Draft Acceptable Means of Compliance (AMC) and Guidance Material (GM) to Annexes I-VIII to Commission Regulation (EU) No 965/2012 and to Annex I to Commission Regulation (EU) No 1178/2011

(RMT.0599 and RMT.0379)

The AMC and GM to Annexes I-VIII to Commission Regulation (EU) No 965/2012 are amended as follows:

The text of the amendment is arranged to show deleted text, new or amended text as shown below:

(a) deleted text is ~~struck-through~~;

(b) new or amended text is highlighted in blue;

(c) an ellipsis '(…)' indicates that the rest of the text is unchanged.

Disclaimer: This document is provided for information purposes only. No quality control has been performed.

1. Draft AMC & GM to Annex I (Definitions) to Commission Regulation (EU) No 965/2012

1. GM1 Annex I Definitions is amended as follows:

GM1 Annex I Definitions

ED Decision 2021/008/RED Decision 2021/008/R

DEFINITIONS FOR TERMS USED IN ACCEPTABLE MEANS OF COMPLIANCE AND GUIDANCE MATERIAL

(…)

~~(aa) ‘Space-based augmentation system (SBAS)’ means a wide coverage augmentation system that augments and/or integrates the information obtained from the other GNSS elements with information from a satellite-based transmitter. The most common form of SBAS in Europe is the European Geostationary Navigation Overlay Service (EGNOS).~~

(…)

2. GM2 Annex I Definitions is amended as follows:

GM2 Annex I Definitions

ABBREVIATIONS AND ACRONYMS

2D	two dimensional
3D	three dimensional
(…)	
~~Baro-VNAV~~ Baro VNAV	barometric VNAV
(…)	
CVS	combined vision system
(…)	
FAS	final approach segment
(…)	
EFVS	enhanced flight vision system
EFVS-A	enhanced flight vision system used for approach
EFVS-L	enhanced flight vision system used for landing
(…)	
FOV	field of view
(…)	
IAP	instrument approach procedure

(…)

OFZ	obstacle free zone
(…)	
PVD	paravisual display
(…)	
SA CAT I	special authorisation category I
SA CAT II	special authorisation category II
~~Sap~~SAp	stabilised approach
SVS	synthetic vision system
(…)	
TDZE	touchdown zone elevation
(…)	
VSS	visual segment surface
(…)	

3. The following GM31 Annex I Definitions is inserted:

GM31 Annex I Definitions

DEFINITIONS OF TERMS RELATED TO ALL-WEATHER OPERATIONS

The following terms and concepts are used in the provisions related to all-weather operations in the AMC and GM to Regulation (EU) No 965/2012:

'Advanced aircraft' means an aircraft with equipment in addition to that required for a basic aircraft for a given take-off, approach or landing operation.

'AFM or additional data from the TC/STC holder'.

An AFM or additional data from the TC/STC holder may provide:

- limitations: which the aircraft must be operated in accordance with, as described under point 4.1 of Annex V of Regulation 2018/1139 . This means the aircraft may NOT exceed those given values; or
- demonstrated capabilities, which are the assumptions, envelope or conditions that were used to demonstrate adequate performances to comply with the appropriate certification specifications.

However, some AFMs (especially for those aircraft or landing systems that were certified before the introduction of CS-AWO issue 2) may not include all of the assumptions, envelope or conditions that were used to demonstrate adequate performances. Information regarding the assumptions, envelope, or conditions that were used to demonstrate adequate performance of a landing system can be provided by equivalent documentation issued by TC/STC holder.

Other types of information issued by TC/STC holder may include(not an exhaustive list):

- Equivalence between different Aircraft models (types)
- Equivalence between aircraft types and variants
- Landing System equivalence

- List of Runways with demonstrated performances
- A letter of no-technical objection/ evaluation letter.

Note: TC/STC holder should be understood as the holder of the certificate for the Landing System.

'Basic aircraft' means an aircraft which has the minimum equipment required to perform the intended take-off, approach or landing operation.

'Continuous descent final approach (CDFA)': when the circling altitude/height is reached, it is acceptable to maintain altitude (level-off) and transition to the visual segment. The operator may provide a point in the visual segment in which the descent may be resumed to follow a continuous descent to a point approximately 15 m (50 ft) above the landing runway threshold or the point where the flare manoeuvre begins for the type of aircraft flown.

'Enhanced flight vision system (EFVS)-Approach (EFVS-A)' means a system that has been demonstrated to meet the criteria to be used for approach operations from a decision altitude/height (DA/H) or a minimum descent altitude/height (MDA/H) to 100 ft (30 m) threshold elevation while all system components are functioning as intended, but may have failure modes that could result in the loss of EFVS capability. It should be assumed for an EFVS-A that:

(a) the pilot will conduct a go-around at or above 100 ft threshold elevation, in the event of an EFVS failure; and

(b) descent below 100 ft above the threshold elevation through to touchdown and roll-out should be conducted using natural vision so that any failure of the EFVS does not prevent the pilot from completing the approach and landing.

'Enhanced flight vision system (EFVS)-Landing (EFVS-L)' is an EFVS that has been demonstrated to meet the criteria to be used for approach and landing operations that rely on sufficient visibility conditions to enable unaided roll-out and to mitigate for loss of EFVS function.

'Head-up display (HUD) or equivalent display system' refers to a display system which presents flight information to the pilot's forward external field of view (FOV) and which does not significantly restrict the external view.

'Landing system' means an airborne equipment, which:

(a) provides automatic control of the aircraft during the approach and landing (e.i. Automatic Landing System), or;

(b) (b) has been demonstrated to meet the criteria to be used for approach and landing operations (e.g. HUD Landing System, EFVS-Landing system or any other approved system).

'Landing system assessment area (LSAA)' means the part of the runway that extends from the threshold to a distance of 600 m from the threshold. Note – Although the landing systems certification criteria uses a value greater than 600 m after the threshold to evaluate limit conditions, for the purpose of flight operations assessment a distance of 600 m is the relevant part as landing beyond this point is not expected to occur in day-to-day operations. LSAA no sesarelly coincident with the touch zone. The touchdown zone is specified in CS-ADR DSN.

'Low-visibility procedures (LVPs)' means procedures applied by an aerodrome for the purpose of ensuring safety during LVOs.

Regular runway means a runway whose characteristics fit within the acceptable limits demonstrated by the OEM during certification. The classification of a runway as ‘regular runway’ is different from one set of equipment to another.

‘Required visual reference’ refers to that section of the visual aids or of the approach area which should have been in view for sufficient time for the pilot to have made an assessment of the aircraft position and rate of change of position, in relation to the desired flight path. In the case of a circling approach, the required visual reference is the runway environment.

‘Satellite-based augmentation system (SBAS)’ means a wide coverage augmentation system in which the user receives augmentation information from a satellite-based transmitter. The most common form of SBAS in Europe is the European Geostationary Navigation Overlay Service (EGNOS).

‘Synthetic vision system (SVS)’ means a system to display data derived synthetic images of the external scene from the perspective of the flight deck.

‘Landing area’ means that part of a movement area intended for the landing or take-off of aircraft.

‘Touchdown zone’ means the portion of a runway, beyond the threshold, where landing aeroplanes are intended to first contact the runway.

‘Type B instrument approach operations categories’ where decision height (DH) and runway visual range (RVR) fall into different categories of operation, the instrument approach operation would be conducted in accordance with requirements of the most demanding category. This does not apply if the RVR and/or DH has been approved as operational credits.’

4. The following GM32 Annex I Definitions is inserted:

GM32 Annex I Definitions

EFVS — DIFFERENCES WITH ENHANCED VISION SYSTEMS (EVSs)

(a) Introduction to EVSs

EVSs use sensing technology to improve a pilot’s ability to detect objects and topographical features ahead of the aircraft. Different types of sensing technology are used on different aircraft installations. Sensing technologies used include forward-looking infrared, millimetre wave radiometry, millimetre wave radar or low-light level intensification; additional technologies may be developed in the future. The image from sensors may be displayed to the pilot in a number of different ways including ‘head-up’ and ‘head-down’ displays.

(b) EVSs and EFVSs

An EFVS is an EVS that is integrated with a flight guidance system, which presents the image from sensors to the pilot on a head-up display (HUD) or equivalent display. If EFVS equipment is certified according to the applicable airworthiness requirements and an operator holds the necessary specific approval, then an EFVS may be used for EFVS operations. An EFVS operation is an operation with an operational credit which allows operating in visibility conditions lower than those in which operations without the use of EFVS are permitted.

(c) Functions of EVSs

Depending on the capabilities of the particular system, EVSs may be useful during operations at night or in reduced visibility for the following:

(1) improving visibility of airport features and other traffic during ground operations;

(2) displaying terrain and obstructions in flight;

(3) displaying weather in flight;

(4) improving visibility of the runway environment during approach operations; and

(5) improving visibility of obstructions on a runway (e.g. aircraft, vehicles or animals) during take-off and approach operations.

(d) Limitations of EVSs

EVSs are a useful tool for enhancing situational awareness; however, each EVS installation has its own specific limitations. These may include:

(1) Performance variations according to conditions including ambient temperature and lighting and weather phenomena. A system may provide very different image qualities in the same visibility depending on the particular phenomena causing restricted visibility, e.g. haze, rain, fog, snow, dust, etc.

(2) An EVS may not be able to detect certain types of artificial lighting. Light emitting diode (LED) lights have a much lower infrared signature than incandescent lights and therefore may not be detected by some types of EVSs. LED lighting is used for runway, taxiway and approach lighting at many airports.

(3) Monochrome display. EVSs will generally not be able to detect and display the colour of airport lighting. This means that colour coding used on airport lighting will not be visible to the pilot using an EVS.

(4) Many EVS installations do not have redundancy, so a single failure may lead to loss of EVS image.

(5) The location of the sensor on the airframe may mean that in certain conditions it could be susceptible to ice accretion or obscuration from impact damage from objects such as insects or birds.

(6) Where an EVS image is presented on a HUD or an equivalent display, the image needs to be consistent with the pilot's external view through the display. Particular installations may have limitations on the conditions under which this consistent image can be generated (e.g. crosswind conditions during approach).

(7) Imaging sensor performance can be variable and unpredictable. Pilots should not assume that a flightpath is free of hazards because none are visible in an EVS image.

(e) Considerations for the use of EVSs

EVSs may be used in all phases of flight and have significant potential to enhance the pilot's situational awareness. No specific approval is required for the use of an EVS; however, the operator is responsible to ensure that the flight crew members have received training on the equipment installed on their aircraft in accordance with ORO.FC.120. In addition, the operator is responsible to evaluate the risks associated with system limitations and implement suitable mitigation measures in accordance with ORO.GEN.200(a)(3) before using the EVS.

The use of EVSs does not permit the use of different operating minima and EVS images cannot replace natural vision for the required visual reference in any phase of flight including take-off, approach or landing.

An EVS that is not an EFVS cannot be used for EFVS operations and therefore does not attract an operational credit.

5. The following GM33 Annex I Definitions is inserted:

GM33 Annex I Definitions

INSTRUMENT APPROACH OPERATIONS

(a) Depending on the instrument approach procedure (IAP) in use, the lateral and vertical navigation guidance for an instrument approach operation may be provided by:

  (1) a ground-based radio navigation aid; or

  (2) computer-generated navigation data from ground-based, space-based or self-contained navigation aids or a combination of these.

(b) A non-precision approach procedure flown as CDFA with vertical path guidance calculated by on-board equipment is considered to be a 3D instrument approach operation. Depending on the limitations of the equipment and information sources used to generate vertical guidance, it may be necessary for the pilot to cross-check this guidance against other navigational sources during the approach and to ensure that the minimum altitude/height over published step-down fixes is observed. CDFAs with manual calculation of the required rate of descent are considered 2D operations.

(c) Further guidance on the classification of an instrument approach operation based on the designed lowest operating minima is contained in Appendix J to ICAO Doc 9365 Manual of All-Weather Operations, Fourth Edition, 2017.

6. The following GM34 Annex I Definitions is inserted:

GM34 Annex I Definitions

DECISION ALTITUDE (DA) OR DECISION HEIGHT (DH)

(a) Decision altitude (DA) is referenced to mean sea level and decision height (DH) is referenced to the threshold elevation.

(b) For operations using DA, the aircraft altimeters are set to QNH. For operations using a barometric DH, the aircraft altimeters are set to QFE.

(c) For SA CAT I, SA CAT II, CAT II/III operations, the DH is based on the use of a radio altimeter or other devices capable of providing equivalent performance. The DH is determined with reference to threshold elevation, but the value of the DH set for the approach will be based on the height of the aircraft above the pre-threshold terrain, which may be higher or lower than the threshold.

(d) For convenience, when both expressions are used, they may be written in the form ‘decision altitude/height’ and abbreviated ‘DA/H’.

7. The following GM35 Annex I Definitions is inserted:

GM35 Annex I Definitions

MINIMUM DESCENT ALTITUDE (MDA) OR MINIMUM DESCENT HEIGHT (MDH)

(a) Minimum descent altitude (MDA) is referenced to mean sea level and minimum descent height (MDH) is referenced to the aerodrome elevation or to the threshold elevation if that is more than 7 ft below the aerodrome elevation. An MDH for a circling approach is referenced to the aerodrome elevation.

(b) For operations using MDA, the aircraft altimeters are set to QNH. For operations using a barometric MDH, the aircraft altimeters are set to QFE.

(c) For convenience, when both expressions are used, they may be written in the form ‘minimum descent altitude/height’ and abbreviated ‘MDA/H’.

2. Draft AMC & GM to Annex II (Part-ARO) to Commission Regulation (EU) No 965//2012

8. The following AMC5 ARO.OPS.200 is inserted:

AMC5 ARO.OPS.200 Specific approval procedure

PROCEDURES FOR THE APPROVAL OF LOW-VISIBILITY OPERATIONS

Before issuing an approval for low-visibility operations (LVOs), the competent authority should verify that the applicant has:

(a) taken account of the relevant airworthiness requirements and limitations;

(b) established relevant aerodrome operating minima;

(c) established and documented relevant operating procedures;

(d) established and conducted adequate training and checking programmes;

(e) adopted the minimum equipment list (MEL) for the LVOs to be undertaken;

(f) processes to ensure that only runways and instrument procedures suitable for the intended operations are used; and

(g) established and conducted the relevant risk assessment and monitoring programmes.

9. The following GM4 ARO.OPS.200 is inserted:

GM4 ARO.OPS.200 Specific approval procedure

HELICOPTER POINT-IN-SPACE (PINS) APPROACHES AND DEPARTURES WITH REDUCED VFR MINIMA

When issuing an approval for helicopter PinS approaches and departures with reduced VFR minima, the competent authority may use the ‘OTHERS’ box of Appendix II (EASA Form 139).

3. Draft AMC & GM to Annex III (Part-ORO) to Commission Regulation (EU) No 965/2012

10. GM2 ORO.GEN.110 is amended as follows:

GM2 ORO.GEN.110(f) Operator responsibilities

ELEMENTS OF THE BRIEFING GIVEN TO FLIGHT OPERATIONS OFFICERS/FLIGHT DISPATCHERS BEFORE ASSUMING DUTIES

Before commencing their shift, the FOO/FD should be briefed on relevant safety information such as:
(a) weather charts;
(b) weather reports;
(c) NOTAMs;
(d) operational restrictions in force;
(e) flights in the air and flights for which operational flight plans have been issued but which have not yet started and for which the FOO/FD will be responsible;
(f) the forecast flight schedule; and

~~(f)~~(g) other relevant safety information as listed in GM 28 Annex I 'Definitions for terms used in Annexes II to VIII'.

11. GM1 ORO.GEN.130(b) is amended as follows:

GM1 ORO.GEN.130(b) Changes related to an AOC holder

CHANGES REQUIRING PRIOR APPROVAL

The following GM is a non-exhaustive checklist of items that require prior approval from the competent authority as specified in the applicable implementing rules:

(…)

(p) method used to establish aerodrome operating minima;

(~~p~~q) (…)

(~~q~~r) (…)

(~~r~~s) (…)

(~~s~~t) (…)

12. AMC3 ORO.GEN.160 is introduced as follows:

AMC3 ORO.GEN.160 Occurrence reporting

REPORTABLE EVENTS OF LVO OPERATIONS

(a) A reportable event should include:
  (1) significant deviations from the flight path not caused by flight crew input;
  (2) misleading information without flight deck alerts;
  (3) loss of airborne navigation equipment functions necessary for the operation;
  (4) loss of functions or facilities at the aerodrome necessary for the operation, including aerodrome operating procedures, ATC operation, navigation facilities, visual aids and electrical power supply;
  (5) loss of other functions related to external infrastructure necessary for the operation; and
  (6) any other event causing the approach or landing to be abandoned if occurring repeatedly.

(b) The reports should be submitted to the aerodrome involved when relevant and in addition to the recipients prescribed in ORO.GEN.160 (b).

13. GM1 ORO.GEN.160 is introduced as follows:

GM1 ORO.GEN.160 Occurrence reporting

REPORTABLE EVENTS OF LVO OPERATIONS - OTHER EVENTS OCCURRING REPEATEDLY

(a) The purpose of point (a)(6) of AMC3 ORO.GEN.160 is to share the information with other aviation stakeholders other than the operator of the aircraft to identify yet unknown systematic safety-related issues. The main focus is thus on a series of similar events rather that an isolated single event.

(b) Other events causing the approach or landing to be abandoned may include – but are not limited to:

(1) erroneous or inadequate flight crew action or aircraft handling, or

(2) meteorological phenomena or human-made disturbances (e.g road crossing final approach in an EFVS approach, laser strikes…etc) or emissions from infrastructures (e.g. 5G) which require flight crews to take corrective action to an extent to which the LVO cannot be terminated successfully or completed as planned, leading to a go-around, a balked landing or an unplanned manual intervention by the pilot during the landing manoeuvre.

(c) Possible causes may be human factor related issues when employing newly introduced LVO equipment technologies or procedures or when changes take place in the runway environment or aerodrome vicinity.

14. AMC1 ORO.DEC.100(a);(d) is introduced as follows:

AMC1 ORO.DEC.100(a);(d) Declaration

RELEVANT INFORMATION PRIOR TO COMMENCING OPERATION AND NOTIFICATION OF ANY CHANGES TO DECLARATION – EFVS200 OPERATIONS

Declarations involving EFVS200 operations (under NCC.OP.235 or SPO.OP.235) should be submitted at least 60 days before the new declaration or any change becomes effective and indicate the date as of which they would apply.

GM1 ORO.DEC.100(a);(d) Declaration

RELEVANT INFORMATION PRIOR TO COMMENCING OPERATION AND NOTIFICATION OF ANY CHANGES TO DECLARATION

(a) When a declaration involves EFVS 200 operations in accordance with NCC.OP.235 or SPO.OP.235, the competent authority should be enabled to fulfil its responsibilities in accordance with ARO.GEN.345 prior starting these operations or implementing changes to it.

(b) In accordance to ORO.DEC.100 point (a) and (d) the operator shall provide all relevant information and notify any changes. In relation to EFVS200 this may be, but not limited to:

(i) AFM or additional data from the TC/STC holder

(ii) established relevant aerodrome operating minima

(iii) documented operating procedures

(iv) training and checking programmes

(v) minimum equipment list (MEL) for the operations to be undertaken

(vi) processes to ensure that only runways and instrument procedures suitable for the intended operations are used and conducted operational assessments

15. The current AMC1 ORO.FC.100(c) is deleted:

~~AMC1 ORO.FC.100(c) Composition of flight crew~~

~~OPERATIONAL MULTI-PILOT LIMITATION (OML)~~

~~The operator should ensure that pilots with an OML on their medical certificate only operate aircraft in multi-pilot operations when the other pilot is fully qualified on the relevant type of aircraft, is not subject to an OML and has not attained the age of 60 years.~~

16. The following GM1 ORO.FC.100(d) is inserted:

GM1 ORO.FC.100(c) Composition of flight crew

HOLD A LICENCE AND RATINGS IN ACCORDANCE WITH COMMISSION REGULATION (EU) No 1178/2011

When determining the composition of the crew, and monitoring whether the flight crew holds the appropriate licence and ratings, the operator needs to take into account any limitations prescribed in Regulation (EU) No 1178/2011 applicable to the flight crew members such as, but not limited to, recent experience and operational multi-pilot limitation.

17. AMC1 ORO.FC.105(b)(2);(c) is amended as follows:

AMC1 ORO.FC.105(b)(2);(c) Designation as pilot-in-command/commander

GENERAL

The operator should comply with the national training and checking requirements published in the aeronautical information publication (AIP).

ROUTE, ~~/~~AREA AND AERODROME KNOWLEDGE FOR COMMERCIAL OPERATIONS

~~For commercial operations, the~~ The experience of the route or area to be flown and of the aerodrome facilities and procedures to be used should include the following:

(a) Area and route knowledge

  (1) An objective of the area ~~Area~~ and route training should be to ensure that the pilot has ~~include~~ knowledge of:

    (i) terrain and minimum safe altitudes;

    (ii) seasonal meteorological conditions;

    (iii) meteorological, communication and air traffic facilities, services and procedures;

    (iv) search and rescue procedures where available; and

    (v) navigational facilities associated with the area or route along which the flight is to take place.

  (2) ~~Depending on the complexity of the area or route, as assessed by the operator, the following methods of familiarisation should be used:~~Another objective of the area and route training should be to ensure that the pilots are aware of the most significant underlying risks and threats of a route or an area that could affect their operations following the ‘threat and error management model’ or an alternative risk model agreed with the authority.

~~(i) for the less complex areas or routes, familiarisation by self-briefing with route documentation, or by means of programmed instruction; and~~

~~(ii) in addition, for the more complex areas or routes, in-flight familiarisation as a pilot-in-command/commander or co-pilot under supervision, observer, or familiarisation in a flight simulation training device (FSTD) using a database appropriate to the route concerned.~~

(3) The area and route familiarisation training should:

(i) be based on an assessment by the operator of the underlying risks and threats of a route or an area using:

(A) internal evidence;

(B) external evidence;

(ii) be conducted:

(A) as an initial training before operating to a route and area;

(B) as a refresher training after not operating to a route and area for 12 months.

(4) The area and route familiarisation training should be delivered using different methods and tools.

(i) The selection of the method and tools should result from a combination of the learning objectives and the type of risk or threat that needs to be trained.

(ii) The selection of the appropriate method and tool should be driven by the desired outcome in terms of adequate knowledge and awareness.

(iii) The methods and tools employed should include one or more of the following:

Training in a flight simulation training device (FSTD), computer-based training, familiarisation flight as a pilot in-command/commander or co-pilot under supervision or observer, video training, virtual reality training, familiarisation by self-briefing with route documentation and audio training.

(b) Aerodrome knowledge

(1) Aerodrome familiarisation training should include knowledge of obstructions, physical layout, lighting, approach aids and arrival, departure, holding and instrument approach procedures, applicable operating minima and ground movement considerations.

(2) The operations manual should describe the method of categorisation of aerodromes and, in the case of CAT operations, provide a list of those aerodrome categorised as B or C.

(3) All aerodromes to which an operator operates should be categorised in one of these three categories:

(i) category A — an aerodrome that ~~meets~~ has all ~~of~~ the following ~~requirements~~:

(A) A straight-in 3-D instrument approach procedure with a glide path angle of not more than 3.5 degrees to each runway expected to be used for landing. ~~an approved instrument approach procedure~~

(B) at least one runway with no performance limited procedure for take-off and/or ~~L~~landing, such as no requirement to follow a contingency procedure for obstacle clearance in the event of an engine failure on take-off from any runway expected to be used for departure.

(C) ~~published circling minima not higher than 1000 feet above aerodrome level~~

~~(D)~~night operations capability

(ii) category B - an aerodrome that does not meet the category A requirements or which requires extra considerations due to ~~such as~~:

(A) non-standard approach aids and/or approach pattern, such as restrictions on the availability of straight-in instrument approach procedures;

(B) unusual local weather conditions, such as environmental features that can give rise to turbulence, windshear or unusual wind conditions;

(C) unusual characteristics or performance limitations, such as unusual runway characteristics in length, width, slope, markings or lighting that present an atypical visual perspective on approach;

(D) any other relevant considerations, including obstructions, physical layout, lighting, etc., such as restrictions on circling in certain sectors due to obstacles in the circling area.

(E) training or experience requirements stipulated by the competent authority responsible for the aerodrome that do not include instruction in an FSTD or visiting the aerodrome;

(iii) category C — an aerodrome that requires additional considerations to those of a category B aerodrome,~~;~~and:

(A) that requires additional considerations to a category B aerodrome or;

(B) for which flight crew experience or qualification requirements for instruction in an FSTD or visiting the aerodrome are stipulated by the competent authority responsible for the aerodrome or;

(C) at which approach procedures require flight crew to be familiar with particular visual cues or terrain features.

(iv) offshore installations may be categorised as category B or C aerodromes, taking into account the limitations determined in accordance with AMC1 SPA.HOFO.115 'Use of offshore locations'

(c) Prior to operating to a category B aerodrome (planned destination or required alternate), the pilot-in-command/commander should:

(1) comply with any requirements stipulated by the competent authority responsible for the aerodrome; and

(2) be briefed, or self-brief~~ed~~ by means of programmed instruction, about the extra considerations applicable to operations to the category B aerodrome(s) concerned. The completion of the briefing should be recorded. This recording may be accomplished after completion or confirmed by the pilot-in-command/commander before departure on a flight involving category B aerodrome(s) as destination or alternate aerodromes.

(c) Prior to operating to a category C aerodrome (planned destination or required alternate), the pilot-in-command/commander should:

(1) comply with any requirements stipulated by the competent authority responsible for the aerodrome; and

(2) be briefed or self-briefed by means of programmed instruction, about the extra considerations applicable to operations to the aerodrome(s); and

   - (3) visit the aerodrome as an observer and/or undertake instruction in a suitable FSTD.
   - (4) The completion of the briefing, visit and/or instruction should be recorded.

ROUTE, AREA AND AERODROME KNOWLEDGE FOR NON-COMMERCIAL OPERATIONS

The knowledge of the route or area to be flown and of the aerodrome facilities and procedures to be used should include the following:

(d) Area and route knowledge

   - (1) Area and route familiarisation should include knowledge of:
      - (i) terrain and minimum safe altitudes;
      - (ii) seasonal meteorological conditions;
      - (iii) meteorological, communication and air traffic facilities, services and procedures;
      - (iv) search and rescue procedures where available; and
      - (v) navigational facilities associated with the area or route along which the flight is to take place.
   - (2) The operations manual should describe appropriate methods of familiarisation depending on the complexity of the area or route and the experience of the pilot-in-command.

(e) Aerodrome knowledge

   - (1) Aerodrome familiarisation should include knowledge of obstructions, physical layout, lighting, approach aids and arrival, departure, holding and instrument approach procedures, applicable operating minima and ground movement considerations.
   - (2) The operator's manual should describe appropriate methods of familiarisation depending on the complexity of the aerodrome.
   - (3) If the competent authority of the aerodrome or area requires specific training or familiarisation, the operator, ORO.GEN.220 mandates the operator to maintain all records of this training or familiarisation.
   - (4) For offshore installations, the limitations determined in accordance with AMC1 SPA.HOFO.115 should be taken into account.

18. The following GM2 ORO.FC.105(b)(2) is inserted:

GM2 ORO.FC.105(b)(2) Designation as pilot-in-command/commander

AERODROME KNOWLEDGE FOR NON-COMMERCIAL OPERATIONS

The operator may, based on complexity, categorise all aerodromes in one of the following three categories:

(a) category A — an aerodrome that has all of the following:

   - (1) an approved instrument approach procedure;
   - (2) at least one runway with no performance-limited procedure for take-off and/or landing;
   - (3) published circling minima not higher than 1 000 ft above aerodrome level; and
   - (4) night operations capability.

(b) category B — an aerodrome that does not meet the category A requirements or which requires extra considerations such as:

    (1) non-standard approach aids and/or approach patterns;

    (2) unusual local weather conditions;

    (3) unusual characteristics or performance limitations; or

    (4) any other relevant considerations, including obstacles, physical layout, lighting, etc.

(c) category C — an aerodrome that requires additional considerations to those of a category B aerodrome.

Offshore installations may be categorised as category B or C aerodromes, taking into account the limitations determined in accordance with AMC1 SPA.HOFO.115 ‘Use of offshore locations’.

19. The following AMC1 ORO.FC.105(b)(3) is inserted:

AMC1 ORO.FC.105(b)(3) Designation as pilot-in-command/commander

OPERATOR’S COMMAND COURSE FOR NON-COMMERCIAL OPERATIONS WITH COMPLEX MOTOR-POWERED AIRCRAFT (NCC)

(a) For aeroplane and helicopter operations, when upgrading from co-pilot to pilot-in-command, the fligth crew member should be trained at least on the following elements, as part of the command course:

    (1) command responsibilities training;

    (2) demonstration of competence operating as pilot-in-command.

(b) Demonstration of competence operating as pilot-in-command may be achieved by:

    (1) completing a proficiency check in the role of pilot-in-command; or

    (2) operating at least one flight under the supervision and to the satisfaction of a suitably qualified pilot-in-command nominated by the operator.

20. AMC1 ORO.FC.105(c) is amended as follows:

AMC1 ORO.FC.105(c) Designation as pilot-in-command/commander

ROUTE/AREA AND AERODROME RECENCY

(a) The 12-month period should be counted from the last day of the month:

    (1) when the familiarisation training was undertaken; or

    (2) when the latest operation on the route or area was flown and when the aerodromes, facilities and procedures were used.

(b) ~~When the operation is undertaken within the last 3 calendar months of that period, the new 12-month period should be counted from the original expiry date.~~ The 36-month period should be counted from the last day of the month:

    (1) when the familiarisation training was undertaken; or

    (2) when the latest operation on the route or area was flown.

21. The following GM1 ORO.FC.105(c) is inserted:

GM1 ORO.FC.105(c) Designation as pilot-in-command/commander

AREA AND ROUTE FAMILIARISATION TRAINING DELIVERY

When developing the area and route familiarisation training, the operator may apply the following methodology:

(a) Internal evidence

  (1) Operator assessment by conducting an operational risk evaluation according to the following criteria:

    (i) terrain and minimum safe altitudes;

    (ii) seasonal meteorological conditions;

    (iii) meteorological, communication and air traffic facilities, services and procedures;

    (iv) search and rescue procedures where available; and

    (v) navigational facilities associated with the area or route along which the flight is to take place.

  (2) Operator-specific evidence gathered through the safety management process in accordance with ORO.GEN.200.

(b) External evidence

  (1) notices to airmen (NOTAMs);

  (2) AIP.

(c) When selecting the method and tool, operators should be driven by the objective of reaching the optimum in terms of the desired outcome, which is the maximum possible knowledge increase. This methodology intends that such selection is based on the type of the underlying risks of a route / area as determined in accordance with (a) and (b) and the learning objectives. For example: for the less complex areas or routes, familiarisation by self-briefing with route documentation, or by means of programmed instruction; and for the more complex areas or routes, in-flight familiarisation as a pilot-incommand/commander or co-pilot under supervision, observer, or familiarisation in a flight simulation training device (FSTD) using a database appropriate to the route concerned.

22. The following AMC1 ORO.FC.105(d) is inserted:

AMC1 ORO.FC.105(d) Designation as pilot-in-command/commander

AREA FAMILIARISATION TRAINING THAT INCLUDES ROUTE /AERODROME FAMILIARISATION — HELICOPTERS

(a) The area familiarisation training for day VFR should ensure that a pilot is capable of selecting aerodromes and operating sites from the ground and from the air, and of establishing a safe flight path for landing and take-off.

AREA FAMILIARISATION TRAINING

(b) The following areas and conditions should require specific area familiarisation training:

  (1) mountain environment;

  (2) offshore environment;

(3) complex airspace;

(4) areas that are regularly covered by snow and are prone to white-out phenomena during the cruise or landing phase; and

(5) other challenging areas or conditions.

23. AMC1 ORO.FC.115 is amended as follows:

AMC1 ORO.FC.115 Crew resource management (CRM) training

CRM TRAINING — MULTI-PILOT OPERATIONS

(a) General

(…)

(4) Flight simulation training devices (FSTDs)

(i) Whenever practicable, parts of the CRM training should be conducted in FSTDs that reproduce a realistic operational environment and permit interaction. This includes but is not limited to line-oriented flight training (LOFT) scenarios.

(ii) If the operator proficiency check is conducted in a FSTD, it should include a line-oriented flight during which a complementary CRM assessment should take place, in conditions that reproduce a realistic operational environment.

(…)

(c) Operator conversion course — CRM training

When the flight crew member undertakes a conversion course with a change of aircraft type or ~~change of~~when joining an operator, elements of CRM training should be integrated into all appropriate phases of the operator's conversion course, as specified in Table 1 of (g).

(…)

(d) Annual recurrent CRM training

(…)

(g) CRM training syllabus

(…)

Table 1: Flight crew CRM training

CRM training elements	Initial operator's CRM training	Operator conversion course when changing aircraft type	Operator conversion course when ~~changing~~ joining an operator	Annual recurrent training	Command course
General principles					
Human factors in aviation; General instructions on CRM principles and objectives;	In-depth	Not ~~R~~required	Required	Required	Required

Human performance and limitations; Threat and error management.					
Relevant to the individual flight crew member					
Personality awareness, human error and reliability, attitudes and behaviours, self-assessment and self-critique; Stress and stress management; Fatigue and vigilance; Assertiveness, situational awareness, information acquisition and processing.	In-depth	Not required	~~Not r~~Required	Required	In-depth
Relevant to the flight crew					
Automation and philosophy on the use of automation	Required	In-depth	In-depth	In-depth	In-depth
Specific type-related differences	Required	In-depth	Not required	Required	Required
Monitoring and intervention	Required	In-depth	In-depth	Required	Required
Relevant to the entire aircraft crew					
Shared situational awareness, shared information acquisition and processing; Workload management; Effective communication and coordination inside and outside the flight crew compartment; Leadership, cooperation, synergy, delegation, decision-making, actions; Resilience development; Surprise and startle effect; Cultural differences.	In-depth	Required	Required	Required	In-depth
Relevant to the operator and the organisation					
Operator's safety culture and company culture, standard operating procedures (SOPs), organisational factors, factors linked to the type of operations;	In-depth	Required	In-depth	Required	In-depth

Effective communication and coordination with other operational personnel and ground services.					
Case studies	In-depth	In-depth	In-depth	In-depth	In-depth

(…)

24. AMC2 ORO.FC.115 is amended as follows:

AMC2 ORO.FC.115 Crew resource management (CRM) training

CRM TRAINING — SINGLE-PILOT OPERATIONS

(…)

(b)

(…)

(3) Virtual classroom ~~Computer-based~~ training

Notwithstanding (a)(2) ~~(a)(3)~~ of AMC1 ORO.FC.115, ~~computer-based training may be conducted as a stand-alone training method~~ classroom training may take place remotely, using a video-conferencing tool. The tool should permit real-time interaction between the trainees and the trainer, including speech and elements of body language. It should also be capable of transmitting any document to the trainee that the trainer wishes to present. The CRM trainer should establish the list of trainees in advance. Their numbers should be limited to 6 to ensure a sufficient level of interaction during the training session.

25. AMC3 ORO.FC.115 is amended as follows:

AMC3 ORO.FC.115 Crew resource management (CRM) training

FLIGHT CREW CRM TRAINER

(a) Applicability

The provisions described herein:

(1) should be fulfilled by flight crew CRM trainers responsible for classroom CRM training; and

(2) are not applicable to:

(i) instructors, holding a certificate in accordance with Commission Regulation (EU) No 1178/2011, ~~who conduct~~ when conducting CRM training in the operational environment; and

(ii) trainers or instructors when conducting training other than CRM training, but integrating CRM elements into this training.

(b) Qualification of flight crew CRM trainer

~~(1) A training and standardisation programme for flight crew CRM trainers should be established.~~

~~(2) A flight crew CRM trainer, in order to be suitably qualified, should:~~

(1) Prerequisites. A flight crew CRM trainer should:

  ~~(i) have adequate knowledge of the relevant flight operations;~~

  (i~~i~~) have adequate knowledge of human performance and limitations (HPL), whilst:

    (A) having obtained a commercial pilot licence in accordance with Commission Regulation (EU) No 1178/2011; or

    (B) having followed a theoretical HPL course covering the whole syllabus of the HPL examination;

  (ii~~i~~) have completed flight crew initial operator's CRM training;

  (~~iv~~iii) have received training in group facilitation skills~~;~~, except for instructors holding a certificate in accordance with Commission Regulation (EU) No 1178/2011;

  ~~(iv) have received additional training in the fields of group management, group dynamics and personal awareness;~~ and

  ~~(vi) have demonstrated the knowledge, skills and credibility required to train the CRM training elements in the non-operational environment, as specified in Table 1 of AMC1 ORO.FC.115.~~

  ~~(iv) Instructors holding a certificate in accordance with Commission Regulation (EU) No 1178/2011 shall be considered as complying with the provisions of points..~~

~~(3) The following qualifications and experiences are also acceptable for a flight crew CRM trainer in order to be suitably qualified:~~

  ~~(i) A flight crew member holding a recent qualification as a flight crew CRM trainer may continue to be a flight crew CRM trainer after the cessation of active flying duties if he/she maintains adequate knowledge of the relevant flight operations.~~

  ~~(ii) A former flight crew member may become a flight crew CRM trainer if he/she maintains adequate knowledge of the relevant flight operations and fulfils the provisions of (2)(ii) to (2)(vi).~~

  ~~(iii) An experienced CRM trainer may become a flight crew CRM trainer if he/she demonstrates adequate knowledge of the relevant flight operations and fulfils the provisions of (2)(ii) to (2)(vi).~~

(2) In order to qualify as flight crew CRM trainer, a person meeting the pre-requisites should:

  (i) have adequate knowledge of the relevant flight operations at one operator, in accordance with (d);

  (ii) receive the initial training in accordance with (c)(3); and

  (iii) be assessed by that operator in accordance with (f).

(3) In order to act as flight crew CRM trainer at an operator, a qualified and current flight crew CRM trainer should meet one of the following conditions:

  (i) have adequate knowledge of the relevant flight operations at that operator, in accordance with (d); or

  (ii) be part of a team of trainers in accordance with (e).

(4) The period of validity of the flight crew CRM trainer qualification should be 3 years. This period of validity may be counted from the end of the month.

(5) Recency and renewal of the flight crew CRM trainer qualification:

(i) The flight crew CRM trainer should complete CRM trainer refresher training within the last 12 months of the 3-year validity period; and

(ii) the flight crew CRM trainer should meet one or both of the following conditions:

(A) conduct at least 3 CRM training events within the 3-year validity period;

(B) be assessed within the last 12 months of the 3-year validity period in accordance with (f); and

(iii) If the flight crew CRM trainer qualification has expired, it can be renewed if all of the conditions below are met. The validity should be 3 years after completion of (A) and (C) below, whichever comes first:

(A) complete CRM trainer refresher training;

(B) receive refresher training on knowledge of the relevant flight operations, as necessary;

(C) be assessed in accordance with (f).

(c) Training of flight crew CRM trainer

(1) If the operator trains flight crew CRM trainers, the training syllabi should be described in the operations manual. The operator should ensure that the initial and refresher training of the flight crew CRM trainers is be conducted by flight crew CRM trainers with a minimum of 3 years' experience.

(~~1~~2) Training of flight crew CRM trainers should be both theoretical and practical. Practical elements should include the development of specific trainer skills, particularly the integration of CRM into line operations.

(23) The ~~basic~~ initial training of flight crew CRM trainers should include~~ the training elements for flight crew, as specified in Table 1 of AMC1 ORO.FC.115. In addition, the basic training should include~~ the following:

(i) introduction to CRM training and competencies for CRM trainers;

(A) ability to interact with and manage a group

(B) ability to pre-plan an objective and timely training session

(C) ability to deliver a good balance or "telling", "selling" and "facilitating"

(D) ability to connect realistically poor and good CRM to the operations

(E) ability to assess the performance, the progress and needs of trainee in a meaningfully way

(ii) operator's management system as defined in point (a)(7) of AMC1 ORO.FC.115; and

(iii) characteristics of the flight crew CRM training as defined by table 1 of AMC1 ORO.FC.115 and its integration into line operations~~, as applicable~~:

(A) ~~of~~ the different types of CRM trainings (initial, recurrent, etc.);

(B) ~~of~~ combined training; and

(C) training related to the type of aircraft or operation. ~~; and~~

(iv) ~~assessment.~~ Instructors holding a certificate in accordance with Commission Regulation (EU) No 1178/2011 may be credited towards (i) and (ii) if they have completed the refresher training defined in (4).

(34) The refresher training of flight crew CRM trainers should include new methodologies, procedures and lessons learned, as well as additional topics such as the following:

(i) Group facilitation skills incl. team dynamics, moderation skills and use of questions

(ii) Course preparation, defining objectives and selecting methods to best convey knowledge (e.g. lecture, group work, case analysis, gamification, scenario based training, individual research)

(iii) Safety culture and management systems.

(iv) An example of an analysis of CRM factors in an accident or serious incident.

(v) New developments or research in human factors and CRM

(vi) TEM principles and their practical implementation in normal operations

(45) Instructors, holding a certificate in accordance with Commission Regulation (EU) No 1178/2011, who are also CRM trainers, may combine the CRM trainer refresher training with instructor refresher training if the instructor refresher training meets all of the conditions defined in (4).

(56) Instructors for other-than complex motor-powered aeroplanes ~~aircraft~~ should be qualified as flight crew CRM trainers for this aircraft category with no additional training, as specified in (2) and (3) when:

(i) holding a certificate in accordance with Commission Regulation (EU) No 1178/2011; and

(ii) fulfilling the provisions of (b) (2) or (b)(3).

~~(6) The training of flight crew CRM trainers should be conducted by flight crew CRM trainers with a minimum of 3 years' experience. Assistance may be provided by experts in order to address specific areas.~~

(d) Knowledge of the relevant flight operations.

(1) The operator should evaluate the experience and knowledge of the flight crew CRM trainer. The evaluation of the operator should include at least:

(i) the operational experience of the flight crew CRM trainer as a flight crew member

(ii) whether this experience as flight crew member or former flight crew member covers the aircraft category, the aircraft generation and the form of operations, as relevant to the operator.

(2) If the flight crew CRM trainer does not have the relevant knowledge of the relevant flight operation based on the evaluation in (1), the operator should provide training to the flight crew CRM trainer to provide the adequate knowledge.

(3) The operator should describe the assessment and training in the operations manual.

(e) Team of CRM trainers

If the flight crew CRM trainer is qualified in accordance with (b) but does not meet the conditions defined in (d), he or she may be assisted by a training assistant that has the knowledge of the relevant flight operations. The operator should ensure that all the following conditions are met:

(1) The training assistant should meet the condition defined in (c) but needs not meet the conditions defined in (b). The training assistant should be an instructor or have experience in ground training.

(2) The flight crew CRM trainer and the training assistant should prepare the training session together and adapt it to the operational needs of the operator.

(3) If the flight crew CRM trainer and the training assistant have already provided training for the operator or for a similar operator, the operator may determine that condition (2) is met.

(4) The flight crew CRM trainer and the training assistant should provide the training together.

(5) The flight crew CRM trainer remains responsible for the training.

(~~d~~f) Assessment of flight crew CRM trainer

(1) ~~A flight crew CRM trainer should be assessed by the operator when conducting the first CRM training course. This first assessment should be valid for a period of 3 years.~~

~~(2)~~ The operator should ensure that the process for the assessment is included in the operations manual describing methods for observing, recording, interpreting and debriefing the flight crew CRM trainer. All personnel involved in the assessment must be credible and competent in their role.

(2) The assessment should enable the flight crew CRM trainer to demonstrate his knowledge and ability to train the CRM training elements in the non-operational environment. Special attention should be given in fields such as group management, group dynamics and personal awareness ;

(3) The initial assessment of a flight crew CRM trainer by the operator may take place when conducting their first CRM training course.

(4) The assessment of flight crew CRM trainers should be conducted by flight crew CRM trainers with a minimum of 3 years' experience.

~~(e) Recency and renewal of qualification as flight crew CRM trainer~~

~~(1) For recency of the 3-year validity period, the flight crew CRM trainer:~~

~~(i) conduct at least 2 CRM training events in any 12-month period;~~

~~(ii) be assessed within the last 12 months of the 3-year validity period by the operator; and~~

~~(iii) complete CRM trainer refresher training within the 3-year validity period.~~

~~(2) The next 3-year validity period should start at the end of the previous period.~~

~~(3) For renewal, i.e. when a flight crew CRM trainer does not fulfil the provisions of (1), he/she should, before resuming as flight crew CRM trainer:~~

~~(i) be assessed by the operator; and~~

~~(ii) complete CRM trainer refresher training.~~

(g) The operator should only select a qualified and current flight crew CRM trainer meeting the conditions defined in (d) or (e).

26. GM3 ORO.FC.115 is amended as follows:

GM3 ORO.FC.115 Crew resource management (CRM) training

MINIMUM TRAINING TIMES

(a) The following minimum training times are appropriate:

(1) multi-pilot operations:

(i) combined CRM training: 6 training hours over a period of 3 years and for EBT a minimum of 3 training hours within 3 years; and

(…)

27. The following GM8 ORO.FC.115 is inserted:

GM8 ORO.FC.115 Crew resource management (CRM) training

VIRTUAL CLASSROOM TRAINING — SINGLE-PILOT OPERATIONS

(a) A successful virtual classroom training relies on the ability of the trainer to make best use of the associated technologies in the context of CRM training. The flight crew CRM trainer may need to receive appropriate training coveringthe following:

(1) learning style,

(2) teaching method associated to virtual classroom instruction, such as videoconferencing, and a familiarisation to the used virtual classroom instruction system, including management of time, training media and equipment and tools.

(b) The operator implements a training system feedback loop as per AMC1 ORO.FC.115(h)(3)(iii).

(c) The operator facilitates access of the competent authority to the virtual classroom as required by ORO.GEN.140.

(d) More information on virtual classroom training is provided in the EASA Guidance for allowing virtual classroom instruction and distance learning.

28. The following AMC1 ORO.FC.120 is inserted:

AMC1 ORO.FC.120 Operator conversion training

OPERATOR CONVERSION TRAINING FOR NON-COMMERCIAL OPERATIONS WITH COMPLEX MOTOR-POWERED AIRCRAFT (NCC)

(a) General

(1) The operator conversion training should include:

(i) ground training, including the following:

(A) aircraft systems;

(B) normal procedures, which include flight planning, ground handling and flight operations, including performance, mass and balance, fuel schemes, selection of alternates, and ground de-icing/anti-icing;

            - (C) abnormal and emergency procedures, which include pilot incapacitation, as applicable;
            - (D) a review of relevant samples of accidents/incidents and occurrences to increase awareness of the occurrences that may be relevant for the intended operation;
        - (ii) emergency and safety equipment training and checking, including survival equipment training (completed before operating on any passenger-carrying flight);
        - (iii) passenger handling for operations where no cabin crew is carried; and
        - (iv) a minimum number of sectors and/or flight hours operated under the supervision of a flight crew member nominated by the operator, to demonstrate the standard of qualification specified in the operator's manual.
    - (2) The operator conversion course may be combined with a new type rating course, as required by Commission Regulation (EU) No 1178/2011.
    - (3) The conversion training should ensure that each flight crew member:
        - (i) has been trained to competency on the emergency and safety equipment installed on the aircraft they are to operate; and
        - (ii) is competent in the operating procedures and the use of checklists used by the operator.
- (b) Emergency and safety equipment training should:
    - (1) as far as practicable, take place in conjunction with cabin/technical crew. Emphasis should be placed on the importance of effective coordination and two-way communication between crew members in various emergency situations;
    - (2) address the operational procedures of rescue and emergency services; and
    - (3) cover the items of point (a)(2) of AMC1 ORO.FC.130.

29. The following AMC2 ORO.FC.120 is inserted:

AMC2 ORO.FC.120 Operator conversion training

FORM OF OPERATIONS – SINGLE-PILOT HELICOPTERS

The training for conversion from single-pilot operations to multi-pilot operations and vice versa on a given helicopter type, as specified in point FCL.725(d)(2) of Annex I (Part-FCL) to Regulation (EU) No 1178/2011, should take into account all of the following:

- (a) the SOPs of the operator;
- (b) the flight crew member's previous trainings and experience.

30. The following AMC3 ORO.FC.120 is inserted:

AMC3 ORO.FC.120 Operator conversion training

SPO OPERATOR CONVERSION COURSE – GROUND TRAINING

- (a) General
    - (1) The operator conversion training should include:

(i) ground training and checking, including all of the following:

(A) aircraft systems,

(B) normal procedures, which include flight planning ground handling and flight operations, including performance, mass and balance, fuel schemes selection of alternates, and ground de-icing/anti-icing,

(C) abnormal and emergency procedures, which include pilot incapacitation as applicable;

(D) a review of relevant samples of accident/incident and occurrences to increase awareness of the occurrences that may be relevant for the intended operation.

SPECIALISED OPERATIONS

If a flight crew member undergoes training with regard to SOPs related to a specialised operation, either as part of an equipment and procedure training or a conversion training, the following should apply:

(b) Initial training for a given specialised operation

(1) In-depth training should achieve competence in carrying out normal, abnormal and emergency procedures, covering the SOPs associated with the specialised task.

(2) The training should include ground training associated with the specialised task, completed before any flight training in an aircraft commences.

(3) If one or more task specialists are on board, the training should include emergency and safety equipment training, completed before any flight training in an aircraft commences. The training should ensure that all emergency equipment can be used timely and efficiently, that an emergency evacuation and first aid can be conducted, taking into account the training and operating procedures of the task specialist.

(4) Unless the flight crew member has significant experience in similar specialised operations as defined in the operations manual, the training should include aircraft/FSTD training associated with the specialised task.

(c) Initial training and experience for any level of HEC and HESLO operations: AMC1 SPO.SPEC.HEC.100 and AMC1 SPO.SPEC.HESLO.100 should apply in combination with point (b) above.

(d) Training when changing operators:

(1) The training should focus on the elements of the SOPs that are specific to the operator.

(2) The operator should determine the amount of training required in the operator's conversion course in accordance with the standards of qualification and experience specified in the operations manual, taking into account the flight crew member's previous training and experience in the given specialised operation and in similar operations.

(e) Training when changing specialised operations within the same operator, with previous experience of the specialised operation: point (d) above should apply.

(f) Training when changing types or variants: The training should focus on the elements of the SOPs that are specific to the type or variant. The operator should assess whether the flight crew should require ground training, aircraft/FSTD training or both, when changing type or variants within the framework of the same specialised operations. The assessment should take the following into account:

(1) the validity of the flight crew type rating;

(2) the experience and recency of the flight crew on the type or variant;

(3) whether any type or variant specific procedures exist;

(4) differences in equipment related to the specialised operations;

(5) differences in limitations or procedures related to the specialised operations.

31. The following GM1 ORO.FC.120 is inserted:

GM1 ORO.FC.120 Operator conversion training

STANDARD OPERATING PROCEDURES FOR MULTI-PILOT OPERATIONS — SINGLE-PILOT HELICOPTERS

MCC training is generic to all types. A pilot holding a certificate of completion of MCC training requires additional training to implement the multi-pilot SOPs of a given helicopter type.

32. AMC1 ORO.FC.125 is amended as follows:

AMC1 ORO.FC.125 Differences training, ~~and~~ familiarisation ~~training~~ , equipment and procedure training

GENERAL

(a) Differences training requires additional knowledge and training on the aircraft or an appropriate training device. It should be carried out:

~~(1) when introducing a significant change of equipment and/or procedures on types or variants currently operated; and~~

(1~~2~~) in the case of aeroplanes, when operating another variant of an aeroplane of the same type or another type of the same class currently operated; or

(2~~3~~) in the case of helicopters, when operating a variant of a helicopter currently operated.

(b) Familiarisation ~~training~~ requires only the acquisition of additional knowledge. It should be carried out when~~:~~

~~(1)~~ operating another helicopter or aeroplane of the same type~~; or~~

~~(2) when introducing a significant change of equipment and/or procedures on types or variants currently operated~~.

33. The following AMC2 ORO.FC.125 is inserted:

AMC2 ORO.FC.125 Differences training, familiarisation, equipment and procedure training

OPERATOR DIFFERENCE REQUIREMENTS (ODRs)

When defining the needs for differences training, familiarisation and equipment training, the operator should make use of the concept of ODRs and of the methodology described in AMC1 ORO.FC.140(a), including the ODRs tables.

FORM OF OPERATIONS — SINGLE-PILOT HELICOPTERS

If the differences training, familiarisation, equipment and procedure training includes the conversion from single-pilot operations to multi-pilot operations and vice versa, it should take into account all elements described in AMC2 ORO.FC.120.

34. The following GM1 ORO.FC.125 is inserted:

GM1 ORO.FC.125 Differences training, familiarisation, equipment and procedure training

OPERATOR DIFFERENCE REQUIREMENTS (ODRs)

The ODRs tables may result in different training programmes, depending on the training needs, regardless of the ‘base aircraft’ used to establish the table (e.g. the trainee may know the ‘other aircraft’ and be trained towards the ‘base aircraft’).

35. The following AMC1 ORO.FC.125(b) is inserted:

AMC1 ORO.FC.125(b) Differences training, familiarisation, equipment and procedure training

SPECIALISED OPERATIONS

If the equipment and procedure training includes training for SOPs related to a specialised operation, points (b) to (f) of AMC3 ORO.FC.120 should apply.

36. The following GM1 ORO.FC.125(b) is inserted:

GM1 ORO.FC.125(b) Differences training, familiarisation, equipment and procedure training

GENERAL

Introducing a change of equipment and/or procedures on types or variants currently operated may require additional knowledge or additional training on the aircraft, or an appropriate training device, or both.

37. The following GM2 ORO.FC.125(b) is inserted:

GM2 ORO.FC.125(b) Differences training, familiarisation, equipment and procedure training

STANDARD OPERATING PROCEDURES FOR MULTI-PILOT OPERATIONS — SINGLE-PILOT HELICOPTERS

MCC training is generic to all types. A pilot holding a certificate of completion of MCC training requires additional training to implement the multi-pilot SOPs of a given helicopter type.

38. The following AMC1 ORO.FC.130 is inserted:

AMC1 ORO.FC.130 Recurrent training and checking

RECURRENT TRAINING AND CHECKING TO DEMONSTRATE COMPETENCE FOR NON-COMMERCIAL OPERATIONS WITH COMPLEX MOTOR-POWERED AIRCRAFT (NCC)

(a) Recurrent training

Recurrent training should comprise the following:

(1) Ground training

The ground training programme should include:

(i) aircraft systems;

(ii) normal procedures, which include flight planning, ground handling and flight operations, including performance, mass and balance, fuel schemes, selection of alternates, and ground de-icing/anti-icing;

(iii) abnormal and emergency procedures, which include pilot incapacitation as applicable;

(iv) a review of relevant samples of accidents/incidents and occurrences to increase awareness of the occurrences that may be relevant for the intended operation;

(2) Emergency and safety equipment training

(i) Emergency and safety equipment training may be combined with emergency and safety equipment checking and should be conducted in an aircraft or a suitable alternative training device.

(ii) Every year the emergency and safety equipment training programme should include the following:

(A) actual donning of a life jacket, where fitted;

(B) actual donning of protective breathing equipment, where fitted;

(C) actual handling of fire extinguishers of the type used;

(D) instruction on the location and use of all emergency and safety equipment carried on the aircraft; and

(E) instruction on the location and use of all types of exits.

(3) Elements of CRM as specified in Table 1 of AMC1 ORO.FC.115 should be integrated into all appropriate phases of recurrent training.

(4) Aircraft/FSTD training

(i) The aircraft/FSTD training programme should be established in such a way that all the major failures of aircraft systems and associated procedures will have been covered in the preceding 3-year period.

(ii) When engine-out manoeuvres are carried out in an aircraft, the engine failure should be simulated.

(iii) When an FSTD is not available, the operator should establish mitigating measures to ensure that an adequate level of safety is maintained when conducting the training or checking in an aircraft. If one or more of the major failures cannot be practised in the aircraft because of their associated risks or because of environmental considerations, the failure(s) may be partially replicated for crew training purposes using pre-briefed, risk-assessed measures that avoid degrading the aircraft's performance below a predetermined level, and which permit immediate reversion to normal operating conditions.

(b) Periodic check to demonstrate competence

  (1) Each flight crew member should complete the periodic check as part of the normal crew complement.

  (2) Periodic demonstrations of competence should be conducted every 12 months and may be combined with the proficiency check required by Commission Regulation (EU) No 1178/2011.

39. The following GM1 ORO.FC.130 is inserted:

GM1 ORO.FC.130 Recurrent training and checking

PERIODIC CHECKS

(a) For CAT operations, the operator proficiency checks and the line checks are both part of the periodic checks. For EBT operators, the EBT module and the line evaluations of competence are both part of the periodic checks.

(b) For SPO operations, the operator proficiency checks are part of the periodic checks.

(c) For non-CAT operations, the periodic checks may include a line check.

40. The following AMC1 ORO.FC.130(a) is inserted:

AMC1 ORO.FC.130(a) Recurrent training and checking

OPERATIONS ON VARIATIONS IN AIRCRAFT CONFIGURATION

AMC1 ORO.FC.140(a) should be used to determine the recurrent ground training and checking relevant to variations in aircraft configuration, if all of the following apply:

(a) the pilot operates variations in aircraft configuration;

(b) the aircraft operated do not all belong to the same group of types defined under ORO.FC.140(b); and

(c) credit (in the sense of (a)(4) of AMC1 ORO.FC.140(a)) is sought.

41. The following AMC1 ORO.FC.135 is inserted:

AMC1 ORO.FC.135 Pilot qualification to operate in either pilot's seat

GENERAL

The training and checking for pilot qualification to operate in either pilot's seat should include any safety-critical items as specified in the operations manual where the action to be taken by the pilot is different depending on which seat they occupy.

NON-COMMERCIAL OPERATIONS WITH COMPLEX MOTOR-POWERED AIRCRAFT (NCC)

Training should be arranged so that all such items will have been covered in the preceding 3-year period.

42. The following GM1 ORO.FC.140 is inserted:

GM1 ORO.FC.140 Operation on more than one type or variant

GENERAL

(a) The concept of operating more than one type or variant depends on the experience, knowledge and ability of the operator and the flight crew concerned.

(b) The first consideration is whether aircraft types or variants allow the safe operation of all types and variants.

(c) The second consideration is if and how to achieve adequate training to address potential confusion and increased workload caused by the operation of several types or variants.

43. The following AMC1 ORO.FC.140(a) is inserted:

AMC1 ORO.FC.140(a) Operation on more than one type or variant

GENERAL

(a) Terminology

The terms used in the context of operation on more than one type or variant have the following meaning:

(1) 'Base aircraft' refers to an aircraft used as a reference to compare differences with another aircraft.

(2) 'Variant' refers to an aircraft or a group of aircraft within the same pilot type or class rating that has differences with the base aircraft and requires differences training or familiarisation.

(3) A 'variation in aircraft configuration' refers to an aircraft or a group of aircraft within the same variant that has differences with the base aircraft and requires equipment and procedure training.

(4) 'Credit' refers to the recognition of recurrent training, checking or recent experience based on commonalities between aircraft.

(5) 'Operator difference requirements (ODRs)' refer to a formal description of differences between types or variants or aircraft configurations flown by a particular operator.

(6) 'Training' refers to differences training, familiarisation and equipment training.

(7) 'Currency' refers to the recurrent training on types and variants.

(b) Scope of ODRs

The operator should use the ODRs methodology, a means of evaluating aircraft differences and similarities, in order to define the training and checking in the following cases:

(1) for the introduction of a change of equipment on a type or variant currently operated;

(2) for the introduction of a new variant within a type or class currently operated;

(3) for the recurrent training and checking of variations in aircraft configuration. The operator may define credit based on ODRs tables;

(4) for the operation of more than one type or variant when credit is sought, in which case all of the following should apply:

(i) All training, checking and currency requirements should be completed independently for each type or variant, unless credits have been established by using ODRs tables.

(ii) All recent experience requirements should be completed independently for each type, unless credits have been established by using ODRs tables.

(iii) The operator may define credit based on ODRs tables that should not be less restrictive than the OSD.

(c) ODRs methodology

(1) The operator should conduct a detailed evaluation of the differences or similarities of the aircraft concerned in order to establish appropriate procedures or operational restrictions. This evaluation should be based on the OSD for the relevant types or variants and should be adapted to the operator's specific variations in aircraft configuration. This evaluation should take into account all of the following:

(i) the level of technology;

(ii) operational procedures; and

(iii) handling characteristics.

(2) ODRs tables

The operator should first nominate one aircraft as the base aircraft from which to show differences with the second aircraft type or variant or variation in aircraft configuration, the 'difference aircraft', in terms of technology (systems), procedures, pilot handling and aircraft management. These differences, known as ODRs, preferably presented in tabular format, constitute part of the justification for operating more than one type or variant and also the basis for the associated differences/familiarisation or reduced type rating training for the flight crew.

(3) The ODRs tables should be presented as follows:

GENERAL OPERATOR DIFFERENCE REQUIREMENTS TABLE										
DIFFERENCE AIRCRAFT: **BASE AIRCRAFT:**				**COMPLIANCE METHOD**						
				TRAINING					**CHECKING/ CURRENCY**	
General	**Differences**	**Flt char**	**Proc chg**	**A**	**B**	**C**	**D**	**E**	**FLT CHK**	**CURR ENCY**
GENERAL	Range ETOPS certified	No	Yes		CBT					
DIMENSIONS	Configuration per AFM, FCOM	Yes	No		CBT					

SYSTEM OPERATOR DIFFERENCE REQUIREMENTS TABLE		
DIFFERENCE AIRCRAFT: **BASE AIRCRAFT:**	**COMPLIANCE METHOD**	
	TRAINING	**CHECKING/ CURRENCY**

System	**Differences**	**Flt char**	**Proc chg**	**A**	**B**	**C**	**D**	**E**	**FLT CHK**	**CURRENCY**
21 – AIR CONDITIONING	CONTROLS AND INDICATORS: - Panel layout	No	Yes	HO						
21 – AIR CONDITIONING	PACKS: - Switch type - Automatically controlled - Reset switch for both packs	No	Yes		CBT					

MANOEUVRE OPERATOR DIFFERENCE REQUIREMENTS TABLE										
DIFFERENCE AIRCRAFT: **BASE AIRCRAFT:**				**COMPLIANCE METHOD**						
				TRAINING					**CHECKING/ CURRENCY**	
Manoeuvre	**Differences**	**Flt char**	**Proc chg**	**A**	**B**	**C**	**D**	**E**	**FLT CHK**	**CURRENCY**
Exterior Preflight	Minor differences	No	No	HO						
Preflight	Differences due to systems, ECL	No	Yes		CBT	FTD				
Normal take-off	FBW handling v conventional; AFDS TAKEOFF: Autothrottle engagement FMA indications	No	Yes		CBT			FFS		

(4) Compilation of ODRs tables

(i) ODRs 1: General

The general characteristics of the candidate aircraft are compared with the base aircraft with regard to:

(A) general dimensions and aircraft design (number and type of rotors, wing span or category);

(B) flight deck general design;

(C) cabin layout;

(D) engines (number, type and position);

(E) limitations (flight envelope).

(ii) ODRs 2: Systems

Consideration is given to differences in design between the candidate aircraft and the base aircraft. For this comparison, the Air Transport Association (ATA) 100 index is used. This index establishes a system and subsystem classification and then an analysis is performed for each index item with respect to the main architectural, functional and operations elements, including controls and indications on the systems control panel.

(iii) ODRs 3: Manoeuvres

Operational differences encompass normal, abnormal and emergency situations and include any change in aircraft handling and flight management. It is necessary to establish a list of operational items for consideration on which an analysis of differences can be made.

The operational analysis should take the following into account:

(A) flight deck dimensions (size, cut-off angle and pilot eye height);

(B) differences in controls (design, shape, location and function);

(C) additional or altered function (flight controls) in normal or abnormal conditions;

(D) handling qualities (including inertia) in normal and in abnormal configurations;

(E) aircraft performance in specific manoeuvres;

(F) aircraft status following failure;

(G) management (e.g. ECAM, EICAS, navaid selection, automatic checklists).

(iv) Once the differences for ODRs 1, ODRs 2 and ODRs 3 have been established, the consequences of differences evaluated in terms of flight characteristics (FLT CHAR) and change of procedures (PROC CHNG) should be entered into the appropriate columns.

(v) Difference levels — crew training, checking and currency

(A) In order to operate more than one type or variant, the operator should establish crew training, checking and currency requirements. This may be done by applying the coded difference levels from the table in point (d)(2) to the compliance method column of the ODRs tables.

(B) Differences identified in the ODRs tables as impacting flight characteristics or procedures, should be analysed in the corresponding ATA section of the ODRs manoeuvres. Normal, abnormal and emergency situations should be addressed accordingly.

(d) Difference levels

(1) Difference levels — general

Difference levels are used to identify the extent of a difference between a base and a candidate aircraft with reference to the elements described in the ODRs tables. These levels are proportionate to the differences between a base and a candidate aircraft. A range of five difference levels in order of increasing requirements, identified as A through E, are each specified for training, checking, and currency.

Difference levels apply when a difference with the potential to affect flight safety exists between a base and a candidate aircraft. Differences may also affect the knowledge, skills, or abilities required from a pilot. If no differences exist, or if differences exist but do not affect flight safety, or if differences exist but do not affect knowledge, skills or abilities, then difference levels are neither assigned nor applicable to pilot qualification. When difference levels apply, each level is based on a scale of differences related to design features, systems, or manoeuvres. In assessing the effects of differences, both flight characteristics and procedures are considered since flight characteristics address handling qualities and performance, while procedures include normal, non-normal and emergency items.

Levels for training, checking, and currency are assigned independently, but are linked depending on the differences between a base and candidate aircraft. Training at level E usually identifies that the candidate aircraft is a different type to the base aircraft.

(2) Difference levels are summarised in the table below regarding training, checking, and currency.

DIFFERENCE LEVEL	**TRAINING**	**CHECKING**	**CURRENCY**
A	Self-instruction	Not applicable or integrated with next proficiency check	Not applicable
B	Aided instruction	Task or system check	Self-review
C	System devices	Partial proficiency check using qualified device	Designated system
D	Manoeuvre training devices[1] or aircraft to accomplish specific manoeuvres	Partial proficiency check using qualified device[1]	Designated manoeuvre(s)[1]
E	FSTDs[2] or aircraft	Proficiency check using FSTDs[2] or aircraft	As per regulation, using FSTDs[2] or aircraft

Footnote (1):

– *Aeroplane: FTD level 2, or FFS, or aeroplane*

– *Helicopter: FTD levels 2 and 3, or FFS, or helicopter*

Footnote (2):

– *Aeroplane: FFS level C or D, or aeroplane*

– *Helicopter: FSTDs having dual qualification: FFS level B and FTD level 3, or FFS level C or D, or helicopter*

Training levels A and B require knowledge, levels C and D require additional skills. Training level E means that the differences are such that type rating training is required or, in the context of equipment and procedure training, aircraft/FSTD training and checking is required.

(3) Difference levels — training

The training difference levels specified represent the minimum requirements. Devices associated with a higher difference level may be used to satisfy a training differences requirement.

(i) Level A training

Level A differences training is applicable to aircraft with differences that can adequately be addressed through self-instruction. Level A training represents a knowledge requirement such that once appropriate information is provided, understanding and compliance can be assumed to be demonstrated.

Training needs not covered by level A training may require level B training or higher, depending on the outcome of the evaluations described in the aircraft evaluation process (CS FCD.420).

(ii) Level B training

Level B differences training is applicable to aircraft with system or procedure differences that can adequately be addressed through aided instruction.

At level B aided instruction, it is appropriate to ensure pilot understanding, emphasise issues, provide a standardised method of presentation of material, or to aid retention of material following training.

(iii) Level C training

Level C differences training can only be accomplished through the use of devices capable of systems training.

Level C differences training is applicable to variants having ‘part task’ differences that affect skills or abilities as well as knowledge. Training objectives focus on mastering individual systems, procedures, or tasks, as opposed to performing highly integrated flight operations and manoeuvres in ‘real time’. Level C may also require self-instruction or aided instruction of a pilot, but cannot be adequately addressed by a knowledge requirement alone. Training devices are required to supplement instruction to ensure attainment or retention of pilot skills and abilities to accomplish the more complex tasks, usually related to operation of particular aircraft systems.

The minimum acceptable training media for level C are interactive computer-based training, cockpit systems simulators, cockpit procedure trainers, part task trainers (such as inertial navigation system (INS), flight management system (FMS), or traffic collision avoidance system (TCAS) trainers), or similar devices.

(iv) Level D training

Level D differences training can only be accomplished with devices capable of performing flight manoeuvres and addressing full task differences affecting knowledge, skills, or abilities.

Devices capable of flight manoeuvres address full task performance in a dynamic ‘real time’ environment and enable integration of knowledge, skills and abilities in a simulated flight environment, involving combinations of operationally oriented tasks and realistic task loading for each relevant phase of flight. At level D, knowledge and skills to complete necessary normal, non-normal and emergency procedures are fully addressed for each variant.

Level D differences training requires mastery of interrelated skills that cannot be adequately addressed by separate acquisition of a series of knowledge areas or skills that are interrelated. However, the differences are not so significant that a full type rating training course is required. If demonstration of interrelationships between the systems was important, the use of a series of separate devices for systems training would not suffice. Training for level D differences requires a training device that has accurate, high-fidelity integration of systems and controls and realistic instrument indications. Level D training may also require manoeuvre visual cues, motion cues, dynamics, control loading or specific environmental conditions. Weather phenomena such as low-visibility operations or wind shear may or may not be incorporated. Where simplified or generic characteristics of an aircraft type are used in devices to satisfy level D differences training, significant negative training should not occur as a result of the simplification.

Appropriate devices as described in CS FCD.415(a), satisfying level D differences training range from those where relevant elements of aircraft flight manoeuvring, performance, and handling qualities are incorporated. The use of a manoeuvre training device or aircraft is limited for the conduct of specific manoeuvres or handling differences, or for specific equipment or procedures.

(v) Level E training

Level E differences training is applicable to candidate aircraft that have such significant 'full task' differences that a full type rating training course or a type rating training course with credit for previous experience on similar aircraft types is required to meet the training objectives.

The training requires a 'high-fidelity' environment to attain or maintain knowledge, skills, or abilities that can only be satisfied by the use of FSTDs or the aircraft itself as mentioned in CS FCD.415(a). Level E training, if done in an aircraft, should be modified for safety reasons where manoeuvres can result in a high degree of risk.

When level E differences training is assigned, suitable credit or constraints may be applied for knowledge, skills or abilities related to other pertinent aircraft types. The training programme should specify the relevant subjects, procedures or manoeuvres.

(4) Difference levels — checking

Differences checking addresses any pertinent pilot testing or checking. Initial and recurrent checking levels are the same unless otherwise specified.

It may be possible to satisfactorily accomplish recurrent checking objectives in devices that do not meet the initial checking requirements. In such instances, the applicant may propose for revalidation checks the use of certain devices that do not meet the initial checking requirements.

(i) Level A checking

Level A differences checking indicates that no check related to differences is required at the time of differences training. However, a pilot is responsible for knowledge of each variant flown.

(ii) Level B checking

Level B differences checking indicates that a 'task' or 'systems' check is required following initial and recurring training.

(iii) Level C checking

Level C differences checking requires a partial check using a suitable qualified device. A partial check is conducted relative to particular manoeuvres or systems.

(iv) Level D checking

Level D differences checking indicates that a partial proficiency check is required following both initial and recurrent training. In conducting the partial proficiency check, manoeuvres common to each variant may be credited and need not be repeated. The partial proficiency check covers the specified particular manoeuvres, systems or devices. Level D checking is performed using scenarios that represent a 'real time' flight environment and uses qualified devices permitted for level D training or higher.

(v) Level E checking

Level E differences checking requires that a full proficiency check be conducted in FSTDs or in an aircraft as mentioned in CS FCD.415(a), following both initial and recurrent training. If appropriate, alternating Level E checking between relevant aircraft is possible and credit may be defined for procedures or manoeuvres based on commonality.

Assignment of level E checking requirements alone, or in conjunction with level E currency, does not necessarily result in assignment of a separate type rating.

(5) Difference levels — currency

Differences currency addresses any currency and re-currency levels. Initial and recurrent currency levels are the same unless otherwise specified.

(i) Level A currency

Level A currency is common to each aircraft and does not require separate tracking. Maintenance of currency in any aircraft suffices for any other variant within the same type rating.

(ii) Level B currency

Level B currency is 'knowledge-related' currency, typically achieved through self-review by individual pilots.

(iii) Level C currency

(A) Level C currency is applicable to one or more designated systems or procedures and it relates to both skill and knowledge requirements. When level C currency applies, any pertinent lower level currency is also to be addressed.

(B) Re-establishing level C currency

When currency is lost, it may be re-established by completing required items using a device equal to or higher than that specified for level C training and checking.

(iv) Level D currency

(A) Level D currency is related to designated manoeuvres and addresses knowledge and skills required for performing aircraft control tasks in real time with integrated use of associated systems and procedures. Level D currency may also address certain differences in flight characteristics including performance of any required manoeuvres and related normal, non-normal and emergency procedures. When level D is necessary, any pertinent lower level currency is also to be addressed.

(B) Re-establishing level D currency

When currency is lost, currency may be re-established by completing pertinent manoeuvres using a device equal to or higher than that specified for level D differences training and checking.

(v) Level E currency

(A) Level E currency requires that recent experience requirements of Part-FCL and operational requirements be complied with in each aircraft separately. Level E currency may also specify other system, procedure, or manoeuvre currency item(s) necessary for safe operations and may require procedures or manoeuvres to be accomplished in FSTDs or in an aircraft as mentioned in CS FCD.415(a). Provisions are applied in a way which addresses the required system or manoeuvre experience.

When level E is assigned between aircraft of common characteristics, credit may be permitted. Assignment of level E currency requirements does not automatically lead to a determination on same or separate type rating. Level E currency is tracked by a means that is acceptable to the competent authority.

When common take-off and landing credit (CTLC) is permitted, any credit or constraints applicable to using FSTDs, as mentioned in CS FCD.415(a), are also to be determined.

(B) Re-establishing level E currency

When currency is lost, currency may be re-established by completing pertinent manoeuvres using a device specified for level E differences training and checking.

(6) Competency regarding non-normal and emergency procedures — currency

Competency for non-normal and emergency manoeuvres or procedures is generally addressed by checking requirements. Particular non-normal and emergency manoeuvres or procedures may not be considered mandatory for checking or training. In this situation, it may be necessary to periodically practise or demonstrate those manoeuvres or procedures specifying currency requirements for those manoeuvres or procedures.

44. The following GM1 ORO.FC.140(a) is inserted:

GM1 ORO.FC.140(a) Operation on more than one type or variant

OPERATOR DIFFERENCE REQUIREMENTS (ODRS)

The ODR tables may result in different training programmes, depending on the training needs, regardless of the ‘base aircraft’ used to establish the table (e.g. the trainee may know the ‘other aircraft’ and be trained towards the ‘base aircraft’).

45. The following AMC1 ORO.FC.140(b) is inserted:

AMC1 ORO.FC.140(b) Operation on more than one type or variant

GROUPS OF SINGLE-ENGINED PISTON HELICOPTER TYPES FOR THE REVALIDATION OF THE OPC

When establishing groups of single-engined helicopter types for the purpose of crediting of proficiency checks, the operator should only take into account the helicopter types considered for crediting in AMC1 FCL.740.H (a)(3).

46. The following AMC1 ORO.FC.140(d) is inserted:

AMC1 ORO.FC.140(d) Operation on more than one type or variant

LINE CHECKS — HELICOPTERS

(a) Prior to using a line check on one helicopter type or variant to revalidate the line check on other helicopter types or variants, the operator should consider whether the kind of operations are sufficiently similar in terms of:

- (1) use of aerodromes or operating sites;
- (2) day VFR or night VFR;
- (3) use of operational approvals and specific approvals;
- (4) normal procedures, including flight preparation, take-off and landing procedures; and
- (5) use of automation.

(b) For IFR operations of helicopters, a line check on one type or variant should revalidate the line check for the other type or variant only if such credits are defined in the operational suitability data established in accordance with Commission Regulation (EU) No 748/2012[1].

(c) Line check cross-crediting should be defined in the operations manual.

47. The following AMC1 ORO.FC.145 is inserted:

AMC1 ORO.FC.145 Provision of training, checking and assessment

ACCEPTANCE OF PREVIOUS TRAINING FOR NON-COMMERCIAL OPERATIONS WITH COMPLEX MOTOR-POWERED AIRCRAFT, INCLUDING NON-COMMERCIAL SPECIALISED OPERATIONS

(a) If the operator chooses to make use of previous training received by the pilot, the operator should develop a policy for the crediting of such training. Details of such policy should be included in the operations manual.

(b) The policy should as a minimum include measures to ascertain:

  (1) the content of the previous training;

  (2) whether the previous training was delivered by suitably qualified personnel or organisations;

  (3) whether the aircraft, FSTD or other equipment used for the previous training was sufficiently similar to the aircraft and equipment the crew member will operate; and

  (4) whether the operating procedures used during such previous training were sufficiently representative of the procedures used by the new operator.

(c) Where previous training delivered by other suitably qualified personnel or organisations is found to satisfy all or some of the requirements in ORO.FC.120, the training may be credited and an abbreviated conversion course may be used. Such an abbreviated course should cover all items not credited from previous training.

(d) Where a pilot flies for more than one operator and the training delivered by that other operator is found to satisfy some of the requirements of ORO.FC.130, then such training may be credited and an abbreviated recurrent training programme may be used. Such an abbreviated recurrent training programme should cover all items not credited from the training delivered by the other operator.

(e) An aircraft operator remains responsible for all training required by this part regardless of whether the training is conducted by the operator, another operator, a certified organisation or another sub-contractor, as defined in ORO.GEN.205.

(f) An operator accepting any previous training should be satisfied that the flight crew member is competent to operate in accordance with that operator's procedures and to use the specific equipment installed on the aircraft to be operated.

(g) Previous training needs to be formally documented.

(h) The assessment under (b) and the documents referred to under (g) should be stored as part of the crew member training, checking and qualifications records.

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[1] OJ L 243, 27.9.2003, p. 6.

48. The following GM1 ORO.FC.145 is inserted:

GM1 ORO.FC.145 Provision of training, checking and assessment

POLICY FOR ACCEPTANCE OF PREVIOUS TRAINING AND CHECKING FOR OTHER THAN COMMERCIAL AIR TRANSPORT OPERATIONS (NCC)

If the operator chooses to make use of previous training received by the pilot, in accordance with AMC1 ORO.FC.145, the operator may wish to enter into arrangements with other operators in order to satisfy the requirements of ORO.GEN.205 in relation to contracted training providers or other aircraft operators.

49. The following AMC1 ORO.FC.145(a) is inserted:

AMC1 ORO.FC.145(a) Provision of training, checking and assessment

TRAINING AND CHECKING PROGRAMMES AND SYLLABI

(a) Training and checking programmes and syllabi should include as a minimum:

  (1) when training is combined with checking, the distinction between the two phases;

  (2) a list of the items covered;

  (3) the minimum time allocation (duration);

  (4) the means of delivery (e.g. FSTD, OTD, computer-based, VR, etc.);

  (5) the personnel providing the training and conducting the checks.

(b) Further details to the training and checking programmes and syllabi should be included in the operations manual depending on the complexity of the operations (e.g. further contextualisation of the training programme, details of the airport in where some items will be covered, time allocation to brief and debrief, whether the item to be trained is a legal requirement or an SMS item…etc).

50. The following GM1 ORO.FC.145(a) is inserted:

GM1 ORO.FC.145(a) Provision of training, checking and assessment

TRAINING AND CHECKING PROGRAMMES AND SYLLABI

The syllabus lists the topics to be covered in a training and checking programme. A syllabus may include:

- Personnel providing the training and conducting the checks.
- A description of the content.
- Means of delivery (e.g. FSTD, aircraft, OTD, class-room, computer-based, virtual reality, etc.).
- Minimum time allocation (duration).
- Prerequisites to be fulfilled before starting the training or checking.
- Standard of performance.
- Training objectives.
- Reference to training/checking material.
- Checking requirements, if any.
- When training and checking is combined, the distinction between trained and checked items.

51. AMC1 ORO.FC.145(b) is amended as follows:

AMC1 ORO.FC.145(b) Provision of training, checking and assessment

NON-MANDATORY (RECOMMENDATION) ELEMENTS OF OPERATIONAL SUITABILITY DATA

When developing the training programmes and syllabi, the operator should include ~~consider~~ the non-mandatory (recommendation) elements for the relevant type that are provided in the operational suitability data established in accordance with Commission Regulation (EU) No 748/2012.

52. AMC1 ORO.FC.145(d) is re-named as follows:

AMC1 ORO.FC.145(d) Provision of training, checking and assessment

FULL FLIGHT SIMULATORS (FFS)

(…)

53. The following AMC2 ORO.FC.145(d) is inserted:

AMC2 ORO.FC.145(d) Provision of training, checking and assessment

FSTDs

(a) Before the operator extracts the data from an FSTD that can be related to a pilot, it should develop a data access and security policy.

(b) Availability and accessibility of FSTD

  (1) 'Available FSTD' refers to any flight simulation training device (FSTD) that is vacant for use by the FSTD operator or by the customers irrespective of any time consideration.

  (2) 'Accessible' refers to a device that can be used by the operator to conduct training or checking pertaining to this Subpart, and by the nominated person conducting the training or checking.

54. The following GM1 ORO.FC.145(d) is inserted:

GM1 ORO.FC.145(d) Provision of training, checking and assessment

CONFIDENTIALITY AND PROTECTION OF TRAINING DATA IN COMMERCIAL AIR TRANSPORT

(a) Without prejudice to applicable national legislation on the protection of individuals with regard to the processing of personal data, for the training conducted in accordance with ORO.FC.145 the operator may have a training data access and security policy (including the procedure to prevent disclosure of crew identity).

(b) If the operator decides to have such a policy, it should:

  (i) be agreed by all parties involved (airline management and flight crew member representatives nominated either by the union or the flight crew themselves);

  (ii) be in line with the organisation's safety policy in order to not make available or to not make use of the training data to attribute blame or liability.

(c) The training data access and security policy may include a policy for access to information only to specifically authorised persons identified by their position in order to perform their duties.

55. The following AMC1 ORO.FC.145(f) is inserted:

AMC1 ORO.FC.145(g) Provision of training, checking and assessment

VALIDITY PERIOD OF RECURRENT ASSESSMENT, TRAINING AND CHECKING

(a) When the recency, training or the check is completed within the last 3 months of the validity period, the new validity period should be counted from the original expiry date.

(b) When the recency, training or check is completed before the 3 months of the validity period, the new validity period should be counted from the end of the month where the recency, training or check was completed and not from the original expiry date.

(c) Notwithstanding (a), the revalidation of CRM instructor and EBT instructor qualifications should follow AMC3 ORO.FC.115 and AMC2 ORO.FC.146.

56. The following AMC1 ORO.FC.146 is inserted:

AMC1 ORO.FC.146 Personnel providing training, checking and assessment

PERSONNEL CONDUCTING TRAINING AND CHECKING — GENERAL

Training and checking should be conducted by the following personnel:

(a) Ground and refresher training by suitably qualified personnel;

(b) Emergency and safety equipment training and checking by suitably qualified personnel as specified in the operator's manual;

(c) CRM

  (1) Integration of CRM elements into the different phases of training by all the personnel conducting the training, as per AMC1 and AMC2 ORO.FC.115.

  (2) The operator should ensure that all personnel conducting such training are suitably qualified to integrate elements of CRM into this training.

  (3) Classroom CRM training by at least one CRM trainer, qualified as specified in AMC3 ORO.FC.115 who may be assisted by experts in order to address specific areas.

57. The following AMC1 ORO.FC.146(b) is inserted:

AMC1 ORO.FC.146(b) Personnel providing training, checking and assessment

PERSONNEL PROVIDING AIRCRAFT/FSTD TRAINING AND CONDUCTING OPERATOR PROFICIENCY CHECKING AND QUALIFIED UNDER ANNEX I (PART-FCL) TO REGULATION (EU) NO 1178/2011

Training should be provided and checking should be conducted by the following personnel:

(a) Flight training by a type rating instructor (TRI) or class rating instructor (CRI), flight instructor (FI) or, in the case of the FSTD content, a synthetic flight instructor (SFI). For commercial air transport, the FI, TRI, CRI or SFI should satisfy the operator's experience and knowledge requirements sufficiently to instruct on aircraft systems and operational procedures and requirements.

(b) Operator proficiency check by a type rating examiner (TRE), class rating examiner (CRE) or, if the check is conducted in an FSTD, a synthetic flight examiner (SFE). The TRE, CRE or SFE should betrained in CRM concepts and the assessment of CRM skills.

(c) For aircraft/FSTD training, line flying under supervision, operator proficiency checks and line checks, if the training or checking includes multi-pilot operations of helicopters, by personnel holding 350 hours flying experience in multi-pilot operations.

(d) In the case of CAT operations in helicopters, the 350 hours flying experience in multi-pilot operations defined in (c) may be reduced on an individual basis, as part of the approval of the training and checking programmes. The operator may apply for such a reduced flying experience based on the unavailability of experienced pilots in both multi-pilot operations and in their types of operations. A FI/TRI/SFI rating and MCC training in helicopters should be a prerequisite for any reduced flying experience in multi-pilot operations. In addition, the operator should define mitigation measures after having performed a risk assessment. The following should be taken into account:

  (1) flying experience criteria in single-pilot operations in the types of operations;

  (2) any other training, checking, recency and experience criteria;

  (3) robustness and maturity of multi-pilot SOPs.

(e) In the case of training and checking towards the relevant aspects associated with a specialised operation, points (i)(2) to (i)(4) of AMC1 ORO.FC.146(f) should apply.

58. AMC1 ORO.FC.146(c) is amended as follows:

AMC2 ORO.FC.146(c) Personnel providing training, checking and assessment

EBT INSTRUCTOR — RECURRENT STANDARDISATION PROGRAMME

The EBT instructor should:

(…)

(c) complete an EBT assessment of competence every 3 years. When the assessment of competence is conducted within the 12 months preceding the expiry date, the next assessment of competence should be completed within 36 calendar months of the original expiry date of the previous assessment of competence.

59. The following AMC1 ORO.FC.146(e)(f)&(g) is inserted:

AMC1 ORO.FC.146(e),(f)&(g) Personnel providing training, checking and assessment

SUITABLY QUALIFIED PIC OR COMMANDER NOMINATED BY THE OPERATOR — GENERAL

(a) The nominated PIC/commander conducting training should either be qualified as an instructor under Regulation (EU) No 1178/2011 or receive training which should cover at least:

  (1) techniques of briefing and debriefing;

(2) CRM concepts and CRM assessment;

(3) for SPO, which manoeuvres the nominated PIC/commander should not train or check unless qualified as an instructor.

(b) In addition, the nominated PIC/commander conducting operator proficiency checks or line checks should either be qualified as an examiner under Regulation (EU) No 1178/2011 or receive additional training which should cover at least:

(1) how to perform a check;

(2) flight techniques applicable to checks performed in flight;

(3) the assessment of CRM skills.

(c) The nominated PIC/commander conducting aircraft/FSTD training, line flying under supervision, operator proficiency checks or line checks taking place under multi-pilot operations of helicopters should have 350 hours flying experience in multi-pilot operations.

(d) The nominated PICs/commanders, or the criteria for nominating PICs/commanders, should be included in the operations manual.

(e) The nominated PIC/commander should be type rated or class rated in the type or class where he or she provides the training, checking or assessment.

CAT — SUITABLY QUALIFIED COMMANDER OR INSTRUCTOR NOMINATED BY THE OPERATOR

(f) For CAT operations under visual flight rules (VFR) by day, the minimum experience of the nominated commander should be more than 750 hours total flight time with at least 50 hours on the type, class or the aircraft variant.

(g) For CAT operations of performance class B aeroplanes under night VFR or under instrument flight rules (IFR), the minimum experience of the nominated commander should be more than 1 000 hours total flight time with at least 100 hours on the type, class or the aircraft variant.

(h) In the case of CAT operations with helicopters, the 350 hours flying experience in multi-pilot operations defined in (c) may be reduced on an individual basis, as part of the approval of the training and checking programmes. The operator may apply for such a reduced flying experience based on the unavailability of experienced pilots in both multi-pilot operations and in their types of operations. A FI/TRI/SFI rating and MCC training in helicopters should be a prerequisite for any reduced flying experience in multi-pilot operations. In addition, the operator should define mitigation measures after having performed a risk assessment. The following should be taken into account:

(1) flying experience criteria in single-pilot operations in the types of operations;

(2) any other training, checking, recency and experience criteria; and

(3) robustness and maturity of multi-pilot SOPs.

SPO — SUITABLY QUALIFIED PIC OR INSTRUCTOR NOMINATED BY THE OPERATOR

(i) For SPO, the person conducting the aircraft/FSTD training and the operator proficiency check should meet the following criteria:

(1) Training and checking covering normal, abnormal and emergency procedures relevant to the type or variant should be conducted in accordance with AMC1 ORO.FC.146(b).

(2) Training and checking covering the relevant aspects associated with HEC and HESLO should be conducted by a HEC or HESLO instructor as defined in AMC1 SPO.SPEC.HEC.100 and AMC1 SPO.SPEC.HESLO.100.

(3) Training and checking covering the relevant aspects associated with a specialised operation other than HEC and HESLO should be conducted by a nominated PIC with the following flight experience:

(i) at least 750 hours total flight time with at least 50 hours on the type, class or aircraft variant;

(ii) for specialised operations other than HEC and HESLO, either:

(A) at least 350 hours in the applicable specialised operation, or

(B) 800 hours in specialised operations and the number of hours in the applicable specialised operation as defined by the operator, based on a risk assessment, taking into account the complexity of the relevant aspects associated with the applicable specialised operation. Flight experience in HHO, firefighting flight experience and flight experience in the search component of search and rescue flights may be credited towards the 800 hours in specialised operations. In addition, up to 200 hours of experience in CAT operations (other than HHO) may be credited towards the 800 hours in specialised operations.

(4) In addition to (2) and (3) above, flight training and checking of sensitive type-related manoeuvres in combination with the training and checking of the relevant aspects associated with a specialised task, should be conducted by a qualified instructor.

(j) In addition to (i) above, if the SPO operator combines the operator proficiency check with a licence proficiency check, the person conducting the check should meet the requirements for licence proficiency checks.

60. AMC1 ORO.FC.205 is amended as follows:

AMC1 ORO.FC.205 Command course

COMBINED UPGRADING AND CONVERSION COURSE — HELICOPTER

If a pilot is converting from one helicopter type ~~or variant~~ to another when upgrading to commander:

(…)

61. AMC1 ORO.FC.220 is amended as follows:

AMC1 ORO.FC.220 Operator conversion training and checking

OPERATOR CONVERSION TRAINING SYLLABUS

(a) General

(1) The operator conversion training should include, in the following order:

(i) ground training and checking, including all of the following:

(A) aircraft systems;~~, and~~

(B) normal procedures, which include flight planning and groundhandling and flight operations, including performance, mass and balance, fuel schemes, selection of alternates, and ground de-icing/anti-icing;~~,~~

(C) abnormal and emergency procedures, which include pilot incapacitation as applicable;

(D) a review of relevant samples of accident/incident and occurrences to increase awareness of the occurrences that may be relevant for the intended operation;

(ii) emergency and safety equipment training and checking~~,~~ (completed before any flight training in an aircraft commences);

(iii) flight training and checking (aircraft and/or FSTD); and

(iv) line flying under supervision and line check.

(…)

(b) Ground training

(1) (…)

(2) The course of ground instruction should incorporate formal tests ~~on such matters as aircraft systems, performance and flight planning, where applicable~~.

(c) Emergency and safety equipment training and checking

(…)

(3) Operations where no cabin crew is required

(i) Passenger handling

Other than general training on dealing with people, emphasis should be placed on the following:

(A) advice on the recognition and management of passengers who appear or are intoxicated with alcohol, under the influence of drugs or aggressive;

(B) methods used to motivate passengers and the crowd control necessary to expedite an aircraft evacuation; and

(C) the importance of correct seat allocation with reference to aircraft mass and balance. Particular emphasis should also be given on the seating of special categories of passengers.

(ii) Discipline and responsibilities

Emphasis should be placed on discipline and an individual's responsibilities in relation to:

(A) his or her ongoing competence and fitness to operate as a crew member with special regard to flight and duty time limitation (FTL) requirements; and

(B) security procedures.

(iii) Passenger briefing/safety demonstrations

Training should be given in the preparation of passengers for normal and emergency situations.

(d) Flight training

(1) Flight training should be conducted to familiarise the flight crew member thoroughly with all aspects of limitations and normal, abnormal and emergency procedures associated with the aircraft and should be carried out by suitably qualified class and type rating instructors and/or examiners. For specific operations, such as steep approaches, ETOPS, or operations based on QFE, additional training should be carried out, based on any additional elements of training defined for the aircraft type in the operational suitability data in accordance with Commission Regulation (EU) No 748/2012, where they exist.

(2) In planning flight training on aircraft with a flight crew of two or more, particular emphasis should be placed on the practice of LOFT with emphasis on CRM, and the use of crew coordination procedures, including coping with incapacitation.

(3) Normally, the same training and practice in the flying of the aircraft should be given to co-pilots as well as commanders. The ‘flight handling’ sections of the syllabus for commanders and co-pilots alike should include all the requirements of the operator proficiency check required by ORO.FC.230.

(4) Unless the type rating training programme has been carried out in an FSTD usable for ZFTT, the training should include at least three take-offs and landings in the aircraft.

(e) Operator proficiency check

(1) For aeroplanes, the operator proficiency check that is part of the operator’s conversion checking should follow the provisions in AMC1 ORO.FC.230. For EBT the operator should include either an EBT module in accordance with ORO.FC.231 or an OPC in accordance with AMC1 ORO.FC.230.

(2) For helicopters, the operator proficiency check that is part of the operator’s conversion checking should include at least the following emergency/abnormal procedures as relevant to the helicopter and operations:

(i) engine fire;

(ii) interior helicopter fire or smoke;

(iii) emergency operation of undercarriage;

(iv) hydraulic failure;

(v) electrical failure;

(vi) flight and engine control system malfunctions;

(vii) recovery from unusual attitudes;

(viii) landing with one or more engine(s) inoperative;

(ix) instrument meteorological conditions (IMC) autorotation techniques;

(x) autorotation to a designated area;

(xi) pilot incapacitation;

(xii) directional control failures and malfunctions; and

(xiii) engine failure and if relevant, relight;

and for multi-engined helicopters:

(xiv) engine failure during take-off before decision point;

(xv) engine failure during take-off after decision point;

(xvi) engine failure during landing before decision point; and

(xvii) engine failure during landing after decision point.

(3) For helicopter pilots required to engage in IFR operations, the proficiency check should include the following additional normal/abnormal/emergency procedures:

(i) 3D approach operation to minima;

(ii) go-around on instruments;

(iii) 2D approach operation to minima;

(iv) if relevant, at least one of the 3D or 2D approach operations should be an RNP APCH or RNP AR APCH operation;

(v) in the case of multi-engined helicopters, a simulated failure of one engine to be included in either the 3D or 2D approach operation to minima; and

(vi) where appropriate to the helicopter type, approach with flight control system/flight director system malfunctions, flight instrument and navigation equipment failures.

(4) For helicopters, the flight crew should be assessed on their CRM skills in accordance with the methodology described in AMC1 ORO.FC.115 and as specified in the operations manual.

(5) The use of FSTDs, composition of the flight crew, and the possible combinations with training or with the licence proficiency check should be defined as per AMC1 ORO.FC.230.

(~~e~~f) Line flying under supervision (LIFUS)

(…)

~~(f) Passenger handling for operations where no cabin crew is required~~

~~Other than general training on dealing with people, emphasis should be placed on the following:~~

~~(1) advice on the recognition and management of passengers who appear or are intoxicated with alcohol, under the influence of drugs or aggressive;~~

~~(2) methods used to motivate passengers and the crowd control necessary to expedite an aircraft evacuation; and~~

~~(3) the importance of correct seat allocation with reference to aircraft mass and balance. Particular emphasis should also be given on the seating of special categories of passengers.~~

~~(g) Discipline and responsibilities, for operations where no cabin crew is required~~

~~Emphasis should be placed on discipline and an individual's responsibilities in relation to:~~

~~(1) his/her ongoing competence and fitness to operate as a crew member with special regard to flight and duty time limitation (FTL) requirements; and~~

~~(2) security procedures.~~

~~(h) Passenger briefing/safety demonstrations, for operations where no cabin crew is required~~

~~Training should be given in the preparation of passengers for normal and emergency situations.~~

62. The following AMC3 ORO.FC.220 is inserted:

AMC3 ORO.FC.220 Operator conversion training and checking

TRAINING PROGRAMMES

The operator should ensure that training programmes include the relevant de-identified feedback from the management system, including occurrence reporting and flight data monitoring programmes.

63. The following AMC1 ORO.FC.220(b) is inserted:

AMC1 ORO.FC.220(b) Operator conversion training and checking

ASSIGNMENT TO FLIGHTS DURING A OPERATOR CONVERSION COURSE — HELICOPTERS

(a) A group of helicopter types should include either only single-engined turbine or only single-engined piston helicopters. Helicopters within a group should be operated only under VFR. The flight crew member should only be assigned to flights on a helicopter within the same group of helicopter types as the type used for the operator conversion training and checking.

(b) Once an operator conversion course has been commenced, the flight crew member should not start another operator conversion course on another helicopter type until that course is completed or terminated.

64. The following AMC1 ORO.FC.220(f) is inserted:

AMC1 ORO.FC.220 (f) Operator conversion training and checking

SPECIFIC CONVERSION COURSE FOR PILOTS TEMPORARILY JOINNING THE OPERATOR WHO WILL BE NOMINATED TO CONDUCT LINE CHECKS - SUITABLY QUALIFIED COMMANDER NOMINATED BY THE OPERATOR.

(a) The operator conversion training should include training as follows:

  (1) normal procedures, which include flight planning and ground handling and flight operations, including performance, mass and balance, fuel schemes, selection of alternates, and ground de-icing/anti-icing;

  (2) abnormal and emergency procedures, which include pilot incapacitation as applicable;

(b) the operator should ensure the line checker is familiar with:

  (1) the operating procedures and the use of checklists used by the operator;

  (2) the emergency and safety equipment installed or carried on the operated aircraft.

(c) After the completion of the specific conversion course the following applies:

  (1) AMC1 ORO.FC.146 (e),(f)&(g) applies as required.

  (2) The line checker cannot exercise duties at the controls of the aircraft.

  (3) The line checker should only conduct recurrent line checks of pilots whose previous line check has not expired, in accordance with ORO.FC.230.

(d) The validity of the specific conversion course should be limited to 6 months.

65. GM1 ORO.FC.220(f) is amended as follows:

GM1 ORO.FC.220(f) Operator conversion training and checking

SPECIF CONVERSION COURSE TO BE USE TEMPORARILY FOR A LIMITED NUMBER OF PILOTS – NEW AOC OR NEW AIRCRAFT TYPE.

For a new AOC and/or the introduction of a new types/fleet, the operator may contact the competent authority to agree on a specific conversion course to be included in the operations manual (CAT requires approval iaw ORO.FC.145 point (c)) and to be used temporarily for a limited number of pilots. These may include an agreement on the minimum experience of the pilots, the required experience of the line supervisor and line checkers,…etc.

66. AMC1 ORO.FC.230 is amended as follows:

AMC1 ORO.FC.230 Recurrent training and checking

RECURRENT TRAINING AND CHECKING SYLLABUS

(a) Recurrent training

Recurrent training should comprise the following:

(1) Ground training

(i) The ground training programme should include:

(A) aircraft systems;

~~(B) operational procedures and requirements, including ground de-icing/anti-icing and pilot incapacitation; and~~

(B) normal procedures, which include flight planning and groundhandling and flight operations, including performance, mass and balance, fuel schemes, selection of alternates, and ground de-icing/anti-icing;

(C) abnormal and emergency procedures, which include pilot incapacitation as applicable;

(D)~~(C)~~ ~~accident/incident and occurrence review~~ a review of relevant samples of accident/incident and occurrences to increase awareness of the occurrences that may be relevant for the intended operation.

(ii) Knowledge of the ground training should be verified by a questionnaire or other suitable methods.

~~(iii) When the ground training is conducted within 3 calendar months prior to the expiry of the 12 calendar months period, the next ground and refresher training should be completed within 12 calendar months of the original expiry date of the previous training.~~

(…)

(4) Aircraft/FSTD training

(i) General

(A) The aircraft/FSTD training programme should be established in a way that all major failures of aircraft systems and associated procedures will have been ~~covered~~ trained in the preceding 3-year period.

(B) When engine-out manoeuvres are carried out in an aircraft, the engine failure should be simulated.

(C) ~~Aircraft/FSTD training may be combined with the operator proficiency check.~~ The recurrent aircraft/FSTD training of a single task or manoeuvre should be separate from, and should not take place at the same time as an operator proficiency check of the item.

~~(D) When the aircraft/FSTD training is conducted within 3 calendar months prior to the expiry of the 12 calendar months period, the next aircraft/FSTD training should be completed within 12 calendar months of the original expiry date of the previous training.~~

(ii) Helicopters

(A) ~~Where a suitable FSTD is available, it should be used for the aircraft/FSTD training programme. If the operator is able to demonstrate, on the basis of a compliance and risk assessment, that using an aircraft for this training provides equivalent standards of training with safety levels similar to those achieved using an FSTD, the aircraft may be used for this training to the extent necessary.~~

If the operator is able to demonstrate, on the basis of a compliance and risk assessment, that alternating the use of an FSTD with the use of an aircraft for this training provides equivalent standards of training with safety levels similar to those achieved using an FSTD, the aircraft may be used (alternating with the use of an FSTD) for this training to the extent necessary.

(B) Where a suitable FSTD is available, it should be used to complete the following additional items: ~~The recurrent training should include the following additional items, which should be completed in an FSTD:~~

— settling with power and vortex ring;

— loss of tail rotor effectiveness.

(5) (…)

(b) Recurrent checking

Recurrent checking should comprise the following:

(1) Operator proficiency checks

(i) Aeroplanes

~~Where applicable, operator~~ Operator proficiency checks should take place as part of the normal crew complement and should include, where applicable, the following manoeuvres as pilot flying:

(…)

(C) 3D approach operation to minima with, in the case of multi-engined aeroplanes, one-engine-inoperative;

(…)

(G) landing with one-engine-inoperative. For single-engined aeroplanes, a practice forced landing is required.

(ii) Helicopters

(A) ~~Where applicable, operator proficiency checks should include the following abnormal/emergency procedures:~~

~~— engine fire;~~

~~— fuselage fire;~~

~~— emergency operation of under carriage;~~

~~— fuel dumping;~~

~~— engine failure and relight;~~

~~— hydraulic failure;~~

~~— electrical failure;~~

~~— engine failure during take-off before decision point;~~

~~— engine failure during take-off after decision point;~~

~~— engine failure during landing before decision point;~~

~~— engine failure during landing after decision point;~~

~~— flight and engine control system malfunctions;~~

~~— recovery from unusual attitudes;~~

~~— landing with one or more engine(s) inoperative;~~

~~— instrument meteorological conditions (IMC) autorotation techniques;~~

~~— autorotation to a designated area;~~

~~— pilot incapacitation;~~

~~— directional control failures and malfunctions.~~

The aircraft/FSTD checking programme should be established in a way that all major failures of aircraft systems and associated procedures will have been checked in the preceding 3-year period.

The operator should define which failures are major for the purpose of the operator proficiency check based on a risk assessment, taking the following into account:

(a) cautions or warnings associated with the failure;

(b) the criticality of the situation or failure;

(c) the outcome of the procedure (land immediately or as soon as possible as opposed to land as soon as practical);

(d) when available, manufacturer documentation; and

(e) the list of abnormal/emergency procedures described in point (e)(1) of AMC1 ORO.FC.220.

In addition, for single-engined helicopters, each operator proficiency check should include at least the following procedures:

(f) engine failure;

(g) directional control failures and malfunctions; and

(h) hydraulic failure as applicable.

(B) When a group of single-engine turbine or single-engine piston- helicopter types is defined for the purpose of extending the validity of the operator proficiency check, all major system failures should nevertheless be checked on every type within a 3-year cycle unless credits related to the training, checking and recent experience requirements are defined in the operational suitability data established in accordance with Commission Regulation (EU) No 748/2012 for the relevant types or variants.

(~~B~~C) For pilots required to engage in IFR operations, proficiency checks include the following additional normal/abnormal/emergency procedures:

— 3D approach operation to minima;

— go-around on instruments~~ from minima with, in the case of multi-engined helicopters, a simulated failure of one engine~~;

— 2D approach operation to minima;

— if relevant, at least one of the 3D or 2D approach operations should be an RNP APCH or RNP AR APCH operation;

— in the case of multi-engined helicopters, a simulated failure of one engine to be included in either the 3D or 2D approach operation to minima;

— ~~landing with a simulated failure of one or more engines;~~

— where appropriate to the helicopter type, approach with flight control system/flight director system malfunctions, flight instrument and navigation equipment failures.

(~~C~~D) Before a flight crew member without a valid instrument rating is allowed to operate in VMC at night, ~~he/she~~ they should be required to undergo a proficiency check at night. Thereafter, each second proficiency check should be conducted at night.

(E) Operator proficiency checks should be conducted with two qualified pilots in multi-pilot operations, and one qualified pilot in single-pilot operations. A pilot flying both single-pilot and multi-pilot operations should be checked in multi-pilot conditions with the essential malfunctions or manoeuvres below being also checked in the single-pilot role:

(a) at least two abnormal or emergency manoeuvres relevant to the type based on a risk assessment;

(b) one instrument approach for IFR operations.

(F) The flight crew should be assessed on their CRM skills in accordance with the methodology described in AMC1 and AMC2 ORO.FC.115 and as specified in the operations manual.

(G) If the operator is able to demonstrate, on the basis of a compliance and risk assessment, that alternating the use of an FSTD with the use of an aircraft for this training provides equivalent standards of checking with safety levels similar to those achieved using an FSTD, the aircraft may be used (alternating with the use of an FSTD) for this checking to the extent necessary.

(iii) ~~Once every 12 months the~~ The checks prescribed in (b)(1) ~~(ii)(A)~~ may be combined with the skill test or proficiency check ~~for~~ required for the issue, the revalidation or renewal of the ~~ATPL and~~ aircraft type rating and with the skill test required for the issue of the ATPL licence.

~~(iv) Operator proficiency checks should be conducted by a type rating examiner (TRE) or a synthetic flight examiner (SFE), as applicable.~~

(2) Emergency and safety equipment checks

(…)

(3) Line checks

(i) A line check ~~Line checks~~ should establish the ability to perform satisfactorily a complete line operation, including pre-flight and post-flight procedures and use of the equipment provided, as specified in the operations manual. The route chosen should be such as to give adequate representation of the scope of a pilot's normal operations. When weather conditions preclude a manual landing, an automatic landing is acceptable. The commander, or any pilot who may be required to relieve the commander, should also demonstrate ~~his/her~~ their ability to ‘manage’ the operation and take appropriate command decisions.

(…)

(v) A line check ~~Line checks~~ should be conducted by a commander nominated by the operator. The operator should maintain a list of nominated commanders and inform the competent authority about the persons nominated. The person conducting the line check should occupy an observer’s seat where installed. ~~His/her CRM assessments should solely be based on observations made during the initial briefing, cabin briefing, flight crew compartment briefing and those phases where he/she occupies the observer’s seat.~~

(A) For aeroplanes, in the case of long-haul operations where additional operating flight crew are carried, the person conducting the line check may fulfil the function of a cruise relief pilot and should not occupy either pilot’s seat during take-off, departure, initial cruise, descent, approach and landing.

(B) If an observer’s seat is not installed but a forward-facing passenger seat allows a good view and sound of the cockpit and the crew, this seat should be used as an observer’s seat.

(C) If an observer’s seat is not available and cannot be installed, the commander nominated by the operator should occupy a pilot seat to conduct the line check.

(vi) CRM assessment during the line check

(A) The CRM assessment taking place during the line check should be solely based on observations made during the initial briefing, cabin briefing, flight crew compartment briefing and those phases where the checker occupies the observer’s seat.

(B) If an observer’s seat is not available and cannot be installed, then the operator should define the best way to assess CRM taking into account the CRM principles above.

(vii) Complimentary CRM assessment

if a suitable FSTD is available for operator proficiency checks or FSTD training, then a CRM assessment should take place in a line-oriented flight scenario (LOFT or line oriented section of the OPC) of an FSTD session. This assessment complements the CRM assessment taking place during the line check but is not part of the line check.

(viii) Where a pilot is required to operate as pilot flying and pilot monitoring, they ~~he/she~~ should be checked on one flight sector as pilot flying and on another flight sector as pilot monitoring. ~~However, where the operator’s procedures require integrated flight preparation, integrated cockpit initialisation and that each pilot performs both flying and monitoring duties on the same sector, then the line check may be performed on a single flight sector~~.

(4) ~~When the operator proficiency check, line check or emergency and safety equipment check are undertaken within the final 3 calendar months of validity of a previous check, the period of validity of the subsequent check should be counted from the expiry date of the previous check.~~

~~(5)~~ In the case of single-pilot operations ~~with helicopters~~, the recurrent checks referred to in (b)(1)~~, (2)~~ and (3) should be performed in the single-pilot role ~~on a particular helicopter type~~ in an environment representative of the operation.

(c) (…)

~~(d) Personnel providing training and checking~~

~~Training and checking should be provided by the following personnel:~~

~~(1) ground and refresher training by suitably qualified personnel;~~

~~(2) flight training by a flight instructor (FI), type rating instructor (TRI) or class rating instructor (CRI) or, in the case of the FSTD content, a synthetic flight instructor (SFI), providing that the FI, TRI, CRI or SFI satisfies the operator's experience and knowledge requirements sufficient to instruct on the items specified in paragraphs (a)(1)(i)(A) and (B);~~

~~(3) emergency and safety equipment training by suitably qualified personnel;~~

~~(4) CRM:~~

~~(i) integration of CRM elements into all the phases of the recurrent training by all the personnel conducting recurrent training. The operator should ensure that all personnel conducting recurrent training are suitably qualified to integrate elements of CRM into this training;~~

~~(ii) classroom CRM training by at least one CRM trainer, qualified as specified in AMC3 ORO.FC.115 who may be assisted by experts in order to address specific areas.~~

~~(5) recurrent checking by the following personnel:~~

~~(i) operator proficiency check by a type rating examiner (TRE), class rating examiner (CRE) or, if the check is conducted in an FSTD, a TRE, CRE or a synthetic flight examiner (SFE), trained in CRM concepts and the assessment of CRM skills.~~

~~(ii) emergency and safety equipment checking by suitably qualified personnel.~~

(~~e~~d) Use of FSTD

(1) Training and checking provide an opportunity to ~~practice~~ practise abnormal/emergency procedures that rarely arise in normal operations and should be part of a structured programme of recurrent training. This should be carried out in an FSTD ~~whenever possible~~ when available.

(…)

(4) The operator should make the FSTD accessible, by using its training syllabi and nominated persons.

67. The following AMC3 ORO.FC.230 is inserted:

AMC3 ORO.FC.230 Recurrent training and checking

TRAINING PROGRAMMES

The operator should ensure that training programmes include the relevant de-identified feedback from the management system, including occurrence reporting and flight data monitoring programmes.

68. GM1 ORO.FC.230 is amended as follows:

GM1 ORO.FC.230 Recurrent training and checking

LINE CHECK AND PROFICIENCY TRAINING AND CHECKING

(…)

(b) The line check is considered a particularly important factor in the development, maintenance and refinement of high operating standards, and can provide the operator with a valuable indication of the usefulness of ~~his/her~~ its training policy and methods. Line checks are a test of a flight crew member's ability to perform a complete line operation, including pre-flight and post-flight procedures and use of the equipment provided, and an opportunity for an overall assessment of ~~his/her~~ their ability to perform the duties required as specified in the operations manual. The line check is not intended to determine knowledge on any particular route.

(c) (…)

MAJOR FAILURES — HELICOPTERS

(d) The list of major failures as defined by the operator in AMC1 ORO.FC.230 for the purpose of training may be more extensive than the list covered in the 3-yearly operator proficiency checking programme for the following reasons:

   (1) It may happen that several training elements are covered by a single check; and

   (2) Certain complex system malfunctions are best explored under recurrent training, where the trainee will derive more benefit and training to proficiency is also employed.

69. GM3 ORO.FC.231(a) is amended as follows:

GM3 ORO.FC.231(a) Evidence-based training

ED Decision 2021/002/RED Decision 2021/002/R

CUSTOMISATION OF THE EBT PROGRAMME (SYLLABI)

(a) Syllabi can be customised at three different steps:

   (1) The first step would be a syllabus for the whole pilots' population (customisation only at type rating level and/or aircraft generation level). At this step, the operator customises the example scenario elements based on relevant operational data (safety management system, state safety plan, OSD, occurrences, manufacturer data, etc.), and the training topics within the module are the same (same syllabus). At this level, it may be necessary to have a different example scenario element for the different crews within the same module to ensure that pilots are exposed to surprise and unexpected events and thus avoid pilots knowing all the details of the simulator session beforehand.

   (2) The second step would be a different syllabus or part of it for the different populations of pilots. For example, some parts of the syllabus are different for the ~~first officers~~ co-pilot and the captain, or the syllabus is different for the B747 pilots or for the Airbus pilots, etc. At this step, the module or part of the module is different for each population; this may include a different example scenario element for each population (or a different training topic; however, the customisation at training topic level is more difficult to control).

   (3) The third step would be syllabi tailored to the individual pilot (pilot customisation — individual syllabus). This step is linked to the procedures established for the tailored training and the additional training of the pilots following the VENN model.

(b) The procedure to describe the customisation of syllabi must be described in the OM. Customisation is based on evidence that can be gathered on three different levels, two from the inner loop, one from the outer loop.

   (1) Inner loop

(i) Individual evidence based on training data (e.g. grading metrics, training reports, questionnaires, etc.), analysed either for an individual pilot or a group of pilots (for example, all ~~first officers~~ co-pilots, all B747 pilots, all pilots flying an Airbus model, etc.).

(ii) Operator-specific evidence gathered through the safety management process in accordance with ORO.GEN.200.

(2) Outer loop

Evidence gathered from external sources such as authorities (e.g. state safety plan, etc.), OEMs (e.g. OEBs, OSD, safety documentation such as getting to grip, etc.

70. GM1 ORO.FC.231(a)(5) point (b) is amendmed as follows:

GM3 ORO.FC.231(a)(2) Evidence-based training

EBT PROGRAMME —ORDER OF THE PHASES

The order of the phases is intended as follows:

(a) ~~(2)~~ First the EVAL; and

(b) ~~(3)~~ Second, and in a timely manner after the EVAL, the training phases. The training phases are the MT and the SBT and may be delivered in any order.

Further guidance can be found in the EASA EBT manual.

GM1 ORO.FC.231(a)(5) Evidence-based training

CONTINGENCY PROCEDURES — RATINGS RENEWAL

(…)

(b) In case of an expiry longer than 1 year, the requirements of Part-FCL will be followed and the proficiency checks will be performed in accordance with Appendix 9 as the EBT system may not have sufficient training data for the pilot.

(1) Expiry longer than 1 year but shorter than 3 years: a minimum of three training sessions in which the most important malfunctions in the available system are covered plus a proficiency check in accordance with Appendix 9 to renew the licence.

~~(2) Expiry longer than 3 years: the pilot should undergo the training for the initial issue of the type rating.~~

~~(3) Expiry longer than 7 years: the pilot should undergo the training for the initial issue of the instrument rating.~~

71. AMC4 ORO.FC.231(d)(1) point (b) is amended as follows:

AMC4 ORO.FC.231(d)(1) Evidence-based training

(a) (…)

(b) Grades should be determined during each EBT module as follows:

(1) EVAL — overall performance of the phase for each competency at level 1 grading metrics.

(2) MT — overall performance of the phase at level 0 grading metrics. When the phase is graded 'not competent', it requires level 2 grading metrics.

Note: Only a limited number of competencies may be observed and graded in this phase (e.g. PRO, FPA, FPM); the others are 'to be left in blank'.

(3) SBT — overall performance of the phase for each competency at level 1 grading metrics. Unless just culture and the necessary non-jeopardy environment during training may be compromised. In that case, level 0 grading metrics.

Note: In-seat instruction (ISI) should not be included in any assessment.

(….)

72. GM1 ORO.FC.231(d)(1) point (a) is amended as follows:

GM1 ORO.FC.231(d)(1) Evidence-based training

RECOMMENDED CONDUCT OF THE GRADING — ORCA

(a) At the end of the EVAL, after the facilitated de-briefing, the instructor may, as a minimum, record level 1 grading metrics.

(b) The instructor may conduct the simulator session of the EVAL following the principles of a summative assessment and the facilitated de-briefing following the principles of a formative assessment. The MT and SBT simulator sessions may be conducted as a formative assessment.

(c) At the end of each training phase, it is recommended to record level 1 grading metrics unless just culture and the necessary non-jeopardy environment during training may be compromised. In that case, the following alternative may be recommended: level 0 grading metrics for all competencies may be recorded (exceptionally 'not observed' or 'left in blank' may be recorded) and de-identified level 1 grading metrics may be recorded for the data collection and analysis purposes.

(d) A simple practice to classify in the debriefing the observations recorded during the simulator session is to classify the OB as positive or negative (e.g. Level 0) and when it is not clear, undetermined.

73. GM2 ORO.FC.231(d)(1) point (a) is amended as follows:

GM2 ORO.FC.231(d)(1) Evidence-based training

ED Decision 2021/002/RED Decision 2021/002/R

RECOMMENDED GRADING SYSTEM METHODOLOGY — VENN MODEL

(a) Grades may be determined during each EBT module as follows:

(1) For each assigned grade:

(i) the observed performance should be identified with one or more OBs; and

(ii) the OB(s) should simply link the observed performance to the competency; they are not to be used as a checklist.

(2) At the completion of the EVAL, the grade should be ~~assigned for each competency, based on~~ the overall assessment of the performance of each competency during the EVAL. Although it is not recommended, if the instructor performs an overall grade (additional to level 1), it should be at level 0 grading metric (competent or not).

(3) The underlying philosophy of the individual tailored training and additional FSTD training is the identification of the pilot's individual training needs during the EVAL or EVALs. However, there may be cases in which such an identification may be complemented using other phases or combination of phases along the EBT programme. Nevertheless, when this happens consistently to a large number of pilots, it may indicate a problem of instructor standardisation.

(4) At the completion of the MT, only a limited number of competencies can be graded. The others are to be left in blank. Note: The grade of a competency as 'not observed' is a relevant set of data to be used in the EBT programme (e.g. may be used for instructor concordance assurance programme, programme design, etc.), while 'competency left in blank' is stating the obvious, which is that MT is a skill retention phase and therefore it focuses on only some of the competencies which may provide NO opportunity to observe all the competencies.

(5) At the completion of the module, grades should be assigned for each competency, based on the overall assessment of training during the SBT.

(6) In exceptional occasions, the instructor may have been unable to assess one or two competencies in the EVAL or SBT. A 'not observed' may be graded. The training system performance and concordance assurance system may use these metrics to improve instructors' standardisation and the EBT programme design. When the operator grades the MT alone (instead of grading the MT and EVAL together), a 'not observed' grading may be frequent. It also occurs when the instructor grades each one of the manoeuvres.

(b) The word pictures are standardised according to the VENN model but may be simplified once instructors become familiar with the system.

Word picture VENN model	
Application of procedures (PRO)	
5	The pilot applied procedures in an exemplary manner, by always demonstrating almost all of the observable behaviours to a high standard when required, which enhanced safety, effectiveness and efficiency
4	The pilot applied procedures effectively, by regularly demonstrating most of the observable behaviours when required, which resulted in a safe operation
3	The pilot applied procedures adequately, by regularly demonstrating many of the observable behaviours when required, which resulted in a safe operation
2	The pilot applied procedures at the minimum acceptable level, by only occasionally demonstrating some of the observable behaviours when required, but which did not result in an unsafe situation
1	The pilot applied proceduresineffectively ~~incorrectly~~, by rarely demonstrating any of the observable behaviours when required, which resulted in an unsafe situation

Communication (COM)	
5	The pilot communicated in an exemplary manner, by always demonstrating almost all of the observable behaviours to a high standard when required, which enhanced safety, effectiveness and efficiency
4	The pilot communicated effectively, by regularly demonstrating most of the observable behaviours when required, which resulted in a safe operation

3	The pilot communicated adequately, by regularly demonstrating many of the observable behaviours when required, which resulted in a safe operation
2	The pilot communicated at the minimum acceptable level, by only occasionally demonstrating some of the observable behaviours when required, but which did not result in an unsafe situation
1	The pilot communicated ineffectively, by rarely demonstrating any of the observable behaviours when required, which resulted in an unsafe situation

Flight path management — automation (FPA)	
5	The pilot managed the automation in an exemplary manner, by always demonstrating almost all of the observable behaviours to a high standard when required, which enhanced safety, effectiveness and efficiency
4	The pilot managed the automation effectively, by regularly demonstrating most of the observable behaviours when required, which resulted in a safe operation
3	The pilot managed the automation adequately, by regularly demonstrating many of the observable behaviours when required, which resulted in a safe operation
2	The pilot managed the automation at the minimum acceptable level, by only occasionally demonstrating some of the observable behaviours when required, but which did not result in an unsafe situation
1	The pilot managed the automation ineffectively, by rarely demonstrating any of the observable behaviours when required, which resulted in an unsafe situation

Flight path management — manual control (FPM)	
5	The pilot controlled the aircraft in an exemplary manner, by always demonstrating almost all of the observable behaviours to a high standard when required, which enhanced safety, effectiveness and efficiency
4	The pilot controlled the aircraft effectively, by regularly demonstrating most of the observable behaviours when required, which resulted in a safe operation
3	The pilot controlled the aircraft adequately, by regularly demonstrating many of the observable behaviours when required, which resulted in a safe operation
2	The pilot controlled the aircraft at the minimum acceptable level, by only occasionally demonstrating some of the observable behaviours when required, but which did not result in an unsafe situation
1	The pilot controlled the aircraft ineffectively, by rarely demonstrating any of the observable behaviours when required, which resulted in an unsafe situation

Application of knowledge (KNO)	
5	The pilot showed exemplary knowledge, by always demonstrating almost all of the observable behaviours to a high standard when required, which enhanced safety, effectiveness and efficiency
4	The pilot showed adequate knowledge, by regularly demonstrating most of the observable behaviours when required, which resulted in a safe operation

3	The pilot showed adequate knowledge, by regularly demonstrating many of the observable behaviours when required, which resulted in a safe operation
2	The pilot showed knowledge at the minimum acceptable level, by only occasionally demonstrating some of the observable behaviours when required, but which did not result in an unsafe situation
1	The pilot showed inadequate knowledge, by rarely demonstrating any of the observable behaviours when required, which resulted in an unsafe situation

Leadership & teamwork (LTW)	
5	The pilot led and worked as a team member in an exemplary manner, by always demonstrating almost all of the observable behaviours to a high standard when required, which enhanced safety, effectiveness and efficiency
4	The pilot led and worked as a team member effectively, by regularly demonstrating most of the observable behaviours when required, which resulted in a safe operation
3	The pilot led and worked as a team member adequately, by regularly demonstrating many of the observable behaviours when required, which resulted in a safe operation
2	The pilot led and worked as a team member at the minimum acceptable level, by only occasionally demonstrating some of the observable behaviours when required, but which did not result in an unsafe situation
1	The pilot led or worked as a team member ineffectively, by rarely demonstrating any of the observable behaviours when required, which resulted in an unsafe situation

Problem-solving & decision-making (PSD)	
5	The pilot solved problems and made decisions in an exemplary manner, by always demonstrating almost all of the observable behaviours to a high standard when required, which enhanced safety, effectiveness and efficiency
4	The pilot solved problems and made decisions effectively, by regularly demonstrating most of the observable behaviours when required, which resulted in a safe operation
3	The pilot solved problems and made decisions adequately, by regularly demonstrating many of the observable behaviours when required, which resulted in a safe operation
2	The pilot solved problems and made decisions at the minimum acceptable level, by only occasionally demonstrating some of the observable behaviours when required, but which did not result in an unsafe situation
1	The pilot solved problems or made decisions ineffectively, by rarely demonstrating any of the observable behaviours when required, which resulted in an unsafe situation

Situation awareness (SAW)	
5	The pilot’s situation awareness was exemplary, by always demonstrating almost all of the observable behaviours to a high standard when required, which enhanced safety, effectiveness and efficiency

4	The pilot’s situation awareness was good, by regularly demonstrating most of the observable behaviours when required, which resulted in a safe operation
3	The pilot’s situation awareness was adequate, by regularly demonstrating many of the observable behaviours when required, which resulted in a safe operation
2	The pilot’s situation awareness was at the minimum acceptable level, by only occasionally demonstrating some of the observable behaviours when required, but which did not result in an unsafe situation
1	The pilot’s situation awareness was inadequate, by rarely demonstrating any of the observable behaviours when required, which resulted in an unsafe situation

Workload management (WLM)	
5	The pilot managed the workload in an exemplary manner, by always demonstrating almost all of the observable behaviours to a high standard when required, which enhanced safety, effectiveness and efficiency
4	The pilot managed the workload effectively, by regularly demonstrating most of the observable behaviours when required, which resulted in a safe operation
3	The pilot managed the workload adequately, by regularly demonstrating many of the observable behaviours when required, which resulted in a safe operation
2	The pilot managed the workload at the minimum acceptable level, by only occasionally demonstrating some of the observable behaviours when required, but which did not result in an unsafe situation
1	The pilot managed the workload ineffectively, by rarely demonstrating any of the observable behaviours when required, which resulted in an unsafe situation

74. AMC1 ORO.FC.231(d)(2) point (b) is amendmed as follows:

AMC1 ORO.FC.231(d)(2) Evidence-based training

VERIFICATION OF THE ACCURACY OF THE GRADING SYSTEM

(a) (…)

(b) The items defined below are based on Part-FCL Appendix 9. They should be included in the EVAL and MT of the applicable module. The minimum items to be included are: rejected take-off, failure of critical engine between V1 & V2, ~~adherence to departure and arrival~~, 3D approaches down to a decision height (DH) not less than 60 m (200 ft), engine-out approach & go-around, 2D approach down to the MDH/A, engine-out approach & go-around, engine-out landing.

(c) (…)

75. AMC2 ORO.FC.232 is amended as follows:

AMC2 ORO.FC. 232 EBT programme assessment and training topics

GENERATION 4 (JET) — TABLE OF ASSESSMENT AND TRAINING TOPICS

(…)

	Assessment and training topic	*Frequency*	*Description (includes type of topic, being threat, error or focus)*	*Desired outcome* *(includes performance criteria OR training outcome)*	*Flight phase*	*Guidance material (GM)* *Example scenario elements*	*PRO*	*COM*	*FPA*	*FPM*	*LTW*	*PSD*	*SAW*	*WLM*	*KNO*
Generation 4 Jet — Recurrent assessment and training matrix							*Competency map*								
Section 1 — Skill retention. Manoeuvres training phase (MT)															
MT	Rejected take-off	B	~~Engine failure~~ Rejected take-off after the application of take-off thrust and before reaching V1 (CAT I or above)	Demonstrate manual aircraft control skills with smoothness and accuracy as appropriate to the situation. Detect deviations through instrument scanning. Maintain spare mental capacity during manual aircraft control. Maintain the aircraft within the flight envelope. Apply knowledge of the relationship between aircraft attitude, speed and thrust.	TO	From initiation of take-off to complete stop (or as applicable to the procedure)	x			x					
	(…)	(…)	(….)		(…)	(…)	(…)	(…)	(…)	(…)	(…)	(…)	(…)	(…)	(…)
	Emergency descent	C	Initiation of emergency descent from normal cruise altitude		CRZ	The manoeuvre is complete once the aircraft is stabilised in emergency descent configuration (and profile). However, if the EBT programme does not include the example scenario element ‘emergency descent’ in the training topic ‘automation management’ the emergency descent procedures should be completed	x		x	x					

(…)

EVAL or SBT	Automation management	A	CLB CRZ DES APP	The purpose of this topic is to encourage and develop effective flight path management through proficient and appropriate use of the flight management system(s), guidance and automation, including transitions between modes, monitoring, mode awareness, vigilance and flexibility needed to change from one mode to another. The means of mitigating errors are included in this topic. The errors are described as mishandled auto flight systems, inappropriate mode selection, mishandled flight management system(s) and inappropriate autopilot usage.	Know how and when to use the flight management system(s), guidance and automation. Demonstrate correct methods for engagement and disengagement of the auto flight system(s). Demonstrate appropriate use of flight guidance, auto thrust and other automation systems. Maintain mode awareness of the auto flight system(s), including engagement and automatic transitions. Revert to different modes when appropriate. Detect deviations from the desired aircraft state (flight path, speed, attitude, thrust, etc.) and take appropriate action. Anticipate mishandled auto flight system. Recognise mishandled auto flight system. Take appropriate action if necessary. Restore correct auto flight state. Identify and manage consequences.	ACAS warning (resolution advisory), recovery and subsequent engagement of automation	x		x						
			ALL			FMS tactical programming issues, e.g. step climb, runway changes, late clearances, destination re-programming, executing diversion	x		x						X
			CLB CRZ DES APP			Recoveries from terrain avoidance warning systems (TAWS), management of energy state to restore automated flight	x		x	x					
			CLB CRZ DES APP			Amendments to ATC cleared levels during altitude capture modes to force mode awareness and intervention.	x		x				x		
						ACAS warning (resolution advisory to level off) during climb or descend, for example close to the cleared level when the capture mode has already been activated	x		x				x		
			TO			Late ATC clearance to an altitude below acceleration altitude	x		x				x		
			TO APP			Engine-out special terrain procedures	x		x				x		
			CRZ			Forcing autopilot disconnect followed by re-engagement, recovery from low- or high-speed events in cruise	x		x	x			x		
			CLB			Engine failure during or after initial climb using automation	x		x						
			CRZ			Engine failure in cruise to onset of descent using automation	x		x						
			CRZ			Emergency descent	x		x						X
			DES APP			Managing high-energy descent capturing descent path from above (correlation with unstable approach training)	x		x				x		X
			APP			No ATC clearance received prior to commencement of approach or final descent	x		x				x		
			APP			Reactive wind shear and recovery from the consequent high-energy state	x		x				x		
			APP			Automation fail to capture the approach altitude in descent (e.g. last altitude before the FAP). Ideally, the failure occurs when the workload is high (e.g. configuration of the aircraft for final approach).					x	x	x	x	
			APP			Non-precision or infrequently flown approaches using the maximum available level of automation	x		x						X
			APP			Gear malfunction during an approach planned with autoland (including autobrake). Competency FPA may or may not be included depending on the impact of such malfunction on the automation.		x	x			x		x	
			APP			ATC clearances to waypoints beyond the programmed descent point for a coded final descent point during an approach utilising a final descent that is commanded by the flight management system	x		x				x		X

Section 5 — UPRT training topic with frequency (B). Evaluation phase, manoeuvres training phase or scenario-based training phase (EVAL, MT or SBT)

EVAL, MT or SBT	Upset prevention training	B	N/A	Compliance with AMC1 or AMC2 to ORO.FC.220&230 Include upset prevention elements in Table 1 for the recurrent training programme in at least every cycle, such that all the elements are covered over a period not exceeding 3 years. The elements are numbered with letters from A to I in Table 1 of AMC1 ORO.FC.220&230. Each element is made up of several numbered components. According to the principles of EBT, covering one component should satisfy the requirement to cover the whole element of recognising and preventing the development of upset conditions.	Early recognition and prevention of upset conditions. When the differences between LHS and RHS are not significant in the handling of the aircraft, UPRT may be conducted in either seat.	See Table 1 of AMC1 ORO.FC.220&230: Elements and respective components of upset prevention training.	Intentionally blank								
			CRZ			Demonstration of the defined normal flight envelope and any associated changes in flight instruments, flight director systems, and protection systems. This should take the form of an instructor-led exercise to show the crew the points beyond which an upset condition could exist.			X					x	x
			TO APP			Severe wind shear or wake turbulence during take-off or approach			x	x		x	x		
			CRZ			As applicable and relevant to the aircraft type, demonstration at a suitable intermediate level, with turbulence as appropriate; practise steep turns and note the relationship between bank angle, pitch and stalling speed.				X			x		x
			CRZ			At the maximum cruise flight level for the current aircraft weight, turbulence to trigger overspeed conditions (if FSTD capability exists, consider use of the vertical wind component to add realism).	X		x	x			x		
			CRZ			At the maximum cruise flight level for the current aircraft weight, turbulence and significant temperature rise to trigger low-speed conditions (if FSTD capability exists, consider use of the vertical wind component to add realism).			X	x			x		X
			CRZ			High-altitude ~~T~~ACAS RA (where the RA is required to be flown in manual flight)	x			x			x	x	

(…)

EVAL or SBT	Competencies —non-technical (CRM)	A	APP	This encapsulates the general CRM principles and objectives. It includes communication; leadership and teamwork; problem-solving and decision-making; situation awareness and management of information; and workload management. Emphasis should be placed on the development of leadership, shown by EBT data sources to be a highly effective competency in mitigating risk and improving safety through pilot performance.	Exposure to an event or sequence of events to allow the pilot to build awareness of human factors in aviation and the human limitations. This includes the development of the following competencies: Communication: Demonstrate: — effective use of language; — responsiveness to feedback; and — capability to state the plans and resolve ambiguities. Leadership and teamwork:	GPS failure prior to commencement of approach associated with position drift and a terrain alert					x	x	x		X
			DES			Cabin crew report of water noise below the forward galley indicating a possible toilet pipe leak, with consequent avionics failures					x	x	x		
			CRZ			Smoke removal but combined with a diversion until landing is completed.		x			x	x	x	x	X
			GND			Apron fuel spilling					x	x		x	
			CRZ			Important water leak in an aircraft galley		x			x	x		x	
			ALL			A relevant number of cabin crew are wounded or incapacitated. Additionally, the cabin crew wounded or incapacitated are the most competent (e.g. senior cabin crew member).					x	x		x	
			ALL			Unruly passenger(s)					x			x	
			GND			Passenger oxygen: passenger service unit open and mask falling down					x	x		x	
			ALL			Passenger with medical problems — medical emergency					x			x	

			CRZ		Use appropriate authority to ensure focus on the task. Support others in completing tasks. Problem-solving and decision-making: Detect deviations from the desired state, evaluate problems, identify the risk, consider alternatives and select the best course of action. Continuously review progress and adjust plans. Situation awareness and management of information: Have an awareness of the aircraft state in its environment; project and anticipate changes. Workload management: Prioritise, delegate and receive assistance to maximise focus on the task. Continuously monitor the flight progress.	Credible threat reported to the crew. Stowaway or fugitive on board.		x			x		x	x	
			GND			No METAR or TAFOR is available for destination due to industrial action at the destination airport.	x	x			x	x			
			CRZ			Credible bomb threat reported to crew		x			x		x	x	
			CLB DES			Credible bomb threat or pressurisation problem, but no quick landing possible (due to weather, terrain or other reasons)		x			x	x		x	
			APP			Diversion with low remaining fuel or increased fuel flow due to system malfunction	x				x		x	x	
			APP			ACAS warning (resolution advisory) immediately following a go-around, with a descent manoeuvre required. (The RA should be a command for descend when above 1100 feet AGL).		x			x	x	x	X	

(…)

EVAL or SBT	Manual aircraft control	A	CLB CRZ DES APP	Controls the flight path through manual control	Demonstrate manual aircraft control skills with smoothness and accuracy as appropriate to the situation. Detect deviations through instrument scanning. Maintain spare mental capacity during manual aircraft control. Maintain the aircraft within the normal flight envelope. Apply knowledge of the relationship between aircraft attitude, speed and thrust.	Flight with unreliable airspeed, which may or may not be recoverable	x			x			x		X
			CLB CRZ DES APP			Alternate flight control modes according to malfunction characteristics	x			x				x	X
			CLB CRZ DES APP			ACAS warning (resolution advisory)~~A~~ requires the pilot to descend or ATC calls for immediate descent (preferably during climb which requires a significant change in aircraft attitude)	x	x		x					
						ACAS warning (Resolution advisory) requires the pilot to climb or ATC calls for immediate climb (preferably during descend which requires a significant change in aircraft attitude).	x	x		x					
			DES			TAWS warning when deviating from planned descent routing, requiring immediate response	x			x	x				
			TO			Scenario immediately after take-off which requires an immediate and overweight landing			x	x	x	x			
			TO			Adverse wind, crosswinds with or without strong gusts on take-off	x			x					

EVAL or SBT			TO			Adverse weather, wind shear, wind shear encounter during take-off, with or without reactive warnings	x			x			x		
			TO			Engine failure during initial climb, typically 30-60 m (100-200 ft) (autopilot off)	x	x		x				x	
			CRZ			Wind shear encounter scenario during cruise, significant and rapid change in wind speed or down/updrafts, without wind shear warning	x		x			x	x	x	
			APP			Adverse weather, wind shear, wind shear encounter with or without warning during approach	x		x	x			x		
			APP			Adverse weather, deterioration in visibility or cloud base, or adverse wind, requiring a go-around from visual circling approach, during the visual segment	x	x	x	x		x	x	x	
			APP			Interception of the glide slope from above (correlation with unstable approach training)			x				x	x	
			APP LDG			Adverse wind, crosswinds with or without strong gusts on approach, final approach and landing (within and beyond limits)	x			x		x			
			APP LDG			Adverse weather, adverse wind, approach and landing in demanding weather conditions, e.g. turbulence, up and downdrafts, gusts and crosswinds including shifting wind directions				x		x	x		
			APP LDG			Circling approach manually flown at night in minimum in-flight visibility to ensure ground reference, minimum environmental lighting and no glide slope guidance lights	X			X			X	X	
			APP LDG			Runway incursion during approach, which can be triggered by ATC at various altitudes or by visual contact during the landing phase	x			x			x		
			LDG			Adverse wind, visibility, type-specific, special consideration for long-bodied aircraft, landing in minimum visibility for visual reference, with crosswind	x	x		x			x		
			LDG			System malfunction, auto flight failure at DA during a low-visibility approach requiring a go-around flown manually	x		x	x			x		
			APP LDG			Approach planned with autoland, followed by a failure below 1 000 ft requiring a manual go-around and an immediate landing due to fuel shortage	x		x		x		x		
			TO			In-seat instruction: Insufficient engine failure recovery, forcing the pilot monitoring to take over the flight controls		x		x			x	x	
			APP LDG			In-seat instruction: Unstable approach on short final or long landing, forcing the pilot monitoring to take over the flight controls		x		x			x	x	

(…)

EVAL or	Traffic	C	CLB CRZ DES	Traffic conflict. ACAS RA or TA, or visual observation of conflict, which requires evasive manoeuvring	Anticipate potential loss of separation.	ACAS warning that requires crew intervention		x				x	x	x	

					Recognise loss of separation. Take appropriate action. Apply the appropriate procedure correctly. Maintain aircraft control. Manage consequences.	Dilemma: Visual acquisition of conflicting traffic followed by an ACAS warning (resolution advisory) trigger by the same traffic or another traffic. Even if the traffic is insight the pilot should follow the RA.	x		x	x					
						While in descent, ACAS warning (traffic advisory) of an aircraft below. The crew should not initiate an avoidance maneuver based on TA (except decreasing the rate of descent, unless otherwise instructed by ATC…etc.). This example scenario can be done during climb with a conflicting traffic above.	x				x	x			

(…)

76. AMC3 ORO.FC.232 is amended as follows:

AMC3 ORO.FC. 232 EBT programme assessment and training topics

GENERATION 3 (JET) — TABLE OF ASSESSMENT AND TRAINING TOPICS

(…)

	Assessment and training topic	*Frequency*	*Description (includes type of topic, being threat, error or focus)*	*Desired outcome* *(includes performance criteria OR training outcome)*	*Flight phase*	*Guidance material (GM)* *Example scenario elements*	*PRO*	*COM*	*FPA*	*FPM*	*LTW*	*PSD*	*SAW*	*WLM*	*KNO*
Generation 3 Jet — Recurrent assessment and training matrix							*Competency map*								
Section 1 — Skill retention. Manoeuvres training phase (MT)															
MT	Rejected take-off	B	~~Engine failure~~ Rejected take-off after the application of take-off thrust and before reaching V1 (CAT I or above)	Demonstrate manual aircraft control skills with smoothness and accuracy as appropriate to the situation. Detect deviations through instrument scanning. Maintain spare mental capacity during manual aircraft control. Maintain the aircraft within the flight envelope. Apply knowledge of the relationship between aircraft attitude, speed and thrust.	TO	From initiation of take-off to complete stop (or as applicable to the procedure)	x			x					
	(…)	(…)	(….)		(…)	(…)	(…)	(…)	(…)	(…)	(…)	(…)	(…)	(…)	(…)
	Emergency descent	C	Initiation of emergency descent from normal cruise altitude		CRZ	The manoeuvre is complete once the aircraft is stabilised in emergency descent configuration (and profile). However, if the EBT programme does not include the example scenario element 'emergency descent' in the training topic 'automation management' the emergency descent procedures should be completed	x		x	x					

(…)

Section 5 — UPRT training topic with frequency (B). Evaluation phase, manoeuvres training phase or scenario-based training phase (EVAL, MT or SBT)															
EVAL, MT or SBT	Upset prevention training	B	N/A	Compliance with AMC1 or AMC2 to ORO.FC.220&230 Include upset prevention elements in Table 1 for the recurrent training programme in at least every cycle, such that all the elements are covered over a period not exceeding 3 years. The elements are numbered with letters from A to I in Table 1 of AMC1 ORO.FC.220&230. Each element is made up of several numbered components. According to the principles of EBT, covering one component should satisfy the requirement to cover the whole element of recognising and preventing the development of upset conditions.	Early recognition and prevention of upset conditions. When the differences between LHS and RHS are not significant in the handling of the aircraft, UPRT may be conducted in either seat.	See Table 1 of AMC1 ORO.FC.220&230: Elements and respective components of upset prevention training.	Intentionally blank								
			CRZ			Demonstration of the defined normal flight envelope and any associated changes in flight instruments, flight director systems, and protection systems. This should take the form of an instructor-led exercise to show the crew the points beyond which an upset condition could exist.			X					x	x
			TO APP			Severe wind shear or wake turbulence during take-off or approach			x	x		x	x		
			CRZ			As applicable and relevant to the aircraft type, demonstration at a suitable intermediate level, with turbulence as appropriate; practise steep turns and note the relationship between bank angle, pitch and stalling speed.				X			x		x
			CRZ			At the maximum cruise flight level for the current aircraft weight, turbulence to trigger overspeed conditions (if FSTD capability exists, consider use of the vertical wind component to add realism).	X		x	x			x		
			CRZ			At the maximum cruise flight level for the current aircraft weight, turbulence and significant temperature rise to trigger low-speed conditions (if FSTD capability exists, consider use of the vertical wind component to add realism).			X	x			x		X
			CRZ			High-altitude ~~T~~ACAS RA (where the RA is required to be flown in manual flight)	x			x			x	x	

(…)

77. AMC4 ORO.FC.232 point “rejected take-off” included in the table is amendmed as follows:

AMC4 ORO.FC. 232 EBT programme assessment and training topics

GENERATION 3 (TURBOPROP) — TABLE OF ASSESSMENT AND TRAINING TOPICS

(…)

Rejected take-off	B	~~Engine failure~~ Rejected take-off after the application of take-off thrust and before reaching V1 (CAT I or above)

(…)

78. AMC1 ORO.FC.235(d) is deleted:

~~AMC1 ORO.FC.235(d) Pilot qualification to operate in either pilot’s seat~~

~~SINGLE-ENGINE HELICOPTERS — AUTOROTATIVE LANDING~~

~~In the case of single-engined helicopters, the autorotative landing should be carried out from left- and right-hand seats on alternate proficiency checks.~~

79. The following AMC1 ORO.FC.236 is inserted:

AMC1 ORO.FC.236 Pilot qualification to operate in either pilot’s seat — helicopters

GENERAL

(a) The operator should either conduct a check every year or alternate training and checking every year. The training and checking may take place during or together with an operator proficiency check or an aircraft/FSTD training session.

(b) When engine-out manoeuvres are carried out in an aircraft, the engine failure should be simulated.

(c) Helicopter pilots should meet one of the following criteria:

(1) complete their operator proficiency checks from left- and right-hand seats, on alternate proficiency checks; or

(2) For multi-engined helicopters, if two consecutive operator proficiency checks are conducted from the same seat, the pilot should complete at least the following from the other pilot’s seat:

(i) an engine failure during take-off;

(ii) a one-engine-inoperative approach and go-around; and

(iii) a one-engine-inoperative landing;

(3) For single-engined helicopters, if two consecutive operator proficiency checks are conducted from the same seat, the pilot should complete at least one autorotation training or checking from the other pilot’s seat.

80. The following GM1 ORO.FC.236 is inserted:

GM1 ORO.FC.236 Pilot qualification to operate in either pilot’s seat — helicopters

QUALIFICATION TO FLY IN EITHER PILOT’S SEAT – NOMINATED COMMANDER IN CHARGE OF LINE CHECKS

If the line check takes place for the purpose of the line check revalidation of a fully qualified commander and the line checker has no pilot tasks other than checking, then the nominated commander in charge of conducting the line check does not require a qualification to operate in either pilot’s seat regardless of the seat he or she occupies.

81. AMC1 ORO.FC.240 is amended as follows:

AMC1 ORO.FC.240 Operation on more than one type or variant

GENERAL

(…)

(b) Helicopters

(1) If a flight crew member operates more than one type or variant, the following provisions should be met:

(i) The recency requirements and the requirements for recurrent training and checking should be met and confirmed prior to CAT operations on any type, and the minimum number of flights on each type within a ~~3-month~~ 3 months' period specified in the operations manual.

(…)

(iv) If a ~~For~~ helicopter~~s with~~ has a maximum certified take-off mass (MCTOM) of more than 5 700 kg~~,~~ or ~~with~~ a maximum operational passenger seating configuration (MOPSC) of more than 19:

(…)

(B) a minimum of 3 months and 150 hours experience on the type ~~or variant~~ should be achieved before the flight crew member should commence the conversion course onto the new type or variant, unless credits related to the training, checking and recent experience requirements are defined in operational suitability data established in accordance with Commission Regulation (EU) No 748/2012 for the relevant types or variants;

(C) 28 flying days ~~and/~~or 50 hours ~~flying~~ experience should then be achieved exclusively on the new type or variant, unless credits related to the training, checking and recent experience requirements are defined in the operational suitability data established in accordance with Commission Regulation (EU) No 748/2012 for the relevant types or variants; and

(D) a flight crew member should not be rostered to fly more than one type ~~or significantly different variant of a type~~ during a single duty period, unless the following conditions are met:

— There should be sufficient time off between the two types for a comprehensive training or self-training on the differences between the types.

— The training should include time in flight or in the cockpit or in a device representative of the cockpit of the next type to be flown. The time off should not include flight preparation duties.

— The training syllabus should be based on a risk assessment of the operator and be described in the operations manual. The training should take place every time the pilot changes types, whether within the same duty period or not.

(v) In the case of all other helicopters, the flight crew member should not operate more than three helicopter types or groups of types in CAT, NCC and SPO ~~or significantly different variants~~, unless credits related to the training, checking and recent experience requirements are defined in the operational suitability data established in accordance with Commission Regulation (EU) No 748/2012 for the relevant types or variants.

(vi) The operator should only define a group of types for the purpose of this AMC if the following conditions are met:

(A) a group of helicopter types should either include only single-engined turbine helicopters operated only under VFR or it should include only single-engined piston helicopters operated only under VFR;

(B) The operator should define conditions for flying more than one type or variant on the same day, including sufficient time for a briefing or self-briefing on changing types or variants;

(C) The operator should define the maximum number of types and variants that can be flown on the same day.

(vii) Points (v) and (vi) above apply whenever a flight crew member operates more than one type or variant in CAT.

(c) Combination of helicopter and aeroplane

(1) ~~The flight crew member may fly one helicopter type or variant and one aeroplane type irrespective of their MCTOM or MOPSC.~~ The flight crew member should only operate a combination of helicopters and aeroplanes if one of the following sets of conditions is met:

(i) operations under CAT, NCC and SPO should be limited to one type or class of aeroplane and one helicopter type; or

(ii) operations under CAT, NCC and SPO should be limited to one type or class of aeroplane and one group of helicopter types defined in (b)(vi) above; or

(iii) operations under CAT, NCC and SPO should be limited to only performance class B aeroplanes from the single-pilot classes of reciprocating engine aeroplanes and one helicopter type or group of helicopter types defined in (b)(vi) above.

(2) If ~~the~~ a helicopter type is covered by point ~~paragraph~~ (b)(1)(iv), then (b)(1)(iv)(B), (C) and (D) should also apply in this case.

82. AMC2 ORO.FC.240 is deleted:

~~AMC2 ORO.FC.240 Operation on more than one type or variant~~

~~GENERAL~~

83. AMC1 ORO.FC.A.245 is amended as follows:

AMC1 ORO.FC.A.245 Alternative training and qualification programme

COMPONENTS AND IMPLEMENTATION

(a) Alternative training and qualification programme (ATQP) components

The ATQP should comprise the following:

(1) Documentation that details the scope and requirements of the programme, including the following:

(…)

(iv) A description of how the programme will:

(…)

(D) integrate CRM in all aspects of training and ensure that each flight crew member undergoes specific modular CRM training. All major topics of CRM training should be covered by distributing modular training sessions as evenly as possible over each 3-year period;

(…)

(4) A specific training programme for:

(i) each aeroplane type/class within the ATQP;

(ii) instructors (class rating instructor rating/synthetic flight instructor authorisation/type rating instructor rating — CRI/SFI/TRI), and other personnel undertaking flight crew instruction; and

(iii) examiners (class rating examiner/synthetic flight examiner/type rating examiner — CRE/SFE/TRE).

This should include a method for the standardisation of instructors and examiners.

Personnel who perform training and checking of flight crew in an operator's ATQP should receive the following additional training on:

(A) ATQP principles and goals;

(B) knowledge/skills/behavioural markers as learnt from task analysis;

(C) line-oriented evaluation (LOE)/ LOFT scenarios to include triggers/behavioural markers/event sets/observable behaviour;

(D) qualification standards;

(E) harmonisation of assessment standards;

(F) behavioural markers and the systemic assessment of CRM;

(G) event sets and the corresponding desired knowledge/skills and behavioural markers of the flight crew;

(H) the processes that the operator has implemented to validate the training and qualification standards and the instructors part in the ATQP quality control; and

(I) line-oriented quality evaluation (LOQE).

(…)

(6) A method for the assessment of flight crew during conversion and recurrent training and checking. The assessment process should include event-based assessment as part of the LOE. The assessment method should comply with ORO.FC.230.

(…)

(v) The assessment and the subsequent grading of the performance of flight crew members should include the following steps:

(A) Observe performance (behaviours) during the simulator session.

(B) Record details of effective and ineffective performance (behaviours) observed during the simulator session ('record' in this context refers to instructors taking notes).

(C) Classify observations against the set of behavioural markers and allocate the behavioural markers to each knowledge or skill or task, using amongst others the facilitation technique. If the operator has developed a set of competencies it may allocate the behavioural markers to each competency/ies.

        (D) Assess and evaluate (grade): assess the performance by determining the root cause(s). Low performance would normally indicate the area of performance to be remediated in subsequent phases or modules or training sessions. Evaluate (grade) the performance by determining a grade using the methodology defined by the operator.

(…)

84. The following GM3 ORO.FC.A.245 is inserted:

GM3 ORO.FC.A.245 Alternative training and qualification programme

BEHAVIOURAL MARKERS AND OBSERVABLE BEHAVIOURS – ATQP & EBT.

(a) Behavioural markers in ATQP are observable behaviours that contribute to superior or substandard performance within a flight (including pre-flight and post flight duties).
(b) A good behavioural marker:
    (1) It describes a specific, observable behaviour, not an attitude or personality trait, with clear definition (enactment of skills or knowledge is shown in behaviour).
    (2) It has demonstrated a causal relationship to performance outcome.
        – It does not have to be present in all situations.
        – Its appropriateness may depends on context.
    (3) It uses simple phraseology.
    (4) It describes a clear concept.
(c) The characteristics of good behavioural marker systems are:
    (1) Validity: in relation to performance outcome.
    (2) Reliability: inter-rater reliability, internal consistency.
    (3) Sensitivity: in relation to levels of performance.
    (4) Transparency: the pilot receiving the training or checking understand the performance criteria against which they are being rated; availability of reliability and validity data.
    (5) Usability: easy to train, simple framework, easy to understand, domain appropriate language, sensitive to rater workload, easy to observe.
    (6) Can provide a focus for training goals and needs
    (7) Minimal overlap between components
(d) For EBT mixed implementation the operator may refer to Annex I definitions: 'behaviour' and 'observable behaviour' which includes the concept of behavioural marker in ATQP. In other words, the EBT OBs may be used as Behavioural markers under ATQP.

85. AMC1 ORO.FC.A.245(d)(e)(2) is amended as follows:

AMC1 ORO.FC.A.245(d)(e)(2) Alternative training and qualification programme

COMBINATION OF CHECKS

(a) The line-orien~~ta~~ted evaluation (LOE) may be undertaken with other ATQP training. The operator should ensure training and checking are clearly distinguished and described in the operations manual.

(b) The line check may be combined with a line-oriented quality evaluation (LOQE).

(c) Complimentary CRM assessment

The CRM assessment should take place in a line-oriented flight scenario (LOFT, LOE or line oriented section of the OPC) of an FSTD session. This assessment complements the CRM assessment taking place during the line check /LOQE but is not part of the line check / LOQE.

86. a new AMC1 ORO.FC.A.245(g) is introduced as follows:

AMC1 ORO.FC.A.245 (g) Alternative training and qualification programme

VOLUME OF ATQP PROGRAMME – EQUIVALENT LEVEL OF SAFETY

(a) The ATQP programme should be developed to include a notional exemplar of 48 FSTD hours over a 3-year programme for each flight crew member.

(b) Subject to ORO.GEN.120, the operator may reduce the number of FSTD hours provided that an equivalent level of safety is achieved. The programme should not be less than 36 FSTD hours

(c) The FSTD qualification level should be adequate to complete proficiency checks; therefore, it should be conducted in a full-flight simulator (FFS) level C or D.

87. The following AMC1 ORO.FC.320 is inserted:

AMC1 ORO.FC.320 Operator conversion training and checking

OPERATOR PROFICIENCY CHECK

The operator proficiency check should take place at the end of the operator conversion training programme defined in AMC3 ORO.FC.120.

88. The following AMC1 ORO.FC.325 is inserted:

AMC1 ORO.FC.325 Equipment and procedure training and checking

SPECIALISED OPERATIONS

a) If the equipment and procedure training includes training for SOPs related to a specialised operation, points (b) to (f) of AMC3 ORO.FC.120 should apply.

b) The operator proficiency check should take place at the end of the aircraft/FSTD training programme defined in AMC3 ORO.FC.120.

89. The following AMC1 ORO.FC.330 is inserted:

AMC1 ORO.FC.330 Recurrent training and checking — operator proficiency check

SPO — RECURRENT TRAINING

(a) The training should include:

  (1) ground training, including all the following:

    (i) aircraft systems;

    (ii) normal procedures, which include flight planning and groundhandling and flight operations, including performance, mass and balance, fuel schemes selection of alternates, and ground de-icing/anti-icing;

    (iii) abnormal and emergency procedures, which include pilot incapacitation as applicable;

    (iv) a review of relevant samples of accident/incident and occurrences to increase awareness of the occurrences that may be relevant for the intended operation.

(2) emergency and safety equipment training if one or more task specialists are on board,. The training should ensure that all emergency equipment can be used timely and efficiently, that an emergency evacuation and first aid can be conducted, taking into account the training and operating procedures of the task specialist;

(3) aircraft/FSTD training relevant to the type or variant of aircraft on which the flight crew operates; and

(b) Additional training relevant to the specialised tasks should be either ground training or aircraft/FSTD training or both, in accordance with the results of the operator's risk assessment.

SPO — OPERATOR PROFICIENCY CHECK

(c) The SPO operator proficiency check should take place at least annually. If the SPO operator combines the operator proficiency check with a licence proficiency check, the check should cover both the normal, abnormal and emergency procedures relevant to the type or variant and the relevant aspects associated with the specialised tasks described in the operations manual.

(d) If the SPO operator does not combine the operator proficiency check with a licence proficiency check, the the operator proficiency check may not include the normal, abnormal and emergency procedures relevant to the type or variant that are already covered within the licence proficiency check. The operator proficiency check then covers the relevant aspects associated with the specialised task described in the operations manual.

(e) The flight crew should be assessed on their CRM skills in accordance with the methodology described in AMC1 and AMC2 ORO.FC.115 and as specified in the operations manual. CRM assessment should not be used as a reason for a failure of the operator proficiency check, unless the observed behaviour could lead to an unacceptable reduction in safety margin.

(f) Each flight crew member should complete the operator proficiency checks as part of the normal crew complement.

SPO — RELEVANT PROCEDURES TO BE TRAINED AND CHECKED

(g) The operator should determine, based on a risk assessment, which procedures associated with the specialised tasks are relevant to be trained and checked. The following should be taken into account:

(1) specific risks associated with the specialised operation;

(2) for abnormal and emergency procedures, the criticality of the situation or failure and the impact of training and checking on ensuring a positive outcome; and

(3) for normal procedures, the amount of experience and recent experience accumulated since the previous training or checking.

(h) The operator should establish a training and checking programme to ensure that normal, abnormal and emergency procedures covering the relevant aspects associated with the specialised tasks are:

(1) trained and checked over a 2-year cycle for SPO operators engaged in only one specialised operation;

(2) trained and checked over a 2-year cycle for pilots engaged in only one specialised operation;

(3) trained and checked over a 3-year cycle, if neither (1) nor (2) applies;

(4) trained and checked before a pilot with no recent experience of the specialised operation in the last 6 months resumes the specialised operation.

(i) Whenever an item requires both training and checking, the recurrent aircraft/FSTD training of a single task or manoeuvre should be separate from, and should not take place at the same time as an operator proficiency check of the item.

(j) Specialised operations may be exposed to specific risks such as routinely flying within the height velocity envelope of a helicopter. The operator should avoid taking unnecessary risks during aircraft training and checking and should take advantage of simulation devices, if possible, to train for such situations.

COMBINED CAT AND SPO TRANING AND CHECKING

(k) If the operator is involved in both CAT and SPO, the CAT training and checking programme may include elements that are relevant to the specialised tasks. If this is the case, these training and checking elements may be credited towards compliance with ORO.FC.330 as approved by the authority under ORO.FC.145(c).

90. The following GM1 ORO.FC.330 is inserted:

GM1 ORO.FC.330 Recurrent training and checking — operator proficiency check

SPO — RELEVANT PROCEDURES TO BE TRAINED AND CHECKED

The procedures to be trained in the aircraft/FSTD may be different from procedures to be checked if both complement each other, as defined by the operator in AMC1 ORO.FC.330, considering the following:

(a) It may happen that several training elements are covered by a single check; and

(b) Certain complex procedures are best explored under recurrent training, where the trainee will derive more benefit and training to proficiency is also employed.

91. AMC1 ORO.CC.115(e) is amended as follows:

AMC1 ORO.CC.115(e) Conduct of training courses and associated checking

Table 1 — Cabin crew CRM training

(…)

(g) CRM training syllabus

Table 1 below specifies which CRM training elements should be covered in each type of training. The levels of training in Table 1 can be described as follows:

(1) 'Required' means training that should be instructional or interactive in style to meet the objectives specified in the CRM training programme or to refresh and strengthen knowledge gained in a previous training.

(2) 'In-depth' means training that should be instructive or interactive in style taking full advantage of group discussions, team task analysis, team task simulation, etc., for the acquisition or consolidation of knowledge, skills and attitudes. The CRM training elements should be tailored to the specific needs of the training phase being undertaken.

Table 1 — Cabin crew CRM training

CRM training elements	**Operator's CRM training**	**Operator aircraft type conversion training**	**Annual recurrent training**	**Senior cabin crew member (SCC) course**
General principles				
Human factors in aviation; General instructions on CRM principles and objectives; Human performance and limitations; Threat and error management.	Required ~~Not required (covered under initial training required by Part-CC)~~	~~Required~~ Not required	Required	Required
Relevant to the individual cabin crew member				
Personality awareness, human error and reliability, attitudes and behaviours, self-assessment and self-critique; Stress and stress management; Fatigue and vigilance; Assertiveness, situational awareness, information acquisition and processing.	~~Not required (covered under initial training required by Part-CC)~~ Required	Required	Required (3-year cycle)	Required
Relevant to the entire aircraft crew				
Shared situational awareness, shared information acquisition and processing; Workload management; Effective communication and coordination between all crew members including the flight crew as well as inexperienced cabin crew members; Leadership, cooperation, synergy, delegation, decision-making, actions; Resilience development; Surprise and startle effect; Cultural differences; Identification and management of the passenger human factors: crowd control, passenger stress,	In-depth	Required when relevant to the type(s)	Required (3-year cycle)	In-depth

conflict management, medical factors.				
Specifics related to aircraft types (narrow-/wide-bodied, single-/multi-deck), flight crew and cabin crew composition and number of passengers	Required	In-depth	Required (3-year cycle)	In-depth
Relevant to the operator and the organisation				
Operator's safety culture and company culture, standard operating procedures (SOPs), organisational factors, factors linked to the type of operations; Effective communication and coordination with other operational personnel and ground services; Participation in cabin safety incident and accident reporting.	In-depth	Required when relevant to the type(s)	Required (3-year cycle)	In-depth
Case- studies	In-depth	Required when relevant to the type(s)	In-depth	In-depth

92. AMC2 ORO.CC.115(e) is amended as follows:

AMC2 ORO.CC.115(e) Conduct of training courses and associated checking

CREW RESOURCE MANAGEMENT (CRM) TRAINING — SINGLE CABIN CREW OPERATIONS

For single cabin crew operations, AMC1 ORO.CC.115(e) should be applied with the following differences:

(a) Relevant training elements

(…)

(b) Virtual classroom ~~Computer-based~~ training

Notwithstanding (a)(2) ~~(3)~~ of AMC1 ORO.CC.115(e), ~~computer-based training may be conducted as a stand-alone training method~~ classroom training may take place remotely, using a video-conferencing tool for a cabin crew member operating on aircraft with a maximum operational passenger seating configuration of 19 or less. The tool should permit real-time interaction between the trainees and the trainer, including speech and elements of body language. It should also be capable of transmitting any document to the trainee that the trainer wishes to present. The CRM trainer should establish the list of trainees in advance. Their numbers should be limited to 10 to ensure a sufficient level of interaction during the training session.

93. The following GM2 ORO.CC.115(e) is amendmed as follows:

GM2 ORO.CC.115(e) Crew resource management (CRM) training

MINIMUM TRAINING TIMES

(a) The following minimum training times are appropriate:
(1) multi cabin crew operations:
(i) combined CRM training: 6 training hours over a period of 3 years; and
(ii) operator's CRM training: 6 training hours;

(2) operator's CRM training for single cabin crew operations: 4 training hours for a cabin crew member operating on aircraft with a maximum operational passenger seating configuration of 19 or less;

94. The following GM6 ORO.CC.115(e) is inserted:

GM6 ORO.CC.115(e) Conduct of training courses and associated checking

VIRTUAL CLASSROOM TRAINING — SINGLE-CABIN CREW OPERATIONS WITH A MOPSC OF 19 OR LESS

a) A successful virtual classroom training relies on the ability of the trainer to make best use of the associated technologies in the context of CRM training. The cabin crew CRM trainer may need to receive appropriate training covering the following:

(1) learning style,

(2) teaching method associated to virtual classroom instruction, such as videoconferencing, and a familiarisation to the used virtual classroom instruction system, including management of time, training media and equipment and tools.

b) The operator facilitates access of the competent authority to the virtual classroom as required by ORO.GEN.140.

c) More information on virtual classroom training is provided in EASA guidance on virtual classroom instruction.

4. Draft AMC & GM to Annex IV (Part-CAT) to Commission Regulation (EU) No 965/2012

95. The following GM1 CAT.OP.MPA.101 is inserted:

GM1 CAT.OP.MPA.101(b) Altimeter check and settings

ALTIMETER SETTING PROCEDURES

The following paragraphs of ICAO Doc 8168 (PANS-OPS), Volume I provide recommended guidance to develop the altimeter setting procedure:

(a) 3.2 'Pre-flight operational test';

(b) 3.3 'Take-off and climb';

(c) 3.5 'Approach and landing'.

96. AMC1 CAT.OP.MPA.110 is amended as follows:

AMC1 CAT.OP.MPA.110 Aerodrome operating minima

TAKE-OFF OPERATIONS — AEROPLANES

(a) ~~General~~ Take-off minima

~~(1)~~ Take-off minima should be expressed as visibility (VIS) or runway visual range (RVR) limits, taking into account all relevant factors for each ~~aerodrome~~ runway planned to be used and aircraft characteristics and equipment. 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 commander 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 (VIS) is below that required for take-off and RVR is not reported, a take-off should only be commenced if the commander can determine that the visibility along the take-off runway 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 commander can determine that the visibility along the take-off runway 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~~ the prescribed runway lights should be ~~available to illuminate~~ in operation ~~the runway and any obstacles~~.

(c) Required RVR~~/~~ or VIS~~— aeroplanes~~

(1) For multi-engined aeroplanes, with performance such that, in the event of a critical engine failure at any point during take-off, the aeroplane can either stop or continue the take-off to a height of 1 500 ft above the aerodrome while clearing obstacles by the required margins, the take-off minima

specified by the operator should be expressed as RVR~~/CMV (converted meteorological visibility)~~ or VIS values not lower than those specified in Table 1~~.A~~.

(2) For multi-engined aeroplanes without the performance to comply with the conditions in (c)(1) in the event of a critical engine failure, there may be a need to re-land immediately and to see and avoid obstacles in the take-off area. Such aeroplanes may be operated to the following take-off minima provided they are able to comply with the applicable obstacle clearance criteria, assuming engine failure at the height specified. The take-off minima specified by the operator should be based upon the height from which the one-engine-inoperative (OEI) net take-off flight path can be constructed. The RVR minima used should not be lower than either of the values specified in Table 1~~.A~~ or Table 2~~.A~~.

(3) For single-engined turbine aeroplane operations approved in accordance with Subpart L (SET-IMC) of Annex V (Part-SPA)~~ to Regulation (EU) No 965/2012~~, the take-off minima specified by the operator should be expressed as RVR~~/CMV~~ values not lower than those specified in Table 1~~.A~~ below.

Unless the operator is making use of a risk period, whenever the surface in front of the runway does not allow for a safe forced landing, the RVR~~/CMV~~ values should not be lower than 800 m. In this case, the proportion of the flight to be considered starts at the lift-off position and ends when the aeroplane is able to turn back and land on the runway in the opposite direction or glide to the next landing site in case of power loss.

~~(4) When RVR or VIS meteorological visibility is not available, the commander should not commence take-off unless he/ or she can determine that the actual conditions satisfy the applicable take-off minima.~~

Table 1~~.A~~

Take-off — aeroplanes (without ~~an approval for low-visibility take-off (~~LVTO approval~~)~~)

RVR~~/~~ or VIS

Facilities	**RVR~~/~~ or VIS (m) ***
Day only: Nil**	500
Day: at least runway edge lights or runway centreline markings Night: at least runway edge lights and runway end lights or runway centreline lights and runway end lights	400

*: The reported RVR~~/~~ or 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 2~~.A~~

Take-off — aeroplanes (without LVTO approval)

Assumed engine failure height above the runway versus RVR~~/~~ or VIS

Assumed engine failure height above the take-off runway (ft)	**RVR~~/~~ or VIS (m)*** *
<50	400 ~~(200 with LVTO approval)~~
51–100	400 ~~(200 with LVTO approval)~~

101–150	400
151–200	500
201–300	1 000
>300 ~~*~~or if no positive take-off flight path can be constructed	1 500

~~*: 1 500m is also applicable if no positive take-off flight path can be constructed.~~

~~*~~* The reported RVR~~/~~ or VIS value representative of the initial part of the take-off run can be replaced by pilot assessment.

97. AMC2 CAT.OP.MPA.110 is amended as follows:

AMC2 CAT.OP.MPA.110 Aerodrome operating minima

TAKE-OFF OPERATIONS — HELICOPTERS

(a) General

(1) Take-off minima should be expressed as ~~visibility~~ VIS or ~~runway visual range (~~RVR~~)~~ limits, taking into account all relevant factors for each aerodrome or operating site planned to be used and aircraft characteristics and equipment. Where there is a specific need to see and avoid obstacles on departure, ~~and/or~~ or for a forced landing, additional conditions, e.g. ceiling, should be specified.

(2) The commander should not commence take-off unless the ~~weather~~ meteorological conditions at the aerodrome or operating site of departure are equal to or better than the applicable minima for landing at that aerodrome or operating site unless a weather-permissible take-off alternate aerodrome is available.

(3) When the reported ~~meteorological visibility (~~VIS~~)~~ is below that required for take-off and the RVR is not reported, a take-off should only be commenced if the commander can determine that the visibility or RVR along the take-off runway/area is equal to or better than the required minimum.

(4) When no reported ~~meteorological visibility~~ VIS or RVR is available, a take-off should only be commenced if the commander can determine that the visibility 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 take-off runway/final approach and take-off area (FATO) and any obstacles.

(3) For point-in-space (PinS) departures to an initial departure fix (IDF), the take-off minima should be selected to ensure sufficient guidance to see and avoid obstacles and return to the heliport if the flight cannot be continued visually to the IDF. This should require a VIS of 800 m. The ceiling should be 250 ft.

(c) Required RVR~~/~~ or VIS — helicopters~~:~~

(1) For performance class 1 operations, the operator should specify an RVR~~/~~ or a VIS as take-off minima in accordance with Table 3~~1.H~~.

(2) For performance class 2 operations onshore, the commander should operate to take-off minima of 800 m RVR~~/~~ or VIS and remain clear of cloud during the take-off manoeuvre until reaching performance class 1 capabilities.

(3) For performance class 2 operations offshore, the commander should operate to minima not less than ~~that~~ those for performance class 1 and remain clear of cloud during the take-off manoeuvre until reaching performance class 1 capabilities.

~~(4) Table 8 for converting reported meteorological visibility to RVR should not be used for calculating take-off minima.~~

Table 3~~1.H~~

Take-off — helicopters (without LVTO approval)

RVR or ~~/~~VIS

Onshore aerodromes with instrument flight rules (IFR) departure procedures	**RVR or ~~/~~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.

** On PinS departures to IDF, VIS should not be less than 800 m and the ceiling should not be less than 250 ft.

98. AMC3 CAT.OP.MPA.110 is amended as follows:

AMC3 CAT.OP.MPA.110 Aerodrome operating minima

~~NPA, APV, CAT I OPERATIONS~~

DETERMINATION OF DH/MDH FOR INSTRUMENT APPROACH OPERATIONS — AEROPLANES

(a) The decision height (DH) to be used for a ~~non-precision approach (NPA)~~ 3D approach operation or a 2D approach operation flown with the continuous descent final approach (CDFA) technique~~, approach procedure with vertical guidance (APV) or category (CAT) I operation~~ should not be lower than the highest of:

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

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

(23) the published approach procedure DH or minimum descent height (MDH) where applicable;

(34) the system minima~~um~~ specified in Table 4~~3~~; ~~or~~

(4) the minimum DH permitted for the runway specified in Table 5; or

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

(b) The ~~minimum descent height (~~MDH~~)~~ for a~~n NPA operation~~ 2D approach operation flown without the CDFA technique should not be lower than the highest of:

(1) the OCH for the category of aircraft;

(2) the published approach procedure MDH where applicable;

(3~~2~~) the system minima~~um~~ specified in Table 4~~3~~; ~~or~~

(4) the lowest MDH permitted for the runway specified in Table 5; or

(5~~3~~) the ~~minimum~~ lowest MDH specified in the AFM, if stated.

Table 4~~3~~

System minima — aeroplanes

Facility	**Lowest DH/MDH (ft)**
ILS/MLS/GLS	200
GNSS/SBAS (LPV)	200*
Precision approach radar (PAR)	200
GNSS/SBAS (LP)	250
GNSS (LNAV)	250
GNSS/Baro-VNAV (LNAV/VNAV)	250
LOC with or without DME	250
SRA (terminating at ½ NM)	250
SRA (terminating at 1 NM)	300
SRA (terminating at 2 NM or more)	350
VOR	300
VOR/DME	250
NDB	350
NDB/DME	300
VDF	350

* For localiser performance with vertical guidance (LPV), a DH of 200 ft may be used only if the published FAS datablock sets a vertical alert limit not exceeding 35 m. Otherwise, the DH should not be lower than 250 ft.

~~DME: distance measuring equipment;~~

~~GNSS: global navigation satellite system;~~

~~ILS: instrument landing system;~~

~~LNAV: lateral navigation;~~

~~LOC: localiser;~~

~~LPV: localiser performance with vertical guidance~~

~~SBAS: satellite-based augmentation system;~~

~~SRA: surveillance radar approach;~~

~~VDF: VHF direction finder;~~

~~VNAV: vertical navigation;~~

~~VOR: VHF omnidirectional radio range.~~

Table 5

Runway type minima — aeroplanes

Runway type		**Lowest DH/MDH (ft)**
Instrument runway	Precision approach (PA) runway Category I	200
	NPA runway	250
Non-Instrument runway	Non-instrument runway	Circling minima as shown in Table 15

(c) Where a barometric DA/H or MDA/H is used, this should be adjusted where the ambient temperature is significantly below international standard atmosphere (ISA). GM8 CAT.OP.MPA.110 'Low temperature correction' provides a cold temperature correction table for adjustment of minimum promulgated heights/altitudes.

99. The following AMC4 CAT.OP.MPA.110 is inserted (note: The current AMC4 is re-numbered. See below):

AMC4 CAT.OP.MPA.110 Aerodrome operating minima

DETERMINATION OF DH/MDH FOR INSTRUMENT APPROACH OPERATIONS — HELICOPTERS

(a) The DH or MDH to be used for a 3D or a 2D approach operation should not be lower than the highest of:

(1) the OCH for the category of aircraft used;

(2) the published approach procedure DH or MDH where applicable;

(3) the system minima specified in Table 6;

(4) the minimum DH permitted for the runway/FATO specified in Table 7, if applicable; or

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

Table 6

System minima — helicopters

Facility	**Lowest DH/MDH (ft)**
ILS/MLS/GLS	200
GNSS/SBAS (LPV) *	200

Facility	**Lowest DH/MDH (ft)**
Precision approach radar (PAR)	200
GNSS/SBAS (LP)	250
GNSS (LNAV)	250
GNSS/Baro-VNAV (LNAV/VNAV)	250
Helicopter point-in-space (PinS) approach	250**
LOC with or without DME	250
SRA (terminating at ½ NM)	250
SRA (terminating at 1 NM)	300
SRA (terminating at 2 NM or more)	350
VOR	300
VOR/DME	250
NDB	350
NDB/DME	300
VDF	350

* For LPV, a DH of 200 ft may be used only if the published FAS datablock sets a vertical alert limit not exceeding 35 m. Otherwise, the DH should not be lower than 250 ft.

** For PinS approaches with instructions to 'proceed VFR' to an undefined or virtual destination, the DH or MDH should be with reference to the ground below the missed approach point (MAPt).

Table 7

Type of runway/FATO versus lowest DH/MDH — helicopters

Type of runway/FATO	**Lowest DH/MDH (ft)**
Precision approach runway, Category I Non-precision approach runway Non-instrument runway	200
Instrument FATO FATO	200 250

Table 7 does not apply to helicopter PinS approaches with instructions to 'proceed VFR'.

100. The current AMC4 CAT.OP.MPA.110 is re-numbered and amended as follows (note: The current AMC5 is deleted. See below):

AMC5 ~~AMC4~~ CAT.OP.MPA.110 Aerodrome operating minima

~~CRITERIA FOR ESTABLISHING RVR/CMV~~

~~(a) Aeroplanes~~

~~The following criteria for establishing RVR/CMV should apply:~~

~~(1) In order to qualify for the lowest allowable values of RVR/CMV specified in Table 6.A, the instrument approach should meet at least the following facility specifications and associated conditions:~~

~~(i) 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:~~

~~(A) ILS/microwave landing system (MLS)/GBAS landing system (GLS)/precision approach radar (PAR); or~~

~~(B) 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.~~

~~(ii) 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 NDB, NDB/DME, VOR, VOR/DME, LOC, LOC/DME, VDF, SRA or GNSS/LNAV, with a final approach segment of at least 3 NM, which also fulfil the following criteria:~~

~~(A) 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;~~

~~(B) 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/GNSS (FMS/GNSS) or DME; and~~

~~(C) if the missed approach point (MAPt) is determined by timing, the distance from FAF or another appropriate fix to THR is ≤ 8 NM.~~

~~(iii) 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)(1)(ii), or with an MDH ≥ 1 200 ft.~~

~~(2) The missed approach operation, after an approach operation has been flown using the CDFA technique, should be executed when reaching the DA/H 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.~~

DETERMINATION OF RVR OR VIS FOR INSTRUMENT APPROACH OPERATIONS — AEROPLANES

(a) The RVR or VIS for straight-in instrument approach operations should be not less than the greater of the following:

(1) the minimum RVR or VIS for the type of runway used according to Table 8;

(2) the minimum RVR determined according to the MDH or DH and class of lighting facility according to Table 9; or

(3) the minimum RVR according to the visual and non-visual aids and on-board equipment used according to Table 10.

If the value determined in (1) is a VIS then the result is a minimum VIS. In all other cases the result is a minimum RVR.

(b) For Category A and B aeroplanes, if the RVR or VIS determined in accordance with (a) is greater than 1 500 m, then 1 500 m should be used.

(c) If the approach is flown with a level flight segment at or above the MDA/H, then 200 m should be added to the RVR calculated in accordance with (a) and (b) for Category A and B aeroplanes and 400 m for Category C and D aeroplanes.

(d) The visual aids should comprise standard runway day markings, runway edge lights, threshold lights, runway end lights and approach lights as defined in Table 11.

Table 8

Type of runway versus minimum RVR or VIS — aeroplanes

Type of runway	**Minimum RVR or VIS (m)**
Precision approach runway, Category I	RVR 550
Non-precision approach runway	RVR 750
Non-instrument runway	VIS according to Table 15 (circling minima)

Table 9~~5~~

RVR versus DH/MDH — aeroplanes

DH or MDH (ft)			**Class of lighting facility**			
			FALS	**IALS**	**BALS**	**NALS**
			RVR (m)			
200	-	210	550	750	1 000	1 200
211	-	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	2 400
561	-	580	1 900	2 200	2 400	2 400
581	-	600	2 000	2 300	2 400	2 400
601	-	620	2 100	2 400	2 400	2 400
621	-	640	2 200	2 400	2 400	2 400
641		660	2 300	2 400	2 400	2 400
661	and above		2 400	2 400	2 400	2 400

Table 10

Visual and non-visual aids and/or on-board equipment versus minimum RVR – aeroplanes

Type of approach	**Facilities**	**Lowest RVR**	
		Multi-pilot operations	**Single-pilot operations**
3D operations	runway touchdown zone lights (RTZL) and runway centreline lights (RCLL)	No limitation	
	without RTZL and RCLL but using HUDLS or equivalent system; coupled auto-pilot or flight director to the DH	No limitation	600 m
	No RTZL and RCLL, not using HUDLS or equivalent system or auto-pilot to the DH	750 m	800 m
2D operations	Final approach track offset ≤15° for category A and B aeroplanes or ≤5° for Category C and D aeroplanes	750 m	800 m
	Final approach track offset > 15° for Category A and B aeroplanes	1 000 m	1 000 m
	Final approach track offset > 5° for Category C and D aeroplanes	1 200 m	1 200 m

Table 11

Approach lighting systems — aeroplanes

Class of lighting facility	**Length, configuration and intensity of approach lights**
FALS	CAT I lighting system (HIALS ≥720 m) distance coded centreline, barrette centreline
IALS	Simple approach lighting system (HIALS 420–719 m) single source, barrette
BALS	Any other approach lighting system (HIALS, MALS or ALS 210–419 m)
NALS	Any other approach lighting system (HIALS, MALS or ALS <210 m) or no approach lights

(e) For night operations or for any operation where credit for visual aids is required, the lights should be on and serviceable except as provided for in Table 17.

(f) Where any visual or non-visual aid specified for the approach and assumed to be available in the determination of operating minima is unavailable, revised operating minima will need to be determined.

101. The current AMC5 CAT.OP.MPA.110 is deleted.

~~AMC5 CAT.OP.MPA.110 Aerodrome operating minima~~

~~DETERMINATION OF RVR/CMV/VIS MINIMA FOR NPA, APV, CAT I — AEROPLANES~~

102. AM6 CAT.OP.MPA.110 is amended as follows:

AMC6 CAT.OP.MPA.110 Aerodrome operating minima

DETERMINATION OF RVR~~/CMV/~~ OR VIS ~~MINIMA~~ FOR ~~NPA, CAT I~~ INSTRUMENT APPROACH OPERATIONS — HELICOPTERS

~~(a) Helicopters~~

~~The RVR/CMV/VIS minima for NPA, APV and CAT I operations should be determined as follows:~~

~~(1) For NPA operations operated in performance class 1 (PC1) or performance class 2 (PC2), the minima specified in Table 6.1.H should apply:~~

~~(i) 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;~~

~~(ii) for night operations, ground lights should be available to illuminate the FATO/runway and any obstacles; and~~

~~(iii) for single-pilot operations, the minimum RVR is 800 m or the minima in Table 6.1.H, whichever is higher.~~

~~(2) For CAT I operations operated in PC1 or PC2, the minima specified in Table 6.2.H should apply:~~

~~(i) for night operations, ground light should be available to illuminate the FATO/runway and any obstacles;~~

~~(ii) for single-pilot operations, the minimum RVR/VIS should be calculated in accordance with the following additional criteria:~~

~~(A) 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~~

~~(B) the DH applied should not be less than 1.25 times the minimum use height for the autopilot.~~

~~Table 6.1.H: 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~~

~~*: '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 glideslope guidance (e.g. precision approach path 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 6.2.H: Onshore CAT I minima~~

~~DH (ft) *~~	**~~Facilities vs RVR/CMV (m) **, ***~~**			
	~~FALS~~	**~~IALS~~**	**~~BALS~~**	**~~NALS~~**
~~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 glideslope 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.~~

The RVR/VIS minima for Type A instrument approach and Type B CAT I instrument approach operations should be determined as follows:

(a) For IFR operations, the RVR or VIS should not be less than the greater of the following:

(1) the minimum RVR or VIS for the type of runway/FATO used according to Table 12;

(2) the minimum RVR determined according to the MDH or DH and class of lighting facility according to Table 13; or

(3) for PinS operations with instructions to 'proceed visually', the distance between the MAPt of the PinS and the FATO or its approach light system.

If the value determined in (1) is a VIS then the result is a minimum VIS. In all other cases the result is a minimum RVR.

(b) For PinS operations with instructions to 'proceed VFR', the VIS should be compatible with visual flight rules.

(c) For Type A instrument approach where the MAPt is within ½ NM of the landing threshold, the approach minima specified for FALS may be used regardless of the length of the approach lights available. However, FATO/runway edge lights, threshold lights, end lights and FATO/runway markings are still required.

(d) An RVR of less than 800 m should not be used except when using a suitable autopilot coupled to an ILS, an MLS, a GLS or LPV, in which case normal minima apply.

(e) For night operations, ground lights should be available to illuminate the FATO/runway and any obstacles.

(f) The visual aids should comprise standard runway day markings, runway edge lights, threshold lights and runway end lights and approach lights as specified in Table 14.

(g) For night operations or for any operation where credit for runway and approach lights as defined in Table 14 is required, the lights should be on and serviceable except as defined in Table 17.

Table 12

Type of runway/FATO versus minimum RVR — Helicopters

Type of runway/FATO	**Minimum RVR or VIS**
Precision approach runway, Category I Non-precision approach runway Non-instrument runway	RVR 550 m
Instrument FATO	RVR 550 m
FATO	RVR/VIS 800 m

Table 13

Onshore helicopter instrument approach minima

DH/MDH (ft)	**Facilities versus RVR (m)**			
	FALS	**IALS**	**BALS**	**NALS**
200	550	600	700	1 000
201–249	550	650	750	1 000
250–299	600*	700*	800	1 000
300 and above	750*	800	900	1 000

* Minima on 2D approach operations should be no lower than 800 m.

Table 14

Approach lighting systems — helicopters

Class of lighting facility	**Length, configuration and intensity of approach lights**
FALS	CAT I lighting system (HIALS ≥ 720 m) distance coded centre line, barrette centreline
IALS	Simple approach lighting system (HIALS 420–719 m) single source, barrette
BALS	Any other approach lighting system (HIALS, MALS or ALS 210–419 m)
NALS	Any other approach lighting system (HIALS, MALS or ALS < 210 m) or no approach lights

103. AM7 CAT.OP.MPA.110 is amended as follows:

AMC7 CAT.OP.MPA.110 Aerodrome operating minima

CIRCLING OPERATIONS — AEROPLANES

(a) Circling minima

The following standards should apply for establishing circling minima for operations with aeroplanes:

(1) the MDH for circling operation should not be lower than the highest of:

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

(ii) the minimum circling height derived from Table 15~~7~~; or

(iii) the DH/MDH of the preceding ~~instrument approach procedure~~ IAP;

(2) the MDA for circling should be calculated by adding the published aerodrome elevation to the MDH, as determined by (a)(1); and

(3) the minimum VIS ~~visibility~~ for circling should be the highest of:

(i) the circling VIS~~visibility~~ for the aeroplane category, if published; or

(ii) the minimum VIS ~~visibility~~ derived from Table 15~~7~~.~~; or~~

~~(iii) the RVR/CMV derived from Tables 5 and 6.A for the preceding instrument approach procedure.~~

Table 15~~7~~

Circling — aeroplanes

MDH and minimum VIS ~~visibility~~ versus aeroplane category

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

(b) Conduct of flight — general:

(1) the MDH and 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~~ VIS; 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~~ established, but not below the MDA/H, the aeroplane should follow the corresponding ~~instrument approach procedure~~ IAP 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, RNAV, RNP, ILS, MLS or GLS~~ 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~~ visual references.

(3) If the pilot cannot comply with the conditions in (c)(2) at the MAPt ~~When reaching the published instrument MAPt and the conditions stipulated in (c)(2) are unable to be established by the pilot~~, then a missed approach should be ~~carried out~~executed in accordance with ~~that~~ the ~~instrument approach procedure~~ IAP.

(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 to:

  (i) ~~to~~ attain a controlled and stable descent path to the intended landing runway; and

  (ii) ~~to~~ 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 the 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~~ TDZ.

(d) Instrument approach followed by a visual manoeuvring (circling) with prescribed track

(1) The aeroplane should remain on the initial ~~instrument approach procedure~~ IAP 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, RNAV, RNP, ILS, MLS or GLS~~ in level flight at or above the MDA/H at or by the circling manoeuvre divergence point.

(…)

(8) Unless otherwise specified in the procedure, final descent should not be commenced from the 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~~ TDZ.

(e) Missed approach

(1) Missed approach during the instrument procedure prior to circling~~:~~

  (i) (…)

(ii) If the ~~instrument approach procedure~~ IAP is carried out with the aid of an ILS, an MLS or a~~n~~ stabilised approach (SAp), the MAPt associated with an ILS~~,~~ or an MLS procedure without glide path (GP-out procedure) or the SAp, where applicable, should be used.

(…)

104. AMC8 CAT.OP.MPA.110 is amended as follows:

AMC8 CAT.OP.MPA.110 Aerodrome operating minima

ONSHORE CIRCLING OPERATIONS — HELICOPTERS

For circling, the specified MDH should not be less than 250 ft, and the ~~meteorological visibility~~ VIS not less than 800 m.

105. AMC10 CAT.OP.MPA.110 is amended as follows:

AMC10 CAT.OP.MPA.110 Aerodrome operating minima

CONVERSION OF ~~REPORTED METEOROLOGICAL~~ VISIBILITY TO CMV~~RVR~~ — AEROPLANES

~~(a) A conversion from meteorological visibility to RVR/CMV should not be used:~~

~~(1) when reported RVR is not available;~~

~~(2) for calculating take-off minima; and~~

~~(3) for any 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 for (a)(1).~~

~~(c) When converting meteorological visibility to RVR in circumstances other than those in (a), the conversion factors specified in Table 8 should be used.~~

The following conditions apply to the use of CMV instead of RVR:

(a) If the reported RVR is not available, a CMV may be substituted for the RVR, except:

(1) to satisfy the take-off minima; or

(2) for the purpose of continuation of an approach in LVOs.

(b) If the minimum RVR for an approach is more than the maximum value assessed by the aerodrome operator, then CMV should be used.

(c) In order to determine CMV from visibility:

(1) for flight planning purposes, a factor of 1.0 should be used;

(2) for purposes other than flight planning, the conversion factors specified in Table 16 should be used.

Table 16~~8~~

Conversion of reported ~~meteorological visibility~~ VIS to RVR/CMV

Light elements in operation	**RVR/CMV = reported VIS x ~~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

106. AMC11 CAT.OP.MPA.110 is amended as follows:

AMC11 CAT.OP.MPA.110 Aerodrome operating minima

EFFECT ON LANDING MINIMA OF TEMPORARILY FAILED OR DOWNGRADED GROUND EQUIPMENT

(a) General

These instructions are intended for use both preflight and in-flight. It is, however, not expected that the commander 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 commander'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 17~~9~~, and the approach may have to be abandoned.

(b) Conditions applicable to Table 17~~9~~:

(1) multiple failures of runway/FATO lights other than those indicated in Table 17~~9~~ should not be acceptable;

(2) deficiencies of approach and runway/FATO lights are treated separately;~~ and~~

(3) failures other than ILS, GLS, MLS affect the RVR only and not the DH; and

(4) when one or more lights are unserviceable on a runway, Table 18 may be used to assess whether the remaining lights will be sufficient for that lighting group to be considered operative.

Table 17~~9~~

Failed or downgraded equipment — effect on landing minima

Operations without ~~a low visibility operations (~~LVO~~)~~ approval

Failed or downgraded equipment	**Effect on landing minima**	
	~~CAT I~~Type B	**~~APV, NPA~~ Type A**
navaid~~ILS/MLS~~ stand-by transmitter	No effect	
Outer ~~M~~marker (ILS only)	Not allowed except if ~~replaced by height check at 1 000 ft~~ the required height versus glide path can be checked using other means, e.g. DME fix	APV —not applicable
		NPA with FAF: no effect unless used as FAF
		If the FAF cannot be identified (e.g. no method available for timing of descent), NPA ~~approach~~ operations ~~using NPA procedures~~ cannot be conducted
Middle marker (ILS only)	No effect	No effect unless used as MAPt
RVR assessment systems	No effect	

Failed or downgraded equipment	**Effect on landing minima**	
	~~CAT I~~ Type B	**~~APV, NPA~~ Type A**
Approach lights	Minima as for NALS	
Approach lights except the last 210 m	Minima as for BALS	
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 except in the case of partial unserviceability (see Table 18)	
Centreline lights	Aeroplanes: No effect if flight director (F/D), HUDLS or autoland; otherwise RVR 750 m Helicopters: No effect on CAT I and HELI SA CAT I approach operations;	No effect
Centreline lights spacing increased to 30 m	No effect	
~~Touchdown zone~~ TDZ lights	Aeroplanes: No effect if F/D, HUDLS or autoland; otherwise RVR 750 m Helicopters: No effect;	No effect
Taxiway lighting system	No effect	

Table 18

Minimum serviceability for a lighting group to be considered operative

Lighting group	**Minimum specification to be considered operative**
Runway edge lights	— Minimum runway edge light spacing for an instrument runway is 60 m. — Minimum runway edge light spacing for a non-instrument runway is 100 m. — Lights should be uniformly spaced in rows; however, at intersections to runways or due to temporary unserviceability, lights may be spaced irregularly or omitted, provided that adequate guidance remains available to the pilot.
Runway threshold lights	— A minimum of six threshold lights is required for a non-instrument runway. — On a precision approach runway CAT I, at least the number of lights that would be required if the lights were uniformly spaced at intervals of 3 m between the rows of runway edge lights, is required. — On a non-instrument or non-precision approach runway which has a displaced threshold, the runway threshold lights may be replaced by runway wing bar lights.
Runway wing bar lights	— Each wing bar should be formed by at least five lights extending at least 10 m outward from the runway edge lights.
Runway end lights	— A minimum of six runway end lights is required.
Runway centreline lights	— Minimum runway centreline light spacing is 15 m

107. GM2 CAT.OP.MPA.110 is amended as follows:

GM2 CAT.OP.MPA.110 Aerodrome operating minima

APPROACH LIGHTING SYSTEMS — ICAO, FAA

The following table provides a comparison of ICAO and FAA specifications.

Table 19 ~~1~~

Approach lighting systems — ICAO and FAA specifications

Class of lighting facility	**Length, configuration and intensity of approach lights**
FALS	ICAO: CAT I lighting system ~~(HIALS ≥ 900 m)~~ (HIALS ≥ 720 m) distance coded centreline, barrette centreline FAA: ALSF1, ALSF2, SSALR, MALSR, high or medium intensity and/or flashing lights, 720 m or more
IALS	ICAO: simple approach lighting system (HIALS 420–719 m) single source, barrette FAA: MALSF, MALS, SALS/SALSF, SSALF, SSALS, high or medium intensity and/or flashing lights, 420–719 m

BALS	Any other approach lighting system (HIALS, MALS or ALS 210–419 m) FAA: ODALS, high or medium intensity or flashing lights 210–419 m
NALS	Any other approach lighting system (HIALS, MALS or ALS <210 m) or no approach lights

~~Note: ALSF: approach lighting system with sequenced flashing lights;~~

~~MALS: medium-intensity approach lighting system;~~

~~MALSF: medium-intensity approach lighting system with sequenced flashing lights;~~

~~MALSR: medium-intensity approach lighting system with runway alignment indicator lights;~~

~~ODALS: omnidirectional approach lighting system;~~

~~SALS: simple approach lighting system;~~

~~SALSF: short approach lighting system with sequenced flashing lights;~~

~~SSALF: simplified short approach lighting system with sequenced flashing lights;~~

~~SSALR: simplified short approach lighting system with runway alignment indicator lights;~~

~~SSALS: simplified short approach lighting system.~~

108. GM3 CAT.OP.MPA.110 is amended as follows:

GM3 CAT.OP.MPA.110 Aerodrome operating minima

SBAS OPERATIONS

(a) SBAS LPV~~CAT I~~ operations with a DH of 200 ft depend on an SBAS system approved for operations down to a DH of 200 ft.

(…)

109. The following GM4 CAT.OP.MPA.110 is inserted:

GM4 CAT.OP.MPA.110 Aerodrome operating minima

MEANS TO DETERMINE THE REQUIRED RVR BASED ON DH AND LIGHTING FACILITIES

The values in Table 9 are derived from the formula below:

Minimum RVR (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 9 up to 3.77° and then remaining constant. An upper RVR limit of 2 400 m has been applied to the table.

110. The following GM5 CAT.OP.MPA.110 is inserted:

GM5 CAT.OP.MPA.110 Aerodrome operating minima

USE OF DH FOR NON-PRECISION APPROACHES FLOWN USING THE CDFA TECHNIQUE

AMC3 CAT.OP.MPA.110 provides that, in certain circumstances, a published MDH may be used as a DH for a 2D operation flown using the CDFA technique.

The safety of the use of MDH as DH in CDFA operations has been verified by at least two independent analyses concluding that CDFA using MDH as DH without any add-on is safer than the traditional step-down and level-flight NPA operation. A comparison has been made between the safety level of using MDH as DH without an add-on with the well-established safety level resulting from the ILS collision risk model. The NPA used was the most demanding, i.e. most tightly designed NPA, which offers the least additional margins. It should be noted that the design limits of the ILS approach design, e.g. the maximum GP angle of 3,5 degrees, must be observed for the CDFA in order to keep the validity of the comparison.

There is a wealth of operational experience in Europe confirming the above-mentioned analytical assessments. It cannot be expected that each operator is able to conduct similar safety assessments, and this is not necessary. The safety assessments already performed take into account the most demanding circumstances at hand, like the most tightly designed NPA procedures and other ‘worst-case scenarios’. The assessments naturally focus on cases where the controlling obstacle is located in the missed approach area.

However, it is necessary for operators to assess whether their cockpit procedures and training are adequate to ensure minimal height loss in case of a go-around manoeuvre. Suitable topics for the safety assessment required by each operator may include:

- understanding of the CDFA concept including the use of the MDA/H as DA/H;
- cockpit procedures that ensure flight on speed, on path and with proper configuration and energy management;
- cockpit procedures that ensure gradual decision making; and
- identification of cases where an increase of the DA/H may be necessary because of non-standard circumstances, etc.

111. GM1 CAT.OP.MPA.110(a) is re-numbered and amended as follows:

GM6~~GM1~~ CAT.OP.MPA.110~~(a)~~ Aerodrome operating minima

INCREMENTS SPECIFIED BY THE COMPETENT AUTHORITY

Additional increments to the published minima may be specified by the competent authority to take into account certain operations, such as downwind approaches, ~~and~~ single-pilot operations or approaches flown without the use of the CDFA technique.

112. The following GM7 CAT.OP.MPA.110 is inserted:

GM7 CAT.OP.MPA.110 Aerodrome operating minima

USE OF COMMERCIALLY AVAILABLE INFORMATION

When an operator uses commercially available information to establish aerodrome operating minima, the operator remains responsible for ensuring that the material used is accurate and suitable for its operation, and that aerodrome operating minima are calculated in accordance with the method specified in Part C of its operations manual and approved by the competent authority.

The procedures in ORO.GEN.205 ‘Contracted activities’ apply in this case.

113. The following GM8 CAT.OP.MPA.110 is inserted:

GM8 CAT.OP.MPA.110 Aerodrome operating minima

LOW TEMPERATURE CORRECTION

(a) An operator may determine the aerodrome temperature below which a correction should be applied to the DA/H.

(b) Table 20 may be used to determine the correction that should be applied.

(c) The calculations in the table are for a sea-level aerodrome; they are therefore conservative when applied at higher-level aerodromes.

(d) Guidance on accurate corrections for specific conditions (if required) is available in PANS-OPS, Volume I (ICAO Doc 8168) Section 1 Chapter 4.

Table 20

Temperature corrections to be applied to barometric DH/MDH

Aerodrome temperature (°C)	*Height above the elevation of the altimeter setting source (ft)*													
	200	300	400	500	600	700	800	900	1000	1500	2000	3000	4000	5000
0	20	20	30	30	40	40	50	50	60	90	120	170	230	280
-10	20	30	40	50	60	70	80	90	100	150	200	290	390	490
-20	30	50	60	70	90	100	120	130	140	210	280	420	570	710
-30	40	60	80	100	120	140	150	170	190	280	380	570	760	950
-40	50	80	100	120	150	170	190	220	240	360	480	720	970	1 210
-50	60	90	120	150	180	210	240	270	300	450	590	890	1 190	1 500

114.

115. The following GM9 CAT.OP.MPA.110 is inserted:

GM9 CAT.OP.MPA.110 Aerodrome operating minima

AERODROME OPERATING MINIMA — HELICOPTERS

High vertical speeds should be avoided due to unstable aerodynamics and potential transient autorotation state of the main rotor.

Vertical speeds at or below 800 ft/min should be considered to be normal, and vertical speeds above 1 000 ft/min should be considered to be high.

The vertical speed on final approach increases with the descent angle and the ground speed (GS), including tailwinds. Whereas the helicopter should be manoeuvred into the wind during the visual segment of an instrument approach, tailwinds may be encountered during the instrument segments of the approach.

If the vertical speed is above 1 000 ft/min, a go-around should be considered. Greater vertical speeds may be used based on the available data in the rotorcraft flight manual.

Table 21 below gives an indication of the vertical speed based on the descent angles and ground speed.

Table 21

Examples of vertical speeds

Ground speed	Descent angle	Vertical speed
80 kt	5.7° (10 %)	800 ft/min
100 kt	5.7° (10 %)	1 000 ft/min
80 kt	7.5° (13.2 %)	1 050 ft/min
100 kt	7.5° (13.2 %)	1 300 ft/min

Note: A GS of 80 kt may be the result of an indicated airspeed (IAS) of 60 kt and a tailwind component of 20 kt.

116. The following GM1 CAT.OP.MPA.110(b)(5) is inserted:

GM1 CAT.OP.MPA.110(b)(5) Aerodrome operating minima

VISUAL AND NON-VISUAL AIDS AND INFRASTRUCTURE

‘Visual and non-visual aids and infrastructure’ refers to all equipment and facilities required for the procedure to be used for the intended instrument approach operation. This includes but is not limited to lights, markings, ground- or space-based radio aids, etc.

117. AMC1 CAT.OP.MPA.115 is amended as follows:

AMC1 CAT.OP.MPA.115 Approach flight technique — aeroplanes

CONTINUOUS DESCENT FINAL APPROACH (CDFA)

~~(a) Flight techniques:~~

~~(1) The CDFA technique should ensure that an approach can be flown on the desired vertical path and track in a stabilised manner, without significant vertical path changes during the final segment descent to the runway. This technique applies to an approach with no vertical guidance and controls the descent path until the DA/DH. This descent path can be either:~~

~~(i) a recommended descent rate, based on estimated ground speed;~~

~~(ii) a descent path depicted on the approach chart; or~~

~~(iii) a descent path coded in the flight management system in accordance with the approach chart descent path.~~

~~(2) The operator should either provide charts which depict the appropriate cross check altitudes/heights with the corresponding appropriate range information, or such information should be calculated and provided to the flight crew in an appropriate and usable format. Generally, the MAPt is published on the chart.~~

~~(3) The approach should be flown as an SAp.~~

~~(4) The required descent path should be flown to the DA/H, observing any step-down crossing altitudes if applicable.~~

~~(5) This DA/H should take into account any add-on to the published minima as identified by the operator's management system and should be specified in the OM (aerodrome operating minima).~~

~~(6) During the descent, the pilot monitoring should announce crossing altitudes as published fixes and other designated points are crossed, giving the appropriate altitude or height for the appropriate range as depicted on the chart. The pilot flying should promptly adjust the rate of descent as appropriate.~~

~~(7) The operator should establish a procedure to ensure that an appropriate callout is made when the aeroplane is approaching DA/H. If the required visual references are not established at DA/H, the missed approach procedure is to be executed promptly.~~

~~(8) The descent path should ensure that little or no adjustment of attitude or thrust/power is needed after the DA/H to continue the landing in the visual segment.~~

~~(9) The missed approach should be initiated no later than reaching the MAPt or at the DA/H, whichever comes first. The lateral part of the missed approach should be flown via the MAPt unless otherwise stated on the approach chart.~~

~~(b) Flight techniques conditions:~~

~~(1) The approach should be considered to be fully stabilised when the aeroplane is:~~

~~(i) tracking on the required approach path and profile;~~

~~(ii) in the required configuration and attitude;~~

~~(iii) flying with the required rate of descent and speed; and~~

~~(iv) flying with the appropriate thrust/power and trim.~~

~~(2) The aeroplane is considered established on the required approach path at the appropriate energy for stable flight using the CDFA technique when:~~

~~(i) it is tracking on the required approach path with the correct track set, approach aids tuned and identified as appropriate to the approach type flown and on the required vertical profile; and~~

~~(ii) it is at the appropriate attitude and speed for the required target rate of descent (ROD) with the appropriate thrust/power and trim.~~

~~(3) Stabilisation during any straight-in approach without visual reference to the ground should be achieved at the latest when passing 1 000 ft above runway threshold elevation. For approaches with a designated vertical profile applying the CDFA technique, a later stabilisation in speed may be acceptable if higher than normal approach speeds are required by ATC procedures or allowed by the OM. Stabilisation should, however, be achieved not later than 500 ft above runway threshold elevation.~~

~~(4) For approaches where the pilot has visual reference with the ground, stabilisation should be achieved not later than 500 ft above aerodrome elevation. However, the aeroplane should be stabilised when passing 1 000 ft above runway threshold elevation; in the case of circling approaches flown after a CDFA, the aircraft should be stabilised in the circling configuration not later than passing 1 000 ft above the runway elevation.~~

~~(5) To ensure that the approach can be flown in a stabilised manner, the bank angle, rate of descent and thrust/power management should meet the following performances:~~

~~(i) The bank angle should be less than 30 degrees.~~

~~(ii) The target rate of descent (ROD) should not exceed 1 000 fpm and the ROD deviations should not exceed ± 300 fpm, except under exceptional circumstances which have been anticipated and briefed prior to commencing the approach; for example, a strong tailwind. Zero ROD may be used when the descent path needs to be regained from below the profile. The target ROD may need to be initiated prior to reaching the required descent point, typically 0.3 NM before the descent point, dependent upon ground speed, which may vary for each type/class of aeroplane.~~

~~(iii) The limits of thrust/power and the appropriate range should be specified in the OM Part B or equivalent document.~~

~~(iv) The optimum angle for the approach slope is 3° and should not exceed 4.5°.~~

~~(v) The CDFA technique should be applied only to approach procedures based on NDB, NDB/DME, VOR, VOR/DME, LOC, LOC/DME, VDF, SRA, GNSS/LNAV and fulfil the following criteria:~~

~~(A) the final approach track off-set ≤ 5° except for Category A and B aeroplanes, where the approach-track off-set is ≤ 15°; and~~

~~(B) a FAF, or another appropriate fix, e.g. final approach point, where descent initiated is available; and~~

~~(C) the distance from the FAF or another appropriate fix to the threshold (THR) is less than or equal to 8 NM in the case of timing; or~~

~~(D) the distance to the THR is available by FMS/GNSS or DME; or~~

~~(E) the minimum final segment of the designated constant angle approach path should not be less than 3 NM from the THR unless approved by the authority.~~

~~(7) The CDFA techniques support a common method for the implementation of flight-director-guided or auto-coupled RNAV approaches.~~

The following criteria apply to CDFA:

(a) For each NPA procedure to be used, the operator should provide information allowing the flight crew to determine the appropriate descent path. This information is either:

(1) a descent path depicted on the approach chart including check altitude/heights against range;

(2) a descent path coded into the aircraft flight management system; or

(3) a recommended descent rate based on estimated ground speed.

(b) The information provided to the crew should observe human factors principles.

(c) The descent path should be calculated to pass at or above the minimum altitude specified at any step down fix.

(d) The optimum angle for the descent path is 3° and should not exceed 4,5° except for steep approach operations approved in accordance with this Part.

(e) For multi-pilot operations, the operator should establish procedures that require:

  (1) the pilot monitoring to verbalise deviations from the required descent path;

  (2) the pilot flying to make prompt corrections to deviation from the required descent path; and

  (3) a call-out to be made when the aircraft is approaching the DA/H.

(f) A missed approach should be executed promptly at the DA/H or the MAPt, whichever is first, if the required visual references have not been established.

(g) For approaches other than circling approaches, the lateral part of the missed approach should be flown via the MAPt unless otherwise stated on the approach chart.

118. AMC2 CAT.OP.MPA.115 is amended as follows:

AMC2 CAT.OP.MPA.115 Approach flight technique — aeroplanes

~~**NPA OPERATIONS WITHOUT APPLYING THE CDFA TECHNIQUE**~~

APPROACH OPERATIONS USING NPA PROCEDURES FLOWN WITH A FLIGHT TECHNIQUE OTHER THAN CDFA

(…)

(d) In case the CDFA technique is not used and when the MDA/H is high, it may be appropriate to make an early descent to the MDA/H with appropriate safeguards such as the application of a significantly higher RVR~~/~~ or VIS.

(e) The procedures that are flown with level flight at~~/~~ or above the MDA/H should be listed in the OM.

(f) Operators should categorise aerodromes where there are approaches that require level flight at~~/~~ or above the MDA/H as B ~~and~~ or C. Such aerodrome categorisation will depend upon the operator’s experience, operational exposure, training programme(s) and flight crew qualification(s).

119. AMC3 CAT.OP.MPA.115 is amended as follows:

AMC3 CAT.OP.MPA.115 Approach flight technique — aeroplanes

OPERATIONAL PROCEDURES AND INSTRUCTIONS AND TRAINING

(a) The operator should establish procedures and instructions for flying approaches using the CDFA technique and not using it. These procedures should be included in the OM and should include the duties of the flight crew during the conduct of such operations. The operator should ensure that initial and recurrent flight crew training required by ORO.FC includes the use of the CDFA technique.

(b) Operators holding an approval to use another technique for NPAs on certain runways should establish procedures for the application of such techniques.

~~(b) The operator should at least specify in the OM the maximum ROD for each aeroplane type/class operated and the required visual reference to continue the approach below:~~

  ~~(1) the DA/H, when applying the CDFA technique; and~~

  ~~(2) the MDA/H, when not applying the CDFA technique.~~

~~(c) The operator should establish procedures which prohibit level flight at MDA/H without the flight crew having obtained the required visual references. It is not the intention to prohibit level flight at MDA/H when conducting a circling approach, which does not come within the definition of the CDFA technique.~~

~~(d) The operator should provide the flight crew with unambiguous details of the technique used (CDFA or not). The corresponding relevant minima should include:~~

~~(1) type of decision, whether DA/H or MDA/H;~~

~~(2) MAPt as applicable; and~~

~~(3) appropriate RVR/VIS for the approach operation and aeroplane category.~~

~~(e) Training~~

~~(1) Prior to using the CDFA technique, each flight crew member should undertake appropriate training and checking as required by Subpart FC of Annex III (ORO.FC). The operator's proficiency check should include at least one approach to a landing or missed approach as appropriate using the CDFA technique or not. The approach should be operated to the lowest appropriate DA/H or MDA/H, as appropriate; and, if conducted in a FSTD, the approach should be operated to the lowest approved RVR. The approach is not in addition to any manoeuvre currently required by either Part-FCL or Part-CAT. The provision may be fulfilled by undertaking any currently required approach, engine out or otherwise, other than a precision approach (PA), whilst using the CDFA technique.~~

~~(2) The policy for the establishment of constant predetermined vertical path and approach stability is to be enforced both during initial and recurrent pilot training and checking. The relevant training procedures and instructions should be documented in the operations manual.~~

~~(3) The training should emphasise the need to establish and facilitate joint crew procedures and crew resource management (CRM) to enable accurate descent path control and the provision to establish the aeroplane in a stable condition as required by the operator's operational procedures.~~

~~(4) During training, emphasis should be placed on the flight crew's need to:~~

~~(i) maintain situational awareness at all times, in particular with reference to the required vertical and horizontal profile;~~

~~(ii) ensure good communication channels throughout the approach;~~

~~(iii) ensure accurate descent-path control particularly during any manually-flown descent phase. The monitoring pilot should facilitate good flight path control by:~~

~~(A) communicating any altitude/height crosschecks prior to the actual passing of the range/altitude or height crosscheck;~~

~~(B) prompting, as appropriate, changes to the target ROD; and~~

~~(C) monitoring flight path control below DA/MDA;~~

~~(iv) understand the actions to be taken if the MAPt is reached prior to the MDA/H;~~

~~(v) ensure that the decision for a missed approach is taken no later than when reaching the DA/H or MDA/H;~~

~~(vi) ensure that prompt action for a missed approach is taken immediately when reaching DA/H if the required visual reference has not been obtained as there may be no obstacle protection if the missed approach procedure manoeuvre is delayed;~~

~~(vii) understand the significance of using the CDFA technique to a DA/H with an associated MAPt and the implications of early missed approach manoeuvres; and~~

~~(viii) understand the possible loss of the required visual reference due to pitch-change/climb when not using the CDFA technique for aeroplane types or classes that require a late change of configuration and/or speed to ensure the aeroplane is in the appropriate landing configuration.~~

~~(5) Additional specific training when not using the CDFA technique with level flight at or above MDA/H~~

~~(i) The training should detail:~~

~~(A) the need to facilitate CRM with appropriate flight crew communication in particular;~~

~~(B) the additional known safety risks associated with the 'dive-and-drive' approach philosophy which may be associated with non-CDFA;~~

~~(C) the use of DA/H during approaches flown using the CDFA technique;~~

~~(D) the significance of the MDA/H and the MAPt where appropriate;~~

~~(E) the actions to be taken at the MAPt and the need to ensure that the aeroplane remains in a stable condition and on the nominal and appropriate vertical profile until the landing;~~

~~(F) the reasons for increased RVR/Visibility minima when compared to the application of CDFA;~~

~~(G) the possible increased obstacle infringement risk when undertaking level flight at MDA/H without the required visual references;~~

~~(H) the need to accomplish a prompt missed approach manoeuvre if the required visual reference is lost;~~

~~(I) the increased risk of an unstable final approach and an associated unsafe landing if a rushed approach is attempted either from:~~

~~(a) inappropriate and close-in acquisition of the required visual reference; or~~

~~(b) unstable aeroplane energy and or flight path control; and~~

~~(J) the increased risk of controlled flight into terrain (CFIT).~~

120. The following AMC1 CAT.OP.MPA.115(a) is inserted:

AMC1 CAT.OP.MPA.115(a) Approach flight technique — aeroplanes

STABILISED APPROACH OPERATIONS — AEROPLANES

The following criteria should be satisfied for all stabilised approach operations with aeroplanes:

(a) The flight management systems and approach aids should be correctly set and any required radio aids identified before reaching a predetermined point or altitude/height on the approach.

(b) The aeroplane should be flown according to the following criteria from a predetermined point or altitude/height on the approach:

(1) the angle of bank should be less than 30 degrees; and

(2) the target rate of descent should be that required to maintain the correct vertical path at the planned approach speed.

(c) Variations in the rate of descent should normally not exceed 50 % of the target rate of descent.

(d) An aeroplane should be considered stabilised for landing when the following conditions are met:

(1) the aeroplane is tracking within an acceptable tolerance of the required lateral path;

(2) the aeroplane is tracking within an acceptable tolerance of the required vertical path;

(3) the vertical speed of the aeroplane is within an acceptable tolerance of the required rate of descent;

(4) the airspeed of the aeroplane is within an acceptable tolerance of the intended landing speed;

(5) the aeroplane is in the correct configuration for landing, unless operating procedures require a final configuration change for performance reasons after visual reference is acquired; and

(6) the thrust/power and trim settings are appropriate.

(e) The aeroplane should be stabilised for landing before reaching 500 ft above the landing runway threshold elevation.

(f) For approach operations where the pilot does not have visual reference with the ground, the aeroplane should additionally be stabilised for landing before reaching 1 000 ft above the landing runway threshold elevation except that a later stabilisation in airspeed may be acceptable if higher than normal approach speeds are required for operational reasons specified in the operations manual.

(g) The operator should specify the following in the operations manual:

(1) the acceptable tolerances referred to in (d);

(2) the means to identify the predetermined point referred to in (a) and (b) above. This should normally be the FAF.

(f) When the operator requests approval for an alternative to the stabilised approach criteria for a particular approach to a particular runway, the operator should demonstrate that the proposed alternative will ensure that an acceptable level of safety is achieved.

121. The following GM1 CAT.OP.MPA.115(a) is inserted:

GM1 CAT.OP.MPA.115(a) Approach flight techniques — aeroplanes

ACCEPTABLE TOLERANCES FOR STABILISED APPROACH OPERATIONS

(a) The requirement for the aircraft to be tracking within an acceptable tolerance of the required lateral path does not imply that the aircraft has to be aligned with the runway centreline by any particular height.

(b) The target rate of descent for the final approach segment (FAS) of a stabilised approach normally does not exceed 1 000 fpm. Where a rate of descent of more than 1 000 fpm will be required (e.g. due to high ground speed or a steeper-than-normal approach path), this should be briefed in advance.

(c) Operational reasons for specifying a higher-than-normal approach speed below 1 000 ft may include compliance with air traffic control (ATC) speed restrictions.

(d) For operations where a level flight segment is required during the approach (e.g. circling approaches or approaches flown as non-CDFA), the criteria in point (b) of AMC1 CAT.OP.MPA.115(a) should apply from the predetermined point until the start of the level flight segment and again from the point at which the aircraft begins descent from the level flight segment down to a point of 50 ft above the threshold or the point where the flare manoeuvre is initiated, if higher.

122. GM1 CAT.OP.MPA.115 is re-numbered and amended as follows:

GM1 CAT.OP.MPA.115(b) Approach flight technique — aeroplanes

CONTINUOUS DESCENT FINAL APPROACH (CDFA)

(a) Introduction

(1) Controlled flight into terrain (CFIT) is a major hazard in aviation. Most CFIT accidents occur in the ~~final approach segment~~ FAS of ~~non-precision approaches;~~ approach operations flown using NPA procedures. T~~t~~he 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. ~~Operators should ensure that 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~~ instrument approach operations using NPA procedures ~~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~~ 3D approach operations; and

(viii) when used and the approach is flown in a stabilised manner, CDFA is the safest approach technique for all ~~NPA operations~~ instrument approach operations using NPA procedures.

(b) CDFA

(1) CDFA ~~Continuous descent final approach~~ is defined in Annex I to this Regulation.

~~(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; or~~

~~(v) GNSS/LNAV.~~

(2~~3~~) Stabilised approach (SAp) is defined in Annex I to this Regulation.

(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 specifications for conducting an SAp, should not be confused with the path specifications for using the CDFA technique. The predetermined path specification for conducting an SAp are established by the operator and published in the operations manual ~~part B.~~

(iii) The appropriate descent path ~~predetermined approach slope specifications~~ for applying the CDFA technique is ~~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~~ Straight-in approach operations using CDFA ~~will never~~ do not have a~~ny~~ 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 the MDA/H~~.

(v) An approach using the CDFA technique is ~~will ~~always ~~be~~ flown as an SAp, since this is a specification for applying CDFA. However, an SAp does not have to be flown using the CDFA technique, for example, a visual approach.

(c) Circling approach operations using CDFA technique

Circling approach operations using the CDFA technique require a continuous descent from an altitude/height at or above the final approach fix altitude/height until MDA/H or visual flight manoeuvre altitude/height (see definition in Annex I). This does not preclude level flight at or above the MDA/H. This level flight may be at MDA/H while following the instrument approach procedure or after visual reference has been established as the aircraft is aligned with the final approach track. The conditions for descent from level flight are described in AMC7 CAT.OP.MPA.110.

123. AMC2 CAT.OP.MPA.126 is amended as follows:

AMC2 CAT.OP.MPA.126 Performance-based navigation

MONITORING AND VERIFICATION

[…]

(d) Altimetry settings for RNP APCH operations using Baro VNAV

[…]

(2) Temperature compensation

(i) For RNP APCH operations to LNAV/VNAV minima using Baro VNAV:

(A) […]

(B) when the temperature is within promulgated limits, the flight crew should not make compensation to the altitude at the FAF~~ and DA/H~~;

[…]

124. AMC8 CAT.OP.MPA.182 is amended as follows:

AMC8 CAT.OP.MPA.182 Fuel/energy scheme — aerodrome selection policy — aeroplanes

BASIC FUEL SCHEME WITH VARIATIONS — PLANNING MINIMA

(…)

Row	Type of approach operation	Aerodrome ceiling (cloud base or vertical visibility)	RVR/VIS
1	Type B instrument approach operations	DA/H + 200 ft	RVR/VIS + 550 m
2	3D Type A instrument approach operations, based on a facility with a system minimum of 200 ft or less	DA/H ~~or MDA/H~~* + 200 ft	RVR/VIS** + 800 m
3	Two or more usable type A instrument approach operations***, each based on a separate navigation aid	DA/H or MDA/H* + 200 ft	RVR/VIS** + 1 000 m
4	Other type A instrument approach operations	DA/H or MDA/H + 400 ft	RVR/VIS + 1 500 m
5	Circling approach operations	MDA/H + 400 ft	VIS + 1 500 m
Crosswind planning minima: see Table 1 of AMC3 CAT.OP.MPA.182			
Wind limitations should be applied taking into account the runway condition (dry, wet, contaminated).			

125. AMC9 CAT.OP.MPA.182 is amended as follows:

AMC9 CAT.OP.MPA.182 Fuel/energy scheme — aerodrome selection policy — aeroplanes

BASIC FUEL SCHEME WITH VARIATIONS — PLANNING MINIMA

(…)

Row	Type of approach	Aerodrome ceiling (cloud base or vertical VIS)	RVR/VIS
1	Two or more usable type B instrument approach operations to two separate runways***	DA/H* + 100 ft	RVR** + 300 m
2	One usable type B instrument approach operation	DA/H + 150 ft	RVR + 450 m

3	3D Type A instrument approach operations, based on a facility with a system minimum of 200 ft or less	DA/H ~~or MDA/H~~* + 200 ft	RVR/VIS** + 800 m
4	Two or more usable type A instrument approach operations ***, each based on a separate navigation aid	DA/H or MDA/H* + 200 ft	RVR/VIS** + 1 000 m
5	One usable type A instrument approach operation	DA/H or MDA/H + 400 ft	RVR/VIS + 1 500 m
6	Circling approach operations	MDA/H + 400 ft	VIS + 1 500 m
Crosswind planning minima: see Table 1 of AMC3 CAT.OP.MPA.182			
Wind limitations should be applied taking into account the runway condition (dry, wet, contaminated).			

126. The following GM1 CAT.OP.MPA.185 is deleted:

~~GM1 CAT.OP.MPA.185 Planning minima for IFR flights — aeroplanes~~

~~**PLANNING MINIMA FOR ALTERNATE AERODROMES**~~

~~Non-precision minima (NPA) in Table 1 of CAT.OP.MPA.185 mean the next highest minima that apply in the prevailing wind and serviceability conditions. Localiser only approaches, if published, are considered to be non-precision in this context. It is recommended that operators wishing to publish tables of planning minima choose values that are likely to be appropriate on the majority of occasions (e.g. regardless of wind direction). Unserviceabilities should, however, be fully taken into account.~~

~~As Table 1 does not include planning minima requirements for APV, lower than standard (LTS) CAT I and other than standard (OTS) CAT II operations, the operator may use the following minima:~~

~~(a) for APV operations — NPA or CAT I minima, depending on the DH/MDH;~~

~~(b) for LTS CAT I operations — CAT I minima; and~~

~~(c) for OTS CAT II operations — CAT II minima.~~

127. AMC1 CAT.OP.MPA.192(d)[2] is amended as follows:

AMC1 CAT.OP.MPA.192(d) Selection of aerodromes and operating sites — helicopters

PBN OPERATIONS

(a) To comply with CAT.OP.MPA.192 (d), when the operator intends to use PBN, the operator should either:

(1) demonstrate that the GNSS is robust against loss of capability; or

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[2] This AMC has been developed in the context of the activities of RMT.0573 ‘Fuel/energy planning and management’, the Opinion of which was published on 8 October 2020. A draft AMC & GM of RMT.0573 was also published at that date, for information purposes only. The final text of the AMC and GM may be subject to further changes before the publication of the EASA Decision. However, for the purpose of this draft AMC & GM, EASA reproduced here the same text as published on 8 October 2020, to indicate further changes to this AMC proposed by RMT.0379. In the current rules, this is AMC1 CAT.OP.MPA.182, which states: ‘The pilot-in-command should only select an aerodrome as a destination alternate aerodrome if an instrument approach procedure that does not rely on GNSS is available either at that aerodrome or at the destination aerodrome.’

(2) select an aerodrome as a destination alternate aerodrome only if an instrument approach procedure that does not rely on a GNSS is available either at that aerodrome or at the destination aerodrome.

GNSS ROBUSTNESS AGAINST LOSS OF CAPABILITY — HELICOPTERS

(b) The operator may demonstrate robustness against the loss of capability of the GNSS if all of the following criteria are met:

(1) SBAS or GBAS are available and used.

(2) The failure of a single receiver or system should not compromise the navigation capability required for the intended instrument approach.

(3) The temporary jamming of all GNSS frequencies should not compromise the navigation capability required for the intended route. The operator should establish a procedure to deal with such cases unless other sensors are available to continue on the intended route.

(4) The duration of a jamming event should be determined as follows:

(i) Considering the average speed and height of a helicopter flight, the duration of a jamming event may be considered to be less than 2 minutes.

(ii) The time needed for the GNSS system to re-start and provide the aircraft position and navigation guidance should also be considered.

(iii) Based on (i) and (ii) above, the operator should establish the duration of the loss of GNSS navigation data due to jamming. This duration should be no less than 3 minutes, and may be no longer than 4 minutes.

(5) The operator should ensure resilience to jamming for the duration determined in (4) above, as follows:

(i) If the altitude of obstacles on both sides of the flight path is higher than the planned altitude for a given segment of the flight, the operator should ensure no excessive drift on either side by relying on navigation sensors such as a inertial system with performance in accordance to the intended function.

(ii) If (i) does not apply and the operator cannot rely on sensors other than GNSS, the operator should develop a procedure to ensure that a drift from the intended route during the jamming event has no adverse consequences on the safety of the flight. This procedure may involve air traffic services.

(6) The operator should ensure that no space weather event is predicted to disrupt the GNSS reliability and integrity at both the destination and the alternate.

(7) The operator should verify the availability of RAIM for all phases of flight based on GNSS, including navigation to the alternate.

(8) The operator's MEL should reflect the elements in points (b)(1) and (b)(2).

OPERATIONAL CREDITS

(c) To comply with point CAT.OP.MPA.192(d), when the operator intends to use 'operational credits' (e.g. EFVS, SA CAT I, etc.), the operator should select an aerodrome as destination alternate aerodrome only if an instrument approach procedure that does not rely on the same 'operational credit' is available either at that aerodrome or at the destination aerodrome.

128. The following GM2 CAT.OP.MPA.192(d) is inserted:

GM2 CAT.OP.MPA.192(d) Selection of aerodromes and operating sites — helicopters

GNSS ROBUSTNESS AGAINST LOSS OF CAPABILITY — HELICOPTERS

(a) Redundancy of on-board systems ensures that no single on-board equipment failure (e.g. antenna, GNSS receiver, FMS, or navigation display failure) results in the loss of the GNSS capability.

(b) Any shadowing of the GNSS signal or jamming of all GNSS frequencies from the ground is expected to be of a very short duration and affect a very small area. Additional sensors or functions, such as inertial coasting, may be used during jamming events. Jamming should be considered on all segments of the intended route, including the approach.

(c) The availability of GNSS signals can be compromised if space weather events cause 'loss of lock' conditions and more than one satellite signal may be lost on a given GNSS frequency. Until space weather forecasts are available, the operator may use 'nowcasts' as short-term predictions for helicopter flights of short durations.

(d) SBAS also contributes to the mitigation of space weather effects, both by providing integrity messages and by correcting ionosphere-induced errors.

(e) Even though SBAS should be available and used, RAIM should remain available autonomously. In case of loss of SBAS, the route and the approach to the destination or alternate should still be flown with an available RAIM function.

(f) When available, GNSS based on more than one constellation and more than one frequency may provide better integrity and redundancy regarding failures in the space segment of GNSS, jamming, and resilience to space weather events.

AMC1 CAT.OP.MPA.265(a) Take-off conditions

METEOROLOGICAL CONDITIONS FOR TAKE-OFF — RUNWAYS

(a) The commander should not commence take-off unless the weather conditions at the aerodrome of departure are equal to or better than the applicable minima for landing at that aerodrome unless a weather-permissible take-off alternate aerodrome is available.

(b) If the reported VIS is below the minimum specified for take-off and RVR is not reported, then take-off should only be commenced if the commander can determine that the visibility along the take-off runway is equal to or better than the required minimum.

129. The following GM1 CAT.OP.MPA.305 is inserted:

GM1 CAT.OP.MPA.305 Commencement and continuation of approach

APPLICATION OF RVR OR VIS REPORTS — AEROPLANES

(a) There is no prohibition on the commencement of an approach based on the reported RVR or VIS. The restriction in CAT.OP.MPA.305 applies only if the RVR or VIS is reported and applies to the continuation of the approach past a point where the aircraft is 1 000 ft above the aerodrome elevation or into the FAS as applicable.

APPLICATION OF RVR OR VIS REPORTS — HELICOPTERS

(b) There is no prohibition on the commencement of an approach based on the reported RVR. The restriction in CAT.OP.MPA.305 applies to the continuation of the approach past a point where the aircraft is 1 000 ft above the aerodrome elevation or into the final approach segment as applicable.

The prohibition to continue the approach applies only if the RVR is reported and is below 550 m and is below the operating minima. There is no prohibition based on VIS.

(c) If the reported RVR is 550 m or greater, but it is less than the RVR calculated in accordance with AMC5 CAT.OP.MPA.110, a go-around is likely to be necessary since visual reference may not be established at the DH or MDH. Similarly, in the absence of an RVR report, the reported visibility or a digital image may indicate that a go-around is likely. The commander should consider the available options, based on a thorough assessment of risk, such as diverting to an alternate, before commencing the approach.

APPLICATION OF RVR OR VIS REPORTS — ALL AIRCRAFT

(d) If a deterioration in RVR or VIS is reported once the aircraft is below 1 000 ft or into the FAS, as applicable, then there is no requirement for the approach to be discontinued. In this situation, if visual reference is required, it would apply at the DA/H.

(e) Where additional RVR information is provided (e.g. midpoint and stop end), this is advisory; such information may be useful to the pilot in order to determine whether there will be sufficient visual reference to control the aircraft during roll-out and taxi. For operations where the aircraft is controlled manually during roll-out, Table 1 in AMC1 SPA.LVO.100(a) provides an indication of the RVR that may be required to allow manual lateral control of the aircraft on the runway.

130. The following AMC1 CAT.OP.MPA.305(a) is inserted:

AMC1 CAT.OP.MPA.305(a) Commencement and continuation of approach

MINIMUM RVR FOR CONTINUATION OF APPROACH — AEROPLANES

(a) The touchdown RVR should be the controlling RVR.

(b) If the touchdown RVR is not reported, then the midpoint RVR should be the controlling RVR.

(c) Where the RVR is not available, CMV should be used except for the purpose of continuation of an approach in LVO in accordance with AMC10 CAT.OP.MPA.110.

131. The following AMC1 CAT.OP.MPA.305(b) is inserted:

AMC1 CAT.OP.MPA.305(b) Commencement and continuation of approach

MINIMUM RVR FOR CONTINUATION OF APPROACH — HELICOPTERS

(a) The touchdown RVR should be the controlling RVR.

(b) If the touchdown RVR is not reported, then the midpoint RVR should be the controlling RVR.

132. AMC1 CAT.OP.MPA.305(e) is re-numbered and amended as follows:

AMC1 CAT.OP.MPA.305(c~~e~~) Commencement and continuation of approach

VISUAL REFERENCES FOR INSTRUMENT APPROACH OPERATIONS

~~(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:~~

For instrument approach operations Type A and CAT I instrument approach operations Type B, at least one of the visual references specified below should be distinctly visible and identifiable to the pilot at the MDA/H or the DA/H:

(a~~1~~) elements of the approach lighting system;

(b~~2~~) the threshold;

(c~~3~~) the threshold markings;

(d~~4~~) the threshold lights;

(e~~5~~) the threshold identification lights;

(f~~6~~) the visual glide slope indicator;

(g~~7~~) the TDZ ~~touchdown zone~~ or TDZ ~~touchdown zone~~ markings;

(h~~8~~) the TDZ ~~touchdown zone~~ lights;

(i~~9~~) FATO/runway edge lights; or

(j) for helicopter point-in-space (PinS) approaches, the identification beacon light and visual ground reference;

(k) for helicopter PinS approaches, the identifiable elements of the environment defined on the instrument chart;

(l) for helicopter PinS approaches with instructions to 'proceed VFR', sufficient visual cues to determine that VFR criteria are met; or

(m~~10~~) other visual references specified in the operations manual.

~~(b) 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 them;~~

~~(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 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 them;~~

~~(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 specification for visual reference with the runway prior to touchdown.~~

~~(e) Approach operations utilising EVS — CAT I operations~~

~~(1) At DH, the following visual references should be displayed and identifiable to the pilot on the EVS image:~~

~~(i) elements of the approach light; or~~

~~(ii) the runway threshold, identified by at least one of the following:~~

~~(A) the beginning of the runway landing surface,~~

~~(B) the threshold lights, the threshold identification lights; or~~

~~(C) 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.~~

~~(f) Approach operations utilising EVS — APV and NPA operations flown with the CDFA technique~~

~~(1) At DH/MDH, visual references should be displayed and identifiable to the pilot on the EVS image as specified under (a).~~

~~(2) At 200 ft above runway threshold elevation, at least one of the visual references specified under (a) should be distinctly visible and identifiable to the pilot without reliance on the EVS.~~

133. GM1 CAT.OP.MPA.305(f) is deleted:

~~GM1 CAT.OP.MPA.305(f) Commencement and continuation of approach~~

134. The following GM1 CAT.OP.MPA.312 is inserted:

GM1 CAT.OP.MPA.312 EFVS 200 operations

GENERAL

(a) EFVS operations exploit the improved visibility provided by the EFVS to extend the visual segment of an instrument approach. EFVS cannot be used to extend the instrument segment of an approach and thus the DH for EFVS 200 operations is always the same as for the same approach conducted without EFVS.

(b) Equipment for EFVS 200 operations

(1) In order to conduct EFVS 200 operations, a certified EFVS is used (EFVS-A or EFVS-L). An EFVS is an enhanced vision system (EVS) that also incorporates a flight guidance system and displays the image on a head-up display (HUD) or equivalent display. The flight guidance system will incorporate aircraft flight information and flight symbology.

(2) In multi-pilot operations, a suitable display of EFVS sensory imagery is provided to the pilot monitoring.

(c) Suitable approach procedures

(1) Types of approach operation are specified in AMC1 CAT.OP.MPA.312(a)(2)

EFVS 200 operations should be conducted as 3D approach operations. This may include operations based on NPA procedures, approach procedures with vertical guidance and precision approach procedures including approach operations requiring specific approvals, provided that the operator holds the necessary approvals.

(2) Offset approaches

Refer to AMC1 CAT.OP.MPA.312(a)(2).

(3) Circling approaches

EFVSs incorporate a HUD or an equivalent system so that the EFVS image of the scene ahead of the aircraft is visible in the pilot's forward external FOV. Circling operations require the pilot to maintain visual references that may not be directly ahead of the aircraft and may not be aligned with the current flight path. EFVS cannot therefore be used in place of natural visual reference for circling approaches.

(d) Aerodrome operating minima for EFVS 200 operations determined in accordance with AMC1 CAT.OP.MPA.312(a)(8)

The performance of EFVSs depends on the technology used and weather conditions encountered. Table 1 'Operations utilising EFVS: RVR reduction' has been developed after an operational evaluation of two different EVSs both using infrared sensors, along with data and support provided by the FAA. Approaches were flown in a variety of conditions including fog, rain and snow showers, as well as at night to aerodromes located in mountainous terrain. Table 1 contains conservative figures to cater for the expected performance of infrared sensors in the variety of conditions that might be encountered. Some systems may have better capability than those used for the evaluation, but credit cannot be taken for such performance in EFVS 200 operations.

(e) Conditions for commencement and continuation of the approach in accordance with CAT.OP.MPA.305

Pilots conducting EFVS 200 operations may commence an approach and continue that approach below 1 000 ft above the aerodrome or into the FAS if the reported RVR or CMV is equal to or greater than the lowest RVR minima determined in accordance with AMC1 CAT.OP.MPA.312(a)(8) and if all the conditions for the conduct of EFVS 200 operations are met.

Should any equipment required for EFVS 200 operations be unserviceable or unavailable, the conditions to conduct EFVS 200 operations would not be satisfied and the approach should not be commenced. In the event of failure of the equipment required for EFVS 200 operations after the aircraft descends below 1 000 ft above the aerodrome or into the FAS, the conditions of CAT.OP.MPA.305 would no longer be satisfied unless the RVR reported prior to commencement of the approach was sufficient for the approach to be flown without EFVS in lieu of natural vision.

(f) EFVS image requirements at the DA/H specified in AMC1 CAT.OP.MPA.312(a)(4)

The requirements for features to be identifiable on the EFVS image in order to continue the approach below the DH are more stringent than the visual reference requirements for the same approach flown without EFVS. The more stringent standard is needed because the EFVS might not display the colour of lights used to identify specific portions of the runway and might not consistently display the runway markings. Any visual approach path indicator using colour-coded lights may be unusable.

(g) Obstacle clearance in the visual segment

The ‘visual segment’ is the portion of the approach between the DH or the MAPt and the runway threshold. In the case of EFVS 200 operations, this part of the approach may be flown using the EFVS image as the primary reference and obstacles may not always be identifiable on an EFVS image. The operational assessment specified in AMC1 CAT.OP.MPA.312(a)(2) is therefore required to ensure obstacle clearance during the visual segment.

(h) Visual reference requirements at 200 ft above the threshold

For EFVS 200 operations, natural visual reference is required by a height of 200 ft above the runway threshold. The objective of this requirement is to ensure that the pilot will have sufficient visual reference to land. The visual reference should be the same as that required for the same approach flown without EFVS.

Some EFVSs may have additional requirements that have to be fulfilled at this height to allow the approach to continue, such as a requirement to check that elements of the EFVS display remain correctly aligned and scaled to the external view. Any such requirements will be detailed in the AFM and included in the operator’s procedures.

(i) Specific approval for EFVS

In order to use an EFVS without natural visual reference below 200 ft above the threshold, or EFVS to touchdown, the operator needs to hold a specific approval in accordance with Part-SPA.

(j) Go-around

A go-around will be promptly executed if the required visual references are not maintained on the EFVS image at any time after the aircraft has descended below the DA/H or if the required visual references are not distinctly visible and identifiable using natural vision after the aircraft is below 200 ft. It is considered more likely that an EFVS 200 operation could result in the initiation of a go-around below DA/H than the equivalent approach flown without EFVS and thus the operational assessment required by AMC1 CAT.OP.MPA.312(a)(2) takes into account the possibility of a balked landing.

An obstacle free zone (OFZ) may be provided for CAT I precision approach procedures. Where an OFZ is not provided for a CAT I precision approach, this will be indicated on the approach chart. Non Precision Approach (NPA) procedures and approach procedures with vertical guidance (APV) provide obstacle clearance for the missed approach based on the assumption that a go-around is executed at the MAPt and not below the OCH.

135. The following AMC1 CAT.OP.MPA.312(a)(1) is inserted:

AMC1 CAT.OP.MPA.312(a)(1) EFVS 200 operations

EQUIPMENT CERTIFICATION

For EFVS 200 operations, the aircraft should be equipped with an approach system using EFVS-A or a landing system using EFVS-L.

136. The following AMC1 CAT.OP.MPA.312(a)(2) is inserted:

AMC1 CAT.OP.MPA.312(a)(2) EFVS 200 operations

AERODROMES AND INSTRUMENT PROCEDURES SUITABLE FOR EFVS 200 OPERATIONS

(a) For EFVS 200 operations, the operator should verify the suitability of a runway before authorising EFVS operations to that runway through an operational assessment taking into account the following elements:

  (1) the obstacle situation;

  (2) the type of aerodrome lighting;

  (3) the available IAPs;

  (4) the aerodrome operating minima; and

  (5) any non-standard conditions that may affect the operations.

(b) EFVS 200 operations should only be conducted as 3D operations, using an IAP in which the final approach track is offset by a maximum of 3 degrees from the extended centreline of the runway.

(c) The IAP should be designed in accordance with PANS-OPS, Volume I (ICAO Doc 8168) or equivalent criteria.

137. The following AMC2 CAT.OP.MPA.312(a)(2) is inserted:

AMC2 CAT.OP.MPA.312(a)(2) EFVS 200 operations

VERIFICATION OF THE SUITABILITY OF RUNWAYS FOR EFVS 200 OPERATIONS

The operational assessment before authorising the use of a runway for EFVS 200 operations should be conducted as follows:

(a) Check whether the runway has been promulgated as suitable for EFVS operations or is certified as a precision approach runway category II or III by the State of the aerodrome. If this is so, then check whether and where LED lights are installed in order to assess the impact on the EFVS equipment used by the operator.

(b) If the check in point (a) above comes out negative, then proceed as follows:

  (1) For straight-in IAPs, US Standard for Terminal Instrument Procedures (TERPS)[3] may be considered to be acceptable as an equivalent to PANS-OPS. If other design criteria than those in PANS-OPS or US TERPS are used, the operations should not be conducted.

  (2) If an OFZ is established, this will ensure adequate obstacle protection from 960 m before the threshold. If an OFZ is not established or if the DH for the approach is above 250 ft, then check whether there is a visual segment surface (VSS).

  (3) VSSs are required for procedures published after 15 March 2007, but the existence of the VSS has to be verified through the aeronautical information publication (AIP), operations manual Part C, or direct contact with the aerodrome. Where the VSS is established, it may not be penetrated by obstacles. If the VSS is not established or is penetrated by obstacles and an OFZ is not established, then the operations should not be conducted. Note: obstacles of a height of less than 50 ft above the threshold may be disregarded when assessing the VSS.

  (4) Runways with obstacles that require visual identification and avoidance should not be accepted.

  (5) For the obstacle protection of a balked landing where an OFZ is not established, the operator may specify that pilots follow a departure procedure in the event of a balked landing, in which case it is necessary to verify that the aircraft will be able to comply with the climb gradients published for the instrument departure procedures for the expected landing conditions.

(c) If the AFM stipulates specific requirements for approach procedures, then the operational assessment should verify that these requirements can be met.

138. The following AMC1 CAT.OP.MPA.312(a)(3) is inserted:

AMC1 CAT.OP.MPA.312(a)(3) EFVS 200 operations

INITIAL TRAINING FOR EFVS 200 OPERATIONS

Operators should ensure that flight crew members complete the following conversion training before being authorised to conduct EFVS 200 operations unless credits related to training and checking for previous experience on similar aircraft types are defined in the operational suitability data established in accordance with Regulation (EU) No 748/2012:

(a) A ground training course including at least the following:

  (1) characteristics and limitations of HUDs or equivalent display systems including information presentation and symbology;

  (2) EFVS sensor performance in different weather conditions, sensor limitations, scene interpretation, visual anomalies and other visual effects;

  (3) EFVS display, control, modes, features, symbology, annunciations and associated systems and components;

  (4) the interpretation of EFVS imagery;

  (5) the interpretation of approach and runway lighting systems and display characteristics when using EFVS;

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[3] https://www.faa.gov/regulations_policies/orders_notices/index.cfm/go/document.information/documentID/1029266

(6) pre-flight planning and selection of suitable aerodromes and approach procedures;

(7) principles of obstacle clearance requirements;

(8) the use and limitations of RVR assessment systems;

(9) normal, abnormal and emergency procedures for EFVS operations;

(10) the effect of specific aircraft/system malfunctions;

(11) human factors aspects of EFVS operations;

(12) qualification requirements for pilots to obtain and retain approval for EFVS 200 operations.

(b) An aircraft/FSTD training course in two phases as follows:

(1) Phase one (EFVS 200 operations with aircraft and all equipment serviceable) — objectives:

(i) understand the operation of equipment required for EFVS 200 operations;

(ii) understand operating limitations of the installed EFVS;

(iii) practise the use of HUD or equivalent display systems;

(iv) practise setup and adjustment of EFVS equipment in different conditions (e.g. day and night);

(v) practise monitoring of automatic flight control systems, EFVS information and status annunciators;

(vi) practise the interpretation of EFVS imagery;

(vii) become familiar with the features needed on the EFVS image to continue approach below DH;

(viii) practise the identification of visual references using natural vision while using EFVS equipment;

(ix) master the manual aircraft handling relevant to EFVS operations including, where appropriate, the use of the flare cue and guidance for landing;

(x) practise coordination with other crew members; and

(xi) become proficient at procedures for EFVS 200 operations.

(2) Phase one of the training should include the following exercises:

(i) the required checks for satisfactory functioning of equipment, both on the ground and in flight;

(ii) the use of HUD or equivalent display systems during at least approach, landing and go-around;

(iii) approach using the EFVSs installed on the aircraft to the appropriate DH and transition to natural vision for continuing approach and landing;

(iv) approach with all engines operating using the EFVS, down to the appropriate DH followed by a missed approach, all without external visual reference, as appropriate.

(3) Phase two (EFVS 200 operations with aircraft and equipment failures and degradations) — objectives:

(i) understand the effect of known aircraft unserviceabilities including use of the MEL;

(ii) understand the effect on aerodrome operating minima of failed or downgraded equipment;

    - (iii) understand the actions required in response to failures and changes in the status of the EFVS including HUD or equivalent display systems;
    - (iv) understand the actions required in response to failures above and below the DH;
    - (v) practise abnormal operations and incapacitation procedures; and
    - (vi) become proficient at dealing with failures and abnormal situations during EFVS 200 operations.
- (4) Phase two of the training should include the following exercises:
    - (i) approaches with engine failures at various stages on the approach;
    - (ii) approaches with failures of the EFVS at various stages of the approach, including failures between the DH and the height below which an approach should not be continued if natural visual reference is not acquired, require either:
        - (A) reversion to head down displays to control missed approach; or
        - (B) reversion to flight with downgraded or no guidance to control missed approaches from the DH or below, including those which may result in a touchdown on the runway.
    - (iii) incapacitation procedures appropriate to EFVS 200 operations;
    - (iv) failures and procedures applicable to the specific EFVS installation and aircraft type; and
    - (v) FSTD training including minimum eight approaches.

139. The following AMC2 CAT.OP.MPA.312(a)(3) is inserted:

AMC2 CAT.OP.MPA.312(a)(3) EFVS 200 operations

RECURRENT TRAINING AND CHECKING FOR EFVS 200 OPERATIONS

(a) The operator should ensure that the pilots' competence to perform EFVS 200 operations is trained every 6 months by performing at least two approaches on each type of aircraft operated, and

(b) The operator should ensure that the pilots' competence to perform EFVS 200 operations is checked at each required operator proficiency check by performing at least two approaches on each type of aircraft operated, of which one should be flown without natural vision to 200 ft.

140. The following AMC3 CAT.OP.MPA.312(a)(3) is inserted:

AMC3 CAT.OP.MPA.312(a)(3) EFVS 200 operations

RECENT EXPERIENCE REQUIREMENTS FOR EFVS 200 OPERATIONS

Pilots should complete a minimum of four approaches using the operator's procedures for EFVS 200 operations during the validity period of the operator proficiency check unless currency related to credits is defined in the operational suitability data established in accordance with Regulation (EU) No 748/2012.

141. The following AMC4 CAT.OP.MPA.312(a)(3) is inserted:

AMC4 CAT.OP.MPA.312(a)(3) EFVS 200 operations

DIFFERENCES TRAINING FOR EFVS 200 OPERATIONS

(a) The operator should ensure that the flight crew members authorised to conduct EFVS 200 operations are provided with a differences training or familiarisation whenever there is a change to any of the following:

  (1) the technology used in the flight guidance and flight control system;

  (2) the HUD or equivalent display systems; or

  (3) the operating procedures.

(b) The differences training should:

  (1) meet the objectives of the appropriate initial training course;

  (2) take into account the flight crew members' previous experience; and

  (3) take into account the operational suitability data established in accordance with Regulation (EU) No 748/2012.

142. The following AMC5 CAT.OP.MPA.312(a)(3) is inserted:

AMC5 CAT.OP.MPA.312(a)(3) EFVS 200 operations

TRAINING FOR EFVS 200 OPERATIONS

If a flight crew member is to be authorised to operate as pilot flying and pilot monitoring during EFVS 200 operations, then he or she should complete the required FSTD training for each operating capacity.

143. The following GM1 CAT.OP.MPA.312(a)(3) is inserted:

GM1 CAT.OP.MPA.312(a)(3) EFVS 200 operations

RECURRENT CHECKING FOR EFVS 200 OPERATIONS

In order to provide the opportunity to practise decision-making in the event of system failures and failure to acquire natural visual reference, it is recommended that the recurrent training and checking for EFVS 200 operations periodically include different combinations of equipment failures, go-around due to loss of visual reference, and landings.

144. The following AMC1 CAT.OP.MPA.312(a)(4) is inserted:

AMC1 CAT.OP.MPA.312(a)(4) EFVS 200 operations

OPERATING PROCEDURES FOR EFVS 200 OPERATIONS

(a) When conducting EFVS 200 operations:

  (1) the pilot flying should use the EFVS throughout the approach;

(2) in multi-pilot operations, a suitable display of EFVS sensory imagery should be provided to the pilot monitoring;

(3) the approach between the FAF and the DA/H should be flown using vertical flight path guidance;

(4) the approach may be continued below the DA/H provided that the pilot can identify on the EFVS image either:

  (i) the approach light system; or

  (ii) both of the following:

    (A) the runway threshold identified by the beginning of the runway landing surface, the threshold lights or the runway end identifier lights; and

    (B) the touchdown zone identified by the touchdown zone lights, the touchdown zone runway markings or the runway lights; and

(5) a missed approach should be executed promptly if the required visual reference is not distinctly visible and identifiable to the pilot without reliance on the EFVS by 200 ft above the threshold.

(b) Operating procedures for EFVS 200 operations should:

(1) be consistent with the AFM;

(2) be appropriate to the technology and equipment to be used;

(3) specify the duties and responsibilities of each flight crew member in each relevant phase of flight;

(4) ensure that the flight crew workload is managed to facilitate effective decision-making and monitoring of the aircraft; and

(5) deviate to the minimum extent practicable from normal procedures used for routine operations.

(c) Operating procedures for EFVS 200 operations should include:

(1) required checks for the satisfactory functioning of the aircraft equipment, both before departure and in flight;

(2) correct seating and eye position;

(3) determination of aerodrome operating minima;

(4) required visual references at the DH;

(5) the action to be taken if natural visual reference is not acquired by 200 ft;

(6) the action to be taken in the event of loss of the required visual reference; and

(7) procedures for balked landing.

(d) Operating procedures for EFVS 200 operations should be included in the operations manual.

145. The following AMC1 CAT.OP.MPA.312(a)(8) is inserted:

AMC1 CAT.OP.MPA.312(a)(8) EFVS 200 operations

AERODROME OPERATING MINIMA — EFVS 200 OPERATIONS

When conducting EFVS 200 operations:

(a) the DA/H used should be the same as for operations without EFVS;

(b) the lowest RVR minima to be used should be determined by reducing the RVR presented in:

(1) Table 9 in AMC5 CAT.OP.MPA.110 in accordance with Table 1 below for aeroplanes;

(2) Table 13 in AMC6 CAT.OP.MPA.110 in accordance with Table 1 below for helicopters;

(c) in case of failed or downgraded equipment, Table 17 in AMC11 CAT.OP.MPA.110 should apply.

Table 1

Operations utilising EFVS: RVR reduction

RVR presented in Table 9 in AMC5 CAT.OP.MPA.110 and Table 13 in AMC6 CAT.OP.MPA.110	RVR (m) for EFVS 200 operations
550	550
600	550
650	550
700	550
750	550
800	550
900	600
1 000	650
1 100	750
1 200	800
1 300	900
1 400	900
1 500	1 000
1 600	1 100
1 700	1 100
1 800	1 200
1 900	1 300
2 000	1 300
2 100	1 400
2 200	1 500
2 300	1 500
2 400	1 600

146. The following AMC1 CAT.OP.MPA.312(c) is inserted:

AMC1 CAT.OP.MPA.312(c) EFVS 200 operations

EFVS 200 WITH EVSs MEETING MINIMUM CRITERIA

The EVS should be certified before 01 January 2022 as 'EVS with an operational credit'

GM1 CAT.OP.MPA.312(c) EFVS 200 operations

The competent authority refers in CAT.OP.MPA.312 point (c) is the competent authority referred in ORO.GEN.105.

147. The following AMC2 CAT.POL.A.230 is inserted:

AMC2 CAT.POL.A.230 Landing — dry runways

FACTORING OF LANDING DISTANCE PERFORMANCE DATA WHEN USING HEAD-UP DISPLAY (HUD) OR EQUIVALENT DISPLAY WITH FLARE CUE

In those cases where the landing requires the use of a HUD or an equivalent display with flare cue, and the distance published in the AFM includes safety margins equivalent to those contained in CAT.POL.A.230(a)(1), the landing mass of the aeroplane should be the lesser of:

(a) the landing mass determined in accordance with CAT.POL.A.230(a)(1); or

(b) the landing mass determined, when using a HUD or an equivalent display with flare cue for the appropriate surface condition, as given in the AFM or equivalent document.

148. The following GM1 CAT.POL.A.230 is inserted:

GM1 CAT.POL.A.230 Landing — dry runways

LANDING MASS

CAT.POL.A.230 establishes two considerations in determining the maximum permissible landing mass at the destination and alternate aerodromes:

(a) Firstly, the aeroplane mass will be such that on arrival the aeroplane can be landed within 60 % or 70 % (as applicable) of the landing distance available (LDA) on the most favourable (normally the longest) runway in still air. Regardless of the wind conditions, the maximum landing mass for an aerodrome/aeroplane configuration at a particular aerodrome cannot be exceeded.

(b) Secondly, consideration should be given to anticipated conditions and circumstances. The expected wind, or ATC and noise abatement procedures, may indicate the use of a different runway. These factors may result in a lower landing mass than that permitted under (a), in which case dispatch should be based on this lesser mass.

(c) The expected wind referred to in (b) is the wind expected to exist at the time of arrival.

149. The following AMC1 CAT.POL.A.235 is inserted:

AMC1 CAT.POL.A.235 Landing — wet and contaminated runways

FACTORING OF LANDING DISTANCE PERFORMANCE DATA WHEN USING HEAD-UP DISPLAY (HUD) OR EQUIVALENT DISPLAY WITH FLARE CUE

In those cases where the landing requires the use of a HUD or an equivalent display with flare cue, and the distance published in the AFM includes safety margins equivalent to those contained in CAT.POL.A.235, the landing mass of the aeroplane should be the lesser of:

(a) the landing mass determined in accordance with CAT.POL.A.235 as appropriate; or

(b) the landing mass determined, when using a HUD or an equivalent display with flare cue for the appropriate surface condition, as given in the AFM or equivalent document.

150. AMC3 CAT.IDE.A.190 is amended as follows:

AMC3 CAT.IDE.A.190 Flight data recorder

PERFORMANCE SPECIFICATIONS FOR THE PARAMETERS TO BE RECORDED FOR AEROPLANES FIRST ISSUED WITH AN INDIVIDUAL CofA ON OR AFTER 1 APRIL 1998 AND BEFORE 1 JANUARY 2016

(…)

Table 2

FDR — Additional parameters for aeroplanes with an MCTOM of more than 27 000 kg

No	**Parameter**
18	Primary flight controls — control surface position and/or pilot input (pitch, roll, yaw)
19	Pitch trim position
20	Radio altitude
21	Vertical beam deviation (ILS or GLS glide path or MLS elevation)
22	Horizontal beam deviation (ILS localiser or GLS lateral deviation or MLS azimuth)
23	Marker beacon passage
24	Warnings
25	Reserved (navigation receiver frequency selection or GLS channel is recommended)
26	Reserved (DME or GLS distance is recommended)
27	Landing gear squat switch status or air/ground status
28	Ground proximity warning system

29	Angle of attack
30	Low pressure warning (hydraulic and pneumatic power)
31	Groundspeed
32	Landing gear or gear selector position

(…)

Table 3

(…)

21	Vertical beam deviation		1	As installed ±3 % recommended	0.3 % of full range	Data from all of ~~both~~ the ILS, GLS and MLS systems need not to be recorded at the same time. The approach aid in use should be recorded. For autoland/ category III operations, each radio altimeter should be recorded, but arranged so that at least one is recorded each second.
21a	ILS or GLS glide path	±0.22 DDM or available sensor range as installed				
21b	MLS elevation	0.9° to 30°				
22	Horizontal beam deviation	Signal range	1	As installed ±3 % recommended	0.3 % of full range	See parameter 21 remarks.
22a	ILS Localiser or GLS lateral deviation	±0.22 DDM or available sensor range as installed				
22b	MLS azimuth	±62°				

[…]

151. The following AMC1 CAT.IDE.H.125(b) is inserted:

AMC1 CAT.IDE.H.125(b) Operations under VFR by day – flight and navigational instruments and associated equipment

MULTI-PILOT OPERATIONS

Two pilots should be considered to be required for the operation if required by the one of the following:

(a) the AFM;

(b) point ORO.FC.200

152. The following GM1 CAT.IDE.H.125(b) is inserted:

GM1 CAT.IDE.H.125(b) Operations under VFR by day – flight and navigational instruments and associated equipment

MULTI-PILOT OPERATIONS ON A VOLUNTARY BASIS – HELICOPTERS OPERATED UNDER VFR BY DAY

If the AFM permits single-pilot operations, and the operator decides that the crew composition is more than one pilot, then point CAT.IDE.H.125(b) should not apply. Additional means to display instruments referred to in CAT.IDE.H.125(b) may be required by point CAT.IDE.H.100(d).

153. The following AMC1 CAT.IDE.H.130(h) is inserted:

AMC1 CAT.IDE.H.130(h) Operations under IFR or at night – flight and navigational instruments and associated equipment

MULTI-PILOT OPERATIONS Two pilots should be considered to be required for the operation if required by the one of the following:

(a) the AFM;

(b) the operations manual.

5. Draft AMC & GM to Annex V (Part-SPA) to Commission Regulation (EU) No 965/2012

154. The current AMC1 SPA.LVO.100 is deleted.

~~AMC1 SPA.LVO.100 Low visibility operations~~

~~LVTO OPERATIONS – AEROPLANES~~

155. The current AMC3 SPA.LVO.100 is deleted.

~~AMC3 SPA.LVO.100 Low visibility operations~~

~~LTS CAT I OPERATIONS~~

156. The current AMC4 SPA.LVO.100 is deleted.

~~AMC4 SPA.LVO.100 Low visibility operations~~

~~CAT II AND OTS CAT II OPERATIONS~~

157. The current AMC6 SPA.LVO.100 is deleted.

~~AMC6 SPA.LVO.100 Low visibility operations~~

~~OPERATIONS UTILISING EVS~~

158. The current AMC7 SPA.LVO.100 is deleted.

~~AMC7 SPA.LVO.100 Low visibility operations~~

~~EFFECT ON LANDING MINIMA OF TEMPORARILY FAILED OR DOWNGRADED EQUIPMENT~~

159. GM1 SPA.LVO.100 is amended as follows:

GM1 SPA.LVO.100 Low-visibility operations and operations with operational credits

DOCUMENTS CONTAINING INFORMATION RELATED TO ~~LOW-VISIBILITY OPERATIONS~~ LVOs AND OPERATIONS WITH OPERATIONAL CREDITS

The following documents provide further information to low-visibility operations (LVOs):

(a) ICAO Annex 2 — Rules of the Air;

(b) ICAO Annex 6 — Operation of Aircraft;

(c) ICAO Annex 10 — Aeronautical Telecommunications ~~Vol. 1~~ (Volume I — Radio Navigation Aids);

(d) ICAO Annex 14 —Aerodromes ~~Vol. 1~~ (Volume I — Aerodrome Design and Operations);

(e) ICAO Doc 8168 — PANS-OPS — Procedures For Air Navigation Services — Aircraft Operations;

(f) ICAO Doc 9365 — ~~AWO~~ Manual of All-Weather Operations;

(g) ICAO Doc 9476 — Manual of surface movement guidance and control systems (SMGCS);

(h) ICAO Doc 9157 — Aerodrome Design Manual;

(i) ICAO Doc 9328 — Manual of RVR Observing and Reporting Practices;

(j) ICAO EUR Doc 013 — European Guidance Material on All Weather Operations at Aerodromes ~~European Guidance Material on Aerodrome Operations under Limited Visibility Conditions~~;

(k) ECAC Doc 17, Issue 3; and

(l) CS-AWO All weather operations.

160. GM2 SPA.LVO.100 is amended as follows:

GM2 SPA.LVO.100 Low-visibility operations and operations with operational credits

ILS AND GLS CLASSIFICATION

(a) The ILS and GBAS classification systems are ~~is~~ specified in ICAO Annex 10 and GM2 SPA.LVO.110.

LOW-VISIBILITY CONDITIONS

(b) Meteorological conditions with a runway visual range less than 550 m.

161. The following AMC1 SPA.LVO.100(a) is inserted:

AMC1 SPA.LVO.100(a) Low-visibility operations and operations with operational credits

LOW-VISIBILITY TAKE OFF (LVTO) OPERATIONS — AEROPLANES IN AN RVR OF LESS THAN 400 M BUT NOT LESS THAN 125 M

(a) Required RVR

(1) For multi-engined aeroplanes which, in the event of a critical engine failure at any point during take-off, can either stop or continue the take-off to a height of 1 500 ft above the aerodrome while clearing obstacles by the required margins, the criteria in Table 1 should apply:

Table 1: LVTO operations with aeroplanes: RVR versus facilities

Minimum RVR	Minimum RVR	Facilities
300 m (day)	Centreline markings; and Runway edge lights.	
300 m (night)	Centreline markings; and Runway end lights; and Runway edge lights or centreline lights.	
150 m	Centreline markings; and	

	Runway end lights; and Runway edge lights; and Runway centreline lights.
125 m	Centreline markings; and Runway end lights; and Runway edge lights (spaced 60 m or less); and Runway centreline lights (spaced 15 m or less).

(2) For multi-engined aeroplanes not complying with the conditions in (a)(1), there may be a need to land immediately and to see and avoid obstacles. Such aeroplanes may be operated to the take-off minima shown in Table 2 and the marking and lighting criteria shown in Table 1, provided that they are able to comply with the applicable obstacle clearance criteria, assuming engine failure at the height specified:

Table 2

LVTO operations with aeroplanes:

Assumed engine failure height versus RVR

Assumed engine failure height above the take-off runway (ft)	**RVR (m)**
Less than 50	Not less than 200
More than 50 but less than 100	Not less than 300

(b) The reported RVR value representative of the initial part of the take-off run can be replaced by pilot assessment.

(c) The minimum RVR value specified in Table 1 or 2 should be achieved for all reporting points representative of the parts of the runway from the point at which the aircraft commences the take-off until the calculated accelerate-stop distance from that point.

(d) The operator should verify that low-visibility procedures (LVPs) are established for take-off with RVR less than 400 unless the operator has verified that regional procedures ensure that LVPs will be in force under such conditions. If the operator selects an aerodrome where the term 'LVPs' is not used, the operator should ensure that there are equivalent procedures that adhere to the requirements of LVPs at the aerodrome. This situation should be clearly noted in the operations manual or procedures manual including guidance to the flight crew on how to determine that the equivalent procedures are in effect.

162. The following AMC2 SPA.LVO.100(a) is inserted:

AMC2 SPA.LVO.100(a) Low-visibility operations and operations with operational credits

LVTO OPERATIONS — AEROPLANES IN AN RVR OF LESS THAN 125 M

(a) For LVTO operations with an RVR of less than 125 m, the reported RVR should be not less than the minimum specified in the AFM or, if no such minimum is specified, not less than 75 m.

(b) The minimum required RVR should be achieved for all reporting points representative of the parts of the runway from the point at which the aircraft commences the take-off until the greater of the calculated take-off distance or accelerate-stop distance from that point.

(c) The reported RVR value representative of the initial part of the take-off run can be replaced by pilot assessment.

163. The current AMC2 SPA.LVO.100 is re-numbered and amended as follows:

AMC3 ~~AMC2~~ SPA.LVO.100(a) Low-visibility operations and operations with operational credits

LVTO OPERATIONS — HELICOPTERS

~~For LVTOs with helicopters the provisions specified in Table 1.H should apply.~~

~~Table 1.H: LVTO – helicopters~~

~~RVR vs. facilities~~

~~**Facilities**~~	~~**RVR (m)**~~
~~**Onshore aerodromes with IFR departure procedures**~~	
~~No light and no markings (day only)~~	~~250 or the rejected take-off distance, whichever is the greater~~
~~No markings (night)~~	~~800~~
~~Runway edge/FATO light and centre line marking~~	~~200~~
~~Runway edge/FATO light, centre line marking and relevant RVR information~~	~~150~~
~~**Offshore helideck ***~~	
~~Two-pilot operations~~	~~250~~
~~Single-pilot operations~~	~~500~~

~~*: The take-off flight path to be free of obstacles~~

~~FATO: final approach and take-off area~~

The following should apply to LVTOs for helicopters with an RVR of less than 400 m:

(a) For take-off from onshore aerodromes or operating sites with IFR departure procedures, the criteria in Table 3 should apply:

Table 3

LVTO operations with helicopters — RVR versus facilities onshore

RVR or VIS (m) *	**Facilities**
Not less than 250 m or the rejected take-off distance, whichever is the greater	No light and no markings (day only)
Not less than 800 m	No markings (night)
Not less than 200 m	Runway edge/FATO light and centre line marking

RVR or VIS (m) *	Facilities
Not less than 150 m	Runway edge/FATO light, centre line marking and relevant RVR information

* On PinS departures to IDF, VIS should not be less than 800 m and ceiling should not be less than 250 ft.

(b) For take-off from offshore helidecks where the take-off flight path is free of obstacles, the minimum RVR for take-off should not be less than:

– 500 m for single-pilot operations; or

– 250 m for two-pilot operations.

164. The following GM1 SPA.LVO.100(a) is inserted:

GM1 SPA.LVO.100(a) Low-visibility operations and operations with operational credits

CLASSIFICATION OF LVTO OPERATIONS

Take-off operations are classified as 'normal take-off operations' with an RVR at or above 550 m and 'LVTO operations' with an RVR below 550 m. Only LVTO operations in an RVR of less than 400 m require a specific approval.

165. The following GM2 SPA.LVO.100(a) is inserted:

GM2 SPA.LVO.100(a) Low-visibility operations and operations with operational credits

VISUAL SEGMENT FOR TAKE-OFF

The value of 125 m RVR for take-off with 15 m centreline light spacing has been selected because flight deck geometry means that this will provide at least a 90 m visual segment for the large majority of aircraft types. In a 90 m visual segment the pilot is expected to be able to see six centreline lights intervals (seven centreline lights) at 15 m spacing once lined up on the runway centreline.

166. The following AMC1 SPA.LVO.100(b) is inserted:

AMC1 SPA.LVO.100(b) Low-visibility operations and operations with operational credits

CAT II OPERATIONS

For CAT II operations, the following should apply:

(a) The DH should be determined by the use of a radio altimeter or other device capable of providing equivalent performance and be not lower than the highest of:

(1) the minimum DH specified in the AFM, if stated;

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

(3) the DH to which the flight crew is qualified to operate; or

(4) 100 ft.

(b) The lowest RVR minima to be used are specified in Table 4:

Table 4

CAT II operation minima: RVR (m) versus DH (ft)

Aircraft categories		**Auto-couple or HUD to below DH***	
		A, B, C	**D**
DH (ft)	100–120	300	300/350*
	121–140	400	400
	141–199	450	450

*: An RVR of 300 m may be used for a Category D aeroplane conducting an Autoland or using HUDLS to touchdown.

167. The current AMC5 SPA.LVO.100 is renumbered and amended as follows:

AMC2 ~~AMC5~~ SPA.LVO.100(b) Low-visibility operations and operations with operational credits

CAT III OPERATIONS

~~The following provisions should apply to~~ For CAT III operations, the following should apply:

(a) ~~Where the DH and RVR do not fall within the same category, the RVR should determine in which category the operation is to be considered.~~

~~(b)~~ For operations in which a DH is used, the DH should be determined by the use of a radio altimeter or other device capable of providing equivalent performance and be not lower than:

(1) the minimum DH specified in the AFM, if stated;

(2) the DH to which the flight crew is qualified to operate. ~~the minimum height to which the precision approach aid can be used without the specified visual reference; or~~

(b)~~(c)~~ Operations with no DH should only be conducted if:

(1) ~~the~~ operation with no DH is specified in the AFM;

(2) there is no published information indicating that the approach aid or aerodrome facilities cannot support operations with no DH; and ~~the approach aid and the aerodrome facilities can support operations with no DH; and~~

(3) the flight crew is qualified to operate with no DH.

(c)~~(d)~~ The lowest RVR ~~minima~~ to be used ~~are specified in Table 5.~~ should be determined in accordance with Table 5:

~~***Table 5: CAT III operations minima***~~

~~***RVR vs. DH and rollout control/guidance system***~~

~~**CAT**~~	~~**DH (ft) ***~~	~~**Rollout control/guidance system**~~	~~**RVR (m)**~~
~~IIIA~~	~~Less than 100~~	~~Not required~~	~~200~~
~~IIIB~~	~~Less than 100~~	~~Fail-passive~~	~~150**~~

~~IIIB~~	~~Less than 50~~	~~Fail-passive~~	~~125~~
~~IIIB~~	~~Less than 50 or no DH~~	~~Fail-operational ***~~	~~75~~

~~*: Flight control system redundancy is determined under CS-AWO by the minimum certified DH.~~

~~**: For aeroplanes certified in accordance with CS-AWO 321(b)(3) or equivalent.~~

~~***: The fail-operational system referred to may consist of a fail-operational hybrid system.~~

Table 5

CAT III operation minima: RVR (m) versus DH (ft)

DH (ft)	Roll-out control/guidance system	RVR (m)*
50-99	Not required	175
0-49 or no DH	Fail-passive	125
	Fail-operational	75

* Note: For a fail-passive or HUD roll-out control system, a lower RVR value (no lower than 75 m) can be used as stated in the AFM provided that the equipment was demonstrated as part of the certification process. This is provided that the operator has implemented the appropriate operating procedures and training.

168. The current AMC7 SPA.LVO.100 is re-numbered and amended as follows:

~~AMC7~~ AMC3 SPA.LVO.100(b) Low-visibility operations and operations with operational credits

EFFECT ON LANDING MINIMA OF TEMPORARILY FAILED OR DOWNGRADED EQUIPMENT FOR APPROACH OPERATIONS WITH A DH BELOW 200 ft

(a) ~~General~~

~~These instructions are intended for use both pre-flight and in-flight. It is however not expected that the pilot-in-command/commander 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/commander'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 7, and the approach may have to be abandoned.~~

Only those facilities mentioned in Table 6 should be acceptable to be used to determine the effect of temporarily failed of downgraded equipment on the required RVR for CAT II/III approach operations.

(b) The following conditions should be ~~applicable to the tables below~~ applied to Table 6:

(1) multiple failures of runway/FATO lights other than indicated in Table 6~~7~~ are not acceptable;

(2) deficiencies of both the approach and runway/FATO lights ~~are treated separately;~~ are acceptable at the same time and the most demanding consequence should be applied.

(3) for ~~CAT II and CAT III~~approach operations with a DH below 200 ft, a combination of deficiencies in runway/FATO lights and RVR assessment equipment are not permitted; and

(4) failures other than ILS, GLS and MLS affect the RVR only and not the DH.

Table 6~~7~~

Failed or downgraded equipment — ~~affect~~ effect on landing minima

~~Operations with an LVO approval~~ CAT II/III operations

<table>
<tr><th rowspan="2" colspan="2">Failed or downgraded equipment</th><th colspan="4">Effect on landing minima</th></tr>
<tr><th>CAT III~~B~~ ~~(~~no DH~~)~~</th><th>CAT III~~B~~ DH<50 ft</th><th>CAT III~~A~~ DH>=50 ft</th><th>CAT II</th></tr>
<tr><td rowspan="13">Failed or downgraded equipment</td><td>~~ILS/MLS~~ navaid stand-by transmitter</td><td>Not allowed</td><td>RVR 200 m</td><td colspan="2">No effect</td></tr>
<tr><td>Outer marker (ILS)</td><td colspan="4">No effect if ~~replaced by height check at 1 000 ft~~ the required height versus glide path can be checked using other means, e.g. DME fix</td></tr>
<tr><td>Middle marker (ILS)</td><td colspan="4">No effect</td></tr>
<tr><td>DME</td><td colspan="4">No effect if replaced by RNAV (GNSS) information or the outer marker.</td></tr>
<tr><td>RVR assessment systems</td><td>At least one RVR value to be available on the aerodrome</td><td colspan="3">On runways equipped with two or more RVR assessment units, one may be inoperative</td></tr>
<tr><td>Approach lights</td><td>No effect</td><td colspan="2">Not allowed for operations with DH >50 ft</td><td>Not allowed</td></tr>
<tr><td>Approach lights except the last 210 m</td><td colspan="3">No effect</td><td>Not allowed</td></tr>
<tr><td>Approach lights except the last 420 m</td><td colspan="4">No effect</td></tr>
<tr><td>Standby power for approach lights</td><td colspan="4">No effect</td></tr>
<tr><td rowspan="2">Standby power for runway lights with 1 second switchover time</td><td>**No effect**</td><td rowspan="2">Not allowed</td><td>**Day:** RVR 550 m</td><td>**Day:** RVR 550 m</td></tr>
<tr><td>**No effect**</td><td>**Night:** RVR 550 m</td><td>**Night:** RVR 550 m</td></tr>
<tr><td rowspan="2">~~Edge lights, threshold lights and runway end lights~~</td><td colspan="2" rowspan="2">~~No effect~~</td><td>~~**Day:** no effect~~</td><td>~~**Day:** no effect~~</td></tr>
<tr><td>~~**Night:** RVR 550 m~~</td><td>~~**Night:** not allowed~~</td></tr>
</table>

	Failed or downgraded equipment	**Effect on landing minima**			
		CAT III~~B~~ ~~(~~no DH~~)~~	**CAT III~~B~~ DH<50 ft**	**CAT III~~A~~ DH>=50 ft**	**CAT II**
	Edge lights	No effect	**Day:** no effect **Night:** RVR 550 m	**Day:** no effect **Night:** RVR 550 m	**Day:** no effect **Night:** not allowed
	Threshold lights	No effect	No effect	**Day:** no effect **Night:** RVR 550 m	**Day:** no effect **Night:** not allowed
	Runway end lights	No effect if centreline lights are serviceable			
	Centre line lights	**Day:** RVR 200 m **Night:** not allowed	Not allowed	**Day:** RVR 300 m **Night:** RVR 400 m	**Day:** RVR 350 m **Night:** RVR 550 m (400 m with HUD~~LS~~ or autoland)
	Centre line lights spacing increased to 30 m	RVR 150 m		No effect	
	~~Touchdown~~ TDZ lights	No effect	**Day:** RVR 200 m **Night:** RVR 300 m	**Day:** RVR 300 m **Night:** RVR 550 m, 350 m with HUD~~LS~~ or autoland	
	Taxiway light system	No effect			

Table 7: Failed or downgraded equipment —effect on landing minima

Operational credits

	Failed or downgraded equipment	**Effect on landing minima**			
		SA CAT I	**SA CAT II**	**EFVS-A**	**EFVS-L**
Failed or downgraded equipment	navaid stand-by transmitter	No effect			
	Outer marker (ILS)	No effect if replaced by height check at 1 000 ft			
	Middle marker (ILS)	No effect			
	RVR assessment systems	On runways equipped with two or more RVR assessment units, one may be inoperative			
	Approach lights	Not allowed	Not allowed	As per instrument approach procedure	As per instrument approach procedure

Failed or downgraded equipment	**Effect on landing minima**			
	SA CAT I	**SA CAT II**	**EFVS-A**	**EFVS-L**
Approach lights except the last 210 m	Not allowed	No effect	As per instrument approach procedure	As per instrument approach procedure
Approach lights except the last 420 m	No effect	No effect	As per instrument approach procedure	As per instrument approach procedure
Standby power for approach lights	No effect			
Edge lights, Threshold lights	Day: No effect	**Day:** no effect	As per instrument approach procedure	As per instrument approach procedure
	Night: not allowed	**Night:** RVR 550 m	As per instrument approach procedure	As per instrument approach procedure
Runway end lights	No effect if centre line lights are serviceable		As per instrument approach procedure	
Centreline lights	**Day:** RVR 400 m	**Day:** RVR 300 m	As per instrument approach procedure	As per instrument approach procedure
	Night: RVR 550 m	**Night:** RVR 400 m	As per instrument approach procedure	As per instrument approach procedure
Centre line lights spacing increased to 30 m	No effect	No effect	As per instrument approach procedure	As per instrument approach procedure
TDZ lights	**Day:** no effect	**Day:** RVR 300 m	As per instrument approach procedure	
	Night: no effect	**Night:** RVR 350 m	As per instrument approach procedure	
Taxiway light system	No effect			

169. The following GM1 SPA.LVO.100(b) is inserted:

GM1 SPA.LVO.100(b) Low-visibility operations and operations with operational credits

CLASSIFICATION OF STANDARD APPROACH OPERATIONS

The different types of approach and landing operations are classified according to the lowest DH (or MDH) and RVR applicable to the approach type. The classification of approach types does not depend on the technology used for the approach. The lowest minima specified do not take account of 'operational credits' that may allow for lower operating minima.

The classification does not subdivide CAT III operations into CAT IIIA, IIIB, and IIIC. The actual minima applicable to any operation depends on the aircraft equipment and the specific LVO approval held by the air operator.

The AFM for aircraft certified for CAT III operations will state the lowest usable DH, or no DH. Some AFMs may refer to the previous ICAO classifications as follows:

- CAT IIIA: a DH lower than 30 m (100 ft) or no DH and an RVR not less than 175 m;
- CAT IIIB: a DH lower than 15 m (50 ft) or no DH and an RVR less than 175 m but not less than 50 m; and
- CAT IIIC: no DH and no RVR limitations.

CAT IIIC has not been used in Europe and the minimum RVR in the European regulations is 75 m.

Where an operational credit allows operation to lower-than-standard minima, this is not considered a separate approach classification.

170. The following GM2 SPA.LVO.100(b) is inserted:

GM2 SPA.LVO.100(b) Low-visibility operations and operations with operational credits

EQUIPMENT CERTIFICATION FOR LOW-VISIBILITY APPROACH OPERATIONS OTHER THAN EFVS

This GM describes the certification requirements of CS-AWO. Operators should always refer to CS-AWO for the actual requirements.

Aircraft suitable for low-visibility approach operations are certified according to the minimum usable DH which is stated in the AFM.

Certification specifications (CS-AWO) allow for systems to be certified for SA CAT I, CAT II or CAT III operations. Systems certified for CAT III operations may specify:

- a lowest usable DH of:
  - less than 100 ft but not less than 50 ft;
  - less than 50 ft; or
- no DH.

Legacy systems may be described as capable of 'CAT 3A' or 'CAT IIIA' operations. This implies a minimum DH of less than 100 ft but not less than 50 ft. Systems described as capable of 'CAT 3B' or 'CAT IIIB' may be certified for a DH of less than 50 ft or no DH.

Operations to a DH of less than 100 ft but not less than 50 ft will typically require a fail-passive automatic landing system or a HUD or equivalent system. Operations to a DH of less than 50 ft will require a fail-operational landing system, a fail-passive go-around system, automatic thrust control and either automatic ground roll control or ground roll guidance using a HUD. For no DH operations, a fail-passive or fail-operational ground roll control system is required.

The RVR required for SA CAT I, CAT II and SA CAT II approach operations is determined by the DH and the aircraft approach speed category. The RVR required for CAT III approach operations is determined by the DH and the capability of the ground-roll control system. Operations with fail-passive roll control systems require a greater RVR than operations with fail-operational ground control systems because the pilots would need to have sufficient visibility to maintain lateral control in the event of a system failure.

171. The current GM1 SPA.LVO.100(c),(e) is re-numbered and amended as follows:

GM3 SPA.LVO.100(b) ~~GM1 SPA.LVO.100(c),(e)~~ Low-visibility operations and operations with operational credits

ESTABLISHMENT OF MINIMUM RVR FOR ~~CAT II AND CAT III~~ APPROACH OPERATIONS WITH A DH BELOW 200 ft

(…)

(c) CAT III fail-passive operations

(1) (…)

(2) During an automatic landing the pilot needs to monitor the performance of the aircraft system, not in order to detect a failure that is better done by the monitoring devices built into the system, but so as to know precisely the flight situation. In the final stages the pilot should establish visual contact and, by the time the pilot reaches the DH, the pilot should have checked the aircraft position relative to the approach or runway centreline lights. For this the pilot will need sight of horizontal elements (for roll reference) and part of the touchdown area. The pilot should check for lateral position and cross-track velocity and, if not within the pre-stated lateral limits, the pilot should carry out a missed approach procedure. The pilot should also check longitudinal progress and sight of the landing threshold is useful for this purpose, as is sight of the TDZ lights.

Where a fail-operational automatic landing and roll-out system is used, it is not considered necessary for the pilot to check the lateral position and cross-track velocity, and thus it is not necessary for the visual reference requirements to include horizontal elements of the lighting system.

[…]

172. The following GM4 SPA.LVO.100(b) is inserted:

GM4 SPA.LVO.100(b) Low-visibility operations and operations with operational credits

EFFECT ON LANDING MINIMA OF TEMPORARILY FAILED OR DOWNGRADED EQUIPMENT FOR APPROACH OPERATIONS WITH A DH BELOW 200 ft

The instructions for the effect on landing minima of temporarily failed or downgraded equipment are intended for use both preflight and in-flight. It is, however, not expected that the pilot-in-command/commander 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/commander'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 6, and the approach may have to be abandoned.

173. The following AMC1 SPA.LVO.100(c) is inserted:

AMC1 SPA.LVO.100(c) Low-visibility operations and operations with operational credits

OPERATIONAL CREDIT: SPECIAL AUTHORISATION CATEGORY I (SA CAT I)

For special authorisation category I (SA CAT I) operations, the following should apply:

(a) The decision height (DH) of an SA CAT I operation should not be lower than the highest of:

  (1) the minimum DH specified in the AFM, if stated;

  (2) the applicable OCH for the category of aeroplane;

  (3) the DH to which the flight crew is qualified to operate; or

  (4) 150 ft.

(b) Where the DH for an SA CAT I operation is less than 200 ft, it should be determined by the use of a radio altimeter or other device capable of providing equivalent performance.

(c) The following visual aids should be available:

  (1) approach lights as specified in Table 9;

  (2) precision approach runway markings;

  (3) category I runway lights.

(d) The lowest RVR should not be lower than the highest of:

  (1) the minimum RVR specified in the AFM, if stated

  (2) The RVR specified in Table 9.

  For class of approach lighting facility, see GM2 CAT.OP.MPA.110.

Table 9: SA CAT I operation minima RVR (m) versus approach lighting system

Class of light facility		FALS	IALS	BALS	NALS
DH (ft)	150–160	400	500	600	700
	161–200	450	550	650	750

	201–210	450	550	650	750
	211–220	500	550	650	800
	221–230	500	600	700	900
	231–240	500	650	750	1000
	241–249	550	700	800	1100

174. The following AMC2 SPA.LVO.100(c) is inserted:

AMC2 SPA.LVO.100(c) Low-visibility operations and operations with operational credits

OPERATIONAL CREDIT: SPECIAL AUTHORISATION CATEGORY II (SA CAT II)

For special authorisation category II (SA CAT II) operations, the following should apply:

(a) The DH should be determined by the use of a radio altimeter or other device capable of providing equivalent performance, if so determined by the aircraft certification process, and be not lower than the highest of:

(1) the minimum DH specified in the AFM, if stated;

(2) the applicable OCH for the category of aeroplane;

(3) the DH to which the flight crew is qualified to operate; or

(4) 100 ft.

(b) The following visual aids should be available:

(1) approach lights as specified in Table 10;

(2) precision approach runway markings;

(3) category I runway lights.

(c) The lowest RVR minima to be used are specified in Table 10:

Table 10: SA CAT II operation minima: RVR (m) versus DH (ft)

Class of light facility		FALS	IALS	BALS	NALS
DH (ft)	100–120	350	450	600	700
	121–140	400	500	600	700
	141–160	400	500	600	750
	161–199	400	550	650	750

AMC3 SPA.LVO.100(c) Low-visibility operations and operations with operational credits

OPERATIONAL CREDIT: EFVS OPERATIONS TO A RUNWAY

For EFVS operations to a runway, the following should apply:

(a) The DA/H used should be the same as for operations without EFVS.

(b) The lowest RVR minima to be used should be determined:

- (1) in accordance with criteria specified in the AFM for the expected weather conditions or,
- (2) if no such criteria are specified, by reducing the RVR determined for operation without the use of EFVS/CVS in accordance with Table 11.

(c) Where the lowest RVR to be used, determined in accordance with (b), is less than 550 m, then this should be increased to 550 m unless LVPs are established at the aerodrome of intended landing.

(d) Where EFVS is part of a CVS, it is only the EFVS element that should provide the operational credits. The other part of the CVS, the synthetic vision system (SVS), should not provide operational credits.

Table 11: Operations using EFVS/CVS — RVR/CMV reduction

RVR/CMV (m) required without the use of EFVS	RVR/CMV (m) with the use of EFVS
550	350
600	400
650	450
700	450
750	500
800	550
900	600
1 000	650
1 100	750
1 200	800
1 300	900
1 400	900
1 500	1 000
1 600	1 100
1 700	1 100
1 800	1 200
1 900	1 300
2 000	1 300
2 100	1 400
2 200	1 500
2 300	1 500
2 400	1 600

175. The following AMC4 SPA.LVO.100(c) is inserted:

AMC4 SPA.LVO.100(c) Low-visibility operations and operations with operational credits

HELICOPTER SPECIAL AUTHORISATION CATEGORY I (HELI SA CAT I) OPERATIONS

For HELI SA CAT I operations, the following should apply:

(a) HELI SA CAT I operations should only be conducted to a runway with an approach lighting system. The following visual aids should be available:

(1) standard runway day markings, approach lights, runway edge lights, threshold lights, and runway end lights;

(2) for operations with an RVR below 450 m, runway centre line markings.

(b) An instrument landing system/microwave landing system (ILS/MLS) that supports a HELI SA CAT I operation should be an unrestricted facility.

(c) The helicopter should be:

(1) equipped with a 3-axis autopilot capable of flying the approach to the minima;

(2) able to maintain Vy in IMC on a coupled Type B approach;

(3) equipped with a radio altimeter or other device capable of providing equivalent performance; and

(4) equipped with two independent navigation aids capable of Type B CAT I approaches and certified for CAT I.

(d) The DH of a HELI SA CAT I operation should not be lower than the highest of:

(1) the minimum DH specified in the AFM, if stated;

(3) the minimum height to which the precision approach aid can be used without the specified visual reference;

(3) the applicable OCH for Category A aeroplanes or the OCH for Category H if available;

(4) the DH to which the flight crew is qualified to operate;

(6) 130 ft on a CAT II landing system;

(6) 150 ft on a CAT I ILS certified to Class I/C/1 or MLS certified to 100 ft/E/1; or

(7) 200 ft on other landing systems;

(8) 200 ft unless the autopilot is a 4-axis autopilot with automatic level-off capability.

(e) The lowest RVR minima to be used are specified in Table 12.

Table 12: HELI SA CAT I operation minima

RVR versus approach lighting system				
DH (ft)	**Class of light facility**			
	FALS	**IALS**	**BALS**	**NALS**
201–250	450	650	750	1 000
181–200	300	450	650	900

151–180	300	350	550	750
130–150	300	300	400	600

(f) Operations

(1) The minimum crew should be two pilots or one pilot and a technical crew member. The technical crew member should be seated in the front seat and be allocated no other task than assisting the pilot, from the initial approach fix (IAF) onwards.

(2) On a CAT II landing system, the flight crew should use the radio altimeter or other equivalent device for the determination of the DH.

(3) On a CAT I ILS, the flight crew should use the altimeter for the determination of the DH. The crew should cross-check the altitude with the radio altimeter or equivalent device, considering the local geography.

(4) The AFCS and radio altimeter should be serviceable prior to commencing the approach.

(5) The approach should be flown in coupled 4-axis mode down to minima or below.

(6) The flight crew should promptly initiate a go-around if any of the following conditions are met below a 1 000-ft height:

(i) discrepancy in altitude/radio altitude information;

(ii) discrepancy in navigation information;

(iii) partial or total failure of an AFCS system or navigation system;

(iv) deviation of ¼ scale or more on the landing system navigation display.

(7) The planning minima at the alternate where a HELI SA CAT I approach is envisaged should be as defined in Table 13.

Table 13: Planning minima at the alternate with HELI SA CAT I operations

Type of approach	**Aerodrome ceiling**	**Weather minima RVR/VIS**
Two or more usable Type B instrument approach operations* **	DA/H* + 100 ft	RVR** + 300 m
One usable Type B instrument approach operation	DA/H + 150 ft	RVR + 450 m

* The higher of the usable DA/H or MDA/H.

** The higher of the usable RVR or VIS.

*** Compliance with CAT.OP.MPA.192(d) should be ensured.

(8) Under commercial air transport, if no other alternate is selected and the weather forecast at destination is not based on Part-MET, the planning minima at the alternate where a HELI SA CAT I approach is envisaged should be as defined in Table 14.

Table 14: Planning minima at the alternate with HELI SA CAT I operations with alternative weather source at destination

Type of approach	**Aerodrome ceiling**	**Weather minima RVR/VIS**
Two or more usable Type B instrument approach operations ***	DA/H * + 200 ft	RVR** + 600 m
One usable Type B instrument approach operation	DA/H + 300 ft	RVR + 900 m

* The higher of the usable DA/H or MDA/H.

** The higher of the usable RVR or VIS.

*** Compliance with CAT.OP.MPA.192(d) should be ensured.

(g) Crew training and competency

(1) Under CAT, NCC and SPO, the aerodrome used for HELI SA CAT I operations should be considered as a Category C aerodrome under ORO.FC.105.

(2) A crew member should undergo training to determine the eligibility of a HELI SA CAT I approach as determined under points (a) to (c), paragraphs (1) to (3), and to determine the applicable minima under points (d) and (e).

(3) A crew member should have the relevant knowledge to implement the operating procedures described in point (f)

(4) A crew member that is involved in HELI SA CAT I operations should undergo initial and recurrent training to proficiency using a suitable FSTD, including one approach and landing and one go-around using the lowest minima defined in points (d) and (e).

(5) The recurrent training should have a validity of 6 calendar months. The validity period should be counted from the end of the month when the check was taken. When the training is undertaken within the last 3 months of the validity period, the new validity period should be counted from the previous expiry date.

(6) In addition to (5), a technical crew member that is involved in HELI SA CAT I operations should be trained to perform navigation and monitoring functions under IFR, as described under AMC3 SPA.NVIS.130(f). The training and checking should include all of the following on the given helicopter type:

(i) initial and recurrent general training;

(ii) initial and recurrent monitoring training;

(iii) initial and recurrent navigation training;

(iv) initial and recurrent aircraft/FSTD training focusing on crew cooperation with the pilot;

(v) line flying under supervision;

(vi) initial and recurrent operator proficiency checks, which should meet all of the following criteria:

(A) The technical crew member should complete an operator proficiency check to demonstrate his or her competence in carrying out normal, abnormal and emergency procedures, covering the relevant aspects associated with the flight operational tasks described in the operations manual and not covered in the line check.

(B) The initial training course should include an operator proficiency check.

(C) The operator proficiency check should be valid for a given helicopter type. In order to consider an operator proficiency check to be valid for several helicopter types, the operator should demonstrate that the types are sufficiently similar from the technical crew member's perspective.

(D) The validity period of the operator proficiency check should be 12 calendar months. The validity period should be counted from the end of the month when the check was performed. When the operator proficiency check is undertaken within the last 3 months of the validity period, the new validity period shall be counted from the original expiry date.

(E) The operator proficiency check should be conducted by a suitably qualified instructor nominated by the operator to conduct flight crew operator proficiency checks.

(vii) initial and recurrent line checks, which should meet all of the following criteria;

(A) the line check should be performed on the helicopter.

(B) the technical crew member should demonstrate competence in carrying out normal operations described in the operator's operations manual.

(C) the line check should take place after the completion of the line flying under supervision.

(D) The validity period of the line check should be 12 calendar months. The validity period should be counted from the end of the month when the check was performed. When the line check is undertaken within the last 3 months of the validity period, the new validity period should be counted from the original expiry date.

(E) The line check should be conducted by a suitably qualified commander nominated by the operator.

(F) Any task-specific items may be checked by a suitably qualified technical crew member nominated by the operator and trained in CRM concepts and the assessment of non-technical skills.

176. The following GM1 SPA.LVO.100(c) is inserted:

GM1 SPA.LVO.100(c) Low-visibility operations and operations with operational credits

THE CONCEPT OF OPERATIONS WITH OPERATIONAL CREDITS

For each specific class of standard take-off or approach operations, a standard combination of airborne equipment, aerodrome infrastructure and equipment, and procedures (system components) needs to be available to ensure the required performance of the total system. In practical operations, one or more system components may exceed the required standard performance. The aim of the concept of operations with operational credits is to exploit such enhanced performance to provide operational flexibility beyond the limits of standard operations.

In certain circumstances it may be possible to achieve the required system performance without some standard items being available by using other enhanced equipment or procedures. In order to apply an operational credit, it is necessary that the equipment or procedures employed mitigate effectively the shortcomings in other system components. Another application of operational credits is to use the enhanced performance of certain system components to allow operations to lower than the standard minima presented in Table 8. For approach operations, an operational credit can be applied to the instrument or the visual segment or both.

Where an operational credit allows operation to lower than standard minima, this is not considered a separate approach classification.

177. The following GM2 SPA.LVO.100(c) is inserted:

GM2 SPA.LVO.100(c) Low-visibility operations and operations with operational credits

SPECIAL AUTHORISATION CATEGORY I (SA CAT I) OPERATIONS

SA CAT I is an operational credit that exploits a navigation solution with superior performance to that required for standard CAT I by extending the instrument segment of CAT I approach operations. This navigation solution may be an ILS installation with the necessary performance coupled to a suitably certified autoland system or a HUD or equivalent display system or SVGS. The extended instrument segment means that the DH can be reduced from the standard minimum of 200 down to 150 ft. The lower DH allows a corresponding reduction in the RVR required for the approach.

SA CAT I is not a separate approach classification; it is an operational credit applied to a CAT I operation.

178. The following GM3 SPA.LVO.100(c) is inserted:

GM3 SPA.LVO.100(c) Low-visibility operations and operations with operational credits

SPECIAL AUTHORISATION CATEGORY II (SA CAT II) OPERATIONS

SA CAT II is an operational credit that applies to the visual segment of an approach conducted where aerodrome, runway and approach lighting systems do not meet the usual requirements for a CAT II precision lighting system. SA CAT II exploits the performance of a suitably certified HUDLS or autoland system. The DH will be the same as for standard CAT II and the required RVR will depend on the class of light facility installed.

SA CAT II is not a separate approach classification; it is an operational credit applied to a CAT II operation usually in a CATI runway.

179. The following GM4 SPA.LVO.100(c) is inserted:

GM4 SPA.LVO.100(c) Low-visibility operations and operations with operational credits

EFVS OPERATIONS

(a) EFVS operations, if approved, exploit the improved visibility provided by the EFVS to allow an operational credit applied to the visual segment of an instrument approach. An EFVS cannot be used to extend the instrument segment of an approach and thus the DH for operation with an EFVS is always the same as for the same approach conducted without an operational credit.

(b) EFVS operations require specific approval from the competent authority in accordance with Part-SPA. However, other EFVS operations may be conducted by operators and without a specific approval if specifically covered in accordance with Part-CAT, Part-NCC or Part-SPO (e.g. 'EFVS 200').

(c) Equipment for EFVS operations:

  (1) In order to conduct EFVS operations, a certified EFVS is used. An EFVS is an enhanced vision system (EVS) that also incorporates a flight guidance system and displays the image on a HUD or an equivalent display. The flight guidance system will incorporate aircraft flight information and flight symbology.

  (2) For operations for which a minimum flight crew of more than one pilot is required, the aircraft will also be equipped with a suitable display of EFVS sensory imagery for the pilot monitoring the progress of the approach.

  (3) Legacy systems may be certified as 'EVS with an operational credit'. Such a system may be considered an EFVS used for approach (EFVS-A).

  (4) Aircraft holding a type certificate issued by a third country may be certified for operations equivalent to EFVS operations. Specific approval for an operational credit for EFVS operations will be available only if the operator can demonstrate that the equipment meets all the requirements for certification in accordance with CS-AWO.

  (5) For approaches for which natural visual reference is not required prior to touchdown, the EFVS (EFVS used for landing (EFVS-L)) will additionally display:

    (i) flare prompt or flare guidance information; and

    (ii) height AGL.

(d) Suitable approach procedures

  (1) Types of approach operation are specified in AMC10 SPA.LVO.110.

  EFVS operations may be used for 3D approach operations. These may include operations based on non-precision approach (NPA) procedures, approach procedures with vertical guidance and PA procedures including approach operations requiring specific approvals, provided that the operator holds the necessary approvals.

  An NPA procedure flown using vertical guidance from computer-generated navigation data from ground-based, space-based, self-contained navigation aids, or a combination of these may be considered a 3D instrument approach operation so EFVS may be used for NPA procedures provided that vertical guidance is available to the pilot.

  (2) Offset approaches

  The extent to which EFVSs can be used for offset approaches will depend on the FOV of the specific system. Where an EFVS has been demonstrated to be usable with a final approach track offset more than 3 degrees from the runway centreline, this will be stated in the AFM.

  Instrument approach procedures (IAPs) may have the final approach course significantly offset from the centreline of the runway and still be considered 'straight-in approaches'. Many approach procedures with an offset final approach course are constructed so that the final approach course crosses the runway centreline extended well out from the runway. Depending on the construction of a particular procedure, the wind conditions and the available FOV of a specific EFVS installation, the required visual references may not come into view before the aircraft reaches the DH.

  (3) Circling approaches

EFVSs incorporate a HUD or an equivalent system so that the EFVS image is visible in the pilot's forward external FOV. Circling operations require the pilot to maintain visual references which may not be directly ahead of the aircraft and may not be aligned with the current flight path. EFVSs cannot therefore be used in place of natural visual reference for circling approaches.

(e) Aerodrome operating minima for EFVS operations are determined in accordance with AMC3 SPA.LVO.100(c).

The performance of EFVSs depends on the technology used and weather conditions encountered. The minimum RVR for an approach is based on the specific capabilities of the installed equipment in the expected weather conditions ,so the RVR for a particular operation is determined according to criteria stipulated in the AFM.

Table 11 has been provided to allow calculation of an appropriate RVR for aircraft where the AFM does not contain criteria to determine the minimum usable RVR. This table has been developed after an operational evaluation of two different EVSs both using infrared sensors, along with data and support provided by the Federal Aviation Administration (FAA). Approaches were flown in a variety of conditions including fog, rain and snow showers, as well as at night to aerodromes located in mountainous terrain. Table 11 contains conservative figures to cater for the expected performance of infrared sensors in the variety of conditions that might be encountered.

(f) Conditions for commencement and continuation of the approach are in accordance with CAT.OP.MPA.305, NCC.OP.230, NCO.OP.210 and SPO.OP.215 as applicable.

Pilots conducting EFVS operations may commence an approach and continue that approach below 1 000 ft above the aerodrome or into the final approach segment (FAS) if:

(1) the reported RVR or converted meteorological visibility (CMV) is equal to or greater than the lowest RVR minima determined in accordance with AMC3 SPA.LVO.100(c); and

(2) all the conditions for conducting EFVS operations are met.

If any equipment required for EFVS operations is unserviceable or unavailable, then the conditions for conducting EFVS operations would not be satisfied, and the approach cannot be commenced. Operators may develop procedures for flight crew to follow in the event of unserviceability arising after the aircraft descends below 1 000 ft above the aerodrome or into the FAS. Such procedures should ensure that the approach is not continued unless the RVR is sufficient for the type of approach that can be conducted with equipment that remains available. In the event of failure of the equipment required for EFVS operations, a go-around would be executed unless the RVR reported prior to commencement of the approach was sufficient for the approach to be flown without the use of EFVS in lieu of natural vision.

(g) EFVS image requirements at the DA/H are specified in AMC7 SPA.LVO.105(c).

The requirements for features to be identifiable on the EFVS image in order to continue approach below DH are more stringent than the visual reference requirements for the same approach flown without EFVS. This is necessary because the EFVS might not display the colour of lights used to identify specific portions of the runway and might not consistently display the runway markings. Any visual approach path indicator using colour-coded lights may be unusable.

(h) Obstacle clearance in the visual segment

The 'visual segment' is the portion of the approach between the DH and the runway threshold. In the case of EFVS operations, this part of the approach may be flown using the EFVS image as the primary reference and there may be obstacles that are not always identifiable on an EFVS image. Approach procedures designed in accordance with PANS-OPS criteria is required to ensure that the visual segment is protected for obstacles by the visual segment surface (VSS) that extends from 60 m before the threshold to the location of the OCH. Procedures not designed in accordance with PANS-OPS may have not been assessed for terrain or obstacle clearance below the OCH-and may not provide a clear vertical path to the runway at the normally expected descent angle. SA CAT I and CAT II/III runways subject to EU aerodrome regulations are required to provide an OFZ, which offers protection from obstacles in the visual segment. Standard CAT I runways may also provide an OFZ and if not, the lack of an OFZ shall be indicated according to ICAO Annex 4, normally on the approach chart.

(i) Visual reference requirements at minimum height to continue approach without natural visual reference

For operations other than EFVS to touchdown, natural visual reference is required before landing. The objective of this requirement is to ensure that the pilot will have sufficient visual reference to land. The visual reference should be the same as the one required for the same approach flown without the use of EFVS. The specific height at which this is required will depend on the capability of the aircraft installation and will be specified in the AFM. For aircraft certified for EFVS operations but where no such height is specified in the AFM, natural visual reference is required by a height of 100 ft above the threshold elevation.

Specific EFVSs may have additional requirements that must be fulfilled at this height to allow the approach to continue, such as a requirement to check that the elements of the EFVS display remain correctly aligned and scaled to the external view. Any such requirements will be detailed in the AFM.

(j) Use of EFVS to touchdown

In order for the use of EFVS to touchdown to be approved, the EFVS will provide flare prompt or flare guidance (EFVS-L). This mitigates the fact that a 2D image and a narrow FOV displayed by the EFVS may cause erroneous perceptions of depth or height. The EFVS will also display height above the runway by the use of a radio altimeter or other device capable of providing equivalent performance. Unless the operator has verified that the terrain ahead of the threshold and landing system assessment area slope is suitable for the use of a radio altimeter, such a system should not be relied upon to provide accurate information about the height of the aircraft above the runway threshold until the aircraft is over the runway surface.

(k) Go-around

A go-around will be promptly executed if the required visual references are not maintained on the EFVS image at any time after the aircraft has descended below the DA/H or if the required visual references are not distinctly visible and identifiable using natural vision after the aircraft is below the minimum height to continue approach without natural visual reference (if applicable). It is considered more likely that an operation with EFVS could result in initiation of a go-around below the DA/H than the equivalent approach flown without EFVS. According to AMC1 SPA.LVO.105(f), operators involved in EFVS operations should keep records of the number of successful and unsuccessful approaches using EFVS in order to detect and act on any undesirable trends.

For Category II and III PA procedures designed in accordance with PANS-OPS criteria, obstacle protection is provided for a go-around initiated below the DH (balked landing) by means of an obstacle free zone (OFZ). An OFZ may also be provided for Category I PA procedures. Where an OFZ is not provided for a Category I PA, this may be indicated on the approach chart. NPA procedures and approach procedures with vertical guidance provide obstacle clearance for the missed approach based on the assumption that the missed approach is executed at or above the DH. The DH should be located at or before the MAPt.

180. The following GM5 SPA.LVO.100(c) is inserted:

GM5 SPA.LVO.100(c) Low-visibility operations and operations with operational credits

COMBINED VISION SYSTEMS

A combined vision system (CVS) consisting of an EFVS and an SVS can be approved for EFVS operations if it meets all the certification requirements for an EFVS.

181. The following GM6 SPA.LVO.100(c) is inserted:

GM6 SPA.LVO.100(c) Low-visibility operations and operations with operational credits

HELICOPTER SPECIAL AUTHORISATION CATEGORY I (HELI SA CAT I) OPERATIONS

HELI SA CAT I is an operational credit that exploits a navigation solution with superior performance to that required for standard CAT I by extending the instrument segment of CAT I approach operations. This navigation solution may be an ILS installation with the necessary performance coupled to a suitably certified 3- or 4-axis autopilot capable of handling low speeds, together with the superior outside visibility of the helicopter on the visual segment, and the go-around performance of a helicopter. The better outside visibility and the lower speed allows a reduction in the RVR required for the approach, for a given DH. With a 4-axis autopilot and auto-level-off capability, the DH can also be reduced from the standard minimum of 200 ft down to 150 or 130 ft.

HELI SA CAT I is not a separate approach classification; it is an operational credit applied to a CAT I operation.

182. The current GM1 SPA.LVO.100(f) is deleted.

~~GM1 SPA.LVO.100(f) Low Visibility Operations~~

~~OPERATIONS UTILISING EVS~~

183. The current AMC1 SPA.LVO.105 is deleted.

~~AMC1 SPA.LVO.105 LVO approval~~

~~OPERATIONAL DEMONSTRATION – AEROPLANES~~

184. The current AMC2 SPA.LVO.105 is deleted.

~~AMC2 SPA.LVO.105 LVO approval~~

~~OPERATIONAL DEMONSTRATION – HELICOPTERS~~

185. The current AMC3 SPA.LVO.105 is deleted.

~~AMC3 SPA.LVO.105 LVO approval~~

~~CONTINUOUS MONITORING – ALL AIRCRAFT~~

186. The current AMC4 SPA.LVO.105 is deleted.

~~AMC4 SPA.LVO.105 LVO approval~~

~~TRANSITIONAL PERIODS FOR CAT II AND CAT III OPERATIONS~~

187. The current AMC5 SPA.LVO.105 is deleted.

~~AMC5 SPA.LVO.105 LVO approval~~

~~MAINTENANCE OF CAT II, CAT III AND LVTO EQUIPMENT~~

188. The current AMC6 SPA.LVO.105 is deleted.

~~AMC6 SPA.LVO.105 LVO approval~~

~~ELIGIBLE AERODROMES AND RUNWAYS~~

189. GM1 SPA.LVO.105 is amended as follows:

GM1 SPA.LVO.105 ~~LVO approval~~ Specific approval criteria

CRITERIA FOR A SUCCESSFUL ~~CAT II, OTS CAT II, CAT III~~ APPROACH AND ~~AUTOMATIC~~ LANDING

(a) The purpose of this GM is to provide operators with supplemental information regarding the criteria for a successful approach and landing ~~to facilitate fulfilling the requirements prescribed in SPA.LVO.105~~.

(b) An approach may be considered to be successful if:

(1) from 500 ft to start of the flare:

(i) speed is maintained ~~as specified in AMC-AWO 231, paragraph 2 'Speed Control' and~~ within +/- 5 kt of the intended speed, disregarding rapid fluctuations due to turbulence;

(ii) no relevant system failure occurs;

and

(2) from 300 ft to the DH:

(i) no excess deviation occurs; and

(ii) no centralised warning gives a missed approach procedure command (if installed).

(c) A~~n automatic~~ landing may be considered to be successful if:

(1) no relevant system failure occurs;

(2) no flare failure occurs;

(3) no de-crab failure occurs (if installed);

(4) longitudinal touchdown is beyond a point on the runway 60 m after the threshold and before the end of the ~~touchdown zone~~ TDZ ~~light~~ (900 m from the threshold);

(5) lateral touchdown with the outboard landing gear is not outside the ~~touchdown zone~~ TDZ ~~light~~ edge;

(6) sink rate is not excessive;

(7) bank angle does not exceed a bank angle limit; and

(8) no roll-out failure or deviation (if installed) occurs.

(d) More details can be found in ~~CS-AWO 131, CS-AWO 231 and AMC-AWO 231~~CS AWO.A.ALS.106, CS AWO.B.CATII.113 and AMC AWO.B.CATII.113.

190. The following AMC1 SPA.LVO.105(a) is inserted:

AMC1 SPA.LVO.105(a) Specific approval criteria

EQUIPMENT CERTIFICATION

(a) Aircraft used for LVTO in an RVR of less than 125 m should be equipped with a system certified for the purpose.

(b) Aircraft used for low-visibility approach operations should be equipped in accordance with the applicable airworthiness requirements and certified as follows:

(1) For CAT II operations, the aircraft should be certified for CAT II operations.

(2) For CAT III operations, the aircraft should be certified for CAT III operations.

(3) For SA CAT I, the aircraft should be certified for SA CAT I operations.

(4) For SA CAT II, the aircraft should be certified for CAT II operations and be equipped with HUDLS or fail-passive autoland or better.

(5) For EFVS operations, the aircraft should be equipped with a certified EFVS-Approach or EFVS-Landing.

191. The following GM1 SPA.LVO.105(a) is inserted:

GM1 SPA.LVO.105(a) Specific approval criteria

EQUIPMENT ELIGIBLE FOR TAKE-OFF IN AN RVR LESS THAN 125 M

Systems that are used to qualify for take-off in an RVR less than 125 m typically allow the pilot to use the external visual cues as well as instrumented guidance to track the runway centreline. The kind of systems in use today include paravisual display (PVD) and HUD. It is expected that EFVSs will be certified for take-off guidance in the future. Where the PVD or HUD uses an ILS localiser signal as reference, the ILS sensitive area must be protected by the LVPs at the aerodrome.

192. The following AMC1 SPA.LVO.105(c) is inserted:

AMC1 SPA.LVO.105(c) Specific approval criteria

OPERATING PROCEDURES FOR LVOs

Prior to commencing an LVO, the pilot-in-command/commander should be satisfied that:

(a) the status of visual and non-visual facilities is as required;

(b) LVPs are in effect; and

(c) the flight crew members are appropriately qualified.

193. The following AMC2 SPA.LVO.105(c) is inserted:

AMC2 SPA.LVO.105(c) Specific approval criteria

OPERATING PROCEDURES — GENERAL

(a) Operating procedures should be established for all types of LVOs and operations with operational credits for which an operator is seeking approval. The operating procedures should:

  (1) be consistent with the AFM;

  (2) be appropriate to the technology and equipment to be used;

  (3) specify the duties and responsibilities of each flight crew member in each relevant phase of flight;

  (4) ensure that flight crew workload is managed to facilitate effective decision-making and monitoring of the aircraft; and

  (5) deviate to the minimum extent practicable from normal procedures used for routine operations.

(b) Operating procedures should include:

  (1) the required checks for the satisfactory functioning of the aircraft equipment, both before departure and in flight;

  (2) correct seating and eye position;

  (3) determination of aerodrome operating minima;

  (4) the increment to be added to minima for use by pilots-in-command/commanders who are new to the aircraft type, if applicable;

  (5) the effect on aerodrome operating minima of temporarily failed or downgraded ground equipment;

  (6) the effect on aerodrome operating minima of the failure or change of the status of any aircraft systems;

  (7) the requirement for LVPs to be established;

  (8) a requirement for a call-out approaching minima to prevent inadvertent descent below the DA/H;

  (9) the requirement for height call-outs below 200 ft to be based on the use of a radio altimeter or other device capable of providing equivalent performance, if applicable;

  (10) the required visual references;

  (11) the action to be taken in the event of loss of the required visual references; and

  - (12) the maximum allowable flight path deviations and action to be taken in the event that such deviations occur.

(c) Operators required to comply with the requirements of Annex III (Part-ORO) to this Regulation should include operating procedures in the operations manual required by ORO.MLR.100. The operators to which Part-ORO does not apply should include the operating procedures in a ‘procedures manual’.

194. The following AMC3 SPA.LVO.105(c) is inserted:

AMC3 SPA.LVO.105(c) Specific approval criteria

OPERATING PROCEDURES — CAT II

For CAT II operations, the following should apply:

(a) The flight crew should consist of at least two pilots.

(b) The approach should be flown using a certified system as identified in the AFM.

(c) If the approach is flown using autopilot, for a manual landing the autopilot should remain engaged until after the pilot has achieved visual reference.

(d) All height call-outs below 200 ft above the runway threshold elevation should be determined by the use of a radio altimeter or other device capable of providing equivalent performance.

(e) The DH should be determined by the use of a radio altimeter or other device capable of providing equivalent performance, if so determined by the aircraft certification process.

(f) At DH, the following visual references should be distinctly visible and identifiable to the pilot:

  - (1) a segment of at least three consecutive lights, which are the centre line of the approach lights or TDZ lights or runway centreline lights or edge lights or a combination of these; and
  - (2) a visual reference that should include a lateral element of the ground pattern, such as an approach lighting crossbar, or the landing threshold, or a barrette of the TDZ lighting unless the operation is conducted using a HUD or an equivalent system to touchdown.

195. The following AMC4 SPA.LVO.105(c) is inserted:

AMC4 SPA.LVO.105(c) Specific approval criteria

OPERATING PROCEDURES — CAT III

For CAT III operations, the following should apply:

(a) The flight crew should consist of at least two pilots.

(b) The approach should be flown using a certified system as identified in the AFM.

(c) All height call-outs below 200 ft above the runway threshold elevation should be determined by the use of a radio altimeter or other device capable of providing equivalent performance.

(d) For operations in which a DH is used, the DH should be determined by the use of a radio altimeter or other device capable of providing equivalent performance, if so determined by the aircraft certification process.

(e) At DH, the following visual references should be distinctly visible and identifiable to the pilot:

  - (1) for operations conducted either with fail-passive flight control systems or with the use of an approved HUD or equivalent display system: a segment of at least three consecutive lights, which are the centreline of the approach lights, or TDZ lights, or runway centreline lights, or runway edge lights, or a combination of these to be attained and maintained by the pilot; and
  - (2) for operations conducted either with fail-operational flight control systems or with a fail-operational hybrid landing system using a DH: at least one centreline light to be attained and maintained by the pilot.

(f) For operations with no DH, there is no specification for visual reference with the runway prior to touchdown.

196. The following AMC5 SPA.LVO.105(c) is inserted:

AMC5 SPA.LVO.105(c) Specific approval criteria

OPERATING PROCEDURES — SA CAT I

For SA CAT I operations, the following should apply:

(a) The approach should be flown using a certified system as identified in the AFM.

(b) All height call-outs below 200 ft above the runway threshold elevation should be determined by the use of a radio altimeter or other device capable of providing equivalent performance.

(c) The DH should be determined by the use of a radio altimeter or other device capable of providing equivalent performance, if so determined by the aircraft certification process.

(d) At DH the following visual references should be visible to the pilot:

  - (1) a segment of at least three consecutive lights, which are the centreline of the approach lights, or TDZ lights, or runway centreline lights, or runway edge lights, or a combination of these; and
  - (2) a visual reference that should include a lateral element of the ground pattern, such as an approach lighting crossbar, or the landing threshold, or a barrette of the TDZ lighting unless the operation is conducted utilising an approved HUD or an equivalent system usable down to 120 ft above the runway threshold.

197. The following AMC6 SPA.LVO.105(c) is inserted:

AMC6 SPA.LVO.105(c) Specific approval criteria

OPERATING PROCEDURES — SA CAT II

For SA CAT II operations, the following should apply:

(a) The flight crew should consist of at least two pilots.

(b) The approach should be flown using a certified HUDLS or autoland system as identified in the AFM.

(c) All height call-outs below 200 ft above the runway threshold elevation should be determined by the use of a radio altimeter or other device capable of providing equivalent performance.

(d) The DH should be determined by the use of a radio altimeter or other device capable of providing equivalent performance, if so determined by the aircraft certification process.

(e) At DH the visual references should be distinctly visible and identifiable to the pilot:

    (1) a segment of at least three consecutive lights, which are the centreline of the approach lights or TDZ lights, runway centreline lights, runway edge lights or a combination of these;
    (2) a visual reference that should include a lateral element of the ground pattern, such as an approach lighting crossbar, or the landing threshold, or a barrette of the TDZ lighting.

198. The following AMC7 SPA.LVO.105(c) is inserted:

AMC7 SPA.LVO.105(c) Specific approval criteria

OPERATING PROCEDURES: EFVS OPERATIONS TO A RUNWAY

For EFVS operations to a runway, the following should apply:

(a) The approach should be flown using a certified EFVS-A or EFVS-L as identified in the AFM.

(b) The pilot flying should use the EFVS throughout the approach.

(c) In multi-pilot operations, the pilot monitoring should monitor the EFVS-derived information.

(d) The approach between the final approach fix (FAF) and the DA/H should be flown using vertical flight path guidance mode (e.g. flight director)

(e) The approach may be continued below the DA/H provided that the pilot can identify on the EFVS image either:

- (1) the approach light system; or
- (2) both of the following:
    - (i) the runway threshold identified by the beginning of the runway landing surface, the threshold lights or the runway end identifier lights; and
    - (ii) the TDZ identified by the TDZ lights, the TDZ runway markings or the runway edge lights.

(f) Unless the aircraft is equipped with a certified EFVS-L, a missed approach should be executed promptly if the required visual reference is not distinctly visible and identifiable to the pilot without reliance on the EFVS by the following height above the threshold:

- (1) the height below which an approach should not be continued if natural visual reference is not acquired by the crew as stated in the AFM; or
- (2) if the AFM does not specify such a height, 100 ft.

199. The current GM1 SPA.LVO.100(e) is re-numbered and amended as follows:

GM1 SPA.LVO.105(c)~~100(e) Low-visibility operations~~ Specific approval criteria

FLIGHT CREW ACTIONS IN CASE OF AUTOPILOT FAILURE AT OR BELOW DH IN FAIL-PASSIVE CAT III OPERATIONS

[…]

200. The following AMC1 SPA.LVO.105(f) is inserted:

AMC1 SPA.LVO.105(f) Specific approval criteria

SAFETY ASSESSMENT AND PERFORMANCE INDICATORS

(a) The operator should monitor LVOs and operations with an operational credit in order to validate the effectiveness of the applicable aircraft flight guidance systems, training, flight crew procedures, aircraft maintenance programme and to identify hazards.

(b) Data should be collected whenever an LVO or an operation with an operational credit is attempted regardless of whether the approach is abandoned, is unsatisfactory, or is concluded successfully. The data should include records of the following:

(1) occasions when it was not possible to commence an approach due to deficiencies or unserviceabilities of related airborne equipment;

(2) occasions when approaches were discontinued, including the reasons for discontinuing the approach and the height above the runway at which the approach was discontinued;

(3) occasions when system abnormalities required pilot intervention to ensure a continued approach or safe landing;

(4) landing performance, whether or not the aircraft landed satisfactorily within the desired touchdown area with acceptable lateral velocity or cross-track error. The approximate lateral and longitudinal position of the actual touchdown point in relation to the runway centreline and the runway threshold, respectively, should be recorded.

(c) Data about LVOs should be collected by means of the operator's flight data monitoring programme supplemented by other means including reports submitted by flight crew. Operators that do not have a flight data monitoring programme should use reports submitted by flight crew as the primary means of gathering data.

(d) Performance indicators should include the following:

(1) the rate of unsuccessful low-visibility approaches, i.e. the number of attempted approaches terminating in discontinued approaches, approaches where pilot intervention was required to ensure a continued approach or safe landing or where landing performance was unsatisfactory, compared to the number of low-visibility approaches attempted;

(2) measures of performance of the airborne equipment required for low-visibility approaches or operations with an operational approval of each individual aircraft;

(3) safety performance indicators related to other specific risks associated with LVOs.

(e) The following information should be retained for at least 5 years:

(1) the total number of low-visibility approaches or operations with an operational approval attempted or completed, including practice approaches, by aircraft type; and

(2) reports of unsatisfactory approaches and/or landings, by runway and aircraft registration, in the following categories:

(i) airborne equipment faults;

(ii) ground facility difficulties;

(iii) missed approaches because of air traffic control (ATC) instructions; or

(iv) other reasons.

201. The following AMC2 SPA.LVO.105(f) is inserted:

AMC2 SPA.LVO.105(f) Specific approval criteria

SAFETY ASSESSMENT PRIOR TO OBTAINING AN APPROVAL

(a) Prior to commencing LVOs or operations with operational credits, an operator should demonstrate to the competent authority that such operations will achieve an acceptable level of safety. This requires the operator to gather data from operations using the relevant systems and procedures and conduct safety assessments taking that data into account.

(b) The operator applying for the approval of low-visibility approach operations should determine the minimum number of approaches required to gather sufficient data to demonstrate an acceptable level of safety and the time period over which such data should be gathered.

(c) If an operator is applying for more than one LVO approval or an approval for operation with operational credits for a particular aircraft type, then data gathered from operations using the systems and procedures designed for one classification of operations or operation with operational credits may be used to support the application for another classification of operations or operation with operational credits provided the following elements are similar:

- (1) type of technology, including:
  - (i) flight control/guidance system (FGS) and associated displays and controls;
  - (ii) flight management system (FMS) and level of integration with the FGS;
  - (iii) use of HUD or an equivalent display system; and
  - (iv) use of EFVS;
- (2) operational procedures, including:
  - (i) alert height;
  - (ii) manual landing/automatic landing;
  - (iii) no DH operations;
  - (iv) use of HUD or an equivalent display system in hybrid operations; and
  - (v) use of EFVS to touchdown; and
- (3) handling characteristics, including:
  - (i) manual landing from automatic or HUD or an equivalent display system guided approach;
  - (ii) manual missed approach procedure from automatic approach; and
  - (iii) automatic/manual roll-out.

(d) An operator holding an approval for low-visibility approach operations or operations with operational credits may use data gathered from approaches conducted using one aircraft type to support an application for approval for a different aircraft type or variants provided the following elements are similar:

- (1) type of technology, including the following:
  - (i) FGS and associated displays and controls;
  - (ii) FMS and level of integration with the FGS;

    - (iii) use of HUD or an equivalent display system; and
    - (iv) use of EFVS;
  - (2) operational procedures, including:
    - (i) alert height;
    - (ii) manual landing/automatic landing;
    - (iii) no DH operations;
    - (iv) use of HUD or an equivalent display system in hybrid operations; and
    - (v) use of EFVS to touchdown; and
  - (3) handling characteristics, including:
    - (i) manual landing from automatic or HUD or an equivalent display system guided approach;
    - (ii) manual missed approach procedure from automatic approach; and
    - (iii) automatic/manual roll-out.

202. The following GM1 SPA.LVO.105(f) is inserted:

GM1 SPA.LVO.105(f) Specific approval criteria

SAFETY PERFORMANCE MONITORING

(a) Data gathering for safety performance monitoring of LVOs and operations with operational credits will need to include sufficient information for the operator to identify hazards and assess the risks associated with LVOs and operations with operational credits.

(b) The following data relating to LVOs and operations with operational credits may be gathered via flight crew reports, flight data monitoring or other means, as appropriate:

  - (1) date and time;
  - (2) aircraft details (type and registration);
  - (3) airport, approach procedure, final approach and take-off area (FATO) and/or runway used;
  - (4) the type of LVO or operation with operational credits attempted or completed;
  - (5) weather conditions including wind, reported RVR and nature phenomena restricting visibility;
  - (6) the reason for a discontinued approach (if applicable);
  - (7) details of any pilot intervention to ensure a continued approach or safe landing;
  - (8) adequacy of speed control;
  - (9) trim at time of automatic flight control system disengagement (if applicable);
  - (10) compatibility of automatic flight control system, flight director and raw data;
  - (11) an indication of the position of the aircraft relative to the centreline when descending through to 100 ft;
  - (12) touchdown position relative to the TDZ;
  - (13) an assessment of the sink rate, lateral velocity and bank angle at touchdown;

(14) the nature of any problems encountered by the crew in relation to operating procedures or training; and

(15) any human factors issues that arose in relation to the operation.

(c) Where data is gathered as part of the operator's flight data monitoring programme, procedures should be established to ensure that information that is only available directly from the flight crew or other sources (e.g. weather information) is captured.

(d) In order to assess the risks associated with LVOs and operations with operational credits, operators may consider hazards with the potential to result in the following unacceptable safety outcomes:

(1) loss of control in flight;

(2) runway overrun or excursion;

(3) controlled flight into terrain;

(4) runway incursion and ground collision; and

(5) airborne conflict.

(e) Operators' safety control processes will ensure that LVOs and operations with operational credits:

(1) meet the safety objectives and performance standards established in the operator's safety policy;

(2) achieve at least the same level of safety as operations other than LVOs and operations without operational credits; and

(3) have a continuously improving safety performance.

203. The following GM2 SPA.LVO.105(f) is inserted:

GM2 SPA.LVO.105(f) Specific approval criteria

DATA GATHERING FOR SAFETY ASSESSMENT PRIOR TO OBTAINING AN APPROVAL

(a) General

The intention of the safety assessment is to validate the use and effectiveness of the applicable aircraft flight control and guidance systems, procedures, flight crew training and aircraft maintenance programme. The intention is not to repeat the statistical analysis required for certification of equipment, but rather to demonstrate that the various elements of the 'total system' for LVOs work together for a particular operator.

(b) Data gathering for safety assessment — LVTOs

(1) If the procedures used for LVTOs are not significantly different from those used for standard take-offs, it may be sufficient for operators to conduct only a small number of take-offs using the procedures established for LVTOs for the purpose of data gathering. The following could be considered as a minimum:

(i) For LVTOs in an RVR of 125 m or more if procedures are similar to those used for standard take-offs: 1 take-off;

(ii) For LVTOs in an RVR of less than 125 m or any other LVTOs using specific procedures: 10 take-offs.

(2) An operator holding approval for LVTOs on one aircraft type and applying approval for for LVTOs on another type or variant may use data from LVTOs conducted on the first type if the following are similar:

(i) level of technology, including flight deck displays, HUD or an equivalent guidance system;

(ii) operational procedures; and

(iii) handling characteristics.

(c) Data gathering for safety assessment — approach operations with a DH below 200 ft

The data required for the safety assessment needs to be gathered from approaches conducted in a representative sample of expected operating conditions. The operator needs to take seasonal variations in operating conditions such as prevalent weather, planned destinations and operating bases, and ensure that the approaches used for data gathering are conducted over a sufficient period of time to be representative of the planned operation.

In order to ensure that the data is representative of planned operations, approaches are conducted at a variety of airports and runways. If more than 30 % of the approaches are conducted to the same runway, the operator may increase the number of approaches required and take measures to ensure that the data is not distorted.

The number of approaches used for data gathering will depend on the performance indicators and analysis methods used by the operator. The operator will need to demonstrate that the operation for which approval is sought will achieve an acceptable level of safety. The following figures may be considered a minimum for an operator without previous experience of low-visibility approach operations:

(1) for approval of operations with a DH of not less than 50 ft: 30 approaches;

(2) for approval of operations with a DH of less than 50 ft: 100 approaches.

Approaches conducted for the purpose of gathering data in order to conduct a safety assessment prior to obtaining an LVO approval may be conducted in line operations or any other flight where the operator's procedures are used. Approaches may also be conducted in an FSTD if the operator is satisfied that this would be representative of the operation.

The data gathered from these approaches will only be representative if all required elements of the total system for LVOs are in place. These include not only operating procedures and airborne equipment, but also airport and ATC procedures and ground- or space-based navigation facilities. If the operator chooses to collect data from approaches conducted without all required elements in place, then the data analysis takes into account the effect of at least the following:

(1) air traffic services (ATS) factors including situations where a flight conducting an instrument approach is vectored too close to the FAF for satisfactory lateral and vertical path capture, lack of protection of ILS sensitive areas or ATS requests to discontinue the approach;

(2) misleading navigation signals such as ILS localiser irregularities caused by taxiing aircraft or aircraft overflying the localiser array;

(3) other specific factors that could affect the success of LVOs that are reported by the flight crew.

(d) Safety considerations for approaches used for data gathering

If an operator chooses to collect data from approaches conducted without all required elements of the total system for LVOs in place, then the operator takes actions to ensure an acceptable level of safety.

(e) Sharing of data: operators may use data from other operators or aircraft manufacturers to support the safety assessment required to demonstrate an acceptable level of safety. The operator applying for a specific approval would need to demonstrate that the data used was relevant to the proposed operation.

(f) It is expected that operators will have more than 6 months or at least 1 000 hours of total operational experience on the aircraft model before they can have sufficient data to set up meaningful performance indicators and establish whether planned LVOs would achieve an acceptable level of safety.

204. The current GM1 SPA.LVO.110(c)(4)(i) is deleted.

~~GM1 SPA.LVO.110(c)(4)(i) General operating requirements~~

~~APPROVED VERTICAL FLIGHT PATH GUIDANCE MODE~~

205. The following AMC1 SPA.LVO.110 is inserted:

AMC1 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures

ASSESSMENT OF AERODROMESFOR THE INTENDED OPERATIONS– AEROPLANES

(a) The assessment on the suitability of the aircraft operations at an aerodrome including instrument flight procedure comprises:
  (1) The availability of suitable navigation facilities and associated instrument flight approach procedures;
  (2) The availability of suitable aerodrome operating procedures including LVP and the compatibility with the intended aircraft operations; and
  (3) The availability of suitable runway and runway environment characteristics and facilities.

(b) The suitability of the aircraft operations should be ensured by means of or a combination of:
  (1) An assessment of previous operational data for the particular aerodrome, runway and instrument flight procedure; or
  (2) An assessment of the:
    (i) aerodrome data
    (ii) instrument flight procedure and
    (iii) the aircraft data and capabilities;

    or
  (3) An operational assessment.

GM1 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures.

ASSESSMENT OF AERODROMES FOR THE INTENDED OPERATIONS – AEROPLANES

The suitability of the aircraft operations could be assessed with one of three methods, or a combination of them, as outlined in AMC1 SPA.LVO.110 (b).

Previous operational data.

The first method entails the verification of the availability of previous operational data, such as records of approaches flown in the same aerodrome, with the same procedure and aircraft type.

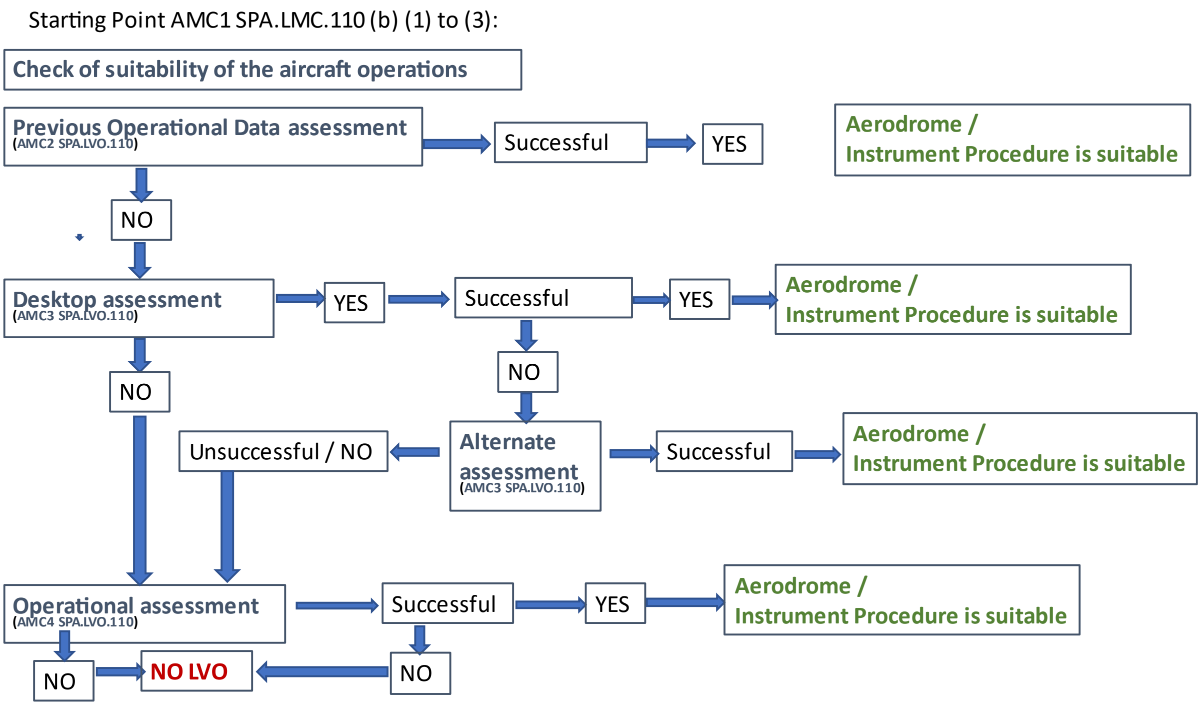
Desktop assessment.

The second method is a desktop assessment that compares aircraft data and capabilities, the aerodrome and instrument approach characteristics. If the aircraft data are compatible with the aerodrome and instrument approach procedure characteristics, the aerodrome and runway will be considered suitable for the intended LVO.Operational assessment.

The third method is meant to be used if the suitability could not be positively assessed with the other methods. In that case an operational assessment becomes necessary, actual flights should be performed. The operational assessment could be adapted in accordance with the level of complexity of the aerodrome characteristics.

The following AMCs and GMs provide details on the three methods.

A diagram with a schematic of the assessment is depicted below.



GM2 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures.

AVAILABILITY OF SUITABLE NAVIGATION FACILITIES

(a) **Classification for ILS/MLS:** The ILS classification – e.g. “III/D/4”, II/T/3, “I/C/2”, etc. - is defined in ICAO Annex 10 Volume 1 by using three characters:

- (1) I, II or III: this character indicates conformance to Facility Performance Category which is usually associated to approach operational category,
- (2) A, B, C, T, D or E: this character defines the ILS/MLS points to which the localizer/glideslope has been verified to be conformal to the course structure. The ICAO minimum standard for the limit of coverage of the localizer in the direction of the approach is:
  - (i) Facility Performance Category I: point C (100 ft),
  - (ii) Facility Performance Category II: point T (ILS reference datum: runway threshold),
  - (iii) Facility Performance Category III: point E (600m before the stop end of the runway)

(3) 1, 2, 3 or 4: this number indicates the level of integrity and continuity of service. The integrity relates to the trust which can be placed in localizer or glideslope not radiating false guidance signals. The continuity of service relates to the rarity of signal interruptions. The minimum level of integrity and continuity of service are represented by a single descriptor "level" which would typically be associated as follows:
  - (i) Level 1: the localizer's or glideslope's integrity or continuity of service have not been demonstrated or they have been demonstrated but at least one of them does not meet the Level 2 requirements.
  - (ii) Level 2 is the performance objective for ILS/MLS equipment used to support low visibility operations when ILS/MLS guidance for position information in the landing phase is supplemented by visual cues/references.
  - (iii) Level 3 is the performance objective for ILS/MLS equipment used to support operations which place a high degree of reliance on ILS/MLS guidance for positioning through touchdown.
  - (iv) Level 4 is the performance objective for ILS/MLS equipment used to support operations which place a high degree of reliance on ILS/MLS guidance throughout touchdown and rollout.

Further information may be found in ICAO Annex 10 Volume 1.

(b) GBAS Facility Classification (GFC)

The Facility classification – i.e. "C/G1/35/H" - refers to the station serving all approaches to a given airport and is defined in ICAO Annex 10 Volume 1 using four elements:

(1) Facility approach service type (FAST): (A-D) indicates the service types supported by the navigation facility, i.e. "C" means FAST C, which denotes a facility meeting all the performance and functional requirements necessary to support GBAS Approach Service Type (GAST) C. GAST C was designed to meet requirements for CAT I as well as, with additional constraints, CAT II. GAST D was designed to meet requirements for CAT III. A downgrade from GAST D to C is possible and announced in the avionics.
(2) Ranging Source Types: indicates what ranging sources are augmented by the ground subsystem. i.e. "G1" means GPS ("G2": SBAS, "G3": GLONASS, "G4": reserved for Galileo, etc.).
(3) Facility Coverage: defines the outer horizontal coverage of the GBAS positioning service expressed in nautical miles. "0" is for facilities that do not provide positioning service. The facility coverage for position service does not indicate the coverage for the GBAS approach service. The information on the coverage for the approach service is contained in the "Service volume radius from the GBAS reference point to the nearest kilometer or nautical mile" as described in point (d) below.
(4) Polarization: indicates the polarization of the VHF Data Broadcast (VDB) signal. E indicates elliptical polarization (option) and H indicates horizontal polarization (standard). Aircraft operators that use vertically polarized receiving antenna will have to take this information into account when managing flight operations, including flight planning and contingency procedures.

Further information may be found in ICAO Annex 10 Volume 1.

(c) Approach Facility Designation (AFD) for GBAS

The approach facility designation – i.e. "EDDF/G25A/20748/S/C" or "ABCD/XABC/21278/150/CD", describing parameters for an individual approach procedure is defined in ICAO Annex 10 using five elements:

(1) GBAS identification: 4-character facility identifier, ie ABCD.
(2) Approach identifier: 4-character approach identifier, ie XABC.
(3) Channel number: 5-digit channel number (20001 – 39999) associated with the approach.
(4) Approach service volume: indicates the inner limit of the service volume either by a numerical value in feet corresponding to the minimum decision height (DH) – i.e. "150" - or by the GBAS points (i.e. A, B, C, T, D, E, or S). The GBAS points are equivalent to the ILS/MLS points, where "S" is only specific to GBAS and denotes the stop end of the runway.
(5) Supported service types: designates the supported GBAS service types (A-D).

Further information may be found in ICAO Annex 10 Volume 1.

(d) Service volume radius from the GBAS reference point

Maximum use distance (D_{max}): the maximum distance (slant range) from the GBAS reference point to the nearest kilometer or nautical mile within which pseudo-range corrections are applied by the aircraft system.

Note: This parameter does not indicate the distance within which VHF data broadcast field strength requirements for the approach service are met.

Further information may be found in ICAO Annex 10 Volume 1.

SUITABLE RUNWAY AND RUNWAY ENVIRONMENT CHARACTERISTICS AND FACILITIES

For runways intended to be used for CATIII, CAT II, SA CAT II and SA CAT I operations the state of aerodrome should provide a Precision Approach Terrain Chart (PATC) more information in GM7 SPA.LVO.110.

There should be a radio altimeter operating area for runways intended to be used for CATIII, CAT II, SA CAT II and SA CAT I operations. The ICAO aerodrome provisions detailed that the radio altimeter operating area extends to at least 300 m from the runway threshold with a width of 60 metres on either side of the extended centre line of the runway. The width may be reduced to not less than ± 30 metres if such a reduction does not affect the safety of aircraft operations as assessed by the aerodrome operator in cooperation with affected stakeholders. Slope changes should be kept to a minimum.

Information on pre-threshold terrain and its effect on radio altimeters and automatic flight control systems (AFCS) is contained in the Manual of All-Weather Operations (ICAO Doc 9365, Section 5.2.

TYPE OF xLS NAVIGATION

In the context of AMC3 SPA.LVO.110 point (b)(3) type of xLS means the facilities external to the aircraft and the associated limitations (if any) which have been used as the basis for certification.

AMC2 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures

ASSESSMENT OF PREVIOUS OPERATIONAL DATA – AEROPLANES

To ensure the suitability of the aircraft intended operations at an aerodromes including instrument flight procedures as refers in the AMC1 SPA.LVO.110 point (a) and in the context of AMC1 SPA.LVO.110 point (b)(1), the following applies:

(a) Previous operational data refers to data from:
  (1) The operator itself; or when not available
  (2) The following entities
    (i) the state of the aerodrome or the competent authority issuing the operator's LVO approval;
    (ii) the type certificate holder of the aircraft; or
    (iii) other operators.
(b) Previous operational data should only be used if:
  (1) It is to the same runway and there were no relevant changes to the runway, runway environment and navigation facilities;
  (2) It is derived in accordance with table 15 below for the intended operation; and
  (3) there is no safety concern for such operation.
(c) Previous operational data may be credited to an aircraft if it is from:
  (1) the same aircraft make and model unless it is restricted by any of the entities in point (a)(2) or

(2) another aircraft model if states by the type certificate holder of the aircraft with regard to its similarity of behaviour

Table 15

Intended operation	**Operation from which previous operational data was derived – subject to the conditions specified above**	**Remark**
SA CAT I – automatic landing	CAT I/II/III – automatic landing SA CAT I – automatic landing SA CAT II – automatic landing LTS CAT I – automatic landing.	Automatic landing in hybrid systems may also be used
SA CAT I - HUDLS	CAT II/III - HUDLS SA CAT I - HUDLS SA CAT II – HUDLS LTS CAT I – HUDLS	
SA CAT II – automatic landing	CAT II/III – automatic landing SA CAT II – automatic landing	Automatic landing in hybrid systems may also be used
SA CAT II - HUDLS	SA CAT II - HUDLS CAT II/III – HUDLS	
CAT II –HUD to below DH with manual landing	CAT II - HUD to below DH with manual landing CAT II - automatic landing	Data related to LSAA should only be used in case of HUDLS or automatic landing
CAT II – auto-coupled to below DH with manual landing	CAT II - auto-coupled to below DH with manual landing CAT II - automatic landing	
CAT II - automatic landing	CAT II - automatic landing SA CAT II - automatic landing CAT III automatic landing	Automatic landing in hybrid systems may also be used
CAT II - HUDLS	CAT II/III - HUDLS SA CAT II - HUDLS	
CAT III - HUDLS	CAT III - HUDLS	
CAT III – automatic landing	CAT III – automatic landing	If the hybrid system uses automatic landing then

		the data may be used as any other CAT III system
CAT III – hybrid system	CAT III–hybrid system based on same components	
EFVS operations requiring flare prompt or flare command, i.e. EFVS-L	EFVS operations requiring flare prompt or flare commands Data from any operation with automatic landing system, HUDLS or HUD with flare prompt or command may be used for EFVS requiring flare prompt or command.	

Note: Previous operational data should be based on the same kind of xLS (e.g. ILS, MLS or GLS) but not necessary with the same performance. Data related to landing system performance derived on infrastructure systems with less performance may be used on systems with better performance, e.g. data derived on a CAT II ILS may be used on a CAT III ILS.

Note 2: The suitability of the indication of the DH and AH (where applicable) should be based on data covering the actual DH/AH location. This indication should be stable and continuous.

GM3 SPA.LVO. 110 Aerodrome-related requirements, including instrument flight procedures

PREVIOUS OPERATIONAL DATA PROVIDED BY THE STATE OF THE AERODROME.

The following guidance is provided for the assessment of suitability of aerodromes for LVOs or operation with operational credits,.

(a) If a State provides a list of airports or runways in its territory that are suitable for CAT II or CAT III operations with a specific aircraft model or group of aircraft models, those airports or runways may be considered suitable for the purpose of AMC2 SPA.LVO.110 for those specific aircraft model(s), airport or runway, and approach operation (e.g. FAA may provide such type of list). Note: A CAT II or CAT III approved runway does not necessarily mean the airport is suitable for the purpose of AMC2 SPA.LVO as the aerodromes provisions may not ensure that the requirements for certain aircraft models are fulfilled.

(b) If a State provides a list of airports or runways in its territory that are found suitable for SA CAT I or SA CAT II, those airports or runways may be considered suitable for the purpose of AMC2 SPA.LVO.110. Note: in some states the concept of SA CATI and SA CATII may be different from the European concept. The operator should consider these differences.

(c) If a State provides a list of airports or runways in its territory that are approved for CAT II/III operations but are designated as restricted or nonstandard or irregular, those designated runways should be considered no suitable. The remaining CATII/III runways of that State may be considered regular.

(d) A competent authority may provide a list of airport or runways that can be considered suitable for defined LVO. The suitability statement could be credited by operators under the oversight of that authority.

GM4 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures.

MAKE, MODEL, SERIES AND VARIANT. PREVIOUS OPERATIONAL DATA – AEROPLANES

(a) The Air OPS regulation often use those terms in accordance to the ICAO Commercial Aviation Safety Team (CAST) taxonomy (e.g. AMC2 SPA.LVO.110).
   (1) Aircraft make: The aircraft make is the name assigned to the aircraft by the aircraft manufacturer when each aircraft was produced. In most cases aircraft make is the organization common name of the aircraft manufacturer. For example Airbus, Boeing, Embraer…etc.
   (2) Model: An aircraft model is an aircraft manufacturer’s designation for an aircraft grouping with similar design or style of structure. In EASA type certificate data sheet (TCDS) it means the aircraft type certificate for example A330, B777.
   (3) Series: An aircraft series is an aircraft manufacturer’s designation to identify differences within an aircraft model grouping. It provides a further specification to the aircraft type for example B777-232 where the series is the number 232. Some manufactures define the so call “master series”: An aircraft master series creates a grouping of similar aircraft series for analytical purposes and to identify aircraft series that share airworthiness properties. A master series contains aircraft series from within one aircraft model. For example, A320-100 and A320-200, the A320-100 master series only has one series A320-111 while the master series A320-200 has many series 211, 212, 214, 215, 216, 231, 232, 233.
   (4) Variant defines different sets of limiting structural masses (e.g MTOW, MLW, MZFW, etc.) within a series. For example A320-232-007 or the A330-243 RR engines variant 052. Variants are not covered in the ICAO Cast taxonomy, however it maybe specified in the EASA type certificate data sheet (TCDS).
   (5) More information can be found in the ICAO Common taxonomy team document ‘international standard for aircraft make, model and series groupings’(Aircraft type designators).

GM5 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures.

RUNWAY AND RUNWAY ENVIRONMENT

In the context of AMC2 SPA.LVO.110 point (b)(2), runway and runway environment characteristics may include:

(a) Pre-threshold terrain, including radio altimeter operating area.
(b) Runway dimensions.
(c) Average slope of the landing system assessment area (LSAA).
(d) visual aids including approach lights and runway lights (including switch over time for those lights).
(e) Visual segment surface (VSS).
(f) Obstacle free zone (OFZ).

AMC3 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures

ASSESSMENT OF THE AERODROME DATA, INSTRUMENT FLIGHT PROCEDURE AND AIRCRAFT DATA AND CAPABILITIES (DESKTOP ASSESSMENT)

To ensure the suitability of the aircraft intended operations at an aerodrome including instrument flight procedures as refers in the AMC1 SPA.LVO.110 point (a) and in the context of AMC1 SPA.LVO.110 point (b)(2), the following applies:

(a) The desktop assessment should correspond to the nature and complexity of the operation intended to carry out and should take into account the hazards and associated risks inherent in these operations.

(b) The assessment should include the AFM or additional data from the TC/STC holder, instrument flight procedures and aerodrome data. For landing system, the following runway or airport conditions, should include as a minimum:

  (1) Approach path slope.

  (2) Runway elevation.

  (3) Type of xLS navigation means intended to be used.

  (4) The average slope of the LSAA.

  (5) Ground profile under the approach path (Pre-threshold terrain). The distance should be calculated from the publish threshold. It should be 300 meters Unless otherwise stated by the AFM or additional data from the TC/STC holder, the state of the aerodrome or AIP data, or the competent authority issuing the operator’s LVO approval.

  Note: the above points assume a CAT II or CAT III runway for other types of runways the operator may need to consider other factors.

(c) In addition to (b) additional point may be required if stated by:

  (1) AFM or additional data from the TC/STC holder or
  (2) the state of the aerodrome or AIP data, or
  (3) the competent authority issuing the operator’s LVO approval.

(d) For operations using a DH based on radio altimeter or other device measuring the height over the ground, the usability of the height indication to identify the DH should be assessed. This indication should be stable and continuous.

(e) For EFVS operation the following applies: If the system used to perform EFVS operation contains a flare cues, each aircraft type/equipment/runway combination should be verified before authorising the use of EFVS-L system, on any runway with irregular pre-threshold terrain (not within the certification assumption for pre-threshold terrain), if landing system assessment area presents significant slope change in the landing system assessment area.

GM6 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures

DATA NOT PROVIDED IN THE AFM TO SUPPORT DESKTOP ASSESSMENT

(a) When the AFM or additional data from the TC/STC holder does not provide the information needed in AMC3 SPA.LVO.110 point (b)(1) to (5), the operator may contact the TC/STC holder to request such information. Otherwise the operator may seek to use previous operational data in accordance with AMC2 SPA.LVO.110 or perform operational demonstration in accordance with AMC4 SPA.LVO.110.

USE OF PREVIOUS OPERATIONAL DATA TO SUPPORT DESKTOP ASSESSMENT

(b) In-service consolidated experience from already successfully demonstrated and consistently used runways with the specific aircraft type and with the same intended operations (typically CAT II/III) could be used to support the desktop assessment. The assessment criteria, for pre-threshold terrain variation and LSAA slope determining the suitability of a runway for the intended operation, could then be defined by the prevailing complexity of the RWY on which the operator already has in-service experience and where sufficient operational flight data is available to prove adequate performance of the automatic landing system.

GM7 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures

AERODROME DATA SOURCES

This GM describes some aerodrome data sources that ICAO Member States provides in accordance with ICAO Annex 4.

(a) Type A and Type B Aerodrome Obstacle chart

Aerodrome obstacle charts (AOC) come in two forms. Type A and B charts may be combined and the chart is called Aerodrome Obstacle Chart (ICAO Comprehensive). Where a terrain and obstacle chart is provided in electronic form, there is no need to provide Type A or B obstacle charts.

(b) Type A Aerodrome Obstacle chart (ICAO Annex 4 , chapter 3)

AOC Type A, AOC Type A charts are found at most aerodromes approved for LVO. The function of the type A chart is to enable an operator to comply with the performance operating limitations in Annex 6. The type A chart does not have to be provided if there are no take-off obstacles but a note informing about this shall be made according to ICAO Annex 4. The elevation should be given to the nearest half-metre or nearest foot. Linear dimensions shall be shown to the nearest half-metre.

(c) Type B Aerodrome Obstacle chart (ICAO Annex 4, chapter 4)

AOC Type B shall contain information about the elevation (at the centre line) of both runway plus the elevation at each significant change of the slope of the runway. The function of the Type B chart is:

(1) the determination of minimum safe altitudes/heights including those for circling procedures;
(2) the determination of procedures for use in the event of an emergency during take-off or landing;
(3) the application of obstacle clearing and marking criteria; and
(4) the provision of source material for aeronautical charts.

Elevations and linear dimensions should be shown to the nearest half-metre.

(d) Aerodrome Terrain and Obstacle Chart – ICAO (Electronic) (ICAO Annex 4, chapter 5)

The function of this chart is:

(1) to enable an operator to comply with the operating limitations of Annex 6, Part I, Chapter 5, and Part III, Section II, Chapter 3, by developing contingency procedures for use in the event of an emergency during a missed approach or take-off, and by performing aircraft operating limitations analysis; and
(2) support the following air navigation applications:
  (i) instrument procedure design (including circling procedure);
  (ii) aerodrome obstacle restriction and removal; and
  (iii) provision of source data for the production of other aeronautical charts.

Note that this chart may also contain the information required for the PATCH.

According to ICAO Annex 4 from November 2015, this chart should be made available for aerodromes regularly used by international aviation. The chart should be made available in printed form on request.

(e) Aerodrome chart (ICAO Annex 4, chapter 13)

According to ICAO Annex 4 an aerodrome chart should be provided for aerodromes regularly used by international aviation. The function of this chart is to provide information to facilitate the ground movement of aircraft and in general also to provide essential operational information.

This chart should contain information about height of the THR and, for precision approach runways, the highest point of the TDZ. This information may also be included in the text part of the AIP, chapter AD2 (normally paragraph 2.12 – Runway Physical Characteristics). The elevation should be provided to the nearest half-metre.

(f) Precision Approach Terrain Chart (PATC) (Annex 4, Chapter 6)

According to ICAO Annex 4 a PATCH should be made available for all precision approach runways Categories II and III at aerodromes used by international civil aviation, except where the requisite information is provided in the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic). The chart should include:

(4) a plan showing contours at 1 m (3 ft) intervals in the area 60 m on either side of the extended centre line of the runway, to the same distance as the profile, the contours to be related to the runway threshold;

(5) an indication where the terrain or any object thereon, within the plan defined in a), differs by ± 3 m in height from the centre line profile and is likely to affect a radio altimeter;

(6) a profile of the terrain to a distance of 900 m from the threshold along the extended centre line of the runway. Where the terrain at a distance greater than 900 m from the runway threshold is mountainous or otherwise significant to users of the chart, the profile of the terrain should be shown to a distance not exceeding 2 000 m from the runway threshold.

(g) Summary

(1) For the determination of runway slopes, the AOC, preferably the combined version, appears to provide the best information. The PATC appears to be the best source to determine the elevations and slopes in the approach area.

(2) If the information provided from different AIP parts, not related to possible differences in required accuracy this may be an error by the aerodrome and should be reported to AIP publication authority.

(3) It may be difficult to conclusively state, which chart is best for determining the runway slope in each case, but the primary source of information is the AIP, and therein the aerodrome obstacle chart and the PATC. As the Aerodrome Terrain and Obstacle Chart – ICAO (Electronic) becomes more available, it will probably take over as the primary source of information about both runways and pre-threshold terrain.

AMC4 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures

OPERATIONAL ASSESSMENT – AEROPLANES

To ensure the suitability of the aircraft intended operations at an aerodrome including instrument flight procedures as refers in the AMC1 SPA.LVO.110 point (a) and in the context of AMC1 SPA.LVO.110 point (b)(3), the following applies:

(a) The operator should verify each aircraft type and runway combination by successfully completing the determined number of approaches and landings according to the process in point (c) below and in the conditions determined in table 16.

Table16

Type of approach	**Aerodrome ceiling (cloud base or vertical VIS)**	**RVR/VIS**
CAT III if previously successfully assessed CAT II operations	CAT II conditions	CAT II conditions
CAT II & CAT III	CAT I conditions	CAT I conditions
EFVS Approach	As per instrument approach no EFVS credits	As per instrument approach no EFVS credits
SA CAT I & SA CAT II	CAT I conditions	CAT I conditions

(b) The operational assessment should validate the use and effectiveness of the aircraft flight guidance systems, and operating procedures for the intended operation applicable to a specific instrument flight procedure and runway.

(c) The process to determine the number of approaches and landing should be based on identified risks and agreed with competent authorities, as follows:

- (1) Identify the risks related to the landing system (based on AFM/EOM data or other relevant source) which may include limitation/s in the conditions during the operational assessment (e.g. to perform the assessment under a non-commercial flight).
- (2) Determine complexity of the runway based on:
  - (i) A set of criteria based on the certification assumptions identified in AFM/EOM data
  - (ii) Availability and quality of runway data supporting the risk assessment
  - (iii) Other known factors identified.
- (3) Scale the number of required approaches based on complexity, refer to GM (9):

(d) The operational assessment maybe performed in a commercial flight.

(e) If the operator has different variants of the same type of aircraft in accordance with (c), utilising the same landing systems, the operator should show that the variants have satisfactory operational performance, but there is NO need to conduct a full operational assessment for each variant/runway combination.

(f) The operator may replace partially or completely the approaches and landing if approved by the Competent authority:

- (1) By Aircraft Manufacturer simulations or approved design organisations (holding a DOA) simulations if the terrain is properly modelled in the simulation.

(2) By a verification using an FSTD if the FSTD is suitable for the operational assessment.

GM8 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures.

OPERATIONAL ASSESSMENT - PROCESS TO DETERMINE THE NUMBER OF APPROACHES AND LANDING - AEROPLANES

(a) The following guidance provide example of criteria that can be used to evaluate level complexity of the runway versus a landing system for; the purpose of the determination of the number of approaches and landings in the context of AMC4 SPA.LVO.110 point (c). Depending on the landing system used, some criteria might not be relevant or others might need to be considered.

(1) Pre-Threshold terrain profile:

Typical length of pre-runway threshold, calculated from the published threshold (displaced threshold if present), to be considered is 300m on the extended centreline unless otherwise specified by AFM or additional data from the TC/STC holder, the state of the aerodrome or AIP data, or the competent authority issuing the operator's LVO approval. Below it is described the complexity of the pre-threshold terrain profiles as follows:

(i) **Simple**:
  (A) Approximately ± 1 m variation from runway threshold altitude in the typical length or
  (B) previous experience in more constraining pre-threshold terrain in the same aircraft type or variant.

(ii) **Moderate**:
  (A) Presence of ARAS

  or

  (B) Approximately ± 1 m variation within last 60m prior runway threshold

  and

  (C) Prior to 60 m and up to typical length:
  - moderate rising slope (less than 7% rising)
    or
  - moderate "see wall" (less than 3m)

(iii) **Complex**:
  (A) Approximately ± 2 m variation within last 60m prior runway threshold
  and
  (B) Prior to 60 m and up to typical length:
  - Significant rising slope (up to 15% rising)
  or
  - Significant "see wall" (up to 6m)
  or
  - Significant change of slope (Rising then descending or descending then rising close to the limit values)

(iv) **Very complex**: outside any of the limits define above for complex pre-threshold terrain profiles.

Note: "see wall" are sudden change of terrain elevation that typically occurs when runway threshold are located near the sea. Sea level may change due to tide. Other cases of *sudden terrain elevation may occur in other cases, slope of 100% may be considered as comparable to "see wall" (e.g. Boston USA).*

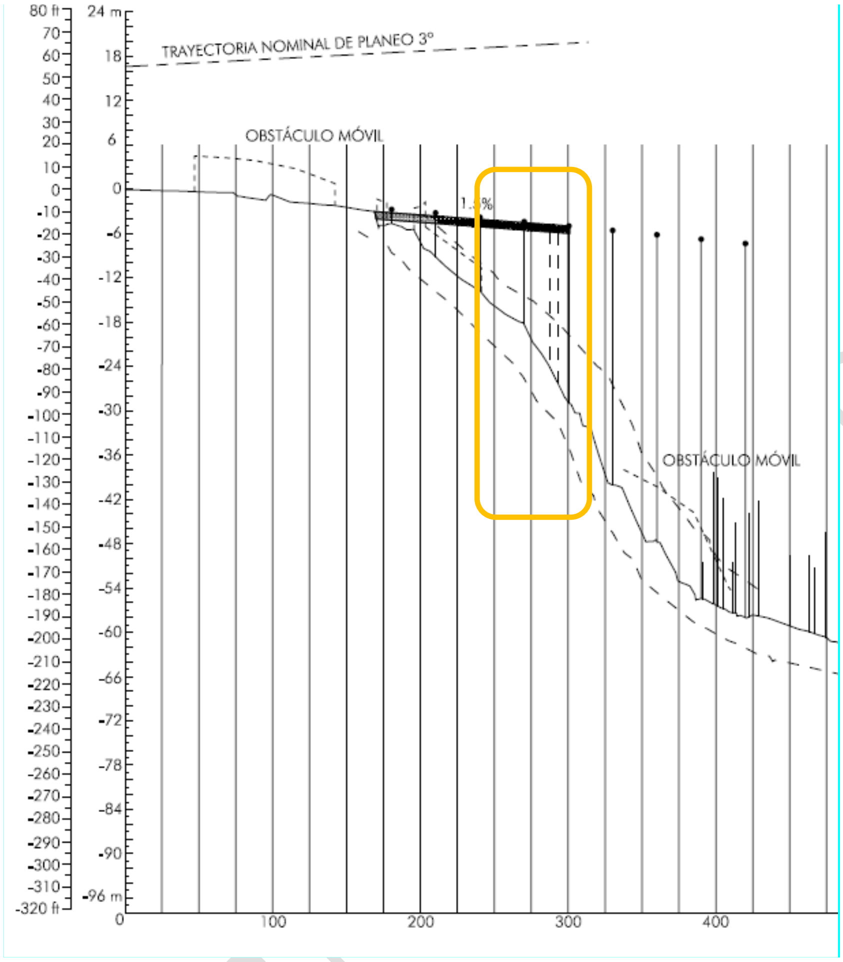


Figure 1: *Typical example of "**Very Complex**" with greater than 6m "sea wall" at 300m (LEAS 29 dated 2007)*

Example: pre-threshold terrain with a variation of 1.5 meters (following point (iii)(A)) but without any condition in (iii)(B), then it should be asses against the criteria in point (ii) 'moderate'. If the pre-threshold does not have the conditions in point (ii)(C), then it should be considered 'simple' (point (i)) even if the variation is more than 1.5 meters from the middle line.

(2) Landing system assessment area (LSAA) slope:

Note: 600 meters pass the threshold is the standard length, however depending on the landing system, other length might be relevant.

Although not recommended by ICAO Annex 14 Volume 1, slope variation in the LSAA can exists (Refer to §3.1.15 to §3.1.18) and represent a factor of risk to be considered. For the propose of determining relevant parameters characterising slope and slope variation the following definitions may be used (Figure 1).:

- **Mean LSAA slope** : Slope computed from runway threshold elevation up to runway elevation at 600 meters pass the threshold.
- **Deviation from mean LSAA slope:** greatest elevation difference between any runway elevation inside LSAA and Mean LSAA slope

Figure 1: Mean LSAA slope & Deviation from mean LSAA slope

Note: Published runway profiles usually contains position and elevation of each significant runway longitudinal slope change. Elevation at other location can be interpolated assuming straight slope between each published elevation. Highest / Lowest elevation of the LSAA might not be the one where the deviation from mean LSAA slope is the greatest.

(i) **Simple**:

- Approximately up to +/- 0.4% mean LSAA slope and Less than 1 m (3 ft) variation around mean LSAA slope.

or

- previous experience in more constraining touch down condition in the same aircraft type or variant.

(ii) **Moderate**:

- Approximately up to +/- 0.8% mean LSAA slope and Less than 2m (3ft) variation around mean LSAA slope .

(iii) **Complex**:

- Approximately up to +/- 1.0% mean LSAA slope and Less than 4m (6ft) variation around mean LSAA slope.

(iv) **Very complex**:

- Outside any of the limits define above.

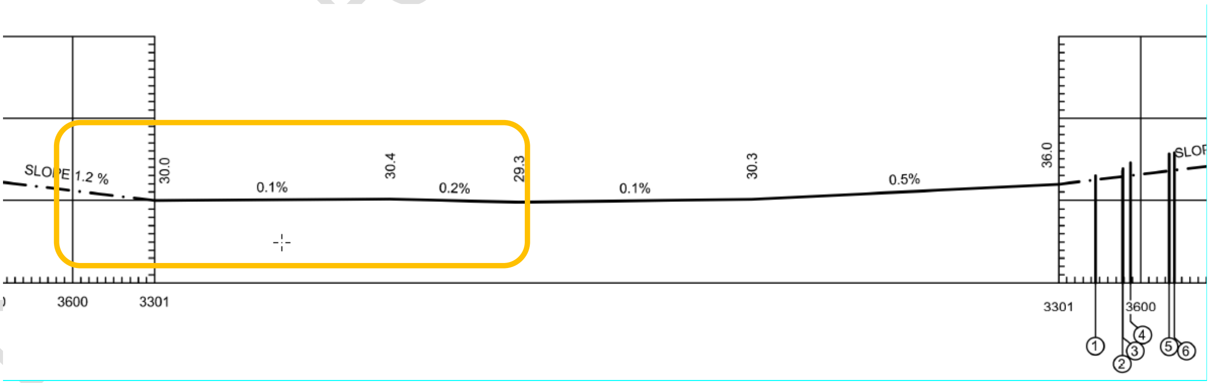


Figure 2: Typical example of "Simple" LSAA Slope (ESSA 01L dated 2018)

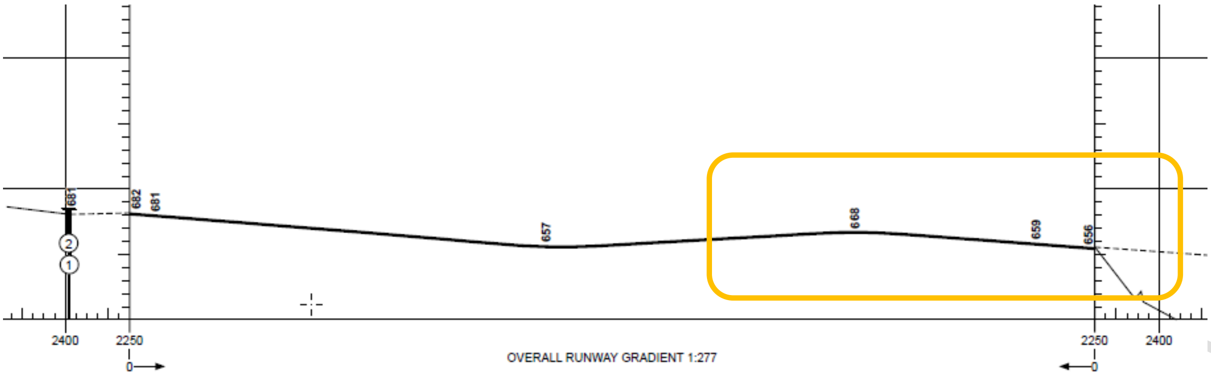


Figure 3: *Typical example of "**Moderate**" LSAA slope due to variation around mean LSAA slope greater than 1m but lower than 2m (EGNM 32 dated 2018)*

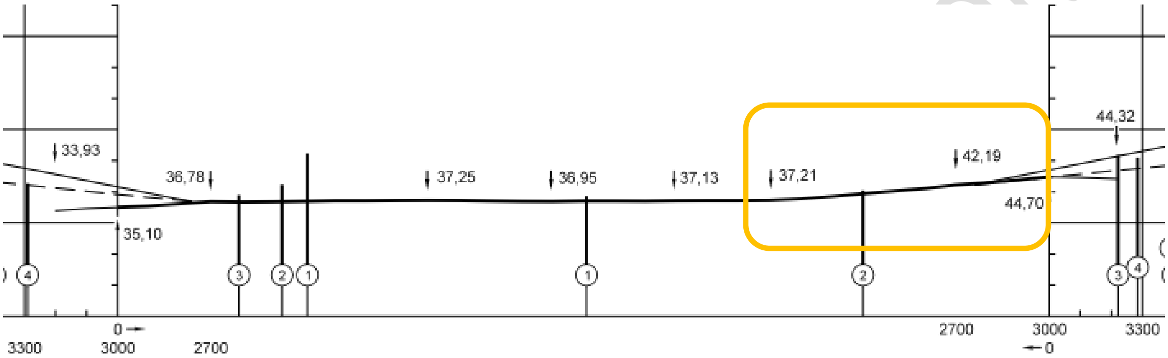


Figure 4: *Typical example of "**Complex**" mean LSAA slope greater than 0.8% but lower than 1% (EDD 23L dated 2009)*

(b) **Operational assessment Program:** the following guidance provide example to typical Flight program than can be used to demonstrate suitability of a landing system using operational assessment method, considering the overall level of runway irregularities. As stated in AMC4 (2), the flight program should be agreed between Aircraft Operator and Competent Authority.

Note: For CAT II operation without use of autoland nor Guidance for the flare manoeuvre, the program could be alleviate.

The flight programs is expected to depend on level of runway irregularities. Table 1 provided example of criteria that can be used to determine level of runway irregularities.

Pre-threshold LSAA Slope	Simple	Moderate	Complex	Very Complex
Simple	Simple	Moderate	Complex	Very Complex
Moderate	Moderate	Moderate	Complex	Very Complex
Complex	Complex	Complex	Complex	Very Complex
Very Complex	Very Complex	Very Complex	Very Complex	Very Complex

Table 1: *Level of Runway irregularities to scale the Flight program*

(1) Simple runway: For simple runways, unless other factors can be identified as a source of concern, no inflight approach and landing may be required.

(2) Moderate runway: Moderate runway:

For moderate runways, a minimum of one successful approach/landing using the procedures, equipment and operationally relevant heights (DH/AH) for the intended operations should be performed in the meteorological conditions described in AMC4 SPA.LVO.110 point (a). More approaches could be required if any issue is identified during this approach/landing.

(3) Complex runway: for complex runways, an initial minimum of three approach/landing using the procedures, equipment and operationally relevant heights (DH/AH) for the intended operations meteorological conditions described in AMC4 SPA.LVO.110 point (a), with at least one of the landings close to the maximum landing weight for the intended operation and the other two with other different conditions, for example with a mid-weight in one and low weight in another or with different or wind conditions or aircraft configuration flap full/flap 3, or a combination of them…etc. The flights for the assessment should be conducted by pilots designated by the operator with a defined minimum experience and qualification, with procedures defined for the purpose More approaches could be required if any issue is identified during these approach/landing.

(4) Very Complex runway: for very complex runways, an initial minimum of four to six approach/landing using the procedures, equipment and operationally relevant heights (DH/AH) for the intended operations meteorological conditions described in AMC4 SPA.LVO.110 point (a) in typical Aircraft weight conditions in non revenue service.

If no anomaly is observed after the first four to six approaches/landings, extend the condition progressively close to the maximum landing weight for the intended operation with at least 15 successful approaches/landings and report any anomalies with the meteorological conditions described in AMC4 SPA.LVO.110 point (a) and with different conditions, for example with different range of weight conditions (high, mid, low) or with different wind conditions or aircraft configuration flap full/flap 3, or a combination of them…etc. The flights for the assessment should be conducted by pilots designated by the operator with a defined minimum experience and qualification, with procedures defined for the purpose.

(c) Operational assessment successful criteria:

(1) Data to be recorded: to assess adequate performance of the landing system some form of quantitative data should be recorded and reviewed with competent authorities as verification of performances. Acceptable method of data collections include, but are not limited to:

(i) Record of wind conditions and touch down point (Can be observation).

(ii) Record of pertinent landing system parameters (Typically from DFDR, quick access recorder or equivalent) with sufficient sampling rate (typically higher than 1 sample per second) for the part of the flight paths of interest (Typically from 300ft height above touch down through de-rotation after touch down) including typically:

- Barometric altitude
- Radio Altitude
- Glide path error
- Vertical speed
- Elevator command
- Pitch attitude
- Throttle position / Thrust commanded

    - Airspeed
    - Mode transition or engagement.

(iii) Photo or Video recording of pertinent instrument or instrument and outside view allowing post flight replay and review of the above parameters.

(2) Data review and analysis to assess acceptable performance: the final approach, flare and touch down profile should be reviewed with competent authorities to ensure suitability of at least each of the following:

(i) Suitability of the resulting flight path

(ii) Acceptability of any flight path deviation from the nominal path (e.g. glide path deviation, deviation from nominal flare profile)

(iii) Proper mode switching

(iv) Suitable Touch down point

(v) Suitable sink rate at touch down

(vi) Proper Flare initiation altitude

(vii) Suitability flare quality (e.g. no evidence of early or late flare, no over-flare or under flare, no undue “pitch down” tendency at flare initiation or during flare, no flare oscillation, no abrupt flare, no inappropriate pitch response during flare, no unacceptable floating tendency, or other inacceptable characteristic that a pilot could interpret as a failure or inappropriate response of the landing system).

(viii) No unusual flight control displacement (e.g. elevator control input spikes or oscillation)

(ix) Appropriate Throttle/Thrust retard (e.g. no early or late retard, no failure to retard, no undue reversal of retard, no undue pitch/thrust coupling)

(x) Appropriate speed decay in flare (e.g. no unusually low speed risking high pitch attitude and tail strike, no excessive float, appropriate seed decay even if well above Vref at flare initiation due to planned wind or gust compensation)

(xi) Proper mode initiation or mode transition relating to altitude or radio altitude inputs (e.g. crosswind alignment).

GM9 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures

VERIFICATION USING AN FSTD (AMC4 SPA.LVO.110 POINT (f)(2)).

Using an FSTD to support an operational assessment can be useful when, for example, terrain criteria would qualify as “complex” or “very complex” (level of runway irregularities according to GM10 SPA.LVO.110).

FSTD are usually designed with the objective to replicate the aspects relevant to the scope of flight training associated to type and level of the FSTD qualification. FSTD are usually not designed to be used in the context of this GM and there may be limits to what an FSTD may be used for. It should be ensured that the capabilities of the FSTD can support the objectives of the operational assessment.

When using an FSTD any relevant differences between the real aircraft and the FSTD should be taken into consideration. A full flight simulator (FFS) Level D certified for zero flight time training is generally most suitable.

Relevant FSTD TO APPLY A VERIFICATION USING AN FSTD

An FSTD should only be used if the same use concept of approach system or landing system can be replicated, see GM4 SPA.LVO.110 ‘same use concept of approach system or landing system’. If the FSTD replicates another aircraft model, series or variant, point (c) of AMC2 SPA.LVO.110 should be applied.

The following factors should be considered:

(1) Aircraft systems

With regard to the replication of the aircraft system, the operator should ensure that the FSTD replicates the configuration and behavior of the approach system or landing system of the aircraft. It should cover all systems that are relevant and should include - as a minimum - the guidance and control systems, the relevant displays and the automatic call outs.

The FSTD may be composed by actual aircraft components or simulated components either by the aircraft manufacturer or by another supplier (e.g., the FSTD manufacturer). If a version or standard of a system or component differs from the aircraft, the operator should verify with the TC/STC holder, if the differences have an impact the performance or behavior of the approach system or landing system.

(2) Pre-threshold and runway terrain

The aircraft operator should ensure that all relevant pre threshold and runway profile data are inserted in the FSTD and are presentative of the real world. This could mean that additional features may need to be implemented in the terrain database of the FSTD, as the certification specifications for FSTD require a realistic topography only for a very limited number of aerodromes.

If the pre-threshold terrain includes an artificial radio altimeter surface (ARAS), the ARAS may be verified in the FSTD, provided that it can be shown, which may be done by using flight data, for this ARAS that the actual echoes of the radio altimeters can be adequately reproduced in the FSTD.

(3) Navigation facilities and associated instrument flight approach procedures

All relevant navigation facilities for the instrument flight approach procedures need to be adequately represented in the FSTD. It has to be taken into account that the FSTD representation of the signal in space are usually not realistic in the sense of the signal propagation and is limited to being a straight line on space, which is adequate for training purposes. Some FSTD support, as simulation feature for a failure case, a parallel displacement of target approach path, however dynamic displacements (bends) or VHF noise in the signal is usually not simulated.

If the operational depends on a navigational aid, the use of the FSTD should be limited to the published service volume of the real world navigation aid. The use of the FSTD outside of this space is usually not meaningful as the signal performance and quality of the real world navigation aid is not known.

(4) Runway environment characteristics and facilities

Whenever the flight operations relies on visual references in both natural or enhanced vision to control or monitor the flight path or to identify relevant obstacles, all relevant environment characteristics and facilities need to be suitably represented. In the case of an EFVS the visual advantage of the system needs to be representative of the EFVS presentation in the aircraft. This could mean that additional features may need to be implemented in the visual database of the FSTD, as the certification specifications for FSTD require a realistic scenery only for a very limited number of aerodromes.

(5) Scope of FSTD assessment

The minimum scope of the FSTD verification may be based on the level of runway irregularities as per GM10 SPA.LVO.110 (scaled approach).

AMC5 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures

COLLECT AND DEVELOP AIRPORT DATA NOT CONTAINED IN THE AIP – AEROPLANES

When the operator wishing to use an aerodrome where its relevant data for the purpose of LVO is not provided or some data is not provided, the operator should develop procedures to collect or develop the necessary data. The procedure should be stated specific (area of operation) and should be approved by competent authority.

GM10 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures.

COLLECT AND DEVELOP AIRPORT DATA NOT CONTAINED IN THE AIP – AEROPLANES

The AIP charts should be the primary means to collect the necessary data.

In the context of AMC5 SPA.LVO.110, the operator may use surveys and/or collected data from airplane sensors or data recorders. This method could be typically used to determine the pre threshold terrain profile and partially the LSAA if not published by a state authority.

These options should be part of the approval and could include, but not limited to:

(i) Data of appropriate sensors (e.g. radio altimeter, GNSS Position, LOC/GS deviations)
(ii) Data collected from appropriate sensors stored in recorders
(iii) FDM data if appropriate

Sensors and data accuracy including recorded sampling rate should be considered in the usage of the collected data.

When defined in the approval, the respective data might be used for other airplane types.

AMC6 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures

SUITABLE INSTRUMENT APPROACH PROCEDURES

(a) CAT II instrument approach operations should only be conducted using a CAT II IAP.

(b) CAT III instrument approach operations should only be conducted using a CAT III IAP.

(c) SA CAT I operations should only be conducted using a SA CATI IAP or if not available an CAT I IAP that includes an OCH based on radio altimeter.

(d) SA CAT II operations should only be conducted using a SA CATII IAP or if not available CAT II IAP.

(e) EFVS operations should only be conducted using an IAP which is offset by a maximum of 3 degrees unless a different approach offset is stated in the AFM.

206. The following AMC2 SPA.LVO.110 is inserted:

AMC7 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures

SUITABLE AERODROMES — LVTO OPERATIONS

(a) An operator should only use an aerodrome for LVTO operations if LVPs have been established.

(b) For LVTO operations with an RVR of less than 125 m, the following should apply:

  (1) The runway has centreline lights spaced at intervals of 15 m or less;

  (2) If an ILS signal is used for lateral guidance, the ILS localiser signal meets the requirements for category III operations, unless otherwise stated in the AFM;

  (3) If an ILS signal is to be used, LVPs include protection of the runway and, where an ILS localiser signal is used, it should include protection of the ILS-sensitive area unless otherwise stated in the AFM; and

  (4) If a GLS signal is used for lateral guidance, the GLS performance type meets the requirements for category III operations, unless otherwise stated in the AFM.

207. The following AMC3 SPA.LVO.110 is inserted:

AMC8 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures

SUITABLE AERODROMES — APPROACH OPERATIONS OTHER THAN EFVS OPERATIONS

(a) For CAT II instrument approach operations, a PA runway category II or category III should be used. The following visual aids should be available:

  (1) category II approach lights;

  (2) standard runway markings;

  (3) category II runway lights.

(b) For CAT III instrument approach operations, a PA runway category III should be used. The following visual aids should be available:

  (1) category III approach lights;

  (2) standard runway markings;

  (3) category III runway lights.

(c) For SA CAT I operations:

  (1) where an ILS/MLS is used, it should not be promulgated with any restrictions affecting its usability and should not be offset from the extended centreline;

  (2) where a GLS is used, it should not be promulgated with any restrictions affecting its usability and should not be offset from the extended centreline;

  (3) where an ILS or GLS is used, it should be at least the minimum ILS or GLS classification stated in the AFM and meet any of the required minimum performance parameters stated in the AFM;

(4) the glide path angle is 3.0°; a steeper glide path, not exceeding 3.5 ° and not exceeding the limits stated in the AFM, can be approved provided that an equivalent level of safety is achieved; and

(5) runway markings, category I approach lights as well as runway edge lights, runway threshold lights, and runway end lights should be available.

(d) For SA CAT II operations:

(1) where an ILS/MLS is used, it should not be promulgated with any restrictions affecting its usability and should not be offset from the extended centreline;

(2) where an ILS or GLS is used, the following applies:

(i) an ILS is used, it should be certified to at least class II/D/2; or

(ii) a GLS is used, it should not be promulgated with any restrictions affecting its usability and should not be offset from the extended centreline; or

(iii)) if the AFM provide such data, the minimum ILS or GLS classification stated in the AFM and meet any of the required minimum performance parameters stated in the AFM.

(3) the glide path angle is 3.0°; a steeper glide path, not exceeding 3.2°, can be approved provided that the operator demonstrates an equivalent level of safety; and

(4) the following visual aids should be available:

(i) standard runway markings, category I approach lights as well as runway edge lights, runway threshold lights and runway end lights; and

(ii) for operations with an RVR of less than 400 m, centreline lights.

208. The following AMC4 SPA.LVO.110 is inserted:

AMC9 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures

SUITABLE AERODROMES — LVPs

(a) An operator should only use an aerodrome for low-visibility approach operations if:

(1) the aerodrome is approved or assessed as suitable as follows:

(i) In case of CAT II or CAT III operations, the aerodrome has been approved for such operations by the State of the aerodrome;

(ii) In case of other than CAT II or CAT III operations:

(A) the aerodrome has been approved for such operations, where the State of the aerodrome issues such approvals as per Regulation (EU) No 139/2014; or

(B) the aerodrome has been assessed by the operator as suitable for the intended operation, where the State of the aerodrome does not issue such approvals;

(2) LVPs have been established.

(b) Notwithstanding (a), if an operator selects an aerodrome, where the term 'LVPs' is not used, the operator should verify that suitable procedures are established to ensure an equivalent level of safety to that achieved at approved aerodromes. This situation should be clearly noted in the operations manual or procedures manual, including guidance to the flight crew on how to determine that the suitable procedures are in effect at the time of an actual operation.

209. The following AMC5 SPA.LVO.110 is inserted:

AMC10 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures

VERIFICATION OF THE SUITABILITY OF RUNWAYS FOR EFVS OPERATIONS

(a) The operator should conduct an ASSESSMENT OF AERODROMES FOR THE INTENDED OPERATIONS as detailed in AMC1 SPA.LVO.110 and related AMC.

(b) The assessment in point (a) should include the approach and runway lights installed (notably incandescent or LED lights) are adequate for the EFVS equipment used by the operator.

(c) Additionally, for the following operations:

(1) NPA procedures;

(2) APV;

(3) category I PA procedures on runways where an OFZ is not provided; and

(4) approach procedures not designed in accordance with PANS-OPS or equivalent criteria.

the operator should assess obstacles.

(d) The assessment in point (c) should determine whether:

(1) obstacle protection can be ensured in the visual segment from DA/H to landing, without reliance on visual identification of obstacles or in the event of a balked landing; and

(2) obstacle lights installed (notably incandescent or LED lights) are adequate for the EFVS equipment used by the operator.

(d) If the assessment determines that obstacle clearance cannot be ensured in the visual segment without reliance on visual identification of obstacles, the operator should not authorise EFVS operations to that runway or restrict the operation to the type and/or category of instrument approach operations where obstacle protection is ensured. Note: obstacles of a height of less than 50 ft above the threshold may be disregarded when assessing the VSS.

(e) If the operational assessment determines that obstacle protection is not assured in the event of a go-around initiated at any point prior to touchdown, the operator should not authorise the operation unless procedures to mitigate the risk of inadequate obstacle protection are developed and implemented.

(f) If the AFM stipulates specific requirements for approach procedures, the operational assessment should include a determination of whether these requirements can be met.

210. The following GM1 SPA.LVO.110 is inserted:

211. The following GM2 SPA.LVO.110 is inserted:

GM11 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures

SUITABLE AERODROMES — INSTRUMENT APPROACH PROCEDURES FOR SA CAT I AND SA CAT II

ICAO design criteria for IAPs are contained in PANS-OPS (Doc 8168), Volume II.

The design criteria for SA CAT I are the same as those used for standard CAT I approaches, except that the procedures used for SA CAT I should have an OCH based on radio altimeter height loss since the use of a radio altimeter or other device capable of providing equivalent performance to determine the DH is prescribed.

PANS-OPS Volume II contains the following statement about OCH based on the use of a radio altimeter: ‘If the radio altimeter OCA/H is promulgated, operational checks shall have confirmed the repeatability of radio altimeter information.’ To assist in assessing the suitability of the approach area for the use of a radio altimeter, aerodromes may produce a precision approach terrain chart. Such a chart is a standard requirement for CAT II/III runways. The criteria for the precision approach terrain chart are contained in ICAO Annex 4, which explains the function as follows: ‘The chart shall provide detailed terrain profile information within a defined portion of the final approach so as to enable aircraft operating agencies to assess the effect of the terrain on DH determination by the use of radio altimeters.’ A DH of 150 ft is located approximately 600 m before the threshold on a 3° glide path.

For SA CAT I operations, the instrument approach chart should contain an OCH based on the use of a radio altimeter or other device capable of providing equivalent performance, and the information in Part C of the operations manual must contain a DH based on the use of a radio altimeter. This procedure may be titled ‘SA CAT I’ or ‘CAT I’.

For SA CAT II, the situation is similar. The design criteria are identical to those for CAT II approaches in PANS-OPS, the only exception being the lack of some lighting systems. The OCH and DH are based on the use of a radio altimeter or other device capable of providing equivalent performance.

Since some of the lighting systems are missing, it is unlikely that a State will publish the instrument approach chart as CAT II or OTS CAT II but preferably as SA CAT II, even though the design criteria are the same. If a State, however, promulgates such an instrument approach as CAT II, it can be used for SA CAT II operations.

SA CAT II operations can be conducted on regular CAT II runways and following CAT II procedures.

212. The following GM3 SPA.LVO.110 is inserted:

GM12 SPA.LVO.110 Aerodrome-related requirements, including instrument flight procedures

VERIFICATION OF THE SUITABILITY OF RUNWAYS FOR EFVS OPERATIONS

(a) EFVS operations allow operation below the DA/H without ‘natural’ visual reference. Obstacles may not be obvious to the crew using the EFVS and thus the approach descent slope used has to ensure that obstacle protection will be provided in the visual segment.

(b) When operating below the DA/H, pilots rely on the EFVS and, for EFVS-A operations, the pilot flying will need to acquire ‘natural’ visual reference at some point prior to touchdown (typically100 ft above the threshold elevation). EFVS operations may present a higher probability of initiating a go-around below the DA/H than non-EFVS operations, depending on the equipment used.

(c) The purpose of the assessment of the suitability of aerodromes of Instrument Approach Procedures (IAPs) is to confirm that clearance from terrain and obstacles will be available at every stage of the approach including the visual segment and, in the event of a go-around initiated below the DH, the missed approach segment. The assessment of the visual segment should be done with reference to the visual segment surface (VSS).

(d) If a runway and an approach has been promulgated as suitable for EFVS operations, it may be assumed that the required obstacle clearance for the instrument segment and obstacle protection for the visual segment is assured and that the lighting systems are suitable. For EFVS-L operations, the pre-threshold terrain and LSAA need to be evaluated with regard to the function of flare cues or flare commands.

(e) US TERPS and ICAO Doc 9905 'Required Navigation Performance Authorisation Required (RNP AR) Procedure Design Manual' describe procedure design criteria that may be considered equivalent to PANS-OPS.

(f) Procedures not designed in accordance with PANS-OPS may have not been assessed for–obstacle protection below the OCH, and may not provide a clear vertical path to the runway at the normal-descent angle. Instrument approach procedures do not ensure obstacle clearance if a go-around is initiated below the DA/H. If an OFZ is established the runway, obstacle protection is provided for the go-around maneuver.

(g) For approach procedures where obstacle protection is not assured for a balked landing, operational procedures available to the operator could include one or more of the following actions:

(1) continue to the end of the runway and follow a published departure procedure for the landing runway (standard instrument departure or omnidirectional departure) in the event of a go-around below the DA/H;

(2) require that a go-around should be executed promptly if the required visual reference is not distinctly visible and identifiable to the pilot without reliance on the EFVS by a height above the threshold that will ensure that obstacle protection. This height might be greater than 100 ft or the height below which an approach should not be continued if the flight crew does not acquire natural visual reference as stated in the AFM;

(3) develop an alternative lateral profile to be followed in the event of a go-around below the DA/H; and

(4) impose an aircraft mass restriction for EFVS operations so that the aircraft can achieve a sufficient missed approach climb performance to clear any obstacles in the missed approach segment if a go-around is initiated at any point prior to touchdown.

(h) The terrain/obstacle clearance required in the missed approach phase for EFVS operations should be no less than for the same approach flown without EFVS.

(i) Certain EFVSs may have additional requirements for the suitability of the runways to be used. These could include verification of the accuracy of charting information for the runway threshold or the type of approach lighting installed (incandescent or LED). The assessment of aerodromes for the intended operations should include verification that all such requirements can be satisfied before EFVS operations are authorised for a particular runway.

213. The current AMC1 SPA.LVO.120 is deleted.

~~AMC1 SPA.LVO.120 Flight crew training and qualifications~~

~~GENERAL PROVISIONS~~

214. The current GM1 SPA.LVO.120 is deleted.

~~GM1 SPA.LVO.120 Flight crew training and qualifications~~

~~FLIGHT CREW TRAINING~~

215. The following AMC1 SPA.LVO.120(a) is inserted:

AMC1 SPA.LVO.120(a) Flight crew competence

EXPERIENCE IN TYPE OR CLASS OR AS PILOT-IN-COMMAND/COMMANDER

The operator should assess the risks associated with the conduct of low-visibility approach operations by pilots new to the aircraft type or class and take the necessary mitigation. Where such mitigation includes an increment to the visibility or RVR for LVOs, this should be stated in the operations manual.

216. The following AMC2 SPA.LVO.120(a) is inserted:

AMC2 SPA.LVO.120(a) Flight crew competence

RECENT EXPERIENCE REQUIREMENTS FOR EFVS OPERATIONS

(a) Pilots should complete a minimum of two approaches on each type of aircraft operated using the operator's procedures for EFVS operations during the validity period of each operator proficiency check or periodic demonstration of competence unless credits related to recent experience when operating more than one type are defined in the operational suitability data established in accordance with Regulation (EU) No 748/2012.

(b) If a flight crew member is authorised to operate as pilot flying and pilot monitoring during EFVS operations, he or she should complete the required number of approaches in each operating capacity.

217. The following AMC3 SPA.LVO.120(a) is inserted:

AMC3 SPA.LVO.120(a) Flight crew competence

RECENT EXPERIENCE REQUIREMENTS FOR SA CAT I, CAT II, SA CAT II AND CAT III APPROACH OPERATIONS

During the validity period of each operator proficiency check or periodic demonstration of competence:

(a) pilots authorised to conduct low-visibility approach operations or operations with operational credits, should complete at least two approaches using the operator's procedures for low-visibility approach operations or operations with operational credits.

(b) notwithstanding (a), pilots authorised to conduct low-visibility approach operations or operations with operational credits, using HUDLS or equivalent display systems to touchdown, should complete at least four approaches using the operator's procedures for low-visibility approach operations or operations with operational credits using HUDLS.

218. The following GM1 SPA.LVO.120(a) is inserted:

GM1 SPA.LVO.120(a) Flight crew competence

EXPERIENCE IN TYPE OR CLASS OR AS PILOT-IN-COMMAND/COMMANDER

As general guidance, the operator may use the following reference to assess the experience in type or class or as pilot-in-command/commander referred to in AMC1 SPA.LVO.120(a):

(a) Before commencing CAT II operations, the following additional provisions may apply to pilots-in-command/commanders or pilots to whom conduct of the flight may be delegated, who are new to the aircraft type or class:

  (1) 50 hours or 20 sectors on the type, including LIFUS; and

  (2) 100 m may be added to the applicable CAT II RVR minima when the operation requires a CAT II manual landing to touchdown until:

    (i) a total of 100 hours or 40 sectors, including LIFUS, has been achieved on the type; or

    (ii) a total of 50 hours or 20 sectors, including LIFUS, has been achieved on the type where the flight crew member has been previously qualified for CAT II manual landing operations with an EU operator;

  (3) 100 m may be added to the applicable CAT II RVR minima when the operation requires the use of CAT II HUDLS to touchdown until:

    (i) a total of 40 sectors, including LIFUS, has been achieved on the type; or

    (ii) a total of 20 sectors, including LIFUS, has been achieved on the type where the flight crew member has been previously qualified for CAT II HUDLS to touchdown with an EU operator.

  The sector provision in point (a)(1) may always be applicable; the hours on type or class may not fulfil the provisions.

(b) Before commencing CAT III operations, the following additional provisions may apply to pilots-in-command/commanders or pilots to whom conduct of the flight may be delegated, who are new to the aircraft type:

  (1) 50 hours or 20 sectors on the type, including LIFUS; and

  (2) 100 m may be added to the applicable CAT II or CAT III RVR minima unless they have previously qualified for CAT II or III operations with an EU operator, until a total of 100 hours or 40 sectors, including LIFUS, has been achieved on the type.

219. The following GM2 SPA.LVO.120(a) is inserted:

GM2 SPA.LVO.120(a) Flight crew competence

RECENCY IN LOW-VISIBILITY APPROACHES OR OPERATIONAL CREDIT

The recency provisions in point (a) AMC2 SPA.LVO.120(a) follows the same principles as FCL.060 where it may be completed in normal flight operations, flight training, FSTD, ...etc.

220. The following AMC1 SPA.LVO.120(b) is inserted:

AMC1 SPA.LVO.120(b) Flight crew competence

INITIAL TRAINING FOR LVTO IN AN RVR LESS THAN 400 M

The operator should ensure that the flight crew members have completed the following training and checking prior to being authorised to conduct take-offs in an RVR below 400 m unless credits related to training and checking for previous experience in LVTO on similar aircraft types are defined in the operational suitability data established in accordance with Regulation (EU) No 748/2012:

(a) A ground training course including at least the following:

- (1) characteristics of fog;
- (2) effects of precipitation, ice accretion, low level wind shear and turbulence;
- (3) effect of specific aircraft/system malfunctions;
- (4) use and limitations of RVR assessment systems;
- (5) procedures to be followed and precautions to be taken with regard to surface movement during operations when the RVR is 400 m or less and any additional procedures required for take-off in conditions below 150 m (200 m for Category D aeroplanes);
- (6) qualification requirements for pilots to obtain and retain approval to conduct LVOs; and
- (7) importance of correct seating and eye position.

(b) A course of FSTD/flight training covering system failures and engine failures resulting in continued as well as rejected take-offs. Such training should include at least:

- (1) normal take-off in minimum approved RVR conditions;
- (2) take-off in minimum approved RVR conditions with an engine failure:
  - (i) for aeroplanes, between V_1 and V_2 (take-off safety speed) or as soon as safety considerations permit;
  - (ii) for helicopters, at or after the take-off decision point (TDP); and
- (3) take-off in minimum approved RVR conditions with an engine failure:
  - (i) for aeroplanes, before V_1 resulting in a rejected take-off; and
  - (ii) for helicopters, before the TDP.

(c) The operator approved for LVTOs with an RVR below 150 m should ensure that the training specified in (b) is carried out in an FSTD. This training should include the use of any special procedures and equipment.

(d) The operator should ensure that a flight crew member has completed a check before conducting LVTOs in RVRs of less than 150 m. The check should require the execution of:

- (1) at least one LVTO in the minimum approved visibility;
- (2) at least one rejected take-off at minimum authorised RVR in an aircraft or FSTD:

For pilots with previous experience with an EU operator of LVTO in RVRs of less than 150 m, the check may be replaced by successful completion of the FSTD and/or flight training specified in (a), (b) and (c).

221. The following AMC2 SPA.LVO.120(b) is inserted:

AMC2 SPA.LVO.120(b) Flight crew competence

INITIAL TRAINING AND CHECKING FOR SA CAT I, CAT II, SA CAT II AND CAT III APPROACH OPERATIONS

Operators should ensure that flight crew members complete the following training and checking before being authorised to conduct SA CAT I, CAT II, SA CAT II and CAT III approach operations unless credits related to training and checking for previous experience on similar aircraft types are defined in the operational suitability data established in accordance with Regulation (EU) No 748/2012:

(a) Flight crew members who do not have previous experience with an EU operator of low-visibility approach operations requiring an approval under this Subpart:

  (1) A course of ground training including at least the following:

    (i) characteristics and limitations of different types of approach aid;

    (ii) characteristics of the visual aids;

    (iii) characteristics of fog;

    (iv) operational capabilities and limitations of airborne systems to include symbology used on HUD/HUDLS or equivalent display systems, if appropriate;

    (v) effects of precipitation, ice accretion, low level wind shear and turbulence;

    (vi) effect of specific aircraft/system malfunctions;

    (vii) use and limitations of RVR assessment systems;

    (viii) principles of obstacle clearance requirements;

    (ix) recognition of and action to be taken in the event of failure of ground equipment or in satellite approaches the signal in space;

    (x) procedures to be followed and precautions to be taken with regard to surface movement during operations when the RVR is 400 m or less and any additional procedures required for take-off in conditions below 150 m;

    (xi) significance of DHs based upon radio altimeters and the effect of terrain profile in the approach area on radio altimeter readings and on automatic approach/landing systems. This applies to other devices capable of providing equivalent information;

    (xii) importance and significance of alert height, if applicable, and action in the event of any failure above and below the alert height;

    (xiii) qualification requirements for pilots to obtain and retain approval to conduct LVOs; and

    (xiv) importance of correct seating and eye position.

  (2) A course of FSTD training and/or flight training in two phases as follows:

    (i) Phase one (LVOs with aircraft and all equipment serviceable) — objectives:

      (A) understand the operation of equipment required for LVOs;

      (B) understand the operating limitations resulting from airworthiness certification;

      (C) practise monitoring of automatic flight control systems and status annunciators;

      (D) practise the use of HUD/HUDLS or equivalent display systems, where appropriate;

(E) practise monitoring of automatic flight control systems and status annunciators;

(F) understand the significance of alert height, if applicable;

(G) become familiar with the maximum lateral and vertical deviation permitted for different types of approach operation;

(H) become familiar with the visual references required at DH;

(I) master the manual aircraft handling relevant to low-visibility approach operations;

(J) practise coordination with other crew members; and

(K) become proficient at procedures for low-visibility approach operations with serviceable equipment.

(ii) Phase one of the training should include the following exercises:

(A) the required checks for satisfactory functioning of equipment, both on the ground and in flight;

(B) the use of HUD/HUDLS or equivalent display systems during all phases of flight, if applicable;

(C) approach using the appropriate flight guidance, autopilots, and control systems installed on the aircraft to the appropriate DH and transition to visual flight and landing;

(D) approach with all engines operating using the appropriate flight guidance, autopilots and control systems installed on the aircraft, including HUD/HUDLS or equivalent display systems, down to the appropriate DH followed by a missed approach, all without external visual reference;

(E) where appropriate, approaches using autopilot to provide automatic flare, hover, landing and roll-out; and

(F) where appropriate, approaches using approved HUD/HUDLS or equivalent display system to touchdown.

(iii) Phase two (low-visibility approach operations with aircraft and equipment failures and degradations) — objectives:

(A) understand the effect of known aircraft unserviceability including use of the MEL;

(B) understand the effect on aerodrome operating minima of failed or downgraded equipment;

(C) understand the actions required in response to failures and changes in the status of automatic flight control/guidance systems including HUD/HUDLS or equivalent display systems;

(D) understand the actions required in response to failures above and below alert height, if applicable;

(E) practise abnormal operations and incapacitation procedures; and

(F) become proficient at dealing with failures and abnormal situations during low-visibility approach operations.

(iv) Phase two of the training should include the following exercises:

(A) approaches with engine failures at various stages on the approach;

(B) approaches with critical equipment failures, such as electrical systems, auto-flight systems, ground or airborne approach aids and status monitors;

(C) approaches where failures of auto-flight or flight guidance systems, including HUDLS or equivalent display systems, require either:

(a) reversion to manual control for landing or missed approach; or

(b) reversion to manual flight or a downgraded automatic mode to control missed approaches from the DH or below, including those which may result in contact with the runway.

This should include aircraft handling if, during a CAT III fail-passive approach, a fault causes autopilot disconnect at or below the DH when the last reported RVR is 300 m or less;

(D) failures of systems that will result in excessive lateral or vertical deviation both above and below the DH in the minimum visual conditions for the operation;

(E) incapacitation procedures appropriate to low-visibility approach operations; and

(F) failures and procedures applicable to the specific aircraft type.

(v) FSTD training should include:

(A) for approaches flown using HUDLS or equivalent display systems, a minimum of eight approaches;

(B) otherwise, a minimum of six approaches.

(vi) For aircraft for which no FSTDs representing the specific aircraft are available, operators should ensure that the flight training phase specific to the visual scenarios of low-visibility approach operations is conducted in a specifically approved FSTD. Such training should include a minimum of four approaches. Thereafter, type-specific training should be conducted in the aircraft.

(3) A check requiring the completion of at least the following exercises in an aircraft or FSTD:

(i) Low-visibility approaches in simulated instrument flight conditions down to the applicable DH, using the flight guidance system. Standard procedures of crew coordination (task sharing, call-out procedures, mutual surveillance, information exchange and support) should be observed. For CAT III operations, the operator should use an FSTD approved for this purpose;

(ii) Go-around after approaches as indicated in (2) at any point between 500 feet AGL and on reaching the DH; and

(iii) Landing(s) with visual reference established at the DH following an instrument approach. Depending on the specific flight guidance system, an automatic landing should be performed.

(4) For operators for which LIFUS is required by Part-ORO, practice approaches during LIFUS, as follows:

(i) For low-visibility approach operations using a manual landing:

(A) if a HUDLS or equivalent display system is used to touchdown, four landings, or if the training required by (a)(2) was conducted in an FSTD qualified for zero flight-time training (ZFTT), two landings;

(B) otherwise, three landings, or if the training required by (a)(2) was conducted in an FSTD qualified for ZFTT, one landing;

(ii) For low-visibility operations using autoland:

(A) if the training required by (a)(2) was conducted in an FSTD qualified for ZFTT, one landing, or none if the fight crew member successfully completed a type rating based on ZFTT;

(B) otherwise, two landings.

(b) Flight crew members who have previous experience of low-visibility approach operations requiring an approval under this Subpart when changing to an aircraft for which a new class or type rating is required with the same operator:

(1) A course of ground training as specified in (a)(1), taking into account the flight crew member's existing knowledge of low-visibility approach operations.

(2) The course of FSTD and/or flight training required by (a)(2) above. If the flight crew member's previous experience of low-visibility approach operations is on a type where the following were the same or similar:

(i) the technology used in the flight guidance and flight control system;

(ii) operating procedures;

(iii) handling characteristics; and

(iv) the use of HUD/HUDLS or equivalent display systems,

then he or she may complete an abbreviated course of FSTD and/or flight training.

(3) Such an abbreviated course should meet the objectives described in (a)(2), need not include the number of approaches required by (a)(2)(v), but should include at least the following number of landings:

(i) if a HUDLS or an equivalent display system is utilised to touchdown, then four approaches including a landing at the lowest approved RVR and a go-around; or

(ii) otherwise, two approaches including a landing at the lowest authorised RVR and a go-around.

(c) Flight crew members who have previous experience with an EU operator of low-visibility approach operations requiring an approval under this Subpart when joining another operator:

(1) A course of ground training as specified in (a)(1), taking into account the flight crew member's existing knowledge of low-visibility approach operations.

(2) The course of FSTD and/or flight training required by (a)(2) above. If the flight crew member's previous experience of low-visibility approach operations is on the same aircraft type and variant, or on a different type or variant where the following were the same or similar:

(i) the technology used in the flight guidance and flight control system;

(ii) operating procedures;

(iii) handling characteristics; and

(iv) the use of HUD/HUDLS or equivalent display systems,

then he or she may complete an abbreviated course of FSTD and/or flight training. Such an abbreviated course should meet the objectives described in (a)(2), need not include the number of approaches required by (a)(2)(v), but should include at least two approaches including a landing at the lowest authorised RVR and a go-around.

- (3) Practice approaches during LIFUS as required by (a)(3) above, unless the flight crew member's previous experience of low-visibility approach operations is on the same aircraft type and variant.

222. The following AMC3 SPA.LVO.120(b) is inserted:

AMC3 SPA.LVO.120(b) Flight crew competence

INITIAL TRAINING AND CHECKING FOR EFVS OPERATIONS

Operators should ensure that flight crew members complete the following training and checking before being authorised to conduct EFVS operations unless credits related to training and checking for previous experience on similar aircraft types are defined in the operational suitability data established in accordance with Regulation (EU) No 748/2012:

(a) Flight crew members who do not have previous experience with an EU operator of EFVS operations requiring an approval under this Subpart:

- (1) A course of ground training including at least the following:
    - (i) characteristics and limitations of HUD/HUDLSs or equivalent display systems including information presentation and symbology;
    - (ii) EFVS sensor performance, sensor limitations, scene interpretation, visual anomalies and other visual effects;
    - (iii) EFVS display, control, modes, features, symbology, annunciations and associated systems and components;
    - (iv) interpretation of EFVS imagery;
    - (v) interpretation of approach and runway lighting systems and display characteristics when using EFVS;
    - (vi) weather associated with low-visibility conditions and its effect on EFVS performance;
    - (vii) preflight planning and selection of suitable aerodromes and approach procedures;
    - (viii) principles of obstacle clearance requirements;
    - (ix) use and limitations of RVR assessment systems;
    - (x) normal, abnormal and emergency procedures for EFVS operations;
    - (xi) effect of specific aircraft/system malfunctions;
    - (xii) procedures to be followed and precautions to be taken with regard to surface movement during operations when the RVR is 400 m or less;
    - (xiii) human factors aspects of EFVS operations; and
    - (xiv) qualification requirements for pilots to obtain and retain approval for EFVS operations.
- (2) A course of FSTD training and/or flight training in two phases as follows:
    - (i) Phase one (EFVS operations with aircraft and all equipment serviceable) — objectives:
        - (A) understand the operation of equipment required for EFVS operations;
        - (B) understand operating limitations of the installed EFVS;
        - (C) practise the use of HUD/HUDLS or equivalent display systems;

(D) practise setup and adjustment of EFVS equipment in different conditions (e.g. day and night);

(E) practise monitoring of automatic flight control systems, EFVS information and status annunciators;

(F) practise interpretation of EFVS imagery;

(G) become familiar with the features needed on the EFVS image to continue approach below the DH;

(H) practise identification of visual references using natural vision while using EFVS equipment;

(I) master the manual aircraft handling relevant to EFVS operations including, where appropriate, the use of the flare cue and guidance for landing;

(J) practise coordination with other crew members; and

(K) become proficient at procedures for EFVS operations.

(ii) Phase one of the training should include the following exercises:

(A) the required checks for satisfactory functioning of equipment, both on the ground and in flight;

(B) the use of HUD/HUDLS or equivalent display systems during all phases of flight;

(C) approach using the EFVSs installed on the aircraft to the appropriate DH and transition to visual flight and landing;

(D) approach with all engines operating using the EFVS, down to the appropriate DH followed by a missed approach, all without external visual reference;

(E) where appropriate, approaches using approved EFVS to touchdown.

(iii) Phase two (EFVS operations with aircraft and equipment failures and degradations) — objectives:

(A) understand the effect of known aircraft unserviceabilities including use of the MEL;

(B) understand the effect on aerodrome operating minima of failed or downgraded equipment;

(C) understand the actions required in response to failures and changes in the status of the EFVS including HUD/HUDLS or equivalent display systems;

(D) understand the actions required in response to failures above and below the DH;

(E) practise abnormal operations and incapacitation procedures; and

(F) become proficient at dealing with failures and abnormal situations during EFVS operations.

(iv) Phase two of the training should include the following exercises:

(A) approaches with engine failures at various stages on the approach;

(B) approaches with failures of the EFVS at various stages of the approach, including failures between the DH and the height below which an approach should not be continued if natural visual reference is not acquired, requiring either:

(a) reversion to head-down displays to control missed approach; or

        (b) reversion to flight with no, or downgraded, guidance to control missed approaches from the DH or below, including those which may result in a touchdown on the runway.

      (C) incapacitation procedures appropriate to EFVS operations; and

      (D) failures and procedures applicable to the specific EFVS installation and aircraft type.

    (v) FSTD training should include a minimum of eight approaches.

    (vi) If a flight crew member is to be authorised to operate as pilot flying and pilot monitoring during EFVS operations, then the flight crew member should complete the required FSTD training for each operating capacity.

  (3) For operators for which LIFUS is required by Part-ORO, practice approaches during LIFUS, as follows:

    (i) if EFVS is used to touchdown, four landings; or

    (ii) otherwise, three landings.

(b) Flight crew members who have previous experience of EFVS operations requiring an approval under this Subpart and changing to an aircraft for which a new class or type rating is required with the same operator:

  (1) A course of ground training as specified in (a)(1), taking into account the flight crew member's existing knowledge of low-visibility approach operations.

  (2) The course of FSTD and/or flight training required by (a)(2) above. If the flight crew member's previous experience of low-visibility approach operations is on a type where the following were the same or similar:

    (i) the technology used in the EFVS sensor, flight guidance and flight control system;

    (ii) operating procedures; and

    (iii) handling characteristics,

    then he or she may complete an abbreviated course of FSTD and/or flight training. Such an abbreviated course should meet the objectives described in (a)(2), need not include the number of approaches required by (a)(2)(v), but should include at least the following number of landings:

    (i) For EFVS to touchdown, four approaches including a landing at the lowest approved RVR and a go-around, or

    (ii) otherwise, two approaches including a landing at the lowest authorised RVR and a go-around.

(c) Flight crew members who have previous experience with an EU operator of EFVS operations requiring an approval under this Subpart when joining another operator:

  (1) A course of ground training as specified in (a)(1), taking into account the flight crew member's existing knowledge of low-visibility approach operations.

  (2) The course of FSTD and/or flight training required by (a)(2) above. If the flight crew member's previous experience of EFVS operations is on the same aircraft type and variant with the same EFVS or on a different type or different EFVS where the following were the same or similar:

    (i) the technology used in the EFVS sensor, flight guidance and flight control system;

    (ii) operating procedures; and

    (iii) handling characteristics,

then he or she may complete an abbreviated course of FSTD and/or flight training. Such an abbreviated course should meet the objectives described in (a)(2), need not include the number of approaches required by (a)(2)(v), but should include at least the following number of landings:

(i) for EFVS to touchdown, four approaches including a landing at the lowest approved RVR and a go-around, or

(ii) otherwise, two approaches including a landing at the lowest authorised RVR and a go-around.

(3) Practice approaches during LIFUS as required by (a)(3) above, unless the flight crew member's previous experience of low-visibility approach operations is on the same aircraft type and variant.

223. The following AMC4 SPA.LVO.120(b) is inserted:

AMC4 SPA.LVO.120(b) Flight crew competence

RECURRENT CHECKING FOR LVTO, SA CAT I, CAT II, SA CAT II AND CAT III APPROACH OPERATIONS

(a) The operator should ensure that the pilots' competence to perform LVOs for which they are authorised is checked at each required operator proficiency check or periodic demonstration of competence by completing at least the following exercises:

(1) Rejected take-off at minimum authorised RVR;

(2) One or more low-visibility approaches in simulated instrument flight conditions down to a point between 500 feet AGL and the applicable DH followed by go-around at DH; and

(3) One or more low-visibility approach and landings with visual reference established at the DH.

(b) Pilots authorised to conduct CAT III operations on aircraft with a fail-passive flight control system, including HUD/HUDLS or equivalent, should complete a missed approach at least once over the period of three consecutive operator proficiency checks or demonstrations of competence as the result of an autopilot failure at or below the DH when the last reported RVR was 300 m or less.

(c) Pilots authorised for LVTO operations in an RVR of less than 150 m should additionally conduct at least one LVTO in the minimum approved visibility.

(d) CAT III approach operations should be conducted in an FSTD. Other exercises may be conducted in an FSTD or aircraft.

224. The following AMC5 SPA.LVO.120(b) is inserted:

AMC5 SPA.LVO.120(b) Flight crew competence

DIFFERENCES TRAINING FOR LVTO, SA CAT I, CAT II, SA CAT II AND CAT III APPROACH OPERATIONS

(a) The operator should ensure that the flight crew members are provided with a differences training or familiarisation training whenever they are required to conduct low-visibility approach operations or operations with operational credits requiring an approval under this Subpart for which they are not already authorised, or whenever there is a change to any of the following:

(1) the technology used in the flight guidance and flight control system;

(2) the operating procedures including:

(i) fail-passive/fail-operational;

    (ii) alert height;
    (iii) manual landing or automatic landing;
    (iv) operations with DH or no DH operations;
  (3) the handling characteristics;
  (4) the use of HUD/HUDLS or equivalent display systems;
  (5) the use of EFVS.

(b) The differences training should:
  (1) meet the objectives of the appropriate initial training course;
  (2) take into account the flight crew members' previous experience; and
  (3) take into account the operational suitability data established in accordance with Regulation (EU) No 748/2012.

225. The following AMC6 SPA.LVO.120(b) is inserted:

AMC6 SPA.LVO.120(b) Flight crew competence

RECURRENT CHECKING FOR EFVS OPERATIONS

(a) The operator should ensure that the pilots' competence to perform EFVS operations is checked at each required demonstration of competence or operator proficiency check by performing at least two approaches of which one should be flown without natural vision, to the height below which an approach should not be continued if natural visual reference is not acquired.

(b) If a flight crew member is authorised to operate as pilot flying and pilot monitoring during EFVS operations, then the flight crew member should complete the required number of approaches in each operating capacity.

226. The following AMC7 SPA.LVO.120(b) is inserted:

AMC7 SPA.LVO.120(b) Flight crew competence

DIFFERENCES TRAINING FOR EFVS OPERATIONS

(a) The operator should ensure that the flight crew members authorised to conduct EFVS operations are provided with a differences training or familiarisation training whenever there is a change to any of the following:
  (1) the technology used in the EFVS sensor, flight guidance and flight control system;
  (2) the operating procedures; and
  (3) the handling characteristics.

(b) The differences training should
  (1) meet the objectives of the appropriate initial training course;
  (2) take into account the flight crew members' previous experience; and

(3) take into account the operational suitability data established in accordance with Regulation (EU) No 748/2012.

227. The following GM1 SPA.LVO.120(b) is inserted:

GM1 SPA.LVO.120(b) Flight crew competence

FLIGHT CREW TRAINING

(a) The number of approaches referred to in AMC2, AMC3, AMC4 and AMC6 to SPA.LVO.120(b) represents the minimum number of approaches that the flight crew members should conduct during initial and recurrent training and checking. More approaches or other training exercises may be required in order to ensure that flight crew members achieve the required proficiency.

(b) Where flight crew members are to be authorised to conduct more than one classification of LVOs or operation with operational credits for which the technology and operating procedures are similar, there is no requirement to increase the number of approaches in initial training if the training programme ensures that the flight crew members are competent for all operations for which they will be authorised. Where flight crew members are to be authorised to conduct more than one classification of LVOs or operations with operational credits using different technology or operating procedures, then the required minimum number of approaches should be completed for each different technology or operating procedure.

(c) Where flight crew members are authorised to conduct more than one classification of LVOs or operation with operational credits for which the technology and operating procedures are similar, then there is no requirement to increase the number of approaches flown during recurrent checking. However, where flight crew members are authorised to conduct more than one classification of LVOs or operation with operational credits using different technology or operating procedures, then the required number of approaches should be completed for each different technology or operating procedure.

(d) Flight crew members are required to complete initial and recurrent FSTD training for each operating capacity for which they will be authorised (e.g. as pilot flying and/or pilot monitoring). A pilot who will be authorised to operate in either capacity will need to complete the minimum number of approaches in each capacity.

(e) Approaches conducted in a suitably qualified FSTD and/or during a proficiency check or demonstration of competence may be counted towards the recent experience requirements. If a flight crew member has not complied with the recent experience requirements of AMC2 SPA.LVO.120(a) or AMC3 SPA.LVO.120(a), the required approaches may be conducted during recurrent training, an operator proficiency check or a periodic check of competence either in an aircraft or on an FSTD.

(f) Table 1 presents a summary of initial training requirements for LVOs and operations with operational credits.

(g) Table 2 presents a summary of recent experience and recurrent training/checking requirements for LVOs and operations with operational credits.

Table 1: Summary of initial training requirements for LVOs and operations with operational credits

Approval	Technology	Previous experience	Reference	Practical (FSTD) training	LIFUS (if required)
CAT II	Manual	none	AMC2 SPA.LVO.120(b) point (a)(2)(v)	As required but not less than 6 approaches	3 landings or 1 landing[1]
		Previously qualified with the same operator, similar operations[3]	AMC2 SPA.LVO.120(b) point (b)(2)(ii)	2 approaches	none
		Previously qualified with a different EU operator, same type and variant	AMC2 SPA.LVO.120(b) point (c)(2)	2 approaches	none
		Previously qualified with a different EU operator, similar operations[3]	AMC2 SPA.LVO.120(b) point (c)(2)	2 approaches	3 landings or 1 landing[1]
SA CAT I CAT II SA CAT II CAT III	Autoland	none	AMC2 SPA.LVO.120(b) point (a)(4)(ii)	As required but not less than 6 approaches	2 landings or 1 landing[1] or no landings[2]
		Previously qualified with the same operator, similar operations[3]	AMC2 SPA.LVO.120(b) point (b)(2)(ii)	2 approaches	None
		Previously qualified with a different EU operator, same type and variant	AMC2 SPA.LVO.120(b) point (c)(2)	2 approaches	none
		Previously qualified with a different EU operator, similar operations[3]	AMC2 SPA.LVO.120(b) point (c)(2)	2 approaches	2 landings or 1 landing[1] or no landings[2]
CAT II SA CAT II CAT III	HUDLS / manual landing	none	AMC2 SPA.LVO.120(b) point (a)(2)(v)	As required but not less than 8 approaches	4 landings or 2 landings[1]
		Previously qualified with the same operator, similar operations[3]	AMC2 SPA.LVO.120(b) point (b)(2)(i)	4 approaches	None
		Previously qualified with a different EU operator, same type and variant	AMC2 SPA.LVO.120(b) point (c)(2)	4 approaches	none
		Previously qualified with a different EU operator, similar operations[3]	AMC2 SPA.LVO.120(b) point (c)(2)	4 approaches	4 landings or 2 landings[1]
SA CAT I CAT II SA CAT II CAT III	HUDLS / automatic landing	none	AMC2 SPA.LVO.120(b) point (a)(4)	As required but not less than 8 approaches	2 landings or 1 landing[1] or no landings[2]
		Previously qualified with the same operator, similar operations[3]	AMC2 SPA.LVO.120(b) point (b)(2)	4 approaches	None

Approval	**Technology**	**Previous experience**	**Reference**	**Practical (FSTD) training**	**LIFUS (if required)**
		Previously qualified with a different EU operator, same type and variant	AMC2 SPA.LVO.120(b) point (c)(2)	4 approaches	None
		Previously qualified with a different EU operator, similar operations[3]	AMC2 SPA.LVO.120(b) point (c)(2)	4 approaches	2 landings or 1 landing[1] or no landings[2]
Approach using EFVS	(HUD / HUDLS)	none	AMC3 SPA.LVO.120(b) point (a)(2)	As required but not less than 8 approaches	3 landings
		Previously qualified with the same operator, similar operations[3]	AMC3 SPA.LVO.120(b) point (b)(2)	2 approaches	None
		Previously qualified with a different EU operator, same type and variant	AMC3 SPA.LVO.120(b) point (c)(2)	2 approaches	none
		Previously qualified with a different EU operator, similar operations[3]	AMC3 SPA.LVO.120(b) point (c)(2)	2 approaches	3 landings
EFVS to land	(HUD / HUDLS)	none	AMC3 SPA.LVO.120(b) point (a)(2)	As required but not less than 8 approaches	4 landings
		Previously qualified with the same operator, similar operations[3]	AMC3 SPA.LVO.120(b) point (b)(2)	4 approaches	None
		Previously qualified with a different EU operator, same type and variant	AMC3 SPA.LVO.120(b) point (c)(2)	4 approaches	none
		Previously qualified with a different EU operator, similar operations[3]	AMC3 SPA.LVO.120(b) point (1) (c)(2)	4 approaches	4 landings

Notes:

1: Fewer landings during LIFUS are required if a level ‘D’ FSTD is used for conversion training.

2: No landings are required if a candidate has completed the zero flight-time (ZFT) type rating.

3: ‘Similar operations’ implies that the level of technology, operating procedures, handling characteristics and HUD/HUDLS or equivalent display systems are the same or similar.

4: ‘operational suitability stablished in accordance with Regulation (EU) No 748/2012 may define credits’

Table 2: Summary of recurrent LVO training/checking and recent experience requirements

LVO / operational credit	**Technology**	**Recent Experience**[1]	**Reference**	**Recurrent Training / Checking**	**Reference**
LVTO	-	-	AMC4 SPA.LVO.120(b) point (a)(1), (d)	1 rejected take-off and 1 LVTO at minimum RVR[1]	
CAT II	Manual landing	2 approaches	AMC3 SPA.LVO.120(a) point (a)	1 approach to land; 1 approach to go-around	AMC4 SPA.LVO.120(b) point (a)(2), (4)
SA CAT I CAT II SA CAT II CAT III	Autoland				
CAT II / III SA CAT I SA CAT II	HUDLS / manual landing	4 approaches	AMC3 SPA.LVO.120(a) point (b)	2 approaches including a landing	AMC4 SPA.LVO.120(b) point (b)
CAT II / III SA CAT I SA CAT II	HUDLS / automatic landing				
Approach using EFVS	(HUD / HUDLS)	2 approaches[2]	AMC2 SPA.LVO.120(a)	2 approaches[3]	AMC6 SPA.LVO.120(b)

Notes:

1: LVTO only required if the minimum approved RVR is less than 150m.

2: If a flight crew member is authorised to operate as pilot flying and pilot monitoring during EFVS operations, then the flight crew member should complete the required number of approaches in each operating capacity.

3: One approach to be flown without natural vision, to the height below which an approach should not be continued if natural visual reference is not acquired.

228. The following GM2 SPA.LVO.120(b) is inserted:

GM2 SPA.LVO.120(b) Flight crew competence

RECURRENT CHECKING FOR EFVS OPERATIONS

In order to provide the opportunity to practise decision-making in the event of system failures and failure to acquire natural visual reference, the recurrent training/checking for EFVS operations should periodically include different combinations of equipment failures, go-around due to loss of visual reference and landings.

229. The following GM3 SPA.LVO.120(b) is inserted:

GM3 SPA.LVO.120(b) Flight crew competence

INITIAL TRAINING AND CHECKING FOR SA CAT I, CAT II, SA CAT II AND CAT III APPROACH OPERATIONS

The ground training referred to in points (a)(1)(i) and (iv) of AMC2 SPA.LVO.120(b) may include:

(a) airborne and ground equipment:

  (1) technical requirements;

  (2) operational requirements;

  (3) operational reliability;

  (4) fail-operational;

  (5) fail-passive;

  (6) equipment reliability;

  (7) operating procedures;

  (8) preparatory measures;

  (9) operational downgrading; and

  (10) communications; and

(b) procedures and limitations:

  (1) operational procedures; and

  (2) crew coordination.

230. The current AMC1 SPA.LVO.125 is deleted.

~~AMC1 SPA.LVO.125 Operating procedures~~

~~GENERAL~~

231. The following AMC1 SPA.NVIS.120 is inserted:

AMC1 SPA.NVIS.120 Operating minima for night-vision imaging systems (NVISs)

NVIS OPERATIONS UNDER IFR

(a) Any limitation in the rotorcraft flight manual should be complied with.

(b) Night-vision goggles may be used in a flipped-down position during a flight under IFR:

  (1) under VMC;

  (2) under IMC:

    (i) in preparation of the visual segment of an instrument approach or a visual approach;

    (ii) during the visual segment of an instrument approach or departure;

    (iii) during a visual approach;

    (iv) in preparation of a transition to VFR.

(c) The pilot-in-command/commander should not proceed on a visual segment of an IFR flight unless the visual cues required for the visual segment are visible using unaided visions.

(d) The pilot-in-command/commander should not proceed VFR unless the VFR weather minima are assessed without using unaided vision.

232. The following GM1 SPA.NVIS.120 is inserted:

GM1 SPA.NVIS.120 Operating minima for night-vision imaging systems (NVISs)

NVIS OPERATIONS UNDER IFR

The use of night-vision goggles in a flipped-down position does not prevent the use of unaided vision, by looking out below the goggles or to the sides.

233. AMC1 SPA.NVIS.130(f) is amended as follows:

AMC1 SPA.NVIS.130(f) Crew requirements for NVIS operations

CHECKING OF NVIS CREW MEMBERS

(a) The operator proficiency check and line check required in SPA.NVIS.130(f) should have a validity of 12 calendar months. The validity period should be counted from the end of the month when the training was taken. When the check is undertaken within the last 3 months of the validity period, the new validity period should be counted from the previous expiry date.

(b) These ~~The~~ checks ~~required in SPA.NVIS.130 (f)~~ may be combined with those checks required for the underlying activity.

234. The following AMC2 SPA.NVIS.130(f) is inserted:

AMC2 SPA.NVIS.130(f) Crew requirements for NVIS operations

NVIS OPERATIONS UNDER IFR

(a) The minimum crew should be two pilots, or one pilot and one NVIS technical crew member.

(b) The crew training and experience should ensure:

  (1) efficient scanning of the instruments with the night-vision goggles (NVGs) flipped up or down as defined in the standard operating procedures (SOPs);

  (2) proficiency during the transition phase;

  (3) proficient use of the NVGs on the visual segments of the flight during which they are expected to be used;

  (4) the continuity of a crew concept.

(c) A crew member that is involved in NVIS operations under IFR should undergo initial and recurrent training using a suitable FSTD as part of the normal crew complement. The training should cover at least the following items under a variety of weather conditions and cultural lighting:

  (1) transition from instrument to visual flight during the final approach;

  (2) transition from visual to instrument flight on departure.

(d) In addition to (b) and (c), a technical crew member that is involved in NVIS operations under IFR should be trained to perform navigation and monitoring functions under IFR, as described under AMC3 SPA.NVIS.130(f). The training should include all of the following on the given helicopter type:

  (1) initial and recurrent general training;

(2) initial and recurrent monitoring training;

(3) initial and recurrent navigation training;

(4) initial and recurrent aircraft/FSTD training focusing on crew cooperation with the pilot;

(5) line flying under supervision.

(e) An FSTD suitable for the NVIS training described in (c) should meet all of the following criteria:

(1) be a helicopter FSTD;

(2 have a NVIS-compatible cockpit;

(3) have a night visual system that can be representative of different moon phases and allows external visual cues to be adjusted to the point where they are no longer visible without NVGs and remain visible with NVGs, when simulating night conditions.

(4) The night visual system should be able to support atmospheric conditions such as:

(i) more than one cloud layer or one cloud layer with a geographically variable cloud base;

(ii) variable visibility; and

(iii) snow, light rain and heavy rain with and without NVGs;

(5) be of a helicopter type on which the crew member is current, unless the crew member receives additional training for the use of the FSTD.

(f) The person conducting the training defined in (c) above should be a NVIS instructor and should hold an instrument rating in accordance with Regulation (EU) No 1178/2011.

(g) The training should have a validity of 12 calendar months. The validity period should be counted from the end of the month when the training was taken. When the training is undertaken within the last 3 months of the validity period, the new validity period should be counted from the previous expiry date.

(h) The flight crew operator proficiency check should include one transition from instrument to visual flight during the final approach, using NVIS. This manoeuvre may be combined with a 2D or 3D approach to minima.

(i) NVIS operations under IFR on more than one type or variant with different levels of automation

(1) The crew member should undergo differences or familiarisation training.

(2) The flight crew member should perform the manoeuvre defined in (h) each time on a different type or variant.

235. The following AMC3 SPA.NVIS.130(f) is inserted:

AMC3 SPA.NVIS.130(f) Crew requirements for NVIS operations

TECHNICAL CREW MEMBER TRAINING FOR OPERATIONS UNDER IFR

INITIAL AND RECURRENT GENERAL TRAINING AND CHECKING

(a) The technical crew member initial and recurrent training and checking syllabus should include the following items:

(1) duties in the technical crew member role;

(2) map reading, including:

      - (i) ability to keep track with helicopter position on map;
      - (ii) ability to detect conflicting terrain/obstacles on a given route, and at a given altitude;
      - (iii) use of moving maps, as required;
   - (3) basic understanding of the helicopter type in terms of location and design of normal and emergency systems and equipment, including all helicopter lights and operation of doors, and including knowledge of helicopter systems and understanding of terminology used in checklists;
   - (4) the dangers of rotor-running helicopters;
   - (5) outside lookout during the flight;
   - (6) crew coordination with in-flight call-outs, with emphasis on crew coordination regarding the tasks of the technical crew member, including checklist initiation, interruptions and termination;
   - (7) warnings, and use of normal, abnormal and emergency checklists assisting the pilot as required;
   - (8) the use of the helicopter intercommunications system;
   - (9) basic helicopter performance principles, including the definitions of Category A certification, performance class 1 and performance class 2;
   - (10) operational control and supervision;
   - (11) meteorology;
   - (12) applicable parts of SERA, including instrument flight rules, as relevant to the tasks of the technical crew member;
   - (13) mission planning;
   - (14) early identification of pilot incapacitation;
   - (15) debriefing.
   - (16) PBN, as necessary.

INITIAL AND RECURRENT NAVIGATION TRAINING AND CHECKING

(b) The initial and recurrent navigation training and checking syllabus should include the following items:

   - (1) aeronautical map reading (additional training to (a)(4) above), navigation principles;
   - (2) navigation aid principles and use;
   - (3) crew coordination with in-flight call-outs, with emphasis on navigation issues;
   - (4) applicable parts of SERA;
   - (5) airspace, restricted areas, and noise-abatement procedures.

INITIAL AND RECURRENT MONITORING TRAINING AND CHECKING

(c) The initial and recurrent monitoring training and checking syllabus should include the following items:

   - (1) basic understanding of the helicopter type, including knowledge of any limitations to the parameters the crew member is tasked to monitor, and knowledge of the basic principles of flight;
   - (2) instrument reading;
   - (3) inside monitoring during the flight;

   - (i) aircraft state/cockpit cross-check;
   - (ii) automation philosophy and autopilot status monitoring, as relevant;
   - (iii) FMS, as relevant;
- (4) crew coordination with in-flight call-outs, with emphasis on call-outs and actions resulting from the monitoring process; and
- (5) flight path monitoring.

INITIAL AIRCRAFT/FSTD TRAINING

(d) The technical crew member training syllabus should include aircraft/FSTD training focusing on crew cooperation with the pilot.

- (1) The initial training should include at least 4 hours instruction dedicated to crew cooperation unless:
   - (i) the technical crew member has undergone this training under another operator; or
   - (ii) the technical crew member has performed at least 50 missions in assisting the pilot from the front seat as a technical crew member.
- (2) The training described in (1) should be organised with a crew composition of one pilot and one technical crew member.
- (3) The training described in (1) should be supervised by a pilot with a minimum experience of 500 hours in either multi-pilot operations or single-pilot operations with a technical crew member assisting from the front seat, or a combination of these.
- (4) The training may be combined with the line flying under supervision.

LINE FLYING UNDER SUPERVISION

(e) Line flying under supervision

- (1) Line flying under supervision should take place during the operator's conversion course.
- (2) Line flights under supervision provide the opportunity for a technical crew member to practise the procedures and techniques he or she should be familiar with, regarding ground and flight operations, including any elements that are specific to a particular helicopter type. Upon completion of the line flying under supervision, the technical crew member should be able to safely conduct his or her flight operational duties assigned to him or her according to the procedures laid down in the operator's operations manual.
- (3) Line flying under supervision should be conducted by a suitably qualified technical crew member or commander nominated by the operator.
- (4) Line flying under supervision should include a minimum of five sectors under IFR.

RECURRENT AIRCRAFT/FSTD TRAINING

(f) Recurrent helicopter/FSTD training

- (1) The recurrent training should focus on crew cooperation and contain a minimum of 2 hours of flight.
- (2) The training described in (1) should take place in the same conditions as the initial training in (d) above.

236. The following GM1 SPA.NVIS.130(f) is inserted:

GM1 SPA.NVIS.130(f) Crew requirements for NVIS

SUITABLE FSTD — NVIS OPERATIONS UNDER IFR

The FSTD may be a generic FSTD and may have no motion system.

237. GM1 SPA.NVIS.140 is amended as follows:

GM1 SPA.NVIS.140 Information and documentation

CONCEPT OF OPERATIONS

Night Vision Imaging System for Civil Operators

Foreword

[…]

An FAA study (DOT/FAA/RD-94/21, 1994) best summarised the need for night vision imaging systems by stating, "When properly used, NVGs can increase safety, enhance situational awareness, and reduce pilot workload and stress that are typically associated with night operations."

Concept of operations — NVIS operations under IFR

The NVIS can be useful to assess the environment when not in a cloud layer, if procedures are established for its use. It may also be useful for decision-making before cancelling IFR and during the transition from instrument flight to visual flight under IFR.

During departure, the NVIS provides extra safety if used correctly. This is especially true for a departure where the instruction is to proceed VFR from the FATO to the initial departure fix (IDF), because VFR departures provide no obstacle protection. It could also be useful for other instrument departures.

During the transition to visual flight, the NVIS provides additional safety because the visibility may be very different with or without the NVIS, and it may help to assess the situation.

The scanning of instruments and of external cues will be modified. Multi-crew operations with SOPs and the relevant training should be in place.

Operator SOPs may define that when one of the crew members uses the NVGs in a flipped-down position, the other should have the NVGs flipped up and should monitor the flight instruments and navigation instruments used for the flight. In this case, the continuity of the crew concept will rely on efficient crew communication.

In other situations and operations, the operator SOPs may also define that both crew members have NVGs in the flipped-down position, using the capability to look below the NVGs to monitor both the instruments and the VMC situation.

[…]

3. SYSTEM DESCRIPTION

[…]

3.2.1 NVG design characteristics

There are limitations inherent in the current NVG design.

[…]

3.2.1.7 LED lights

Some red obstacle lights and other artificial lights that are clearly visible to the naked eye are not visible to NVGs. These obstacle lights may employ LED instead of traditional incandescent sources. The use of LED lights is becoming more common for almost all lighting applications because of their extensive lifetime and low energy consumption.

Aviation red light ranges from about 610 to 700 nanometres (nm), and NVGs approved for civil aviation (having a Class B Minus Blue Filter) are only sensitive to energy ranging from 665 to about 930 nm. LED and other artificial lights may have a relatively narrow emission band (around 630 nm ± 20 nm) and that band is below the range in which NVGs are sensitive and LEDs do not emit infrared energy like incandescent lights for obstacle red lights.

In general terms, NVG users should be aware that obstacle lighting systems and other artificial lights that fall outside the combined visible and near-infrared spectrum of NVGs (approximately 665 to 930 nm) will not be visible to their goggles. Other obstacle lights may use a wavelength very close to the approximate cut-off wavelength of 665 nm and will remain visible to the goggles, but they will be dimmed and will be better seen with the naked eye.

Full awareness of obstacle lights can only be achieved with an unaided scan.

[…]

3.2.2.6 Instrument lighting brightness considerations

When viewing the NVG image, the brightness of the image will affect the amount of time it takes to adapt to the brightness level of the instrument lighting, thereby affecting the time it takes to interpret information provided by the instruments. The higher the quality (figure of merit (FOM), resolution, filters, contrast, etc.) of the 'tubes', the less critical this effect becomes.

For example, if the instrument lighting is fairly bright, the time it takes to interpret information provided by the instruments may be instantaneous. However, if the brightness of the lighting is set to a very low level, it may take several seconds to interpret the information, thus increasing the heads-down time and increasing the risk of spatial disorientation. It is important to ensure that instrument lighting is kept at a brightness level that makes it easy to rapidly interpret the information. If the NVGs are used in the transition phase from IFR to VFR, the brightness level of the instrument lighting should be set in advance.

[…]

4. OPERATIONS

[…]

4.2.2.2 Artificial illumination

Since ~~the~~ NVGs are sensitive to any source of energy in the visible and near-infrared spectrums, there are also many types of artificial illumination sources (e.g.~~,~~ flares, IR searchlights, cultural lighting, etc.). As with any illumination source, these can have both positive and detrimental effects on NVG utili~~z~~sation. For example, viewing a scene indirectly illuminated by a searchlight can enable the pilot to more clearly view the scene; conversely, viewing the same scene with the searchlight near or within the NVG field of view will reduce the available visual cues. It is important to be familiar with the effects of cultural lighting in the flying area in order to be able to avoid the associated problems and to be able to use the advantages provided. Also, it is important to know how to properly use artificial light sources (e.g.~~,~~ aircraft IR spotlight). It should be noted that artificial light sources may not always be available or dependable, and this should be taken into consideration during flight planning.

When using NVGs in an area with high-intensity cultural lighting, the lights beyond this area may not be visible. The visibility assessed with the NVGs might be judged to be worse than the unaided visibility.

[…]

4.4.1.1.3 Unaided scan

Under certain conditions, this scan can be as important as the others can. For example, it may be possible to detect distance and/or closure to another aircraft more easily using unaided vision, especially if the halo caused by the external lights ~~is masking~~ masks aircraft detail on the NVG image. Additionally, there are other times when unaided information can be used in lieu of or can augment NVG and instrument information.

When using the NVGs in the transition from IFR to VFR, the unaided scan is essential to assess the unaided visibility conditions. Focusing on the first light seen when looking out is an automatic response, but it is vital to continue the scan in order to assess the surrounding weather conditions.

Some examples where unaided scan can enhance safety is where LED-lit obstacles can be encountered (e.g. during low-altitude flying and when performing a reconnaissance of landing areas) or when unmanned aircraft systems (UASs) fly at night with LED navigation lights.

Air operators should incorporate procedures into their manuals and/or SOPs that require periodic unaided scanning when operating at low altitudes, when looking for potential landing areas, and when performing a reconnaissance of a landing area. This may be accomplished by looking under the NVGs, or by briefly placing the NVGs in the stowed (flipped-up) position. Manuals/SOPs should include procedures and call-outs for LED-lit obstacles.

Air operators and pilots are encouraged to report encounters with obstacles equipped with LED lighting systems not visible by NVGs, with pertinent information, to their competent authority.

[…]

238. AMC1 SPA.HOFO.120 is amended as follows:

AMC1 SPA.HOFO.120 Selection of aerodromes and operating sites

~~COASTAL AERODROME~~ DESTINATION AERODROME — SUFFICIENT OPERATIONAL CONTINGENCY

(a) Any alleviation from the requirement to select an alternate aerodrome under instrument flight rules (IFR) routing from offshore to a land destination should be based on an individual safety risk assessment with sufficient operational contingency to ensure a safe return from offshore.

REVISED AERODROME OPERATING MINIMA

(b) Unless the destination is a coastal aerodrome, the operator should ensure that all the following criteria are met:

- (1) the destination aerodrome has a published instrument approach;
- (2) the flight time is less than 3 hours; and
- (3) the published weather forecast valid from 1 hour prior, and 1 hour subsequent to the expected landing time specifies that:
  - (i) the ceiling is at least 700 ft above the minima associated with the instrument approach, or 1 000 ft above the destination aerodrome, whichever is the higher; and
  - (ii) visibility is at least 2 500 m.

COASTAL AERODROME

(c) A coastal aerodrome is an aerodrome used for offshore operations within 5 nm of the coastline.

(d) If the coastal aerodrome has a published instrument approach, the operator should use the aerodrome operating minima defined in (b)(3).

(e) The operator may use the following operating minima by day only, as an alternative to (b)(3):

- (1) the cloud base is at least 400 ft above the minima associated with the instrument approach; and
- (2) visibility is at least 4 km.

(f) If descent over the sea is intended to meet VFR criteria, the operator should ensure that the coastal aerodrome is geographically sited so that the helicopter is able, within the rules of the air and within the landing forecast to proceed inbound from the coast and carry out an approach and landing in full compliance with VFR for the associated airspace category(ies) and any notified route.

(g) If the operator makes use of the provisions in (e) or (f), the following should be taken into account as part of the risk assessment:

- 1) where the destination coastal aerodrome is not directly on the coast, the required usable fuel for the flight should be sufficient to return to the coast at any time after crossing the coastline, descend safely, carry out an approach under VFR and land, with the VFR fuel reserves intact;
- (2) the descent to establish visual contact with the surface should take place over the sea away from the coastline and in an area clear of surface obstructions, or as part of the instrument approach;
- (3) routings and procedures for coastal aerodromes nominated as such should be included in the operations manual (Part C for CAT operators);
- (4) the MEL should reflect the requirement for airborne radar and radio altimeter for this type of operation; and
- (5) operational limitations for each coastal aerodrome should be specified in the operations manual.

~~(b) The following should be taken into account:~~

- ~~(1) suitability of the weather based on the landing forecast for the destination;~~
- ~~(2) the fuel required to meet the IFR requirements of CAT.OP.MPA.150, NCC.OP.131 or SPO.OP.131 except for the alternate fuel;~~
- ~~(3) where the destination coastal aerodrome is not directly on the coast, it should be:~~

~~(i) within a distance that with the fuel specified in (b)(2), the helicopter is able, at any time after crossing the coastline, to return to the coast, descend safely, carry out an approach under visual flight rules (VFR) and land, with the VFR fuel reserves intact;~~

~~(ii) within 5 nm of the coastline; and~~

~~(iii) geographically sited so that the helicopter is able, within the rules of the air and within the landing forecast:~~

~~(A) to proceed inbound from the coast at 500 ft above ground level (AGL), and carry out an approach and landing under VFR; or~~

~~(B) to proceed inbound from the coast on an agreed route, and carry out an approach and landing under VFR;~~

~~(4) procedures for coastal aerodromes should be based on a landing forecast no worse than:~~

~~(i) by day, a cloud base of ≥ 400 ft above descent height (DH)/minimum descent height (MDH), and a visibility of 4 km, or, if descent over the sea is intended, a cloud base of 600 ft and a visibility of 4 km; or~~

~~(ii) by night, a cloud base of 1 000 ft and a visibility of 5 km;~~

~~(5) the descent to establish visual contact with the surface should take place over the sea or as part of the instrument approach;~~

~~(6) routings and procedures for coastal aerodromes nominated as such should be included in the operations manual (OM) (Part C for CAT operators);~~

~~(7) the minimum equipment list (MEL) should reflect the requirement for airborne radar and radio altimeter for this type of operation; and~~

~~(8) operational limitations for each coastal aerodrome should be specified in the OM.~~

239. The following AMC1 SPA.HOFO.125(g) is inserted:

AMC1 SPA.HOFO.125(g) Offshore standard approach procedures (OSAPs)

TRAINING AND CHECKING FOR OSAPs

(a) Initial training and checking for OSAPs should be conducted either as part of the operator’s conversion course or as a separate equipment and procedure training, and should include all of the following:

(1) ground training, including knowledge of:

(i) the structure of the OSAP;

(ii) the airborne radar specifications, limitations, modes, and usage;

(iii) the area navigation system, as necessary for the envisaged OSAP;

(2) aircraft/FSTD training, including all of the following:

(i) OSAPs to various offshore sites with and without obstacles or obstructions;

(ii) OSAPs in different wind conditions, followed by landings and go-arounds;

(iii) OSAPs in the pilot-monitoring, pilot-flying and single-pilot functions, by day and by night, as relevant to the kind of operations;

(3) line flying under supervision;

(4) line check.

(b) The recurrent training and checking programme should include at least one OSAP per year in the pilot-monitoring, pilot-flying and single-pilot functions as relevant to the kind of operations. OSAPs should be part of the annual aircraft/FSTD training, the line check or the operator's proficiency check. Checking is not necessary if training to proficiency is employed.

240. AMC1 SPA.HOFO.125 is amended as follows:

AMC1 SPA.HOFO.125 ~~Airborne radar approach (ARA) to offshore locations~~ Offshore standard approach procedures (OSAPs)

~~Note: alternative approach procedures using original equipment manufacturer (OEM) certified approach systems are not covered by this AMC.~~

AIRBORNE RADAR APPROACH (ARA) ~~GENERAL~~

[…]

241. The following AMC2 SPA.HOFO.125 is inserted:

AMC2 SPA.HOFO.125 Offshore standard approach procedures (OSAPs)

ORIGINAL EQUIPMENT MANUFACTURER (OEM) — CERTIFIED APPROACH SYSTEM

Where an OSAP is conducted to a non-moving offshore location (i.e. fixed installation or moored vessel), and an original equipment manufacturer (OEM)-certified approach system is available, the use of automation to reach a reliable GNSS position for that location should be used to enhance the safety of the OSAP.

The OSAP should meet the following requirements:

(a) The OEM-certified approach system should be approved in accordance with the applicable airworthiness requirements for operations at night and in IMC.

(b) The aircraft should be equipped with a radar altimeter (RA) and a suitable airborne radar.

(c) The GNSS position of the installation should be retrieved from the area navigation system database or by manual entry if the aircraft flight management system will allow for that.

(d) The approach system vertical path should be a Baro-VNAV or a GNSS SBAS vertical source type. The radar height (RH) should be cross-checked (either automatically or by the crew) to avoid erroneous QNH selection.

(e) The descent angle should be of a maximum of 4°. Up to 6° could be acceptable only if the GS is reduced to 60 kt.

(f) The minimum descent height (MDH) should not be less than 50 ft above the elevation of the helideck:

    (1) the MDH for an approach should not be lower than:
        (i) 200 ft by day; or
        (ii) 300 ft by night; and
    (2) the MDH for an approach leading to a circling manoeuvre should not be lower than:
        (i) 300 ft by day; or

(ii) 500 ft by night.

(g) The minimum descent altitude (MDA) may only be used if the radio altimeter is unserviceable. The MDA should be a minimum of the MDH + 200 ft and should be based on a calibrated barometer at destination or on the lowest forecast barometric pressure adjusted to sea level (QNH) for the region.

(h) The MDA/H for a single-pilot ARA should be 100 ft higher than that calculated in accordance with (f) and (g) above. The decision range should not be less than 1 NM.

(i) The approach system lateral path guidance should be capable of at least performance monitoring and alerting function of RNP 0.3 NM up to the missed approach point (MAPt), then RNP 1.0 NM to missed approach holding point.

(j) The horizontal flight path should be defined in accordance with the RNP capability of the approach system (e.g. offset no lower than the RNP capability).

(k) The maximum acceptable offset angle between the final inbound course and the installation should be 30°.

(l) Before commencing the final approach, the pilot-in-command/commander should ensure that a clear path exists on the radar screen for the final and missed approach segments. If lateral clearance from any obstacle is less than the navigation performance, the pilot-in-command/commander should:

(1) approach to a nearby target structure and thereafter proceed visually to the destination structure; or

(2) make the approach from another direction leading to a circling manoeuvre.

(m) The minimum decision range (MDR) should not be less than 0.75 NM. The maximum acceptable GS at the MAPt for a 0.75-NM MDR should be 80 kt.

(n) The segment from the MAPt to destination should not be flown in tailwind conditions. The approach course should be selectable accordingly.

(o) The aircraft should have the capability to compare the airborne radar picture and GNSS range and bearing data to cross-check the position of the offshore location.

242. GM1 SPA.HOFO.125 is re-named as follows:

GM1 SPA.HOFO.125 ~~Airborne radar approach (ARA) to offshore locations~~ Offshore standard approach procedures (OSAPs)

AIRBORNE RADAR APPROACH (ARA)

[…]

243. GM2 SPA.HOFO.125 is amended as follows:

GM2 SPA.HOFO.125 ~~Airborne radar approach (ARA) to offshore locations~~ Offshore standard approach procedures (OSAPs)

GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS)/AREA NAVIGATION SYSTEM — AIRBORNE RADAR APPROACH (ARA)

Where an ARA is conducted to a non-moving offshore location (i.e. fixed installation or moored vessel), and the GNSS/area navigation system is used to enhance the safety of the ARA, the following procedure or equivalent should be applied:

(a) selection from the area navigation system database or manual entry of the offshore location;

(b) manual entry of the final approach fix (FAF) or intermediate fix (IF), as a range of and bearing from the offshore location;

(c) ~~operation of the GNSS equipment in terminal mode;~~ the full-scale deviation of the GNSS/area navigation system display should be in accordance with the expected navigation performance, and be no greater than 1 NM;

(d) comparison of weather radar and GNSS range and bearing data to cross-check the position of the offshore location;

(e) use of GNSS guidance to guide the aircraft onto the final approach track during the initial or intermediate approach segments;

(f) use of GNSS guidance from the FAF towards the offset initiation point (OIP) during the final approach segment to establish the helicopter on the correct approach track and, hence, heading;

(g) transition from GNSS guidance to navigation based on headings once the track is stabilised and before reaching OIP;

(h) use of GNSS range of and bearing to the offshore location during the intermediate and final approach segments to cross-check weather radar information (for correct 'painting' of the destination and, hence, of other obstacles);

(i) use of GNSS range of the offshore location to enhance confidence in the weather radar determination of arrival at the OIP and MAPt; and

(j) use of GNSS range of and bearing to the destination to monitor separation from the offshore location.

244. A new subpart N is inserted as follows:

SUBPART N: HELICOPTER POINT-IN-SPACE APPROACHES AND DEPARTURES WITH REDUCED VFR MINIMA

AMC1 SPA.PINS-VFR.100 Helicopter point-in-space (PinS) approaches and departures with reduced VFR minima

GENERAL

(a) Part-SERA operating minima should apply under VFR, unless one of the following applies:

(1) The VFR segment of the flight follows a PinS approach and the distance from the missed approach point (MAPt) to the destination is less than 5 km.

(2) The VFR segment of the flight is a departure with the intention of transitioning to IFR at the IDF and the distance from the take-off to the initial departure fix (IDF) is less than 5 km.

(3) The VFR segment of the flight follows the planned cancellation of the IFR flight plan at or above the MAPt or decision point of an instrument approach, the destination is different from the aerodrome attached to the instrument approach, the distance from the planned point of cancellation of IFR to the destination is less than 5 km, and the operator charts the obstacle environment on the VFR segment of the flight.

(b) By day, if either (a)(1) or (a)(2) applies, the operating minima in Tables 1 and 2 should apply and visual references to the ground should be maintained.

(c) By night, if either (a)(1) or (a)(2) applies, the operating minima in Tables 3 and 4 should apply and visual references to the ground should be maintained.

(d) If (a)(3) applies, Table 1 applies by day, Table 3 applies by night, and visual references to the ground should be maintained. The MDH in the table should be understood as the DH/MDH of the instrument approach procedure, whichever is higher.

Table 1

<table>
<tr><th colspan="3">VFR operating minima BY DAY
when instructed to ‘proceed VFR’ following an instrument approach</th></tr>
<tr><td colspan="3">x is the distance between the missed approach point (MAPt) and the heliport or operating site</td></tr>
<tr><td>X</td><td>Visibility</td><td>Ceiling</td></tr>
<tr><td>x < 1 000 m</td><td>1 000 m</td><td>MDH or 300 ft*</td></tr>
<tr><td>1 000 m ≤ x ≤ 3 000 m</td><td>x or 1 500 m, whichever is lower</td><td>MDH or 400 ft*</td></tr>
<tr><td>3 000 m < x ≤ 5 000 m</td><td>1 500 m</td><td>MDH or 600 ft*</td></tr>
</table>

Note: In Class B/C/D airspace, a special VFR clearance is needed and may require higher minima in accordance with local airspace restrictions.

* Whichever is higher.

Table 2

<table>
<tr><th colspan="3">VFR operating minima BY DAY
when instructed to ‘proceed VFR’ prior to an IFR departure</th></tr>
<tr><td colspan="3">x is the distance between the heliport or operating site and the initial departure fix (IDF)</td></tr>
<tr><td>X</td><td>Visibility</td><td>Ceiling</td></tr>
<tr><td>x < 1 000 m</td><td>1 000 m</td><td>MDH or 300 ft*</td></tr>
<tr><td>1 000 m ≤ x ≤ 3 000 m</td><td>x or 1 500 m, whichever is lower</td><td>MDH or 400 ft*</td></tr>
<tr><td>3 000 m < x ≤ 5 000 m</td><td>1 500 m</td><td>MDH or 600 ft*</td></tr>
</table>

***Note:** In Class B/C/D airspace, a special VFR clearance is needed and may require higher minima in accordance with local airspace restrictions*

* Whichever is higher.

Table 3

VFR operating minima by NIGHT **when instructed to 'proceed VFR' following an instrument approach**		
x is the distance between the missed approach point (MAPt) and the heliport or operating site		
X	Visibility	Ceiling
x < 1 000 m	2 000 m	MDH or 600 ft*
1 000 m ≤ x ≤ 3 000 m	x + 1 000 m	MDH + 200 ft or 600 ft*
3 000 m < x ≤ 5 000 m	5 000 m	MDH + 200 ft or 600 ft*

* Whichever is higher.

Table 4

VFR operating minima by NIGHT **when instructed to 'proceed VFR' prior to an IFR departure**		
x is the distance between the heliport or operating site and the initial departure fix (IDF)		
X	Visibility	Ceiling
x < 1 000 m	2 000 m	MCA or 600 ft*
1 000 m ≤ x ≤ 3 000 m	x + 1 000 m	MCA + 200 ft or 600 ft*
3 000 m < x ≤ 5 000 m	5 000 m	MCA + 200 ft or 600 ft*

* Whichever is higher.

(d) The operator should define SOPs that describe the VFR segment of the departure and approach, including the transition from IFR to VFR and the transition from VFR to IFR.

(e) The operator should provide a thorough description of the following elements; the description may be provided by means of a chart and should be included in the operations manual or other document:

  (1) the environment in the vicinity of the VFR segment of the flight;

  (2) the visual cues that are useful for the purpose of VFR navigation and that should be available on departure or for the continuation of the flight at the MAPt;

  (3) the relevant obstacles.

(f) The operator should ensure that the elements in (e) are updated on a regular basis.

(g) The operator should encourage occurrence reporting and have a safety analysis capability.

(h) The pilot-in-command/commander should have at least 1 000 hours of flying experience on helicopters, and 100 hours of instrument time on helicopters.

(i) The pilot-in-command/commander should undergo initial and yearly recurrent FSTD training or checking, covering the following items:

  (1) 3D approach operation to minima;

  (2) go-around on instruments;

  (3) 2D approach operation to minima;

(4) at least one of the 3D or 2D approach operations should be a PinS approach followed by a transition to VFR and a VFR landing;

(5) in the case of multi-engined helicopters, a simulated failure of one engine should be included in either the 3D or 2D approach operation to minima;

(6) where appropriate to the helicopter type, approach with flight control system/flight director system malfunctions, flight instrument and navigation equipment failures;

(7) recovery from unusual attitudes by instrument;

(8) loss of VMC during the VFR segment of flight;

(9) VFR departure followed by a manoeuvre back to the take-off location;

(10) VFR departure to the IDF followed by an IFR departure.

(j) The training and checking elements of an approved training programme may be credited towards compliance with point (i) and need not be duplicated.

(k) The training under (i) should take place on a suitable FSTD, corresponding to the helicopter type on which the operations take place.

6. Draft AMC & GM to Annex VI (Part-NCC) Non-commercial air operations with complex motor-powered aircraft

245. The following GM1 NCC.OP.101 is inserted:

GM1 NCC.OP.101 Altimeter check and settings

ALTIMETER SETTING PROCEDURES

The following paragraphs of ICAO Doc 8168 (PANS-OPS), Volume I provide recommended guidance on how to develop the altimeter setting procedure:

(a) 3.2 'Pre-flight operational test';

(b) 3.3 'Take-off and climb';

(c) 3.5 'Approach and landing'.

246. AMC3 NCC.OP.110 is amended as follows:

AMC3 NCC.OP.110 Aerodrome operating minima — general

TAKE-OFF OPERATIONS

(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 and equipment. 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~~ VIS is below that required for take-off and the 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~~ VIS or RVR is available, a take-off should only be commenced if the pilot-in-command can determine that the visibility ~~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~~ the prescribed runway lights should be in operation to mark the runway and any obstacles.

(c) Required RVR~~/~~ or VIS~~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.~~

(i) For multi-engined aeroplanes, with such performance that in the event of a critical engine failure at any point during take-off the aeroplane can either stop or continue the take-off to a height of 1 500 ft above the aerodrome while clearing obstacles by the required margins, the take-off minima specified by the operator should be expressed as RVR or VIS values not lower than those specified in Table 1.

(ii) Multi-engined aeroplanes without the performance to comply with the conditions in (c)(1)(i) in the event of a critical engine failure may need to re-land immediately and to see and avoid obstacles in the take-off area. Such aeroplanes may be operated to the following take-off minima provided they are able to comply with the applicable obstacle clearance criteria, assuming engine failure at the specified height:

(A) The take-off minima specified by the operator should be based on the height from which the one-engine-inoperative (OEI) net take-off flight path can be constructed.

(B) The RVR minima used should not be lower than either of the values specified in Table 1 or Table 2.

(iii) For single-engined complex aeroplane operations, the take-off minima specified by the operator should be expressed as RVR/CMV values not lower than those specified in Table 1 below.

Unless the operator is using a risk period, whenever the surface in front of the runway does not allow for a safe forced landing, the RVR values should not be lower than 800 m. In this case, the proportion of the flight to be considered starts at the lift-off position and ends when the aeroplane is able to turn back and land on the runway in the opposite direction or glide to the next landing site in case of power loss.

(iv) When the RVR or the VIS is not available, the commander should not commence take-off unless he or she can determine that the actual conditions satisfy the applicable take-off minima.

Table 1~~.A~~

Take-off — aeroplanes (without ~~low visibility take-off (~~LVTO~~)~~ approval)

RVR~~/~~ or VIS

Facilities	**RVR~~/~~ or 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~~/~~ or 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 2

Take-off — aeroplanes (without LVTO approval)

Assumed engine failure height above the runway versus RVR or VIS

Assumed engine failure height above the take-off runway (ft)	**RVRor VIS (m) ***
<50	400
51–100	400
101–150	400
151–200	500
201–300	1 000
>300 or if no positive take-off flight path can be constructed	1 500

*: The reported RVR or VIS value representative of the initial part of the take-off run can be replaced by pilot assessment.

(2) Helicopters:

(i) For helicopters having a mass where it is possible to reject the take-off and land on the FATO in case of the critical engine failure being recognised at or before the take-off decision point (TDP), the operator should specify an RVR or ~~/~~VIS as take-off minima in accordance with Table 3~~1.H~~.

(ii) For all other cases, the pilot-in-command should operate to take-off minima of 800 m RVR or ~~/~~VIS and remain clear of cloud during the take-off manoeuvre until reaching the performance capabilities of (c)(2)(i).

(iii) For point-in-space (PinS) departures to an initial departure fix (IDF), the take-off minima should be selected to ensure sufficient guidance to see and avoid obstacles and return to the heliport if the flight cannot continue visually to the IDF.

~~(iii) Table 5 for converting reported meteorological visibility to RVR should not be used for calculating take-off minima.~~

Table 3~~1.H~~

Take-off — helicopters (without LVTO approval)

RVR~~/ Visibility~~ or VIS

Onshore aerodromes or operating sites with instrument flight rules (IFR) departure procedures	**RVR~~/~~ or 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.

** On PinS departures to IDF, VIS should not be less than 800 m and the ceiling should not be less than 250 ft.

247. AMC4 NCC.OP.110 is amended as follows:

AMC4 NCC.OP.110 Aerodrome operating minima — general

~~CRITERIA FOR ESTABLISHING RVR/CMV~~

~~(a) In order to qualify for the lowest allowable values of RVR/CMV specified in Table 4.A, 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:~~

~~(i) instrument landing system (ILS)/microwave landing system (MLS)/GBAS landing system (GLS)/precision approach radar (PAR); or~~

~~(ii) 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 navigation (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.~~

DETERMINATION OF DH/MDH FOR INSTRUMENT APPROACH OPERATIONS — AEROPLANES

(a) The decision height (DH) to be used for a 3D approach operation or a 2D approach operation flown with the CDFA technique should not be lower than the highest of:

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

(2) the published approach procedure DH or minimum descent height (MDH) where applicable;

(3) the system minima specified in Table 4;

(4) the minimum DH permitted for the runway specified in Table 5; or

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

(b) The MDH for a 2D approach operation flown without the CDFA technique should not be lower than the highest of:

(1) the OCH for the category of aircraft;

(2) the published approach procedure MDH where applicable;

(3) the system minima specified in Table 4;

(4) the lowest MDH permitted for the runway specified in Table 5; or

(5) the lowest MDH specified in the AFM, if stated.

DETERMINATION OF DH/MDH FOR INSTRUMENT APPROACH OPERATIONS — HELICOPTERS

(c) The DH or MDH should not be lower than the highest of:

(1) the OCH for the category of aircraft used;

(2) the published approach procedure DH or MDH where applicable;

(3) the system minima specified in Table 4;

(4) the lowest DH or MDH permitted for the runway/FATO specified in Table 6 if applicable; or

(5) the lowest DH or MDH specified in the AFM, if stated.

Table 4

System minima — all aircraft

Facility	**Lowest DH/MDH (ft)**
ILS/MLS/GLS	200
GNSS/SBAS (LPV)	200*
Precision approach radar (PAR)	200
GNSS/SBAS (LP)	250
GNSS (LNAV)	250
GNSS/Baro-VNAV (LNAV/VNAV)	250
Helicopter point-in-space (PinS) approach	250**
LOC with or without DME	250
SRA (terminating at ½ NM)	250
SRA (terminating at 1 NM)	300
SRA (terminating at 2 NM or more)	350
VOR	300
VOR/DME	250
NDB	350
NDB/DME	300
VDF	350

* For localiser performance with vertical guidance (LPV), a DH of 200 ft may be used only if the published final approach segment (FAS) datablock sets a vertical alert limit not exceeding 35 m. Otherwise, the DH should not be lower than 250 ft.

** For PinS approaches with instructions to 'proceed VFR' to an undefined or virtual destination, the DH or MDH should be with reference to the ground below the missed approach point (MAPt).

Table 5

Runway type minima — aeroplanes

Runway type	**Lowest DH/MDH (ft)**
Precision approach (PA) runway, Category I	200
NPA runway	250
Non-instrument runway	Circling minima as shown in Table 1 in NCC.OP.112

Table 6

Type of runway/FATO versus lowest DH/MDH — helicopters

Type of runway/FATO	**Lowest DH/MDH (ft)**
Precision approach runway, Category I	200

NPA runway	
Non-instrument runway	
Instrument FATO	200
FATO	250

Table 6 does not apply to helicopter PinS approaches with instructions to 'proceed VFR'

248. AMC5 NCC.OP.110 is amended as follows:

AMC5 NCC.OP.110 Aerodrome operating minima

DETERMINATION OF RVR OR VIS ~~MINIMA FOR NPA, APV, CAT I~~ FOR INSTRUMENT APPROACH OPERATIONS — AEROPLANES

~~(a) The minimum RVR/CMV/VIS should be the highest of the values specified in Table 3 and Table 4.A but not greater than the maximum values specified in Table 4.A, where applicable.~~

~~(b) The values in Table 3 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 3 up to 3.77° and then remaining 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 3 and Table 4.A.~~

~~(d) An RVR of less than 750 m as indicated in Table 3 may be used:~~

~~(1) for CAT I operations to runways with full approach lighting 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 3 may be used for HUDLS and autoland operations if approved in accordance with Annex V (Part SPA), Subpart E.~~

~~(f) The visual aids should comprise standard runway day markings and approach and runway lights as specified in Table 2. The competent authority may approve that RVR values relevant to a basic approach lighting 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 6.~~

~~(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 3 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 3 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 2: Approach lighting systems~~

~~Class of lighting facility~~	**~~Length, configuration and intensity of approach lights~~**
~~FALS~~	~~CAT I lighting system (HIALS ≥ 720 m) distance coded centreline, Barrette centreline~~
~~IALS~~	~~Simple approach lighting system (HIALS 420 – 719 m) single source, Barrette~~
~~BALS~~	~~Any other approach lighting system (HIALS, MIALS or ALS 210 – 419 m)~~
~~NALS~~	~~Any other approach lighting system (HIALS, MIALS or ALS < 210 m) or no approach lights~~

~~*Note:* HIALS: high intensity approach lighting system;~~
~~MIALS: medium intensity approach lighting system;~~
~~ALS: approach lighting system.~~

~~Table 3: 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~~

~~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)~~			
~~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~~
~~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 4.A: 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 3~~			
	~~Max~~	~~1 500~~	~~1 500~~	~~2 400~~	~~2 400~~
~~NDB, NDB/DME, VOR, VOR/DME, LOC, LOC/DME, VDF, SRA, GNSS/LNAV with a procedure that fulfils the criteria in AMC4 NCC.OP.110 (a)(2).~~	~~Min~~	~~750~~	~~750~~	~~750~~	~~750~~
	~~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 AMC4 NCC.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 3 if flown using the CDFA technique, otherwise an add-on of 200/400 m applies to the values in Table 3 but not to result in a value exceeding 5 000 m.~~			

(a) The RVR or VIS for straight-in instrument approach operations should not be less than the greatest of the following:

(1) the minimum RVR or VIS for the type of runway used according to Table 7; or

(2) the minimum RVR determined according to the MDH or DH and class of lighting facility according to Table 8; or

(3) the minimum RVR according to the visual and non-visual aids and on-board equipment used according to Table 9.

If the value determined in (1) is a VIS then the result is a minimum VIS. In all other cases the result is a minimum RVR.(b) For Category A and B aeroplanes, if the RVR or VIS determined in accordance with point (a) is greater than 1 500 m, then 1 500 m should be used.

(c) If the approach is flown with a level flight segment at or above the MDA/H, then 200 m should be added to the RVR calculated in accordance with (a) and (b) for Category A and B aeroplanes and 400 m for Category C and D aeroplanes.

(d) The visual aids should comprise standard runway day markings, runway edge lights, threshold lights, runway end lights and approach lights as defined in Table 10.

Table 7

Type of runway versus minimum RVR or VIS — aeroplanes

Type of runway	**Minimum RVR or VIS (m)**
Precision approach runway, Category I	RVR 550
NPA runway	RVR 750
Non-instrument runway	VIS according to Table 1 in NCC.OP.112 (Circling minima)

Table 8

RVR versus DH/MDH

DH or MDH (ft)			**Class of lighting facility**			
			FALS	**IALS**	**BALS**	**NALS**
			RVR (m)			
200	-	210	550	750	1 000	1 200
211	-	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

DH or MDH (ft)			**Class of lighting facility**			
			FALS	**IALS**	**BALS**	**NALS**
			RVR (m)			
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	2 400
561	-	580	1 900	2 200	2 400	2 400
581	-	600	2 000	2 300	2 400	2 400
601	-	620	2 100	2 400	2 400	2 400
621	-	640	2 200	2 400	2 400	2 400
641		660	2 300	2 400	2 400	2 400
661	and above		2 400	2 400	2 400	2 400

Table 9

Visual and non-visual aids and/or on-board equipment versus minimum RVR — multi-pilot operations

Type of approach	**Facilities**	**Lowest RVR**	
		Multi-pilot operations	**Single-pilot operations**
3D operations	runway touchdown zone lights (RTZL) and runway centreline lights (RCLL)	No limitation	
	without RTZL and RCLL but using HUDLS or equivalent system; coupled auto-pilot or flight director to the DH	No limitation	600
	No RTZL and RCLL, not using HUDLS or equivalent system or auto-pilot to the DH	750 m	800
2D operations	Final approach track offset ≤15° for category A and B aeroplanes or ≤5° for Category C and D aeroplanes	750 m	2D operations
	Final approach track offset > 15° for Category A and B aeroplanes	1 000 m	1 000
	Final approach track offset > 5° for Category C and D aeroplanes	1 200 m	1 200

Table 10

Approach lighting systems — aeroplanes

Class of lighting facility	**Length, configuration and intensity of approach lights**
FALS	CAT I lighting system (HIALS ≥720 m) distance coded centreline, barrette centreline
IALS	Simple approach lighting system (HIALS 420–719 m) single source, barrette
BALS	Any other approach lighting system (HIALS, MALS or ALS 210–419 m)
NALS	Any other approach lighting system (HIALS, MALS or ALS <210 m) or no approach lights

(e) For night operations or for any operation where credit for visual aids is required, the lights should be on and serviceable except as provided for in Table 15.

(f) Where any visual or non-visual aid specified for the approach and assumed to be available in the determination of operating minima is unavailable, revised operating minima will need to be determined.

249. AMC6 NCC.OP.110 is amended as follows:

AMC6 NCC.OP.110 Aerodrome operating minima — general

DETERMINATION OF RVR~~/CMV/~~OR VIS ~~MINIMA~~ FOR ~~NPA,~~ TYPE A INSTRUMENT APPROACH AND TYPE B CAT I INSTRUMENT APPROACH OPERATONS — HELICOPTERS

~~(a) For non-precision approach (NPA) operations the minima specified in Table 4.1.H 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 4.2.H, whichever is higher.~~

~~(b) For CAT I operations, the minima specified in Table 4.2.H 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 4.1.H: Onshore minima~~

~~MDH /DH (ft) *~~	**~~Approach lighting systems 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~~

~~*: ‘MDH/DH’ refers to the initial calculation of MDH/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 MDA/DA.~~

~~**: 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 glideslope guidance (e.g. precision approach path indicator (PAPI)) is also visible at the MDH.~~

~~**Table 4.2.H: Onshore CAT I minima**~~

~~**DH (ft) ***~~	~~**Approach lighting systems vs RVR/CMV (m) **, *****~~			
	~~**FALS**~~	~~**IALS**~~	~~**BALS**~~	~~**NALS**~~
~~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~~

~~*: ‘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 standard approaches with a glide slope up to and including 4°.~~

(a) For IFR operations, the RVR or VIS should not be less than the greater of the following:

(1) the minimum RVR or VIS for the type of runway/FATO used according to Table 11;

(2) the minimum RVR determined according to the MDH or DH and class of lighting facility according to Table 12; or

(3) for PinS operations with instructions to ‘proceed visually’, the distance between the MAPt of the PinS and the FATO or its approach light system.

If the value determined in (1) is a VIS then the result is a minimum VIS. In all other cases the result is a minimum RVR.

(b) For PinS operations with instructions to ‘proceed VFR’, the VIS should be compatible with visual flight rules.

(c) For type A instrument approaches where the MAPt 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.

(d) An RVR of less than 800 m should not be used except when using a suitable autopilot coupled to an ILS, MLS, GLS or LPV, in which case normal minima apply.

(e) For night operations, ground lights should be available to illuminate the FATO/runway and any obstacles.

(f) The visual aids should comprise standard runway day markings, runway edge lights, threshold lights and runway end lights and approach lights as specified in Table 13.

(g) For night operations or for any operation where credit for runway and approach lights as defined in Table 13 is required, the lights should be on and serviceable except as provided for in Table 15.

Table 11

Type of runway/FATO versus minimum RVR — helicopters

Type of runway/FATO	**Minimum RVR or VIS**
Precision approach runway, Category I	RVR 550 m
NPA runway	
Non-instrument runway	

Instrument FATO	RVR 550 m
FATO	RVR or VIS 800 m

Table 12

Onshore helicopter instrument approach minima

DH/MDH (ft)	**Facilities versus RVR (m)**			
	FALS	**IALS**	**BALS**	**NALS**
200	550	600	700	1 000
201–249	550	650	750	1 000
250–299	600*	700*	800	1 000
300 and above	750*	800	900	1 000

* Minima on 2D approach operations should be no lower than 800 m.

Table 13

Approach lighting systems — helicopters

Class of lighting facility	**Length, configuration and intensity of approach lights**
FALS	CAT I lighting system (HIALS ≥ 720 m) distance coded centre line, barrette centre line
IALS	Simple approach lighting system (HIALS 420–719 m) single source, barrette
BALS	Any other approach lighting system (HIALS, MALS or ALS 210–419 m)
NALS	Any other approach lighting system (HIALS, MALS or ALS < 210 m) or no approach lights

250. AMC8 NCC.OP.110 is amended as follows:

AMC8 NCC.OP.110 Aerodrome operating minima — general

CONVERSION OF ~~REPORTED METEOROLOGICAL~~ VISIBILITY TO ~~RVR/~~CMV — AEROPLANES

~~(a) A conversion from meteorological visibility to RVR/CMV should not be used:~~

- ~~(1) when the 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 for (a)(1).~~

~~(c) When converting meteorological visibility to RVR in circumstances other than those in (a), the conversion factors specified in Table 5 should be used.~~

The following conditions should apply to the use of CMV instead of RVR:

(a) If the reported RVR is not available, a CMV may be substituted for the RVR, except:

(1) to satisfy take-off minima; or

(2) for the purpose of continuation of an approach in LVO.

(b) If the minimum RVR for an approach is more than the maximum value assessed by the aerodrome operator, then CMV should be used.

(c) In order to determine CMV from visibility:

(1) for flight planning purposes, a factor of 1.0 should be used;

(2) for purposes other than flight planning, the conversion factors specified in Table 14 should be used.

Table 14~~5~~

Conversion of reported ~~meteorological visibility~~ VIS to RVR/CMV

Light elements in operation	RVR/CMV = reported VIS x ~~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

251. AMC9 NCC.OP.110 is amended as follows:

AMC9 NCC.OP.110 Aerodrome operating minima — general

EFFECT ON LANDING MINIMA OF TEMPORARILY FAILED OR DOWNGRADED GROUND EQUIPMENT

(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 15~~6~~ and, if considered necessary, the approach should be abandoned.

(b) Conditions applicable to Table 15~~6~~:

(1) multiple failures of runway/FATO lights other than indicated in Table 15~~6~~ should not be acceptable;

(2) deficiencies of approach and runway/FATO lights are treated separately; and

(3) failures other than ILS, GLS, or MLS affect the RVR only and not the DH.

Table 15~~6~~

Failed or downgraded equipment — effect on landing minima

Failed or downgraded equipment	Effect on landing minima	
	~~CAT I~~ Type B	~~APV, NPA~~ Type A
~~ILS/MLS~~Navaid standby transmitter	No effect	

Failed or downgraded equipment	**Effect on landing minima**	
	~~CAT I~~ Type B	**~~APV, NPA~~ Type A**
Outer marker (ILS only)	No effect if ~~replaced by height check at 1 000 ft~~ the required height or glide path can be checked using other means, e.g. DME fix	APV — not applicable NPA with FAF: no effect unless used as FAF If the FAF cannot be identified (e.g. no method available for timing of descent), ~~non-precision~~ NPA operations cannot be conducted
Middle marker (ILS only)	No effect	No effect unless used as MAPt
RVR assessment systems	No effect	
Approach lights	Minima as for NALS	
Approach lights except the last 210 m	Minima as for BALS	
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	Aeroplanes: No effect if flight director (F/D), HUDLS or autoland; otherwise, RVR 750 m Helicopters: No effect on CAT I and SA CAT I approach operations	No effect
Centreline lights spacing increased to 30 m	No effect	
~~Touchdown zone~~ TDZ lights	Aeroplanes: No effect if F/D, HUDLS or autoland; otherwise, RVR 750 m Helicopters: No effect	No effect
Taxiway lighting system	No effect	

252. The current table 1 in GM1 NCC.OP.110 is re-numbered as follows:

GM1 NCC.OP.110 Aerodrome operating minima — general

AIRCRAFT CATEGORIES

[…]

Table 16~~1~~: Aircraft categories corresponding to V_{AT} values

[…]

253. The following GM4 NCC.OP.110 is inserted:

GM4 NCC.OP.110 Aerodrome operating minima — general

APPROACH LIGHTING SYSTEMS — ICAO AND FAA SPECIFICATIONS

The following table provides a comparison of the ICAO and FAA specifications.

Table 17

Approach lighting systems — ICAO and FAA specifications

Class of lighting facility	**Length, configuration and intensity of approach lights**
FALS	ICAO: CAT I lighting system (HIALS ≥ 720 m) distance coded centreline, barrette centreline FAA: ALSF1, ALSF2, SSALR, MALSR, high- or medium-intensity and/or flashing lights, 720 m or more
IALS	ICAO: simple approach lighting system (HIALS 420–719 m) single source, barrette FAA: MALSF, MALS, SALS/SALSF, SSALF, SSALS, high- or medium-intensity and/or flashing lights, 420–719 m
BALS	Any other approach lighting system (e.g. HIALS, MALS or ALS 210–419 m) FAA: ODALS, high- or medium-intensity or flashing lights 210–419 m
NALS	Any other approach lighting system (e.g. HIALS, MALS or ALS <210 m) or no approach lights

254. The following GM5 NCC.OP.110 is inserted:

GM5 NCC.OP.110 Aerodrome operating minima — general

SBAS OPERATIONS

(a) SBAS LPV operations with a DH of 200 ft depend on an SBAS approved for operations down to a DH of 200 ft.

(b) The following systems are in operational use or in a planning phase:

- (1) European geostationary navigation overlay service (EGNOS), operational in Europe;
- (2) wide area augmentation system (WAAS), operational in the USA;
- (3) multi-functional satellite augmentation system (MSAS), operational in Japan;
- (4) system of differential correction and monitoring (SDCM), planned by Russia;
- (5) GPS-aided geo-augmented navigation (GAGAN) system, planned by India; and
- (6) satellite navigation augmentation system (SNAS), planned by China.

255. The following GM7 NCC.OP.110 is inserted:

GM7 NCC.OP.110 Aerodrome operating minima — general

MEANS TO DETERMINE THE REQUIRED RVR BASED ON DH AND LIGHTING FACILITIES

The values in Table 8 are derived from the formula below:

RVR (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 8 up to 3.77° and then remaining constant. An upper RVR limit of 2 400 m has been applied to the table.

256. The following GM8 NCC.OP.110 is inserted:

GM8 NCC.OP.110 Aerodrome operating minima — general

USE OF DH FOR NPA FLOWN USING CDFA

The safety of the use of MDH as DH in CDFA operations has been verified by at least two independent analyses concluding that a CDFA using MDH as DH without any add-on is safer than the traditional step-down and level flight NPA operation. A comparison was made between the safety level of using MDH as DH without an add-on with the well-established safety level resulting from the ILS collision risk model (CRM). The NPA used was the most demanding, i.e. most tightly designed NPA, which offers the least additional margins. It should be noted that the design limits of the ILS approach design, e.g. the maximum glide path (GP) angle of 3,5 degrees, must be observed for the CDFA in order to keep the validity of the comparison.

There is a wealth of operational experience in Europe confirming the above-mentioned analytical assessments. It cannot be expected that each operator is able to conduct similar safety assessments and this is not necessary. The safety assessments already performed take into account the most demanding circumstances at hand, like the most tightly designed NPA procedures and other 'worst-case scenarios'. The assessments naturally focus on cases where the controlling obstacle is located in the missed approach area.

However, it is necessary for operators to assess whether their cockpit procedures and training are adequate to ensure minimal height loss in case of a go-around manoeuvre. Suitable topics for the safety assessment required by each operator may include:

— Understanding of the CDFA concept including use of the MDA/H as DA/H;

— Cockpit procedures that ensure flight on speed, on path and with proper configuration and energy management;

— Cockpit procedures that ensure gradual decision-making; and

— Identification of cases where an increase of the DA/H may be necessary because of non-standard circumstances, etc.

257. GM9 NCC.OP.110 is inserted:

GM9 NCC.OP.110 Aerodrome operating minima — general

INCREMENTS SPECIFIED BY THE COMPETENT AUTHORITY

Additional increments to the published minima may be specified by the competent authority to take into account certain operations, such as downwind approaches, ~~s~~ingle-pilot operations or approaches flown without the use of the CDFA technique.

258. The following GM10 NCC.OP.110 is inserted:

GM10 NCC.OP.110 Aerodrome operating minima — general

USE OF COMMERCIALLY AVAILABLE INFORMATION

When an operator uses commercially available information to establish aerodrome operating minima, the operator remains responsible for ensuring that the material used is accurate and suitable for its operation, and that the aerodrome operating minima are calculated in accordance with the method specified in Part C of its operations manual and approved by the competent authority.

The operator should apply the procedures in ORO.GEN.205 'Contracted activities'.

259. The following GM1 NCC.OP.110(b)(5) is inserted:

GM1 NCC.OP.110(b)(5) Aerodrome operating minima

VISUAL AND NON-VISUAL AIDS AND INFRASTRUCTURE

'Visual and non-visual aids and infrastructure' refers to all equipment and facilities required for the procedure to be used for the intended instrument approach operation. This includes but is not limited to lights, markings, ground- or space-based radio aids, etc.

260. GM1 NCC.OP.112 is amended as follows:

GM1 NCC.OP.112 Aerodrome operating minima — circling operations with aeroplanes

SUPPLEMENTAL INFORMATION

(a) The purpose of this ~~G~~guidance ~~M~~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~~ VIS; 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 the MDA/H — the aeroplane should follow the corresponding instrument approach procedure (IAP) 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 the radio navigation aids, RNAV, RNP, ILS, MLS or GLS~~ 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~~ visual references.

(3) If the pilot cannot comply with the conditions in (c)(2) at the MAPt ~~When reaching the published instrument MAPt and the conditions stipulated in (c)(2) are unable to be established by the pilot~~, then a missed approach should be ~~carried out~~executed in accordance with ~~that~~ the ~~instrument approach procedure~~ IAP.

(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 to:

(i) ~~to~~ attain a controlled and stable descent path to the intended landing runway; and

(ii) ~~to~~ remain within the circling area and in ~~a~~ such a 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 the 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~~ TDZ.

(d) Instrument approach followed by a visual manoeuvring (circling) with prescribed track.

(1) The aeroplane should remain on the initial ~~instrument approach procedure~~ IAP 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, RNAV, RNP, ILS, MLS or GLS~~ in level flight at or above the MDA/H at or by the circling manoeuvre divergence point.

[…]

(8) Unless otherwise specified in the procedure, final descent should not be commenced from the 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~~TDZ.

(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; RNAV, RNP, ILS, MLS or GLS~~and before commencing the circling manoeuvre, the published missed approach for the instrument approach should be followed; or

(ii) if the ~~instrument approach procedure~~ IAP is carried out with the aid of an ILS, an MLS or a stabilised approach (SAp), the MAPt associated with an ILS or an MLS procedure without glide path (GP-out procedure) or the SAp, where applicable, should be used.

[…]

261. The following AMC1 NCC.OP.115(c) is inserted:

AMC1 NCC.OP.115(c) Departure and approach procedures

APPROACH FLIGHT TECHNIQUE — AEROPLANES

(a) All approach operations should be flown as stabilised approach operations.

(b) The CDFA technique should be used for NPA procedures.

262. AMC2 NCC.OP.116 is amended as follows:

AMC2 NCC.OP.116 Performance-based navigation – aeroplanes and helicopters

MONITORING AND VERIFICATION

[…]

(d) Altimetry settings for RNP APCH operations using Baro VNAV

[…]

(2) Temperature compensation

(i) For RNP APCH operations to LNAV/VNAV minima using Baro VNAV:

(A) […]

(B) when the temperature is within promulgated limits, the flight crew should not make compensation to the altitude at the FAF~~ and DA/H~~;

[…]

263. The current AMC1 NCC.OP.153 is amended as follows:

AMC1 NCC.OP.153 Destination aerodromes — instrument approach operations

PBN OPERATIONS

~~The pilot-in-command should only select an aerodrome as a destination alternate aerodrome if an instrument approach procedure that does not rely on GNSS is available either at that aerodrome or at the destination aerodrome.~~

(a) To comply with NCC.OP.153, when the operator intends to use PBN, the operator should either:

  (1) demonstrate that the GNSS is robust against loss of capability; or

  (2) select an aerodrome as a destination alternate aerodrome only if an instrument approach procedure that does not rely on a GNSS is available either at that aerodrome or at the destination aerodrome.

GNSS ROBUSTNESS AGAINST LOSS OF CAPABILITY — HELICOPTERS

(b) The operator may demonstrate robustness against the loss of capability of the GNSS if all of the following criteria are met:

  (1) SBAS or GBAS are available and used.

  (2) The failure of a single receiver or system should not compromise the navigation capability required for the intended instrument approach.

  (3) The temporary jamming of all GNSS frequencies should not compromise the navigation capability for the intended route. The operator should provide a procedure to deal with such cases unless other sensors are available to continue on the intended route.

  (4) The duration of a jamming event should be determined as follows:

    (i) Considering the average speed and height of a helicopter flight, the duration of a jamming event may be considered to be less than 2 minutes.

    (ii) The time needed for the GNSS system to re-start and provide the aircraft position and navigation guidance should also be considered.

    (iii) Based on (i) and (ii) above, the operator should establish the duration of the loss of GNSS navigation data due to jamming. This duration should be no less than 3 minutes, and may be no longer than 4 minutes.

  (5) The operator should ensure resilience to jamming for the duration determined in (4) above, as follows:

    (i) In the case where the altitude of obstacles on both sides of the flight path are higher than the planned altitude for a given segment of the flight, the operator should ensure that there is no excessive drift on either side by relying on navigation sensors such as a inertial systems with performance in accordance to the intended function.

    (ii) If (i) does not apply and the operator cannot rely on sensors other than GNSS, the operator should develop a procedure to ensure that a drift from the intended route during the jamming event has no adverse consequences on the safety of the flight. This procedure may involve air traffic services.

  (6) The operator should ensure that no space weather event is predicted to disrupt GNSS reliability and integrity at both the destination and the alternate.

(7) The operator should verify the availability of RAIM for all phases of flight based on GNSS, including navigation to the alternate.

(8) The operator's MEL should reflect the elements in points (b)(1) and (b)(2).

OPERATIONAL CREDITS

(c) . If the weather margins at the destination alternate are less than the greatest operational credit used (eg EFVS, EFVS200, SA CAT I), then the planning minima should be increased as necessary to ensure that an instrument approach procedure that does not rely on that 'operational credit' is available either at destination or at the destination alternate.

264. The following GM1 NCC.OP.153 is inserted:

GM1 NCC.OP.153 Selection of aerodromes and operating sites

GNSS ROBUSTNESS AGAINST LOSS OF CAPABILITY — HELICOPTERS

(a) Redundancy of on-board systems ensures that no single on-board equipment failure (e.g. antenna, GNSS receiver, FMS, or navigation display failure) results in the loss of the GNSS capability.

(b) Any shadowing of the GNSS signal or jamming of all GNSS frequencies from the ground is expected to be of a very short duration and affect a very small area. Additional sensors or functions such as inertial coasting may be used during jamming events. Jamming should be considered on all segments of the intended route, including the approach.

(c) The availability of GNSS signals can be compromised if space weather events cause 'loss of lock' conditions and more than one satellite signal may be lost on a given GNSS frequency. Until space weather forecasts are available, the operator may use 'nowcasts' as short-term predictions for helicopter flights of short duration.

(d) SBAS also contributes to the mitigation of space weather effects, both by providing integrity messages and by correcting ionosphere-induced errors.

(e) Even though SBAS should be available and used, RAIM should remain available autonomously. In case of loss of the SBAS, the route and the approach to the destination or alternate should still be flown with an available RAIM function.

(f) When available, GNSS based on more than one constellation and more than one frequency may provide better integrity and redundancy regarding failures in the space segment of GNSS, jamming, and resilience to space weather events.

265. The following GM1 NCC. OP.230 is inserted:

GM1 NCC.OP.230 Commencement and continuation of approach

APPLICATION OF RVR OR VIS REPORTS — AEROPLANES

(a) There is no prohibition on the commencement of an approach based on the reported RVR or VIS. The restriction in NCC.OP.230 applies only if the RVR or VIS is reported and applies to the continuation of the approach past a point where the aircraft is 1 000 ft above the aerodrome elevation or in the FAS as applicable.

APPLICATION OF RVR OR VIS REPORTS — HELICOPTERS

(b) There is no prohibition on the commencement of an approach based on the reported RVR. The restriction in NCC.OP.230 applies to the continuation of the approach past a point where the aircraft is 1 000 ft above the aerodrome elevation or in the FAS as applicable.

The prohibition to continue the approach applies only if the RVR is reported and is below 550 m and is below the operating minima. There is no prohibition based on VIS.

(c) If the reported RVR is 550 m or greater, but it is less than the RVR calculated in accordance with AMC5 CAT.OP.MPA.110, a go-around is likely to be necessary since visual reference may not be established at the DH or MDH. Similarly, in the absence of an RVR report, the reported visibility or a digital image may indicate that a go-around is likely. The pilot-in-command should consider available options, based on a thorough assessment of risk, such as diverting to an alternate, before commencing the approach.

APPLICATION OF RVR OR VIS REPORTS — ALL AIRCRAFT

(d) If a deterioration in the RVR or VIS is reported once the aircraft is below 1 000 ft or in the FAS, as applicable, then there is no requirement for the approach to be discontinued. In this situation, the normal visual reference requirements would apply at the DA/H.

(e) Where additional RVR information is provided (e.g. midpoint and stop end), this is advisory; such information may be useful to the pilot in order to determine whether there will be sufficient visual reference to control the aircraft during roll-out and taxi. For operations where the aircraft will be controlled manually during roll-out, Table 1 in AMC1 SPA.LVO.100(a) provides an indication of the RVR that may be required to allow manual lateral control of the aircraft on the runway.

266. The current AMC1 NCC.OP.230(a) is re-numbered and amended as follows:

AMC1 NCC.OP.230(a) Commencement and continuation of approach

~~VISUAL REFERENCES FOR INSTRUMENT APPROACH OPERATIONS~~ MINIMUM RVR FOR CONTINUATION OF APPROACH — AEROPLANES

~~(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 lighting 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) FATO/runway edge lights; or~~

~~(10) other visual references specified in the operations manual.~~

~~(b) Lower than standard category I (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 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 – CAT I operations~~

~~(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:~~

~~(A) the beginning of the runway landing surface,~~

~~(B) the threshold lights, the threshold identification lights; or~~

~~(C) 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.~~

~~(f) Approach operations utilising EVS – APV and NPA operations flown with the CDFA technique~~

~~(1) At DH/MDH, visual references should be displayed and identifiable to the pilot on the EVS image as specified under (a).~~

~~(2) At 200 ft above runway threshold elevation, at least one of the visual references specified under (a) should be distinctly visible and identifiable to the pilot without reliance on the EVS.~~

(a) The touchdown RVR should be the controlling RVR.

(b) If the touchdown RVR is not reported, then the midpoint RVR should be the controlling RVR.

(c) Where the RVR is not available, CMV should be used, except for the purpose of continuation of an approach in LVO in accordance with AMC8 NCC.OP.110.

267. The following AMC1 NCC. OP.230(b) is inserted:

AMC1 NCC.OP.230(b) Commencement and continuation of approach

RVR MINIMUM FOR CONTINUATION OF APPROACH — HELICOPTERS

(a) The touchdown RVR should be the controlling RVR.

(b) If the touchdown RVR is not reported, then the midpoint RVR should be the controlling RVR.

268. The following AMC1 NCC.OP.230(c) is inserted:

AMC1 NCC.OP.230(c) Commencement and continuation of approach

VISUAL REFERENCES FOR INSTRUMENT APPROACH OPERATIONS

For instrument approach operations Type A and CAT I instrument approach operations Type B, at least one of the visual references specified below should be distinctly visible and identifiable to the pilot at the MDA/H or the DA/H:

(a) elements of the approach lighting system;

(b) the threshold;

(c) the threshold markings;

(d) the threshold lights;

(e) the threshold identification lights;

(f) the visual glideslope indicator;

(g) the TDZ or TDZ markings;

(h) the TDZ lights;

(i) the FATO/runway edge lights;

(j) for helicopter PinS approaches, the identification beacon light and visual ground reference;

(k) for helicopter PinS approaches, the identifiable elements of the environment defined on the instrument chart;

(l) for helicopter PinS approaches with instructions to 'proceed VFR', sufficient visual cues to determine that VFR criteria are met; or

(m) other visual references specified in the operations manual.

269. The following GM1 NCC.OP.230(f) is inserted:

GM1 NCC.OP.230(f) Commencement and continuation of approach

APPROACHES WITH NO INTENTION TO LAND

The approach may be continued to the DA/H or the MDA/H regardless of the reported RVR or VIS. Such operations should be coordinated with air traffic services (ATS).

270. The following GM1 NCC.OP.235 is inserted:

GM1 NCC.OP.235 EFVS 200 operations

GENERAL

(a) EFVS operations exploit the improved visibility provided by the EFVS to extend the visual segment of an instrument approach. EFVS cannot be used to extend the instrument segment of an approach and thus the DH for EFVS 200 operations is always the same as for the same approach conducted without EFVS.

(b) Equipment for EFVS 200 operations

(1) In order to conduct EFVS 200 operations, a certified EFVS is used (EFVS-A or EFVS-L). An EFVS is an enhanced vision system (EVS) that also incorporates a flight guidance system and displays the image on a HUD or equivalent display. The flight guidance system will incorporate aircraft flight information and flight symbology.

(2) In multi-pilot operations, a suitable display of EFVS sensory imagery is provided to the pilot monitoring.

(c) Suitable approach procedures

(1) Types of approach operation are specified in AMC1 NCC.OP.235(a)(2).

EFVS 200 operations are used for 3D approach operations. This may include operations based on NPA procedures, approach procedures with vertical guidance and precision approach procedures including approach operations requiring specific approvals, provided that the operator holds the necessary approvals.

(2) Offset approaches

Refer to AMC1 NCC.OP.235(a)(2).

(3) Circling approaches

EFVSs incorporate a HUD or an equivalent system so that the EFVS image of the scene ahead of the aircraft is visible in the pilot's forward external FOV. Circling operations require the pilot to maintain visual references that may not be directly ahead of the aircraft and may not be aligned with the current flight path. EFVS cannot therefore be used in place of natural visual reference for circling approaches.

(d) The aerodrome operating minima for EFVS 200 operations are determined in accordance with AMC1 NCC.OP.235(a)(8).

The performance of EFVSs depends on the technology used and weather conditions encountered. Table 1 'Operations utilising EFVS: RVR reduction' has been developed after an operational evaluation of two different EVSs, both using infrared sensors, along with data and support provided by the FAA. Approaches were flown in a variety of conditions including fog, rain and snow showers, as well as at night to aerodromes located in mountainous terrain. Table 1 contains conservative figures to cater for the expected performance of infrared sensors in the variety of conditions that might be encountered. Some systems may have better capability than those used for the evaluation, but credit cannot be taken for such performance in EFVS 200 operations.

(e) The conditions for commencement and continuation of the approach are in accordance with NCC.OP.230.

Pilots conducting EFVS 200 operations may commence an approach and continue that approach below 1 000 ft above the aerodrome or into the FAS if the reported RVR or CMV is equal to or greater than the lowest RVR minima determined in accordance with AMC1 NCC.OP.235(a)(8) and if all the conditions for the conduct of EFVS 200 operations are met.

Should any equipment required for EFVS 200 operations be unserviceable or unavailable, the conditions to conduct EFVS 200 operations would not be satisfied and the approach should not be commenced. In the event of failure of the equipment required for EFVS 200 operations after the aircraft descends below 1 000 ft above the aerodrome or into the FAS, the conditions of NCC.OP.230 would no longer be satisfied unless the RVR reported prior to commencement of the approach was sufficient for the approach to be flown without the use of EFVS in lieu of natural vision.

(f) The EFVS image requirements at the DA/H are specified in AMC1 NCC.OP.235(a)(4).

The requirements for features to be identifiable on the EFVS image in order to continue approach below the DH are more stringent than the visual reference requirements for the same approach flown without EFVS. The more stringent standard is needed because the EFVS might not display the colour of lights used to identify specific portions of the runway and might not consistently display the runway markings. Any visual approach path indicator using colour-coded lights may be unusable.

(g) Obstacle clearance in the visual segment

The 'visual segment' is the portion of the approach between the DH or the MAPt and the runway threshold. In the case of EFVS 200 operations, this part of the approach may be flown using the EFVS image as the primary reference and obstacles may not always be identifiable on an EFVS image. The operational assessment specified in AMC1 NCC.OP.235(a)(2) is therefore required to ensure obstacle clearance during the visual segment.

(h) Visual reference requirements at 200 ft above the threshold

For EFVS 200 operations, natural visual reference is required by a height of 200 ft above the runway threshold. The objective of this requirement is to ensure that the pilot will have sufficient visual reference to land. The visual reference should be the same as the one required for the same approach flown without the use of EFVS.

Some EFVSs may have additional requirements that have to be fulfilled at this height to allow the approach to continue, such as a requirement to check that elements of the EFVS display remain correctly aligned and scaled to the external view. Any such requirements will be detailed in the AFM and included in the operator's procedures.

(i) Specific approval for EFVS

In order to use an EFVS in LVO without natural visual reference below 200 ft above the threshold, or EFVS to touchdown, the operator needs to hold a specific approval in accordance with Part-SPA.

(j) Go-around

A go-around will be promptly executed if the required visual references are not maintained on the EFVS image at any time after the aircraft has descended below the DA/H or if the required visual references are not distinctly visible and identifiable using natural vision after the aircraft is below 200 ft. It is considered more likely that an EFVS 200 operation could result in the initiation of a go-around below the DA/H than the equivalent approach flown without EFVS and thus the operational assessment required by AMC1 NCC.OP.235(a)(2) takes into account the possibility of a balked landing.

An obstacle free zone (OFZ) may also be provided for CAT I precision approach procedures. Where an OFZ is not provided for a CAT I precision approach, this may be indicated on the approach chart. NPA procedures and approach procedures with vertical guidance provide obstacle clearance for the missed approach based on the assumption that a go-around is executed at the MAPt and not below the MDH.

271. The following AMC1 NCC.OP.235(a)(1) is inserted:

AMC1 NCC.OP.235(a)(1) EFVS 200 operations

EQUIPMENT CERTIFICATION

For EFVS 200 operations, the aircraft should be equipped with an approach system using EFVS-A or a landing system using EFVS-L.

272. The following AMC1 NCC.OP.235(a)(2) is inserted:

AMC1 NCC.OP.235(a)(2) EFVS 200 operations

AERODROMES AND INSTRUMENT PROCEDURES SUITABLE FOR EFVS 200 OPERATIONS

(a) For EFVS 200 operations, the operator should verify the suitability of a runway before authorising EFVS operations to that runway through an operational assessment taking into account the following elements:

  (1) the obstacle situation;

  (2) the type of aerodrome lighting;

  (3) the available IAPs;

  (4) the aerodrome operating minima; and

  (5) any non-standard conditions that may affect the operations.

(b) EFVS 200 operations should only be conducted as 3D operations, using an IAP in which the final approach track is offset by a maximum of 3 degrees from the extended centreline of the runway.

(c) The IAP should be designed in accordance with PANS-OPS, Volume I (ICAO Doc 8168) or equivalent criteria.

273. The following AMC2 NCC.OP.235(a)(2) is inserted:

AMC2 NCC.OP.235(a)(2) EFVS 200 operations

VERIFICATION OF THE SUITABILITY OF RUNWAYS FOR EFVS 200 OPERATIONS

The operational assessment before authorising the use of a runway for EFVS 200 operations may be conducted as follows:

(a) Check whether the runway has been promulgated as suitable for EFVS 200 operations or is certified as a precision approach category II or III runway by the State of the aerodrome. If this is so, then check if and where LED lights are installed in order to assess the impact on the EFVS equipment used by the operator.

(b) If the check in point (a) above comes out negative, then proceed as follows:

  (1) For straight-in IAPs, US Standard for Terminal Instrument Procedures (TERPS)[4] may be considered to be acceptable as an equivalent to PANS-OPS. If other design criteria than PANS-OPS or US TERPS are used, the operations should not be conducted.

  (2) If an OFZ is established, this will ensure adequate obstacle protection from 960 m before the threshold. If an OFZ is not established or if the DH for the approach is above 250 ft, then check whether there is a visual segment surface (VSS).

  (3) VSSs are required for procedures published after 15 March 2007, but the existence of the VSS has to be verified through aeronautical information publication (AIP), operations manual Part C, or direct contact with the aerodrome. Where the VSS is established, it may not be penetrated by obstacles. If the VSS is not established or is penetrated by obstacles and an OFZ is not established, then the operations should not be conducted. Note: obstacles of a height of less than 50 ft above the threshold may be disregarded when assessing the VSS.

  (4) Runways with obstacles that require visual identification and avoidance should not be accepted.

  (5) For the obstacle protection of a balked landing where an OFZ is not established, the operator may specify that pilots follow a departure procedure in the event of a balked landing, in which case it is necessary to verify that the aircraft will be able to comply with the climb gradients published for the instrument departure procedures for the expected landing conditions.

(c) If the AFM stipulates specific requirements for approach procedures, then the operational assessment should verify that these requirements can be met.

274. The following AMC1 NCC.OP.235(a)(3) is inserted:

AMC1 NCC.OP.235(a)(3) EFVS 200 operations

INITIAL TRAINING FOR EFVS 200 OPERATIONS

Operators should ensure that flight crew members complete the following conversion training before being authorised to conduct EFVS operations unless credits related to training and checking for previous experience

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[4] https://www.faa.gov/regulations_policies/orders_notices/index.cfm/go/document.information/documentID/1032731

on similar aircraft types are defined in the operational suitability data established in accordance with Regulation (EU) No 748/2012:

(a) A course of ground training including at least the following:

  (1) characteristics and limitations of head-up displays (HUDs) or equivalent display systems including information presentation and symbology;

  (2) EFVS sensor performance in different weather conditions, sensor limitations, scene interpretation, visual anomalies and other visual effects;

  (3) EFVS display, control, modes, features, symbology, annunciations and associated systems and components;

  (4) interpretation of EFVS imagery;

  (5) interpretation of approach and runway lighting systems and display characteristics when using EFVS;

  (6) pre-flight planning and selection of suitable aerodromes and approach procedures;

  (7) principles of obstacle clearance requirements;

  (8) use and limitations of RVR assessment systems;

  (9) normal, abnormal and emergency procedures for EFVS 200 operations;

  (10) effect of specific aircraft/system malfunctions;

  (11) human factors aspects of EFVS 200 operations;

  (12) qualification requirements for pilots to obtain and retain approval for EFVS 200 operations.

(b) A course of FSTD training and/or flight training in two phases as follows:

  (1) Phase one (EFVS 200 operations with aircraft and all equipment serviceable) — objectives:

    (i) understand the operation of equipment required for EFVS 200 operations;

    (ii) understand operating limitations of the installed EFVS;

    (iii) practise the use of HUD or equivalent display systems;

    (iv) practise setup and adjustment of EFVS equipment in different conditions (e.g. day and night);

    (v) practise monitoring of automatic flight control systems, EFVS information and status annunciators;

    (vi) practise interpretation of EFVS imagery;

    (vii) become familiar with the features needed on the EFVS image to continue approach below the DH;

    (viii) practise identification of visual references using natural vision while using EFVS equipment;

    (ix) master the manual aircraft handling relevant to EFVS 200 operations including, where appropriate, the use of the flare cue and guidance for landing;

    (x) practise coordination with other crew members; and

    (xi) become proficient at procedures for EFVS 200 operations.

(2) Phase one of the training should include the following exercises:

  (i) the required checks for satisfactory functioning of equipment, both on the ground and in flight;

  (ii) the use of HUD or equivalent display systems during all phases of flight;

  (iii) approach using the EFVSs installed on the aircraft to the appropriate DH and transition to visual flight and landing;

  (iv) approach with all engines operating using the EFVS, down to the appropriate DH followed by a missed approach, all without external visual reference, as appropriate.

(3) Phase two (EFVS 200 operations with aircraft and equipment failures and degradations) — objectives:

  (i) understand the effect of known aircraft unserviceabilities including use of the MEL;

  (ii) understand the effect on aerodrome operating minima of failed or downgraded equipment;

  (iii) understand the actions required in response to failures and changes in the status of the EFVS including HUD or equivalent display systems;

  (iv) understand the actions required in response to failures above and below the DH;

  (v) practise abnormal operations and incapacitation procedures; and

  (vi) become proficient at dealing with failures and abnormal situations during EFVS 200 operations.

(4) Phase two of the training should include the following exercises:

  (i) approaches with engine failures at various stages on the approach;

  (ii) approaches with failures of the EFVS at various stages of the approach, including failures between the DH and the height below which an approach should not be continued if natural visual reference is not acquired, require either:

    (A) reversion to head down displays to control missed approach; or

    (B) reversion to flight with downgraded or no guidance to control missed approaches from the DH or below, including those which may result in a touchdown on the runway.

  (iii) incapacitation procedures appropriate to EFVS 200 operations;

  (iv) failures and procedures applicable to the specific EFVS installation and aircraft type; and

  (v) FSTD training, which should include minimum eight approaches.

275. The following AMC2 NCC.OP.235(a)(3) is inserted:

AMC2 NCC.OP.235(a)(3) EFVS 200 operations

RECURRENT TRAINING AND CHECKING FOR EFVS 200 OPERATIONS

(a) The operator should ensure that the pilots' competence to perform EFVS 200 operations is trained every 6 months by performing at least two approaches, and

(b) The operator should ensure that the pilots' competence to perform EFVS 200 operations is checked at each required demonstration of competence by performing at least two approaches, of which one should be flown without natural vision to 200 ft.

276. The following AMC3 NCC.OP.235(a)(3) is inserted:

AMC3 NCC.OP.235(a)(3) EFVS 200 operations

RECENT EXPERIENCE REQUIREMENTS FOR EFVS 200 OPERATIONS

Pilots should complete a minimum of four approaches using the operator's procedures for EFVS 200 operations during the validity period of the periodic demonstration of competence unless credits-related currency is defined in the operational suitability data established in accordance with Regulation (EU) No 748/2012.

277. The following AMC4 NCC.OP.235(a)(3) is inserted:

AMC4 NCC.OP.235(a)(3) EFVS 200 operations

DIFFERENCES TRAINING FOR EFVS 200 OPERATIONS

(a) The operator should ensure that the flight crew members authorised to conduct EFVS 200 operations are provided with a differences training or familiarisation whenever there is a change to any of the following:

  (1) the technology used in the flight guidance and flight control system;

  (2) the HUD or equivalent display systems; or

  (3) the operating procedures.

(b) The differences training should:

  (1) meet the objectives of the appropriate initial training course;

  (2) take into account the flight crew members' previous experience; and

  (3) take into account the operational suitability data established in accordance with Regulation (EU) No 748/2012.

278. The following AMC5 NCC.OP.235(a)(3) is inserted:

AMC5 NCC.OP.235(a)(3) EFVS 200 operations

TRAINING FOR EFVS 200 OPERATIONS

If a flight crew member is to be authorised to operate as pilot flying and pilot monitoring during EFVS 200 operations, then he or she should complete the required FSTD training for each operating capacity.

279. The following GM1 NCC.OP.235(a)(3) is inserted:

GM1 NCC.OP.235(a)(3) EFVS 200 operations

RECURRENT CHECKING FOR EFVS 200 OPERATIONS

In order to provide the opportunity to practise decision-making in the event of system failures and failure to acquire natural visual reference, the recurrent training/checking for EFVS 200 operations should periodically include different combinations of equipment failures, go-around due to loss of visual reference, and landings.

280. The following AMC1 NCC.OP.235(a)(4) is inserted:

AMC1 NCC.OP.235(a)(4) EFVS 200 operations

OPERATING PROCEDURES FOR EFVS 200 OPERATIONS

(a) For EFVS 200 operations, the following should apply:

  (1) the pilot flying should use the EFVS throughout the approach;

  (2) in multi-pilot operations, a suitable display of EFVS sensory imagery should be provided to the pilot monitoring;

  (3) the approach between the FAF and the DA/H should be flown using vertical flight path guidance;

  (4) the approach may be continued below the DA/H provided that the pilot can identify on the EFVS image either:

    (i) the approach light system; or

    (ii) both of the following:

      (A) the runway threshold identified by the beginning of the runway landing surface, the threshold lights or the runway end identifier lights; and

      (B) the touchdown zone identified by the touchdown zone lights, the touchdown zone runway markings or the runway lights;

  (5) a missed approach should be executed promptly if the required visual reference is not distinctly visible and identifiable to the pilot without reliance on the EFVS by 200 ft above the threshold.

(b) Operating procedures for EFVS 200 operations should:

  (1) be consistent with the AFM;

  (2) be appropriate to the technology and equipment to be used;

  (3) specify the duties and responsibilities of each flight crew member in each relevant phase of flight;

  (4) ensure that flight crew workload is managed to facilitate effective decision-making and monitoring of the aircraft; and

  (5) deviate to the minimum extent practicable from normal procedures used for routine operations.

(c) Operating procedures should include:

  (1) required checks for the satisfactory functioning of the aircraft equipment, both before departure and in flight;

(2) correct seating and eye position;

(3) determination of aerodrome operating minima;

(4) required visual references at the DH;

(5) action to be taken if natural visual reference is not acquired by 200 ft;

(6) action to be taken in the event of loss of the required visual reference; and

(7) procedures for balked landing.

(d) Operating procedures should be included in the operations manual.

281. The following AMC1 NCC.OP.235(a)(8) is inserted:

AMC1 NCC.OP.235(a)(8) EFVS 200 operations

AERODROME OPERATING MINIMA — EFVS 200 OPERATIONS

For EFVS 200 operations, the following should apply:

(a) The DA/H used should be the same as for operations without EFVS.

b) The lowest RVR minima to be used should be determined by reducing the RVR presented in:

(1) Table 8 in AMC5 NCC.OP.110 in accordance with Table 1 below for aeroplanes;

(2) Table 12 of AMC6 NCC.OP.110 in accordance with table 1 below for helicopters;

(c) In case of failed or downgraded equipment, table 15 in AMC9 NCC.OP. 110 should apply.

Table 1

Operations utilising EFVS: RVR reduction

RVR (m) presented in Table 8 in AMC5 NCC.OP.110 or in table 12 of AMC6 NCC.OP.110	RVR (m) for EFVS 200 operations
550	550
600	550
650	550
700	550
750	550
800	550
900	600
1 000	650
1 100	750
1 200	800
1 300	900

RVR (m) presented in Table 8 in AMC5 NCC.OP.110 or in table 12 of AMC6 NCC.OP.110	RVR (m) for EFVS 200 operations
1 400	900
1 500	1 000
1 600	1 100
1 700	1 100
1 800	1 200
1 900	1 300
2 000	1 300
2 100	1 400
2 200	1 500
2 300	1 500
2 400	1 600

282. The following AMC1 NCC.OP.235(c) is inserted:

AMC1 NCC.OP.235(c) EFVS 200 operations

EVFS 200 WITH LEGACY SYSTEMS UNDER AN APPROVAL

The EVS should be certified as ‘EVS with an operational credit’

283. The following GM1 NCC.OP.235(c) is inserted:

GM1 NCC.OP.235(c) EFVS 200 operations

The competent authority refers in CAT.OP.MPA.312 point (c) is the competent authority referred in ORO.GEN.105.

284. The following AMC1 NCC.IDE.H.120(c) is inserted:

AMC1 NCC.IDE.H.120(c) Operations under VFR — flight and navigational instruments and associated equipment

MULTI-PILOT OPERATIONS

Two pilots should be considered to be required by the operation if multi-pilot operations are required by one of the following:

(a) the AFM

(b) at night, the operations manual.

285. The following GM1 NCC.IDE.H.120(c) is inserted:

GM1 NCC.IDE.H.120(c) Operations under VFR — flight and navigational instruments and associated equipment

MULTI-PILOT OPERATIONS ON A VOLUNTARY BASIS – HELICOPTERS OPERATED BY DAY UNDER VFR

If the AFM permits single-pilot operations, and the operator decides that the crew composition is more than one pilot for day VFR operations only, then point NCC.IDE.H.120(c) should not apply. Additional displays, including those referred to in NCC.IDE.H.120(c) may be required under point NCC.IDE.H.100(e).

286. The following AMC1 NCC.IDE.H.125(c) is inserted:

AMC1 NCC.IDE.H.125(c) Operations under IFR – flight and navigational instruments and associated equipment

MULTI-PILOT OPERATIONS

Two pilots should be considered to be required by the operation if multi-pilot operations are required by one of the following:

(a) the AFM;

(b) the operations manual.

ANNEX VII
(PART-NCO)

SUBPART B: OPERATING PROCEDURES

287. The following AMC1 NCO.OP.105(c) is amended as follows:

AMC1 NCO.GEN.105(~~e~~a)(3) Pilot-in-command responsibilities and authority

CHECKLISTS

(a) The pilot-in-command should use the latest checklists provided by the manufacturer.

(b) If checks conducted prior to take-off are suspended at any point, the pilot-in-command should re-start them from a safe point prior to the interruption.

288. The following AMC1 NCO.OP.101(a) is inserted:

AMC1 NCO.OP.101(a) Altimeter check and settings

PRE-FLIGHT ALTIMETER CHECK

A serviceable altimeter indicates the elevation of the point selected, plus the height of the altimeter above this point, within a tolerance of ± 60 ft.

If the altimeter does not indicate the reference elevation or height exactly but is within the specified tolerances, no adjustment of this indication should be made at any stage of a flight. Also, any error which is within tolerance on the ground should be ignored by the pilot during flight.

If no altimeter setting is available at the aerodrome or operating site of departure, the altimeter should be set using the elevation of the aerodrome or operating site, and the altimeter setting should be verified on first contact with an ATS unit.

289. AMC1 NCO.OP.110 is amended as follows:

AMC1 NCO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

TAKE-OFF OPERATIONS

(a) General:

  (1) Take-off minima should be expressed as visibility (VIS) or runway visual range (RVR) limits, taking into account all relevant factors for each ~~aerodrome~~runway/final approach and take-off area (FATO)/operating site planned to be used and aircraft characteristics and equipment. 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~~an engine failure after rotation.

(2) For night operations, ~~ground lights should be available to illuminate the runway/final approach and take-off area (FATO) and any obstacles~~ sufficient lighting should be in operation to illuminate the runway/final approach and take-off area (FATO) and any relevant obstacles.

(3) For point-in-space (PinS) departures to an initial departure fix (IDF), the take-off minima should be selected to ensure sufficient guidance to see and avoid obstacles and return to the heliport if the flight cannot be continued visually to the IDF. Minimum VIS should be 800m and minimum ceiling should be 250 ft.

(4) For helicopters outside of a runway environment, minimum VIS should be 800 m and for offshore helideck operations minimum VIS should be 500 m.

290. The following AMC2 NCO.OP.110 is inserted:

AMC2 NCO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

RVR OR VIS FOR INSTRUMENT APPROACH OPERATIONS – DETERMINATION OF DH/MDH FOR INSTRUMENT APPROACH OPERATIONS - AEROPLANES

(a) The RVR (or for non-instrument runways, VIS) for straight-in instrument approach operations should not be less than the greatest of the following:

(1) The minimum RVR (or for non-instrument runways, VIS) for the type of runway used according to Table 1; or

(2) The minimum RVR determined according to the MDH or DH and class of lighting facility according to Table 2; or

(3) The minimum RVR according to the visual and non-visual aids and on-board equipment used according to Table 3.

(b) For Category A and B aeroplanes, if the RVR determined in accordance with (a) is greater than 1 500 m, then 1 500 m should be used.

(d) The visual aids, if available, may comprise standard runway day markings, runway edge lights, threshold lights, runway end lights and approach lights as defined in Table 6.

(e) For night operations or for any operation where credit for visual aids is required, the lights should be on and serviceable except as provided for in GM5 NCO.OP.110.

Table 1

Type of runway versus minimum RVR or VIS — aeroplanes

Type of runway	**Minimum RVR or VIS (m)**
Precision approach runway, category I	550
Non-precision approach runway	750
Non-instrument runway	Visibility according to Table 1 in NCO.OP.112 (Circling minima)

Table 2

RVR versus DH/MDH

DH or MDH			**Class of lighting facility**			
			FALS	**IALS**	**BALS**	**NALS**
ft			**RVR (m)**			
200	-	210	550	750	1 000	1 200
211	-	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	2 400
561	-	580	1 900	2 200	2 400	2 400
581	-	600	2 000	2 300	2 400	2 400
601	-	620	2 100	2 400	2 400	2 400
621	-	640	2 200	2 400	2 400	2 400
641		660	2 300	2 400	2 400	2 400
661	and above		2 400	2 400	2 400	2 400

Table 3

Visual and non-visual aids and/or on-board equipment versus minimum RVR – aeroplanes

Type of approach	**Facilities**	**Lowest RVR (m)**
Precision approach and APV procedure	RTZL and RCLL	[no limitation]
	without RTZL and RCLL but using HUDLS or equivalent system; coupled auto-pilot or flight director to DH	[no limitation]

	No RTZL and RCLL, not using HUDLS or equivalent system or auto-pilot to DH.	750
Non-precision approach procedure	Final approach track offset <15 ° for category A and B aeroplanes or <5 ° Category C and D aeroplanes	750
	Final approach track offset ≥ 15° for category A or B aeroplanes	1 000
	Final approach track offset ≥ 5° for category C or D aeroplanes	1 200

DETERMINATION OF RVR FOR INSTRUMENT APPROACH OPERATIONS – HELICOPTERS

(a) For IFR operations the RVR should not be less than the greatest of the following:

(1) the minimum RVR for the type of runway/FATO used according to Table 4; or

(2) the minimum RVR determined according to the MDH or DH and class of lighting facility according to Table 5;

(3) for point-in-space (PinS) operations with instructions to ‘proceed visually’, the distance between the MAPt of the PinS and the FATO/approach light system.

(b) for PinS operations with instructions to ‘proceed VFR’, the VIS should be compatible with visual flight rules.

(c) The visual aids, if available, may comprise standard runway day markings, runway edge lights, threshold lights, runway, end lights and approach lights as defined in Table 6 of AMC3 NCO.OP.110.

(d) For night operations or for any operation where credit for visual aids is required, the lights should be on and serviceable.

Table 4

Type of runway/FATO versus minimum RVR – helicopters

Type of runway / FATO	**Minimum RVR or VIS (m)**
Precision approach runway, Category I Non-precision approach runway Non-instrument runway	RVR 550
Instrument FATO FATO	RVR 550 RVR or VIS 800

Table 5

DH/MDH versus minimum RVR – helicopters

DH / MDH (ft)	**Facilities versus. RVR (m) ***			
	FALS	**IALS**	**BALS**	**NALS**
200	550	600	700	1 000
201 – 249	550	650	750	1 000

250 – 299	600*	700*	800	1 000
300 and above	750*	800	900	1 000

* Minima on 2D approach operations should be no lower than 800 m.

APPROACH LIGHTING SYSTEMS – AEROPLANES AND HELICOPTERS

Table 6: Approach lighting systems

Class of lighting facility	**Length, configuration and intensity of approach lights**
FALS	CAT I lighting system (HIALS ≥720 m) distance coded centreline, barrette centreline
IALS	Simple approach lighting system (HIALS 420–719 m) single source, barrette
BALS	Any other approach lighting system (HIALS, MALS or ALS 210–419 m)
NALS	Any other approach lighting system (HIALS, MALS or ALS <210 m) or no approach lights

291. AMC2 NCO.OP.110 is re-numbered as follows:

~~AMC2~~ AMC3 NCO.OP.110 Aerodrome operating minima – aeroplanes and helicopters

VISUAL APPROACH

[…]

292. AMC3 NCO.OP.110 is deleted.

~~AMC3 NCO.OP.110 Aerodrome operating minima – aeroplanes and helicopters~~

~~EFFECT ON LANDING MINIMA OF TEMPORARILY FAILED OR DOWNGRADED GROUND EQUIPMENT~~

293. GM1 NCO.OP.110 is deleted.

~~GM1 NCO.OP.110 Aerodrome operating minima – aeroplanes and helicopters~~

~~COMMERCIALLY AVAILABLE INFORMATION~~

294. GM2 NCO.OP.110 is deleted.

~~GM2 NCO.OP.110 Aerodrome operating minima – aeroplanes and helicopters~~

~~VERTICAL PATH CONTROL~~

295. The following GM2 NCO.OP.110 is inserted:

GM2 NCO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

FLIGHTS WITH VFR AND IFR SEGMENTS

Where a flight contains VFR and IFR segments, aerodrome operating minima need be established only as far as relevant to the IFR segments. Attention is drawn to NCO.OP.160(a) and (c), which requires that the pilot-in-command be satisfied that the VFR segments will be conducted in conditions at or above the applicable VFR operating minima. For example, for a VFR departure changing to IFR at a transition point en-route and an IFR arrival at destination, the pilot-in-command should be satisfied that VMC will exist up to the transition point, and aerodrome operating minima should be established for the destination and any alternate destinations required.

296. GM3 NCO.OP.110 is deleted.

~~GM3 NCO.OP.110 Aerodrome operating minima – aeroplanes and helicopters~~

~~CRITERIA FOR ESTABLISHING RVR/CMV~~

297. The following GM3 NCO.OP.110 is inserted:

GM3 NCO.OP.110 Aerodrome operating minima – aeroplanes and helicopters

MEANS TO DETERMINE THE REQUIRED RVR BASED ON DH AND LIGHTING FACILITIES

(a) The values in Table 2 are derived from the formula below:

RVR (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 remaining constant. An upper RVR limit of 2 400 m has been applied to the table.

(b) The lighting system classes in Table 2 have the meaning specified in Table 6.

298. GM4 NCO.OP.110 is deleted.

~~GM4 NCO.OP.110 Aerodrome operating minima — aeroplanes and helicopters~~

~~DETERMINATION OF RVR/CMV/VIS MINIMA FOR NPA, APV, CAT I — AEROPLANES~~

299. The following GM4 NCO.OP.110 is inserted:

GM4 NCO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

USE OF THIRD-PARTY INFORMATION

If a pilot-in-command uses information provided by a third party for aerodrome operating minima, the pilot-in-command verifies that the method for calculating minima is in accordance with this regulation.

300. GM5 NCO.OP.110 is deleted and replaced by the following:

GM5 NCO.OP.110 Aerodrome operating minima – aeroplanes and helicopters

~~CONVERSION OF REPORTED METEOROLOGICAL VISIBILITY TO RVR/CMV~~

~~(a) A conversion from meteorological visibility to RVR/CMV should not be used:~~

  ~~(1) when 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) For all other circumstances, Table 5 should be used.~~

~~Table 5: 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~~

EFFECT OF TEMPORARILY FAILED OR DOWNGRADED GROUND EQUIPMENT ON LANDING MINIMA

(a) Lighting in Table 5 should be considered only if the relevant lighting is operating. For example, if components of a FALS have failed leaving only the last 250 m operating normally, the lighting facilities should be treated as BALS.

(b) Failures of standby equipment, standby power systems, middle markers and RVR assessment systems have no effect on minima.

301. GM6 NCO.OP.110 is re-numbered and amended as follows:

~~GM6~~ GM1 NCO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

AIRCRAFT CATEGORIES

(a) […]

(b) ***Table 7~~6~~: Aircraft categories corresponding to V_{AT} values […]***

(c) Helicopters are also eligible for Category H where applicable.

302. GM7 NCO.OP.110 is deleted.

~~GM7 NCO.OP.110 Aerodrome operating minima — aeroplanes and helicopters~~

~~**CONTINUOUS DESCENT FINAL APPROACH (CDFA) — AEROPLANES**~~

303. GM8 NCO.OP.110 is deleted.

~~GM8 NCO.OP.110 Aerodrome operating minima — aeroplanes and helicopters~~

~~**ONSHORE AERODROME DEPARTURE PROCEDURES — HELICOPTERS**~~

304. The following GM1 NCO.OP.110(b)(5) is inserted:

GM1 NCO.OP.110(b)(5) Aerodrome operating minima — aeroplanes and helicopters

VISUAL AND NON-VISUAL AIDS AND INFRASTRUCTURE

‘Visual and non-visual aids and infrastructure’ refers to all equipment and facilities required for the procedure to be used for the intended instrument approach operation. This includes, but is not limited to, lights, markings, ground or space-based radio aids, etc.

305. AMC1 NCO.OP.111 is deleted.

~~AMC1 NCO.OP.111 Aerodrome operating minima — NPA, APV, CAT I operations~~

~~**NPA FLOWN WITH THE CDFA TECHNIQUE**~~

306. The following GM1 NCO.OP.111, GM2 NCO.OP.111 and GM4 NCO.OP.111 are inserted:

GM1 NCO.OP.111 Aerodrome operating minima —3D and 2D approach operations

VERTICAL PATH CONTROL FOR NPA

(a) During a 3D instrument approach operation (using both lateral and vertical navigation guidance), the displayed vertical path should be followed continuously. The approach may be continued to DA/H, at which point a missed approach must be initiated if visual reference is not acquired.

(b) During a 2D instrument approach operation (using lateral navigation guidance only) flown, using the CDFA technique, the vertical path should be approximated continuously by:

(1) choosing an appropriate vertical speed,

(2) crosschecking level against position along the approach, and

(3) adapting the vertical speed as required.

The approach may be continued to DA/H or the missed approach point (MAPt) (whichever is reached first), at which point a missed approach must be initiated if visual reference is not acquired. There is no MDH for an NPA flown using CDFA. An aircraft may descend briefly below the DH on an NPA flown using CDFA, in the same way as it may on a precision approach or APV.

(c) During a 2D instrument approach operation (using lateral navigation guidance only) flown, using the step-down (non-CDFA) technique, the vertical path consists of a sequence of one or more descents to the next published level (i.e. the MDA/H or height at the next stepdown fix). The aircraft may fly level at the MDA/H until reaching the MAPt, where a missed approach must be initiated if visual reference is not acquired.

The CDFA technique has substantially improved safety performance in commercial air transport operations with complex motor-powered aircraft. In lighter, more manoeuvrable aircraft, operated by a single pilot, which may be accustomed to shorter and steeper visual approaches, there may sometimes be advantages to a step-down technique. Due consideration should be given to the choice of vertical path control at the planning stage of flight.

GM2 NCO.OP.111 Aerodrome operating minima —3D and 2D approach operations

CALCULATION OF DA/MDA

NCO.OP.111 refers to DH and MDH because the rule compares heights with other heights (system minima, minimum DH in the AFM etc.). Usually, the DH or MDH will be converted to DA or MDA for operational use by adding the threshold elevation.

GM3 NCO.OP.111 Aerodrome operating minima — 3D and 2D approach operations

POINT IN SPACE APPROACH WITH VIRTUAL DESTINATION

For PinS approaches with instructions to ‘proceed VFR’ which are not associated with a runway/FATO/operating site, DH/MDH can be established with reference to the ground below the missed approach point.

307. GM1 NCO.OP.112 is amended as follows:

GM1 NCO.OP.112 Aerodrome operating minima — circling operations with aeroplanes

SUPPLEMENTAL INFORMATION

(a) The purpose of this Guidance Material is to provide pilots 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; and

  (3) for these procedures, the applicable visibility is the ~~meteorological~~ flight visibility.

(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 established, but not below MDA/H — the aeroplane should follow the corresponding IAP 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, RNAV, RNP or ILS, microwave landing system (MLS) or GBAS landing system (GLS)~~ 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 visual references.

[…]

308. The following GM2 NCO.OP.112 is inserted:

GM2 NCO.OP.112 Aerodrome operating minima — circling operations with aeroplanes

CALCULATION OF DA/MDA

NCO.OP.112 refers to MDH because the rule compares heights with other heights (minimum circling height, OCH etc.). Usually, the MDH will be converted to MDA for operational use by adding the aerodrome elevation.

309. The following AMC1 NCO.OP.115 is inserted:

AMC1 NCO.OP.115 Departure and approach procedures — aeroplanes and helicopters

ARRIVALS AND DEPARTURES UNDER IFR WHERE NO INSTRUMENT FLIGHT PROCEDURES ARE PUBLISHED

When arriving or departing under IFR to/from an aerodrome or operating site with no published instrument flight procedure, the pilot-in-command should ensure that sufficient obstacle clearance is available for safe operation. This may be achieved, for example, by climbing or descending visually when below a minimum altitude at which obstacle clearance is known to exist.

When operating IFR in uncontrolled airspace, separation from other aircraft remains the responsibility of the pilot in command. The pilot-in-command should also comply with any flight planning and communication requirements designated by the competent authority under SERA.4001(b)(3) and SERA.5025(b). Any ATC clearance required to enter controlled airspace must be obtained prior to entry.

310. The following AMC1 NCO.OP.142(b)(1) is inserted:

AMC1 NCO.OP.142(b)(1) Destination alternate aerodromes – instrument approach operations

SBAS CAPABLE GNSS EQUIPMENT

GNSS system which are (E)TSO-C145() or (E)TSO-C146() are SBAS capable. Aircraft certified for RNP APCH to LPV minima (i.e. AMC1 NCO.IDE.A/H.195(l)) are considered compliant.

311. The following AMC1 NCO.OP.142(b)(3) is inserted:

AMC2 NCO.OP.142(b)(3) Destination alternate aerodromes – instrument approach operations

USE OF RAIM FOR SBAS

Where a receiver with RAIM is used to meet the requirement for ABAS, its availability should be predicted by a pre-flight RAIM check, in accordance with AMC1 NCO.GEN.105(c).

312. GM1 NCO.OP.142 is deleted.

~~GM1 NCO.OP.142 Destination aerodromes — instrument approach operations~~

~~PBN OPERATIONS~~

313. The following GM1 NCO.OP.142(b)(4) is inserted:

GM1 NCO.OP.142(b)(4) Destination alternate aerodromes – instrument approach operations

INSTRUMENT APPROACH PROCEDURES THAT DO NOT RELY ON SBAS

This instrument approach can be an RNP APCH to LNAV minima. It can also be an RNP APCH to LNAV/VNAV minima using BaroVNAV. If the aircraft is equipped with a BaroVNAV function certified for APV.

This requirement is only used for planning purposes to cover the possibility of an SBAS loss; it does not prevent the pilot from flying an approach relying on SBAS if SBAS is available.

314. The following AMC1 NCO.OP.142(b)(5) is inserted:

AMC1 NCO.OP.142(b)(5) Destination alternate aerodromes – instrument approach operations

APPROPRIATE CONTINGENCY ACTION

An appropriate contingency action is an alternative offered in NCO.OP.142(b)(5) to completion of the planned flight to a safe landing, either at the planned destination or a destination alternate, using normal procedures and using navigation equipment meeting the requirements of NCO.IDE.A/H.100, installed for redundancy or as a backup.

The contingency action should be considered before flight and take into account the information identified by flight preparation according to NCO.OP.135. It may depend on the flight and availabilities of navigation solutions (satellites, ground navaids, etc.) and weather conditions (IMC, VMC) along the flight.

The contingency action addresses partial loss of navigation capability, such as:

— Loss of a stand-alone GNSS equipment

— Local loss of GNSS signal-in space (eg local jamming at destination)

— Loss GNSS signal-in-space.

It should take into account what options remain in case of loss of GNSS signal, for instance (non-GNSS-based) radar vectoring by ATC, non-GNSS based navigation systems or the possibility to reach VMC conditions

Examples of contingency actions might include:

— seeking navigational assistance from ATS, using communication and surveillance systems that remain operational, to enable safe descent to VMC;

— the emergency use of navigation equipment not meeting the requirements of NCO.IDE.A/H.100 by making use of the provisions in NCO.OP.105(e);

— descent over water or very flat terrain to levels with reduced (but reasonable) obstacle clearance; and

— unusually long periods of dead reckoning.

—

315. The following GM1 NCO.OP.143 is inserted:

GM1 NCO.OP.143 Destination alternate aerodromes planning minima — aeroplanes

MINIMUM SAFE IFR HEIGHT

For the purpose of this rule, the minimum safe IFR height is the height above the aerodrome of the lowest level compatible with SERA.5015(b) for en-route flight at a point from which visual flight to the aerodrome could reasonably be commenced.

316. The following GM1 NCO.OP.144 is inserted:

GM1 NCO.OP.144 Destination alternate aerodromes planning minima — helicopters

MINIMUM SAFE IFR HEIGHT

For the purpose of this rule, the minimum safe IFR height is the height above the aerodrome of the lowest level compatible with SERA.5015(b) for en-route flight at a point from which visual flight to the aerodrome could reasonably be commenced.

317. The following AMC1 NCO.OP.175 is inserted:

AMC1 NCO.OP.175 Take-off conditions — aeroplanes and helicopters

METEOROLOGICAL CONDITIONS FOR TAKE-OFF: AEROPLANES

(a) When the reported 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.

(b) When no reported 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.

318. AMC1 NCO.OP.210 is amended as follows:

AMC1 NCO.OP.210 Commencement and continuation of approach – aeroplanes and helicopters

VISUAL REFERENCES ~~FOR NPA, APV AND CAT I OPERATIONS~~

(a) For a straight-in approach, 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 lighting 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) FATO/runway edge lights; or

~~(10) other visual references specified in the operations manual.~~

(10) for helicopter PinS approaches, the identification beacon light and visual ground reference;

(11) for helicopter PinS approaches, the identifiable elements of the environment defined on the instrument chart; or

(12) for helicopter PinS approaches with instructions to 'proceed VFR', sufficient visual cues to determine that the conditions for VFR are met.

(b) For a circling approach, the required visual reference is the runway environment.

319. The following AMC2 NCO.OP.210 is inserted:

AMC2 NCO.OP.210 Commencement and continuation of approach – aeroplanes and helicopters

RVR MINIMA FOR CONTINUED APPROACH

(a) The controlling RVR should be the touchdown RVR.

(b) If the touchdown RVR is not reported, then the midpoint RVR should be the controlling RVR.

(c) If the neither touchdown RVR nor midpoint RVR is reported, then NCO.OP.210(a) is not applicable.

320. The following AMC2 NCO.OP.210 is inserted:

GM1 NCO.OP.210 Commencement and continuation of approach — aeroplanes and helicopters

APPLICATION OF RVR REPORTS

(a) There is no prohibition on the commencement of an approach based on reported RVR. The restriction in NCO.OP.210 applies only if the RVR is reported and applies to the continuation of the approach past a point where the aircraft is 1 000 ft above the aerodrome elevation or into the final approach segment as applicable.

(b) If a deterioration in RVR is reported once the aircraft is below 1 000 ft on in the final approach segment, as applicable, then there is no requirement for the approach to be discontinued. In this situation, the normal visual reference requirements would apply at DA/H.

(c) Where additional RVR information is provided (e.g. midpoint and stop end), this is advisory; such information may be useful to the pilot in order to determine whether there will be sufficient visual reference to control the aircraft during roll-out and taxi.

(d) If the RVR is less than the RVR calculated in accordance with AMC3 NCO.OP.110, a go-around is likely to be necessary since visual reference may not be established at the DH, or at the MDH at a point where a stable approach to landing in the TDZ remains possible. Similarly, in the absence of an RVR report, the reported visibility may indicate that a go-around is likely. The pilot-in-command should consider available options, based on a thorough assessment of risk, such as diverting to an alternate, before commencing the approach.

SUBPART D: INSTRUMENTS, DATA AND EQUIPMENT

SECTION 1 – AEROPLANES

321. The following AMC1 NCO.IDE.A.195(a) is inserted:

AMC1 NCO.IDE.A.195(a) Navigation equipment

RNAV SUBSTITUTION

An RNAV system may be used to substitute for conventional navigation aids and radio equipment, without monitoring of the raw data from conventional navigation aids, under the following conditions:

SCOPE OF RNAV SUBSTITUTION

(a) RNAV substitution may be used in all the phases of flight except:

  (1) to provide lateral guidance in the final approach segment of an instrument approach procedure; and

  (2) to substitute for DME, if a DME transceiver is either not installed on the aircraft or found to be unserviceable before flight.

SUITABILITY OF THE RNAV SYSTEM FOR RNAV SUBSTITUTION

(b) The RNAV system:

  (1) should meet at least the requirements of (E)TSO-C129/-C196/-C145/-C146 (or later equivalent standards); and

  (2) its installation in the aircraft should meet the requirements of NCO.OP.116(a) for RNAV 1, RNP 1 or RNP APCH.

OPERATING PROCEDURE

(c) The pilot-in-command is responsible for:

  (1) ensuring that any procedure and waypoints used are retrieved from a navigation database which meet the requirements of NCO.IDE.205;

  (2) verifying waypoint sequence, reasonableness of track angles, and distances of any overlay procedure used;

  (3) applying pre-flight procedures associated with GNSS use (e.g. RAIM check if applicable); and

  (4) complying with any limitation on RNAV Substitution in the AFM.

PILOT COMPETENCE

(d) The pilot-in-command should be aware of the limitations of RNAV substitution.

AIRSPACE LIMITATIONS

(e) RNAV substitution should not be applied on any procedure where RNAV substitution has been indicated as ‘not authorised’ by an aeronautical information publication (AIP) entry or Notice(s) to Airmen (NOTAM).

CONTINGENCY PLANNING

(f) Nothing in this AMC relieves the pilot-in-command from compliance with NCO.IDE.A.195(b) which requires 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 according to the flight plan, or an appropriate contingency action, to be completed safely.

322. The following GM1 NCO.IDE.A.195(a) is inserted:

GM1 NCO.IDE.A.195(a) Navigation equipment

SCOPE OF RNAV SUBSTITUTION

(a) Applications of RNAV substitution include use to:

  (1) determine aircraft position relative to or distance from a VOR, marker, DME fix or a named fix defined by a VOR radial or NDB bearing;

  (2) navigate to or from a VOR, or NDB, except as lateral guidance in the final approach segment;

  (3) hold over a VOR, NDB, or DME fix;

  (4) fly an arc based upon DME;

  (5) fly an overlay of a conventional departure, arrival, approach or route except as lateral guidance in the final approach segment of an instrument approach procedure.

(b) RNAV substitution for ADF, marker and VOR may be used where airborne and/or ground-based equipment is not available.

(c) RNAV substitution for DME may be used where the ground-based DME transponder is unserviceable or the airborne DME transceiver is found to be unserviceable in flight. Caution must be exercised by the pilot-in-command when calculating and using GNSS distances to the active waypoint as reference points are often different.

323. The following GM2 NCO.IDE.A.195(a) is inserted:

GM2 NCO.IDE.A.195(a) Navigation equipment

SUITABILITY OF THE RNAV SYSTEM FOR RNAV SUBSTITUTION

GNSS ETSO are referenced in the AMC since most of the NCO are equipped of a RNAV stand-alone system which exclusively base its positioning on GNSS.

324. The following GM3 NCO.IDE.A.195(a) is inserted:

GM3 NCO.IDE.A.195(a) Navigation equipment

OPERATING PROCEDURE

Although RNAV substitution may not be used for lateral guidance in final approach segment, this does not preclude the use of the RNAV system to fly the final approach segment, provided that raw data from the associated conventional navigation aids is monitored.

325. The following AMC1 NCO.IDE.A.195(b) is inserted:

AMC1 NCO.IDE.A.195(b) Navigation equipment

APPROPRIATE CONTINGENCY ACTION

An appropriate contingency action is an alternative offered in NCO.IDE.A.195(b) to completion of the planned flight to a safe landing, either at the planned destination or a destination alternate, using normal procedures and using navigation equipment meeting the requirements of NCO.IDE.A.100, installed for redundancy or as a backup.

The contingency action should be considered before flight and take into account the information identified by flight preparation according to NCO.OP.135. It may depend on the flight and availabilities of navigation solutions (satellites, ground navaids, etc.) and weather conditions (IMC, VMC) along the flight.

The contingency action addresses partial loss of navigation capability. An appropriate contingency action to meet the requirements of NCO.IDE.A.195(b) does not rely on the performance of any function of the item of equipment whose potential failure is being considered. For example, in considering the failure of a VOR/LOC/DME receiver, none of the functions of that receiver should be relied upon in the contingency action.

Examples of contingency actions might include:

- seeking navigational assistance from ATS, using communication, navigation and surveillance systems that remain operational, to enable a safe instrument approach or a safe descent to VMC;
- the emergency use of navigation equipment not meeting the requirements of NCO.IDE.A.100; and
- unusually long periods of dead reckoning.

A contingency is required such that the failure of one item of navigation equipment has a reasonable likelihood of a safe outcome to the flight, consistent with other risks to which the operation is exposed.

SECTION 2 – HELICOPTERS

326. The following AMC1 NCO.IDE.H.195(a) is inserted:

AMC1 NCO.IDE.H.195(a) Navigation equipment

RNAV SUBSTITUTION

An RNAV system may be used to substitute for conventional navigation aids and radio equipment, without monitoring of the raw data from conventional navigation aids, under the conditions defined in AMC1 NCO.IDE.A.195(a).

327. The following GM1 NCO.IDE.H.195(a) is inserted:

GM1 NCO.IDE.H.195(a) Navigation equipment

SCOPE OF RNAV SUBSTITUTION

(a) Applications of RNAV substitution include use to:

  (1) determine aircraft position relative to or distance from a VOR, marker, DME fix or a named fix defined by a VOR radial or NDB bearing;

  (2) navigate to or from a VOR, or NDB, except as lateral guidance in the final approach segment;

  (3) hold over a VOR, NDB, or DME fix;

  (4) fly an arc based upon DME;

  (5) fly an overlay of a conventional departure, arrival, approach or route except as lateral guidance in the final approach segment of an instrument approach procedure.

(b) RNAV substitution for ADF, marker and VOR may be used where airborne and/or ground-based equipment is not available.

(c) RNAV substitution for DME may be used where the ground-based DME transponder is unserviceable or the airborne DME transceiver is found to be unserviceable in flight. Caution must be exercised by the pilot-in-command when calculating and using GNSS distances to the active waypoint as reference points are often different.

328. The following GM2 NCO.IDE.A.195(a) is inserted:

GM2 NCO.IDE.H.195(a) Navigation equipment

SUITABILITY OF THE RNAV SYSTEM FOR RNAV SUBSTITUTION

GNSS ETSO are referenced in the AMC since most of the NCO are equipped of a RNAV stand-alone system which exclusively base its positioning on GNSS.

329. The following GM3 NCO.IDE.A.195(a) is inserted:

GM3 NCO.IDE.H.195(a) Navigation equipment

OPERATING PROCEDURE

Although RNAV substitution may not be used for lateral guidance in final approach segment, this does not preclude the use of the RNAV system to fly the final approach segment, provided that raw data from the associated conventional navigation aids is monitored.

330. The following AMC1 NCO.IDE.H.195(b) is inserted:

AMC1 NCO.IDE.H.195(b) Navigation equipment

APPROPRIATE CONTINGENCY ACTION

An appropriate contingency action is an alternative offered in NCO.IDE.H.195(b) to completion of the planned flight to a safe landing, either at the planned destination or a destination alternate, using normal procedures and using navigation equipment meeting the requirements of NCO.IDE.H.100, installed for redundancy or as a backup.

The contingency action should be considered before flight and take into account the information identified by flight preparation according to NCO.OP.135. It may depend on the flight and availabilities of navigation solutions (satellites, ground navaids, etc.) and weather conditions (IMC, VMC) along the flight.

The contingency action addresses partial loss of navigation capability. An appropriate contingency action to meet the requirements of NCO.IDE.H.195(b) does not rely on the performance of any function of the item of equipment whose potential failure is being considered. For example, in considering the failure of a VOR/LOC/DME receiver, none of the functions of that receiver should be relied upon in the contingency action.

Examples of contingency actions might include:

— seeking navigational assistance from ATS, using communication, navigation and surveillance systems that remain operational, to enable a safe instrument approach or a safe descent to VMC;

— descent over water or very flat terrain to levels with reduced (but reasonable) obstacle clearance; and

— unusually long periods of dead reckoning.

A contingency is required such that the failure of one item of navigation equipment has a reasonable likelihood of a safe outcome to the flight, consistent with other risks to which the operation is exposed.

SUBPART E: SPECIFIC REQUIREMENTS

331. The following AMC1 NCO.SPEC.110(a) is inserted:

AMC1 NCO.SPEC.110(a) CREW RESPONSIBILITIES

RECORDING OF FLIGHT TIME

(a) The pilot should only record flight time for the purpose of meeting experience requirements in specialised operations defined in AMC1 ORO.FC.146(f) and AMC1 SPO.SPEC.HESLO.100 if NCO.SPEC applies.

(b) The list of specialised operations in GM1 NCO.SPEC.100 may be used for the purpose of (a).

ANNEX VIII

SPECIALISED OPERATIONS

(PART-SPO)

SUBPART B: OPERATING PROCEDURES

332. The following AMC1 SPO.GEN.105(a) is inserted:

AMC1 SPO.GEN.105(a) CREW RESPONSIBILITIES

RECORDING OF FLIGHT TIME

The following should apply for the purpose of recording flight time in accordance with AMC2 SPO.OP.230(i) and meeting experience requirements in specialised operations defined in AMC1 ORO.FC.146(f) and AMC1 SPO.SPEC.HESLO.100:

(a) Flight time should be recorded as flight time in a specialised activity if one of the following applies:

  (1) The aircraft has external equipment or is in a configuration that requires the use of a specific SOP;

  (2) A task specialist is on board, or a person indispensable to the mission is being carried in accordance with Article 5.7;

  (3) The crew applies a specific SOP in the course of a specialised activity.

(b) Irrespective of the scope of Part-SPO, if none of the above applies (eg ferry flights), the flight time should not be recorded as a specialised activity;

(c) The list of specialised operations in GM1 SPO.SPEC.005 may be used for the purpose of (a).

333. The following GM1 SPO.OP.101 is inserted:

GM1 SPO.OP.101 Altimeter check and settings

ALTIMETER-SETTING PROCEDURES

The following paragraphs of ICAO Doc 8168 (PANS-OPS), Volume I provide recommended guidance to develop the altimeter setting procedure:

(a) 3.2 'Pre-flight operational test';

(b) 3.3 'Take-off and climb';

(c) 3.5 'Approach and landing'.

334. AMC2 'Visual approach operations' is renumbered as AMC7, **for consistency with Part-NCC:**

~~AMC2~~ AMC7 SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

VISUAL APPROACH OPERATIONS

(…)

335. AMC3 SPO.OP.110 is amended as follows:

AMC2~~AMC3~~ SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

GENERAL

(a) The aerodrome operating minima should not be lower than those ~~as~~ specified in ~~SPO.OP.111~~ AMC5 SPO.OP.110 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 ~~NCC.OP.111~~ AMC5 SPO.OP.110, 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.

336. AMC4 SPO.OP.110 is amended as follows:

AMC3~~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 and equipment. 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 the applicable minima for landing at that aerodrome, unless a weather-permissible take-off alternate aerodrome is available.

(3) When the reported ~~meteorological visibility~~ VIS is below that required for take-off and the 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~~ VIS or RVR is available, a take-off should only be commenced if the pilot-in-command can determine that the visibility ~~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.

TAKE-OFF OPERATIONS WITH HELICOPTERS AND COMPLEX MOTOR-POWERED AEROPLANES

(c) Required RVR~~/~~ or VIS~~visibility~~:

(1) Complex motor-powered aeroplanes~~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.~~

(i) For multi-engined aeroplanes with such performance that in the event of a critical engine failure at any point during take-off the aeroplane can either stop or continue the take-off to a height of 1 500 ft above the aerodrome while clearing obstacles by the required margins, the take-off minima specified by the operator should be expressed as RVR or VIS values not lower than those specified in Table 1.

(ii) Multi-engined aeroplanes without the performance to comply with the conditions in (c)(1)(i) in the event of a critical engine failure may need to reland immediately and to see and avoid obstacles in the take-off area. Such aeroplanes may be operated to the following take-off minima provided they are able to comply with the applicable obstacle clearance criteria, assuming engine failure at the specified height:

(A) The take-off minima specified by the operator should be based upon the height from which the one-engine-inoperative (OEI) net take-off flight path can be constructed.

(B) The RVR minima used should not be lower than either of the values specified in Table 1 or Table 2.

(iii) For single-engined complex aeroplane operations, the take-off minima specified by the operator should be expressed as RVR/CMV values not lower than those specified in Table 1 below.

Unless the operator makes use of a risk period, whenever the surface in front of the runway does not allow for a safe forced landing, the RVR/CMV values should not be lower than 800 m. In this case, the proportion of the flight to be considered starts at the lift-off position and ends when the aeroplane is able to turn back and land on the runway in the opposite direction or glide to the next landing site in case of power loss.

(iv) When the RVR or the VIS is not available, the pilot-in-command should not commence take-off unless he or she can determine that the actual conditions satisfy the applicable take-off minima.

Table 1~~1.A~~

Take-off — aeroplanes (without ~~low visibility take-off (~~LVTO~~)~~ approval) RVR~~/~~ or VIS

Facilities	**RVR~~/~~ or VIS (m)***
Day only: Nil**	500
Day: at least runway edge lights or runway centre line markings	400

Night: at least runway edge lights or runway centre line lights and runway end lights	

*~~:~~ The reported RVR~~/~~ or 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 2

Take-off — aeroplanes (without an LVTO approval)

Assumed engine failure height above the runway versus RVR or VIS

Assumed engine failure height above the take-off runway (ft)	**RVR~~/~~ or VIS (m) ***
<50	400
51–100	400
101–150	400
151–200	500
201–300	1 000
>300 or if no positive take-off flight path can be constructed	1 500

*: The reported RVR or VIS value representative of the initial part of the take-off run can be replaced by pilot assessment.

(2) Helicopters:

(i) For helicopters having a mass where it is possible to reject the take-off and land on the FATO in case of the critical engine failure being recognised at or before the take-off decision point (TDP), the operator should specify an RVR~~/~~ or VIS as take-off minimum in accordance with Table 3~~1.H~~.

(ii) For all other cases, the pilot-in-command should operate to take-off minima of 800 m RVR~~/~~ or VIS and remain clear of cloud during the take-off manoeuvre until reaching the performance capabilities of (c)(2)(i).

~~(iii) Table 5 for converting reported meteorological visibility to RVR should not be used for calculating take-off minima.~~

(iii) For point-in-space (PinS) departures to an initial departure fix (IDF), the take-off minima should be selected to ensure sufficient guidance to see and avoid obstacles and return to the heliport if the flight cannot continue visually to the IDF.

Table 3~~1.H~~

Take-off — helicopters (without LVTO approval)

RVR~~/Visibility~~ or VIS

Onshore aerodromes or operating sites with instrument flight rules (IFR) departure procedures	**RVR~~/~~ or 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 centre line marking	400
Runway edge/FATO light, centre line 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.

** On PinS departures to IDF, VIS should not be less than 800 m and ceiling should not be less than 250 ft.

337. AMC5 SPO.OP.110 is renumbered and amended as follows:

AMC4~~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.~~

DETERMINATION OF THE DH/MDH FOR INSTRUMENT APPROACH OPERATIONS — AEROPLANES

(a) The DH to be used for a 3D or a 2D approach operation flown with the CDFA technique should not be lower than the highest of:

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

(2) the published approach procedure DH or minimum descent height (MDH) where applicable;

(3) the system minima specified in Table 4;

(4) the minimum DH permitted for the runway specified in Table 5; or

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

(b) The MDH for a 2D approach operation flown without the CDFA technique should not be lower than the highest of:

(1) the OCH for the category of aircraft;

(2) the published approach procedure MDH where applicable;

(3) the system minimum specified in Table 4;

(4) the lowest MDH permitted for the runway specified in Table 5; or

(5) the lowest MDH specified in the AFM, if stated.

DETERMINATION OF THE DH/MDH FOR INSTRUMENT APPROACH OPERATIONS — HELICOPTERS

(c) The DH or MDH should not be lower than the highest of:

(1) the OCH for the category of aircraft used;

(2) the published approach procedure DH or MDH where applicable;

(3) the system minima specified in Table 4;

(4) the lowest DH or MDH permitted for the runway/FATO specified in Table 6 if applicable; or

(5) the lowest DH or MDH specified in the AFM, if stated.

Table 4

System minima — all aircraft

Facility	**Lowest DH/MDH (ft)**
ILS/MLS/GLS	200
GNSS/SBAS (LPV)	200*
Precision approach radar (PAR)	200
GNSS/SBAS (LP)	250
GNSS (LNAV)	250
GNSS/Baro-VNAV (LNAV/VNAV)	250
Helicopter point-in-space (PinS) approach	250**
LOC with or without DME	250
SRA (terminating at ½ NM)	250
SRA (terminating at 1 NM)	300
SRA (terminating at 2 NM or more)	350
VOR	300

Facility	Lowest DH/MDH (ft)
VOR/DME	250
NDB	350
NDB/DME	300
VDF	350

* For localiser performance with vertical guidance (LPV), a DH of 200 ft may be used only if the published final approach segment (FAS) datablock sets a vertical alert limit not exceeding 35 m. Otherwise, the DH should not be lower than 250 ft.

** For PinS approaches with instructions to 'proceed VFR' to an undefined or virtual destination, the DH or MDH should be with reference to the ground below the missed approach point (MAPt).

Table 5

Runway type minima - AEROPLANES

Runway type	Lowest DH/MDH (ft)
Precision approach (PA) runway Category I	200
NPA runway	250
Non-instrument runway	Circling minima as shown in Table 1 in SPO.OP.112

Table 6

Type of runway/FATO versus lowest DH/MDH — helicopters

Type of runway/FATO	Lowest DH/MDH (ft)
Precision approach runway, Category I Non-precision approach runway Non-instrument runway	200
Instrument FATO FATO	200 250

Table 6 does not apply to helicopter PinS approaches with instructions to 'proceed VFR'.

338. AMC6 SPO.OP.110 is deleted:

~~AMC6 SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters~~

~~CRITERIA FOR ESTABLISHING RVR/CMV~~

339. AMC7 SPO.OP.110 is re-numbered and amended as follows:

AMC5~~AMC7~~ SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

DETERMINATION OF RVR OR VIS ~~/CMV/VIS MINIMA FOR NPA, APV, CAT I~~ FOR INSTRUMENT APPROACH OPERATIONS — AEROPLANES

~~(a) The minimum RVR/CMV/VIS should be the highest of the values specified in Table 3 and Table 4.A but not greater than the maximum values specified in Table 4.A, where applicable.~~

~~(b) The values in Table 3 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 3 up to 3.77° and then remaining 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 3 and Table 4.A.~~

~~(d) An RVR of less than 750 m as indicated in Table 3 may be used:~~

- ~~(1) for CAT I operations to runways with full approach lighting 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 3 may be used for HUDLS and autoland operations if approved in accordance with Annex V (Part SPA), Subpart E.~~

~~(f) The visual aids should comprise standard runway day markings and approach and runway lights as specified in Table 2. The competent authority may approve that RVR values relevant to a basic approach lighting 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 6 of AMC6 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 3 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 3 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 2: Approach lighting systems~~

~~Class of lighting facility~~	~~Length, configuration and intensity of approach lights~~
~~FALS~~	~~CAT I lighting system (HIALS ≥ 720 m) distance coded centreline, Barrette centreline~~
~~IALS~~	~~Simple approach lighting system (HIALS 420 – 719 m) single source, Barrette~~
~~BALS~~	~~Any other approach lighting system (HIALS, MIALS or ALS 210 – 419 m)~~
~~NALS~~	~~Any other approach lighting system (HIALS, MIALS or ALS < 210 m) or no approach lights~~

~~*Note:* HIALS: high intensity approach lighting system; MIALS: medium intensity approach lighting system; ALS: approach lighting system.~~

~~Table 3: 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~~
~~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~~

~~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)~~			
~~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 4.A: 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 3~~			
	~~Max~~	~~1 500~~	~~1 500~~	~~2 400~~	~~2 400~~
~~NDB, NDB/DME, VOR, VOR/DME, LOC, LOC/DME, VDF, SRA, GNSS/LNAV with a procedure that fulfils the criteria in AMC4 NCC.OP.110 (a)(2).~~	~~Min~~	~~750~~	~~750~~	~~750~~	~~750~~
	~~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 AMC4 NCC.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 3 if flown using the CDFA technique, otherwise an add-on of 200/400 m applies to the values in Table 3 but not to result in a value exceeding 5 000 m.~~			

(a) The RVR or VIS for straight-in instrument approach operations should not be less than the greatest of the following:

(1) the minimum RVR or VIS for the type of runway used according to Table 7;

(2) the minimum RVR determined according to the MDH or DH and class of lighting facility according to Table 8; or

(3) the minimum RVR according to the visual and non-visual aids and on-board equipment used according to Table 9.

If the value determined in (1) is a VIS then the result is a minimum VIS. In all other cases the result is a minimum RVR.

(b) For Category A and B aeroplanes, if the RVR or VIS determined in accordance with (a) is greater than 1 500 m, then 1 500 m should be used.

(c) If the approach is flown with a level flight segment at or above the MDA/H, then 200 m should be added to the the RVR calculated in accordance with (a) and (b)for Category A and B aeroplanes and 400 m for Category C and D aeroplanes.

(d) The visual aids should comprise standard runway day markings, runway edge lights, threshold lights, runway end lights and approach lights as defined in Table 8.

Table 7

Type of runway versus minimum RVR or VIS – aeroplanes

Type of runway	**Minimum RVR or VIS (m)**
Precision approach runway, Category I	RVR 550
Non-precision approach runway	RVR 750
Non-instrument runway	VIS according to Table 1 in SPO.OP.112 (Circling minima)

Table 8

RVR versus DH/MDH

DH or MDH (ft)			**Class of lighting facility**			
			FALS	**IALS**	**BALS**	**NALS**
			RVR (m)			
200	—	210	550	750	1 000	1 200
211	—	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	2 400
561	—	580	1 900	2 200	2 400	2 400
581	—	600	2 000	2 300	2 400	2 400
601	—	620	2 100	2 400	2 400	2 400
621	—	640	2 200	2 400	2 400	2 400
641	—	660	2 300	2 400	2 400	2 400
661	and above		2 400	2 400	2 400	2 400

Table 9

Visual and non-visual aids and/or on-board equipment versus minimum RVR – aeroplanes

Type of approach	**Facilities**	**Lowest RVR (m)**	
		Multi-pilot operations	**Single-pilot operations**
3D operations	RTZL and RCLL	[no limitation]	

	Without RTZL and RCLL but using HUDLS or equivalent system; coupled autopilot or flight director to the DH	[no limitation]	600
	No RTZL and RCLL, not using HUDLS or equivalent system or autopilot to the DH	750	800
2D operations	Final approach track offset < 15° for Category A and B aeroplanes or < 5° for Category C and D aeroplanes	750	800
	Final approach track offset ≥ 15° for Category A and B aeroplanes	1 000	1 000
	Final approach track offset ≥ 5° for Category C and D aeroplanes	1 200	1 200

Table 10

Approach lighting systems – aeroplanes

Class of lighting facility	**Length, configuration and intensity of approach lights**
FALS	CAT I lighting system (HIALS ≥ 720 m) distance coded centreline, barrette centreline
IALS	Simple approach lighting system (HIALS 420–719 m) single source, barrette
BALS	Any other approach lighting system (HIALS, MALS or ALS 210–419 m)
NALS	Any other approach lighting system (HIALS, MALS or ALS < 210 m) or no approach lights

(e) For night operations or for any operation where credit for visual aids is required, the lights should be on and serviceable except as provided for in Table 15.

(f) Where any visual or non-visual aid specified for the approach and assumed to be available in the determination of operating minima is unavailable, revised operating minima will need to be determined.

340. AMC8 SPO.OP.110 is re-numbered and amended as follows:

AMC6~~AMC8~~ SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

DETERMINATION OF RVR~~/CMV/~~ OR VIS ~~MINIMA~~ FOR ~~NPA,~~ TYPE A INSTRUMENT APPROACH AND TYPE B CAT I INSTRUMENT APPROACH OPERATIONS — HELICOPTERS

~~(a) For non-precision approach (NPA) operations, the minima specified in Table 4.1.H 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 4.2.H, whichever is higher.~~

~~(b) For CAT I operations, the minima specified in Table 4.2.H 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 4.1.H: Onshore minima~~

~~MDH /DH (ft) *~~	**~~Approach lighting systems 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~~

~~*: 'MDH/DH' refers to the initial calculation of MDH/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 MDA/DA.~~

~~**: 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 glideslope guidance (e.g. precision approach path indicator (PAPI)) is also visible at the MDH.~~

~~Table 4.2.H: Onshore CAT I minima~~

~~DH (ft) *~~	**~~Approach lighting systems vs RVR/CMV (m) **, ***~~**			
	~~FALS~~	**~~IALS~~**	**~~BALS~~**	**~~NALS~~**
~~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~~

~~*: '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 standard approaches with a glide slope up to and including 4°.~~

~~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.~~

(a) For IFR operations, the RVR or VIS should not be less than the greater of the following:

(1) the minimum RVR or VIS for the type of runway/FATO used according to Table 11;

(2) the minimum RVR determined according to the MDH or DH and class of lighting facility according to Table 12; or

(3) for PinS operations with instructions to ‘proceed visually’, the distance between the MAPt of the PinS and the FATO or its approach light system.

If the value determined in (1) is a VIS then the result is a minimum VIS. In all other cases the result is a minimum RVR.

(b) For PinS operations with instructions to ‘proceed VFR’, the VIS should be compatible with visual flight rules.

(c) For Type A instrument approaches where the missed approach point (MAPt) 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.

(d) an RVR of less than 800 m should not be used except when using a suitable autopilot coupled to an ILS, MLS, GLS or LPV, in which case normal minima apply.

(e) For night operations, ground lights should be available to illuminate the FATO/runway and any obstacles.

(f) The visual aids should comprise standard runway day markings, runway edge lights, threshold lights and runway end lights and approach lights as specified in Table 13.

(g) For night operations or for any operation where credit for runway and approach lights as defined in Table 13is required, the lights should be on and serviceable except as provided for in Table 15.

Table 11

Type of runway/FATO versus minimum RVR — helicopters

Type of runway/FATO	**Minimum RVR or VIS (m)**
Precision approach runway, Category I Non-precision approach runway Non-instrument runway	RVR 550
Instrument FATO FATO	RVR 550 RVR or VIS 800

Table 12

Onshore helicopter instrument approach minima

DH/MDH (ft)	**Facilities versus RVR (m)**			
	FALS	**IALS**	**BALS**	**NALS**
200	550	600	700	1 000
201–249	550	650	750	1 000
250–299	600*	700*	800	1 000
300 and above	750*	800	900	1 000

* Minima on 2D approach operations should be no lower than 800 m.

Table 13

Approach lighting systems – helicopters

Class of lighting facility	**Length, configuration and intensity of approach lights**
FALS	CAT I lighting system (HIALS ≥ 720 m) distance coded centreline, barrette centreline
IALS	Simple approach lighting system (HIALS 420–719 m) single source, barrette
BALS	Any other approach lighting system (HIALS, MALS or ALS 210–419 m)
NALS	Any other approach lighting system (HIALS, MALS or ALS < 210 m) or no approach lights

341. AMC9 SPO.OP.110 is re-numbered and amended as follows:

AMC8~~AMC9~~ SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

CONVERSION OF ~~REPORTED METEOROLOGICAL~~ VISIBILITY TO ~~RVR/~~CMV ~~— AEROPLANES~~

~~(a) A conversion from meteorological visibility to RVR/CMV should not be used:~~

~~(1) when the reported RVR is available;~~

~~(2) for calculating take-off minima; and~~

~~(3) for other RVR minima less than 800.~~

~~(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 for (a)(1).~~

~~(c) When converting meteorological visibility to RVR in circumstances other than those in (a), the conversion factors specified in Table 5should be used.~~

The following conditions apply to the use of CMV instead of RVR:

(a) If the reported RVR is not available, a CMV may be substituted for the RVR, except:

(1) to satisfy take-off minima; or

(2) for the purpose of continuation of an approach in LVO.

(b) If the minimum RVR for an approach is more than the maximum value assessed by the aerodrome operator, then CMV should be used.

(c) In order to determine CMV from visibility:

(1) for flight planning purposes, a factor of 1.0 should be used;

(2) for purposes other than flight planning, the conversion factors specified in Table 14 should be used.

Table 14~~5~~

Conversion of reported ~~meteorological visibility~~ VIS to RVR/CMV

Light elements in operation	**RVR/CMV = reported VIS x ~~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

AMC9~~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 preflight 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 15~~6~~ and, if considered necessary, the approach should be abandoned.

(b) Conditions applicable to Table 15~~6~~:

(1) multiple failures of runway/FATO lights other than indicated in Table 15~~6~~ should not be acceptable;

(2) deficiencies of approach and runway/FATO lights are treated separately; and

(3) failures other than ILS or ~~,~~ MLS affect the RVR only and not the DH.

Table 15~~6~~

Failed or downgraded equipment — effect on landing minima

Failed or downgraded equipment	Effect on landing minima	
	~~CAT I~~ Type B	~~APV, NPA~~ Type A
~~ILS/MLS~~ navaid standby transmitter	No effect	
Outer marker (ILS only)	No effect if ~~replaced by height check at 1 000 ft~~ the required height or glide path can be checked using other means, e.g. DME fix	APV — not applicable NPA with FAF: no effect unless used as FAF If the FAF cannot be identified (e.g. no method available for timing of descent), ~~non-precision~~ NPA operations cannot be conducted
Middle marker (ILS only)	No effect	No effect unless used as MAPt
RVR assessment systems	No effect	
Approach lights	Minima as for NALS	
Approach lights except the last 210 m	Minima as for BALS	
Approach lights except the last 420 m	Minima as for IALS	

Failed or downgraded equipment	Effect on landing minima	
	~~CAT I~~ **Type B**	~~APV, NPA~~ **Type A**
Standby power for approach lights	No effect	
Edge lights, threshold lights and runway end lights	Day — no effect Night — not allowed	
Centreline lights	Aeroplanes: No effect if flight director (F/D), HUDLS or autoland; otherwise RVR 750 m. Helicopters: No effect on CAT I and SA CAT I approach operations;	No effect
Centreline lights spacing increased to 30 m	No effect	
~~Touchdown zone~~ TDZ lights	Aeroplanes: No effect if F/D, HUDLS or autoland; otherwise RVR 750 m. Helicopters: No effect.	No effect
Taxiway lighting system	No effect	

342. AMC11 SPO.OP.110 is re-numbered and amended as follows:

AMC10~~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

[…]

(b) ~~A minimum RVR of 750 m should be used for CAT I operations 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.

343. GM1 SPO.OP.110 is amended as follows:

GM1 SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

AIRCRAFT CATEGORIES

[…]

Table 16~~1~~

Aircraft categories corresponding to V_{AT} values

[…]

344. The following GM5 SPO.OP.110 is inserted:

GM5 SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

APPROACH LIGHTING SYSTEMS — ICAO, FAA

The following table provides a comparison of the ICAO and the FAA specifications.

Table 17

Approach lighting systems — ICAO and FAA specifications

Class of lighting facility	**Length, configuration and intensity of approach lights**
FALS	ICAO: CAT I lighting system (HIALS ≥ 720 m) distance coded centre line, barrette centreline FAA: ALSF1, ALSF2, SSALR, MALSR, high- or medium-intensity and/or flashing lights, 720 m or more
IALS	ICAO: simple approach lighting system (HIALS 420–719 m) single source, barrette FAA: MALSF, MALS, SALS/SALSF, SSALF, SSALS, high- or medium-intensity and/or flashing lights, 420–719 m
BALS	Any other approach lighting system (e.g. HIALS, MALS or ALS 210–419 m) FAA: ODALS, high- or medium-intensity or flashing lights 210–419 m
NALS	Any other approach lighting system (e.g. HIALS, MALS or ALS <210 m) or no approach lights

345. The following GM6 SPO.OP.110 is inserted:

GM6 SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

SBAS OPERATIONS

(a) SBAS LPV operations with a DH of 200 ft depend on an SBAS approved for operations down to a DH of 200 ft.

(b) The following systems are in operational use or in a planning phase:

  (1) European geostationary navigation overlay service (EGNOS), operational in Europe;

  (2) wide area augmentation system (WAAS), operational in the USA;

  (3) multi-functional satellite augmentation system (MSAS), operational in Japan;

  (4) system of differential correction and monitoring (SDCM), planned by Russia;

  (5) GPS-aided geo-augmented navigation (GAGAN) system, planned by India; and

  (6) satellite navigation augmentation system (SNAS), planned by China.

346. The following GM7 SPO.OP.110 is inserted:

GM7 SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

MEANS TO DETERMINE THE REQUIRED RVR BASED ON DH AND LIGHTING FACILITIES

The values in Table 8 are derived from the formula below:

RVR (m) = [(DH/MDH (ft) × 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 8 up to 3.77° and then remaining constant. An upper RVR limit of 2 400 m has been applied to the table.

347. The following GM8 SPO.OP.110 is inserted:

GM8 SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

USE OF DECISION HEIGHT (DH) FOR NON-PRECISION APPROACHES (NPAs) FLOWN USING CONTINUOUS DESCENT FINAL APPROACH (CDFA)

The safety of the use of the MDH as DH in CDFA operations has been verified by at least two independent analyses concluding that a CDFA using MDH as DH without any add-on is safer than the traditional step-down and level flight NPA operation. A comparison was made between the safety level of using MDH as DH without an add-on with the well-established safety level resulting from the ILS collision risk model (CRM). The NPA used was the most demanding, i.e. most tightly designed NPA, which offers the least additional margins. It should be noted that the design limits of the ILS approach design, e.g. the maximum glide path (GP) angle of 3.5 degrees, must be observed for the CDFA in order to keep the validity of the comparison.

There is a wealth of operational experience in Europe confirming the above-mentioned analytical assessments. It cannot be expected that each operator is able to conduct similar safety assessments and this is not necessary. The safety assessments already performed take into account the most demanding circumstances at hand, like the most tightly designed NPA procedures and other 'worst-case scenarios'. The assessments naturally focus on cases where the controlling obstacle is located in the missed approach area.

However, it is necessary for operators to assess whether their cockpit procedures and training are adequate to ensure minimal height loss in case of a go-around manoeuvre. Suitable topics for the safety assessment required by each operator may include:

— understanding of the CDFA concept including use of the MDA/H as DA/H;

— cockpit procedures that ensure flight on speed, on path, and with proper configuration and energy management;

— cockpit procedures that ensure gradual decision-making; and

— identification of cases where an increase of the DA/H may be necessary because of non-standard circumstances, etc.

348. The following GM9 SPO.OP.110 is inserted:

GM9 SPO.OP.110 Aerodrome operating minima — aeroplanes and helicopters

INCREMENTS SPECIFIED BY THE COMPETENT AUTHORITY

Additional increments to the published RVR/CMV or VIS minima may be specified by the competent authority in order to take into account certain operations, such as downwind approaches and single-pilot operations.

349. The following GM10 SPO.OP.110 is inserted:

GM10 SPO.OP.110 Aerodrome operating minima —aeroplanes and helicopters

USE OF COMMERCIALLY AVAILABLE INFORMATION

When an operator uses commercially available information to establish aerodrome operating minima, the operator remains responsible for ensuring that the information used is accurate and suitable for its operation, and that the aerodrome operating minima are calculated in accordance with the method specified in Part C of its operations manual and approved by the competent authority.

The operator should apply the procedures in ORO.GEN.205 'Contracted activities'.

350. The following GM1 SPO.OP.110(b)(5) is inserted:

GM1 SPO.OP.110(b)(5) Aerodrome operating minima

VISUAL AND NON-VISUAL AIDS AND INFRASTRUCTURE

'Visual and non-visual aids and infrastructure' refers to all equipment and facilities required for the procedure to be used for the intended instrument approach operation. This includes but is not limited to lights, markings, ground- or space-based radio aids, etc.

351.

352. GM1 SPO.OP.112 is amended as follows:

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~~ VIS; 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 the MDA/H, ~~—~~ the aeroplane should follow the corresponding instrument approach procedure (IAP) 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 the radio navigation aids, RNAV, RNP, ILS, MLS or GLS~~ 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~~ visual references.

(3) If the pilot cannot comply with the conditions in (c)(2) at the MAPt ~~When reaching the published instrument MAPt and the conditions stipulated in (c)(2) are unable to be established by the pilot~~, then a missed approach should be ~~carried out~~executed in accordance with ~~that~~ the ~~instrument approach procedure~~ IAP.

(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 to:

(i) ~~to~~ attain a controlled and stable descent path to the intended landing runway; and

(ii) ~~to~~ remain within the circling area and in ~~a~~ such a 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 the 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~~ TDZ.

(d) Instrument approach followed by a visual manoeuvring (circling) with prescribed track.

(1) The aeroplane should remain on the initial ~~instrument approach procedure~~ IAP 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, RNAV, RNP, ILS, MLS or GLS~~ in level flight at or above the MDA/H at or by the circling manoeuvre divergence point.

[…]

(8) Unless otherwise specified in the procedure, final descent should not be commenced from the 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~~TDZ.

(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, RNAV, RNP, ILS, MLS or GLS~~, and before commencing the circling manoeuvre, the published missed approach for the instrument approach should be followed; or

(ii) if the ~~instrument approach procedure~~ IAP is carried out with the aid of an ILS, an MLS or a stabilised approach (SAp), the MAPt associated with an ILS or an MLS procedure without glide path (GP-out procedure) or the SAp, where applicable, should be used.

[…]

353. The following AMC1 SPO.OP.115(c) is inserted:

AMC1 SPO.OP.115(c) Departure and approach procedures – aeroplanes and helicopters

APPROACH FLIGHT TECHNIQUE — AEROPLANES

(a) All approach operations should be flown as stabilised approach operations.

(b) The CDFA technique should be used for non-precision approach (NPA) procedures.

354. AMC1 SPO.OP.152 is amended as follows:

AMC1 SPO.OP.152 Destination aerodromes — instrument approach operations

PBN OPERATIONS

~~The pilot-in-command should only select an aerodrome as a destination alternate aerodrome if an instrument approach procedure that does not rely on GNSS is available either at that aerodrome or at the destination aerodrome.~~

(a) To comply with SPO.OP.152, when the operator intends to use PBN, the operator should either:

(1) demonstrate that the GNSS is robust against loss of capability; or

(2) select an aerodrome as a destination alternate aerodrome only if an instrument approach procedure that does not rely on a GNSS is available either at that aerodrome or at the destination aerodrome.

GNSS ROBUSTNESS AGAINST LOSS OF CAPABILITY - HELICOPTERS

(b) The operator may demonstrate robustness against the loss of capability of the GNSS if all of the following criteria are met:

(1) SBAS or GBAS are available and used.

(2) The failure of a single receiver or system should not compromise the navigation capability required for the intended instrument approach.

(3) The temporary jamming of all GNSS frequencies should not compromise the navigation capability required for the intended route. The operator should provide a procedure to deal with such cases unless other sensors are available to continue on the intended route.

(4) The duration of a jamming event should be determined as follows.

  (i) Considering the average speed and height of a helicopter flight, the duration of a jamming event may be considered to be less than 2 minutes.

  (ii) The time needed for the GNSS system to re-start and provide the aircraft position and navigation guidance should also be considered.

  (iii) Based on (i) and (ii) above, the operator should establish the duration of the loss of GNSS navigation data due to jamming. This duration should be no less than 3 minutes, and may be no longer than 4 minutes.

(5) The operator should ensure resilience to jamming for the duration determined in (4) above, as follows:

  (i) In the case where the altitude of obstacles on both sides of the flight path are higher than the planned altitude for a given segment of the flight, the operator should ensure no excessive drift on either side by relying on navigation sensors such as a inertial systems with performance in accordance to the intended function.

  (ii) If (i) does not apply and the operator cannot rely on sensors other than GNSS, the operator should develop a procedure to ensure that a drift from the intended route during the jamming event has no adverse consequences on the safety of the flight. This procedure may involve air traffic services.

(6) The operator should ensure that no space weather event is predicted to disrupt the GNSS reliability and integrity at both the destination and the alternate.

(7) The operator should verify the availability of RAIM for all phases of flight based on GNSS, including navigation to the alternate.

(8) The operator’s MEL should reflect the elements in paragraphs (b)(1) and (b)(2).

OPERATIONAL CREDITS

(c) If the weather margins at the destination alternate are less than the greatest operational credit used (eg EFVS, EFVS200, SA CAT I), then the planning minima should be increased as necessary to ensure that an instrument approach procedure that does not rely on that ‘operational credit’ is available either at destination or at the destination alternate.

355. The following GM2 SPO.OP.152 is inserted:

GM2 SPO.OP.152 Destination aerodromes — instrument approach operations

GNSS ROBUSTNESS AGAINST LOSS OF CAPABILITY – HELICOPTERS

(a) Redundancy of on-board systems ensures that no single on-board equipment failure (e.g. antenna, GNSS receiver, FMS, or navigation display failure) results in the loss of the GNSS capability.

(b) Any shadowing of the GNSS signal or jamming of all GNSS frequencies from the ground is expected to be of a very short duration and affect a very small area. Additional sensors or functions such as inertial coasting may be used during jamming events. Jamming should be considered on all segments of the intended route, including the approach. (c) The availability of GNSS signals can be compromised if space weather events cause ‘loss of lock’ conditions and more than one satellite signal may be lost on a given GNSS frequency. Until space weather forecasts are available, the operator may use ‘nowcasts’ as short-term predictions for helicopter flights of short durations.

(d) SBAS also contributes to mitigate space weather effects, both by providing integrity messages and by correcting ionosphere-induced errors.

(e) Even though SBAS should be available and used, RAIM should remain available autonomously. In case of loss of the SBAS, the route and the approach to the destination or alternate should still be flown with an available RAIM function.

(f) When available, GNSS based on more than one constellation and more than one frequency may provide better integrity and redundancy regarding failures in the space segment of the GNSS, jamming, and resilience to space weather events.

356. AMC1 SPO.OP.215 is amended as follows:

AMC1 SPO.OP.215(a) Commencement and continuation of approach ~~— aeroplanes and helicopters~~

~~VISUAL REFERENCES FOR INSTRUMENT APPROACH OPERATIONS~~ RVR MINIMUM FOR CONTINUATION OF APPROACH - AEROPLANES

(a) The controlling RVR should be the touchdown RVR.

(b) If the touchdown RVR is not reported, then the midpoint RVR should be the controlling RVR.

(c) Where the RVR is not available, CMV should be used, except for the purpose of continuation of an approach in LVO in accordance with AMC8 SPO.OP.110.

~~(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 lighting 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) FATO/runway edge lights; or~~

~~(10) other visual references specified in the operations manual.~~

~~(b) Lower than standard category I (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 them; 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 category II (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 them; 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 them 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 — CAT I operations~~

~~(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:~~

~~(A) the beginning of the runway landing surface,~~

~~(B) the threshold lights, the threshold identification lights; or~~

~~(C) 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.~~

~~(f) Approach operations utilising EVS – APV and NPA operations flown with the CDFA technique~~

~~(1) At DH/MDH, visual references should be displayed and identifiable to the pilot on the EVS image as specified under (a).~~

~~(2) At 200 ft above runway threshold elevation, at least one of the visual references specified under (a) should be distinctly visible and identifiable to the pilot without reliance on the EVS.~~

357. The following AMC1 SPO.OP.215(b) is inserted:

AMC1 SPO.OP.215(b) Commencement and continuation of approach

RVR MINIMUM FOR CONTINUATION OF APPROACH — HELICOPTERS

(a) The controlling RVR should be the touchdown RVR.

(b) If the touchdown RVR is not reported, then the midpoint RVR should be the controlling RVR.

358. The following GM SPO.OP.215 is inserted:

GM1 SPO.OP.215 Commencement and continuation of approach

APPLICATION OF RVR OR VIS REPORTS — AEROPLANES

(a) There is no prohibition on the commencement of an approach based on the reported RVR or VIS. The restriction in SPO.OP.215 applies only if the RVR or VIS is reported and applies to the continuation of the approach past a point where the aircraft is 1 000 ft above the aerodrome elevation or in the FAS, as applicable.

APPLICATION OF RVR OR VIS REPORTS - HELICOPTERS

(b) There is no prohibition on the commencement of an approach based on the reported RVR. It applies to the continuation of the approach past a point where the aircraft is 1.000 ft above the aerodrome elevation or into the final approach segment as applicable.

The prohibition to continue the approach applies only if the RVR is reported and is below 550m and is below the operating minima. There is no prohibition based on VIS.

(c) If the reported RVR is 550m or greater, but it is less than the RVR calculated in accordance with AMC5 CAT.OP.MPA.110, a go-around is likely to be necessary since visual reference may not be established at the DH or MDH. Similarly, in the absence of an RVR report, the reported visibility or a digital image may indicate that a go-around is likely. The pilot-in-command should consider available options, based on a thorough assessment of risk, such as diverting to an alternate, before commencing the approach.

APPLICATION OF RVR OR VIS REPORTS – ALL AIRCRAFT

(d) If a deterioration in the RVR or VIS is reported once the aircraft is below 1 000 ft or in the FAS, as applicable, then there is no requirement for the approach to be discontinued. In this situation, the normal visual reference requirements would apply at the DA/H.

(e) Where additional RVR information is provided (e.g. midpoint and stop end), this is advisory; such information may be useful to the pilot in order to determine whether there will be sufficient visual reference to control the aircraft during roll-out and taxi. For operations where the aircraft will be controlled manually during roll-out, Table 1.A in AMC1 SPA.LVO.100(a) provides an indication of the RVR that may be required to allow manual lateral control of the aircraft on the runway.

359. The following GM1 SPO.OP.215(f) is inserted:

GM1 SPO.OP.215(f) Commencement and continuation of approach

APPROACHES WITH NO INTENTION TO LAND

The approach may be continued to the DA/H or the MDA/H regardless of the reported RVR or VIS. Such operations should be coordinated with the air traffic services (ATS).

360. The following AMC1 SPO.OP.215(c) is inserted:

AMC1 SPO.OP.215(c) Commencement and continuation of approach

VISUAL REFERENCES FOR INSTRUMENT APPROACH OPERATIONS

For instrument approach operations Type A and CAT I instrument approach operations Type B, at least one of the visual references specified below should be distinctly visible and identifiable to the pilot at the MDA/H or the DA/H:

(a) elements of the approach lighting system;

(b) the threshold;

(c) the threshold markings;

(d) the threshold lights;

(e) the threshold identification lights;

(f) the visual glideslope indicator;

(g) the TDZ or TDZ markings;

(h) the TDZ lights;

(i) FATO/runway edge lights;

(j) for helicopter PinS approaches, the identification beacon light and visual ground reference;

(k) for helicopter PinS approaches, the identifiable elements of the environment defined on the instrument chart;

(l) for helicopter PinS approaches with instructions to ‘proceed VFR’, sufficient visual cues to determine that VFR criteria are met; or

(m) other visual references specified in the operations manual.

361. AMC2 SPO.OP.230 is amended as follows:

AMC2 SPO.OP.230 Standard operating procedures

TEMPLATE

[…] (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).

(3) If the operator specifies a crew composition of more than one pilot, the following should apply:

  (i) the SOPs should ensure that the pilot flying and pilot monitoring functions are possible from either pilot's seat throughout the flight.

  (ii) The operator should adapt the SOPs to the specified crew composition.

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.

[…]

362. The following GM1 SPO.OP.235 is inserted:

GM1 SPO.OP.235 EFVS 200 operations

GENERAL

(a) EFVS operations exploit the improved visibility provided by the EFVS to extend the visual segment of an instrument approach. EFVS cannot be used to extend the instrument segment of an approach and thus the DH for EFVS 200 operations is always the same as for the same approach conducted without EFVS.

(b) Equipment for EFVS 200 operations

  (1) In order to conduct EFVS 200 operations, a certified EFVS is used (EFVS-A or EFVS-L). An EFVS is an enhanced vision system (EVS) that also incorporates a flight guidance system and displays the image on a HUD or equivalent display. The flight guidance system will incorporate aircraft flight information and flight symbology.

  (2) In multi-pilot operations, a suitable display of EFVS sensory imagery is provided to the pilot monitoring.

(c) Suitable approach procedures

  (1) Types of approach operation are specified in AMC1 SPO.OP.235(a)(2).

  EFVS 200 operations are used for 3D approach operations. This may include operations based on NPA procedures, approach procedures with vertical guidance and precision approach procedures including approach operations requiring specific approvals, provided that the operator holds the necessary approvals.

  (2) Offset approaches

  Refer to AMC1 SPO.OP.235(a)(2).

  (3) Circling approaches

  EFVSs incorporate a HUD or an equivalent system so that the EFVS image of the scene ahead of the aircraft is visible in the pilot's forward external FOV. Circling operations require the pilot to maintain visual references that may not be directly ahead of the aircraft and may not be aligned with the current flight path. EFVS cannot therefore be used in place of natural visual reference for circling approaches.

(d) Aerodrome operating minima for EFVS 200 operations are determined in accordance with AMC1 SPO.OP.235(a)(8).

The performance of EFVSs depends on the technology used and weather conditions encountered. Table 1 'Operations utilising EFVS: RVR reduction' has been developed after an operational evaluation of two different EVSs, both using infrared sensors, along with data and support provided by the FAA. Approaches were flown in a variety of conditions including fog, rain and snow showers, as well as at night to aerodromes located in mountainous terrain. Table 1 contains conservative figures to cater for the expected performance of infrared sensors in the variety of conditions that might be encountered. Some systems may have better capability than those used for the evaluation, but credit cannot be taken for such performance in EFVS 200 operations.

(e) Conditions for commencement and continuation of the approach are in accordance with SPO.OP.215.

Pilots conducting EFVS 200 operations may commence an approach and continue that approach below 1 000 ft above the aerodrome or into the FAS if the reported RVR or CMV is equal to or greater than the lowest RVR minima determined in accordance with AMC1 SPO.OP.235(a)(8) and if all the conditions for the conduct of EFVS 200 operations are met.

Should any equipment required for EFVS 200 operations be unserviceable or unavailable, the conditions to conduct EFVS 200 operations would not be satisfied and the approach should not be commenced. In the event of failure of the equipment required for EFVS 200 operations after the aircraft descends below 1 000 ft above the aerodrome or into the FAS, the conditions of SPO.OP.230 would no longer be satisfied unless the RVR reported prior to commencement of the approach was sufficient for the approach to be flown without the use of EFVS in lieu of natural vision.

(f) EFVS image requirements at the DA/H are specified in AMC1 SPO.OP.235(a)(4).

The requirements for features to be identifiable on the EFVS image in order to continue approach below the DH are more stringent than the visual reference requirements for the same approach flown without EFVS. The more stringent standard is needed because the EFVS might not display the colour of lights used to identify specific portions of the runway and might not consistently display the runway markings. Any visual approach path indicator using colour-coded lights may be unusable.

(g) Obstacle clearance in the visual segment

The 'visual segment' is the portion of the approach between the DH or the MAPt and the runway threshold. In the case of EFVS 200 operations, this part of the approach may be flown using the EFVS image as the primary reference and obstacles may not always be identifiable on an EFVS image. The operational assessment specified in AMC1 SPO.OP.235(a)(2) is therefore required to ensure obstacle clearance during the visual segment.

(h) Visual reference requirements at 200 ft above the threshold

For EFVS 200 operations, natural visual reference is required by a height of 200 ft above the runway threshold. The objective of this requirement is to ensure that the pilot will have sufficient visual reference to land. The visual reference should be the same as that required for the same approach flown without the use of EFVS.

Some EFVSs may have additional requirements that have to be fulfilled at this height to allow the approach to continue, such as a requirement to check that elements of the EFVS display remain correctly aligned and scaled to the external view. Any such requirements will be detailed in the AFM and included in the operator's procedures.

(i) Specific approval for EFVS to touchdown

In order to use EFVS without natural visual reference below 200 feet above the threshold, or EFVS to touchdown, the operator needs to hold a specific approval in accordance with Part-SPA.

(j) Go-around

A go-around will be promptly executed if the required visual references are not maintained on the EFVS image at any time after the aircraft has descended below the DA/H or if the required visual references are not distinctly visible and identifiable using natural vision after the aircraft is below 200 ft. It is considered more likely that an EFVS 200 operation could result in the initiation of a go-around below the DA/H than the equivalent approach flown without EFVS and thus the operational assessment required by AMC1 SPO.OP.235(a)(2) takes into account the possibility of a balked landing.

An obstacle free zone (OFZ) may also be provided for CAT I precision approach procedures. Where an OFZ is not provided for a CAT I precision approach, this will be indicated on the approach chart. NPA procedures and approach procedures with vertical guidance provide obstacle clearance for the missed approach based on the assumption that a go-around is executed at the MAPt and not below the MDH.

363. The following AMC1 SPO.OP.235(a)(1) is inserted:

AMC1 SPO.OP.235(a)(1) EFVS 200 operations

EQUIPMENT CERTIFICATION

For EFVS 200 operations, the aircraft should be equipped with an approach system using EFVS-A or a landing system using EFVS-L.

364. The following AMC1 SPO.OP.235(a)(2) is inserted:

AMC1 SPO.OP.235(a)(2) EFVS 200 operations

AERODROMES AND INSTRUMENT PROCEDURES SUITABLE FOR EFVS 200 OPERATIONS

(a) For EFVS 200 operations, the operator should verify the suitability of a runway before authorising EFVS operations to that runway through an operational assessment taking into account the following elements:

  (1) the obstacle situation;

  (2) the type of aerodrome lighting;

  (3) the available IAPs;

  (4) the aerodrome operating minima; and

  (5) any non-standard conditions that may affect the operations.

(b) EFVS 200 operations should only be conducted as 3D operations, using an IAP in which the final approach track is offset by a maximum of 3 degrees from the extended centreline of the runway and intercepts the centreline at the threshold.

(c) The IAP should be designed in accordance with PANS-OPS, Volume I (ICAO Doc 8168) or equivalent criteria.

365. The following AMC2 SPO.OP.235(a)(2) is inserted:

AMC2 SPO.OP.235(a)(2) EFVS 200 operations

VERIFICATION OF THE SUITABILITY OF RUNWAYS FOR EFVS 200 OPERATIONS

The operational assessment before authorising the use of a runway for EFVS 200 operations may be conducted as follows:

(a) Check whether the runway has been promulgated as suitable for EFVS 200 operations or is certified as a precision approach category II or III runway by the State of the aerodrome. If this is so, then check if and where LED lights are installed in order to assess the impact on the EFVS equipment used by the operator.

(b) If the check in point (a) above comes out negative, then proceed as follows:

  (1) For straight-in IAPs, US Standard for Terminal Instrument Procedures (TERPS)[5] may be considered to be acceptable as an equivalent to PANS-OPS. If other design criteria than PANS-OPS or US TERPS are used, the operations should not be conducted.

  (2) If an OFZ is established, this will ensure adequate obstacle protection from 960 m before the threshold. If an OFZ is not established or if the DH for the approach is above 250 ft, then check whether there is a visual segment surface (VSS).

  (3) VSSs are required for procedures published after 15 March 2007, but the existence of the VSS has to be verified through aeronautical information publication (AIP), operations manual Part C, or direct contact with the aerodrome. Where the VSS is established, it may not be penetrated by obstacles. If the VSS is not established or is penetrated by obstacles and an OFZ is not established, then the operations should not be conducted. Note: obstacles of a height of less than 50 ft above the threshold may be disregarded when assessing the VSS.

  (4) Runways with obstacles that require visual identification and avoidance should not be accepted.

  (5) For the obstacle protection of a balked landing where an OFZ is not established, the operator may specify that pilots follow a departure procedure in the event of a balked landing, in which case it is necessary to verify that the aircraft will be able to comply with the climb gradients published for the instrument departure procedures for the expected landing conditions.

(c) If the AFM stipulates specific requirements for approach procedures, then the operational assessment should verify that these requirements can be met.

366. The following AMC1 SPO.OP.235(a)(3) is inserted:

AMC1 SPO.OP.235(a)(3) EFVS 200 operations

INITIAL TRAINING FOR EFVS 200 OPERATIONS

Operators should ensure that flight crew members complete the following conversion training before being authorised to conduct EFVS operations unless credits related to training and checking for previous experience on similar aircraft types are defined in the operational suitability data established in accordance with Regulation (EU) No 748/2012:

(a) A course of ground training including at least the following:

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[5] https://www.faa.gov/regulations_policies/orders_notices/index.cfm/go/document.information/documentID/1032731

(1) characteristics and limitations of head-up displays (HUDs) or equivalent display systems including information presentation and symbology;

(2) EFVS sensor performance in different weather conditions, sensor limitations, scene interpretation, visual anomalies and other visual effects;

(3) EFVS display, control, modes, features, symbology, annunciations and associated systems and components;

(4) interpretation of EFVS imagery;

(5) interpretation of approach and runway lighting systems and display characteristics when using EFVS;

(6) pre-flight planning and selection of suitable aerodromes and approach procedures;

(7) principles of obstacle clearance requirements;

(8) use and limitations of RVR assessment systems;

(9) normal, abnormal and emergency procedures for EFVS 200 operations;

(10) effect of specific aircraft/system malfunctions;

(11) human factors aspects of EFVS 200 operations;

(12) qualification requirements for pilots to obtain and retain approval for EFVS 200 operations.

(b) A course of FSTD training and/or flight training in two phases as follows:

(1) Phase one (EFVS 200 operations with aircraft and all equipment serviceable) — objectives:

(i) understand the operation of equipment required for EFVS 200 operations;

(ii) understand operating limitations of the installed EFVS;

(iii) practise the use of HUD or equivalent display systems;

(iv) practise setup and adjustment of EFVS equipment in different conditions (e.g. day and night);

(v) practise monitoring of automatic flight control systems, EFVS information and status annunciators;

(vi) practise interpretation of EFVS imagery;

(vii) become familiar with the features needed on the EFVS image to continue approach below the DH;

(viii) practise identification of visual references using natural vision while using EFVS equipment;

(ix) master the manual aircraft handling relevant to EFVS 200 operations including, where appropriate, the use of the flare cue and guidance for landing;

(x) practise coordination with other crew members; and

(xi) become proficient at procedures for EFVS 200 operations.

(2) Phase one of the training should include the following exercises:

(i) the required checks for satisfactory functioning of equipment, both on the ground and in flight;

(ii) the use of HUD or equivalent display systems during all phases of flight;

(iii) approach using the EFVSs installed on the aircraft to the appropriate DH and transition to visual flight and landing;

(iv) approach with all engines operating using the EFVS, down to the appropriate DH followed by a missed approach, all without external visual reference, as appropriate.

(3) Phase two (EFVS 200 operations with aircraft and equipment failures and degradations) — objectives:

   (i) understand the effect of known aircraft unserviceabilities including use of the MEL;

   (ii) understand the effect on aerodrome operating minima of failed or downgraded equipment;

   (iii) understand the actions required in response to failures and changes in the status of the EFVS including HUD or equivalent display systems;

   (iv) understand the actions required in response to failures above and below the DH;

   (v) practise abnormal operations and incapacitation procedures; and

   (vi) become proficient at dealing with failures and abnormal situations during EFVS 200 operations.

(4) Phase two of the training should include the following exercises:

   (i) approaches with engine failures at various stages on the approach;

   (ii) approaches with failures of the EFVS at various stages of the approach, including failures between the DH and the height below which an approach should not be continued if natural visual reference is not acquired, require either:

      (A) reversion to head down displays to control missed approach; or

      (B) reversion to flight with downgraded or no guidance to control missed approaches from the DH or below, including those which may result in a touchdown on the runway.

   (iii) incapacitation procedures appropriate to EFVS 200 operations;

   (iv) failures and procedures applicable to the specific EFVS installation and aircraft type; and

   (v) FSTD training, which should include minimum eight approaches.

367. The following AMC2 SPO.OP.235(a)(3) is inserted:

AMC2 SPO.OP.235(a)(3) EFVS 200 operations

RECURRENT TRAINING AND CHECKING FOR EFVS 200 OPERATIONS

(a) The operator should ensure that the pilots' competence to perform EFVS 200 operations is trained every 6 months by performing at least two approaches, and

(b) The operator should ensure that the pilots' competence to perform EFVS 200 operations is checked at each required operator proficiency check by performing at least two approaches, of which one should be flown without natural vision to 200 ft.

368. The following AMC3 SPO.OP.235(a)(3) is inserted:

AMC3 SPO.OP.235(a)3) EFVS 200 operations

RECENT EXPERIENCE REQUIREMENTS FOR EFVS 200 OPERATIONS

Pilots should complete a minimum of four approaches using the operator's procedures for EFVS 200 operations during the validity period of the periodic operator proficiency check unless credits-related currency is defined in the operational suitability data established in accordance with Regulation (EU) No 748/2012.

369. The following AMC4 SPO.OP.235(a)(3) is inserted:

AMC4 SPO.OP.235(a)(3) EFVS 200 operations

DIFFERENCES TRAINING FOR EFVS 200 OPERATIONS

(a) The operator should ensure that the flight crew members authorised to conduct EFVS 200 operations are provided with a differences training or familiarisation whenever there is a change to any of the following:

  (1) the technology used in the flight guidance and flight control system;

  (2) the HUD or equivalent display systems; or

  (3) the operating procedures.

(b) The differences training should:

  (1) meet the objectives of the appropriate initial training course;

  (2) take into account the flight crew members' previous experience; and

  (3) take into account the operational suitability data established in accordance with Regulation (EU) No 748/2012.

370. The following AMC5 SPO.OP.235(a)(3) is inserted:

AMC5 SPO.OP.235(a)(3) EFVS 200 operations

TRAINING FOR EFVS 200 OPERATIONS

If a flight crew member is to be authorised to operate as pilot flying and pilot monitoring during EFVS 200 operations, then he or she should complete the required FSTD training for each operating capacity.

371. The following GM1 SPO.OP.235(a)(3) is inserted:

GM1 SPO.OP.235(a)(3) EFVS 200 operations

RECURRENT CHECKING FOR EFVS 200 OPERATIONS

In order to provide the opportunity to practise decision-making in the event of system failures and failure to acquire natural visual reference, the recurrent training/checking for EFVS 200 operations should periodically include different combinations of equipment failures, go-around due to loss of visual reference, and landings.

372. The following AMC1 SPO.OP.235(a)(4) is inserted:

AMC1 SPO.OP.235(a)(4) EFVS 200 operations

OPERATING PROCEDURES FOR EFVS 200 OPERATIONS

(a) For EFVS 200 operations, the following should apply:

- (1) the pilot flying should use the EFVS throughout the approach;
- (2) in multi-pilot operations, a suitable display of EFVS sensory imagery should be provided to the pilot monitoring;
- (3) the approach between the FAF and the DA/H should be flown using vertical flight path guidance;
- (4) the approach may be continued below the DA/H provided that the pilot can identify on the EFVS image either:
  - (i) the approach light system; or
  - (ii) both of the following:
    - (A) the runway threshold identified by the beginning of the runway landing surface, the threshold lights or the runway end identifier lights; and
    - (B) the touchdown zone identified by the touchdown zone lights, the touchdown zone runway markings or the runway lights;
- (5) a missed approach should be executed promptly if the required visual reference is not distinctly visible and identifiable to the pilot without reliance on the EFVS by 200 ft above the threshold.

(b) Operating procedures for EFVS 200 operations should:

- (1) be consistent with the AFM;
- (2) be appropriate to the technology and equipment to be used;
- (3) specify the duties and responsibilities of each flight crew member in each relevant phase of flight;
- (4) ensure that flight crew workload is managed to facilitate effective decision-making and monitoring of the aircraft; and
- (5) deviate to the minimum extent practicable from normal procedures used for routine operations.

(c) Operating procedures should include:

- (1) required checks for the satisfactory functioning of the aircraft equipment, both before departure and in flight;
- (2) correct seating and eye position;
- (3) determination of aerodrome operating minima;
- (4) required visual references at the DH;
- (5) action to be taken if natural visual reference is not acquired by 200 ft;
- (6) action to be taken in the event of loss of the required visual reference; and
- (7) procedures for balked landing.

(d) Operating procedures should be included in the operations manual.

373. The following AMC1 SPO.OP.235(a)(8) is inserted:

AMC1 SPO.OP.235(a)(8) EFVS 200 operations

AERODROME OPERATING MINIMA — EFVS 200 OPERATIONS

For EFVS 200 operations, the following should apply:

(a) The DA/H used should be the same as for operations without EFVS.

(b) The lowest RVR minima to be used should be determined by reducing the RVR presented in:

- (1) Table 8 in AMC5 SPO.OP.110 in accordance with table 1 below for aeroplanes;
- (2) Table 12 of AMC6 SPO.OP.110 in accordance with table 1 below for helicopters;

(c) In case of failed or downgraded equipment, table 15 in AMC9 SPO.OP. 110 should apply.

Table 1

Operations utilising EFVS: RVR reduction

RVR (m) presented in Table 8 in AMC5 SPO.OP.110 or in table 12 of AMC6 SPO.OP.110	RVR (m) for EFVS 200 operations
550	550
600	550
650	550
700	550
750	550
800	550
900	600
1 000	650
1 100	750
1 200	800
1 300	900
1 400	900
1 500	1 000
1 600	1 100
1 700	1 100
1 800	1 200
1 900	1 300
2 000	1 300
2 100	1 400
2 200	1 500

RVR (m) presented in Table 8 in AMC5 SPO.OP.110 or in table 12 of AMC6 SPO.OP.110	RVR (m) for EFVS 200 operations
2 300	1 500
2 400	1 600

374. The following AMC1 SPO.OP.235(c) is inserted:

AMC1 SPO.OP.235(c) EFVS 200 operations

EVFS 200 WITH LEGACY SYSTEMS UNDER AN APPROVAL

The EVS should be certified as ‘EVS with an operational credit’.

375. The following GM1 SPO.OP.235(c) is inserted:

GM1 SPO.OP.235(c) EFVS 200 operations

The competent authority refers in CAT.OP.MPA.312 point (c) is the competent authority referred in ORO.GEN.105.

SUBPART D: INSTRUMENTS, DATA AND EQUIPMENT

SECTION 2 – HELICOPTERS

376. The following AMC1 SPO.IDE.H.120(d) is inserted:

AMC1 SPO.IDE.H.120(d) Operations under VFR – flight and navigational instruments and associated equipment

MULTI-PILOT OPERATIONS

Two pilots should be considered to be required by the operation if multi-pilot operations are required by one of the following:

(a) the AFM;

(b) at night, the operations manual.

377. The following GM1 SPO.IDE.H.120(d) is inserted:

GM1 SPO.IDE.H.120(d) Operations under VFR – flight and navigational instruments and associated equipment

MULTI-PILOT OPERATIONS ON A VOLUNTARY BASIS – HELICOPTERS OPERATED BY DAY UNDER VFR

If the AFM permits single-pilot operations, and the operator decides that the crew composition is more than one pilot for day VFR operations only, then point SPO.IDE.H.120(d) should not apply. Additional displays, including those referred to in SPO.IDE.H.120(d) may be required under point SPO.IDE.H.100(e).

378. The following AMC1 SPO.IDE.H.125(c) is inserted:

AMC1 SPO.IDE.H.125(c) Operations under IFR – flight and navigational instruments and associated equipment

MULTI-PILOT OPERATIONS

Two pilots should be considered to be required by the operation if multi-pilot operations are required by one of the following:

(a) the AFM;

(b) the operations manual.

379. The following GM6 FCL.010 is inserted:

GM6 FCL.010 Multi-pilot operation

For helicopters, ‘multi-pilot operation’ includes operations where two pilots are required by the operations manual or an equivalent document used for State flights such as military or search and rescue operations. Operations under NCO are not a ‘multi-pilot operation’, except for operations at an ATO for the purpose of training multi-pilot operations, as defined in the operations manual of the ATO.

380. AMC1 FCL.050 is amended as follows:

AMC1 FCL.050 Recording of flight time

GENERAL

(…)

(b) Logging of time:

- (1) PIC flight time:
  - (i) the holder of a licence may log as PIC time all of the flight time during which he or she is the PIC;
  - (ii) the applicant for or the holder of a pilot licence may log as PIC time all solo flight time, flight time as SPIC and flight time under supervision provided that such SPIC time and flight time under supervision are countersigned by the instructor;
  - (iii) the holder of an instructor certificate may log as PIC all flight time during which he or she acts as an instructor in an aircraft;
  - (iv) the holder of an examiner’s certificate may log as PIC all flight time during which he or she occupies a pilot’s seat and acts as an examiner in an aircraft;
  - (v) a co-pilot acting as PICUS on an aircraft on which more than one pilot is required under the type certification of the aircraft or as required by operational requirements provided that such PICUS time is countersigned by the PIC;
  - (vi) if the holder of a licence carries out a number of flights upon the same day returning on each occasion to the same place of departure and the interval between successive flights does not exceed 30 minutes, such series of flights may be recorded as a single entry~~.~~;
  - (vii) where Regulation (EU) No 965/2012 requires the pilot to act as PIC under the supervision of another pilot (supervisor), both the pilot and the supervisor may log the flight time as PIC.
- (2) co-pilot flight time: the holder of a pilot licence occupying a pilot seat as co-pilot may log all flight time as co-pilot flight time on an aircraft on which more than one pilot is required under the type certification of the aircraft, regulations or the operations manual of the operator under which the flight is conducted;
- (…)

INSTRUCTIONS FOR USE

(…)

(i) Notes on recording of flight time:

(…)

(10) column 12: the 'remarks' column may be used to record details of the flight at the holder's discretion. The following entries, however, should always be made:

- (i) instrument flight time undertaken as part of the training for a licence or rating;
- (ii) details of all skill tests and proficiency checks;
- (iii) name and signature of PIC if the pilot is recording flight time as SPIC or PICUS;
- (iv) name and signature of instructor if flight is part of an SEP or TMG class rating revalidation~~.~~;
- (v) for multi-pilot operations of single-pilot helicopters, the form of operations, name and signature of the person conducting the skill test or proficiency check or operator proficiency check, and the name of the operator in the case of the operator proficiency check.

(…)

381. The following GM1 FCL.050 is inserted:

GM1 FCL.050 Recording of flight time

INSTRUCTIONS FOR USE

Pilots may use column 12 ('remarks') of the pilot log book (AMC1 FCL.050) to record the specific nature of a particular flight in the following cases, since a record of relevant experience might be useful with respect to operational requirements:

(a) flight time as a pilot in a specialised operation, using the list provided in GM1 NCO.SPEC.100 and GM1 SPO.GEN.100 (see AMC1 ORO.FC.146(f)) to Regulation (EU) No 965/2012;(b) HEC 1 and 2 cycles, HESLO 1 2 3 4 cycles, and HHO hoisting cycles by day and night, as pilot flying (see AMC1 SPO.SPEC.HEC.100 and AMC1 SPO.SPEC.HESLO.100, SPA.HHO.130 of Regulation (EU) No 965/2012);

(c) HHO hours (see SPA.HHO.130 of Regulation (EU) No 965/2012);

(d) offshore landings by day / by night, as pilot flying (see SPA.HOFO.170 of Regulation (EU) No 965/2012);

(e) NVIS flights or hours (see GM1 SPA.NVIS.130 to Regulation (EU) No 965/2012);

(f) IFR approaches in the single-pilot role (see ORO.FC.202 of Regulation (EU) No 965/2012);

(g) any activity deemed necessary to be recorded for evidence purposes

Pilots may also use column 12 ('remarks') to record IFR approaches exercising PBN privileges and RNP APCH approaches in single-pilot operations (see appendix 8)

382. The following GM1 FCL.520.A is inserted:

GM1 FCL.520.A ATPL(A) – Skill test

ATPL SKILL TEST IN AN EBT MODULE

The skill test in accordance with Appendix 9 may be combined with an EBT module. It may follow the same process already described in mixed EBT for the LPC (e.g. manoeuvres validation phase for the pilot performing the ATPL skill test). The competent authority may provide guidance. Further guidance can be found in the EASA EBT manual.

383. The following AMC1 FCL.510.H(b) is inserted:

AMC1 FCL.510.H (f) ATPL(H) — Prerequisites, experience and crediting

TRAINING GRANTING MCC CREDIT IN THE CONTEXT OF THE ATPL(H) – PILOTS THAT ARE EXPERIENCED IN MULTI-PILOT OPERATIONS

(a) prerequisites: this course should only be completed by ATPL applicants.

(b) training course: The training course should include theoretical training instruction and exercises, as well as practical MCC training using one of the following helicopter simulators:

  (1) FNPT II or III qualified for MCC,

  (2) an FTD 2/3

  (3) an FFS

(c) objectives: The training course should meet the objectives of AMC1 FCL.735.A; FCL.735.H; FCL.735.As. The head of training of the ATO should adapt the duration of training to the individual needs of the applicant, in order to achieve these objectives.

(d) Certificate of completion: On completion of the course, once the applicant has met the objectives defined in (c), the applicant should receive a certificate of completion of the training from the ATO. The form should be based on that defined in AMC1 FCL.735.A; FCL.735.H; FCL.735.As. The title of the form should read "–Training in accordance with FCL.510(f) - helicopters".

384. The following AMC1 FCL.630.H is inserted:

AMC1 FCL.630.H IR(H) - Extension of the privileges of an IR(H) to further helicopter types

APPROPRIATE FFS OR FTD

The appropriate FSTD should be a FFS C/D or a FTD 2/3

385. AMC1 FCL.725(a) is amended as follows:

AMC1 FCL 725(a)

SYLLABUS OF THEORETICAL KNOWLEDGE FOR CLASS OR TYPE RATINGS

I. SE AND ME AEROPLANES

[…]

~~(f) Special requirements for extension of a type rating for instrument approaches down to decision heights of less than 200 ft (60 m):~~

  ~~(1) airborne and ground equipment:~~

    ~~(i) technical requirements;~~

    ~~(ii) operational requirements;~~

    ~~(iii) operational reliability;~~

~~(iv) fail operational;~~

~~(v) fail passive;~~

~~(vi) equipment reliability;~~

~~(vii) operating procedures;~~

~~(viii) preparatory measures;~~

~~(ix) operational downgrading;~~

~~(x) communications.~~

~~(2) procedures and limitations:~~

~~(i) operational procedures;~~

~~(ii) crew coordination.~~

(~~g~~f) Special requirements for 'glass cockpit' aeroplanes with EFIS Additional learning objectives:

(1) general rules of aeroplanes computer hardware and software design;

(2) logic of all crew information and alerting systems and their limitations;

(3) interaction of the different aeroplane computer systems, their limitations, the possibilities of computer fault recognition and the actions to be performed on computer failures;

(4) normal procedures including all crew coordination duties;

(5) aeroplane operation with different computer degradations (basic flying).

(~~h~~g) Flight management systems.

II. SE AND ME HELICOPTERS

(…)

~~(f) Special requirements for extension of a type rating for instrument approaches down to a decision height of less than 200 ft (60 m):~~

~~(1) airborne and ground equipment:~~

~~(i) technical requirements;~~

~~(ii) operational requirements;~~

~~(iii) operational reliability;~~

~~(iv) fail operational;~~

~~(v) fail passive;~~

~~(vi) equipment reliability;~~

~~(vii) operating procedures;~~

~~(viii) preparatory measures;~~

~~(ix) operational downgrading;~~

~~(x) communication.~~

~~(2) Procedures and limitations:~~

~~(i) operational procedures;~~

~~(ii) crew co-ordination.~~

(~~g~~f) Special requirements for helicopters with EFIS.

(~~h~~g) Optional equipment.

(…)

386. AMC2 FCL.725(a) is amended as follows:

AMC2 FCL.725(a) Requirements for the issue of class and type ratings

TRAINING COURSE

FLIGHT INSTRUCTION FOR TYPE RATINGS: HELICOPTERS

(a) The amount of flight instruction depends on:

  (i) complexity of the helicopter type, handling characteristics, level of technology;

  (ii) category of helicopter (SEP or SE turbine helicopter, ME turbine and MP helicopter);

  (iii) previous experience of the applicant;

  (iv) the availability of FSTDs.

(b) FSTDs

The level of qualification and the complexity of the type will determine the amount of practical training that may be accomplished in FSTDs, including completion of the skill test. Before undertaking the skill test, a student should demonstrate competency in the skill test items during the practical training.

(c) Initial issue

The flight instruction (excluding skill test) should comprise:

Helicopter types	**In helicopter**	**In helicopter and FSTD associated training Credits**
SEP (H)	5 hrs	Using FFS C/D: At least 2 hrs helicopter and at least 6 hrs total Using FTD 2/3: At least 4 hrs helicopter and at least 6 hrs total
SET(H) under 3175 kg MTOM	5 hrs	Using FFS C/D: At least 2 hrs helicopter and at least 6 hrs total Using FTD 2/3: At least 4 hrs helicopter and at least 6 hrs total
SET(H) at or over 3175 kg MTOM	8 hrs	Using FFS C/D: At least 2 hrs helicopter and at least 10 hrs total Using FTD 2/3: At least 4 hrs helicopter and at least 10 hrs total
SPH MET (H) CS and FAR 27 and 29	8 hrs	Using FFS C/D: At least 2 hrs helicopter and at least 10 hrs total Using FTD 2/3: At least 4 hrs helicopter and at least 10 hrs total
SPH to MPH With MCC and 50 hours experience of multi-pilot operations	5 hrs	Using FFS C/D: At least 1 hr helicopter and at least 6 hrs total Using FTD 2/3: At least 2 hrs helicopter and at least 7 hrs total
MPH	10 hrs	Using FFS C/D: At least 2 hrs helicopter, and at least 12 hrs total Using FTD 2/3: At least 4 hrs helicopter, and at least 12 hrs total

(d) Additional types

The flight instruction (excluding skill test) should comprise:

Helicopter types	In helicopter	In helicopter and FSTD associated training Credits
SEP(H) to SEP(H) within AMC1 FCL.740.H (a)(3)	2 hrs	Using FFS C/D: At least 1 hr helicopter and at least 3 hrs total Using FTD 2/3: At least 1 hr helicopter and at least 4 hrs total
SEP(H) to SEP(H) not included in AMC1 FCL.740.H (a)(3)	5 hrs	Using FFS C/D: At least 1 hr helicopter and at least 6 hrs total Using FTD 2/3: At least 2 hr helicopter and at least 7 hrs total
SET(H) to SET(H)	2 hrs	Using FFS C/D: At least 1 hr helicopter and at least 3 hrs total Using FTD 2/3: At least 1 hr helicopter and at least 4 hrs total
SE difference training	1 hr	N/A
MET(H) to MET(H)	3 hrs	Using FFS C/D: At least 1 hr helicopter and at least 4 hrs total Using FTD 2/3: At least 2 hrs helicopter and at least 5 hrs total
ME difference training	1 hrs	N/A
MPH to MPH	5 hrs	Using FFS C/D: At least 1 hr helicopter and at least 6 hrs total Using FTD 2/3: At least 2 hrs helicopter and at least 7 hrs total
Extend privileges on the same type rating from SPH to MPH (except for initial MP issue), or from MPH to SPH	2 hr	Using FFS C/D: At least 1 hr helicopter and at least 3 hrs total From SPH to MPH with 50 hours multi-pilot operations on type: at least 1 hr total in helicopter or FFS C/D.

~~(e) Holders of an IR(H) wishing to extend the IR(H) to further types should have additionally 2 hours flight training on type by sole reference to instruments according to IFR which may be conducted in an FFS C/D or FTD 2/3. Holders of an SE IR(H) wishing to extend the IR privileges to an ME IR(H) for the first time should complete at least 5 hours training.~~

387. The following GM1 FCL.725(d)(4)(ii)(b)(2) is inserted:

GM1 FCL.725(d)(4)(ii)(B)(2) Requirements for the issue of class and type ratings

MULTI-PILOT OPERATION IN SINGLE-PILOT HELICOPTERS IN ACCORDANCE WITH ANNEX III (PART-ORO) TO REGULATION (EU) No 965/2012

Point FCL.725(d)(4)(ii)(B)(2) requires pilots to exercise their type rating privileges for multi-pilot operation in single-pilot helicopters only in accordance with the requirements of Part-ORO. Multi-pilot operations of single-pilot helicopters cannot be carried out under Part-NCO. The regulatory framework of Part-ORO applies in any case of commercial operations or operation of complex single-pilot helicopters under Regulation (EU) No 965/2012. This means that an ATO that provides training for multi-pilot operation in single-pilot helicopters will need to base that training on the operational procedures of the operator for which the pilot is flying. That ATO will either be an operator itself or will have an arrangement with an operator on behalf of which the training will be carried out.

388. GM1 FCL.740.A is introduced as follows:

GM1 FCL.740.A Revalidation of class and type ratings – aeroplanes

COMPLETE EBT PRACTICAL ASSESSMENT IN ACCORDANCE WITH APPENDIX 10

(a) The completion of an EBT Practical assessment includes:
   (1) the assessment of pilot performance either in a simulated or an operational environment and
   (2) the administrative action which includes the completion of the Appendix 10 form.

(b) Point (1) usually occurs before the 3 months immediately preceding the expiry date of the rating as the EBT programme includes several FSTD sessions, while point (2) administrative action is usually completed within the 3 months.

389. AMC1 FCL.740.H(a)(3) is amended as follows:

AMC1 FCL.740.H(a)(3) Revalidation of type ratings – helicopters

CREDITING OF THE PROFICIENCY CHECK TOWARDS SEP HELICOPTER TYPES

Only the following SEP helicopter types can be considered for crediting of the proficiency check. Other SEP helicopters (for example, ~~the~~ R22 ~~and R44~~) should not be given credit for.

~~Manufacturer~~	**~~Helicopter type and licence endorsement~~**
~~Agusta-Bell~~	
~~SEP~~	~~Bell47~~
~~Bell Helicopters~~	
~~SEP~~	~~Bell47~~
~~Brantley~~	
~~SEP~~	~~Brantley B2~~
~~Breda Nardi~~	
~~SEP~~	~~HU269~~
~~Enstrom~~	
~~SEP~~	~~ENF28~~
~~Hélicoptères Guimbal~~	
~~SEP~~	~~Cabri G2~~
~~Hiller~~	
~~SEP~~	~~UH12~~
~~Hughes or Schweizer~~	
~~SEP~~	~~HU269~~
~~Westland~~	

~~SEP~~	~~Bell47~~

Manufacturer	**SEP Helicopter type**
Agusta-Bell	Bell47
Bell Helicopters	Bell47
Westland	Bell47
Brantley	Brantley B2
Enstrom	ENF28
Hélicoptères Guimbal	Cabri G2
Hiller	UH12
Robinson	R44

390. Point (e) in GM1 to Appendix 10 is introduced as follows:

GM1 to Appendix 10 — Revalidation and renewal of type ratings, and revalidation and renewal of IRs when combined with the revalidation or renewal of type ratings – EBT practical assessment

REVALIDATION OF TYPE RATING — ADMINISTRATIVE PROCEDURES

(…)

(e) The requirements to ensure completion of the operator's EBT programme included in the form AMC1 to Appendix 10 can be found in ORO.FC.231 and includes as a minimum:

(1) the completion of the EBT modules (minimum two EBT modules),

(2) a valid line evaluation of competence (if applicable, as LEoC may have validity periods above the type rating validity period (one year) or the pilot may have the LEoC expired when under a renewal process of the type rating) and

(3) the completion of the ground training.

(f) The EBT programme includes equivalencies of approaches which determines de necessary training frequency of approaches. Therefore, the PBN privileged are maintained within the EBT programme. However, when an specific approval is involved under SPA.PBN the requirements and provision must be fully followed.

GM2 to Appendix 10 — Revalidation and renewal of type ratings, and revalidation and renewal of IRs when combined with the revalidation or renewal of type ratings – EBT practical assessment

EBT PRACTICAL ASSESSMENT — PROFICIENCY CHECK

EBT practical assessment (or **Practical assessment)** is defined in FCL.010. More information can be found in ICAO Doc 9868 'PANS-TRG'.

(a) The demonstration of skills to revalidate or renew referred to in the definition of proficiency check in FCL.010 is equivalent to the EBT practical assessments conducted in the EBT programme and the final review of the examiner. In fact, one single EBT practical assessment demonstrates the necessary skills performed in legacy training; however, EBT goes one step further — to revalidate or renew, the pilot performs at least two demonstrations, corresponding to at least two EBT modules within the validity period of the type rating.

(b) Therefore, a proficiency check is equivalent to the combination of the EVAL + MT and viceversa. However, EBT also requires an scenario training phase following the EVAL in order to complete the module.