survival ELT (ELT(S)). An ELT that is removable from an aircraft, stowed so as to facilitate its ready use in an emergency and manually activated by a survivor. An ELT(S) may be activated manually or automatically (e.g. by water activation). It should be designed to be tethered to a life-raft or a survivor.

(b) To minimise the possibility of damage in the event of crash impact, the automatic ELT should be rigidly fixed to the aircraft structure, as far aft as is practicable, with its antenna and connections arranged so as to maximise the probability of the signal being transmitted after a crash.

(c) Any ELT carried should operate in accordance with the relevant provisions of ICAO Annex 10, Volume III and should be registered with the national agency responsible for initiating search and rescue or other nominated agency.

AMC3-SPO.IDE.S.135(b) Flight over water

PLB TECHNICAL SPECIFICATIONS

A personal locator beacon (PLB) should have a built-in GNSS receiver with a cosmicheskaya sistyema poiska avariynich sudov - search and rescue satellite-aided tracking (COSPAS-SARSAT) type approval number. However, devices with a COSPAS-SARSAT with a number belonging to series 700 are excluded as this series of numbers identifies the special-use beacons not meeting all the technical requirements and all the tests specified by COSPAS-SARSAT.

GM1-SPO.IDE.S.135(b) Flight over water

TERMINOLOGY

(a) An ELT is a generic term describing equipment that broadcasts distinctive signals on designated frequencies and, depending on application, may be activated by impact or may be manually activated.

(b) A PLB is an emergency beacon other than an ELT that broadcasts distinctive signals on designated frequencies, is standalone, portable and is manually activated by the survivors.

AMC1-SPO.IDE.S.140 Survival equipment

GENERAL

Sailplanes operated across land areas in which search and rescue would be especially difficult should be equipped with the following:

(a) signalling equipment to make the distress signals;

(b) at least one ELT(S) or a PLB; and

(c) additional survival equipment for the route to be flown taking account of the number of persons on board.

AMC2-SPO.IDE.S.140 Survival equipment

ADDITIONAL SURVIVAL EQUIPMENT

(a) The following additional survival equipment should be carried when required:

(1) 500 ml of water;

(2) one knife;

(3) first-aid equipment; and

(4) one set of air/ground codes.

(b) If any item of equipment contained in the above list is already carried on board the sailplane in accordance with another requirement, there is no need for this to be duplicated.

GM1-SPO.IDE.S.140 Survival equipment

SIGNALLING EQUIPMENT

The signalling equipment for making distress signals is described in ICAO Annex 2, Rules of the Air.

GM2-SPO.IDE.S.140 Survival equipment

AREAS IN WHICH SEARCH AND RESCUE WOULD BE ESPECIALLY DIFFICULT

The expression 'areas in which search and rescue would be especially difficult' should be interpreted, in this context, as meaning:

(a) areas so designated by the competent authority responsible for managing search and rescue; or

(b) areas that are largely uninhabited and where:

(1) the competent authority responsible for managing search and rescue has not published any information to confirm whether search and rescue would be or would not be especially difficult; and

(2) the competent authority referred to in 1. does not, as a matter of policy, designate areas as being especially difficult for search and rescue.

GM1-SPO.IDE.S.150 Navigation equipment

APPLICABLE AIRSPACE REQUIREMENTS

For sailplanes being operated under European air traffic control, the applicable airspace requirements include the Single European Sky legislation.

AMC1-SPO.IDE.S.155 Transponder

GENERAL

(a) The SSR transponders of sailplanes being operated under European air traffic control should comply with any applicable Single European Sky legislation.

(b) If the Single European Sky legislation is not applicable, the SSR transponders should operate in accordance with the relevant provisions of Volume IV of ICAO Annex 10.

Section 4 - Balloons

GM1-SPO.IDE.B.100(a) Instruments and equipment – general

APPLICABLE AIRWORTHINESS REQUIREMENTS

The applicable airworthiness requirements for approval of instruments and equipment required by this Part are the following:

(a) Regulation (EC) 1702/2003 for:

(1) balloons registered in the EU; and

(2) balloons registered outside the EU but manufactured or designed by an EU organisation.

(b) Airworthiness requirements of the state of registry for balloons registered, designed and manufactured outside the EU.

GM1-SPO.IDE.B.100(a)&(b) Instruments and equipment – general

INSTRUMENTS AND EQUIPMENT THAT DO NOT NEED TO BE APPROVED

(a) The provision of this paragraph does not exempt the item of equipment from complying with the applicable airworthiness requirements if the instrument or equipment is installed in the balloon. In this case, the installation should be approved as required in the applicable airworthiness requirements and should comply with the applicable airworthiness codes.

(b) The functionality of non-installed instruments and equipment required by this Part that does not need an equipment approval should be checked against recognised industry standards appropriate for the intended purpose. The pilot-in command is responsible for ensuring the maintenance of these instruments and equipment.

(c) The failure of additional non-installed instruments or equipment not required by this Part or by the applicable airworthiness requirements or any applicable airspace requirements should not adversely affect the airworthiness and/or the safe operation of the balloon. Examples are instruments supplying additional flight information (e.g. GPS or anti-collision information systems)).

AMC1-SPO.IDE.B.110 Operating lights

BALLOON LIGHTS

(a) The position lights should be one steady aviation white position light, and one flashing aviation red position light, or flashing aviation white, with an effective flash frequency of at least 40, but not more than 100, cycles per minute.

(b) Both lights should have 360° horizontal coverage and should be visible for at least 3 km (1.6 NM) under clear atmospheric conditions.

(c) The steady white light should be located not more than 20 ft below the basket, trapeze, or other means for carrying occupants. The flashing red or white light should be located between 7 ft and 10 ft below the steady white light.

(d) There should be a means to retract and store the lights.

ILLUMINATION FOR INSTRUMENTS AND EQUIPMENT

A means to provide adequate illumination to instruments and equipment essential to the safe operation of the balloon may be an independent portable light.

AMC1-SPO.IDE.B.115(a) Operations under VFR – flight and navigational instruments

MEANS OF DISPLAYING DRIFT DIRECTION

The drift direction may be determined by using a map and reference to visual landmarks.

AMC1-SPO.IDE.B.115(b)(1) Operations under VFR – flight and navigational instruments

MEANS OF MEASURING AND DISPLAYING THE TIME

A means of measuring and displaying the time in hours, minutes and seconds may be a wrist watch capable of the same functions.

GM1-SPO.IDE.B.115(b)(3) Operations under VFR – flight and navigational instruments

MEANS OF MEASURING AND DISPLAYING PRESSURE ALTITUDE

A means of measuring and displaying pressure altitude is needed when required by ATC, or when altitude needs to be checked for flights where oxygen is used, or the limitations in the AFM require to limit altitude and/or rate of climb/descent.

AMC1-SPO.IDE.B.120 First-aid kit

GENERAL

First-aid kits (FAKs) compliant with DIN 13164 or DIN 13157 are considered to meet the objective of SPO.IDE.B.120.

AMC2-SPO.IDE.B.120 First-aid kit

MAINTENANCE OF FIRST-AID KIT

To be kept up-to-date first-aid kits should be:

(a) inspected periodically to confirm, to the extent possible, that contents are maintained in the condition necessary for their intended use; and

(b) replenished at regular intervals, in accordance with instructions contained on their labels, or as circumstances warrant.

AMC1-SPO.IDE.B.130 Flight over water

RISK ASSESSMENT

(a) When conducting the risk assessment, the pilot-in-command should base his/her decision, as far as is practicable, on the Implementing Rules and AMCs applicable to the operation of the balloon.

(b) The pilot-in-command should, for determining the risk, take the following operating environment and conditions into account:

(1) sea state;

(2) sea and air temperatures;

(3) the distance from land suitable for making an emergency landing; and

(4) the availability of search and rescue facilities.

AMC1-SPO.IDE.B.130(a) Flight over water

MEANS OF ILLUMINATION FOR LIFE-JACKETS

Each life-jacket or equivalent individual flotation device should be equipped with a means of electric illumination for the purpose of facilitating the location of persons.

GM1-SPO.IDE.B.130(a) Flight over water

SEAT CUSHIONS

Seat cushions are not considered to be flotation devices.

AMC1-SPO.IDE.B.130(b) Flight over water

ELT BATTERIES

Batteries used in the ELTs should be replaced (or recharged, if the battery is rechargeable) when the equipment has been in use for more than 1 cumulative hour, and also when 50 % of their useful life (or for rechargeable, 50 % of their useful life of charge), as established by the equipment manufacturer has expired. The new expiry date for the replacement (or recharged) battery should be legibly marked on the outside of the equipment. The battery useful life (or useful life of charge) requirements of this paragraph do not apply to batteries (such as water-activated batteries) that are essentially unaffected during probable storage intervals.

AMC2-SPO.IDE.B.130(b) Flight over water

TYPES OF ELT AND GENERAL TECHNICAL SPECIFICATIONS

(a) The ELT required by this provision should be one of the following:

(1) Automatic fixed (ELT(AF)). An automatically activated ELT that is permanently attached to an aircraft and is designed to aid SAR teams in locating the crash site.

(2) Automatic portable (ELT(AP)). An automatically activated ELT that is rigidly attached to an aircraft before a crash, but is 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 SAR teams in locating the crash site or survivor(s).

(3) Automatic deployable (ELT(AD)). An ELT that is rigidly attached to the aircraft before the crash and which is automatically ejected, deployed and activated by an impact, and, in some cases, also by hydrostatic sensors. Manual deployment is also provided. This type of ELT should float in water and is intended to aid SAR teams in locating the crash site.

(4) Survival ELT (ELT(S)). An ELT that is removable from an aircraft, stowed so as to facilitate its ready use in an emergency and manually activated by a survivor. An ELT(S) may be activated manually or automatically (e.g. by water activation). It should be designed to be tethered to a life-raft or a survivor.

(b) To minimise the possibility of damage in the event of crash impact, the automatic ELT should be rigidly fixed to the aircraft structure, as far aft as is practicable, with its antenna and connections arranged so as to maximise the probability of the signal being transmitted after a crash.

(c) Any ELT carried should operate in accordance with the relevant provisions of ICAO Annex 10, Volume III and should be registered with the national agency responsible for initiating search and rescue or other nominated agency.

AMC3-SPO.IDE.B.130(b) Flight over water

PLB TECHNICAL SPECIFICATIONS

A personal locator beacon (PLB) should have a built-in GNSS receiver with a cosmicheskaya sistyema poiska avariynich sudov - search and rescue satellite-aided tracking (COSPAS-SARSAT) type approval number. However, devices with a COSPAS-SARSAT with a number belonging to series 700 are excluded as this series of numbers identifies the special-use beacons not meeting all the technical requirements and all the tests specified by COSPAS-SARSAT.

GM1-SPO.IDE.B.130(b) Flight over water

TERMINOLOGY

(a) An ELT is a generic term describing equipment that broadcasts distinctive signals on designated frequencies and, depending on application, may be activated by impact or may be manually activated.

(b) A PLB is an emergency beacon other than an ELT that broadcasts distinctive signals on designated frequencies, is standalone, portable and is manually activated by the survivors.

GM1-SPO.IDE.B.130(c) Flight over water

SIGNALLING EQUIPMENT

The signalling equipment for making distress signals is described in ICAO Annex 2, Rules of the Air.

AMC1-SPO.IDE.B.135 Survival equipment

GENERAL

Balloons operated across land areas in which search and rescue would be especially difficult should be equipped with the following:

(a) signalling equipment to make the distress signals;

(b) at least one ELT(S) or a PLB; and

(c) additional survival equipment for the route to be flown taking account of the number of persons on board.

AMC2-SPO.IDE.B.135 Survival equipment

ADDITIONAL SURVIVAL EQUIPMENT

(a) The following additional survival equipment should be carried when required:

  (1) 500 ml of water for each four, or fraction of four, persons on board;

  (2) one knife;

  (3) first-aid equipment; and

  (4) one set of air/ground codes.

(b) If any item of equipment contained in the above list is already carried on board the balloon in accordance with another requirement, there is no need for this to be duplicated.

GM1-SPO.IDE.B.135 Survival equipment

SIGNALLING EQUIPMENT

The signalling equipment for making distress signals is described in ICAO Annex 2, Rules of the Air.

GM2-SPO.IDE.B.135 Survival equipment

AREAS IN WHICH SEARCH AND RESCUE WOULD BE ESPECIALLY DIFFICULT

The expression 'areas in which search and rescue would be especially difficult' should be interpreted, in this context, as meaning:

(a) areas so designated by the competent authority responsible for managing search and rescue; or

(b) areas that are largely uninhabited and where:

(1) the competent authority responsible for managing search and rescue has not published any information to confirm whether search and rescue would be or would not be especially difficult; and

(2) the competent authority referred to in (a) does not, as a matter of policy, designate areas as being especially difficult for search and rescue.

GM1-SPO.IDE.B.145 Radio communication equipment

APPLICABLE AIRSPACE REQUIREMENTS

For balloons being operated under European air traffic control, the applicable airspace requirements include the Single European Sky legislation.

AMC1-SPO.IDE.B.150 Transponder

GENERAL

(a) The SSR transponders of balloons being operated under European air traffic control should comply with any applicable Single European Sky legislation.

(b) If the Single European Sky legislation is not applicable, the SSR transponders should operate in accordance with the relevant provisions of Volume IV of ICAO Annex 10.

Subpart E – Specific requirements

Section 1 – Helicopter external sling load operations (HESLO)

AMC1-SPO.SPEC.HESLO.100 Helicopter external sling load operations

STANDARD OPERATING PROCEDURES

1. Before conducting any HESLO, the operator should follow the procedures described below and demonstrate to the competent authority that the SOPs are suitable for the intended operation.

2. Nature and complexity of the activity

   a. Nature of the activity and exposure:

      Helicopter flights for the purpose of transporting external loads by different means (e.g. under slung, external pods or racks). These operations are performed as low level flights.

   b. Complexity of the activity:

      The complexity of the activity varies with the size and the shape of the load, the length of the rope and characteristics of the pick-up and drop-off zones, the time per load cycle, etc.

      Load Types

Load type 1:	short line, 20 metres (m) or less
Load type 2:	long line, more than 20 m
Load type 3:	logging
Load type 4:	construction, wire stringing, cable laying

c. Operational environment and geographical area:

HESLO may be performed over any geographical area. Special attention should be given to:

i. hostile and congested;

ii. mountains;

iii. sea;

iv. jungle; and

v. desert.

3. Helicopter and equipment

a. The helicopter:

The helicopter should be certificated in Category A or equivalent as determined by the Agency.

b. The equipment:

i. The helicopter may be equipped with:

A. additional mirror(s);

B. a bubble window; and

C. supplementary hook(s) or multi-hook device(s);

D. Load data recorder (lifts, weights, torques, power, forces, shocks and electrical activities).

c. Non-assisted vertical reference operations may require additional engine monitoring in the pilot line of vision or an audio warning system.

d. All additional equipment used, e.g. ropes, cables, mechanical hooks, swivel hooks, nets, buckets, chainsaws, baskets, containers, should be manufactured according to officially recognized standards. The operator is responsible for maintaining the serviceability of this equipment.

e. Adequate radio communication equipment (e.g. VHF, UHF, FM) should be installed in the helicopter for co-ordination with the task specialists involved in the operation.

f. Task specialists involved in the operation should be equipped with hand-held communication equipment, protective helmets with integrated earphones and microphones.

4. Crew members

a. Crew composition:

i. The minimum flight crew is stated in the approved AFM. For operational or training purposes, an additional crew member may assist the pilot-in-command in a single pilot operation.

ii. For safety and/or operational purposes, task specialists may be required by the operator to fulfil the task (e.g. to establish vertical reference).

b. Flight crew:

i. Pilot initial training

Before acting as pilot-in-command, the pilot should demonstrate to the operator that he/she has the required skill and knowledge.

ii. Theoretical knowledge

A. content of the operations manual (OM) including the relevant SOP

B. flight manual (limitations, emergencies etc.)

C. flight procedures (short line, long line, construction, wire stringing or cable laying flying techniques, as required for the operation)

D. load and site preparation including load rigging techniques and external load procedures

E. special equipment used in the operation

F. hazards and dangers

c. Practical training to meet the experience requirements

The pilot-in-command should have the practical training to meet the experience requirement.

d. Pilot experience

i. For operations with a maximum external load mass of less than 1 500 kg, the pilot-in-command should have at least the following experience:

A. 300 hours helicopter flight experience as pilot-in-command, which should be increased to 500 hours experience as pilot-in-command for mountain operations (higher than 5 000 ft);

B. 10 hours flight experience on the helicopter type;

C. 30 hours on the helicopter type, performing load type 1 and 2 operations, before acting as pilot-in-command in a load type 3 or 4 operation. Where a pilot has accomplished 50 hours in load type 1 and 2 operations, the 30 hours experience on the helicopter type may be reduced to 15 hours.

ii. For operations with a maximum external load mass of 1 500 kg and above, the pilot-in- command should have at least the following experience:

A. 1 000 hours helicopter flight experience as pilot-in-command, which should be increased to 1 500 hours experience as pilot-in-command for mountain operations (higher than 5 000 ft) and 20 hours of relevant experience for other areas of operation (desert, sea, jungle, etc.) and 300 hours HESLO;

B. 10 hours flight experience on the helicopter type;

C. 30 hours on the helicopter type, performing load type 1 and 2 operations, before acting as pilot-in-command in a load type 3 or 4 operation. Where a pilot has accomplished 50 hours in load type 1 and 2 operations, the 30 hours experience on the helicopter type may be reduced to 15 hours.

f. Pilot recurrent training

i. review of the load rigging techniques;

ii. external load procedures; and

iii. review of the applicable flying techniques

iv. A pilot who has performed 40 hours of relevant HELO in the same operating environment and helicopter type within the past 24 months may not need any further training other than in accordance with Part-FCL.

5. Task specialists

Before acting as task specialist, he/she should demonstrate to the operator that he/she has been trained appropriately and has the required skill and knowledge required.

a. Initial training

i. The initial training of task specialists should include at least:

A. behaviour in a rotor turning environment and training in ground safety and emergency procedures;

B. procedures including load rigging, usage and conservation (replacement) of LLD;

C. helicopter marshalling signals;

D. radio communication;

E. selection and preparation of pick-up and drop-off sites, dangers on working places (downwash, loose goods, third people);

F. Handling and safety of third party;
G. relevant training for the helicopter type;
H. Duties and responsibilities as described in the appropriate;
I. Perception and classification of flight obstacles (none, critical, danger), measures for safety.

ii. The individual safety equipment appropriate to the operational environment and complexity of the activity should be described in the appropriate manual.

b. Recurrent training

i. The annual recurrent training should include the items listed in the initial training as described in 1a above.

ii. The company should establish a formal qualification list for each individual task specialist.

iii. The company should establish a system of record-keeping that allows adequate storage and reliable traceability of:

A. The inital- and recurrent training

B. Qualifications (qualification list)

c. Briefing of task specialists

Briefings on the organisation and coordination between flight crew and task specialists involved in the operation should take place prior to each operation. These briefings should include at least the following:

i. Location and size of pick-up and drop-off site, operating altitude;

ii. Location of refuelling site and procedures to be applied;

iii. Load sequence, danger areas, performance and limitations, emergency procedures.

d. Responsibility of task specialists operating on the ground

i. Task specialists operating on the ground are responsible for the safe organisation of the ground operation, including:

A. adequate selection and preparation of the pick-up and drop-off points and load rigging; and

B. appropriate communication and assistance to the flight crew and other involved personnel

C. access restriction on the pick-up and drop-off site.

ii. If more than one person is required for a task, one should be nominated as leading the activities. This person should act as main link between flight crew and other task specialist(s) involved in the operation and is responsible for:

A. task specialist co-ordination and activities on the ground; and

B. the safety of the working area (loading and fuelling).

6. HESLO trainer

The HESLO trainer should demonstrate the following:

a. For pilots, a flight crew member holding a minimum HESLO level 1 and 2 and having a minimum experience of 500 hours of HESLO.

b. For task specialists, persons having at least 2 years of HESLO experience.

7. Performance

a. Power margins for HESLO operations

i. Load type 1 and 2

The mass of the helicopter should not exceed the Maximum Take-off Mass (MTOM) permitted at the pick-up or drop-off site, whichever is higher, as stated in the appropriate manual.

ii. Load type 3 and 4

The mass of the helicopter should not exceed the MTOM permitted at the pick-up or drop-off site, whichever is higher, as stated in the appropriate manual, reduced by 5%, or in case of montage operations by 10% of the sling load capacity.

8. Normal procedures

a. Operating procedures

HESLO should be performed in accordance with the appropriate manual and appropriate operating procedures. These procedures should include, for each type of operation:

i. crew individual safety equipment (e.g. helmet, fire retardant suits);

ii. crew responsibilities;

iii. crew coordination and communication;

iv. selection and size of pick-up and drop-off sites;

v. selection of flight routes;

vi. fuel management in the air and on the ground;

vii. task management; and

viii. third party risk management.

b. Ground procedures:

The operator should specify appropriate procedures, including:

i. use of ground equipment;

ii. load rigging;

iii. size and weight assessment of loads;

iv. attachment of suitably prepared loads to the helicopter;

v. two-way radio communication procedures;

vi. selection of suitable pick-up and drop-off sites;

vii. safety instructions for task specialists operating on the ground;

viii. helicopter performances information;

ix. fuel management on the ground;

x. responsibility, organisation and task management of other personnel on the ground involved in the operation;

xi. third party risk management; and

xii. environmental protection.

9. Emergency procedures:

a. Operating procedures (flight crew):

In addition to the emergency procedures publised in the AFM or OM, the operator should ensure that the flight crew:

i. is familiar with the appropriate emergency procedures;

ii. has appropriate knowledge of the emergency procedures for personnel on the ground involved in the operation; and

iii. reports emergencies as specified in the AFM or OM.

b. Ground procedures:

The operator should ensure that the task specialist on the ground involved in the operation:

i. is familiar with the appropriate emergency procedures;

ii. has appropriate knowledge of the flight crew emergency procedures;

iii. reports emergencies as specified in the AFM or OM; and

iv. prevents, as far as possible, environmental pollution.

10. Ground equipment

The operator should specify the use of ground equipment, such as fuel trucks, cables, strops etc. in the AFM or OM, including at least:

a. minimum size of the operating site;

b. surface condition;

c. positioning of ground equipment on the operating site;

d. fuel handling;

e. environment protection plan; and

f. location and use of fire suppression equipment.

11. Operations in a congested hostile environment

For operations in a congested hostile environment, helicopters should be operated in accordance with SPO.POL.120(b) and SPO.POL.146(a), (c) and (d). Particular attention should be given to operations with jettisoning of loads (cargo hook).

GM1-SPO.SPEC.HESLO.100 Helicopter external sling load operations

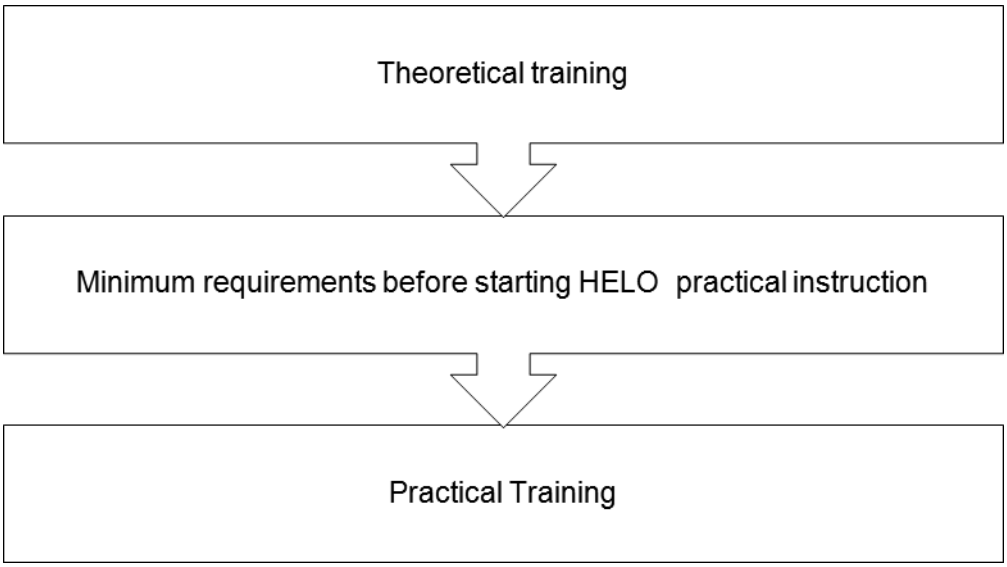
PILOT INITIAL TRAINING

Definitions

Mission: A mission is a HESLO flight or series of HESLO flights, conducted from site A to site B for a particular customer on a particular day.

Cycle: A cycle is a flight from site A to site B with an external load and the subsequent return to site A.

Basics for HESLO 1/2/3/4 and HESLO Conversion 2/3



Minimum requirements before starting the practical instruction

HESLO 1	– CPL(H) or ATPL(H) – Min. 300 hours PIC (H) – Min. 10 hours PIC on type – Type rating completed – HESLO ground intstruction completed – Marshaller syllabus reviewed
HESLO 2	– CPL(H) or ATPL(H) – HESLO level 1 completed – Type rating completed – Min. 10 hours PIC on type – HESLO 2 ground instruction completed – Marshaller syllabus reviewed

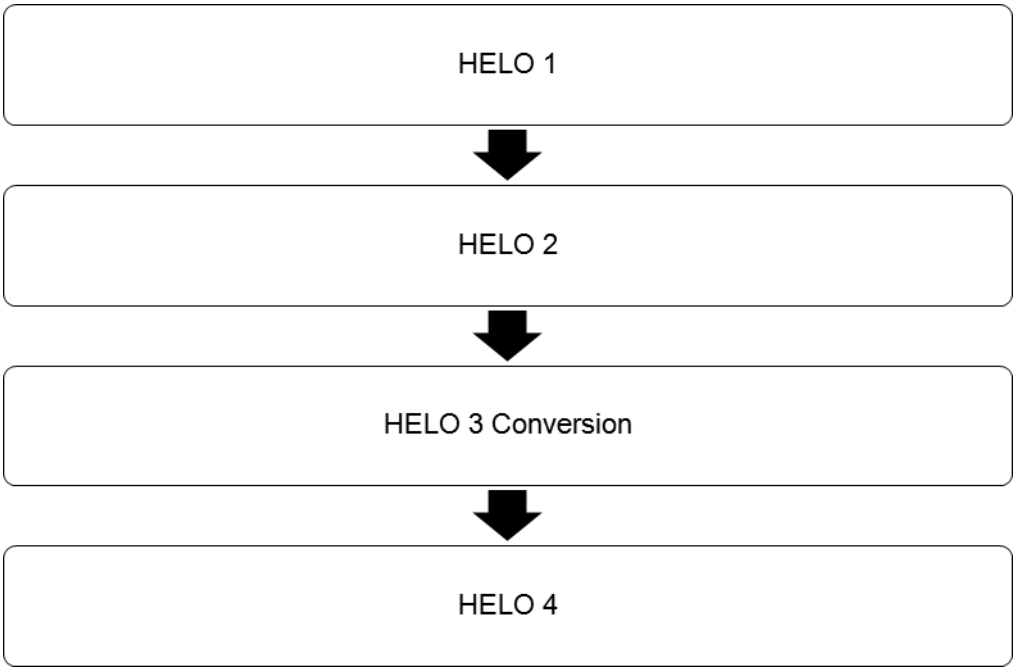
	– Min. 500 HESLO 1 cycles
HESLO 2 Conversion	– CPL(H) or ATPL(H) – HESLO level 3 completed – Type rating completed – Min. 10 hours PIC on type – HESLO 2 ground instructuion completed – Marshaller syllabus reviewed
HESLO 3	– CPL(H) or ATPL(H) – HESLO level 1 completed – Min. 500 HESLO cycles – Type rating completed – Min. 10 hours PIC on type – HESLO 3 ground instruction completed – Marshaller syllabus reviewed – Practical marshaller training for logging
HESLO 3 Conversion	– CPL(H) or ATPL(H) – HESLO level 2 completed – Type rating completed – Min. 10 hours PIC on type – HESLO 3 ground instruction completed – Marshaller syllabus reviewed – Practical marshaller training for logging
HESLO 4	– CPL(H) or ATPL(H) – Min. 1000 hours (H) – HESLO level 2 and 3 completed – Min. 5000 HESLO cycles – Type rating completed – Min. 10 hours PIC on type – HESLO 4 ground instruction completed – Practical load preparation training
HESLO 5	Heavy Lift more than 1500 kilos – Min. 1000 hours (H) – HELO level1 to 4 completed – Min. 5000 HELO cycles – Type rating completed – Min. 10 hours PIC on type

	– HELO 1 to 4 ground instruction completed

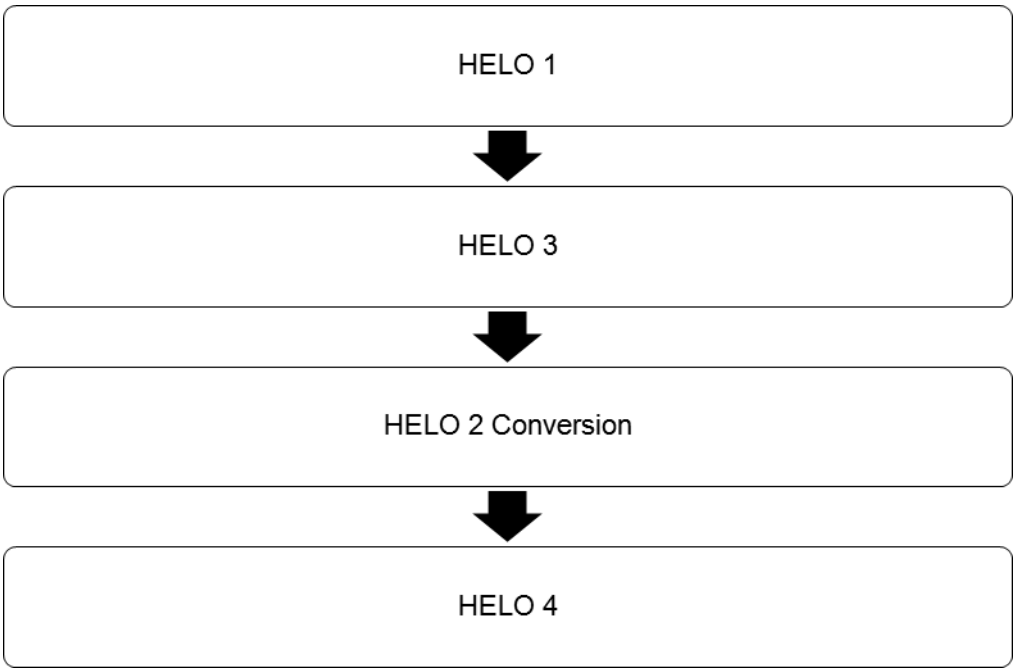
Scenarios and possibilities

Note: A conversion training exists for HESLO 2 and HESLO 3. The purpose is to allow flexibility in regard to the operation. Based on the minimum requirements for the conversion the conversion training allows to add HESLO 2 or HESLO 3 with a shortened training.

Scenario 1



Scenario 2



GM2-SPO.SPEC.HESLO.100 Helicopter external sling load operations

CHECK-LIST TEMPLATES FOR PILOT TRAINING IN HESLO 1,2,3,4 and 5

HESLO 1

EASA license Nr:

Applicant

Last name:_____ First name: _____ Date of birth:_____

Place of birth:_____ Place of origin: _____ Nationality: _____

Postal code:_____ City: _____ Street:_____

Phone/fax home: _____ Phone/fax office:_____

e-mail: _____Signature of applicant:_____

EXTERNAL CARGO SLING GROUND INSTRUCTION

Pilot in charge of theoretical instruction (must have a minimum of 500h HESLO experience):

Last name:_____ First name: _____ License Nr:_____

OM

Flight and duty times
Max. cycles / day
Min. and max. fuel
Refueling procedures
Radio communications
Human factors / CRM / nutrition
Safety equipment / operational briefing
Pilot / marshaller responsibilities

Flight Manual

Limitations
Performance / HOGE
Cargo hook supplement

Flight Procedures

Airspeed selection with load
Flight path selection (3rd party)
Bank / load factor / load drag
Load stabilisation techniques / hover & in-flight
Downwash / load rotation
Visual hover reference
Rotor clearance.
Marshaller hand signals
Environment / slope / forest / canyon
Manual & electrical load release
Decision / exposure time

Load & Person Preparation

Vertical loads
Horizontal loads
Light, bulky and combined loads
Nets & bags

Special Equipment

Concrete bucket / Water bucket
Load lifting attachements (line, net, bag, IBC, FIBC)
Slinging equipment (round sling, chain, shackle, etc)
Load lifting means (cargo hook, remote hook, etc.)
Load meter / printer
Mirror
Bubble window / vertical reference
Audio / vibration warning

Emergency / Limitations

Flight control stops
TR failure
Engine failure / OEI operation
Height velocity diagram / exposure time
Emergency procedures in sling ops.
Review of sling ops. accidents

Dangers

Flights in valleys / cables / wires
Flight over cities / roads / 3rd party
Airflow / up and downdrafts
Sun / shadow / snow / rain / static electricity
Settling with power / vortex
Emergency load jettison

Remarks:

Minimum requirements before starting practical HELO 1 instruction:

- **CPL(H) / ATPL(H)**
- **Min. 300 hours PIC helicopter**
- **Min. 10 hours PIC on type of helicopter**
- **Type rating completed**
- **HESLO ground instruction completed**
- **Marshaller syllabus reviewed**

I herewith certify that the trainee has received the required HESLO 1 ground instruction and is found competent to begin the practical HESLO 1 instruction.

Date: .....

Name: .....

Signature: .....

HESLO 1

FLIGHT INSTRUCTION

License Nr.

LEVEL 1 SHORT LINE
Sling length: ≤20 meters

Conditions:
- Maximum sling length 20 meters
- Maximum cargo weight 1'500 kg
- 1 marshaller (with radio) at pickup point
- 1 marshaller (with radio) at drop off point
- helicopter fitted with cargo mirror / bubble window*
  *if applicable

VERTICAL REFERENCES
The trainee must be able to perform a stabilized hover flight by means of vertical references without any external cargo attached to the helicopter prior to commencing training with external loads.

DEFINITIONS
Mission:
One mission is an HESLO flight or series of HESLO flights, conducted from site A to site B, for a particular customer, on a particular day.
Cycle:
A cycle is a flight from site A to site B with an external load and subsequent return to site A.

Pilot (preferably flight instructor) in charge of HESLO practical training (must be qualified at minimum for HESLO level 1 and 2 and must have a minimum experience of 500 hours HESLO). Maximum 2 persons.

Last name: _____ First name: _____ License Nr:_____

Last name: _____ First name: _____ License Nr:_____

SLING ≤ 10m

Flight instruction DC/minimum 5 hours: (every square is 1 hour) ☐ Mirror ☐ Vertical ref.

Date training started: .....

Cycles DC/minimum 50 cycles: (every square is 1 cycle) **should include load types 1 through 5**

Type of loads (use code in squares)
1 Concrete bucket
2 Vertical load
3 Horizontal load
4 Nets / bags
5 Light and bulky load

Trainee may perform **solo HESLO1 limited to 10m sling length with on site supervision**

Date:..... Signature / License. Nr: .....

SLING ≤ 20m OPTIONAL

Cycles DC/minimum 30 cycles (10m < sling < 20m): (every square is 1 cycle) **should include load types 1 through 5**

☐ Mirror ☐ Vertical ref.
must include 20 cycles 15m < sling < 20m

Trainee may perform **solo HESLO1 limited to 20m sling length with on site supervision**

Date:..... Signature / License. Nr: .....

Flight instruction solo with on site supervision / min. 10 missions: (every square is 1 mission) ☐ Mirror ☐ Vertical ref.

☐ **10m sling** ☐ **20m sling**

Cycles solo/minimum 100 cycles: (every square is 1 cycle) **should include load types 1 through 5**

For **HESLO 1 20m** qualification:
mini. 20 cycles 15m < sling < 20m

Trainee may perform **solo HESLO under supervision** Date:..... Signature / License. Nr: .....

Flight instruction solo under supervision / min 30 missions: (every square is 1 mission) ☐ Mirror ☐ Vertical ref.

SUPERVISOR NOT REQUIRED ON SITE
For **HESLO 1 20m** qualification:
mini. 10 missions 15m < sling < 20m

Trainee is found properly qualified for short line External Cargo Sling (HESLO1) operations without supervision.
The trainee's logbook has been endorsed with ☐ "HESLO Level 1 (10 meter)" or ☐ "HESLO Level 1 (20 meter)" as applicable.

Date: ..... Signature / License. Nr:.....

Total helicopter flight experience:

☐ >300h PIC HEL ☐ HEL<500h ☐ 500h<HEL<1000h ☐ 1000h<HEL<2000h ☐ HEL>2000h

TOTAL TIME HESLO 1:.....Nr. of cycles HESLO 1:.....

Remarks:

HESLO 2

EASA license Nr:

Applicant

Last name:_____ First name: _____ Date of birth:_____

Place of birth:_____ Place of origin: _____ Nationality: _____

Postal code:_____ City: _____ Street:_____

Phone/fax home: _____ Phone/fax office:_____

e-mail: _____Signature of applicant:_____

EXTERNAL CARGO SLING GROUND INSTRUCTION

Pilot in charge of theoretical instruction (must have a minimum of 500h HESLO experience):

Last name:_____ First name: _____ License Nr:_____

OM

Flight and duty times	☐	☐
Max. cycles / day	☐	☐
Min. and max. fuel	☐	☐
Refueling procedures	☐	☐
Radio communications	☐	☐
Human factors / CRM / nutrition	☐	☐
Safety equipment / operational briefing	☐	☐
Pilot / marshaller responsibilities	☐	☐

Flight Manual

Limitations	☐	☐
Performance / HOGE	☐	☐
Cargo hook supplement	☐	☐

Flight Procedures

Airspeed selection with load	☐	☐
Flight path selection (3rd party)	☐	☐
Bank / load factor / load drag	☐	☐
Load stabilisation techniques / hover & in-flight	☐	☐
Downwash / load rotation	☐	☐
Visual hover reference	☐	☐
Rotor clearance.	☐	☐
Marshaller Hand signals	☐	☐
Environment / slope / forest / canyon	☐	☐
Manual & electrical load release	☐	☐
Decision / exposure time	☐	☐

Load & Person Preparation

Vertical loads	☐	☐
Horizontal loads	☐	☐
Light, bulky and combined loads	☐	☐
Nets & bags	☐	☐

Special Equipment

Concrete bucket / Water bucket	☐	☐
Load lifting attachements (line, net, bag, IBC, FIBC)	☐	☐
Slinging equipment (round sling, chain, shackle, etc)	☐	☐
Load lifting means (cargo hook, remote hook, etc.)	☐	☐
Load meter / printer	☐	☐
Mirror	☐	☐
Bubble window / vertical reference	☐	☐
Audio / vibration warning	☐	☐

Emergency / Limitations

Flight control stops	☐	☐
TR failure	☐	☐
Engine failure / OEI operation	☐	☐
Height velocity diagram / exposure time	☐	☐
Emergency procedures in sling ops	☐	☐
Review of sling ops. accidents	☐	☐

Dangers

Flights in valleys / cables / wires	☐	☐
Flight over cities / roads / 3rd party	☐	☐
Airflow / up and downdrafts	☐	☐
Sun / shadow / snow / rain / static electricity	☐	☐
Settling with power / vortex	☐	☐
Emergency load jettison	☐	☐

Remarks:

Minimum requirements before starting practical HESLO 2 instruction:

- **CPL(H) / ATPL(H)** ☐
- **HESLO level 1 completed** ☐ **10m or** ☐ **20 m**
- **Type rating completed** ☐
- **Min. 10 hours PIC on type of helicopter** ☐
- **HESLO 2 ground instruction completed** ☐
- **Marshaller syllabus reviewed** ☐
- **Min. 500 HESLO 1 cycles** ☐

I herewith certify that the trainee has received the required HESLO 2 ground instruction and is found competent to begin the practical HESLO 2 instruction.

Date: .....

Name: .....

Signature: .....

HESLO 2

FLIGHT INSTRUCTION

License Nr.

Transport of external loads with helicopters "Level 2"

LEVEL 2 LONG LINE

Conditions:
- Maximum cargo weight 1'500 kg
- 1 marshaller (with radio) at pickup point
- 1 marshaller (with radio) at drop off point
- helicopter fitted with cargo mirror / bubble window*
  *if applicable

VERTICAL REFERENCES
The trainee must be able to perform a stabilized hover flight by means of vertical references without any external cargo attached to the helicopter prior to commencing training with external loads.

DEFINITIONS

Mission:
One mission is an HESLO flight or series of HESLO flights, conducted from site A to site B, for a particular customer, on a particular day.

Cycle:
A cycle is a flight from site A to site B with an external load and subsequent return to site A.

Pilot (preferably flight instructor) in charge of HESLO practical training (must be qualified at minimum for HESLO level 1 and 2 and must have a minimum experience of 500 hours HESLO). Maximum 2 persons.

Last name: ____________________________ First name: _____________________________ License Nr:____________________

Last name: ____________________________ First name: _____________________________ License Nr:____________________

If trainee is qualified for "HESLO 1 20 m", requirements can be reduced by 50%

10m ≤ SLING ≤ 30m

Flight instruction DC/minimum 3 hours: (every square is 1 hour) ☐ Mirror ☐ Vertical ref.

☐☐☐☐☐☐☐☐☐☐

Date training started: ....

Cycles DC/minimum 30 cycles: (every square is 1 cycle) **should include load types 1 through 5**

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
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Trainee may perform **solo HESLO 2 with on site supervision.** Date: .... Signature / License Nr: ....

Flight instruction solo with on site supervision / min. 10 missions: (every square is 1 mission) ☐ Mirror ☐ Vertical ref.

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Cycles solo/minimum 100 cycles (mini. 50 cycles ≥ 25m): (every square is 1 cycle)

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Type of loads (use code in squares)

1. Concrete bucket
2. Vertical load
3. Horizontal load
4. Nets / bags
5. Light and bulky load

Trainee may perform **solo HESLO 2 under supervision.** Date:.................................... Signature / License Nr: ....

Flight instruction solo under supervision / min 10 missions: (every square is 1 hour) ☐ Mirror ☐ Vertical ref.

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

SUPERVISOR NOT REQUIRED ON SITE

Trainee may perform **solo HESLO 2 max. 30m.** Date:.................................... Signature / License Nr: ....

SLING > 30m

Flight instruction DC/minimum 10 cycles: (every square is 1 cycle) ☐ Mirror ☐ Vertical ref.

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Flight instruction solo under supervision / min 10 missions: (every square is 1 mission)

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

SUPERVISOR NOT REQUIRED ON SITE

**Trainee is found properly qualified for long line External Cargo Sling (HESLO 2) operations without supervision.
The trainee's logbook has been endorsed with HESLO Level 2.**

Date: .... Signature / License Nr:..

Total helicopter flight experience:

☐ 500h<HEL<1000h ☐ 1000h<HEL<1500h ☐ 1500h<HEL<2000h ☐ HEL>2000h

TOTAL TIME HESLO 2:...Nr of cycles HESLO 2:...

Remarks:

HESLO 3	EASA license Nr:	

Applicant

Last name:_____ First name: _____ Date of birth:_____

Place of birth:_____ Place of origin: _____ Nationality: _____

Postal code:_____ City: _____ Street:_____

Phone/fax home: _____ Phone/fax office:_____

e-mail: _____Signature of applicant:_____

LOGGING GROUND INSTRUCTION

Pilot in charge of theoretical instruction (must have a minimum of 500h HESLO experience):

Last name:_____ First name: _____ License Nr:_____

OM

Flight and duty times	☐	☐
Max. cycles / day	☐	☐
Min. and max. fuel	☐	☐
Refueling procedures	☐	☐
Radio communications	☐	☐
Human factors / CRM / nutrition	☐	☐
Safety equipment / operational briefing	☐	☐
Pilot / marshaller responsibilities	☐	☐

Flight Manual

Limitations	☐	☐
Performance / HOGE	☐	☐
Cargo hook supplement	☐	☐

Flight Procedures

Airspeed selection with load	☐	☐
Descent & approach (power, ROD, IAS)	☐	☐
Load ground clearance	☐	☐
Flight path selection (3rd party)	☐	☐
Bank / load factor / load drag	☐	☐
Log uplift and drop off technics	☐	☐
Load stabilisation techniques / hover & in-flight	☐	☐
Downwash / rotor clearance	☐	☐
Visual hover reference	☐	☐
Marshaller hand signals	☐	☐
Manual & electrical load release	☐	☐
Decision / exposure time	☐	☐

Load & Person Preparation

Vertical loads	☐	☐
Horizontal loads	☐	☐
Single log (short stem, long stem)	☐	☐
Multiple chokers	☐	☐
Multiple logs	☐	☐
Combined loads	☐	☐

Special Equipment

Load lifting attachements (line, net, bag, IBC, FIBC)	☐	☐
Slinging equipment (round sling, chain, shackle, etc)	☐	☐
Load lifting means (cargo hook, remote hook, etc.)	☐	☐
Load meter / printer	☐	☐
Mirror	☐	☐
Bubble window / vertical reference	☐	☐
Audio / vibration warning	☐	☐

Emergency / Limitations

Flight control stops	☐	☐
TR failure	☐	☐
Engine failure / OEI operation	☐	☐
Height velocity diagram / exposure time	☐	☐
Emergency procedures in logging ops	☐	☐
Review of logging accidents	☐	☐

Dangers

Flights in valleys / cables / wires	☐	☐
Logging over wires / roads / 3rd party	☐	☐
Airflow / up and downdrafts / settling with power / vortex	☐	☐
Sun / shadow / snow / rain / static electricity	☐	☐
Emergency load jettison	☐	☐

Remarks:

Minimum requirements before starting practical HESLO 3 instruction:

- **CPL(H) / ATPL(H)** ☐
- **HESLO Level 1 completed to 20m** ☐
- **Min. 1000 HESLO cycles** ☐
- **Type rating completed** ☐
- **Min. 10 hours PIC on type of helicopter** ☐
- **HESLO 3 ground instruction completed** ☐
- **Marshaller syllabus reviewed** ☐
- **Practical marshaller training for logging** ☐

I herewith certify that the trainee has received the required HESLO 3 ground instruction and is found competent to begin the practical HESLO 3 instruction.

Date: .....

Name: .....

Signature: .....

HESLO 3

FLIGHT INSTRUCTION

License Nr.

Transport of external loads with helicopters "Level 3"
After completion of training send this form to:

LEVEL 3 LOGGING

Conditions:
- Maximum cargo weight 1'500 kg
- 1 marshaller (with radio) at pickup point
- 1 marshaller (with radio) at drop off point
- helicopter fitted with cargo mirror / bubble window*

*if applicable

VERTICAL REFERENCES
The trainee must be able to perform a stabilized hover flight by means of vertical references without any external cargo attached to the helicopter prior to commencing training with external loads.

DEFINITIONS

Mission:
One mission is an HESLO flight or series of HESLO flights, conducted from site A to site B, for a particular customer, on a particular day.

Cycle:
A cycle is a flight from site A to site B with an external load and subsequent return to site A.

Pilot (preferably flight instructor) in charge of HESLO practical training (must be qualified at minimum for HESLO level 1 and 3 and must have a minimum experience of 500 hours HESLO). Maximum 2 persons.

Last name: ____________________________ First name: _____________________________ License Nr:___________________

Last name: ____________________________ First name: _____________________________ License Nr:___________________

Flight instruction DC/minimum 3 hours: (every square is 1 hour) ☐ Mirror ☐ Vertical ref.

☐☐☐☐☐☐☐☐☐☐ Date training started: ....

Cycles DC/minimum 30 cycles: (every square is 1 cycle) **should include load types 1 through 4**

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
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Trainee may perform **solo HESLO 3 with on site supervision** Date: .... Signature / License Nr: ....

Flight instruction solo with on site supervision / min. 10 missions: (every square is 1 mission) ☐ Mirror ☐ Vertical ref.

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Cycles solo/minimum 100 cycles: (every square is 1 cycle)

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
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Type of loads (use code in squares)

1 Vertical load
2 Logs with branches
3 Multiple logs
4 Combined multiple logs

Trainee may perform **solo HESLO 3 under supervision** Date:.................................... Signature / License Nr: ....

Flight instruction solo under supervision / min 10 missions: (every square is 1 mission) ☐ Mirror ☐ Vertical ref.

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ **SUPERVISOR NOT REQUIRED ON SITE**

Trainee is found properly qualified for LOGGING (HESLO 3) operations without supervision.
The trainee's logbook has been endorsed with ¨HESLO Level 3¨.

Date: .... Signature / License Nr:...

Total Helicopter Flight experience:

☐ 500h<HEL<1000h ☐ 1000h<HEL<1500h ☐ 1500h<HEL<2000h ☐ HEL>2000h

TOTAL TIME HESLO 3:..Nr. of cycles HESLO 3:...

Remarks:

HESLO 4

EASA license Nr:

Applicant

Last name:_____ First name: _____ Date of birth:_____

Place of birth:_____ Place of origin: _____ Nationality: _____

Postal code:_____ City: _____ Street:_____

Phone/fax home: _____ Phone/fax office:_____

e-mail: _____Signature of applicant:_____

EXTERNAL CARGO SLING CONSTRUCTION GROUND INSTRUCTION

Pilot in charge of theoretical instruction (must have a minimum of 500h HESLO experience):

Last name:_____ First name: _____ License Nr:_____

OM

- Flight and duty times
- Max. cycles / day
- Min. and max. fuel
- Refueling procedures
- Radio communications
- Human factors / CRM / nutrition
- Safety equipment
- Pilot / marshaller responsibilities / operational briefing

Flight Manual

- Limitations
- Performance / HOGE
- Cargo hook supplement

Flight Procedures

- Airspeed selection with load
- Flight path selection (3rd party)
- Bank / load factor / load drag
- Load stabilisation techniques / hover & in-flight
- Downwash / load rotation
- Visual hover reference
- Rotor clearance.
- Marshaller hand signals
- Manual & electrical load release
- Decision / exposure time

Load & Person Preparation

- Vertical loads
- Horizontal loads
- Light and bulky loads
- Load guiding devices
- Guide lines / ropes
- Wire stringing

Special Equipment

- Load lifting attachements (line, net, bag, IBC, FIBC)
- Slinging equipment (round sling, chain, shackle, etc)
- Load lifting means (cargo hook, remote hook, etc.)
- Cable drums / winches
- Load meter / printer
- Mirror
- Bubble window / vertical reference
- Audio / vibration warning

Emergency / Limitations

- Flight control stops
- TR failure
- Engine failure / OEI operation
- Height velocity diagram / exposure time
- Emergency procedures in construction ops
- Review of construction accidents

Dangers

- Flights in valleys / cables / wires
- Flight over cities / roads / 3rd party
- Airflow / up and downdrafts
- Sun / shadow / snow / rain / static electricity
- Settling with power / vortex
- Emergency load jettison

Remarks:

Minimum requirements before starting practical HESLO 4 instruction:

- **CPL(H) / ATPL(H)**
- **Min. 1000h HEL**
- **HESLO Level 2 or 3 completed**
- **Mini. 5000 HESLO cycles**
- **Type rating completed**
- **Min. 10 hours PIC on type of helicopter**
- **HESLO 4 ground instruction completed**
- **Practical load preparation training**

I herewith certify that the trainee has received the required HESLO 4 ground instruction and is found competent to begin the practical HESLO 4 instruction.

Date: .....

Name: .....

Signature: .....

HESLO 4

FLIGHT INSTRUCTION

License Nr.

Transport of external loads with helicopters "Level 4"
After completion of training send this form to:

LEVEL 4 CONSTRUCTION

Conditions:
- Maximum cargo weight 1'500 kg
- 1 marshaller (with radio) at pickup point
- 1 marshaller (with radio) at drop off point
- helicopter fitted with cargo mirror / bubble window*
  *if applicable

VERTICAL REFERENCES
The trainee must be able to perform a stabilized hover flight by means of vertical references without any external cargo attached to the helicopter prior to commencing training with external loads.

DEFINITIONS

Mission:
One mission is an HESLO flight or series of HESLO flights, conducted from site A to site B, for a particular customer, on a particular day.

Cycle:
A cycle is a flight from site A to site B with an external load and subsequent return to site A.

Pilot (preferably flight instructor) in charge of HESLO practical training (must be qualified at minimum for HESLO level 4. Maximum 2 persons.

Last name: ____________________________ First name: _____________________________ License Nr: ___________________

Last name: ____________________________ First name: _____________________________ License Nr: ___________________

GROUND LEVEL

Flight instruction solo with on site supervision / min. 3 missions: (every square is 1 mission) ☐ Mirror ☐ Vertical ref.

☐☐☐☐☐☐☐☐☐☐

Date training started: ....

Cycles / minimum 5 cycles: (every square is 1 cycle) **should include load types 1 and 3**

Type of loads (use code in squares)
1 Poles / pylons
2 Vertical load
3 Horizontal load
4 Avalanche protections
5 Light and bulky load

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Trainee is found properly qualified for GROUND LEVEL CONSTRUCTION operations without supervision.
The trainee's logbook has been endorsed with ¨HESLO Level 4 GL¨.

Date:.. Signature / License Nr:..

AERIAL CONSTRUCTION

Flight instruction solo with on site supervision / min. 3 missions: (every square is 1 mission) ☐ Mirror ☐ Vertical ref.

☐☐☐☐☐☐☐☐☐☐

Date training started: ....

Cycles / no minimum required: (every square is 1 cycle) **should include load types 1 and 3**

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Trainee is found properly qualified with GROUND & AERIAL CONSTRUCTION operations without supervision.
The trainee's logbook has been endorsed for ¨HESLO Level 4¨.

Date:.. Signature / License Nr:..

WIRE STRINGING / NO CONSTRUCTION REQUIRED

WIRE STRINGING

Flight instruction with on site supervision/minimum 1 mission: (every square is 1 Mission) ☐ Mirror ☐ Vertical ref.

☐☐☐☐☐

Trainee is found properly qualified for WIRE STRINGING operations without supervision.
The trainee's logbook has been endorsed with ¨HESLO Level 4 WIRE¨.

Date: .... Signature / License Nr:..

Total Helicopter Flight experience:

☐ 1000h<HEL<3000h ☐ 3000h<HEL<5000h ☐ 5000h<HEL<10'000h ☐ HEL>10'000h

TOTAL TIME HESLO 4: .... Nr. of cycles HESLO 4: ....

Remarks:

HESLO-Conversion 2

EASA license Nr:

Applicant

Last name:_____ First name: _____ Date of birth:_____

Place of birth:_____ Place of origin: _____ Nationality: _____

Postal code:_____ City: _____ Street:_____

Phone/fax home: _____ Phone/fax office:_____

e-mail: _____Signature of applicant:_____

EXTERNAL CARGO SLING GROUND INSTRUCTION

Pilot in charge of theoretical instruction (must have a minimum of 500h HESLO experience):

Last name:_____ First name: _____ License Nr:_____

OM

Flight and duty times	☐	☐
Max. cycles / day	☐	☐
Min. and max. fuel	☐	☐
Refueling procedures	☐	☐
Radio communications	☐	☐
Human factors / CRM / nutrition	☐	☐
Safety equipment / operational briefing	☐	☐
Pilot / marshaller responsibilities	☐	☐

Flight Manual

Limitations	☐	☐
Performance / HOGE	☐	☐
Cargo hook supplement	☐	☐

Flight Procedures

Airspeed selection with load	☐	☐
Flight path selection (3rd party)	☐	☐
Bank / load factor / load drag	☐	☐
Load stabilisation techniques / hover & in-flight	☐	☐
Downwash / load rotation	☐	☐
Visual hover reference	☐	☐
Rotor clearance	☐	☐
Marshaller hand signals	☐	☐
Environment / slope / forest / canyon	☐	☐
Manual & electrical load release	☐	☐
Decision / exposure time	☐	☐

Load & Person Preparation

Vertical loads	☐	☐
Horizontal loads	☐	☐
Light, bulky and combined loads	☐	☐
Nets & bags	☐	☐

Special Equipment

Concrete bucket / Water bucket	☐	☐
Load lifting attachements (line, net, bag, IBC, FIBC)	☐	☐
Slinging equipment (round sling, chain, shackle, etc)	☐	☐
Load lifting means (cargo hook, remote hook, etc.)	☐	☐
Load meter / printer	☐	☐
Mirror	☐	☐
Bubble window / vertical reference	☐	☐
Audio / vibration warning	☐	☐

Emergency / Limitations

Flight control stops	☐	☐
TR failure	☐	☐
Engine failure / OEI operation	☐	☐
Height velocity diagram / exposure time	☐	☐
Emergency procedures in sling ops.	☐	☐
Review of sling ops. accidents	☐	☐

Dangers

Flights in valleys / cables / wires	☐	☐
Flight over cities / roads / 3rd party	☐	☐
Airflow / up and downdrafts	☐	☐
Sun / shadow / snow / rain / static electricity	☐	☐
Settling with power / vortex	☐	☐
Emergency load jettison	☐	☐

Remarks:

Minimum requirements before starting practical HESLO-C 2 instruction:

- **CPL(H) / ATPL(H)** ☐
- **HESLO Level 3 completed** ☐
- **Type rating completed** ☐
- **Min. 10 hours PIC on type of helicopter** ☐
- **HESLO 2 ground instruction completed** ☐
- **Marshaller syllabus reviewed** ☐

I herewith certify that the trainee has received the required HESLO 2 ground instruction and is found competent to begin the practical HESLO 2 instruction.

Date: .....

Name: .....

Signature: .....

HESLO-C 2

FLIGHT INSTRUCTION

License Nr.

Transport of external loads with helicopters "Level 2"
After completion of training send this form to:

LEVEL 2 LONG LINE CONVERSION

Conditions:
- Maximum cargo weight 1'500 kg
- 1 marshaller (with radio) at pickup point
- 1 marshaller (with radio) at drop off point
- helicopter fitted with cargo mirror / bubble window*
  *if applicable

VERTICAL REFERENCES
The trainee must be able to perform a stabilized hover flight by means of vertical references without any external cargo attached to the helicopter prior to commencing training with external loads.

DEFINITIONS
Mission:
One mission is an HESLO flight or series of HESLO flights, conducted from site A to site B, for a particular customer, on a particular day.
Cycle:
A cycle is a flight from site A to site B with an external load and subsequent return to site A.

Pilot (preferably Flight Instructor) in charge of HESLO practical training (must be qualified at minimum for HESLO level 1 and 2 and must have a minimum experience of 500 hours HESLO). Maximum 2 persons.

Last name: ____________________________ First name: _____________________________ License Nr: ___________________

Last name: ____________________________ First name: _____________________________ License Nr: ___________________

20m < SLING

Flight instruction DC/minimum 20 cycles: (every square is 1 cycle) ☐ Mirror ☐ Vertical ref.

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Type of loads (use code in squares)

1 Concrete bucket
2 Vertical load
3 Horizontal load
4 Nets / bags
5 Light and bulky load

Date training started: ....

Trainee may perform **solo HESLO 2 with on site supervision** Date: .... Signature / License Nr: ....

Flight instruction solo with on site supervision / min. 5 missions: (every square is 1 mission) ☐ Mirror ☐ Vertical ref.

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Cycles solo/minimum 25 cycles: (every square is 1 cycle)

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☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Type of loads (use code in squares)

1 Concrete bucket
2 Vertical load
3 Horizontal load
4 Nets / bags
5 Light and bulky load

Trainee may perform **solo HESLO 2 under supervision.** Date: .... Signature / License Nr: ....

Flight instruction solo under supervision / min 10 missions: (every square is 1 mission) ☐ Mirror ☐ Vertical ref.

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

SUPERVISOR NOT REQUIRED ON SITE

Trainee is found properly qualified for Long line External Cargo Sling (HESLO 2) operations without supervision.
The trainee's logbook has been endorsed with "HESLO Level 2".

Date: .... Signature / License Nr: ....

Total helicopter flight experience:

☐ >300h PIC ☐ 300h<HEL<700h ☐ 700h<HEL<1000h ☐ 1000h<HEL<2000h ☐ HEL>2000h

TOTAL TIME HESLO 2: ....Nr. of cycles HESLO 2: ....

Remarks:

HESLO-Conversion 3

EASA license Nr:

Applicant

Last name:_____ First name: _____ Date of birth:_____

Place of birth:_____ Place of origin: _____ Nationality: _____

Postal code:_____ City: _____ Street:_____

Phone/fax home: _____ Phone/fax office:_____

e-mail: _____Signature of applicant:_____

LOGGING GROUND INSTRUCTION

Pilot in charge of theoretical instruction (must have a minimum of 500h HESLO experience):

Last name:_____ First name: _____ License Nr:_____

OM

- Flight and duty times ☐ ☐
- Max. cycles / day ☐ ☐
- Min. and max. fuel ☐ ☐
- Refueling procedures ☐ ☐
- Radio communications ☐ ☐
- Human factors / CRM / nutrition ☐ ☐
- Safety equipment / operational briefing ☐ ☐
- Pilot / marshaller responsibilities ☐ ☐

Flight Manual

- Limitations ☐ ☐
- Performance / HOGE ☐ ☐
- Cargo hook supplement ☐ ☐

Flight Procedures

- Airspeed selection with load ☐ ☐
- Descent & approach (power, ROD, IAS) ☐ ☐
- Load ground clearance ☐ ☐
- Flight path selection (3rd party) ☐ ☐
- Bank / load factor / load drag ☐ ☐
- Log uplift and drop off technics ☐ ☐
- Load stabilisation techniques / hover & in-flight ☐ ☐
- Downwash / rotor clearance ☐ ☐
- Visual hover reference ☐ ☐
- Marshaller hand signals ☐ ☐
- Manual & electrical load release ☐ ☐
- Decision / exposure time ☐ ☐

Load & Person Preparation

- Vertical loads ☐ ☐
- Horizontal loads ☐ ☐

- Single log (short stem, long stem) ☐ ☐
- Multiple chokers ☐ ☐
- Multiple logs ☐ ☐
- Combined loads ☐ ☐

Special Equipment

- Load Lifting Attachements (Line, Net, Bag, IBC, FIBC) ☐ ☐
- Slinging Equipment (Round Sling, Chain, Shackle, etc) ☐ ☐
- Load Lifting Means (Cargo Hook, Remote hook, etc.) ☐ ☐
- Load Meter / Printer ☐ ☐
- Mirror ☐ ☐
- Bubble Window / Vertical Refernce ☐ ☐
- Audio / Vibration Warning ☐ ☐

Emergency / Limitations

- Flight control stops ☐ ☐
- TR failure ☐ ☐
- Engine failure / OEI operation ☐ ☐
- Height velocity diagram / exposure time ☐ ☐
- Emergency procedures in logging ops ☐ ☐
- Review of logging accidents ☐ ☐

Dangers

- Flights in valleys / cables / wires ☐ ☐
- Logging over wires / roads / 3rd party ☐ ☐
- Airflow / up and downdrafts / settling with power / vortex ☐ ☐
- Sun / shadow / snow / rain / static electricity ☐ ☐
- Emergency load jettison ☐ ☐

Remarks:

Minimum requirements before starting practical HESLO 3 instruction:

- **CPL(H) / ATPL(H)** ☐
- **HESLO Level 2 completed** ☐
- **Min. 1000 HESLO cycles** ☐
- **Type rating completed** ☐
- **Min. 10 hours PIC on type of helicopter** ☐
- **HESLO 3 ground instruction completed** ☐
- **Marshaller syllabus reviewed / SUVA brochure** ☐
- **Practical marshaller training for logging** ☐

I herewith certify that the trainee has received the required HESLO 3 ground instruction and is found competent to begin the practical HESLO 3 instruction.

Date: .....

Name: .....

Signature: .....

HESLO-C 3

FLIGHT INSTRUCTION

License Nr.

Transport of external loads with helicopters "Level 3"
After completion of training send this form to:

LEVEL 3 LOGGING CONVERSION

Conditions:
- Maximum cargo weight 1'500 kg
- 1 marshaller (with radio) at pickup point
- 1 marshaller (with radio) at drop off point
- helicopter fitted with cargo mirror / bubble window*
  *if applicable

VERTICAL REFERENCES
The trainee must be able to perform a stabilized hover flight by means of vertical references without any external cargo attached to the helicopter prior to commencing training with external loads.

DEFINITIONS
Mission:
One mission is an HESLO flight or series of HESLO flights, conducted from site A to site B, for a particular customer, on a particular day.
Cycle:
A cycle is a flight from site A to site B with an external load and subsequent return to site A.

Pilot (preferably Flight Instructor) in charge of HESLO practical training (must be qualified at minimum for HESLO level 1 and 3 and must have a minimum experience of 500 hours HESLO). Maximum 2 persons.

Last name: _____ First name: _____ License Nr: _____

Last name: _____ First name: _____ License Nr: _____

30m < SLING

Flight instruction DC/minimum 20 cycles: (every square is 1 cycle) ☐ Mirror ☐ Vertical ref.

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
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Type of loads (use code in squares)
1 Horizontal load
2 Vertical load
3 Logs with branches
4 Multiple logs
5 Combined multiple logs

Date training started: .....

Trainee may perform **solo HESLO 3 with on site supervision.** Date: ..... Signature / License Nr: .....

Flight instruction solo with on site supervision / min. 25 cycles: (every square is 1 cycle) ☐ Mirror ☐ Vertical ref.

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
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☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Type of loads (use code in squares)
1 Horizontal load
2 Vertical load
3 Logs with branches
4 Multiple logs
5 Combined multiple logs

Trainee may perform **solo HESLO 3 under supervision.** Date: ..... Signature / License Nr: .....

Flight instruction solo under supervision / min 10 missions: (every square is 1 mission) ☐ Mirror ☐ Vertical ref.

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

SUPERVISOR NOT REQUIRED ON SITE

Trainee is found properly qualified for LOGGING (HESLO 3) operations without supervision.
The trainee's logbook has been endorsed with HESLO Level 3.

Date: .....

Signature / License Nr: .....

Total Helicopter Flight experience:

☐ >300h PIC ☐ 300h<HEL<700h ☐ 700h<HEL<1000h ☐ 1000h<HEL<2000h ☐ HEL>2000h

TOTAL TIME HESLO 3: ..... Nr. of cycles HESLO 3: .....

Remarks:

HESLO 5	EASA license Nr:	

Applicant

Last name:_____ First name: _____ Date of birth:_____

Place of birth:_____ Place of origin: _____ Nationality: _____

Postal code:_____ City: _____ Street:_____

Phone/fax home: _____ Phone/fax office:_____

e-mail: _____Signature of applicant:_____

EXTERNAL CARGO SLING (HEAVY LIFT) GROUND INSTRUCTION

Pilot in charge of theoretical instruction (must have a minimum of 500h HESLO experience):

Last name:_____ First name: _____ License Nr: _____

OM

- Flight and duty times ☐ ☐
- Max. cycles / day ☐ ☐
- Min. and max. fuel ☐ ☐
- Refueling procedures ☐ ☐
- Radio communications ☐ ☐
- Human factors / CRM / nutrition ☐ ☐
- Safety equipment ☐ ☐
- Pilot / marshaller responsibilities / operational briefing ☐ ☐

Flight Manual

- Limitations ☐ ☐
- Performance / HOGE ☐ ☐
- Cargo hook supplement ☐ ☐

Flight Procedures

- Airspeed selection with load ☐ ☐
- Flight path selection (3rd party) ☐ ☐
- Bank / load factor / load drag ☐ ☐
- Load stabilisation techniques / hover & in-flight ☐ ☐
- Downwash / load rotation ☐ ☐
- Visual hover reference ☐ ☐
- Rotor clearance. ☐ ☐
- Marshaller hand signals ☐ ☐
- Manual & electrical load release ☐ ☐
- Decision / exposure time ☐ ☐

Load & Person Preparation

- Vertical loads ☐ ☐
- Horizontal loads ☐ ☐
- Light and bulky loads ☐ ☐
- Load guiding devices ☐ ☐
- Guide lines / ropes ☐ ☐
- Wire stringing ☐ ☐

Special Equipment

- Load lifting attachements (line, net, bag, IBC, FIBC) ☐ ☐
- Slinging equipment (round sling, chain, shackle, etc) ☐ ☐
- Load lifting means (cargo hook, remote hook, etc.) ☐ ☐
- Cable drums / winches ☐ ☐
- Load meter / printer ☐ ☐
- Mirror ☐ ☐
- Bubble window / vertical reference ☐ ☐
- Audio / vibration warning ☐ ☐

Emergency / Limitations

- Flight control stops ☐ ☐
- TR failure ☐ ☐
- Engine failure / OEI operation ☐ ☐
- Height velocity diagram / exposure time ☐ ☐
- Emergency procedures in construction ops ☐ ☐
- Review of heavy lift accidents ☐ ☐

Dangers

- Flights in valleys / cables / wires ☐ ☐
- Flight over cities / roads / 3rd party ☐ ☐
- Airflow / up and downdrafts ☐ ☐
- Sun / shadow / snow / rain / static electricity ☐ ☐
- Settling with power / vortex ☐ ☐
- Emergency load jettison ☐ ☐

Remarks:

Minimum requirements before starting practical HESLO 5 instruction:

- **CPL(H) / ATPL(H)** ☐
- **Min. 2000h HEL / 1000h PIC / 10'000 HESLO cycles** ☐
- **Type rating completed** ☐
- **Min. 10h PIC on type** ☐
- **HESLO Level 4 GND & AERIAL completed** ☐
- **HESLO 5 ground instruction completed** ☐
- **Marshaller syllabus reviewed** ☐
- **Practical load preparation training** ☐

I herewith certify that the trainee has received the required HESLO 5 ground instruction and is found competent to begin the practical HESLO 5 instruction.

Date: .....

Name: .....

Signature: .....

HESLO 5

FLIGHT INSTRUCTION

License Nr.

Transport of external loads with helicopters "Level 4"
After completion of training send this form to:

LEVEL 5 HEAVY LIFT

Conditions:

- 1 marshaller (with radio) at pickup point
- 1 marshaller (with radio) at drop off point
- helicopter fitted with cargo mirror / bubble window*
  *if applicable

☐ Initial HESLO 5

☐ Additional Type Rating

Type used

Type Rating
For an additionnal type rating, the minimum training requirement is determined by the instructor pilot.

Pilot (preferably Flight Instructor) in charge of HESLO practical training (must have a minimum experience of 500 hours HESLO 5). Maximum 2 persons.

Last name: _____ First name: _____ License Nr:_____

Last name: _____ First name: _____ License Nr:_____

GROUND LEVEL / NO CONSTRUCTION

PIC WITHOUT external load / min. 10 hours: (every square is 1 hour)

Date training started: .....

Cycles DC/minimum 500 cycles: (every square is 4 cycles) **should include all load types**

Type of loads trained (check applicable)

- ☐ Logging
- ☐ Vertical load
- ☐ Horizontal load
- ☐ Concentrated loads
- ☐ Light and bulky load

Trainee is found properly qualified for GROUND LEVEL heavy lift operations with on site supervision.

Date:..... Signature / License Nr:.....

Flight instruction solo with on site supervision / min. 500 cycles: (every square is 100 cycles)

Trainee is found properly qualified for ¨GROUND LEVEL HEAVY LIFT¨ operations without supervision.
The trainee's logbook has been endorsed with ¨HESLO Level 5 GND¨ with ¨Type rating¨.

Date:..... Signature / License Nr:.....

GND LEVEL CONSTRUCTION

Flight instruction solo with on site supervision / min. 10 missions: (every square is 1 mission)

Trainee is found properly qualified for ¨GROUND LEVEL HEAVY LIFT CONSTRUCTION¨ operations.
The trainee's logbook has been endorsed with ¨HESLO Level 5 GND CONST¨ with ¨Type rating¨.

Date:..... Signature / License Nr:.....

AERIAL ≤ 100FT CONSTRUCTION

Flight instruction solo with on site supervision / min. 10 missions: (every square is 1 mission)

Trainee is found properly qualified for ¨AERIAL HEAVY LIFT CONSTRUCTION BELOW 100 FT AGL¨operations.
The trainee's logbook has been endorsed with ¨HESLO Level 5 AERIAL ≤100FT/AGL¨ with ¨Type rating¨.

Date:..... Signature / License Nr:.....

Mini. 3000 HESLO cycles on Type before starting training

AERIAL > 100FT CONSTRUCTION

Flight instruction solo with on site supervision / min. 5 missions: (every square is 1 mission)

Trainee is found properly qualified for ¨AERIAL HEAVY LIFT CONSTRUCTION ABOVE 100 FT / AGL¨ operations.
The trainee's logbook has been endorsed with ¨HESLO Level 5 AERIAL¨ with ¨Type rating¨.

Date:..... Signature / License Nr:.....

Total Helicopter Flight experience:

☐ 2000h<HEL<3000h ☐ 3000h<HEL<5000h ☐ 5000h<HEL<10'000h ☐ HEL>10'000h

TOTAL TIME HESLO 5:.....Nr. of cycles HESLO 5:.....

Remarks:

Section II – Human external cargo operations (HEC)

AMC1-SPO.SPEC.HEC.100 Standard operating procedures

STANDARD OPERATING PROCEDURES

1. Before conducting any HEC operations, the operator should follow the procedures described below and demonstrate to the competent authority that the SOPs are suitable for the intended operation.
2. Scope and complexity of the activity
    a. Nature of the activity and exposure:
        i. Helicopter operations for the purpose of transporting humans as external loads from/to aerodromes and/or operating sites. The operations are performed as low level flights.
        ii. HEC should be only authorised by the competent authority based on a risk assessment of the operator. These flights should be permitted to fly task specialists to a site where the level of danger would be too high for them to go there with another mean of transport.
        iii. HEC flights should always be conducted with the minimum time of exposure for the task specialists. The exposure time shall be the shortest one
    b. Complexity of the activity:
        i. The complexity of the activity varies with the length of the rope and characteristics of the pick-up and drop-off zones, etc.
        ii. Operational environment and geographical area:

            HEC may be performed over any geographical area. Special attention should not be limited to:

            A. hostile congested and non-congested environment;

            B. mountains;

            C. sea;

            D. jungle; and

            E. desert.
3. Helicopter and equipment
    a. The helicopter:

The helicopter should be certificated in Category A or B. For operations in a congested hostile environment the helicopter should be certificated in Category A in accordance with SPO.POL.146.

b. Equipment:

i. The helicopter may be equipped with:

A. additional mirror(s);

B. a bubble window; and

C. supplementary hook(s) or multi-hook device(s).

D. Load data recorder (lifts, weights, torques, power, forces, shocks and electrical activities)

c. Non-assisted vertical reference operations may require additional engine monitoring in the pilot line of vision or an audio warning system.

d. All additional equipment used for HEC, e.g. ropes, cables, mechanical hooks, swivel hooks, nets, buckets, baskets, containers, should be manufactured according to officially recognised standards.

e. Adequate radio communication equipment (e.g. VHF, UHF, FM) should be installed in the helicopter for co-ordination with the ground task specialist involved in the operation.

f. Task specialist involved in the operation should be equipped with hand-held communication equipment, protective helmets with integrated earphones and microphones as well as personal protective equipment.

4. Crew members

a. Crew composition:

i. The minimum flight crew is stated in the approved AFM. For operational or training purposes, an additional qualified crew member may assist the pilot-in-command in a single pilot operation.

ii. For safety and/or operational purposes, a task specialist may be required by the operator to fulfil the task (e.g. to establish vertical reference or to operate the release safety device for the belly rope).

b. Flight crew:

Before acting as pilot-in-command, the pilot should demonstrate to the operator that he/she has the required skill and knowledge, as follows:

c. Theoretical knowledge:

i. Load rigging techniques;

ii. External load procedures;

iii. Site organisation and safety measures

iv. Short line, long line, construction, wire stringing or cable laying flying techniques, as required for the operation; and

d. Practical training to meet the experience requirements:

i. 1 000 hours helicopter flight experience as pilot-in-command

ii. 10 hours flight experience on the helicopter type;

iii. Type rating completed

iv. ECS level 1 or 2 completed

v. Relevant experience in the field of operation

vi. Ground instruction completed (marshaller syllabus)

e. Pilot recurrent training:

i. review of the sling technique;

ii. external load procedures; and

iii. review of the applicable flying techniques.

f. Conditions of HEC instruction:

a. Maximum sling length according to the level applicable:

i. 1 task specialist (with radio) at pickup point;

ii. 1 task specialist (with radio) at drop off point;

iii. Helicopter fitted with cargo mirror / bubble window;

iv. Flight instruction DC/: Cycles DC/minimum 10 cycles which of 5 Human Cargo Sling;

v. Flight instruction solo with onsite supervision / Cycles solo/minimum 10 cycles.

b. Qualification of pilot for the instruction of HEC:

i. Flight Instructor in charge of ECS practical training (must be qualified at minimum for ECS level 1 and 2 and must have a minimum experience of 500 hours ECS).

ii. Qualification of task specialist trainer.

iii. Task specialist with at least 2 years of experience on the job. Must be qualified and trained according the above mentioned programme.

5. Task specialists

a. Task specialists are required to be on board the helicopter to manipulate the belly-cabin rope release device.

b. Task specialists will be trained to operate the system including:

i. Montage and removal of system

ii. Normal procedure

c. Briefings:

Briefings on the organisation and coordination between flight crew and task specialist involved in the operation should take place prior to each operation. These briefings should include at least the following:

i. Location and size of pick-up and drop-off site, operating altitude;

ii. Location of refuelling site and procedures to be applied;

iii. Load sequence, danger areas, performance and limitations, emergency procedures.

6. Performance

HEC should be performed with the following power margins:

The mass of the helicopter should not exceed the MTOM HOGE permitted at the pick-up or drop-off site, whichever is higher, as stated in the AFM, reduced by 20% of the MTOM HOGE.

7. Normal procedures

a. Operating procedures:

HEC should be performed in accordance with the AFM. Operating procedures should include, for each type of operation:

i. crew individual safety equipment (e.g. helmet, fire retardant suits);

ii. crew responsibilities;

iii. crew coordination and communication;

iv. selection and size of pick-up and drop-off sites;

v. selection of flight routes;

vi. fuel management in the air and on the ground;

vii. task management; and

viii. third party risk management.

b. Ground procedures:

The operator should specify appropriate procedures, including:

i. use of ground equipment;

ii. load rigging;

iii. size and weight assessment of loads;

iv. attachment of suitably prepared loads to the helicopter;

v. two-way radio communication procedures;

vi. selection of suitable pick-up and drop-off sites;

vii. safety instructions for ground task specialists or other persons required for the safe conduct of the operation;

viii. helicopter performances information;

ix. fuel management on the ground;

x. responsibility and organisation of the personnel on the ground involved in the operation;

xi. task management of personnel on the ground involved in the operation;

xii. third party risk management; and

xiii. environmental protection.