



Notice of Proposed Amendment 2018-06(C)

All-weather operations

RMT.0379

EXECUTIVE SUMMARY

The objective of rulemaking task (RMT).0379 is to modernise the European Union (EU) aviation regulatory framework applicable to all-weather operations (AWOs) so it ensures the highest level of safety while enabling efficiency gains based on the latest technological advancements. It addresses in a coordinated manner all relevant disciplines: initial airworthiness, air operations, flight crew licensing and aerodromes. It proposes performance- and risk-based approach, as much as feasible, considering also the appropriate balance between performance-based and prescriptive principles (depending on the type of air operations (CAT, NCC, NCO, and SPO).

This NPA proposes to update the AWO-relevant rules in many aviation domains such as airworthiness (CS-AWO), air operations (Commission Regulation (EU) No 965/2012), aircrew (Commission Regulation (EU) No 1178/2011) and aerodromes (Commission Regulation (EU) No 139/2014, including CS-ADR.DSN). The main aim has been to allow for a better integration of the regulatory requirements related to the operational use of new, advanced technology — either developed already or to be developed in the future — such as, for example, enhanced flight vision system (EFVS), as well as the application of some advanced new operational procedures, which may support AWOs.

Significant focus has been invested in developing resilient rules, which are not technology-dependent. A particular attention was paid to the development of requirements enabling the use of EFVS to the maximum extent possible (e.g. use of EFVS for landing). A new concept of ‘light operational credits’ for EFVS 200 operations, not requiring the use of specific low-visibility procedures, has also been introduced.

The proposed changes are expected to maintain safety, reduce the regulatory burden, increase cost-effectiveness, improve harmonisation (e.g. with the Federal Aviation Administration (FAA)), and achieve as much as feasible alignment with the Standards and Recommended Practices (SARPs) of the International Civil Aviation Organization (ICAO).

NPA 2018-06 is divided in four parts. The present sub-NPA(C) includes:

- the procedural information pertaining to the regulatory proposal; and
- the proposed amendments to air operations (OPS) and flight crew licensing (FCL).

The other sub-NPAs are organised as follows:

- sub-NPA(A) – procedural information pertaining to the regulatory proposal; presentation of the issue under discussion; impact assessment as well as the hazard identification and risk assessment; and proposed actions to support implementation;
- sub-NPA(B) – initial airworthiness (CS-AWO); and
- sub-NPA(D) – aerodromes.

Action area:	Airlines, air operators other than airlines		
Affected rules:	AMC/GM to the Air OPS Regulation (Commission Regulation (EU) No 965/2012); AMC/GM to the Aircrew Regulation (Commission Regulation (EU) No 1178/2011); AMC/GM to the aerodromes rules (Commission Regulation (EU) No 139/2014, including CS-ADR-DSN); and CS-AWO		
Affected stakeholders:	manufacturers, maintenance organisations (MOs), air operators, approved training organisations (ATOs), aerodrome operators, ATM/ANS; Member States		
Driver:	Level playing field	Rulemaking group:	No
Impact assessment:	Light	Rulemaking Procedure:	Standard

• EASA rulemaking process milestones

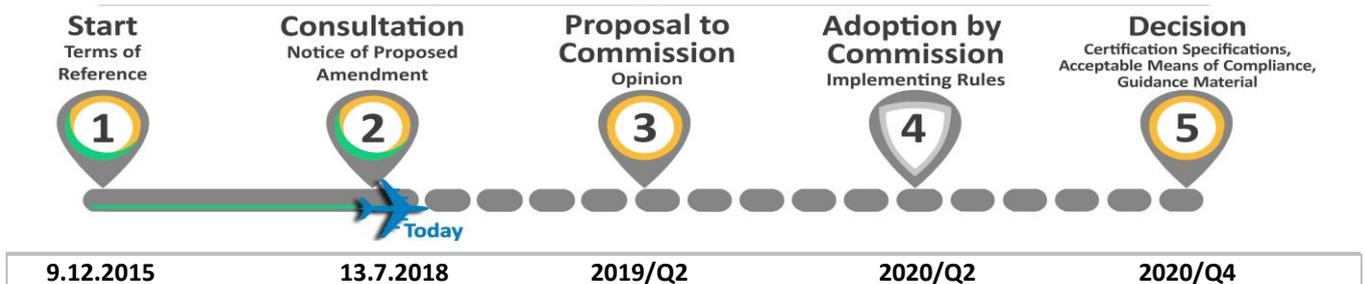


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1. About this NPA

1.1. How this NPA was developed

The European Aviation Safety Agency (EASA) developed this NPA in line with Regulation (EC) No 216/2008¹ (hereinafter referred to as the 'Basic Regulation') and the Rulemaking Procedure². This rulemaking activity is included in the EASA 5-year Rulemaking Programme³ under RMT.0379.

RMT.0379 was initiated with the publication of the related Terms of Reference (ToR) and Concept Paper RMT.0379 Issue 1⁴ on 9 December 2015. For the development of the implementing rules (IRs), the accelerated procedure⁵ is applied; for the development of the acceptable means of compliance (AMC), guidance material (GM) and certification specifications (CSs), the standard rulemaking procedure is followed. As part of the accelerated procedure, EASA has already consulted its Advisory Bodies (ABs) on the regulatory impact assessment (RIA) and the description of operations (DoOs). In the context of the second consultation phase (focused consultation), EASA consulted on the proposed amendments to the IRs only. In addition, EASA provided responses to the comments received during the AB consultation and presented the subsequent amendments to the RIA and the DoOs.

The text of this NPA has been developed by EASA based on the input of the Experts' Task Force Groups (air operations, airworthiness, and aerodromes). It is hereby submitted to all interested parties⁶ for consultation.

1.2. How to comment on this NPA

Please submit your comments using the automated **Comment-Response Tool (CRT)** available at <http://hub.easa.europa.eu/crt/>⁷.

The deadline for submission of comments is **15 October 2018**.

1.3. The next steps

Following the closing of the public commenting period, EASA will review all comments.

Based on the comments received EASA will:

- update the proposed text of the affected AMC & GM; and

¹ Regulation (EC) No 216/2008 of the European Parliament and of the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC (OJ L 79, 19.3.2008, p. 1) (<http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1467719701894&uri=CELEX:32008R0216>).

² EASA is bound to follow a structured rulemaking process as required by Article 52(1) of Regulation (EC) No 216/2008. Such a process has been adopted by the EASA Management Board (MB) and is referred to as the 'Rulemaking Procedure'. See MB Decision No 18-2015 of 15 December 2015 replacing Decision 01/2012 concerning the procedure to be applied by EASA for the issuing of opinions, certification specifications and guidance material (<http://www.easa.europa.eu/the-agency/management-board/decisions/easa-mb-decision-18-2015-rulemaking-procedure>).

³ <http://easa.europa.eu/rulemaking/annual-programme-and-planning.php>

⁴ <https://www.easa.europa.eu/system/files/dfu/ToR%20and%20Concept%20Paper%20RMT.0379%20Issue%201.pdf>

⁵ In accordance with Article 16 of MB Decision No 18-2015.

⁶ In accordance with Article 52 of Regulation (EC) No 216/2008 and Articles 6(3) and 7) of the Rulemaking Procedure.

⁷ In case of technical problems, please contact the CRT webmaster (crt@easa.europa.eu).



- issue an opinion (developed on the basis of the focused consultation and taking into account the comments received to the AWO NPA) containing the proposed amendments to Regulations (EU) Nos 965/2012, 1178/2011 and 139/2014; the opinion will be submitted to the European Commission, which will use it as a technical basis in order to prepare an EU regulation; and
- for sub-NPA(B) issue a decision containing CS-AWO to which the related comment-response document (CRD) will be annexed.

Following the adoption of the regulation, EASA will issue the associated decisions containing the related AMC & GM.

The comments received and the EASA responses for sub-NPAs (A), (C) and (D) will be reflected in CRDs. The CRDs will be annexed to the opinion.



2. Proposed amendments and rationale in detail

This chapter provides the explanatory note for the proposed amendments to the AWO-related regulatory material presented in Chapter 3 of this NPA.

Note: The regulatory material at IR level presented in Chapter 3 of this NPA is not intended to be again subject to the formal public consultation of this NPA, as the consultation should be focused on the relevant AWO-related soft law changes (AMC & GM). Nevertheless, should it be deemed necessary, commenters may also communicate issues related to the IRs.

2.1. Proposed changes to AMC & GM to Regulation (EU) No 965/2012 on air operations (Draft EASA decision) — presented together with the proposed amendments to the IRs

Regulation (EU) No 965/2012⁸ will be hereinafter referred to as the Air OPS Regulation.

Considering the comments received, EASA has changed the proposal initially presented during the focused consultation. The updated version of the IRs is published in this document, in Section 8.2.

2.1.1. Annex I 'Definitions for terms used in Annexes II to VIII' and related AMC & GM

New terms in Annex I

The latest edition of ICAO Annex 6 Part I — International Commercial Air Transport — Aeroplanes (Tenth Edition, July 2016) introduced some new definitions. These terms are proposed to be added in Annex I to the Air OPS Regulation. Additional new definitions have also been introduced during the development of the new rules.

The following new definitions are proposed to be incorporated in Annex I:

'aerodrome operating minima': the source of this term is ICAO Annex 6. ICAO has modified this term through the work on the new ICAO approach classification. The term is transposed with one minor difference, in that 'circling approach' has been included.

'circling approach operation': the existing definition of 'circling' is split into one definition of the term 'circling' and one definition of the term 'circling approach operation'. The amendment provides for better consistency and clarity of the rule text.

'decision altitude (DA) or decision height (DH)': the definition has been transposed from ICAO Annex 6.

'enhanced flight vision system (EFVS)': this definition has been introduced in the European regulatory system in the Air Ops Regulation and in the new CS-AWO, where specific CSs have been developed for EFVS. The definition is aligned with the term used within the FAA regulatory system⁹. The certification of the EFVS allows for operations with operational credits. Contrary to the EFVS, the 'enhanced vision system (EVS)' does not have specifications in CS-AWO and therefore does not benefit from any operational credits. This is reflected in the definitions introduced in this NPA.

⁸ Commission Regulation (EU) No 965/2012 of 5 October 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (OJ L 296, 25.10.2012, p. 1) (<http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1494235623593&uri=CELEX:32012R0965>).

⁹ CFR 14 Chapter 1, Part 1, 1.1 general definitions



‘EFVS operations’: this new term has been introduced to describe operations where EFVS is used for approach or landing and which allows an operational credit (e.g. lower minima), rather than just to improve situational awareness. The EFVS may be used in the future during other phases of flight. The definition is aligned with the one used in recently adopted FAA regulations¹⁰.

‘EFVS 200 operations’: this definition is added because, subject to compliance with certain requirements, operators will be permitted to conduct certain EFVS operations without needing a specific approval (SPA) from the competent authority. Such operations may be conducted only in CAT I or better meteorological conditions (i.e. not LVOs) and down to a height of 200 ft above the runway threshold (the approach may only be continued below 200 ft if the pilots have ‘natural’ visual reference). EFVS 200 operations are a subset of EFVS operations.

‘final approach segment (FAS)’: the definition has been transposed from ICAO Annex 6.

‘go-around’: this definition has been developed in the context of the activities of RMT.0379 in order to promote clarity and ensure consistency in the rules.

‘head-up display landing system (HUDLS)’: this new definition replaces the existing definition of ‘head-up guidance landing system (HUDLS)’. It has been amended in alignment with the one in CS-AWO.

‘instrument approach operations’: the definition has been transposed from ICAO Annex 6. ICAO has modified this term through the work on the new ICAO approach classification. Under the new approach classification, it is important to distinguish between instrument approach *operations* and instrument approach *procedures* (IAPs). Operations are activities performed by pilots, whereas procedures are the predetermined, published series of manoeuvres that are used for those operations. Instrument approach operations may be conducted using different methods, depending on whether vertical guidance is available (2D or 3D), and are classified according to the minimum DA/H as ‘Type A’ or ‘Type B’ (see below). New GM explains the type of guidance that may be used for instrument approach operations and clarifies which operations should be considered 3D operations. 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, July 2016.

‘instrument approach procedure’: the definition is based on revised definitions in ICAO Annex 6 and has been added for clarity.

‘low-visibility operations (LVOs)’: this definition, developed through RMT.0379, will be included in the regulations for the different domains (air operations, aircrew, aerodromes, etc.) in order to promote a consistent understanding across said domains. This term is currently not defined in ICAO standards; however, there is a comparable definition in the ICAO AWO Manual.

‘minimum descent altitude (MDA) or minimum descent height (MDH)’: the definition has been transposed from ICAO Annex 6.

‘obstacle clearance altitude (OCA) or obstacle clearance height (OCH)’: the definition has been transposed from ICAO Annex 6.

¹⁰ CFR 14 Chapter I, Part 1, 1.1 General definitions



‘operation with operational credits’: ICAO standards (specifically 4.2.8.1.1 in ICAO Annex 6 Part I) allow the State of the operator to approve operational credits for operations with aeroplanes with certain equipment, and describe operational credits as allowing operation to lower aerodrome operating minima, reducing or satisfying visibility requirements or requiring fewer ground facilities. Operations with operational credits are operations using specific aircraft or ground equipment or a combination of aircraft and ground equipment, such that lower-than-standard aerodrome operating minima can be applied for a particular classification of operation, using as reference the standard aerodrome operating minima as stipulated in ICAO Doc 9365 ‘Manual of All-Weather Operations’, Appendix F. In that vein, SA CAT I allows a DH as low as 150 ft and an RVR as low as 400 m, but it is still a CAT I operation, albeit some additional requirements will apply. This definition of ‘operation with operational credits’ has been developed in the context of the activities of RMT.0379 based on ICAO standards and it was considered necessary in developing the rules and to ensure consistency throughout the rule text. Operational credits represent a concept approved by ICAO, so these operations will not necessitate any notification of differences with the ICAO standards.

‘Type A instrument approach operation’ and ‘Type B instrument approach operation’: these definitions are derived from the standard 4.2.8.3 of ICAO Annex 6. This is a classification of an instrument approach operation based on the designed lowest operating minima below which an approach operation may only be continued with the required visual reference. ICAO introduced this term as a result of the work on the new ICAO approach classification.

The definition of ‘Type B instrument approach operation’ contains an important difference from the ICAO standard in that CAT III is not subcategorised into CAT IIIA, CAT IIIB and CAT IIIC. The experts involved in the development of this NPA took the view that the subcategorisation was not helpful. The FAA have also initiated a process to delete these subcategories from their definition.

‘visibility’: neither the existing European rules nor ICAO Annex 6 have a definition of visibility. The experts of RMT.0379 considered that it would be valuable to include a definition of visibility to avoid ambiguity, particularly when specifying aerodrome operating minima.

This term refers to the visibility measured and reported by an observer on the ground and not simply to visibility in general or in-flight visibility; visibility for aeronautical purposes refers to the meteorological visibility; therefore, it is understood as meteorological visibility (ref. ICAO Annex 3 ‘Meteorological service for international air navigation’). The definition from ICAO Annex 3 has been used to ensure that the meaning of ‘visibility’ used by pilots is the same as that used by meteorological services, aerodromes and air traffic services. The term ‘meteorological visibility’ is replaced with ‘VIS’ in the Air Ops rules, following the ICAO definition.

Terms amended in Annex I

‘continuous descent final approach (CDFA) operation’: the existing text is amended by adding a reference to circling approach operations. This is in order to clarify that circling approaches are outside the scope of CAT.OP.MPA.115, which requires approval for approaches flown without the CDFA technique.

‘low-visibility take-off (LVTO)’: this term has been amended in order to be aligned with the term ‘LVOs’. The two subcategories, LVTO I and LVTO II, which are distinguished at ICAO level are not included in the European rules, therefore they are not included among definitions. A specific approval is required



only for the ICAO LVTO II; however, in the European rules the limits of RVR are specifically included in the rules of specific approvals (Part-SPA) and therefore the term 'LVTO II' is not needed. The definition LVTO no longer contains a lower limit of 75 m to enable operations with lower-visibility minima.

'visual approach operation': the existing definition of 'visual approach' has been updated in accordance with the distinction between approach 'operations' and approach 'procedures' (see 'instrument approach operation').

Minor amendments, mostly editorial, are made to the following definitions:

- 'continuous descent final approach (CDFA)';
- 'visual approach' and
- 'weather-permissible aerodrome' – the term 'weather reports' has been replaced with 'meteorological reports'.

Terms deleted from Annex I

'approach procedure with vertical guidance (APV) operation': this term is no longer used in the new ICAO approach classification. It is, therefore, deleted and replaced with the new definitions for Type A and Type B instrument approach operations (the definition of an APV remains within the definition of IAPs).

'CAT I', 'CAT II', 'CAT IIIA', 'CAT IIIB' approach operations: in accordance with the new ICAO approach classification, these terms are replaced with the new definition of Type B instrument approach operations.

'head-up guidance landing system (HUDLS)': the definition has been deleted. Its content has been incorporated into the new definition of head-up display landing system (HUDLS) and thus aligned with the one developed within the scope of CS-AWO.

'lower-than-standard category I' (LTS CAT I) is deleted, since this approach classification has been removed from the rules (see SPA.LVO.100).

'non-precision approach (NPA) operation': this term is no longer used in the new ICAO approach classification. It is, therefore, deleted and replaced with the new definitions for instrument approach operations and procedures; however, the definition of NPA remains as part of the definition of IAPs.

Terms transferred to GM level

The following terms are not used anymore in the IRs but only in the AMC and GM, and have been therefore moved at GM level: 'enhanced vision system (EVS)'; 'head-up display (HUD)' (this definition will also include 'equivalent displays'); 'low-visibility procedures (LVPs)'; and 'other-than-standard category II (OTS CAT II) operation'.

New terms in GM to Annex I Definitions

Most definitions related to aircraft systems used for operations with operational credits have been removed from the IRs in Annex I and now appear in GM to Annex I. This is because the new performance-based IRs do not make reference to specific technologies, only to the performance required of the system.



GM16 to Annex I: All-weather operations

The new GM16 to Annex I contains the definitions of the following terms relating to LVOs and operations with operational credits used in the AMC and GM to Part-SPA:

‘EFVS-Approach (EFVS-A)’: this definition is the same as the one proposed in CS-AWO and describes an EFVS that can be certified for operations using EFVS but not for use below 100 ft above the threshold without ‘natural’ visual reference, i.e. not suitable for EFVS to touchdown.

‘EFVS-Landing (EFVS-L)’: this definition is the same as the one proposed in CS-AWO and describes an EFVS that can be certified for EFVS operations to touchdown. A landing system using EFVS will have additional functionality compared to an approach system using EFVS.

‘enhanced vision system (EVS)’: the definition of EVS is moved from IR and amended to ensure consistency with the FAA and to clarify that an EVS may not be used for operations with operational credits unless it is certificated as an EFVS.

‘head-up display (HUD) or equivalent display system’: this definition is moved from the IR and amended. It is now the same as the definition proposed for CS-AWO and takes into account the possibility that future technological developments may result in systems that achieve the same performance as a HUD without meeting the previous definition. One example of a possible system could be a head-mounted device.

GM17 to Annex I: Enhanced vision systems (EVS)

This GM contains some content transferred from GM1 SPA.LVO.100(f) and provides explanation of EVS and EFVS. It has been developed to explain the distinction between EVS and EFVS, especially since the proposal introduces a new definition of EVS, and also to provide guidance for the use of EVS, for which there are no requirements in the Air OPS Regulation.

It was assumed that many stakeholders would not be familiar with regulations and certification standards for other domains (e.g. airworthiness certification) and that a summary of such requirements would therefore be of value.

The GM details the technologies that are currently available for EVS sensors. These are not included in the definition as future technological developments could result in the use of other technologies. The GM also includes a limited explanation of the functionality required for an EFVS, based on the proposed CS-AWO and some information about the limitations of such systems. Some of this is based on information published by the FAA¹¹.

GM18 to Annex I: Instrument approach operations

This new GM clarifies the criteria for an operation to be considered a 3D approach operation. It reflects the notes to the definitions of ‘instrument approach operations’ and ‘instrument approach procedures’ in ICAO Annex 6.

ICAO Annex 6 uses the term ‘advisory VNAV’. The experts consulted during the development of this NPA considered this terminology unhelpful since it is not defined. The need for cross-checking or

¹¹ FAA Advisory Circular 90-106A: ‘Enhanced Flight Vision Systems’



alternate sources of information in order to use vertical guidance will depend on the technology and equipment in use and operators should decide themselves on the need for this based on the aircraft flight manual (AFM) and other considerations.

The GM also emphasises the importance of compliance with specified minimum altitudes/heights during the approach, as obstacle clearance is based on the assumption that such restrictions will be respected.

GM19 to Annex I: Decision altitude or decision height

This GM is added to clarify the relationship between DA and DH. It also expands on the use of DH based on the use of a radio altimeter.

GM20 to Annex I: Minimum descent altitude (MDA) or minimum descent height (MDH)

This new GM reproduces the notes to the definitions of ‘minimum descent altitude (MDA) or minimum descent height (MDH)’ in ICAO Annex 6.

2.1.2. Annex II ‘Authority requirements for air operations’ (Part-ARO) and related AMC & GM

Appendix II — Operations specifications (EASA Form 139)

The template for operations specifications (ref. EASA Form 139 — Issue 4 foreseen to replace the existing Issue 3) of Appendix II has been redesigned. A new line addressing operational credits in addition to already existing take-off and approach and landing has been included in the cell pertaining to LVOs.

Further modifications of the form have been applied:

- for take-off (ref. (11) in the table), an approved minimum take-off RVR in metres is foreseen (one line per approval),
- for approach and landing (ref. (12) in the table) for CAT II and CAT III (LTS CAT I, OTS CAT II, CAT IIIA, CAT IIIB and CAT IIIC have been deleted), the minimum RVR in metres and DH in feet have to be inserted (one line per listed approach category).

For the newly introduced operational credits line (ref. (13) in the table), an applicable operational credit has to be inserted as LTS CAT I, SA CAT I, SA CAT II, EFVS, etc.; the minimum RVR in metres and DH in feet have to be specified (one line to be used per listed operational credit).

The new AMC5 ARO.OPS.200 ‘Specific approval procedure | Procedures for the approval of low-visibility operations’ is added with the intent to provide a checklist to assist the authorities in granting the LVO approval.

2.1.3. Annex III ‘Organisation requirements for air operations’ (Part-ORO) and related AMC & GM

ORO.GEN

There are no amendments proposed to Annex III at the IR level.

AMC and GM to ORO.GEN

In *GM1 ORO.GEN.130(b) ‘Changes related to an AOC holder | Changes requiring prior approval’* the non-exhaustive list of changes requiring prior approval is increased to include the method used to

establish aerodrome operating minima, which will need to be approved in accordance with the revised CAT.OP.MPA.115.

Appendix I to Part-ORO — Declaration

The declaration has been amended to include a line where the operator includes the name of the operations with operational credits conducted. This addition will ensure that the competent authority can take into account the risks presented by operations with operational credits when determining the appropriate oversight programme for declared operators.

2.1.4. Annex IV ‘Commercial air transport operations’ (Part-CAT) and related AMC & GM

Helicopter operations will be dealt with in Phase 2 of the AWO project. Hence, the amendments proposed to the IR, AMC and GM related to helicopters and the associated explanatory notes are not included in this NPA.

CAT.OP.MPA.101 ‘Altimeter check and settings’

As currently neither the Air OPS Regulation nor Regulation (EU) No 923/2012¹² (hereinafter referred to as the ‘standardised European rules of the air (SERA) Regulation’) covers the requirement to establish procedures for altimeter check and settings which are essential for instrument flight rules (IFR) operations, a new requirement, CAT.OP.MPA.101 ‘Altimeter check and settings’ has been introduced for this purpose.

AMC and GM to CAT.OP.MPA.101 ‘Altimeter check and setting’

GM1 CAT.OP.MPA.101 ‘Altimeter setting procedures’ provides technical operational instructions referring to the applicable ICAO material (PANS-OPS, Volume I (ICAO Doc 8168, Volume I), paragraph 3.2 ‘Pre-flight operational test’, paragraph 3.3 ‘Take-off and climb’ and paragraph 3.5 ‘Approach and landing’).

CAT.OP.MPA.107 ‘Adequate aerodrome’

This IR has been slightly amended to replace the term ‘weather’ with ‘meteorological’, for more accuracy.

This change has been applied throughout all Annexes to the Air OPS Regulation.

CAT.OP.MPA.110 ‘Aerodrome operating minima’

The requirements for aerodrome operating minima have been fully deleted and new provisions have been developed. A safety objective has been added to point (a), i.e. ‘to ensure separation of the aircraft from terrain and obstacles and to mitigate the risk of loss of visual references during the visual flight segment of instrument operation operations’. The list of items that must be taken into account in determining the aerodrome operating minima is updated in the new point (b) to ensure closer

¹² Commission Implementing Regulation (EU) No 923/2012 of 26 September 2012 laying down the common rules of the air and operational provisions regarding services and procedures in air navigation and amending Implementing Regulation (EU) No 1035/2011 and Regulations (EC) No 1265/2007, (EC) No 1794/2006, (EC) No 730/2006, (EC) No 1033/2006 and (EU) No 255/2010 (OJ L 281, 13.10.2012, p. 1) (<http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1494236221362&uri=CELEX:32012R0923>).

alignment with ICAO Annex 6 and ICAO Doc 9365 'Manual of All-Weather Operations' (para 6.2.6). The existing point (b), which allows for lower minima based on the use of HUD or EVS, is not kept in the new text, as such credits are now dealt with by means of an operational credit as described in Part-SPA.

The second sentence of the existing point (a), as well as the existing point (b) have been moved to AMC level. The non-exhaustive and descriptive list of items to be considered for the establishment of aerodrome operating minima is now replaced with a more general list of items.

Finally, the content of the existing point (e) has been moved to CAT.OP.MPA.300 'Approach and landing conditions' addressed to the flight crew and also to CAT.OP.MPA.265 'Take-off conditions' (although the existing text only refers to approach operations).

The requirement for the method of determining aerodrome operating minima is added (new item (c)) to ensure compliance with ICAO standards (4.2.8.1 of Annex 6).

AMC and GM to CAT.OP.MPA.110 'Aerodrome operating minima'

The amendments to the AMC and GM to the aerodrome operating minima in CAT.OP.MPA.110 address common elements for aerodrome operating minima and provide provisions for standard take-off and standard approach operations for which no specific approval is required. Operations which require a specific approval — LVOs as well as operations with operational credits — are addressed in the AMC to SPA.LVO.105. In addition, consistency between the AMC and GM structure of CAT.OP.MPA.110 and SPA.LVO.105 is ensured.

All the table references have been updated in the AMC and GM to CAT.OP.MPA.110.

AMC1 CAT.OP.MPA.110 'Take-off operations – aeroplanes' is amended to remove the take-off minima for LVTO; these are now in Part-SPA; the references to converted meteorological visibility (CMV) are removed as these duplicated the requirement in AMC9 CAT.OP.MPA.110 (i.e. that CMV is not to be used for take-off). A requirement is added that the commander should not commence take-off in an RVR of less than 550 m unless LVPs are in effect. This has been transposed from Part-SPA as it is applicable both to operators that do not have an approval for LVTO below 400 m as well as those that do. Some editorial changes have been made.

AMC3 CAT.OP.MPA.110 'NPA, APV, CAT I operations' has a new title: '*Determination of DH/MDH for instrument approach operations*'. The new title reflects the new terminology for approach operations; the reference to 'the minimum height to which the approach aid can be used without the required visual reference' is removed as this is superfluous since system minima are specified in the tables; the explanations of the abbreviations for different facilities in the system minima table are deleted as these are already presented in GM1 to Annex I; an additional provision is added to take account of the possibility to conduct instrument approach operations on non-instrument runways, or to conduct 3D operations on non-precision runways; Table 4.A shows the applicable runway type minima; the lowest DH to be used will be the higher of the minima for the approach type or for the runway; the lowest DH to be used on a non-precision runway will be 250 ft and the lowest DH for a non-instrument runway will be the same as the lowest circling minima for the aeroplane category. An additional provision is added in point (c) to ensure that the DA/H is corrected for low temperatures as required by PANS-OPS. Guidance on the correction to be applied is provided in the new GM8 CAT.OP.MPA.110.



The notes containing the spelled-out abbreviations have been removed throughout the revised AMC and GM where these are duplicated in Annex I.

AMC4 CAT.OP.MPA.110 'Determination of RVR or VIS for instrument approach operations — aeroplanes': the fully revised AMC combines and amends the content of the former AMC4 CAT.OP.MPA.110 'Criteria for establishing RVR/CMV' and AMC5 CAT.OP.MPA.110 'Determination of RVR/CMV/VIS minima for NPA, APV, CAT I — aeroplanes'; parts of the old content of AMC4 and AMC5 have been moved to GM level.

Stakeholder feedback indicated that the existing AMC was not easy to interpret. In order to simplify the presentation, the description of how the values of RVR are determined is provided in the tables. The formula from which these values are derived has been moved to the new GM4 CAT.OP.MPA.110 and the presentation of the tables has been changed to remove the maximum and minimum values and to adopt the new terminology for approach operations (2D or 3D).

The description of how the missed approach should be flown following a CDFAs has been removed from this AMC (this appears in AMC2).

The new AMC4 now provides for the applicable RVR to be determined depending on the type of runway used, i.e. where a precision approach is flown to a non-precision runway or an instrument approach to a non-instrument runway. The lowest applicable RVR may be limited by either the type of runway, the DH/MDH and the class of lighting or the ground facilities and the type of approach so the AMC specifies that the RVR to be used should be not less than the greatest of these three as determined by the applicable tables.

An upper cut-off value of 1 500 m RVR (category A, B) and 2 400 m RVR (category C, D) is applied. Bearing in mind the definition of RVR, the experts took the view that an 'RVR' requirement was not meaningful where the value was likely to be longer than a typical runway and that no additional safety benefit was achieved by requiring higher values of converted meteorological visibility in order to continue an approach.

Point (a)(6) of the existing AMC5 has not been transposed in the redrafted AMC4. In situations where this is required, an operator could apply an AltMoC.

The provision for lower values of RVR to be applied for autoland operations and use of HUDLS have been removed as these are not relevant to Part-CAT; the criteria for LVOs and operations with operational credits now appear in Part-SPA.

The existing *AMC4 CAT.OP.MPA.110* contains a provision for approaches where the final approach fix is not defined or where the missed approach point is defined by timing. If such approaches are flown using the CDFAs technique, then the normal minima may be applied; if they are flown non-CDFAs (with the appropriate approval), then the increment for non-CDFAs applies (point (c)). Note that such operations would require an approval in accordance with the proposed CAT.OP.MPA.115(b).

The existing *AMC5 CAT.OP.MPA.110 'Determination of RVR/CMV/VIS minima for instrument approach operations — aeroplanes'* has been deleted. Most of its content has been transposed into the new AMC4 and further amended.



The proposed *AMC5 CAT.OP.MPA.110 'Determination of RVR/CMV/VIS minima for instrument approach operations — helicopters'* is the former AMC6 renumbered. Helicopter operations will be dealt with in Phase 2 of the AWO project.

AMC6 CAT.OP.MPA.110 'Circling operations — aeroplanes' is the former AMC7. In determining the minimum visibility requirement for circling operations, the requirement to take into account the minimum RVR for the preceding approach procedure is removed, as this will always be less than the visibility prescribed for circling in this AMC.

AMC7 CAT.OP.MPA.110 'Onshore circling operations — helicopters' is the former AMC8. Helicopter operations will be dealt with in Phase 2 of the AWO project.

AMC8 CAT.OP.MPA.110 is the former *AMC9, 'Visual approach operations'*, with no changes.

AMC9 CAT.OP.MPA.110 'Conversion of reported meteorological visibility (CMV)', which is the former *AMC10*, is changed to replace 'meteorological visibility' with 'VIS'.

AMC10 CAT.OP.MPA.110 'Effect on landing minima of temporarily failed or downgraded ground equipment' is the former *AMC11*. Some stakeholders reported that the restrictions on night operations with runway lighting inoperative were unclear and could be unduly restrictive in the case where some elements of a lighting group were inoperative (just a limited number of lights). A new Table 13 has been added to aid operators to determine whether a limited unserviceability should lead to the entire lighting group to be considered inoperative. The content of the table is based on ICAO Annex 14.

AMC11 CAT.OP.MPA.110 is the former *AMC12 'VFR operations with other-than-complex motor-powered aircraft'* with no changes.

The existing *GM2 CAT.OP.MPA.110 'Approach lighting systems — ICAO, FAA'* is corrected (the high-intensity approach lighting system (HIALS) value for CAT I lighting system provided by ICAO). The abbreviations, which can be found in *GM2 Annex I 'Definitions | Abbreviations and acronyms'*, have been removed.

The existing *GM3 CAT.OP.MPA.110 'SBAS operations'* is not affected by this RMT.

The new *GM4 CAT.OP.MPA.110 'Means to determine the required RVR based on DH and lighting facilities'* is added. Its content originates from the former *AMC5 CAT.OP.MPA.110 'Determination of RVR/CMV/VIS minima for NPA, APV, CAT I — aeroplanes'*.

The new *GM5 CAT.OP.MPA.110 'Use of DH for NPA flown using the CDFA technique'* is added. This clarifies that it is not usually necessary to add an increment to the MDA/H for an NPA procedure in order to derive a DA/H for a CDFA operation. In some circumstances (e.g. descent path steeper than 3.5 degrees), the operator may need to make a specific safety assessment.

GM6 CAT.OP.MPA.110 'Increments specified by the competent authority' is the former *GM1 CAT.OP.MPA.110(a)* and has been modified to include the approaches flown without the use of CDFA among those operations to which the competent authority may specify additional increments to the published minima.

The new *GM7 CAT.OP.MPA.110 'Use of commercially available information'* is added to clarify the operator's responsibility for determination of aerodrome operating minima.



The new *GM8 CAT.OP.MPA.110 'Low temperature correction'* provides guidance to support operators in implementing the new requirement in AMC3 CAT.OP.MPA.110(c) to apply a temperature correction when altimeters can be expected to over read due to low ambient temperatures. The table has been taken from ICAO Doc 8168 (PANS-OPS) Chapter 4 (altimeter corrections).

GM9 CAT.OP.MPA.110 'Aerodrome operating minima — Helicopters': helicopter operations will be dealt with in Phase 2 of the AWO project.

The new *GM1 CAT.OP.MPA.110(b)(5) 'Visual and non-visual aids and infrastructure'* is introduced in order to clarify the intention of the requirement in CAT.OP.MPA.110(b)(5).

CAT.OP.MPA.115 'Approach flight technique — aeroplanes'

The amendments to point (a) are of an editorial nature; point (b) is revised and shortened; the amended provision specifies that an approval is required for each particular runway for which the CDFA technique is not used; the penalties on the RVR minima are removed from the IR on the performance-based principle that an IR should contain the safety objective, while the means to achieve the safety objective should be put at AMC level. The content removed from the IR represents only the means to achieve the safety objective identified in the IR and is already addressed in the AMC to CAT.OP.MPA.110.

The rule for stabilised approaches and CDFA is simplified to avert any potential confusion between stabilised approach operations (SAP) and CDFA operations (the definition of the CDFA in Annex I is also amended).

The use of SAP is considered to be a significant factor in the mitigation of the risks of controlled flight into terrain (CFIT) and runway excursions on landing. All approaches must be flown as SAP according to the definition in Annex I and AMC1 CAT.OP.MPA.115 (see below). Both circling approach operations and non-CDFAs can be flown as stabilised approaches in accordance with the definition and the AMC.

NPA procedures may be flown as either 2D or 3D instrument approach operations depending on whether the avionics provide vertical navigation guidance to the pilot. In either case, the approach should be flown using the CDFA technique.

The existing rule imposes a penalty to the use of non-CDFA technique by requiring the use of different minimum RVR. This has been removed from point (b) and transferred to AMC4 CAT.OP.MPA.110 as the determination of aerodrome operating minima is covered by CAT.OP.MPA.110. Where an operator is unable to apply the CDFA technique for a particular instrument approach operation and has approval for another flight technique, the operator is required to implement procedures to ensure that an aircraft will not operate below the MDA/H without adequate visual reference (see the revised AMC3 CAT.OP.MPA.110). GM6 CAT.OP.MPA.110 clarifies that the competent authority may require additional increments to the aerodrome operating minima, for example for the use of a non-CDFA technique.

AMC and GM to CAT.OP.MPA.115 'Approach flight technique — aeroplanes'

AMC1 CAT.OP.MPA.115 'Continuous descent final approach (CDFA)', containing information about SAP and CDFA, is fully replaced with new text containing criteria applicable to CDFA. Only a part of the requirements of the existing AMC1 relating to CDFA has been retained; the wording is changed to make it clear that certain requirements are only applicable to multi-pilot operations. The listing of the



types of approach suitable for CDFA is removed. The requirement that the operator should use an 'add-on' to the published minima when using CDFA (see GM5 CAT.OP.MPA.110 for an explanation) is also removed.

AMC2 CAT.OP.MPA.115 'NPA operations without applying the CDFA technique': only a few editorial changes have been made to this AMC.

AMC3 CAT.OP.MPA.115 'Operational procedures and instructions and training' provides criteria for operational procedures and instructions and training. The whole AMC text has been simplified to avoid duplication of requirements stated in AMC2 CAT.OP.MPA.115 or elsewhere in Part-CAT (e.g. rate of descent and visual reference requirements). Whereas it may have been necessary to provide detailed AMC for CDFA training when the requirement was first introduced, CDFA is now a normal part of initial and recurrent pilot training and operators need to ensure that their training programmes reflect their operational requirements.

The new *GM1 CAT.OP.MPA.115 'Operational reasons for higher-than-normal approach speeds'* is added, as AMC1 CAT.OP.MPA.115 no longer refers to air traffic control (ATC) speed restriction as a reason to use a higher-than-normal approach speed below 1 000 ft, but requires the operator to specify all reasons in its operations manual (OM). This GM highlights that one reason to apply this procedure would be to comply with the ATC speed constraints.

The new *AMC1 CAT.OP.MPA.115(a) 'Stabilised approach operations — aeroplanes'* describes the means to comply with the definition of a stabilised approach operation for all approach procedures and aircraft types. As the entire approach operation should be 'stabilised', the AMC introduces the new term 'stabilised for landing' in order to clarify the conditions that should be achieved before reaching the runway threshold in order to mitigate the risk of excess energy on landing (and possible consequence of runway overrun). The requirement to be 'stabilised for landing' by either 1 000 ft or 500 ft above runway threshold elevation (ARTE), depending on whether the pilot has visual reference with the ground, is retained from the existing text of AMC1 CAT.OP.MPA.115 point (b). The criteria for being 'stabilised for landing' do not include being on the extended runway centreline as this may not be the case for all approaches, particularly for circling approach operations or approaches offset from the runway centreline. The requirement is that the aircraft should be tracking with an acceptable tolerance of the required lateral and vertical path. The maximum acceptable rate of descent (i.e. 1 000 fpm) has been moved to GM as it is not applicable to all types of aircraft and operation.

There is a provision to allow a later stabilisation if a higher approach speed is required for operational reasons. In order to ensure that such operational reasons are considered by the operator and subject to an appropriate risk assessment in accordance with ORO.GEN.200(a)(3) rather than being left to the discretion of the commander, the reasons must be specified in the OM (see points (f) and (g)); similarly, the operator is required to specify in the OM the acceptable tolerances for energy and path control and the point on the approach from which the stabilised approach criteria should apply.

This ensures that the criteria can be applied to different aircraft types and different types of operation and that the commander has clear criteria to determine whether the aircraft is stabilised for landing.

New GM1 CAT.OP.MPA.115(a) 'Target rate of descent of stabilised approach': the specific maximum rate of descent that should be acceptable for a stabilised approach (i.e. 1 000 fpm) has been moved from AMC to GM as it is not applicable to all types of operation. A category D aircraft flying a steeper-



than-normal approach might have a rate of descent higher than 1 000 fpm while still being stabilised; conversely, a category A aircraft on a three-degree slope would not be stabilised with a rate of descent of 1 000 fpm. The GM also clarifies that being aligned with the runway is not one of the criteria for being stabilised for landing.

New GM2 CAT.OP.MPA.115(a) 'Alternative stabilised approach criteria': it is established that the CDFA technique is useful in reducing the number of accidents and is, therefore, preferred to non-CDFA techniques. There may be sound operational reasons why the CDFA is not suitable for some approaches on some runways and there may be a public interest in maintaining such operations. CAT.OP.MPA.115(b) allows that, for particular runways, the competent authority may approve another flight technique. In such circumstances, the competent authority has the responsibility to determine whether approval should be granted on a case-by-case basis. This GM clarifies that, unlike an AltMoC, the level of safety for a non-CDFA may not be the same as for a CDFA, nevertheless the competent authority will need to be satisfied that an *acceptable* level of safety is achieved taking into account the operational need and public interest.

The existing GM1 CAT.OP.MPA.115 'Continuous descent final approach (CDFA)' has been renamed GM1 CAT.OP.MPA.115(b); changes for consistency with the rest of the text have been made.

CAT.OP.MPA.185 'Planning minima for IFR flights — aeroplanes' and CAT.OP.MPA.186 'Planning minima for IFR flights — helicopters': the existing text is not changed within this RMT, as these rules will be fully addressed by RMT.0573 'Fuel planning and management'.

CAT.OP.MPA.265 'Take-off conditions'

The text has been revised to improve readability and consistency. A new point (b) containing the text of the existing paragraph (e) of CAT.OP.MPA.110 is added. This new point requires the flight crew to verify whether for the selected aerodrome operating minima all necessary components (such as ground equipment, aircraft systems, aircraft performance, and flight crew qualifications) are available and operative. This ensures consistency with the requirement for aerodrome operating minima for approach operations in CAT.OP.MPA 300.

CAT.OP.MPA.300 'Approach and landing conditions'

The rule text is amended to improve readability, and some editorial amendments have been proposed for consistency; the reference to 'missed approach' is replaced with the term 'go-around' to also take into account such operations below the DA/H or MDA/H. As mentioned above, a definition of the term 'go-around' is added to Annex I (Definitions). Moreover, a new point (b) is added with the rule content of the existing point (e) of CAT.OP.MPA.110. This new point requires the flight crew to be satisfied that all necessary components (such as ground equipment, aircraft systems, aircraft performance, and flight crew qualifications) are available for the selected aerodrome operating minima.

It should be noted that the whole CAT.OP.MPA.300 will be amended through RMT.0296 'Review of aeroplane performance requirements for CAT operations', to introduce the new concept of 'in-flight assessment of landing performance' having regard to the performance information contained in the OM.

CAT.OP.MPA.305 'Commencement and continuation of approach'



The rule has been reworded for clarification. This requirement is also known by the term 'approach ban'. It is considered to be a safety-critical rule to avoid CFIT. This rule complies with a corresponding ICAO Annex 6 standard. The appropriateness of this rule has been in particular discussed from the perspective of operations using EFVS/CVS for operational credits. For such operations, a credit to the RVR minimum is allowed. The reduced RVR minimum can be applied to comply with the approach ban requirement. The reference to landing runway is added to clarify which RVRs are relevant to the approach ban and account for the case where a pilot commences an approach without the intention of landing, for example training approaches planned to be followed by a missed approach. This is not directly relevant to CAT operations but has been included here for consistency with Part-NCC (and Part-NCO). The description of which RVR to consider is moved to an AMC level; the provisions describing what a pilot 'may' do are moved to GM.

AMC and GM to CAT.OP.MPA.305 'Commencement and continuation of approach'

GM1 CAT.OP.MPA.305 'Application of RVR or VIS reports'

Point (a): The existing CAT.OP.MPA.305 states in point (a) that a pilot may commence an approach regardless of the reported RVR or visibility. The text is not appropriate at IR level as pilots do not require a specific enabling rule to transition from one phase of flight to the next; nevertheless, the group of experts of RMT.0379 considered that it is useful to clarify that there is no prohibition on the commencement of an approach based on reported visibility and that in the event that there is no report of RVR or VIS, then there is no restriction on continuation of the approach.

Point (b): This requirement was transferred from the existing CAT.OP.MPA.305 point (d). As for (a) above, the experts considered that this provides useful clarification of the action to be taken in the event of a deterioration in visibility when an aircraft has already descended below 1 000 ft or into the FAS. Moreover, this is an alignment with the FAA - AC 120-28D requirements (paragraph 6.2.7), according to which 'operations based on an Alert Height (AH) may continue to the AH and then land, if weather is reported to be at or above minima before passing the AH, or if suitable visual reference has been established by the pilot. Operations based on an AH may continue to land regardless of reported weather conditions if equipped with a fail operational rollout system which did not indicate a malfunction prior to passing alert height, and the pilot considers continuation a safe course of action.'

However, one element that should be highlighted is that in Europe firefighting services do not guarantee the required services in visibility less than 75 m.

Point (c): According to the proposed AMC1 CAT.OP.MPA.305(a), only the touchdown RVR is controlling (see below). The GM clarifies that the midpoint and stop-end RVRs may nonetheless be useful to the pilot and provides a reference to AMC1 SPA.LVO.100(a). This information could be useful to operators who determine that there could be an operational or safety benefit from imposing their own limits on minimum or stop-end RVR.

The new *AMC1 CAT.OP.MPA.305(a) 'RVR minimum for continuation of approach'* is added: the criteria for the 'controlling' RVR are simplified. The RMT.0379 experts considered that the objectives of the 'approach ban' are to prevent the situation where a pilot arrives at a DH with insufficient visibility to adequately control the aircraft for landing and to reduce the rate of missed approaches from DH. The RVR relevant to the approach ban should therefore be the touchdown zone (TDZ). Where this is not available, the midpoint (MID) may be used as this is the value most likely to be representative of the



TDZ. Amending this rule has the benefit of simplifying a previously complex requirement, the result of which will be its clear understanding and, consequently, a consistent application.

AMC1 CAT.OP.MPA.305(b) 'Visual references for instrument approach operations' (previously AMC1 CAT.OP.MPA.305(e)): the visual reference requirements at DH are unchanged, but the provisions relating to low-visibility approach operations requiring a specific approval are moved to Part-SPA.

CAT.OP.MPA.310 'Operating procedures — threshold crossing height — aeroplanes'

The term 'precision approaches' has been replaced with 'Type B instrument approach operations'.

CAT.OP.MPA.312 'EFVS 200 operations'

The new CAT.OP.MPA.312 and NCC.OP.235 with their related AMC and GM have been introduced to address EFVS operations in Part-CAT and in Part-NCC respectively. They introduce a new concept into the Air OPS Regulation: the conduct of EFVS operations with operational credits without the need for a specific approval to be granted in accordance with Annex V (Part-SPA).

The concept was initially proposed by representatives of non-commercial operators and aircraft manufacturers, who reported that the existing approval requirements for EFVS operations with operational credits placed an undue burden on the industry which resulted in very few operators being able to apply successfully for the approval of EFVS operations with operational credits and significant safety and operational benefits being therefore denied to the industry.

The proposed requirements are intended to be proportionate, to avoid placing an undue burden on the industry or competent authorities and to provide some of the benefits of EFVS operations without the need for an approval.

The provisions of the new rules are intended to permit EFVS operations in CAT and NCC operations, where the safety risks are well understood and can be mitigated by prescriptive requirements. More complex operations using newer technologies and representing greater potential safety risks will still require a specific approval in accordance with Annex V. For these reasons, the new EFVS rules permit the use of EFVS without natural vision only down to a height of 200 ft above the aerodrome and only in conditions equivalent to an RVR of 550 m or greater (i.e. LVOs are not permitted under this rule).

CAT.OP.MPA.312 and NCC.OP.235 stipulate the requirements that operators intending to conduct EFVS 200 operations must fulfil (which are further developed in the related AMC and GM): the aircraft is certified for the intended operations, only runways and IAPs suitable for EFVS operations might be used, the flight crew is competent to conduct the intended operation, safety assessments are carried out and performance indicators are established to monitor the level of safety, etc. The requirement for a safety assessment is transposed from ICAO standards (Attachment 2A Annex 6 Part 2). These are the same as the requirements for operators seeking approval for EFVS operations in accordance with Annex V (SPA.LVO.105), but with the additional requirement that the operating minima take into account the capability of the systems used.

Introducing this new concept will lead to closer alignment with the FAA, which allows EFVS operations without approval for non-commercial operators ('Part 91'), but would be a departure from ICAO standards, which require any operation with operational credits to be an 'approval' item (ICAO Annex 6 Part II, paragraph 2.2.2.1.1).



The main benefit of this rule is expected to be felt by operators conducting CAT operations with smaller or non-complex aircraft to secondary airports that do not have sophisticated ground infrastructure in place, for example airports without an ILS approach or with an ILS approach but with limited approach lighting. The term 'EFVS 200 operations' describes this operation in the domain of CAT operations as well as in NCC operations.

Note: the proposal of this type of operations has been discussed at the meeting of ICAO OPS panel; despite introducing a new concept about the principles set in ICAO Annex 6 (especially the requirement for a special approval), the formal introduction of such a concept has been found feasible not only for the NCC, but also for the CAT operations.

AMC and GM to CAT.OP.MPA.312 and to NCC.OP.235 'EFVS 200 operations'

GM1 CAT.OP.MPA.312 and GM1 NCC.OP.235 'EFVS operations' provide a logical description of the different elements of the system that the operator needs to put in place and which are described in different AMC.

AMC1 CAT.OP.MPA.312(a) and respectively AMC1 NCC.OP.235(a) 'Equipment certification' describe the equipment required for EFVS 200 operations. The proposed CS will certify EFVSs as either 'EFVS-Approach (EFVS-A) or EFVS-Landing (EFVS-L). Either system will be suitable for EFVS 200 operations as the pilot will not be relying on EFVS below a height of 200 ft (natural visual reference is required below 200 ft). Many existing systems or systems certified under existing requirements will also be suitable for EFVS 200 operations so point (b) confirms that systems approved for 'EVS with operational credit' under existing requirements will be acceptable.

AMC1 CAT.OP.MPA.312(b) and respectively AMC1 NCC.OP.235(b) 'Aerodromes and instrument procedures suitable for EFVS 200 operations': the responsibility for determining the suitability of aerodromes and approach procedures for EFVS 200 operations will rest with the aircraft operator, so these AMCs describe the requirements for aerodromes and approach procedures to be used for EFVS 200 operations. In order to ensure that the pilot will have path information from the EFVS image and from internal cues, the proposal is that EFVS 200 operations should only be available for 3D operations.

The EFVS will include path information (e.g. a flight path vector). In order for this flight path information to correlate with the EFVS or natural visual image, the proposal is that EFVS 200 operations should only be flown where the final approach track is aligned with the runway centreline (+/- 2 degrees). This will ensure that the pilot can 'place' the flight path vector over the runway threshold when flying the approach. Further explanation of the other requirements (point (a)) is provided in GM1 CAT.OP.MPA.312(b) and respectively in GM1 NCC.OP.235(b).

GM1 CAT.OP.MPA.312(b) and respectively GM1 NCC.OP.235(b) 'Verifying the suitability of runways for EFVS operations' explain the steps that an operator could take to establish if a runway is suitable for EFVS 200 operations. If the runway has been promulgated as suitable by the State of the aerodrome (i.e. in the AIP), then no further investigation is required. It has been assumed that, at least in the short term, there will be a few runways so promulgated. Recommendations are therefore provided to describe how an operator could ensure that obstacle clearance would be maintained during the 'visual' part of the approach, bearing in mind that the pilot may be relying on the enhanced image rather than natural vision and that visual avoidance of obstacles may not be practical. The GM also suggest a possible method to ensure obstacle clearance in the event of a balked landing.



AMC1 CAT.OP.MPA.312(c) and respectively AMC1 NCC.OP.235 (c) 'Initial training for EFVS 200 operations': the training requirements for EFVS 200 operations are the same as those for the conduct of EFVS operations requiring an approval in accordance with Annex V (see the proposed AMC3 SPA.LVO.120(b)) and are based on existing requirements for operations with EVS. This training programme will not need to be approved by the competent authority. It is assumed that most operators will use third-party training providers and that this will be a subcontracted activity in accordance with ORO.GEN.205; nevertheless, the training syllabus will have to appear in the OM (ORO.FC.145(a)).

AMC2 CAT.OP.MPA.312(c) and respectively AMC2 NCC.OP.235(c) 'Recurrent training and checking for EFVS 200 operations': the recurrent training and checking requirements for EFVS 200 operations ensure that pilots will need to demonstrate continued competence.

AMC3 CAT.OP.MPA.312(c) and respectively AMC3 NCC.OP.235(c) 'Recent experience requirements for EFVS 200 operations': a recent experience requirement has also been added to ensure that pilots will complete at least four EFVS approaches annually (two for recency and two during the demonstration of competence). This is based on the existing requirement for recurrent training and checking for operations using a HUD. The recent experience and checking requirements are different from the FAA requirements. The FAA requires a larger number of EFVS approaches to maintain recency, but no demonstration of competence.

AMC4 CAT.OP.MPA.312(c) and respectively AMC4 NCC.OP.235(c) 'Differences training for EFVS 200 operations' provide the requirements for differences training for EFVS 200 operations in the event of a change of equipment or operational procedures.

The proposed recurrent training/checking requirement for EFVS 200 operations is for flight crew to demonstrate proficiency by conducting a minimum of two EFVS 200 approaches at each demonstration of competence.

GM1 CAT.OP.MPA.312(c) and respectively GM1 NCC.OP.235(c) 'Recurrent checking for EFVS 200 operations' have been added to highlight the need to vary the scenarios used for this check so that pilots are able to demonstrate proficiency in dealing with different technical failures and weather conditions and, in particular, to practise decision-making.

The requirements for operating procedures for EFVS 200 operations appear in *AMC1 CAT.OP.MPA.312(d) and respectively AMC1 NCC.OP.235(d) 'Operating procedures for EFVS 200 operations'*. Many operators will adopt procedures developed by aircraft manufacturers; nevertheless, these procedures will have to be published in each operator's OM; this could be done by including the 'pilot operating handbook' or an equivalent document into the OM in accordance with point (g) of AMC1 ORO.MLR.100. The requirements for operating procedures are closely based on those for EFVS operations requiring a specific approval in the proposed AMC2 SPA.LVO.105(c) and AMC7 SPA.LVO.105(c). The crucial difference is that, for EFVS 200 operations, pilots must have natural visual reference by a height of 200 ft above the runway or else execute a go-around. Like in AMC7 SPA.LVO.105(c), the visual reference requirements at the DA/H have been transposed from the existing AMC1 CAT.OP.MPA.305, but the wording is amended to be more closely aligned with that of the FAA.

AMC1 CAT.OP.MPA.312(h) and respectively AMC1 NCC.OP.235(h) 'Aerodrome operating minima — EFVS 200 operations' detail the operating minima for EFVS 200 operations. EFVS allows an operational



credit to the visual segment of the approach so the DA/H is always unchanged. The credits for RVR or VIS have been transposed from the existing requirements for operations with EVS (AMC6 SPA.LVO.100) but with a lower 'cut-off' at 550 m. Operations in RVRs of less than 550 m are 'low-visibility operations' and so will require specific approval in accordance with Annex V.

It is expected that new technologies may offer performance in excess of the credits allowed for EFVS 200. In order to take advantage of such performance, operators would need to apply for approval for EFVS operations in accordance with Annex V (Part-SPA). The credits allowed for EFVS 200 are intentionally conservative and based on proven requirements.



2.1.5. Annex V 'Specific approvals' (Part-SPA) and related AMC & GM

SPA.GEN.100 'Competent authority'

This rule is amended to include the LVOs in the list of SPA to which the approval by the competent authority is not required for non-commercial operations using aircraft registered in a third country.

SPA.LVO.100 'Low-visibility operations and operations with operational credits'

In order to develop a performance-based regulation and allow for the introduction of new technologies, the list of specific types of operation has been removed from the IR.

In accordance with ICAO standards, the IR specifies that all take-off operations below 400 m, low-visibility approach operations and operations with operational credits require specific approval.

Therefore, under the revised definitions, any take-off with an RVR of less than 550 m will be classified as LVTO, but only LVTOs with an RVR of less than 400 m will require an approval (as it is the case now).

All approach operations in an RVR of less than 550 m (LVOs) will require prior approval of the competent authority.

The list of operations for which specific approval can be granted is moved to AMC. For any new types of operations or any new technologies used to meet the performance requirements of already defined operations, only additional AMC or amendments to existing AMC will be necessary.

Lower-than-standard category I (LTS CAT I) operation is not transposed into the revised IR or AMC. During the rule-development procedure, the use of a hazard identification and risk assessment process revealed a latent safety risk in relation to LTS CAT I. There are inconsistencies across the different aviation domains in the current requirements. The use of an autoland system with an (instrument landing system) ILS certified to class I/T/1 (as allowed by the current AMC3 SPA.LVO.100) is not anticipated by certification specifications and thus type certificate holders have not demonstrated this during the certification process; similarly, neither aerodrome operators nor aircraft operators are obliged to verify that the pre-threshold terrain of a runway used for LTS CAT I operations is compatible with the autoland system. It appears that few operators regularly use LTS CAT I and thus the level of exposure to this risk has been low. Whereas rules for each aviation domain have previously been made independently and by different organisations (e.g. JAA and EASA), the cross-domain approach adopted through RMT.0379 provides the opportunity to introduce a new operational credit (SA CAT I) that mitigates the risks associated with LTS CAT I and will provide significant operational and safety benefits. Under SA CAT I, the lower RVR required for approach can be paired with a lower DH, meaning that the probability of a go-around due to inadequate visual reference at or below DH is significantly less than for LTS CAT I.

AMC and GM to SPA.LVO.100 'Low-visibility operations and operations with operational credits'

The existing AMC1, AMC3, AMC4, AMC5 and AMC6 to SPA.LVO.100 are deleted and new AMC are created, partly using the text of the deleted rules.

AMC and GM provide further details on how standard LVOs and operations with operational credits can be approved. For any new types of operations or any new technologies used to meet the performance requirements of already defined operations, only additional AMC or amendments to existing AMC will be necessary.



GM1 SPA.LVO.100 'Documents containing information related to LVOs and operations with operational credits' contains minor editorial changes.

The new AMC1 SPA.LVO.100(a) 'LVTO operations — aeroplanes in an RVR of less than 400 m but not less than 125 m' transposes the requirements for LVTO down to 125 m from the existing AMC1 SPA.LVO.110 and incorporates the requirements for LVTO in multi-engined aeroplanes without the performance to stop or continue a take-off in the event of an engine failure. These have been transposed from AMC1 CAT.OP.MPA.110, as a specific approval is required.

The requirement to have a 90 m visual segment is moved to GM2 SPA.LVO.100(a) because this is the intention of requiring an RVR of 125 m, not an additional requirement.

Point (c) clarifies that the specified RVR is required for the reporting points on the parts of the runway that will be used for the take-off roll or in the event of a rejected take-off. The intent of the requirement is not changed.

The new AMC2 SPA.LVO.100(a) 'LVTO operations — aeroplanes in an RVR of less than 125 m' transposes the requirements for LVTO in an RVR of less than 125 m but also allows for the situation where equipment is certified for take-off in specific values of RVR. This is to facilitate the future implementation of new technologies that could have different capabilities.

Note that SPA.LVO.105 and AMC1 SPA.LVO.105(a) detail the equipment required for LVTO below 125 m.

AMC3 SPA.LVO.100(a) 'LVTO operations — helicopters': helicopter operations will be dealt with in Phase 2 of the AWO project.

The new AMC1 SPA.LVO.100(b) 'CAT II operations' transposes the requirements for CAT II operations from the existing AMC4 SPA.LVO.100 but removes the criteria for other-than-standard category II (OTS CAT II) operations (operations with operational credits are dealt with in separate AMC, see AMC2 SPA.LVO.100(c) for the requirements for SA CAT II). The equipment requirements and operating procedures have been moved to SPA.LVO.105 and the aerodrome requirements to SPA.LVO.110.

The requirement for the DH to be not lower than 'the minimum height to which the precision approach (PA) aid can be used without the specified visual reference' is removed as this is a duplication of the minimum DH for the approach category.

The new AMC2 SPA.LVO.100(b) 'CAT III operations' transposes the requirements for CAT III operations from the existing AMC5 SPA.LVO.100. The equipment requirements and operating procedures have been moved to SPA.LVO.105 and the aerodrome requirements to SPA.LVO.110.

The subdivisions of category III have been removed. The lowest DH values to be used for particular aircraft installations will be described in the AFM. The reference to the type of roll-out systems used is included to allow determination of the appropriate RVR value based on the pilot's need to be able to control the roll-out (the certification requirements are described in CS-AWO). GM2 SPA.LVO.100(b) offers additional information about which systems are required for certain DHs.

The lowest RVR for a DH between 50 and 100 ft (previously CAT IIIA) will be 175 m (previously 200 m), to be aligned with the new ICAO standard for CAT IIIA. The provision for an RVR of 150 m for aircraft certificated as 'super fail-passive' is removed. 175 m will now be required for DHs down to 50 ft. It is understood that this provision was applicable to a single aircraft type that is no longer in production.

As the equipment of super fail-passive has been demonstrated as suitable for use down to 150 m, operators with such aircraft could consider applying for an AltMoC.

The minimum RVR for DH below 50 is 125 m in the current rules, based on a fail-passive roll-out system; this has been retained but, based on input from an aircraft manufacturer, a provision has been inserted to allow a minimum RVR of 75 m where this has been demonstrated during the equipment certification process.

The minimum RVR for no DH operations is currently 75 m, based on the assumption that the roll-out system is fail-operational. However, it is possible to get a no DH certification for a fail-passive roll-out system; this is now reflected in a range of RVR, 75-125 m, which has been added to this AMC and will be subject to the same considerations and approval as described for DHs below 50 ft.

The requirement for the DH to be not lower than 'the minimum height to which the precision approach aid can be used without the specified visual reference' is removed as this is a duplication of the minimum DH for the approach category.

AMC3 SPA.LVO.100(b) 'Effect on CAT II/CAT III landing minima of temporarily failed or downgraded equipment' replaces the existing AMC7 SPA.LVO.100. The instructions on when the values in the table should be applied has been moved to GM (GM4 SPA.LVO.100(b)). The only change to the table is that the row for 'edge lights, threshold lights and runway end lights' has been replaced with separate rows for each item.

New AMC1 SPA.LVO.100(c) 'Operational credit: special authorisation category 1 (SA CAT I)' introduces special authorisation category 1 as an operational credit allowing operation to a DH of 150 ft subject to holding specific approval from the competent authority. SA CAT I has been developed using a cross-domain approach and evaluating all of the elements of the 'total system' for approach operations. There are, therefore, specific requirements for airborne equipment (see AMC1 SPA.LVO.105(a)) approach procedures (see AMC1 SPA.LVO.110(a)) and operating procedures (AMC5 SPA.LVO.105(c)). Complementary rules have been developed for the aerodrome and certification domains to ensure that all of these elements can be used together to extend the instrument segment of a CAT I approach. SA CAT I will provide a significant operational benefit compared to LTS CAT I as it allows operation to a lower DH as well as reduced RVR. GM3 SPA.LVO.100(c) provides a description of SA CAT I.

The new *AMC2 SPA.LVO.100(c) 'Operational credit: approval of the special authorisation category 2 (SA CAT II)'* introduces SA CAT II as an operational credit. SA CAT II incorporates the previous requirement for OTS CAT II but is more closely aligned with the FAA standards. SA CAT II allows a CAT II operation without meeting all the lighting requirements for CAT II and therefore requires increased RVR to mitigate the less detailed visual reference. The RVR requirements for SA CAT II based on the DH are transposed from the existing AMC4 SPA.LVO.100 except that there are no increased minima for category D aircraft.

The equipment requirements and operating procedures are in SPA.LVO.105 and the aerodrome requirements in SPA.LVO.110.

The new AMC3 SPA.LVO.100(c) 'Operational credit: EFVS operations' allows approach EFVS operations, including in low-visibility conditions (RVR less than 550 m), and landing EFVS operations considering them operations with operational credits. Such operations will require the operator to hold a specific approval from the competent authority. ICAO standards require that operational credits are specifically



approved by the competent authority, hence this requirement is in Part-SPA. The term 'EFVS' is introduced to describe a system that can be used for operational credits as opposed to 'EVS', which refers to a system to be used only for improved situational awareness (see definitions in Annex I).

NOTE: There is a proposal to allow EFVS operations without specific approval where the equipment is not used below 200 ft and where the RVR is more than 550 m; see CAT.OP.MPA.312 and NCC.OP.235.

It is anticipated that CS-AWO will allow equipment manufacturers to specify the performance of a particular EFVS in different weather conditions and that this information will be presented in the AFM in the form of a table of visibility credits in different weather conditions. In order to allow operators to take advantage of the performance of the particular EFVS being used, this AMC allows the RVR to be determined in accordance with the demonstrated performance as shown in the AFM. For 'legacy' systems and other systems where the AFM does not include such information, the new Table 8 has been transposed from Table 6 in the existing AMC6 SPA.LVO.100.

If EFVS operations are to be conducted in visibilities of less than 550 m, then such operations would be LVOs. Point (c) ensures that LVOs are conducted only if LVPs are established at the aerodrome of intended landing.

The new *GM1 SPA.LVO.100(a) 'Classification of low-visibility take-off operations'* is introduced to clarify that not all LVTOs require a specific approval, only operations below an RVR of 400 m.

The new *GM2 SPA.LVO.100(a) 'Visual segment for take-off'*: the requirement to have a 90 m visual segment is removed from the criteria for LVTO (AMC1 SPA.LVO.100(a)) because this is the intention of requiring an RVR of 125 m, not an additional requirement to be met. This new GM explains the requirement. This GM could be useful to operators wishing to implement an AltMoC to AMC2 SPA.LVO.100(a) because the flight deck geometry of their particular aircraft would allow a 90 m visual segment in different RVR conditions.

The new *GM1 SPA.LVO.100(b) 'Classification of standard approach operations'* explains the revised categorisation of approach operations and the relationship with the ICAO standard.

This GM provides a table on the classification of standard approach operations. It will be useful to operators of aircraft where the AFM includes a reference to CAT IIIA or CAT IIIB rather than a specific DH.

The new *GM2 SPA.LVO.100(b) 'Equipment certification for low-visibility approach operations'* rephrases the information available in CS-AWO in simpler terms, for the easy understanding of operational personnel.

GM3 SPA.LVO.100(b) 'Establishment of minimum RVR for CAT II and CAT III operations' is updated with the addition of a paragraph in point (c)(2). This is in order to clarify that it is not necessary for the visual reference on a 'CAT III with no DH' approach to include a lateral element of the approach lighting system.

New GM4 SPA.LVO.100(b) 'Effect on CAT II/CAT III landing minima of temporarily failed or downgraded equipment': this GM provides more guidance on the use of the table of temporarily failed or downgraded equipment (previously AMC7 SPA.LVO.100 item (a)).

The new *GM1 SPA.LVO.100(c) 'The concept of operations with operational credits'* explains the concept of operations with operational credits, which has been introduced in accordance with ICAO standards.

The new *GM2 SPA.LVO.100(c) 'Special authorisation category 1 (SA CAT I) operations'* explains SA CAT I operations.

The new *GM3 SPA.LVO.100(c) 'Special authorisation category 2 (SA CAT II) operations'* explains SA CAT II operations.

Note: Other than-standard category II (OTS CAT II) has been removed from the proposed changes to the rule as special authorisation category II (SA CAT II) has been introduced.

The new *GM4 SPA.LVO.100(c) 'EFVS operations'* provides an overview of EFVS operations has been provided to collate the requirements for EFVS operations into one place and will be useful to help operators to identify where the specific requirements can be found in AMC and to understand EFVS operations.

The new *GM5 SPA.LVO.100(c) 'Combined vision systems'* clarifies that, in the proposed rule set, there is no operational credit in the visual segment for CVSs other than that available for EFVSs. A CVS consisting of an EFVS and an SVS could be approved for EFVS operations if it met all the certification requirements of an EFVS.

It is anticipated that, in the future, synthetic vision guidance systems (SVGS) and CVSs may be used for LVOs and other operations with operational credits. When such systems are available and certificated, then operators could apply for an AltMoC to allow operations with operational credits and EASA could develop additional AMC.

SPA.LVO.105 'Specific approval criteria'

The title of SPA.LVO.105 was changed from 'LVO approval' to 'Specific approval criteria'. In line with other specific approvals of Part-SPA, this IR specifies the main criteria to obtain a specific approval for LVOs and/or operations with operational credits, which include the components required for safe operations such as:

- aircraft capabilities,
- flight crew competence,
- operating procedures,
- minimum equipment list (MEL),
- continuous airworthiness, and
- safety assessments and continuous monitoring.

The proposed text is aligned with a corresponding proposed amendment to ICAO Annex 6. It is expected that ICAO will publish a related State Letter with the proposed amendment in the course of 2018.

The current text of the IR is completely replaced with new text. The old requirements are moved to the new AMC related to SPA.LVO.100.

AMC and GM to SPA.LVO.105 'Specific approval criteria'



Following the principle of stating the safety objective and relevant criteria in the IRs and providing technical means of achieving those objectives and criteria at AMC level, the following current requirements have been moved to AMC level (AMC to SPA.LVO.105):

- SPA.LVO.110 'General operating requirements';
- SPA.LVO.125 'Operating procedures'; and
- SPA.LVO.130 'Minimum equipment'.

The following AMC have been deleted:

- AMC1 SPA.LVO.105 'LVO approval' — Operational demonstration — aeroplanes;
- AMC3 SPA.LVO.105 'LVO approval' — Continuous monitoring — all aircraft;
- AMC4 SPA.LVO.105 'LVO approval' — Transitional periods for CAT II and CAT III operations;
- AMC5 SPA.LVO.105 'LVO approval' — Maintenance of CAT II, CAT III AND LVTO equipment; and
- AMC6 SPA.LVO.105 'LVO approval' — Eligible aerodromes and runways.

The existing *AMC1, AMC2 and AMC3 to SPA.LVO.105* are superseded by the new AMC2 SPA.LVO.105(f) 'Safety assessment prior to the grant of an approval'.

The existing *AMC4 SPA.LVO.105 'Transitional periods for CAT II and CAT III operations'* is deleted. The opinion of the RMT.0379 experts was that there is no clear safety benefit from imposing an elapsed time limit on the grant of CAT II/III approvals to new operators. It could be argued that the increased probability of go-arounds and diversion resulting from higher operating minima during such a transitional period could result in a lower level of safety. Operators will be required to gather data in order to carry out a safety assessment prior to the grant of an approval. GM2 SPA.LVO.05(f) contains guidance on the extent of operational experience that could be required to gather sufficient data.

The existing *AMC5 SPA.LVO.105 'Maintenance of CAT II, CAT III and LVTO equipment'* is deleted because maintenance of equipment is not an operational matter. Maintenance requirements are stipulated in the applicable airworthiness regulation.

The existing *AMC6 SPA.LVO.105 'Eligible aerodromes and runways'* is superseded by the new AMC3 SPA.LVO.110(a) 'Suitable aerodromes: Approach operations'.

The existing *GM1 SPA.LVO.105 'Criteria for a successful approach and automatic landing'* has a changed subtitle (previously '*Criteria for a successful CAT II, OTS CAT II, CAT III approach and automatic landing*'). This GM provides operators with criteria (supplemental information) for a successful approach and automatic landing.

The new *AMC1 SPA.LVO.105(a): 'Equipment certification'* details the equipment requirements for certain types of LVOs and operations with operational credits. The requirements have been transposed from the existing rules with the following differences:

- For LVTO in an RVR of less than 125 m, a system certificated for the purpose is stipulated. GM1 provides information about the types of system that could be certificated for the purpose;
- A specific certification is proposed for SA CAT I operations (aligned with the proposed CS-AWO). Equipment certified for CAT II/III operations will not automatically be certificated for SA CAT I as

the quality of the ILS signal to be used will not be the same (this differs from the regulations applicable in some other states, e.g. USA and Australia);

- SA CAT II operations will require a CAT II certified aircraft (this will supersede OTS CAT II); and
- Details of the specific aircraft systems suitable for CAT II/III operations (e.g. autoland/HUD) are removed from the AMC as this is determined by the certification of the aircraft and equipment.

New GM1 SPA.LVO.105(a) 'Equipment eligible for take-off in an RVR less than 125 m': the new AMC1 SPA.LVO.105(a) specifies that LVTO requires a system certified for the purpose. In order to provide for the development of new technologies, the AMC does not specify a particular type of system. This GM provides information about technologies certificated on current aircraft types.

New AMC1 SPA.LVO.105(c) 'Operating procedures for LVO': these requirements for LVOs have been transposed from SPA.LVO.125.

New AMC2 SPA.LVO.105(c) 'Operating procedures: general': these operating procedures requirements have been transposed from the existing AMC1 SPA.LVO.125. The content of the AMC has been reworded and reordered to aid understanding. References to specific types of operation and technologies (e.g. instrument landing system (ILS)) have been removed to ensure that the requirements are applicable to all types of LVOs and operations with operational credits, including the use of technologies that may not be available at the time of writing.

An additional requirement has been added that procedures should deviate to the minimum extent practicable from normal procedures used for routine operations as this is considered to be a useful mechanism to reduce the probability of errors. This is a policy that is already widely adopted for LVOs.

New AMC3 SPA.LVO.105(c) 'Operating procedures: CAT II': these requirements for CAT II operations have been transposed from SPA.LVO.110 and the existing AMC4 SPA.LVO.100. The visual reference requirements have been transposed from AMC1 CAT.OP.MPA.305 as they are only applicable to operations requiring a special approval.

The existing AMC4 SPA.LVO.100 states that the minima for CAT II is contingent on operation 'auto-coupled or approved HUDLS' down to 80 % of the DH. The intention of this requirement was to ensure that, in limiting conditions, the HUDLS/autopilot is used down to the DH and that the pilot does not disconnect the autopilot instantly once visual reference is acquired. It was not intended to prevent disconnection of the autopilot once satisfactory visual reference is acquired and maintained. Point (c) of the new AMC3 SPA.LVO.105(c) is added to achieve the intent of this requirement while allowing greater operational flexibility.

The requirement for the DH to be determined by the use of a radio altimeter is modified to allow the adoption of future technologies that could achieve an equivalent level of accuracy (point (d)).

New AMC4 SPA.LVO.105(c) 'Operating procedures: CAT III': these requirements for CAT III operations have been transposed from the existing SPA.LVO.110 and AMC5 SPA.LVO.100. The visual reference requirements have been transposed from the existing AMC1 CAT.OP.MPA.305 as they are only applicable to operations requiring a specific approval.

The requirement that the DH should be determined by the use of a radio altimeter has been modified to allow the adoption of future technologies that could achieve at least an equivalent level of accuracy.

The new AMC5 SPA.LVO.105(c) 'Operating procedures: SA CAT I' details the requirements for SA CAT I operations. The requirements are based on regulations adopted in other States, specifically the USA and Australia. Unlike other low-visibility approach operations, there is no specific requirement for SA CAT I operations to be flown with a crew of two pilots. The visual reference requirements have been adopted from the requirements for CAT II as these are known to provide sufficient visual reference for a continued approach from a DH as low as 150 ft.

The requirement that the DH should be determined by the use of a radio altimeter has been modified to allow the adoption of future technologies that could achieve at least an equivalent level of accuracy.

New AMC6 SPA.LVO.105(c) 'Operating procedures: SA CAT II': the operating requirements for SA CAT II are identical to those for 'standard' CAT II operations. AMC6 is added to ensure a consistent layout of AMC for LVOs and operations with operational credits.

New AMC7 SPA.LVO.105(c) 'Operating procedures: EFVS operations': the operating requirements for EFVS operations have been adapted from the existing AMC6 SPA.LVO.100 and updated to allow 'EVFS-L' operations and also to be aligned with recently published FAA regulations.

The existing provision requires to have natural visual reference of the runway by 200 ft for NPA or APV operations. This provision is removed, as CS-AWO now requires system performance to be demonstrated down to 100 ft for 'EVFS-L'. 'EVFS-L' may require this 'natural' visual reference by a certain height, in which case the height will be indicated in the AFM. The new CS.AWO.A.EFVS is developed following a performance-based philosophy. This allows flexibility in the minimum height for which natural vision reference is required. Therefore, point (f) allows two cases: when the manufacturer is following the new CS-AWO, the height is specified in the AFM allowing thus EFVS-A operations and EFVS-L operations; when the equipment has been certified before the new CS-AWO, then the height of 100 ft is required as previously stipulated in the regulation.

The visual reference requirements have been transposed from the existing AMC1 CAT.OP.MPA.305, but the wording is amended to be more closely aligned with that used by the FAA.

GM1 SPA.LVO.105(c) 'Flight crew actions in case of autopilot failure at or below DH in fail-passive CAT III operations' has been transposed from the existing GM1 SPA.LVO.100(e).

New AMC1 SPA.LVO.105(f) 'Safety assessment and performance indicators': ICAO standards require a safety assessment prior to conducting LVOs. The existing AMC1 SPA.LVO.105 requires operators to gather and analyse data prior to the grant of a specific approval, and AMC3 SPA.LVO.105 requires operators to gather data about LVOs and monitor the performance of individual aircraft. This new AMC describes some of the data that should be collected and performance indicators that should be monitored. These data and performance indicators will also be useful for hazard identification and safety performance monitoring in accordance with ORO.GEN.200(a)(3).

The new AMC2 SPA.LVO.105(f) 'Safety assessment prior to obtaining an approval' mandates that the data and performance indicators in accordance with the new AMC1 SPA.LVO.105(f) be used by the operator for conducting a safety assessment prior to obtaining a specific approval. This safety assessment is proposed to replace the 'operational demonstration' currently required by AMC1 SPA.LVO.105 and AMC2 SPA.LVO.105. The AMC clarifies that the intent of this data gathering is to demonstrate that the operation will achieve an acceptable level of safety.



The existing operational demonstration requires a fixed number of approaches. As this number may not be appropriate for all types of operation, the requirements have been moved to the new GM2 SPA.LVO.105(f) in order to allow more flexibility for operators and competent authorities to determine the number of approaches required to demonstrate that operations will achieve an acceptable level of safety. It must be emphasised that these demonstration approaches do not replace the demonstration required for equipment certification which necessitates substantially more data than that which could be gathered in the context of an 'operational demonstration'.

The existing AMC1 SPA.LVO.105 contains a provision that if the number of approaches is difficult to achieve, this number may be reduced in certain conditions. This provision is no longer needed because the number of approaches is not specified in the AMC (it has been moved to GM level). The operator is responsible to determine the number of approaches required to demonstrate the required level of safety and to satisfy the competent authority that sufficient data will be available to demonstrate an acceptable level of safety. GM2 SPA.LVO.105(f) provides guidance on how relevant data could be obtained.

Points (c) and (d) of the new AMC2 SPA.LVO.105(f) clarify that data for the safety assessment could come from similar operations with the same aircraft or with a different aircraft type provided that the data is relevant to the approval being sought. It is thought that this might be the case where different aircraft types from the same manufacturer and with similar characteristics and equipment were being used. The existing AMC1 SPA.LVO.105 only allows this for variants within a single aircraft type which is considered to be unnecessarily restrictive.

The new GM1 SPA.LVO.105(f) 'Safety performance monitoring' provides more details and explains the requirements for safety performance monitoring referred to in AMC1 SPA.LVO.105(f). It ensures the link to the hazard identification and safety performance monitoring requirements of ORO.GEN.200(a)(3).

The data collection requirements derive from the existing requirements in AMC1 SPA.LVO.105, AMC2 SPA.LVO.105, and AMC3 SPA.LVO.105. The list of potential unacceptable safety outcomes to be considered has been developed in the context of the hazard analysis conducted as part of this RMT.

The new GM2 SPA.LVO.105(f) 'Data gathering for safety assessment prior to obtaining an approval' details and explains the objective of the safety assessment required prior to the grant of an approval as per the new AMC2 SPA.LVO.105(f). The method of conducting the risk assessment is not specified, as this should be in accordance with the risk assessment methodology adopted by the operator in accordance with ORO.GEN.200(a)(3).

The data collection requirements derive from the existing requirements in AMC1 SPA.LVO.105, AMC2 SPA.LVO.105, and AMC3 SPA.LVO.105. The number of required approaches has been transposed from the existing AMC1 SPA.LVO.105. This number of approaches is unlikely to be sufficient to conduct a statistical analysis of the data, but has been used for many years as a means of providing confidence in an operator's equipment, procedures, training, and maintenance systems. The GM highlights that some elements of this confidence could be developed from operations conducted in a flight simulation training device (FSTD). This would especially be the case where the intention was to validate novel operating procedures or training programmes.

The GM highlights the potential risks of conducting LVOs without all the required elements in place. An example of this would be conducting autoland operations without the protection of the ILS signal.



Many operators adopt operating procedures and training programmes developed by, or in conjunction with, an aircraft manufacturer. In such cases, useful data may be available from that manufacturer or from other operators using similar procedures; this data would contribute to the safety assessment. The GM suggests that such data could be shared, when appropriate.

As the AMC on 'transitional periods for CAT II and CAT III operations' is deleted (AMC4 SPA.LVO.105), guidance has been provided in point (f) about the amount of operational experience that might be required for an operator applying for LVO approval. These figures derive from expert opinion.



SPA.LVO.110 'ANS- and aerodrome-related requirements'

In the existing requirements, aerodrome provisions are addressed in SPA.LVO.115. Where appropriate, the existing requirements of SPA.LVO.110 have been transposed to AMC. The new SPA.LVO.110 states only the safety objective — that only aerodromes and instrument procedures suitable for the intended operations must be used for operations described in SPA.LVO. The details on how to implement the safety objective stated in the rule are moved to AMC level.

Since ICAO Annex 14 Standards do not yet address operations with operational credits, it cannot be assumed that aerodrome operators will have to be approved for operations with operational credits. According to the revised rule, the air operator is responsible for establishing whether a particular aerodrome could be used.

For some operations with operational credits (e.g. SA CAT I), an IAP published in the aeronautical information publication (AIP) will be required (at AMC level). However, for the majority of operations, a dedicated published IAP for operations with operational credits will be neither available nor required. These operations will use the published procedure for the standard operation, e.g. an EFVS operation with operational credits may use the CAT I IAP. In such cases, it is the responsibility of the operator to ensure that the IAP used is suitable for the intended operation.

AMC and GM to the new content of SPA.LVO.110 'ANS- and aerodrome-related requirements'

New AMC1 SPA.LVO.110 'Suitable instrument approach procedures': the requirement for operations with operational credits to be offset by no more than 2 degrees is amended to 3 degrees in accordance with the certification requirements in AMC AWO.A.EFVS.109 'EFVS performance'. Where a particular system is certificated to allow a greater offset, this will be stated in the AFM, and the AMC allows for a different offset in this case.

New AMC2 SPA.LVO.110 'Suitable aerodromes — LVTO': the requirements have been transposed from the existing AMC1 SPA.LVO.100.

New AMC3 SPA.LVO.110 'Suitable aerodromes: approach operations other than EFVS operations': the requirements have been transposed from the existing AMC3 SPA.LVO.100, AMC4 SPA.LVO.100, AMC5 SPA.LVO.100, AMC6 SPA.LVO.100, and AMC4 SPA.LVO.105. The revised runway classifications have also been implemented.

For SA CAT I operations, an ILS performing to the standards required for CAT I only will be required. It is considered that the new CS-AWO will require aircraft equipment to perform to an acceptable standard using such an ILS; the aircraft original equipment manufacturer (OEM) should carry out an assessment on the interface between the aircraft navigation system and the worst-case ILS performance (defined in ICAO Annex 10) in terms of localiser (LOC) deviation and glide path deviation and the outcome of this activity should be captured in the AFM; based on the ILS facility performance that should be made available to air operators by the aerodrome operators, the air operator should then assess if the ILS classification and performance of the intended runway was compatible with the AFM prior to conducting SA CAT I operations.

The new CS-AWO will not require IAPs to be promulgated as suitable for EFVS, so it will be the responsibility of the air operator to verify that a particular procedure is suitable (AMC5 SPA.LVO.110 enhances this requirement).



LTS and OTS CAT II have been removed from the new rules. However, the new rule introduces a similar concept, SA CAT I and SA CAT II. Point (d) of AMC3 SPA.LVO.110 has been transposed from the previous AMC4 SPA.LVO.100 (point (a)(1)).

For SA CAT I, the integrity level is as demonstrated during the certification process. A minimum of integrity level of 2 is recommended for LVOs noted in 2.14 of Attachment C to ICAO Annex 10.

According to the existing AMC6 SPA.LVO.105, an operator should verify each aircraft type/runway combination by the successful completion of at least one approach and landing in CAT II or better conditions, prior to commencing CAT III operations. Where a runway is promulgated as suitable for CAT III operations, this is considered unnecessary and the requirement has been removed. There is also a requirement that, for runways with irregular pre-threshold terrain or other foreseeable or known deficiencies, each aircraft type/runway combination should be verified by operations in CAT I or better conditions, prior to commencing SA CAT I, SA CAT II or CAT III operations. The pre-threshold terrain could affect the performance of autoland systems. The intent of this requirement was to verify satisfactory autoland performance. The requirement has been amended in point (g) to clarify that the requirement relates to autoland performance, rather than to a specific classification of operation.

With regard to point (c)(2), the new text has been added considering the following rationale: the aircraft OEM should carry out an assessment on the interface between the aircraft navigation system and the worst-case ILS performance (defined in ICAO Annex 10) in terms of LOC deviation and glide path deviation and the outcome of this activity should be captured in the AFM; based on the ILS facility performance that should be made available to air operators by the aerodrome operators, the air operator should then assess if the ILS classification and performance of the intended runway was compatible with the AFM prior to conducting SA CAT I operations.

On the requirement related to the ILS certification, the change from OTS CAT II to SA CAT II did not involve significant differences. OTS CAT II requirements were developed when II/D/2 was typically used for regular CAT II. Later on, ICAO Annex 10, Vol I was published with the indication that the ILS should typically be II/D/3 (in Attachment C to the Annex, paragraph 2.14.2): '2) Level 3 is the performance objective for ILS equipment used to support operations which place a high degree of reliance on ILS guidance for positioning through touchdown. This level is a required objective for equipment supporting Category II and IIIA operations'. Level 2 is nowadays intended to support CAT I requirements. Since the ILS information (through HUD or autoland) is used to compensate for lack of visual references, it could be argued that the SA CAT II ILS should indeed meet at least the same criteria as for regular CAT II. Therefore the ILS classification for SA CAT II is proposed to be II/D/3.

The new AMC4 SPA.LVO.110 'Low-visibility procedures' enables operators to develop procedures to facilitate LVOs at airports not approved for CAT II/III operations provided that LVPs or equivalent procedures are established. This is intended to facilitate operations with operational credits (e.g. EFVS) in an RVR below 550 m to airports that do not have the usual infrastructure for LVOs. The requirement for LVPs to be established for take-off in an RVR of less than 550 m is moved from AMC1 SPA.LVO.100 to CAT.OP.MPA.110, as this applies to all operators, not only those holding approval for LVTO.

New AMC5 SPA.LVO.110 'Verifying the suitability of runways for EFVS operations': the requirements for verifying the suitability of runways for EFVS operations have been developed based on existing rules and equivalent FAA requirements. It has been assumed that there is a higher probability of baulked



landing during EFVS operations than during standard operations and that obstacle clearance should therefore be provided in the event of a go-around initiated at any point until touchdown.

The new GM1 SPA.LVO.110 'ILS classification' has been transposed from GM2 SPA.LVO.100.

The new GM2 SPA.LVO.110 'Suitable aerodromes — instrument approach procedures for SA CAT I and SA CAT II' details the requirements for instrument approach operations using operational credits.

The new GM3 SPA.LVO.110 'Verification of the suitability of runways for EFVS operations' is added to detail the requirements for verification of the suitability of approach procedures for EFVS operations using operational credits.

SPA.LVO.115 'Aerodrome related requirements' is deleted.

SPA.LVO.120 'Flight crew competence'

The title of SPA.LVO.120 has been changed from 'Flight crew training and qualifications' to 'Flight crew competence'.

The proposed requirement describes the safety objectives and the responsibilities of the operator in relation to flight crew competence, training and checking, and record-keeping. In this regard, it should be noted that it is planned to move the initial and recurrent training, testing and checking requirements for LVOs from Part-FCL to Part-SPA so that it is clear that the training is the responsibility of the aircraft operator.

AMC and GM to the new content of SPA.LVO.120 'Flight crew competence'

The existing *AMC1 SPA.LVO.120 'General provisions'* is deleted so that the training and checking requirements for LVOs can be presented more clearly. The proposal is to have separate AMC for take-off and approach operations and to have separate AMC for initial and recurrent training.

GM1 SPA.LVO.120 'Flight crew training' is proposed to be deleted.

New AMC1 SPA.LVO.120(a) 'Experience in type or class or as pilot-in-command': The existing AMC determines a minimum time/sectors on type before commencing CAT II/CAT III operations. The experts involved in the RMT concluded that the relevant minimum experience is difficult to establish, as it depends on many factors. These minimum experience requirements exposed the unexperienced crew to an increased probability of performing a go-around and diversion which could result in a lower level of safety. The requirement is amended to make the operator responsible for determining this minimum level of experience and establish the appropriate mitigation measures. The figures have been transposed to GM1 SPA.LVO.120(a).

New AMC2 SPA.LVO.120(a) 'Recent experience requirements for EFVS operations' and *AMC3 SPA.LVO.120(a) 'Recent experience requirements for SA CAT I, CAT II, SA CAT II and CAT III approach operations'*: these new AMC have been developed to clarify that the approaches required by the existing AMC1 SPA.LVO.120 do not need to be conducted under a training with a qualified instructor but may be conducted in 'line operations'. For clarity, these approaches are to be referred to as 'recent experience'. Approaches conducted in an FSTD and/or during a proficiency check will count towards this recent experience requirement.

The current recurrent training requirement for pilots using autoland for LVOs is a minimum of two approaches, one of which may be substituted by an approach and landing in the aircraft.



The new GM1 SPA.LVO.120(a) 'Experience in type or class or as pilot-in-command/commander' has been transposed from AMC. See the explanatory note regarding AMC1 SPA.LVO.120(a).

New AMC1 SPA.LVO.120(b) 'Initial training for LVTO in an RVR less than 400 m': prior to being authorised to conduct take-offs in RVRs below 400 m, the flight crew should complete training to cover system failures and engine failures resulting in continued as well as rejected take-offs. This AMC transposes the initial training requirements for LVTO operations from AMC1 SPA.LVO.120. The ground training course requirements have been amended to include only those parts relevant to LVTO. Pilots who have not previously been authorised to conduct LVTO with an EU operator are required to complete a check. This transposes the requirements of Section 6 of the line proficiency check (LPC) detailed in Appendix 9 to Part-FCL.

The new AMC2 SPA.LVO.120(b) 'Initial training and checking for SA CAT I, CAT II, SA CAT II and CAT III approach operations' transposes the initial training requirements for SA CAT I, CAT II, SA CAT II and CAT III operations from the existing AMC1 SPA.LVO.120. Pilots who have not previously been authorised to conduct low-visibility approach operations with an EU operator are required to complete a check. This transposes the requirements of Section 6 of the LPC detailed in Appendix 9 to Part-FCL.

The number of approaches required during the abbreviated FSTD training for pilots previously authorised for AWOs have not been changed, but the actual number has been included in this AMC for clarity.

The existing requirements state that pilots previously qualified for LVOs may complete an abbreviated ground school programme depending on their previous training and experience. This is now amended to clarify that it is the flight crew members' existing knowledge that should determine the content of the ground school training.

The existing requirements state that flight crew should complete a check before conducting CAT II/III operations but allowed that the check could be replaced by successful completion of training. (FCL.605(b)) of Regulation (EU) No 1178/2011¹³ (hereinafter referred to as the 'Aircrew Regulation') currently requires completion of training at an ATO and a check before being authorised for DHs below 60 m. As it is proposed that this requirement should be removed from the Aircrew Regulation, the proposed AMC2 SPA.LVO.120(b) will require pilots who have not previously been qualified for low-visibility approach operations with an EU operator to complete the check.

New AMC3 SPA.LVO.120(b) 'Initial training and checking for EFVS operations': operators should ensure that flight crew members complete the conversion training mentioned in this AMC before being authorised to conduct EFVS operations. There are prescribed elements of the ground training, as well as a course of FSTD training and/or flight training in two phases. This AMC transposes the initial training requirements for EFVS operations from the existing AMC1 SPA.LVO.120. As EFVS operations under Part-SPA may include LVOs, the ground training includes the requirements for LVOs.

¹³ Commission Regulation (EU) No 1178/2011 of 3 November 2011 laying down technical requirements and administrative procedures related to civil aviation aircrew pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (OJ L 311, 25.11.2011, p. 1) (<http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1494247473340&uri=CELEX:32011R1178>).



There is no additional credit against line flying under supervision (LIFUS) for training conducted in a level 'D' full-flight simulator (FFS), as there is currently no enhanced fidelity requirement for EFVSs in level 'D' simulators.

Flight crew members will be required to complete FSTD training in each operating capacity in which they will be authorised to operate, i.e. completing FSTD training as pilot monitoring will not qualify the pilot to act as pilot flying.

A reference to operational suitability data (OSD) has been added to ensure that operators can take advantage of any available credits.

New AMC4 SPA.LVO.120(b) 'Recurrent checking for LVTO, SA CAT I, CAT II, SA CAT II AND CAT III approach operations': the recurrent training requirements for SA CAT I, CAT II, SA CAT II and CAT III approach operations have been transposed for the existing AMC1 SPA.LVO.120. This AMC does not include recurrent training requirements for EFVS operations.

The current recurrent training requirement for pilots using autoland for LVOs is a minimum of two approaches, one of which may be substituted by an approach and landing in the aircraft. A missed approach is also required. The revised requirement is for at least one approach to be completed during the proficiency check but the recent experience requirement (two approaches) must also be satisfied.

New AMC5 SPA.LVO.120(b) 'Differences training for LVTO, SA CAT I, CAT II, SA CAT II and CAT III approach operations': the differences training requirements for SA CAT I, CAT II, SA CAT II AND CAT III approach operations have been transposed from the existing AMC1 SPA.LVO.120.

The new AMC6 SPA.LVO.120(b) 'Recurrent checking for EFVS operations' describes the recurrent checking requirements for EFVS operations. These have been transposed from the existing AMC1 SPA.LVO.120.

It should be noted that the recent experience and checking requirements are not the same as those adopted by the FAA. The FAA mandates recent experience of six approaches using EFVS every six months. It is considered to be valuable to have exposure to EFVS operations in a training environment, ideally in an FSTD, in order to be able to practise go-around procedures and use of the EFVS in restricted visibility. The intention is that the completion of a 'check' will mitigate any skill fade resulting from the lower rate of exposure compared to the FAA system, because pilots will be required to demonstrate their competence to perform EFVS operations.

Pilots will be required to meet the recent experience and recurrent checking requirements in each operating capacity that they are authorised to operate (pilot flying or pilot monitoring).

New AMC7 SPA.LVO.120(b) 'Differences training for EFVS operations': the differences training requirements for EFVS operations have been transposed from the existing AMC1 SPA.LVO.120. A reference to OSD has been included to ensure that operators can take advantage of available credits.

The new GM1 SPA.LVO.120(b) 'Flight crew training' clarifies that the number of approaches required in initial and recurrent training are not cumulative, but where techniques are the same, the training may cover all classifications of operations and operations with operational credits using those techniques. It also specifies that the recent experience requirements may be substituted by approaches flown in an FSTD. This GM also includes a summary table with the number of approaches and landings to be completed in various conditions — described in the preceding AMC.



The new GM3 SPA.LVO.120(b) 'Flight crew training' provides further details about the ground training course in AMC2 SPA.LVO.120(b) points (a)(1)(i) and (iv). This GM was transposed from AMC1 FCL.725 point (f) that is now deleted from Part-FCL of the Aircrew Regulation.

The current requirements **SPA.LVO.125 and SPA.LVO.130** have been deleted. Their content is incorporated in the revised rules.

2.1.6. Annex VI 'Non-commercial operations with complex motor-powered aircraft' (Part-NCC) and related AMC & GM

NCC.OP.101 'Altimeter check and settings'

This new rule is introduced to ensure consistency with Part-CAT; this issue is not yet covered in the Air OPS Regulation or the SERA Regulation; as proper settings are essential for IFR operations, they should be properly covered by regulations; since they are not specific to LVOs or to CAT, the same text is repeated in the GMs to all applicable Annexes (Part-CAT, Part-NCC, Part-NCO and Part-SPO) with the reference to ICAO Doc 8168 (PANS-OPS), Volume I: 3.2 'Pre-flight operational test'; 3.3 'Take-off and climb'; 3.5 'Approach and landing'.

The new GM1 NCC.OP.101 'Altimeter setting procedures' provides relevant references from ICAO PANS-OPS, which an operator should use when establishing its operating procedures.

NCC.OP.110 'Aerodrome operating minima — general'

This requirement is aligned with CAT.OP.MPA.110 in a proportionate manner.

AMC and GM to NCC.OP.110 'Aerodrome operating minima — general'

For all related AMC and GM: for aeroplanes, the text is amended for consistency with the changes to the related AMC and GM to CAT.OP.MPA.110; the parts related to helicopters are not presented in the existing rules and will be presented in AWO NPA Phase 2.

AMC3 NCC.OP.110 'Aerodrome operating minima — general / Take-off operations' has editorial changes and a new provision for the calculation of the 'required RVR' for aeroplanes. The new provision provides clearer requirements depending on the aeroplane used.

Helicopter operations will be dealt with in Phase 2 of the AWO project.

The content of the existing AMC4 NCC.OP.110 'NPA, APV, CAT I operations — criteria for establishing RVR/CMV' is moved to the new GM7 NCC.OP.110.

The new AMC4 NCC.OP.110 'Determination of DH/MDH for instrument approach operations' combines and amends the content of the existing AMC4 ('Criteria for establishing RVR/CMV') and AMC5 ('Determination of RVR/CMV/VIS minima for NPA, APV, CAT I — aeroplanes'); parts of the old content of AMC4 and AMC5 are moved to GM.

The fully revised AMC5 NCC.OP.110 'Determination of RVR or VIS for instrument approach operations — aeroplanes' combines and amends the content of the former AMC4 NCC.OP.110 ('Criteria for establishing RVR/CMV') and AMC5 NCC.OP.110 ('Determination of RVR/CMV/VIS minima for NPA, APV, CAT I — aeroplanes'); parts of the old content of AMC4 and AMC5 have been moved to GM. The AMC also now provides for the applicable RVR to be determined depending on the type of runway used, i.e. where a precision approach is flown to a non-precision runway or an instrument approach to a non-

instrument runway. The lowest applicable RVR may be limited by either the type of runway, the DH/MDH and the class of lighting or the ground facilities and the type of approach, so the AMC specifies that the RVR to be used should be not less than the greatest of these three as determined by the applicable tables. The content of the AMC is identical to the requirements for CAT operators (AMC5 CAT.OP.MPA.110).

NCC.OP.111 'Aerodrome operating minima — NPA, APV, CAT I operations'

This IR is proposed to be deleted. Its content is incorporated into the new AMC4 NCC.OP.110. For additional explanations, please see the relevant paragraphs.

NCC.OP.112 'Aerodrome operating minima — circling approach operations with aeroplanes'

The terms 'circling' and 'circling approach operations' are defined in Annex I 'Definitions'. The rule text is slightly modified to ensure consistency with the new terminology. Moreover, incorrect references to 'procedures' are corrected with references to 'operations'. The editorial error in (b)(2) is corrected and the requirement to take into account the minimum RVR for the preceding approach procedure is removed, as this will always be less than the visibility prescribed for circling.

GM to NCC.OP.112 'Aerodrome operating minima — circling operations with aeroplanes'

The existing GM1 NCC.OP.112 'Supplemental information' has been updated to change 'visibility' with 'VIS' and to remove the references to the instrument approach track being determined by means of radio navigation aids (see also AMC7 CAT.OP.MPA.110).

NCC.OP.115 'Departure and approach procedures'

No change

AMC and GM to NCC.OP.115 'Departure and approach procedures'

The new AMC1 NCC.OP.115(c) 'Approach flight technique — aeroplanes' states that all approach operations should be flown as stabilised approach operations and the CDFA technique should be used for NPA procedures. This AMC has been developed to highlight the importance of the stabilised approach and the appropriate technique that should be used when flying a non-precision approach.

NCC.OP.195 'Take-off conditions'

This requirement is aligned with CAT.OP.MPA.265, the only difference being the use of the term 'pilot-in-command' instead of 'commander'.

NCC.OP.225 'Approach and landing conditions'

The content of this rule is fully changed. The requirement is redrafted in alignment with CAT.OP.MPA.300, the only difference being the use of the term 'pilot-in-command' instead of 'commander'.

NCC.OP.230 'Commencement and continuation of approach'

This requirement is aligned with CAT.OP.MPA.305, the only difference being the use of the term 'pilot-in-command' instead of 'commander'.



AMC and GM to NCC.OP.230 'Commencement and continuation of approach'

AMC1 NCC.OP.230 'RVR minima for continued approach: the subtitle of this AMC is changed. The existing content of point (a) is transferred to the new AMC1 NCC.OP.230(b) and the existing points (b), (c) and (d) are transferred to the AMC to SPA.LVO.105(c).

With the criteria for the 'controlling' RVR being simplified, the experts of RMT.0379 considered that the intention of the 'approach ban' is to prevent the situation where a pilot arrives at a DH with insufficient visibility to adequately control the aircraft for landing and thus to reduce the rate of missed approaches from the DH. The intention is to mitigate the risk of loss of control during the roll-out after landing. The only RVR relevant to the 'approach ban' should therefore be the TDZ. Where this is not available, the MID may be used as this is the value most likely to be representative of TDZ.

With this amendment, a previously complex requirement is now simplified; this should increase the probability of the requirement being clearly understood and applied consistently.

The new GM1 NCC.OP.230 'Application of RVR or VIS reports' has been introduced to clarify that there is no prohibition on the commencement of an approach based on the reported RVR or visibility. The text of this GM is aligned with CAT.OP.MPA.305, which states in point (a) that a pilot may commence an approach regardless of the reported RVR or visibility. The experts of RMT.0379 considered that text was not appropriate at IR level as pilots do not require a specific enabling rule to transition from one phase of flight to the next; nevertheless, it was considered important to clarify that in a GM. A similar new GM has been introduced also to CAT.OP.MPA.305.

The new AMC1 NCC.OP.230(a) 'Approaches with no intention to land' deals with the situation where approaches are being flown for training purposes with the intention of executing a missed approach. In this situation, there is no need for the approach to be discontinued at 1 000 ft. This clarifies that the prohibition on continuing into the final approach segment is not applicable in this case.

The new AMC1 NCC.OP.230(b) 'Visual references for instrument approach operations': visual reference requirements at DH are transferred from the existing AMC1 NCC.OP.230 point (a), but remain unchanged.

NCC.OP.235 'EFVS 200 operations'

Please see the explanations provided above to CAT.OP.MPA.312 and NCC.OP.235, in 3.2.4 'Annex IV Commercial air transport operations (Part-CAT)'.

2.1.7. Annex VII 'Non-commercial operations with other-than complex motor-powered aircraft' (Part-NCO) and related AMC & GM

The NPA proposing amendments to Part-NCO and to helicopters will be published at a later stage. The changes to Part-NCO will be made taking into account the proportionality principle towards the more complex Part-CAT or Part-NCC operations. Consequently, the IRs in Part-NCO will be more prescriptive than for CAT operations, including detailed technical aspects.

2.1.8. Annex VIII 'Specialised operations' (Part-SPO) and related AMC & GM

Part-SPO is still in development; the requirements should mirror the relevant requirements under Subpart B 'Operational procedures' of Part-NCO; the outcome will be published in the same package with the proposed amendments to helicopter operations in all Annexes and to Part-NCO.



2.1.9. Helicopter issues in Annexes IV (Part-CAT) – VIII (Part-SPO) and related AMC & GM

Helicopter AWO-related matters, taking into account all the specificities of the helicopters' design, equipment and operations, will be addressed in the AWO NPA Phase 2, together with General-Aviation-related matters (Part-NCO). The proposed draft changes to the Air OPS IRs and of the associated AMC & GM applicable exclusively to helicopters are excluded from the Chapter 3 content (reference to the titles provided only for informative purposes for the readers' convenience and marked accordingly).

2.2. Proposed changes to AMC/GM to Regulation (EU) No 1178/2011 (Draft EASA decision) – presented together with the proposed amendments to the IRs

General

All the requirements related to training, testing and checking with regard to LVOs are now transferred to Annex V (Part-SPA) to the Air OPS Regulation and the related AMC/GM. Consequently, all the requirements on LVO training, testing and checking contained so far in Annex I (Part-FCL) to the Aircrew Regulation are deleted.

FCL.605 'IR – Privileges'

FCL.605(b) is deleted. As a consequence, privileges for DHs lower than 200 ft (as set out in FCL.605 (a)) as well as for acting as pilot during operations in accordance with Annex V (Part-SPA) Subpart E to the Air OPS Regulation can only be obtained in accordance with the Air OPS Regulation. In addition, such privileges shall be recorded by the operator in accordance with SPA.LVO.115(c). AWO privileges will not be endorsed on the Part-FCL licence.

Appendix 9 'Training, skill test and proficiency check for MPL, ATPL, type and class ratings, and proficiency check for IRs'

The following parts of Appendix 9 to Part-FCL are amended in such a way that the content related to LVOs (CAT II/III operations) of the following sections is deleted:

- Section B (aeroplanes): paragraph 2 (last two sentences);
- Section B (aeroplanes): Section 6 of the skill test programme (CAT II/III exercises);
- Section D (powered-lift aircraft): Section 6 of the skill test programme (CAT II/III exercises); and
- Section E (airships): Section 6 of the skill test programme (CAT II/III exercises).

3. Proposed draft changes to the AWO-related soft law

The main objective of this NPA is to present the newly developed proposals for changes of soft law regulatory material relevant for the AWO content.

For completeness purposes and in order to facilitate the review of the text, a consolidated regulatory text, as applicable, is provided, presenting both the 'hard' and the 'soft' law elements.

Note: In cases where both the hard law and the soft law are affected by the intended change, both are presented; if only either the relevant hard law' or soft law is affected by the intended change, only the proposed change is presented with the note, indicating specifically the intended change (e.g. no changes to the relevant hard law).

The following convention has been applied when drafting the proposed amendments of the regulatory text presented in this Chapter. The text of the amendment is arranged to show deleted text, new or amended text, and unchanged text, as shown below:

- deleted text is marked with ~~strike through~~;
- new or amended text is highlighted in grey;
- an ellipsis '[...]' indicates that the remaining the text is unchanged in front of or following the reflected amendment; and
- the unchanged text is presented in a typical way as non-highlighted or with ~~strike through~~ (when it is found beneficial for the completeness of the meaning of the changed text).



3.1. Proposed changes — air operations

Article 5 Air operations

[...]

2. Operators shall comply with the relevant provisions of Annex V when operating:

- (a) aeroplanes and helicopters used for:
 - (i) operations using performance-based navigation (PBN);
 - (ii) operations in accordance with minimum navigation performance specifications (MNPS);
 - (iii) operations in airspace with reduced vertical separation minima (RVSM);
 - (iv) low-visibility operations (LVOs) and operations with operational credits.

[...]

Annex I Definitions for terms used in Annexes II to VIII

[...]

‘aerodrome operating minima’ means the limits of usability of an aerodrome for:

- (a) take-off operations, expressed in terms of visibility and/or runway visual range (RVR) and, if necessary, cloud conditions;
- (b) two-dimensional (2D) instrument approach operations or circling approach operations, expressed in terms of visibility and/or RVR, minimum descent altitude/height (MDA/H) and, if necessary, cloud conditions; and
- (c) three-dimensional (3D) instrument approach operations, expressed in terms of visibility and/or RVR and decision altitude/height (DA/H);

~~‘approach procedure with vertical guidance (APV) operation’ means an instrument approach which utilises lateral and vertical guidance, but does not meet the requirements established for precision approach and landing operations, with a decision height (DH) not lower than 250 ft and a runway visual range (RVR) of not less than 600 m;~~

~~(13) ‘category I (CAT I) approach operation’ means a precision instrument approach and landing using an instrument landing system (ILS), microwave landing system (MLS), GLS (ground-based augmented global navigation satellite system (GNSS/GBAS) landing system), precision approach radar (PAR) or GNSS using a satellite-based augmentation system (SBAS) with a decision height (DH) not lower than 200 ft and with a runway visual range (RVR) not less than 550 m for aeroplanes and 500 m for helicopters;~~

~~(14) ‘category II (CAT II) operation’ means a precision instrument approach and landing operation using ILS or MLS with:~~

- ~~(a) DH below 200 ft but not lower than 100 ft; and~~
- ~~(b) RVR of not less than 300 m;~~

~~(15) ‘category IIIA (CAT IIIA) operation’ means a precision instrument approach and landing operation using ILS or MLS with:~~

~~(a) — DH lower than 100 ft; and~~

~~(b) — RVR not less than 200 m;~~

~~(16) ‘category IIIB (CAT IIIB) operation’ means a precision instrument approach and landing operation using ILS or MLS with:~~

~~(a) — DH lower than 100 ft, or no DH; and~~

~~(b) — RVR lower than 200 m but not less than 75 m;~~

[...]

~~(20) ‘circling’ means the visual phase of an instrument approach to bring an aircraft into position for landing on a runway/FATO that is not suitably located for a straight-in approach;~~

‘circling’ means the visual phase of a circling approach operation;

‘circling approach operation’ means an approach operation to bring an aircraft into position for landing on a runway/final approach and take-off area (FATO) that is not suitably located for a straight-in approach. Circling is a Type A instrument approach operation;

‘continuous descent final approach (CDFA)’ means a technique, consistent with stabilised approach procedures, for flying the final-approach segment (FAS) of a non-precision approach (NPA) procedure as a continuous descent, without level-off, from an altitude/height at or above the final approach fix altitude/height to a point approximately 15 m (50 ft) above the landing runway threshold or the point where the flare manoeuvre shall begin for the type of aircraft flown; for the FAS of an NPA procedure followed by a circling, the CDFA technique applies until circling minima (circling obstacle clearance altitude/height (OCA/H)) or visual flight manoeuvre altitude/height are reached;

‘decision altitude (DA) or decision height (DH)’ means a specified altitude or height in a 3D instrument approach operation at which a missed approach procedure must be initiated if the required visual reference to continue the approach has not been established;

~~(47) ‘enhanced vision system (EVS)’ means a system to display electronic real time images of the external scene achieved through the use of imaging sensors;~~

‘enhanced flight vision system (EFVS)’ is an electronic means to provide the flight crew with a real-time sensor-derived or enhanced display of the external scene topography (the natural or man-made features of a place or region especially in a way to show their relative positions and elevation) through the use of imaging sensors; an EFVS is integrated with a flight guidance system and is implemented on a head-up display or an equivalent display system; if an EFVS is certificated according to the applicable airworthiness requirements and an operator holds the necessary specific approval, then EFVS may be used for EFVS operations and may allow operations with operational credits.

‘EFVS operation’ means an operation in which visibility conditions require an EFVS to be used in lieu of natural vision in order to perform an approach or landing, identify the required visual references or conduct a roll-out.

‘EFVS 200 operation’ means an operation in which visibility conditions require an EFVS to be used instead of natural vision in order to continue an approach to 200 ft above the runway threshold in other than low-visibility operations (LVOs).

'final approach segment (FAS)' means that segment of an instrument approach procedure (IAP) in which alignment and descent for landing are accomplished;

'go-around' means a transition from an approach operation to a stabilised climb. This includes manoeuvres conducted at or above the MDA/H or DA/H, or below the DA/H (balked landings);

~~(55) 'head-up display (HUD)' means a display system which presents flight information to the pilot's forward external field of view and which does not significantly restrict the external view;~~

~~(56) 'head-up guidance landing system (HUDLS)' means the total airborne system that provides head-up guidance to the pilot during the approach and landing and/or missed approach procedure. It includes all sensors, computers, power supplies, indications and controls;~~

'head-up display landing system (HUDLS)' means the total airborne system which provides head-up guidance to the pilot to enable the pilot to either control the aircraft or to monitor the autopilot during take-off (if applicable), approach and landing (and roll-out if applicable), or go-around. It includes all the sensors, computers, power supplies, indications and controls;

'instrument approach operation' means an approach and landing using instruments for navigation guidance based on an IAP. There are two methods for conducting instrument approach operations:

- (a) 2D instrument approach operation, using lateral navigation guidance only; and
- (b) 3D instrument approach operation, using both lateral and vertical navigation guidance;

'instrument approach procedure (IAP)' means a series of predetermined manoeuvres by reference to flight instruments with specified protection from obstacles from the initial approach fix or, where applicable, from the beginning of a defined arrival route to a point from which a landing can be completed and thereafter, if a landing is not completed, to a position at which holding or en-route obstacle clearance criteria apply. IAPs are classified as follows:

- (a) non-precision approach (NPA) procedure, which means an IAP designed for 2D instrument approach operations Type A;
- (b) approach procedure with vertical guidance (APV) means a performance-based navigation (PBN) IAP designed for 3D instrument approach operations Type A;
- (c) precision approach (PA) procedure means an IAP based on navigation systems designed for 3D instrument approach operations Type A or B;

~~(74) 'low visibility procedures (LVP)' means procedures applied at an aerodrome for the purpose of ensuring safe operations during lower than standard category I, other than standard category II, category II and III approaches and low visibility take-offs;~~

~~(76) 'lower than standard category I (LTS-CAT I) operation' means a category I instrument approach and landing operation using category I DH, with an RVR lower than would normally be associated with the applicable DH but not lower than 400 m;~~

'low-visibility operations (LVOs)' means approach or take-off operations on a runway with any RVR less than 550 m or taxiing at an aerodrome at which any RVR is less than 550 m;

'low-visibility take-off (LVTO)' means a take-off with an RVR lower than 400 m but not less than 75 m; less than 550 m;

'minimum descent altitude (MDA) or minimum descent height (MDH)' means a specified altitude or height in a 2D instrument approach operation or circling approach operation below which descent must not be made without the required visual reference;

~~(83) 'non-precision approach (NPA) operation' means an instrument approach with a minimum descent height (MDH), or DH when flying a CDF/A technique, not lower than 250 ft and an RVR/CMV of not less than 750 m for aeroplanes and 600 m for helicopters;~~

'obstacle clearance altitude (OCA) or obstacle clearance height (OCH)' means the lowest altitude or the lowest height above the elevation of the relevant runway threshold or the aerodrome elevation, as applicable, used in establishing compliance with the appropriate obstacle clearance criteria;

'operation with operational credits' means an operation using specific aircraft or ground equipment, or a combination of aircraft and ground equipment, such that:

- (a) lower-than-standard aerodrome operating minima can be applied for a particular classification of operation; or
- (b) visibility requirements can be satisfied or reduced; or
- (c) fewer ground facilities are required.

~~(92) 'other than standard category II (OTS CAT II) operation' means a precision instrument approach and landing operation using ILS or MLS where some or all of the elements of the precision approach category II light system are not available, and with:~~

- ~~(a) DH below 200 ft but not lower than 100 ft; and~~
- ~~(b) RVR of not less than 350 m;~~

'Type A instrument approach operation' means an operation with an MDA/H or a DA/H at or above 250 ft;

'Type B instrument approach operation' means an operation with a minimum DA/H below 250 ft. Type B instrument approach operations are categorised as:

- (a) Category I (CAT I): a DA/H not lower than 200 ft and with either a visibility not less than 800 m or an RVR not less than 550 m;
- (b) Category II (CAT II): a DH lower than 200 ft but not lower than 100 ft, and an RVR not less than 300 m;
- (c) Category III (CAT III): a DH lower than 100 ft or no DH, and an RVR less than 300 m or no RVR limitation;'

'visibility' means visibility for aeronautical purposes, which is the greater of:

- (a) the greatest distance at which a black object of suitable dimensions, situated near the ground, can be seen and recognised when observed against a bright background; and
- (b) the greatest distance at which lights in the vicinity of 1 000 candelas can be seen and identified against an unlit background;

'visual approach operation' means an approach operation when either part or all parts of an instrument approach procedure IAP is (are) not completed and the approach operation is executed with visual reference to the terrain;

'weather-permissible aerodrome' means an adequate aerodrome where, for the anticipated time of use, weather meteorological reports, or forecasts, or any combination thereof, indicate that the weather meteorological conditions will be at or above the required aerodrome operating minima, and the runway surface condition reports indicate that a safe landing will be possible.

GM2 Annex I Definitions

ABBREVIATIONS AND ACRONYMS

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

(...)

OFZ obstacle free zone

(...)

PVD paravisual display

(...)

SVS synthetic vision system

(...)

TDZE touchdown zone elevation

(...)

VSS visual segment surface

(...)

GM16 Annex I Definitions

DEFINITIONS USED FOR ALL-WEATHER OPERATIONS

For the purpose of AMC and GM to this Regulation, the following definitions should apply:

'EFVS-Approach (EFVS-A)' is a system that has been demonstrated to meet the criteria to be used for approach operations from a DA/H or an MDA to 30 m (100 ft) touchdown zone elevation (TDZE) whilst 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 above 30 m (100 ft) TDZE, in the event of an EFVS failure; and
- (b) descent below 30 m (100 ft) above the TDZE through to touchdown and roll-out should be conducted using natural vision in order that any failure of the EFVS does not prevent the pilot from completing the approach and landing.

'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.

'enhanced vision system (EVS)' is an electronic means to provide the flight crew with a real-time sensor-derived and enhanced image of the external scene topography (the natural or man-made features of a place or region especially in a way to show their relative positions and elevation) through the use of imaging sensors. An EVS that is not an EFVS cannot be used for EFVS operations and therefore does not attract an operational credit.

'head-up display (HUD) or equivalent display system' means 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.

GM17 to Annex I Definitions

ENHANCED VISION SYSTEMS (EVSs)

(a) Introduction to EVS

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) EVS and EFVS

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 certificated 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, EVS may be useful for the following during operations at night or in reduced visibility:

- (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 EVS

EVS is 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 the 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 to 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 EVS

EVSs may be used in all phases of flight and have significant potential to enhance pilot's situational awareness. No specific approval is required for the use of 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, also to evaluate the risks associated with system limitations and implement suitable mitigations 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 required visual reference in any phase of flight including take-off, approach or landing.

GM18 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, self-contained navigation aids or a combination of them.
- (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.
- (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, July 2016.

GM 19 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 device 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.

GM 20 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 2 m (7 ft) below the aerodrome elevation. An MDH for a circling approach is referenced to the aerodrome elevation.
- (b) 'Required visual reference' means 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.
- (c) For convenience, when both expressions are used, they may be written in the form 'minimum descent altitude/height' and abbreviated 'MDA/H'.

APPENDIX J							
Performance-Based Approach Classification Summary							
Domain	Document	ICAO Panel	Operations				
Approach Operations	Annex 6	FLTOSP	Classification	Type A	Type B		
				(>=250')	(200<=DA/H<250')	(<200')	
Approach Minima Runway Requirements	Annex 14	ADOP	MDA/H or DA/H >= VCM M(DA/H) >=250' Visibility >=1 000 m DA/H >= 200' RVR >=550 m DA/H >=100' RVR >=300 m DA/H >=0' RVR >= 0 m	2D or 3D	3D	3D	
				MDA/H or DA/H	DA/H	DA/H	
				Non-instrument RWY			
				Non-precision RWY			
				Precision RWY, Category I			
				Precision RWY, Category II			
				Precision RWY, Category III (A, B, C)			
System Performance Procedures	Annex 10, PANS-OPS, Volume II, PBN Manual	NSP IFPP PBNSG	VOR, NDB, LOC and LDA w/ GS				ILS, MLS, GBAS
			PBN (including SBAS), ILS, MLS, GBAS				



Annex II
Authority requirements for air operations
(Part-ARO)

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 requirement 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) made the relevant assessments as to which runways are eligible for the LVOs to be conducted; and
- (g) established and conducted the relevant risk assessment and monitoring programmes.

Appendix II is replaced by the following:

‘APPENDIX II

OPERATIONS SPECIFICATIONS (subject to the approved conditions in the operations manual)			
Issuing Authority Contact Details Telephone ⁽¹⁾ : _____; Fax: _____; Email: _____			
AOC ⁽²⁾ :	Operator Name ⁽³⁾ :	Date ⁽⁴⁾ :	Signature:
Dba Trading Name			
Operations specifications #:			
Aircraft model ⁽⁵⁾ :			
Registration marks ⁽⁶⁾ :			
Types of operations: Commercial operations air transport			
<input type="checkbox"/> Passengers	<input type="checkbox"/> Cargo	<input type="checkbox"/> Others ⁽⁷⁾ : _____	
Area of operation ⁽⁸⁾ :			



Special limitations ⁽⁹⁾ :				
Specific approvals:	Yes	No	Specification ⁽¹⁰⁾	Remarks
Dangerous goods:	<input type="checkbox"/>	<input type="checkbox"/>		
Low-visibility operations			CAT ⁽¹¹⁾	
Take-off	<input type="checkbox"/>	<input type="checkbox"/>	RVR ⁽¹¹²⁾ : m	
Approach and landing	<input type="checkbox"/>	<input type="checkbox"/>	CAT ⁽¹²⁾ DA/H: ft, RVR: m	
Operational credits	<input type="checkbox"/>	<input type="checkbox"/>	CAT ⁽¹³⁾ DA/H: ft, RVR: m	
RVSM ⁽¹⁴³⁾ <input type="checkbox"/> N/A	<input type="checkbox"/>	<input type="checkbox"/>		
ETOPS ⁽¹⁵⁴⁾ <input type="checkbox"/> N/A	<input type="checkbox"/>	<input type="checkbox"/>	Maximum diversion time ⁽¹⁶⁵⁾ : min.	
Complex navigation specifications for PBN operations ⁽¹⁷⁶⁾	<input type="checkbox"/>	<input type="checkbox"/>		(187)
Minimum navigation performance specification	<input type="checkbox"/>	<input type="checkbox"/>		
Operations of single-engined turbine aeroplane at night or in IMC (SET-IMC)	<input type="checkbox"/>	<input type="checkbox"/>	(1918)	
Helicopter operations with the aid of night vision imaging systems	<input type="checkbox"/>	<input type="checkbox"/>		
Helicopter hoist operations	<input type="checkbox"/>	<input type="checkbox"/>		
Helicopter emergency medical service operations	<input type="checkbox"/>	<input type="checkbox"/>		
Helicopter offshore operations	<input type="checkbox"/>	<input type="checkbox"/>		
Cabin crew training ⁽²⁰¹⁹⁾	<input type="checkbox"/>	<input type="checkbox"/>		
Issue of CC attestation ⁽²¹⁰⁾	<input type="checkbox"/>	<input type="checkbox"/>		
Continuing airworthiness	<input type="checkbox"/>	<input type="checkbox"/>	(224)	
Others ⁽²³²⁾				

- (1) Telephone and fax contact details of the competent authority, including the country code. Email to be provided if available.
- (2) Insertion of associated air operator certificate (AOC) number.
- (3) Insertion of the operator's registered name and the operator's trading name, if different. Insert 'DbA' before the trading name (for 'Doing business as').
- (4) Issue date of the operations specifications (dd-mm-yyyy) and signature of the competent authority representative.
- (5) Insertion of ICAO designation of the aircraft make, model and series, or master series, if a series has been designated (e.g. Boeing-737-3K2 or Boeing-777-232).
- (6) The registration marks are listed either in the operations specifications or in the operations manual. In the latter case, the related operations specifications must make a reference to the related page in the operation manual. In case not all specific approvals apply to the aircraft model, the registration marks of the aircraft may be entered in the remark column to the related specific approval.
- (7) Other type of transportation to be specified (e.g. emergency medical service).
- (8) Listing of geographical area(s) of authorised operation (by geographical coordinates or specific routes, flight information region or national or regional boundaries).
- (9) Listing of applicable special limitations (e.g. VFR only, day only, etc.).
- (10) List in this column the most permissive criteria for each approval or the approval type (with appropriate criteria).
- ~~(11) Insertion of applicable precision approach category: LTS CAT I, CAT II, OTS CAT II, CAT IIIA, CAT IIIB or CAT IIIC. Insertion of minimum runway visual range (RVR) in meters and decision height (DH) in feet. One line is used per listed approach category.~~
- ~~(12) Insertion of approved minimum take-off RVR in metres. One line per approval may be used if different approvals are granted.~~
- ~~(13) Insertion of applicable PA category: LTS CAT I, CAT II, OTS CAT II, or CAT III IIIA, CAT IIIB or CAT IIIC. Insertion of minimum RVR in metres and DH in feet. One line is used per listed approach category.~~
- (13) Insertion of applicable operational credit: SA CAT I, SA CAT II, EFVS, EFVS 200 etc. Insertion of minimum RVR in metres and DH in feet. One line is used per listed operational credit.
- ~~(14) Not Applicable (N/A) box may be checked only if the aircraft maximum ceiling is below FL290.~~
- ~~(15) Extended range operations (ETOPS) currently applies only to two-engined aircraft. Therefore, the not applicable (N/A) box may be checked if the aircraft model has more or less than two engines.~~
- ~~(16) The threshold distance may also be listed (in NM), as well as the engine type.~~
- ~~(17) Performance-based navigation (PBN): one line is used for each complex PBN specific approval (e.g. RNP AR APCH), with appropriate limitations listed in the 'Specifications' and/or 'Remarks' columns. Procedure-specific approvals of specific RNP AR APCH procedures may be listed in the operations specifications or in the operations manual. In the latter case, the related operations specifications must have a reference to the related page in the operations manual.~~
- (18) Specify if the specific approval is limited to certain runway ends and/or aerodromes.

- (1819) Insertion of the particular airframe/engine combination.
- (1920) Approval to conduct the training course and examination to be completed by applicants for a cabin crew attestation as specified in Annex V (Part-CC) to Regulation (EU) No 1178/2011.
- (2021) Approval to issue cabin crew attestations as specified in Annex V (Part-CC) to Regulation (EU) No 1178/2011.
- (2122) The name of the person/organisation responsible for ensuring that the continuing airworthiness of the aircraft is maintained and a reference to the regulation that requires the work, i.e. Subpart G of Annex I (Part-M) to Regulation (EU) No [1321/2014](#).
- (2223) Other approvals or data may be entered here, using one line (or one multi-line block) per authorisation (e.g. short landing operations, steep approach operations, helicopter operations to/from a public interest site, helicopter operations over a hostile environment located outside a congested area, helicopter operations without a safe forced landing capability, operations with increased bank angles, maximum distance from an adequate aerodrome for two-engined aeroplanes without an ETOPS approval, aircraft used for non-commercial operations).

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Annex III
Organisation requirements for air operations
(Part-ORO)

There are no changes proposed for ORO.GEN.130 'Changes relevant to an AOC holder'.

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;

(pq) (...)

(qr) (...)

(rs) (...)

(st) (...)



Appendix I

DECLARATION
in accordance with Commission Regulation (E EC EU) No 965/2012 on Air operations
<p>Operator</p> <p>Name:</p> <p>Place in which the operator is established or residing and place from which the operations are directed:</p> <p>Name and contact details of the accountable manager:</p>
<p>Continuing airworthiness management organisation in accordance with Regulation (EC No 2042/2003(EU) 1321/2014</p> <p>Name and address of the organisation and approval reference (as per EASA Form 14)</p>
<p>Aircraft operation</p> <p>Starting date of operation/applicability date of the change:</p> <p>Type(s) of operation:</p> <p><input type="checkbox"/> Part-NCC: (specify if passenger and/or cargo)</p> <p><input type="checkbox"/> Part-SPO: (specify which type of activity)</p> <p>Type(s) of aircraft, registration(s) and main base:</p> <p>Details of approvals held (attach list of specific approvals to the declaration, if applicable)</p> <p>Details of specialised operations authorisation held (attach authorisations, if applicable)</p> <p>Name of operations with operational credits conducted (e.g. EFVS 200, SA CAT I, etc.):</p> <p>List of alternative means of compliance with references to the AMCs they replace (attach to the declaration)</p>
<p>Statements</p> <p><input type="checkbox"/> The management system documentation, including the operations manual, reflects the applicable requirements set out in Part-ORO, Part-NCC, Part-SPO and Part-SPA.</p> <p>All flights will be carried out in accordance with the procedures and instructions specified in the operations manual.</p> <p><input type="checkbox"/> All aircraft operated hold a valid certificate of airworthiness and comply with Commission Regulation (EU) No 1321/2014(EC) No 2042/2003.</p> <p><input type="checkbox"/> All flight crew members and cabin crew members, as applicable, are trained in accordance with the</p>



Annex IV Commercial air transport operations (Part-CAT)

CAT.OP.MPA.101 Altimeter check and settings

- (a) The operator shall establish procedures for altimeter checking before each departure.
- (b) The operator shall establish procedures for altimeter settings for all phases of flight. If the State of the aerodrome or the State of the airspace has prescribed a different procedure from those established by the operator, that procedure shall be taken into account by the operator.

GM1 CAT.OP.MPA.101 Altimeter check and settings

ALTIMETER SETTING PROCEDURES

The operator procedures should be aligned with the following paragraphs of ICAO Doc 8168 (PANS-OPS), Volume I:

- (a) 3.2 'Pre-flight operational test';
- (b) 3.3 'Take-off and climb';
- (c) 3.5 'Approach and landing'.

CAT.OP.MPA.107 Adequate aerodrome

The operator shall consider an aerodrome as adequate if, at the expected time of use, the aerodrome is available and equipped with necessary ancillary services such as air traffic services (ATS), sufficient lighting, communications, ~~weather~~ meteorological reporting, navigation aids and emergency services.

CAT.OP.MPA.110 Aerodrome operating minima

- ~~(a) The operator shall establish aerodrome operating minima for each departure, destination or alternate aerodrome planned to be used. These minima shall not be lower than those established for such aerodromes by the State in which the aerodrome is located, except when specifically approved by that State. Any increment specified by the competent authority shall be added to the minima.~~
- ~~(b) The use of a head-up display (HUD), head-up guidance landing system (HUDLS) or enhanced vision system (EVS) may allow operations with lower visibilities than the established aerodrome operating minima if approved in accordance with SPA.LVO.~~
- ~~(c) When establishing aerodrome operating minima, the operator shall take the following into account:

 - ~~(1) the type, performance and handling characteristics of the aircraft;~~
 - ~~(2) the composition, competence and experience of the flight crew;~~
 - ~~(3) the dimensions and characteristics of the runways/final approach and take-off areas (FATOs) that may be selected for use;~~
 - ~~(4) the adequacy and performance of the available visual and non-visual ground aids;~~
 - ~~(5) the equipment available on the aircraft for the purpose of navigation and/or control of the flight path during the take-off, the approach, the flare, the landing, rollout and the missed approach;~~~~



- ~~(6) — for the determination of obstacle clearance, the obstacles in the approach, missed approach and the climb-out areas necessary for the execution of contingency procedures;~~
- ~~(7) — the obstacle clearance altitude/height for the instrument approach procedures;~~
- ~~(8) — the means to determine and report meteorological conditions; and~~
- ~~(9) — the flight technique to be used during the final approach.~~
- ~~(d) — The operator shall specify the method of determining aerodrome operating minima in the operations manual.~~
- ~~(e) — The minima for a specific approach and landing procedure shall only be used if all the following conditions are met:
 - ~~(1) — the ground equipment shown on the chart required for the intended procedure is operative;~~
 - ~~(2) — the aircraft systems required for the type of approach are operative;~~
 - ~~(3) — the required aircraft performance criteria are met; and~~
 - ~~(4) — the crew is appropriately qualified.~~~~
- (a) The operator shall establish aerodrome operating minima for each departure, destination or alternate aerodrome planned to be used in order to ensure separation of the aircraft from terrain and obstacles and to mitigate the risk of loss of visual references during the visual flight segment of instrument operations.
- (b) The method used to establish aerodrome operating minima shall take the following elements into account:
 - (1) the type, performance and handling characteristics of the aircraft;
 - (2) the equipment available on the aircraft for the purpose of navigation, acquisition of visual references and/or control of the flight path during take-off, approach, landing and the missed approach;
 - (3) any conditions or limitations stated in the aircraft flight manual (AFM);
 - (4) the dimensions and characteristics of the runways/final approach and take-off areas (FATOs) that may be selected for use;
 - (5) the adequacy and performance of the available visual and non-visual aids and infrastructure;
 - (6) the obstacle clearance altitude/height (OCA/H) for the instrument approach procedures (IAPs);
 - (7) the obstacles in the climb-out areas and necessary clearance margins;
 - (8) any non-standard characteristics of the aerodrome, the IAP or the environment;
 - (9) the composition of the flight crew, their competence and experience;
 - (10) the IAP;
 - (11) the aerodrome characteristics and the available air navigation services (ANS);
 - (12) any minima that may be promulgated by the State of the aerodrome;



- (13) the conditions prescribed in the operations specifications including any specific approvals for LVOs or operations with operational credits; and
 - (14) relevant operational experience of the operator.
- (c) The operator shall specify a method of determining aerodrome operating minima in the operations manual.
- (d) The method used by the operator to establish aerodrome operating minima and any change to that method shall be approved by the competent authority.

AMC1 CAT.OP.MPA.110 Aerodrome operating minima**TAKE-OFF OPERATIONS — AEROPLANES**

(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 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 cloud conditions, should be specified.
- (2) The commander should not commence take-off when the RVR is less than 550 m unless low-visibility procedures (LVPs) are established.
 - (23) ~~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.~~
 - (i) the departure aerodrome is a weather-permissible aerodrome; or
 - (ii) a weather-permissible take-off alternate aerodrome is available.
- (34) 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 along the take-off runway is equal to or better than the required minimum.
- (45) 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 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 to mark 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)): 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

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.

AMC2 CAT.OP.MPA.110 Aerodrome operating minima

TAKE-OFF OPERATIONS — HELICOPTERS

Place holder

AMC3 CAT.OP.MPA.110 Aerodrome operating minima

NPA, APV, CAT I OPERATIONS

DETERMINATION OF DH/MDH FOR INSTRUMENT APPROACH OPERATIONS

- (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;
 - (2) the obstacle clearance height (OCH) for the category of aircraft;
 - (3) the published approach procedure DH or minimum descent height (MDH) where applicable;
 - (4) the system minimum specified in Table 3.A; or
 - (5) the minimum DH permitted for the runway specified in Table 4.A; or
 - (6) the minimum DH specified in the aircraft flight manual (AFM) or equivalent document, if stated.
- (b) The minimum descent height (MDH) for an 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;



- (32) the system minimum specified in Table 3.A; or
- (4) the lowest MDH permitted for the runway specified in Table 4.A; or
- (53) the minimum lowest MDH specified in the AFM, if stated.

Table 3.A: System minima

Facility	Lowest DH/MDH (ft)
ILS/MLS/GLS	200
GNSS/SBAS (LPV)	200*
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 4.A: Runway type minima

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 10
Non-instrument FATO/runway for helicopters	250

- (c) Where a barometric DA/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 table with temperature corrections to be applied.

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 $\geq 1\,200$ 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/CMV for straight-in instrument approach operations should be not less than the greater of the following:
- (1) The minimum RVR or VIS for type of runway used according to Table 5.A; or
 - (2) The minimum RVR or VIS determined according to the MDH or DH and class of lighting facility according to Table 6.A; or
 - (3) The minimum RVR or VIS according to the visual and non-visual aids and on-board equipment used according to Table 7.A.
- (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 calculated RVR 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.A.
- (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 12.

Table 5.A: The type of runway vs minimum RVR or VIS

Type of runway	Minimum RVR or VIS (m)
Precision approach runway, category I	550
Non-precision approach runway	750
Non-instrument runway	According to Table 10

Table 6.A: RVR/CMV vs DH/MDH

DH or MDH (ft)			Class of lighting facility			
			FALS	IALS	BALS	NALS
			RVR/CMV (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 7.A: The visual and non-visual aids and/or on-board equipment vs 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 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 $<15^\circ$ for category A and B aeroplanes or $<5^\circ$ for Category C and D aeroplanes	750 m	800 m
	Final approach track offset $\geq 15^\circ$ for Category A and B aeroplanes	1 000 m	1 000 m
	Final approach track offset $\geq 5^\circ$ for Category C and D aeroplanes	1 200 m	1 200 m

Table 8.A: 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

(f) The RVR/CMV for Type A and Type B CAT I instrument approach operations should be not greater than the lesser of the value calculated in point (a) or:

- (1) for Category A and B aeroplanes, 1 500 m;
- (2) for Category C and D aeroplanes, 2 400 m.



- (g) The visual aids should comprise standard runway day markings, runway edge lights, threshold lights and runway end lights and approach lights as defined in Table 8.A.
- (h) 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 12.
- (i) 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.

~~AMC5 CAT.OP.MPA.110 Aerodrome operating minima~~

~~DETERMINATION OF RVR/CMV/VIS MINIMA FOR NPA, APV, CAT I — AEROPLANES~~

~~AMC5~~ **AMC6 CAT.OP.MPA.110 Aerodrome operating minima**

~~DETERMINATION OF RVR/CMV/VIS MINIMA FOR NPA, CAT I~~ **INSTRUMENT APPROACH OPERATIONS — HELICOPTERS**

Place holder

~~AMC6~~ **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 7.10; 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 7.10; or
 - (iii) ~~the RVR/CMV derived from Tables 5 and 6.A 5.A for the preceding instrument approach procedure.~~

Table 7.10: Circling — aeroplanes

MDH and minimum ~~VIS visibility~~ vs aeroplane category

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

(m)				
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- (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, 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) When reaching the published instrument MAPt and the conditions stipulated in (c)(2) are unable to be established by the pilot, a missed approach should be carried out in accordance with that ~~instrument approach procedure~~ **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) attain a controlled and stable descent path to the intended landing runway; and
 - (ii) remain within the circling area and in such way that visual contact with the runway of intended landing or runway environment is maintained at all times.
 - (5) Flight manoeuvres should be carried out at an altitude/height that is not less than the circling MDA/H.
 - (6) Descent below 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 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.
 - (...)

AMC7 ~~AMC8~~ CAT.OP.MPA.110 Aerodrome operating minima
ONSHORE CIRCLING OPERATIONS — HELICOPTERS

Place holder

AMC8 ~~AMC9~~ CAT.OP.MPA.110 Aerodrome operating minima
VISUAL APPROACH OPERATIONS

The operator should not use an RVR of less than 800 m for a visual approach operation.

AMC9 ~~AMC10~~ CAT.OP.MPA.110 Aerodrome operating minima
CONVERSION OF REPORTED METEOROLOGICAL VISIBILITY TO RVR

- (a) ~~A conversion from meteorological visibility to RVR/CMV should not be used:~~
- (a) If the reported RVR is not available, a converted meteorological visibility (CMV) may be substituted for the RVR, except:
 - (1) ~~when reported RVR is not available;~~
 - (2) for calculating take-off minima; and or
 - (3) for any RVR minima less than 800 m for the purpose of continuation of an approach in LVO.
 - (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).~~

- (b) If the minimum RVR for an approach is more than the maximum value assessed by the aerodrome operator, e.g. 'RVR more than 1 500 m', then CMV should be used.
- (c) When converting meteorological visibility to RVR in circumstances other than those in (a), the conversion factors specified in Table 8 should be used.
- (c) In order to determine CMV from reported or forecast visibility, the conversion factors specified in Table 11 should be used.

Table 811: Conversion of reported meteorological visibility VIS to RVR/CMV

Light elements in operation	RVR/CMV = reported VIS meteorological visibility x	
	Day	Night
HI approach and runway lights	1.5	2.0
Any type of light installation other than above	1.0	1.5
No lights	1.0	not applicable

AMC10 ~~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 912, and the approach may have to be abandoned.

- (b) Conditions applicable to Table 912:

- (1) multiple failures of runway/FATO lights other than indicated in Table 912 should not be acceptable;
- (2) deficiencies of approach and runway/FATO lights are treated separately; and
- (3) failures other than ILS, MLS affect the RVR only and not the DH; and
- (4) when one or more lights are unserviceable on a runway, Table 13 may be used to assess whether the remaining lights will be sufficient for that lighting group to be considered operative.

Table 912: Failed or downgraded equipment — effect on landing minima

Operations without a low visibility operations or an LVO approval

Failed or downgraded equipment	Effect on landing minima	
	CAT-I Type B	APV, NPA Type A
ILS/MLS stand-by transmitter	No effect	



Failed or downgraded equipment	Effect on landing minima	
	CAT-I Type B	APV, NPA Type A
Outer marker	Not allowed except 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 final approach fix (FAF): no effect unless used as FAF
		If the FAF cannot be identified (e.g. no method available for timing of descent), non-precision operations cannot be conducted
Middle marker	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 except in the case of partial unserviceability (see Table 13)	
Centreline lights	No effect if F/D, HUDLS or autoland otherwise RVR of 750 m	No effect
Centreline lights spacing increased to 30 m	No effect	
Touchdown zone TDZ lights	No effect if F/D, HUDLS or autoland; otherwise RVR of 750 m	No effect
Taxiway lighting system	No effect	





Table 13: Minimum serviceability for a lighting group to be considered operative

Lighting group	Minimum specification to be considered operative
Runway edge lights	<ul style="list-style-type: none"> — 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	<ul style="list-style-type: none"> — A minimum of 6 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	<ul style="list-style-type: none"> — Each wing bar should be formed by at least 5 lights extending at least 10 m outward from the runway edge lights.
Runway end lights	<ul style="list-style-type: none"> — A minimum of 6 runway end lights is required.
Runway centreline lights	<ul style="list-style-type: none"> — Minimum runway centreline light spacing is 15 m

AMC11 ~~AMC12~~ CAT.OP.MPA.110 Aerodrome operating minima

VFR OPERATIONS WITH OTHER-THAN-COMPLEX MOTOR-POWERED AIRCRAFT

(...)



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 14: Approach lighting systems with 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.~~

GM4 CAT.OP.MPA.110 Aerodrome operating minima

MEANS TO DETERMINE THE REQUIRED RVR BASED ON DH AND LIGHTING FACILITIES

(a) The values in Table 6.A are derived from the formula below.

$$\text{Required RVR or VIS (m)} = [(DH/MDH \text{ (ft)} \times 0.3048)/\tan\alpha] - \text{length of approach lights (m)}$$

where α is the calculation angle, being a default value of 3.00° increasing in steps of 0.10° for each line in Table 6.A up to 3.77° and then remaining constant.



(b) The lighting system classes in Table 8.A have the meaning specified in Table 15.

Table 15: 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

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 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.



GM6 CAT.OP.MPA.110 ~~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.

GM7 CAT.OP.MPA.110 Aerodrome operating minima
 USE OF COMMERCIALY AVAILABLE INFORMATION

When an operator uses commercially available information for Part C of the operations manual, the operator remains responsible for ensuring that the material used is accurate and suitable for the operation, and that aerodrome operating minima are calculated in accordance with the method approved by the competent authority.

The operator should apply the procedures in ORO.GEN.205 ‘Contracted activities’.

GM8 CAT.OP.MPA.110 Aerodrome operating minima
 LOW TEMPERATURE CORRECTION

- (a) An operator may determine the temperature below which a correction should be applied to the DA/H.
- (b) Table Z may be used to determine the correction that should be applied.

Table 16: 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

GM9 CAT.OP.MPA.110 Aerodrome operating minima
 AERODROME OPERATING MINIMA — HELICOPTERS

Place holder

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.

CAT.OP.MPA.115 Approach flight technique — aeroplanes

- (a) All approaches ~~operations~~ shall be flown as stabilised approaches ~~operations~~ unless otherwise approved by the competent authority for a particular approach to a particular runway.
- (b) ~~Non-precision approaches~~
- (1) ~~The continuous descent final approach (CDFA) technique shall be used for all non-precision approaches.~~
- (2) ~~Notwithstanding (1), another approach flight technique may be used for a particular approach/runway combination if approved by the competent authority. In such cases, the applicable minimum runway visual range (RVR):~~
- (i) ~~shall be increased by 200 m for category A and B aeroplanes and by 400 m for category C and D aeroplanes; or~~
- (ii) ~~for aerodromes where there is a public interest to maintain current operations and the CDFA technique cannot be applied, shall be established and regularly reviewed by the competent authority taking into account the operator's experience, training programme and flight crew qualification.~~

The CDFA technique shall be used for approach operations using NPA procedures except for such particular runways for which the competent authority has approved another flight technique.

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 $\leq 5^\circ$ except for Category A and B aeroplanes, where the approach track off set is $\leq 15^\circ$; 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 the human factors principles.
- (c) The descent path should be calculated and flown 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 $4,5^\circ$ 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 any deviation 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.

AMC2 CAT.OP.MPA.115 Approach flight technique — aeroplanes

NPA OPERATIONS WITHOUT APPLYING THE CDFA TECHNIQUE

(...)

- (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 C. Such aerodrome categorisation will depend upon the operator's experience, operational exposure, training programme(s) and flight crew qualification(s).

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).~~

GM1 CAT.OP.MPA.115 Approach flight technique — aeroplanes

OPERATIONAL REASONS FOR HIGHER-THAN-NORMAL APPROACH SPEEDS

Operational reasons for specifying a higher-than-normal approach speed below 1 000 ft may include compliance with air traffic control (ATC) speed restrictions.

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.

GM1 CAT.OP.MPA.115(a) Approach flight techniques — aeroplanes

TARGET RATE OF DESCENT OF STABILISED APPROACH

- (a) The target rate of descent for the final approach segment (FAS) of a stabilised approach should not normally 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.
- (b) 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.
- (c) 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.

GM2 CAT.OP.MPA.115(a) Approach flight techniques — aeroplanes

ALTERNATIVE STABILISED APPROACH CRITERIA



When requesting 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.



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 the use of stabilised-approach criteria on a continuous descent with a constant, predetermined vertical path is seen as a major improvement in safety during the conduct of such approaches. ~~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.~~

(23) 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~~ CDFA operation will never have any level segment of flight at the DA/H or the MDA/H as applicable. This enhances safety by mandating a prompt missed approach procedure manoeuvre at the DA/H or the MDA/H.
- (v) An approach using the CDFA technique 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.

CAT.OP.MPA.265 Take-off conditions

Before commencing take-off, the commander shall ~~verify~~ ~~be satisfied~~ that:

- (a) ~~according to the information available to him/her,~~ the ~~meteorological conditions~~ weather at the aerodrome or operating site and the condition of the runway ~~or~~ FATO intended to be used ~~would~~ will not prevent a safe take-off and departure; and
- (b) ~~established~~ the selected aerodrome operating minima ~~will be complied with~~ are consistent with:
 - (1) the operative ground equipment;
 - (2) the operative aircraft systems;
 - (3) the aircraft performance; and
 - (4) flight crew qualifications.

CAT.OP.MPA.300 Approach and landing conditions

Before commencing an approach ~~to land~~ operation, the commander shall be satisfied that, ~~according to the information available to him/her,~~ the weather

- (a) the meteorological conditions at the aerodrome or operating site and the condition of the runway ~~or~~ FATO intended to be used ~~will~~ ~~should~~ not prevent a safe approach, landing or ~~missed approach~~ go-



around, ~~having regard to~~ considering the performance information contained in the operations manual; and

(b) the selected aerodrome operating minima are consistent with:

- (1) the operative ground equipment;
- (2) the operative aircraft systems;
- (3) the aircraft performance; and
- (4) flight crew qualifications.

CAT.OP.MPA.305 Commencement and continuation of approach

- ~~(a) The commander or the pilot to whom conduct of the flight has been delegated may commence an instrument approach regardless of the reported RVR/VIS.~~
- ~~(b) If the reported RVR/VIS is less than the applicable minimum the approach shall not be continued:~~
- ~~(1) below 1 000 ft above the aerodrome; or~~
 - ~~(2) into the final approach segment in the case where the DA/H or MDA/H is more than 1 000 ft above the aerodrome.~~
- ~~(c) Where the RVR is not available, RVR values may be derived by converting the reported visibility.~~
- ~~(d) If, after passing 1 000 ft above the aerodrome, the reported RVR/VIS falls below the applicable minimum, the approach may be continued to DA/H or MDA/H.~~
- ~~(e) The approach may be continued below DA/H or MDA/H and the landing may be completed provided that the visual reference adequate for the type of approach operation and for the intended runway is established at the DA/H or MDA/H and is maintained.~~
- ~~(f) The touchdown zone RVR shall always be controlling. If reported and relevant, the midpoint and stopend RVR shall also be controlling. The minimum RVR value for the midpoint shall be 125 m or the RVR required for the touchdown zone if less, and 75 m for the stopped. For aircraft equipped with a rollout guidance or control system, the minimum RVR value for the midpoint shall be 75 m.~~
- (a) If the reported visibility or controlling RVR for the runway to be used for landing is less than the applicable minimum, then an instrument approach operation shall not be continued:
- (1) past a point at which the aircraft is 1 000 ft above the aerodrome elevation; or
 - (2) if the DH or MDH is higher than 1 000 ft, in the final approach segment (FAS).
- (b) If the required visual reference is not established, then a missed approach shall be executed at or before the DA/H or the MDA/H.
- (c) If the required visual reference is not maintained after the DA/H or the MDA/H, then a go-around shall be executed promptly.

GM1 CAT.OP.MPA.305 Commencement and continuation of approach

APPLICATION OF RVR OR VIS REPORTS

- (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.

- (b) 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.
- (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. 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.

AMC1 CAT.OP.MPA.305(a) Commencement and continuation of approach

RVR MINIMUM FOR CONTINUATION OF 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) Where the RVR is not available, CMV should be used.

AMC1 CAT.OP.MPA.305(b) 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:

- ~~(a1)~~ elements of the approach lighting system;
- ~~(b2)~~ the threshold;
- ~~(c3)~~ the threshold markings;
- ~~(d4)~~ the threshold lights;
- ~~(e5)~~ the threshold identification lights;
- ~~(f6)~~ the visual glide slope indicator;
- ~~(g7)~~ the TDZ touchdown zone or TDZ touchdown zone markings;
- ~~(h8)~~ the TDZ touchdown zone lights;
- ~~(i9)~~ FATO/runway edge lights; or
- ~~(j10)~~ 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.~~

CAT.OP.MPA.310 Operating procedures — threshold crossing height — aeroplanes

The operator shall establish operational procedures designed to ensure that an aeroplane conducting ~~precision approaches~~ Type B instrument approach operations crosses the threshold of the runway by a safe margin, with the aeroplane in the landing configuration and attitude.

CAT.OP.MPA.312 EFVS 200 operations

An operator intending to conduct EFVS 200 operations shall ensure that:

- (a) the aircraft is certified for the intended operations;
- (b) only runways and instrument approach procedures (IAPs) suitable for EFVS operations are used;
- (c) the flight crew is competent to conduct the intended operation and that a training and checking programme for the flight crew members and relevant personnel involved in the flight preparation is established;
- (d) operating procedures are established;
- (e) any relevant information is documented in the minimum equipment list (MEL);
- (f) any relevant information is documented in the maintenance programme;
- (g) safety assessments are carried out and performance indicators are established to monitor the level of safety; and
- (h) the aerodrome operating minima take into account the capability of the system used.

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 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(b).

EFVS 200 operations may be 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 CAT.OP.MPA.312(b).

(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(h)

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(h) 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(d)



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 NCC.OP.235(b) 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 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) Use of EFVS to touchdown

In order to use an 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 operations 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(b) 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.

AMC1 CAT.OP.MPA.312(a) EFVS 200 operations

EQUIPMENT CERTIFICATION

- (a) For EFVS 200 operations, the aircraft should be equipped with an approach system using EFVS (EFVS-A) or a landing system using EFVS (EFVS-L).



- (b) Legacy systems that have been certificated as 'EVS with an operational credit' may be considered an approach system using EFVS if approved by the operator's competent authority.

AMC1 CAT.OP.MPA.312(b) 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:
- (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 off-set by a maximum of 3 degrees from the extended centreline of the runway and intercepts the centreline at the threshold.
- (c) The IPA should be designed in accordance with PANS-OPS, Volume I (ICAO Doc 8168) or equivalent criteria.

AMC2 CAT.OP.MPA.312(b) EFVS 200 operations**VERIFYING 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 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 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)¹⁴ 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

¹⁴ https://www.faa.gov/regulations_policies/orders_notices/index.cfm/go/document.information/documentID/1029266

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.

- (4) 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.

AMC1 CAT.OP.MPA.312(c) 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 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 operations;
 - (10) effect of specific aircraft/system malfunctions;
 - (11) human factors aspects of EFVS operations;
 - (12) qualification requirements for pilots to obtain and retain approval to 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 the interpretation of EFVS imagery;
 - (vii) become familiar with the features needed on the EFVS image to continue approach below DH;
 - (viii) practise 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 all phases of flight;
 - (iii) approach using the EFVSs installed in 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 missed approach, all without external visual reference, as appropriate.
- (3) Phase two (low-visibility approach 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 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.

AMC2 CAT.OP.MPA.312(c) EFVS 200 operations**RECURRENT TRAINING AND CHECKING FOR EFVS 200 OPERATIONS**

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 four approaches, of which one should be flown without natural vision to 200 ft.

AMC3 CAT.OP.MPA.312(c) 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.

AMC4 CAT.OP.MPA.312(c) 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 training whenever there is a change to any of the following:
 - (1) the technology used in 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.

AMC5 CAT.OP.MPA.312(c) 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 the flight crew member should complete the required FSTD training for each operating capacity.



GM1 CAT.OP.MPA.312(c) 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.

AMC1 CAT.OP.MPA.312(d) EFVS 200 operations
OPERATING PROCEDURES FOR EFVS 200 OPERATIONS

- (a) The following provisions should apply to 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 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.

AMC1 CAT.OP.MPA.312(h) EFVS 200 operations
AERODROME OPERATING MINIMA — EFVS 200 OPERATIONS

The following provisions should apply to 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 Table 6.A in AMC4 CAT.OP.MPA.110.

Table 1: Operations utilising EFVS: RVR reduction

RVR presented in Table 6.A in AMC4 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



RVR presented in Table 6.A in AMC4 CAT.OP.MPA.110	RVR (m) for EFVS 200 operations
2 000	1 300
2 100	1 400
2 200	1 500
2 300	1 500
2 400	1 600



Annex V
Specific approvals
(Part-SPA)

Subpart A: GENERAL REQUIREMENTS

SPA.GEN.100 Competent authority

(...)

- (b) Notwithstanding (a)(2), for non-commercial operators using aircraft registered in a third country, the applicable requirements under this Annex for the approval of the following operations shall not apply if these approvals are issued by a third-country State of Registry:
- (1) Performance-based navigation (PBN);
 - (2) Minimum operational performance specifications (MNPS);
 - (3) Reduced vertical separation minima (RVSM) airspace; and
 - (4) Low-visibility operations (LVOs).

SUBPART E: LOW-VISIBILITY OPERATIONS (LVOs) AND OPERATIONS WITH OPERATIONAL CREDITS

SPA.LVO.100 Low-visibility operations and operations with operational credits

~~The operator shall only conduct the following low visibility operations (LVO) when approved by the competent authority:~~

- ~~(a) low visibility take-off (LVTO) operation;~~
- ~~(b) lower than standard category I (LTS CAT I) operation;~~
- ~~(c) standard category II (CAT II) operation;~~
- ~~(d) other than standard category II (OTS CAT II) operation;~~
- ~~(e) standard category III (CAT III) operation;~~
- ~~(f) approach operation utilising enhanced vision systems (EVS) for which an operational credit is applied to reduce the runway visual range (RVR) minima by no more than one third of the published RVR.~~

The operator shall conduct the following operations only if approved by the competent authority:

- (a) take-off operations with visibility conditions less than 400 m RVR;
- (b) instrument approach operations with visibility conditions less than 550 m RVR; and
- (c) operations with operational credits.

AMC1 SPA.LVO.100 Low visibility operations

LVTO OPERATIONS – AEROPLANES

This AMC is deleted.



AMC3 SPA.LVO.100 Low visibility operations
LTS CAT I OPERATIONS

This AMC is deleted.

AMC4 SPA.LVO.100 Low visibility operations
CAT II AND OTS CAT II OPERATIONS

This AMC is deleted.

AMC5 SPA.LVO.100 Low visibility operations
CAT III OPERATIONS

This AMC is deleted.

AMC6 SPA.LVO.100 Low visibility operations
OPERATIONS UTILISING EVS

This AMC is deleted.

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 (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 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 Aerodrome Operations under Limited Visibility Conditions;
- (k) ECAC Doc 17, Issue 3; and
- (l) CS-AWO All weather operations.

GM2 SPA.LVO.100 Low-visibility operations and operations with operational credits
ILS CLASSIFICATION

(...)

AMC1 SPA.LVO.100(a) Low-visibility operations and operations with operational credits
LVTO OPERATIONS — AEROPLANES IN AN RVR OF LESS THAN 400 M BUT NOT LESS THAN 125 M

The following provisions should apply to low-visibility take-off (LVTO) with an RVR of less than 400 m but more 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.A should apply:

Table 1.A: LVTO — aeroplanes: RVR vs facilities

RVR (m)	Required facilities
Not less than 300 by day	— Runway centreline markings
Not less than 300 by night	Additionally: — Runway edge lights; and/or — Runway centreline lights
Not less than 150	Additionally: — Runway centreline lights
Not less than 125	Additionally: — Centreline lights spaced at 15 m intervals or less; and — Edge lights spaced at 60 m intervals 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.A and the marking and lighting criteria shown in Table 1.A, provided that they are able to comply with the applicable obstacle clearance criteria, assuming engine failure at the height specified:

Table 2.A: LVTO — aeroplanes: assumed engine failure height vs 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.A or 2.A 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.

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.

AMC1 SPA.LVO.100(b) Low-visibility operations and operations with operational credits

CAT II OPERATIONS

The following provisions should apply to CAT II operations:

- (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 for CAT II specified in the AFM, if stated;
 - (2) the applicable obstacle clearance height (OCH) for the category of aeroplane;
 - (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 3:

Table 3: CAT II operation minima: RVR (m) vs DH (ft)

Aeroplane categories		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.

AMC2 SPA.LVO.100(b) Low-visibility operations and operations with operational credits

CAT III OPERATIONS

The following provisions should apply to CAT III operations:

- (a) 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.



- (b) Operations with no DH should only be conducted if:
- (1) 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
 - (3) the flight crew is qualified to operate with no DH.
- (c) The lowest RVR to be used should be determined in accordance with Table 4:

Table 4: CAT III operation minima: RVR vs DH

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

*: If a fail-passive roll-out control system is used and the AFM specifies that the equipment was demonstrated to be suitable for use in RVRs down to 75 m as part of the certification process, then operations may be conducted in RVRs down to 75 m provided that the operator has implemented appropriate operating procedures and training.

AMC7 AMC3 SPA.LVO.100(b) Low-visibility operations and operations with operational credits
EFFECT ON CAT II/CAT III LANDING MINIMA OF TEMPORARILY FAILED OR DOWNGRADED EQUIPMENT

(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.~~

Table 5 should be used to determine the effect of temporarily failed or 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 5:
- (1) multiple failures of runway/FATO lights other than indicated in Table 75 are not acceptable;
 - (2) deficiencies of approach and runway/FATO lights are treated separately;
 - (3) for CAT II and CAT III operations, a combination of deficiencies in runway/FATO lights and RVR assessment equipment are not permitted; and
 - (4) failures other than ILS and MLS affect the RVR only and not the DH.

**Table 75: Failed or downgraded equipment — effect on landing minima
Operations with an LVO approval CAT II/III operations**

Failed or downgraded equipment		Effect on landing minima			
		CAT III(B) {No DH}	CAT IIIB DH<50 ft	CAT IIIA DH>=50 ft	CAT II
Failed or downgraded equipment	ILS/MLS stand-by transmitter	Not allowed	RVR of 200 m	No effect	
	Outer marker	No effect if replaced by height check at 1 000 ft			
	Middle marker	No effect			
	RVR assessment systems	At least one RVR value to be available on the aerodrome	On runways equipped with two or more RVR assessment units, one may be inoperative		
	Approach lights	No effect	Not allowed for operations with DH >50 ft		Not allowed
	Approach lights except the last 210 m	No effect			Not allowed
	Approach lights except the last 420 m	No effect			
	Standby power for approach lights	No effect			
	Edge lights, threshold lights and runway end lights	No effect		Day: no effect	Day: no effect
				Night: RVR 550 m	Night: not allowed
	Edge lights	No effect	Night: 550 m	Day: no effect	Day: no effect
				Night: RVR of 550 m	Night: not allowed
Threshold lights	N/E	N/E	As edge lights	As edge lights	



Failed or downgraded equipment	Effect on landing minima			
	CAT III(B) (No DH)	CAT IIIB DH<50 ft	CAT IIIA DH>=50 ft	CAT II
Runway end lights	No effect if centreline lights are serviceable			
Centreline lights	Day: RVR of 200 m	Not allowed	Day: RVR of 300 m	Day: RVR of 350 m
	Night: not allowed		Night: RVR of 400 m	Night: RVR of 550 m (400 m with HUDLS or autoland)
Centreline lights spacing increased to 30 m	RVR of 150 m		No effect	
Touchdown TDZ lights	No effect	Day: RVR 200 of m	Day: RVR of 300 m	
		Night: RVR of 300 m	Night: RVR of 550 m, 350 m with HUDLS or autoland	
Taxiway light system	No effect			

AMC1 SPA.LVO.100(c) Low-visibility operations and operations with operational credits

OPERATIONAL CREDIT: SPECIAL AUTHORISATION CATEGORY 1 (SA CAT I)

The following provisions should apply to special authorisation category 1 (SA CAT I) operations:

- (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 lowest RVR minima to be used are specified in Table 6.

For class of approach lighting facility, see GM2 CAT.OP.MPA.110.



Table 6: SA CAT I operation minima RVR (m) vs approach lighting system

Class of approach lighting facility *		FALS	IALS
DH (ft)	150–170	400	450
	171–199	450	500
	200–210	450	500
	211–220	500	550
	221–230	500	600
	230–240	500	650
	241–249	550	700

AMC2 SPA.LVO.100(c) Low-visibility operations and operations with operational credits

OPERATIONAL CREDIT: SPECIAL AUTHORISATION CATEGORY 2 (SA CAT II)

The following provisions should apply to special authorisation category 2 (SA CAT II) operations:

- (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 7;
 - (2) standard runway markings;
 - (3) category I runway lights.
- (c) The lowest RVR minima to be used are specified in Table 7:

Table 7: SA CAT II operation minima: RVR (m) vs 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

The following provisions should apply to EFVS 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:
 - (1) in accordance with criteria specified in the AFM for the expected weather conditions or, if no such criteria are specified,
 - (2) by reducing the RVR determined for operation without the use of EFVS/CVS in accordance with Table 8.
- (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 low-visibility procedures (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 8: Operations utilising 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

RVR/CMV (m) required without the use of EFVS	RVR/CMV (m) with the use of EFVS
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

(e) Where the lowest RVR to be used, determined in accordance with (c), is less than 550 m, then this should be increased to 550 m unless LVPs are established at the aerodrome of intended landing.

GM1 SPA.LVO.100(a) Low-visibility operations and operations with operational credits

CLASSIFICATION OF LOW-VISIBILITY TAKE-OFF 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.

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 at 15 m spacing once lined up on the runway centreline.



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.

In accordance with the ICAO terminology, approach operations are classified as either 'Type A' or 'Type B'. Type A instrument approach operations are those with a minimum DH or MDH at or above 250 ft; Type B instrument approach operations are those with a DH below 250 ft. Type A instrument approach operations may be 2D operations (lateral guidance) or 3D operations (lateral and vertical guidance), whereas all Type B instrument approach operations are 3D operations. Type B instrument approach operations are then further subcategorised into CAT I, II or III according to the usual DA/H and RVR.

Differently from ICAO, the classification in the European regulations 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.

Table 9: Classification of standard approach operations

Approach classification		Lowest MDH, DH (ft)	Lowest RVR (m)
Type A		250	600
Type B	CAT I	200	550
	CAT II	100	300
	CAT III	0 or no DA/H	0

The AFM for aircraft certificated for CAT III operations will state the lowest usable DH, or no DH. Some AFMs may refer to ICAO classifications. These are 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.

GM2 SPA.LVO.100(b) Low-visibility operations and operations with operational credits**EQUIPMENT CERTIFICATION FOR LOW-VISIBILITY APPROACH OPERATIONS**

This GM is purely informative and 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 certificated according to the minimum usable DH which is stated in the AFM.

Certification specifications (CS-AWO) allow for systems to be certificated for SA CAT I, CAT II or CAT III operations. Systems certificated for CAT III operations may specify:

- a lowest usable DH of:
 - less than 100 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 certificated 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-passive 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 the ground roll control system is required to be fail-passive.

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.

~~GM1 SPA.LVO.100(e),(e)~~ GM3 SPA.LVO.100(b) Low-visibility operations and operations with operational credits

ESTABLISHMENT OF MINIMUM RVR FOR CAT II AND CAT III OPERATIONS

(...)

(c) CAT III fail-passive operations

- (1) CAT III operations utilising fail-passive automatic landing equipment were introduced in the late 1960s and it is desirable that the principles governing the establishment of the minimum RVR for such operations be dealt with in some detail.
- (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.

(...)

GM4 SPA.LVO.100(b) Low-visibility operations and operations with operational credits

EFFECT ON CAT II/CAT III LANDING MINIMA OF TEMPORARILY FAILED OR DOWNGRADED EQUIPMENT

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 5, and the approach may have to be abandoned.

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 9. For approach operations, an operational credit can be applied to either the instrument or the visual segment.

Where an operational credit allows operation to lower than standard minima, this is not considered a separate approach classification.

GM2 SPA.LVO.100(c) Low-visibility operations and operations with operational credits

SPECIAL AUTHORISATION CATEGORY 1 (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. 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.



GM3 SPA.LVO.100(c) Low-visibility operations and operations with operational credits**SPECIAL AUTHORISATION CATEGORY 2 (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 system do not meet the usual requirements for a CAT II precision lighting system. SA CAT II exploits the performance of a suitably certified 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.

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.
- (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 head-down view of the EVS image or another means of easily displaying EFVS-derived information to the pilot monitoring the progress of the approach.
 - (3) Legacy systems may be certificated 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 certificated 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 AMC7 SPA.LVO.105(c).

EFVS operations may be used for 3D approach operations. This 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 them 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 EFVS 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. EFVS 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 8 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 8 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.

Pilots conducting EFVS operations may commence an approach and continue that approach below 1 000 ft above the aerodrome or in 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 or the MAPt 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 will ensure that the visual segment is protected for obstacles. Procedures not designed in accordance with PANS-OPS may have not been assessed for terrain or obstacle clearance below the MDA, and may not provide a clear vertical path to the runway at the normally expected descent angle.

(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 certificated 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 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 cueing and 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 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) Missed approach

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 missed approach below the DA/H than the equivalent approach flown without EFVS. AMC1 SPA.LVO.105(f) requires that operators involved in EFVS operations 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 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.

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 of an EFVS.

SPA.LVO.105 LVO approval

To obtain an LVO approval from the competent authority, the operator shall demonstrate compliance with the requirements of this Subpart.

SPA.LVO.105 Specific approval criteria

To obtain a specific approval required by SPA.LVO.100, the operator shall demonstrate for the intended operations that:

- (a) for low-visibility approach operations, LVTO operations in an RVR of less than 125 m, and operations with operational credits, the aircraft is certified for the intended operations;
- (b) the flight crew members are competent to conduct the intended operation and a training and checking programme for the flight crew members and relevant personnel involved in the flight preparation is established;
- (c) operating procedures are established;
- (d) any relevant information is documented in the minimum equipment list (MEL);
- (e) any relevant information is documented in the maintenance programme; and
- (f) safety assessments are carried out and performance indicators are established to monitor the level of safety.



AMC1 SPA.LVO.105 LVO approval

OPERATIONAL DEMONSTRATION – AEROPLANES

This AMC is deleted.

AMC3 SPA.LVO.105 LVO approval

CONTINUOUS MONITORING – ALL AIRCRAFT

This AMC is deleted.

AMC4 SPA.LVO.105 LVO approval

TRANSITIONAL PERIODS FOR CAT II AND CAT III OPERATIONS

This AMC is deleted.

AMC5 SPA.LVO.105 LVO approval

MAINTENANCE OF CAT II, CAT III AND LVTO EQUIPMENT

This AMC is deleted.

AMC6 SPA.LVO.105 LVO approval

ELIGIBLE AERODROMES AND RUNWAYS

This AMC is deleted.

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) An 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.

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 HUDLS or fail-passive autoland or better.
 - (5) For EFVS operations, the EFVS should be certified for the intended operation.

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.

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.

AMC2 SPA.LVO.105(c) Specific approval criteria

OPERATING PROCEDURES: GENERAL

- (a) Operating procedures should be established for all types of LVOs 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;
 - (5) deviate to the minimum extent practicable from normal procedures used for routine operations.
- (b) 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) 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 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) required visual references;
 - (11) action to be taken in the event of loss of the required visual reference; and
 - (12) 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'.

AMC3 SPA.LVO.105(c) Specific approval criteria

OPERATING PROCEDURES: CAT II

The following provisions should apply to CAT II operations:

- (a) The flight crew should consist of at least two pilots.
- (b) The approach should be flown using a certificated 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 centreline of the approach lights or TDZ lights or runway edge lights or a combination of them; and
 - (2) the 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 TDZ light unless the operation is conducted using a HUD or an equivalent system to touchdown.

AMC4 SPA.LVO.105(c) Specific approval criteria

OPERATING PROCEDURES: CAT III

The following provisions should apply to CAT III operations:

- (a) The flight crew should consist of at least two pilots.
- (b) The approach should be flown using a certificated 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 them 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.

AMC5 SPA.LVO.105(c) Specific approval criteria

OPERATING PROCEDURES: SA CAT I

The following provisions should apply to SA CAT I operations:

- (a) The approach should be flown using a certificated 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 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 TDZ light unless the operation is conducted utilising an approved HUD or an equivalent system usable down to 120 ft above the runway threshold.

AMC6 SPA.LVO.105(c) Specific approval criteria

OPERATING PROCEDURES: SA CAT II

The following provisions should apply to SA CAT II operations:

- (a) The flight crew should consist of at least two pilots.
- (b) The approach should be flown using a certificated 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 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 or runway edge lights or a combination of them;
 - (2) the 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 TDZ light unless the operation is conducted using a HUD or an equivalent system to touchdown.

AMC7 SPA.LVO.105(c) Specific approval criteria

OPERATING PROCEDURES: EFVS OPERATIONS

The following provisions should apply to EFVS operations:

- (a) The approach should be flown using a certificated 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.
- (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
 - (iii) the TDZ identified by the TDZ lights, the TDZ runway markings or the runway 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.

GM1 SPA.LVO.100(e)105(c) ~~Low-visibility operations~~ Specific approval criteria

FLIGHT CREW ACTIONS IN CASE OF AUTOPILOT FAILURE AT OR BELOW DH IN FAIL-PASSIVE CAT III OPERATIONS

(...)

AMC1 SPA.LVO.105(f) Specific approval criteria

SAFETY ASSESSMENT AND PERFORMANCE INDICATORS

- (a) The operator should monitor LVOs and operations with an operational approval 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 approval 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 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 or, for operators not required to implement a flight data monitoring programme, by means of reports submitted by flight crew.
- (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 a period of 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 aerodrome 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.

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; and

- (iii) use of HUD or an equivalent display system;
 - (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; and
 - (iii) use of HUD or an equivalent display system;
 - (iv) use of EFVS;
- (2) operational procedures, including:
- (i) alert height;
 - (ii) manual landing/automatic landing;
 - (iii) no DH operations; and
 - (iv) use of HUD or an equivalent display system in hybrid operations;
 - (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.

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) Where data is collected by means of flight crew reports, each report may include:
- (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 30 m (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, 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;
 - (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.

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: low-visibility take-off

If the procedures used for LVTO are not significantly different from those used for standard take-off, it may be sufficient for operators to conduct only a small number of take-offs using the procedures established for LVTO for the purpose of data gathering. The following could be considered as minimum:

- (1) For LVTO in an RVR of 125 m or more: 1 take-off;
- (2) For LVTO in an RVR of less than 125 m: 10 take-offs;

An operator holding approval for LVTO on one aircraft type and applying for LVTO on another type or variant may use data from LVTO conducted on the first type if the following are similar:

- (1) level of technology, including flight deck displays, HUD or an equivalent guidance system;
- (2) operational procedures; and
- (3) handling characteristics.

(c) Data gathering for safety assessment: low-visibility approach operations

The data required for the safety assessment needs to be gathered from approaches conducted in a representative sample of expected operating conditions. The operator should consider 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 data is representative of planned operations, approaches should be conducted at a variety of airports and runways. If more than 30 % of 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 rate of successful low-visibility approaches is not lower than that anticipated by CS-AWO (i.e. 95 %) and also 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 50 ft or less: 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 should take into account the effect of at least the following:

- (1) air traffic services (ATS) factors including situations where a flight conducting an ILS approach is vectored too close to the FAF for satisfactory localiser and glideslope 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 should take 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 should have more than six months or 1 000 hours of total operational experience before they can have sufficient data to set up meaningful performance indicators and establish whether planned LVOs would achieve an acceptable level of safety.

SPA.LVO.110 ~~General operating requirements~~ ANS- and aerodrome-related requirements

(a) ~~The operator shall only conduct LTS CAT I operations if:~~

- (1) ~~each aircraft concerned is certified for operations to conduct CAT II operations; and~~
- (2) ~~the approach is flown:

 - (i) ~~auto-coupled to an auto-land that needs to be approved for CAT IIIA operations; or~~
 - (ii) ~~using an approved head-up display landing system (HUDLS) to at least 150 ft above the threshold.~~~~

- (b) ~~The operator shall only conduct CAT II, OTS CAT II or CAT III operations if:~~
- ~~(1) each aircraft concerned is certified for operations with a decision height (DH) below 200 ft, or no DH, and equipped in accordance with the applicable airworthiness requirements;~~
 - ~~(2) a system for recording approach and/or automatic landing success and failure is established and maintained to monitor the overall safety of the operation;~~
 - ~~(3) the DH is determined by means of a radio altimeter;~~
 - ~~(4) the flight crew consists of at least two pilots;~~
 - ~~(5) all height call-outs below 200 ft above the aerodrome threshold elevation are determined by a radio altimeter.~~
- (c) ~~The operator shall only conduct approach operations utilising an EVS if:~~
- ~~(1) the EVS is certified for the purpose of this Subpart and combines infra-red sensor image and flight information on the HUD;~~
 - ~~(2) for operations with an RVR below 550 m, the flight crew consists of at least two pilots;~~
 - ~~(3) for CAT I operations, natural visual reference to runway cues is attained at least at 100 ft above the aerodrome threshold elevation;~~
 - ~~(4) for approach procedure with vertical guidance (APV) and non-precision approach (NPA) operations flown with CDFA technique, natural visual reference to runway cues is attained at least at 200 ft above the aerodrome threshold elevation and the following requirements are complied with:~~
 - ~~(i) the approach is flown using an approved vertical flight path guidance mode;~~
 - ~~(ii) the approach segment from final approach fix (FAF) to runway threshold is straight and the difference between the final approach course and the runway centreline is not greater than 2°;~~
 - ~~(iii) the final approach path is published and not greater than 3,7°;~~
 - ~~(iv) the maximum cross-wind components established during certification of the EVS are not exceeded.~~
- ~~The operator shall ensure that only aerodromes and instrument procedures suitable for the intended operations are used for LVOs and operations with operational credits.~~

GM1 SPA.LVO.110(c)(4)(i) General operating requirements**APPROVED VERTICAL FLIGHT PATH GUIDANCE MODE**

This GM is deleted.

AMC1 SPA.LVO.110 ANS- and aerodrome-related requirements**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 an CAT I IAP that includes an OCH based on radio altimeter.

- (d) SA CAT II operations should only be conducted using a 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.

AMC2 SPA.LVO.110 ANS- and aerodrome-related requirements

SUITABLE AERODROMES — LVTO

The following provisions should apply to LVTO with an RVR of less than 125 m:

- (a) The runway has centreline lights spaced at intervals of 15 m or less.
- (b) If an ILS signal is used for lateral guidance, the ILS localiser signal meets the requirements for category III operations including the availability of the standby transmitter; and
- (c) LVPs include protection of the runway and, where an ILS localiser signal is used, the ILS-sensitive area.

AMC3 SPA.LVO.110 ANS- and aerodrome-related requirements

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.
- (b) For CAT III instrument approach operations, a PA runway category III should be used.
- (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 an ILS is used, it should be at least the minimum ILS 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° unless the operator has assessed that a steeper glide path, not exceeding 3.5°, provides an equivalent level of safety;
 - (4) the pre-threshold terrain should have been surveyed and assessed as suitable with regard to the usability of the radio altimeter or other device capable of providing equivalent performance and autoland systems; and
 - (5) runway markings, category I approach lights and the following runway lights: runway edge lights, 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 not be offset from the extended centreline;
 - (2) where an ILS is used, it should be certified to class II/D/3;
 - (3) the glide path angle is 3.0° unless the operator has assessed that a steeper glide path, not exceeding 3.5°, provides an equivalent level of safety;
 - (4) the pre-threshold terrain should have been surveyed and assessed as suitable with regard to the usability of the radio altimeter or other device capable of providing equivalent performance and autoland systems; and

- (5) the following visual aids should be available:
- (i) standard runway markings, category I approach lights and the following runway lights: runway edge lights, threshold lights and runway end lights; and
 - (ii) for operations with an RVR of less than 400 m, additionally TDZ and/or centreline lights.
- (e) The operator should verify the suitability of a runway before authorising the use of autoland on any runway other than a PA runway category II or a PA runway category III.
- (f) Each aircraft type/equipment/runway combination should be verified by operations in CAT I or better conditions before authorising the use of autoland on any runway with irregular pre-threshold terrain or other foreseeable or known difficulties.

AMC4 SPA.LVO.110 ANS- and aerodrome-related requirements**LOW-VISIBILITY PROCEDURES**

- (a) An operator should only use an aerodrome for low-visibility approach operations when:
- (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 within the Member States; 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) suitable low-visibility procedures (LVPs) have been established and are in effect as verified by the commander before each approach.
- (b) Notwithstanding (a), if an operator selects an aerodrome, where the term 'LVP' 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 equivalent LVPs are in effect at the time of an actual operation.

AMC5 SPA.LVO.110 ANS- and aerodrome-related requirements**VERIFYING THE SUITABILITY OF RUNWAYS FOR EFVS OPERATIONS**

- (a) The operator should conduct an operational assessment before authorising the use of the following approach procedures for EFVS operations:
- (1) NPA procedures and approach procedures with vertical guidance;
 - (2) category I PA procedures on runways where an OFZ is not provided; and
 - (3) approach procedures not designed in accordance with PANS-OPS criteria.
- (b) The operational assessment should identify whether obstacle clearance can be assured:
- (1) in the visual segment, without reliance on visual identification of obstacles; and



- (2) in the event of a balked landing.
- (c) If the operational assessment determines that obstacle clearance cannot be assured 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 clearance is assured.
- (d) If the operational assessment determines that obstacle clearance 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 clearance are developed and implemented.
- (e) If the AFM stipulates specific requirements for approach procedures, the operational assessment should include a determination of whether these requirements can be met.

GM1 SPA.LVO.110 ANS- and aerodrome-related requirements**ILS CLASSIFICATION**

The ILS classification system is specified in ICAO Annex 10, Volume I.

GM2 SPA.LVO.110 ANS- and aerodrome-related requirements**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, but given the conditions for SA CAT II, this is probably not cost-effective. However, in case of long-term outages of certain lighting systems, SA CAT II operations may be considered.

GM3 SPA.LVO.110 ANS- and aerodrome-related requirements

VERIFICATION OF THE SUITABILITY OF RUNWAYS FOR EFVS OPERATIONS

- (a) EFVS operations allow operation below the DA/H without 'natural' visual reference. Obstacles that could be avoided visually may not be obvious to the crew using the EFVS display and thus the approach procedure used has to ensure that obstacle clearance will be provided as long as the aircraft follows the intended approach path in the visual segment.
- (b) When operating below the DA/H, pilots rely on the EFVS and, for EFVS operations to touchdown, the pilot flying must acquire 'natural' visual reference at some point prior to touchdown. Therefore, EFVS operations may present a higher probability of initiating a go-around below the DA/H than standard operations, depending on the equipment used.
- (c) The purpose of the operational assessment of 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.
- (d) If an approach has been promulgated as suitable for EFVS operations, it may be assumed that the required terrain and obstacle clearance is assured and an operational assessment may not be required.
- (e) Procedures not designed in accordance with PANS-OPS may have not been assessed for terrain or obstacle clearance below the MDA, and may not provide a clear vertical path to the runway at the normally expected descent angle. The following approach procedures do not necessarily ensure obstacle clearance if a go-around is initiated below the DA/H:
 - (1) NPA procedures and approach procedures with vertical guidance;
 - (2) category I PA procedures for which an OFZ is not provided;
 - (3) approach procedures not designed in accordance with PANS-OPS criteria.
- (f) The operational assessment may either examine each approach procedure and check that the required obstacle clearance is available or it may consider the design criteria used for development of the approach procedure. The operator could develop operational procedures for all approaches designed in accordance with these criteria.
- (g) For approach procedures where obstacle clearance is not assured for a balked landing, operational procedures available to the operator could include the following actions:
 - (1) follow a published departure procedure for the landing runway (standard instrument departure or omnidirectional departure) in the event of a missed approach initiated 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 clearance in the missed approach segment. 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 the same as 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 operational assessment will include verification that all such requirements can be satisfied before EFVS operations are authorised for a particular runway.

GM4 SPA.LVO.110 ANS- and aerodrome-related requirements

USE OF AUTOLAND

It may be assumed that category II and category III runways will support autoland systems unless the State of the aerodrome has published information indicating otherwise. Where other runways are to be authorised for autoland operations, the operator should consult the aircraft manufacturer to establish any requirements for satisfactory autoland performance and may conduct autoland in CAT I or better conditions before authorising other use of autoland.

If an operator is not aware of current CAT II/III operations at a particular runway by some other operator and similar aircraft type, it is a good practice for the operator to have conducted at least one approach using the Category II or III system and procedures and preferably with LVPs in effect, to each runway intended for Category II/III operations in weather better than that requiring the use of Category II minima.

SPA.LVO.115 Aerodrome related requirements

This implementing rule is deleted.

SPA.LVO.120 ~~Flight crew training and qualifications~~ Flight crew competence

The operator shall ensure that, prior to conducting an LVO:

- (a) — each flight crew member:
 - (1) — ~~complies with the training and checking requirements prescribed in the operations manual, including flight simulation training device (FSTD) training, in operating to the limiting values of RVR/VIS (visibility) and DH specific to the operation and the aircraft type;~~
 - (2) — ~~is qualified in accordance with the standards prescribed in the operations manual;~~
 - (b) — ~~the training and checking is conducted in accordance with a detailed syllabus.~~
- (a) The operator shall ensure that the flight crew is competent to conduct the intended operations.
 - (b) The operator shall ensure that the flight crew members successfully complete training and checking for all types of LVOs and operations with operational credits. Such training and checking shall:

- (1) include initial and recurrent training and checking;
 - (2) include normal, abnormal and emergency procedures;
 - (3) be tailored to the type of technologies used in the intended operations; and
 - (4) take into account the human factor risks associated with the intended operations.
- (c) The operator shall be responsible for keeping records of the training and qualifications of the flight crew members.
- (d) The training and checking shall be conducted by appropriately qualified personnel. In the case of flight and flight simulation training and checking, the personnel providing the training and conducting the checks shall be qualified in accordance with Annex I (Part-FCL) to Regulation (EU) No 1178/2011.

AMC1 SPA.LVO.120 Flight crew training and qualifications

GENERAL PROVISIONS

This AMC is deleted.

GM1 SPA.LVO.120 Flight crew training and qualifications

FLIGHT CREW TRAINING

This GM is deleted.

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/RVR for LVOs, this should be stated in the operations manual.

AMC2 SPA.LVO.120(a) Flight crew competence

RECENT EXPERIENCE REQUIREMENTS FOR EFVS OPERATIONS

- (a) Pilots should complete a minimum of two approaches using the operator's procedures for EFVS operations during the validity period of the periodic demonstration of competence unless credits related to currency 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.

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 using HUD 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 HUD;

- (b) 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.

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 provisions in points (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 be applicable 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.

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 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 (a) 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:
- (1) The check should require the execution of:
 - (i) at least one LVTO in the minimum approved visibility;
 - (ii) at least one rejected take-off at minimum authorised RVR in an aircraft or FSTD;
 - (2) 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).

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**

The operator should ensure that the flight crew members have completed 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 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 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;
- (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 (LVO with aircraft and all equipment serviceable) — objectives:
 - (A) understand the operation of equipment required for LVO;
 - (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 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 or equivalent display systems during all phases of flight, if applicable;
 - (C) approach using the appropriate flight guidance, autopilots, and control systems installed in 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 or equivalent display systems, down to the appropriate DH followed by 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 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 status of automatic flight control/guidance systems including HUD 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 HUD 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 HUD 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 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) 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 HUD 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 ZFT training, two landings;

- (B) otherwise, three landings, or if the training required by (a)(2) was conducted in an FSTD qualified for ZFT training, one landing;
- (ii) For low-visibility operations using autoland:
 - (A) if the training required by (a)(2) was conducted in an FSTD qualified for ZFT training, one landing, or none if the flight crew member successfully completed a type rating based on ZFT training;
 - (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 type 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) technology used in flight guidance and flight control system;
 - (ii) operating procedures;
 - (iii) handling characteristics; and
 - (iv) use of HUD 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 the following number of landings:
 - (i) if a HUD 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) technology used in flight guidance and flight control system;
 - (ii) operating procedures;
 - (iii) handling characteristics; and
 - (iv) use of HUD 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.

AMC3 SPA.LVO.120(b) Flight crew competence

INITIAL TRAINING AND CHECKING FOR EFVS OPERATIONS

The operator should ensure that the flight crew members have completed the following conversion training before being authorised to conduct EFVS operations unless credits related to training and checking 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 HUDs 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 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 or equivalent display systems during all phases of flight;
 - (C) approach using the EFVSs installed in 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 missed approach, all without external visual reference;
 - (E) where appropriate, approaches using approved EFVS to touchdown.
- (iii) Phase two (low-visibility approach 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 status of the EFVS including HUD 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 type 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) technology used in 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) technology used in 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.

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 demonstration of competence by completing at least the following exercises in an aircraft or FSTD:
 - (1) Rejected take-off at minimum authorised RVR;
 - (2) Low-visibility approaches in simulated instrument flight conditions down to the applicable DH, using 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;
 - (3) Go-around after approaches as indicated in (2) on reaching the DH; and
 - (4) 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.
- (b) During each required operator proficiency check or demonstration of competence:

- (1) Pilots authorised to conduct low-visibility approach operations or operations with operational credits using HUD or equivalent display systems to touchdown should complete at least two low-visibility approaches, one of which should be a landing at the lowest approved RVR.
 - (2) Other pilots authorised to conduct low-visibility approach operations or operations with operational credits should complete at least one low-visibility approach and go-around.
- (c) Pilots authorised to conduct CAT III operations on aircraft with a fail-passive flight control system, including HUD 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.
- (d) Pilots authorised for LVTO in an RVR of less than 150 m should additionally conduct at least one LVTO in the minimum approved visibility.

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 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.

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 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.

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 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.

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 AMC4 SPA.LVO.120 or AMC5 SPA.LVO.120, 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.



LVO / operational credit	Technology	Previous experience	Reference	Initial practical (FSTD) training	Line flying under supervision (LIFUS) (if required)	Recent experience and recurrent training	Notes
CAT II	Manual	none	AMC2 SPA.LVO.120(b) point (a)(2)(v)	6 approaches	3 landings or 1 landing ¹	1 approach (aircraft) + 1 approach to G/A (FSTD) Total 2 approaches	
		Previously qualified with the same operator, similar type	AMC2 SPA.LVO.120(b) point (b)(2)	2 approaches	none	1 approach (aircraft) + 1 approach to G/A (FSTD) Total 2 approaches	
		Previously qualified with a different EU operator, same type and variant	AMC2 SPA.LVO.120(b) point (c)(2)	2 approaches	none	1 approach (aircraft) + 1 approach to G/A (FSTD) Total 2 approaches	
		Previously qualified with a different EU operator, similar type	AMC2 SPA.LVO.120(b) point (c)(2)	2 approaches	3 landings or 1 landing ¹	1 approach (aircraft) + 1 approach to G/A (FSTD) Total 2 approaches	
CAT II / III SA CAT I SA CAT II	Autoland	none	AMC2 SPA.LVO.120(b) point (a)(4)(ii)	6 approaches	2 landings or 1 landing ¹ or no landings ²	1 approach (aircraft) + 1 approach to G/A (FSTD) Total 2 approaches	
		Previously qualified with the same operator, similar type	AMC2 SPA.LVO.120(b) point (b)(2)	2 approaches	None	1 approach (aircraft) + 1 approach to G/A (FSTD) Total 2 approaches	
		Previously qualified with a different EU operator, same type and variant	AMC2 SPA.LVO.120(b) point (c)(2)	2 approaches	none	1 approach (aircraft) + 1 approach to G/A (FSTD) Total 2 approaches	
		Previously qualified with a different EU operator, similar type	AMC2 SPA.LVO.120(b) point (c)(2)	2 approaches	2 landings or 1 landing ¹ or no landings ²	1 approach (aircraft) + 1 approach to G/A (FSTD) Total 2 approaches	



CAT II / III SA CAT I SA CAT II	HUD / manual landing	none	AMC2 SPA.LVO.120(b) point (a)(2)(v)	8 approaches	4 landings or 2 landings ¹	2 approaches (aircraft) + 2 approaches (FSTD) Total 4 approaches	
		Previously qualified with the same operator, similar type	AMC2 SPA.LVO.120(b) point (b)(2)	4 approaches	None	2 approaches (aircraft) + 2 approaches (FSTD) Total 4 approaches	
		Previously qualified with a different EU operator, same type and variant	AMC2 SPA.LVO.120(b) point (c)(2)	4 approaches	none	2 approaches (aircraft) + 2 approaches (FSTD) Total 4 approaches	
		Previously qualified with a different EU operator, similar type	AMC2 SPA.LVO.120(b) point (c)(2)	4 approaches	4 landings or 2 landings ¹	2 approaches (aircraft) + 2 approaches (FSTD) Total 4 approaches	
CAT II / III SA CAT I SA CAT II	HUD / automatic landing	none	AMC2 SPA.LVO.120(b) point (a)(4)	8 approaches	2 landings or 1 landing ¹ or no landings ²	2 approaches (aircraft) + 2 approaches (FSTD) Total 4 approaches	
		Previously qualified with the same operator, similar type	AMC2 SPA.LVO.120(b) point (b)(2)	4 approaches	None	2 approaches (aircraft) + 2 approaches (FSTD) Total 4 approaches	
		Previously qualified with a different EU operator, same type and variant	AMC2 SPA.LVO.120(b) point (c)(2)	4 approaches	None	2 approaches (aircraft) + 2 approaches (FSTD) Total 4 approaches	
		Previously qualified with a different EU operator, similar type	AMC2 SPA.LVO.120(b) point (c)(2)	4 approaches	2 landings or 1 landing ¹ or no landings ²	2 approaches (aircraft) + 2 approaches (FSTD) Total 4 approaches	
Approach using EFVS	(HUD)	none	AMC3 SPA.LVO.120(b) point (a)(2)	8 approaches	3 landings	2 approaches (aircraft) + 2 approaches (FSTD) Total 4 approaches	
		Previously qualified with the same	AMC3 SPA.LVO.120(b) point (b)(2)	2 approaches	None	2 approaches (aircraft) + 2 approaches (FSTD)	



		operator, similar type				Total 4 approaches	
		Previously qualified with a different EU operator, same type and variant	AMC3 SPA.LVO.120(b) point (c)(2)	2 approaches	none	2 approaches (aircraft) + 2 approaches (FSTD) Total 4 approaches	
		Previously qualified with a different EU operator, similar type	AMC3 SPA.LVO.120(b) point (c)(2)	2 approaches	3 landings	2 approaches (aircraft) + 2 approaches (FSTD) Total 4 approaches	
EFVS to land	HUD	none	AMC3 SPA.LVO.120(b) point (a)(2)	8 approaches	4 landings	2 approaches (aircraft) + 2 approaches (FSTD) Total 4 approaches	
		Previously qualified with the same operator, similar type	AMC3 SPA.LVO.120(b) point (b)(2)	4 approaches	None	2 approaches (aircraft) + 2 approaches (FSTD) Total 4 approaches	
		Previously qualified with a different EU operator, same type and variant	AMC3 SPA.LVO.120(b) point (c)(2)	4 approaches	none	2 approaches (aircraft) + 2 approaches (FSTD) Total 4 approaches	
		Previously qualified with a different EU operator, similar type	AMC3 SPA.LVO.120(b) point (1) (c)(2)	4 approaches	4 landings	2 approaches (aircraft) + 2 approaches (FSTD) Total 4 approaches	

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.



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.

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.



Annex VI
Non-commercial air operations with
complex motor-powered aircraft
(Part-NCC)

NCC.OP.101 Altimeter check and settings

- (a) The operator shall establish procedures for altimeter checking before each departure.
- (b) The operator shall establish procedures for altimeter settings for all phases of flight. If the State of the aerodrome or the State of the airspace has prescribed a different procedure from those established by the operator, that procedure shall be taken into account by the operator.

GM1 NCC.OP.101 Altimeter check and settings**ALTIMETER SETTING PROCEDURES**

The operator procedures should be aligned with the following paragraphs of ICAO Doc 8168 (PANS-OPS), Volume I:

- (a) 3.2 'Pre-flight operational test';
- (b) 3.3 'Take-off and climb';
- (c) 3.5 'Approach and landing'.

NCC.OP.110 Aerodrome operating minima — general

- ~~(a) For instrument flight rules (IFR) flights, the operator shall establish aerodrome operating minima for each departure, destination and alternate aerodrome to be used. Such minima shall:
 - ~~(1) not be lower than those established by the State in which the aerodrome is located, except when specifically approved by that State; and~~
 - ~~(2) when undertaking low visibility operations, be approved by the competent authority in accordance with Annex V (Part SPA), Subpart E to Regulation (EU) No 965/2012.~~~~
- ~~(b) When establishing aerodrome operating minima, the operator shall take the following into account:
 - ~~(1) the type, performance and handling characteristics of the aircraft;~~
 - ~~(2) the composition, competence and experience of the flight crew;~~
 - ~~(3) the dimensions and characteristics of the runways and final approach and take-off areas (FATOs) that may be selected for use;~~
 - ~~(4) the adequacy and performance of the available visual and non-visual ground aids;~~
 - ~~(5) the equipment available on the aircraft for the purpose of navigation and/or control of the flight path, during the take-off, the approach, the flare, the landing, the rollout and the missed approach;~~
 - ~~(6) the obstacles in the approach, the missed approach and the climb-out areas necessary for the execution of contingency procedures;~~~~

- ~~(7) — the obstacle clearance altitude/height for the instrument approach procedures;~~
- ~~(8) — the means to determine and report meteorological conditions; and~~
- ~~(9) — the flight technique to be used during the final approach.~~
- ~~(c) — The minima for a specific type of approach and landing procedure shall only be used if all the following conditions are met:~~
- ~~(1) — the ground equipment required for the intended procedure is operative;~~
- ~~(2) — the aircraft systems required for the type of approach are operative;~~
- ~~(3) — the required aircraft performance criteria are met; and~~
- ~~(4) — the crew is qualified appropriately.~~
- (a) The operator shall establish aerodrome operating minima for each departure, destination or alternate aerodrome planned to be used in order to ensure separation of the aircraft from terrain and obstacles and to mitigate the risk of loss of visual references during the visual flight segment of instrument operations.
- (b) The method used to establish aerodrome operating minima shall take the following elements into account:
- (1) the type, performance and handling characteristics of the aircraft;
 - (2) the equipment available on the aircraft for the purpose of navigation, acquisition of visual references and/or control of the flight path during take-off, approach, landing and missed approach;
 - (3) any conditions or limitations stated in the aircraft flight manual (AFM);
 - (4) the dimensions and characteristics of the runways/final approach and take-off area (FATO) that may be selected for use;
 - (5) the adequacy and performance of the available visual and non-visual aids and infrastructure;
 - (6) the obstacle clearance altitude/height (OCA/H) for the instrument approach procedures (IAPs);
 - (7) the obstacles in the climb-out areas and necessary clearance margins;
 - (8) any non-standard characteristics of the aerodrome, the IAP or the environment;
 - (9) the composition of the flight crew, their competence and experience;
 - (10) the IAP;
 - (11) the aerodrome characteristics and the available ANS;
 - (12) any minima that may be promulgated by the State of the aerodrome;
 - (13) the conditions prescribed in any specific approvals for LVOs or operations with operational credits; and
 - (14) the relevant operational experience of the operator.
- (c) The operator shall specify a method of determining aerodrome operating minima in the operations manual.

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 cloud conditions~~, 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.A.
- (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 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.A or Table 2.A.
- (iii) For single-engined turbine aeroplane operations approved in accordance with Subpart L (SET-IMC) of Annex V (Part-SPA) to this Regulation, 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 using 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 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 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.

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) $\geq 1\,200$ 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

- (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 MDH where applicable;
 - (3) the system minimum specified in Table 3.A;
 - (4) the minimum DH permitted for the runway specified in Table 4.A; or
 - (5) the minimum DH specified in the AFM or equivalent document, if stated.
- (b) The minimum descent height (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 3.A;

- (4) the lowest MDH permitted for the runway specified in Table 4.A; or
- (5) the lowest MDH specified in the AFM, if stated.

Table 2.A: System minima

Facility	Lowest DH/MDH (ft)
ILS/MLS/GLS	200
GNSS/SBAS (LPV)	200*
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 final approach segment (FAS) datablock sets a vertical alert limit not exceeding 35 m. Otherwise, the DH should not be lower than 250 ft.

Table 3.A: Runway type minima

Runway type	Lowest DH/MDH (ft)
PA runway category I	200
NPA runway	250
Non-instrument runway	Circling minima as shown in Table 1 in NCC.OP.112
Non-instrument FATO/runway for helicopters	250

AMC5 NCC.OP.110 Aerodrome operating minima — general**DETERMINATION OF RVR/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) × 0.3048) / tan α] — 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 auto-land 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 \geq 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



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)			
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



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)			
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 4.A; or
 - (2) The minimum RVR or VIS determined according to the MDH or DH and class of lighting facility according to Table 5.A; or
 - (3) The minimum RVR or VIS according to the visual and non-visual aids and on-board equipment used according to Table 6.A.
- (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, 200 m should be added to the calculated RVR 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 5.A.
- (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 10.
- (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.

Table 4.A: Type of runway vs minimum RVR or VIS

Type of runway	Minimum RVR or VIS (m)
Precision approach runway, category I	550
Non-precision approach runway	750
Non-instrument runway	According to Table 1 in NCC.OP.112

Table 5.A: RVR/CMV vs DH/MDH

DH or MDH (ft)			Class of lighting facility			
			FALS	IALS	BALS	NALS
			RVR/CMV (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

DH or MDH (ft)			Class of lighting facility			
			FALS	IALS	BALS	NALS
			RVR/CMV (m)			
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 6.A: Visual and non-visual aids and/or on-board equipment vs minimum RVR — Multi-pilot operations

Type of approach	Facilities	Lowest RVR (m)	
		Multi-pilot	Single-pilot



		operations	operations
3D operations	RTZL and 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	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 7: 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 (e.g. HIALS, MALS or ALS 210–419 m)
NALS	Any other approach lighting system (e.g. HIALS, MALS or ALS <210 m) or no approach lights

AMC8 NCC.OP.110 Aerodrome operating minima — general

CONVERSION OF REPORTED METEOROLOGICAL VISIBILITY (VIS) TO RVR/CMV

- (a) A conversion from meteorological visibility VIS 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 the purpose of continuation approach in low-visibility operations.
- (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 VIS to RVR in circumstances other than those in (a), the conversion factors specified in Table 58 should be used.

Table 59: Conversion of reported meteorological visibility VIS to RVR/CMV

Light elements in operation	RVR/CMV = reported VIS meteorological visibility	
	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 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 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 6-10 and, if considered necessary, the approach should be abandoned.

(b) Conditions applicable to Table 6-10:

- (1) multiple failures of runway/FATO lights other than indicated in Table 6-10 should not be acceptable;
- (2) deficiencies of approach and runway/FATO lights are treated separately; and
- (3) failures other than ILS, MLS affect the RVR only and not the DH.

Table 6-10: 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 standby transmitter	No effect	
Outer marker	No effect if replaced by height check at	APV — not applicable
		NPA with FAF: no effect unless used as FAF

Failed or downgraded equipment	Effect on landing minima	
	CAT-I Type B	APV, NPA Type A
	1 000 ft the required height or glide path can be checked using other means, e.g. DME fix	If the FAF cannot be identified (e.g. no method available for timing of descent), non-precision operations cannot be conducted
Middle marker	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	No effect if flight director (F/D), HUDLS or autoland; otherwise RVR of 750 m	No effect
Centreline lights spacing increased to 30 m	No effect	
Touchdown zone TDZ lights	No effect if F/D, HUDLS or autoland; otherwise RVR 750 m	No effect
Taxiway lighting system	No effect	



GM1 NCC.OP.110 Aerodrome operating minima — general
AIRCRAFT CATEGORIES

(...)

Table 11: Aircraft categories corresponding to V_{AT} values

(...)

GM4 NCC.OP.110 Aerodrome operating minima — general

APPROACH LIGHTING SYSTEMS — ICAO, FAA

The following table provides a comparison of the ICAO and FAA specifications.

Table 12: 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

GM6 NCC.OP.110 Aerodrome operating minima — general
SBAS OPERATIONS

- (a) SBAS CAT I 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.



GM7 NCC.OP.110 Aerodrome operating minima — general

MEANS TO DETERMINE THE REQUIRED RVR BASED ON DH AND LIGHTING FACILITIES

(a) The values in Table 5.A are derived from the formula below:

$$\text{Required RVR or VIS (m)} = [(DH/MDH \text{ (ft)} \times 0.3048)/\tan\alpha] - \text{length of approach lights (m)},$$

where α is the calculation angle, being a default value of 3.00° increasing in steps of 0.10° for each line in Table 5.A up to 3.77° and then remaining constant.

(b) The lighting system classes in Table 5.A have the meaning specified in Table 13.

Table 13: 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 (e.g. HIALS, MALS or ALS 210–419 m)
NALS	Any other approach lighting system (e.g. HIALS, MALS or ALS <210 m) or no approach lights

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 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.

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 and single-pilot operations.

GM10 NCC.OP.110 Aerodrome operating minima — general
USE OF COMMERCIALY AVAILABLE INFORMATION

When an operator uses commercially available information for Part C of the operations manual, the operator remains responsible for ensuring that the material used is accurate, suitable for its operation, and that aerodrome operating minima are calculated in accordance with the method approved by the competent authority.

The operator should apply the procedures in ORO.GEN.205 'Contracted activities'.

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.

NCC.OP.111 Aerodrome operating minima — NPA, APV, CAT I operations

This IR is deleted. Its text is incorporated in the new AMC4 NCC.OP.110.

NCC.OP.112 Aerodrome operating minima — circling operations with aeroplanes

- (a) The MDH for a circling approach operation with aeroplanes shall not be lower than the highest of:
- (1) the published circling OCH for the aeroplane category;
 - (2) the minimum circling height derived from Table 1; or
 - (3) the DH/MDH of the preceding instrument approach procedure IAP.
- (b) The minimum visibility for a circling approach operation with aeroplanes shall be the highest of:
- (1) the circling visibility for the aeroplane category, if published; or
 - (2) the minimum visibility derived from Table 2; ~~1. or~~
 - (3) ~~the runway visual range/converted meteorological visibility (RVR/CMV) of the preceding instrument approach procedure.~~

Table 1

MDH and minimum VIS for circling vs 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

GM1 NCC.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) When reaching the published instrument MAPt and the pilot cannot establish the conditions stipulated in (c)(2) ~~are unable to be established by the pilot~~, a missed approach should be carried out in accordance with that ~~instrument approach procedure~~ 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:
- ~~to~~ attain a controlled and stable descent path to the intended landing runway; and
 - ~~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.
- The aeroplane should remain on the initial ~~instrument approach procedure~~ IAP until one of the following is reached:
 - the prescribed divergence point to commence circling on the prescribed track; or
 - the MAPt.
 - 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
- Missed approach during the instrument procedure prior to circling:
 - 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
 - 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.
- (...)

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.

NCC.OP.195 Take-off conditions

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

- (a) ~~according to the information available, the weather~~ the meteorological conditions at the aerodrome or the operating site and the condition of the runway or/FATO intended to be used ~~would~~ will not prevent a safe take-off and departure; and
- ~~(b) the applicable aerodrome minima will be complied with.~~
- (b) the selected aerodrome operating minima are consistent with:
 - (1) the operative ground equipment,
 - (2) the operative aircraft systems;
 - (3) the aircraft performance; and
 - (4) flight crew qualifications.

NCC.OP.225 Approach and landing conditions

Before commencing an approach to land operation, the pilot-in-command shall verify ~~be satisfied~~ that, ~~according to the information available, the weather~~

- (a) the meteorological conditions at the aerodrome or the operating site and the condition of the runway or/FATO intended to be used will ~~would~~ not prevent a safe approach, landing or missed approach go-around, considering the performance information contained in the operations manual; and
- (b) the selected aerodrome operating minima are consistent with:
 - (1) the operative ground equipment;
 - (2) the operative aircraft systems;
 - (3) the aircraft performance; and
 - (4) flight crew qualifications.

NCC.OP.230 Commencement and continuation of approach

- ~~(a) The pilot in command may commence an instrument approach regardless of the reported runway visual range/visibility (RVR/VIS).~~
- ~~(b) If the reported RVR/VIS is less than the applicable minimum the approach shall not be continued:~~
 - ~~(1) below 1 000 ft above the aerodrome; or~~
 - ~~(2) into the final approach segment in the case where the decision altitude/height (DA/H) or minimum descent altitude/height (MDA/H) is more than 1 000 ft above the aerodrome.~~

- (c) ~~Where the RVR is not available, RVR values may be derived by converting the reported visibility.~~
- (d) ~~If, after passing 1 000 ft above the aerodrome, the reported RVR/VIS falls below the applicable minimum, the approach may be continued to DA/H or MDA/H.~~
- (e) ~~The approach may be continued below DA/H or MDA/H and the landing may be completed provided that the visual reference adequate for the type of approach operation and for the intended runway is established at the DA/H or MDA/H and is maintained.~~
- (f) ~~The touchdown zone RVR shall always be controlling.~~
- (a) If the reported visibility or controlling RVR for the runway to be used for landing is less than the applicable minimum, then an instrument approach operation shall not be continued:
- (1) past a point at which the aircraft is 1 000 ft above the aerodrome elevation; or
 - (2) if the DH or MDH is higher than 1 000 ft into the FAS.
- (b) If the required visual reference is not established, a missed approach shall be executed at or before the DA/H or the MDA/H.
- (c) If the required visual reference is not maintained after the DA/H or the MDA/H, a go-around shall be executed promptly.

AMC1 NCC.OP.230 Commencement and continuation of approach

VISUAL REFERENCES FOR INSTRUMENT APPROACH OPERATIONS RVR MINIMA FOR CONTINUED APPROACH

(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 CDEFA 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 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, converted meteorological visibility (CMV) should be used.

GM1 NCC.OP.230 Commencement and continuation of approach

APPLICATION OF RVR OR VIS REPORTS

- (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 in the FAS as applicable.
- (b) 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.
- (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. 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.

AMC1 NCC.OP.230(a) Commencement and continuation of approach

APPROACHES WITH NO INTENTION TO LAND

If the intention is to execute a missed approach at or before the DA/H or the MDA/H, for example for training, then the approach may be continued regardless of the reported RVR or VIS. Such operations should be coordinated with air traffic services (ATS).

AMC1 NCC.OP.230(b) 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; or
- (j) other visual references specified in the operations manual.

NCC.OP.235 EFVS 200 operations

An operator intending to conduct EFVS 200 operations with operational credits and without a specific approval shall ensure that:

- (a) the aircraft is certified for the intended operations;
- (b) only runways and IAPs suitable for EFVS operations are used;
- (c) the flight crew are competent to conduct the intended operation and that a training and checking programme for the flight crew members and relevant personnel involved in the flight preparation is established;
- (d) operating procedures are established;
- (e) any relevant information is documented in the minimum equipment list (MEL);
- (f) any relevant information is documented in the maintenance programme;
- (g) safety assessments are carried out and performance indicators are established to monitor the level of safety; and
- (h) the aerodrome operating minima take into account the capability of the system used.

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(b).
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(b).

(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 NCC.OP.235(h).

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 NCC.OP.230.

Pilots conducting EFVS 200 operations 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(h) 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) EFVS image requirements at the DA/H are specified in AMC1 NCC.OP.235(d).

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(b) 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) Use of EFVS to touchdown

In order to use an 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(b) 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.

AMC1 NCC.OP.235(a) EFVS 200 operations
EQUIPMENT CERTIFICATION

- (a) For EFVS 200 operations, the aircraft should be equipped with an approach system using EFVS (EFVS-A) or a landing system using EFVS (EFVS-L).
- (b) Legacy systems that have been certificated as 'EVS with an operational credit' may be considered an approach system using EFVS only if approved by the operator's competent authority.

AMC1 NCC.OP.235(b) 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:
 - (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.

AMC2 NCC.OP.235(b) EFVS 200 operations

VERIFYING 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)¹⁵ 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.
 - (4) Obstacles that require visual identification and avoidance are not acceptable.
 - (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.

¹⁵ https://www.faa.gov/regulations_policies/orders_notices/index.cfm/go/document.information/documentID/1032731



AMC1 NCC.OP.235(c) 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 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) preflight 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 to 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 in 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 missed approach, all without external visual reference, as appropriate.
- (3) Phase two (low-visibility approach 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 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.

AMC2 NCC.OP.235(c) EFVS 200 operations

RECURRENT TRAINING AND CHECKING FOR EFVS 200 OPERATIONS

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 four approaches, of which one should be flown without natural vision to 200 ft.

AMC3 NCC.OP.235(c) 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.

AMC4 NCC.OP.235(c) 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 training whenever there is a change to any of the following:
- (1) the technology used in 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.

AMC5 NCC.OP.235(c) 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 the flight crew member should complete the required FSTD training for each operating capacity.

GM1 NCC.OP.235(c) 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.

AMC1 NCC.OP.235(d) EFVS 200 operations

OPERATING PROCEDURES FOR EFVS 200 OPERATIONS



- (a) The following provisions should apply to 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;
 - (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.

AMC1 NCC.OP.235(h) EFVS 200 operations
AERODROME OPERATING MINIMA — EFVS 200 OPERATIONS

The following provisions should apply to 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 Table 3.A in AMC5 NCC.OP.110 in accordance with Table 1:

Table 1: Operations utilising EFVS: RVR reduction

RVR (m) presented in Table 3.A in AMC5 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
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



Annex VII
Non-commercial air operations with
other-than complex motor-powered aircraft
(Part-NCO)

Note: the wording of this Part is in final development stage by the dedicated Part-NCO OPS task force group; outcome will be published as part of the AWO Opinion



**Annex VIII
Specialised operations
(Part-SPO)**

NOTE: IN DEVELOPMENT



3.2. Proposed changes — aircrew

Note: There is not any air-crew-related soft law; no soft law elements have been added, so only hard law elements (for reference purposes) are presented

Annex I Flight Crew Licensing

Note: Annex I to Commission Regulation (EU) No 1178/2011 is amended as follows:

- (1) FCL.605, on IR privileges,

FCL.605 IR — Privileges

- ~~(a) The privileges of a holder of an IR are to fly aircraft under IFR with a minimum decision height of 200 feet (60 m).~~
- ~~(b) In the case of a multi-engine IR, these privileges may be extended to decision heights lower than 200 feet (60 m) when the applicant has undergone specific training at an ATO and has passed section 6 of the skill test prescribed in Appendix 9 to this Part in multi-pilot aircraft.~~
- ~~(c) Holders of an IR shall exercise their privileges in accordance with the conditions established in Appendix 8 to this Part.~~
- ~~(d) Helicopters only. To exercise privileges as PIC under IFR in multi-pilot helicopters, the holder of an IR(H) shall have at least 70 hours of instrument time of which up to 30 hours may be instrument ground time.~~

is replaced with the following:

FCL.605 IR — Privileges

(a) Privileges

The privileges of holders of an IR are to fly aircraft under IFR, including PBN operations, with a minimum decision height of no less than 200 ft (60 m).

(b) Conditions

- (1) Holders of an IR shall exercise their privileges in accordance with the conditions established in Appendix 8 to this Annex (Part-FCL).

(2) Helicopters only

To exercise privileges as PIC under IFR in multi-pilot helicopters, holders of an IR(H) shall have at least 70 hours of instrument time, of which up to 30 hours may be instrument ground time.'

- (2) Appendix 9 'Training, skill test and proficiency check for MPL, ATPL, type and class ratings, and proficiency check for IRs' of Part-FCL is amended as follows:

- (a) Point 2 of Section B is replaced by the following:

2. In the case of multi-pilot and single-pilot high performance complex aeroplanes, the applicant shall pass all sections of the skill test or proficiency check. Failure of more than five items will require the applicant to take the entire test or check again. Any applicant failing five or less items shall take the failed items again. Failure in any item on the re-test or re-check including those items that have been passed at a previous attempt will require the applicant to take the entire check or test again. Section 6 is not part of the ATPL or MPL skill test. If the applicant only fails or does not take section 6, the type rating will be issued without CAT II or CAT III privileges. To extend the type rating privileges to CAT II or CAT III, the applicant shall pass the section 6 on the appropriate type of aircraft.

‘2. In the case of multi-pilot and single-pilot high-performance complex aeroplanes, applicants shall pass all sections of the skill test or proficiency check. Failure in more than five items will require applicants to take the entire test or check again. Applicants failing five or fewer items shall take the failed items again. Failure in any item of the retest or recheck, including those items that have been passed on a previous attempt, will require the applicant to take the entire check or test again.’

- (b) In the table following point 6 of Section B,
 - (i) the row with ‘General remarks’ before the headline ‘Section 6’;
 - (ii) Section 6 comprising exercises 6.1 to 6.4; and
 - (iii) the ‘Note’ following exercise 6.4

are deleted:

MULTI-PILOT AEROPLANES AND SINGLE- PILOT HIGH-PERFORMANCE COMPLEX AEROPLANES	PRACTICAL TRAINING					ATPL/MPL/TYPE RATING SKILL TEST OR PROF. CHECK	
	OTD	FTD	FFS	A	Instru- ctor initials when train- ing comp- leted	Chkd in FFS A	Examiner initials when test completed
Manoeuvres/Procedures							
.....							
.....							
.....							
SECTION 6							



<p>Additional authorisation on a type rating for instrument approaches down to a decision height of less than 60 m (200 ft) (CAT II/III).</p> <p>The following manoeuvres and procedures are the minimum training requirements to permit instrument approaches down to a DH of less than 60 m (200 ft). During the following instrument approaches and missed approach procedures all aeroplane equipment required for type certification of instrument approaches down to a DH of less than 60 m (200 ft) shall be used.</p>						
<p>6.1* Rejected take-off at minimum authorised RVR</p>		<p>P* →</p>	<p>→X</p> <p>An aircraft may not be used for this exercise</p>		<p>M*</p>	
<p>6.2* ILS approaches: in simulated instrument flight conditions down to the applicable DH, using flight guidance system. Standard procedures of crew coordination (task sharing, call out procedures, mutual surveillance, information exchange and support) shall be observed</p>		<p>P →</p>	<p>→</p>		<p>M</p>	
<p>6.3* Go-around: after approaches as indicated in 6.2 on reaching DH. The training shall also include a go-around due to (simulated) insufficient RVR, wind shear, aeroplane deviation in excess of approach limits for a successful approach,</p>		<p>P →</p>	<p>→</p>		<p>M*</p>	



and ground/airborne equipment failure prior to reaching DH and, go-around with simulated airborne equipment failure.							
6.4* Landing(s): with visual reference established at DH following an instrument approach. Depending on the specific flight guidance system, an automatic landing shall be performed			P→	→		M	
Note: CAT II/III operations shall be accomplished in accordance with the applicable air operations requirements							

(c) Point 1 of Section D is replaced by the following:

~~1. In the case of skill tests or proficiency checks for powered lift aircraft type ratings, the applicant shall pass sections 1 to 5 and 6 (as applicable) of the skill test or proficiency check. Failure in more than five items will require the applicant to take the entire test or check again. An applicant failing not more than five items shall take the failed items again. Failure in any item of the re-test or re-check or failure in any other items already passed will require the applicant to take the entire test or check again. All sections of the skill test or proficiency check shall be completed within 6 months.~~

1. In the case of skill tests or proficiency checks for powered-lift aircraft type ratings, applicants shall pass Sections 1 to 5 of the skill test or proficiency check. Failure in more than five items will require applicants to repeat the entire test or check. Applicants failing not more than five items shall repeat the failed items. Failure in any item in the case of a retest or a recheck or failure in any other items already passed will require applicants to repeat the entire test or check. All sections of the skill test or proficiency check shall be completed within 6 months.'

(d) In point 6(a) of Section D, the phrase 'and if applicable, section 6' is deleted:

6(a) Applicants for the skill test for the issue of the powered-lift aircraft type rating shall ~~take pass s~~Sections 1 to 5 and, if applicable, section 6.

(e) In point 6(b) of Section D, the phrase 'and/or 7' is deleted:

6(b) Applicants for the revalidation or renewal of the powered-lift aircraft type rating proficiency check shall ~~take pass s~~Sections 1 to 5 and, if applicable ~~s~~Section 6 ~~and/or 7~~.

(f) In the table following point 8 of Section D, Section 6 comprising exercises 6.1 to 6.4 is deleted, and Section 7 'Optional equipment' is renumbered to read 'Section 6':

POWERED-LIFT AIRCRAFT CATEGORY	PRACTICAL TRAINING					SKILL TEST OR PROFICIENCY CHECK	
	OTD	FTD	FFS	PL	Instructor or initials when training completed	Checked in FFS PL	Examiner initials when test completed
Manoeuvres/procedures							
.....							
.....							
.....							
SECTION 6 — Additional authorisation on a type rating for instrument approaches down to a decision height of less than 60 m (CAT II/III)							
6. Additional authorisation on a type rating for instrument approaches down to a decision height of less than 60 m (CAT II/III). The following manoeuvres and procedures are the minimum training requirements to permit instrument approaches down to a DH of less than 60 m (200 ft). During the following instrument approaches and missed approach procedures all powered lift aircraft equipment required for the type certification of instrument approaches down to a DH of less than 60 m (200 ft) shall be used							
6.1 Rejected take-off at minimum authorised RVR		P	→			M*	
6.2 ILS approaches in simulated instrument flight conditions down to the applicable DH, using flight guidance system. Standard procedures of crew		P	→	→		M*	



coordination (SOPs) shall be observed							
6.3 Go-around after approaches as indicated in 6.2 on reaching DH. The training shall also include a go-around due to (simulated) insufficient RVR, wind shear, aircraft deviation in excess of approach limits for a successful approach, ground/airborne equipment failure prior to reaching DH, and go-around with simulated airborne equipment failure		P	→	→		M*	
6.4 Landing(s) with visual reference established at DH following an instrument approach. Depending on the specific flight guidance system, an automatic landing shall be performed		P	→			M*	
SECTION 76 — Optional equipment							
7.6. Use of optional equipment		P	→	→			

(g) Point 1 of Section E

~~1. In the case of skill tests or proficiency checks for airship type ratings the applicant shall pass sections 1 to 5 and 6 (as applicable) of the skill test or proficiency check. Failure in more than five items will require the applicant to take the entire test/check again. An applicant failing not more than five items shall take the failed items again. Failure in any item of the re-test/re-check or failure in any other items already passed will require the applicant to take the entire test/check again. All sections of the skill test or proficiency check shall be completed within 6 months.~~

is replaced by the following:

1. In the case of skill tests or proficiency checks for airship type ratings, applicants shall pass Sections 1 to 5 of the skill test or proficiency check. Failure in more than five items will require applicants to take the entire test or check. Applicants failing not more than five items, shall take the failed items again. Failure in any item in the case of a retest or a recheck, or failure in any other items already passed will require applicants to repeat the

entire test or check again. All sections of the skill test or proficiency check shall be completed within 6 months.'

(h) In point 6(a) of Section E, the phrase 'and, if applicable, section 6' is deleted:

6(a) Applicants for the skill test for the issue of the airship shall take pass Sections 1 to 5 and, if applicable, section 6.

(i) In point 6(b) of Section E, the phrase 'and, if applicable, section 6' is deleted:

6(b) Applicants for the revalidation or renewal of the airship type rating proficiency check shall take pass Sections 1 to 5 and, if applicable section 6.

(j) In the table after point 8 of Section E, Section 6 comprising exercises 6.1 to 6.4 is deleted, and Section 7 'Optional equipment' is renumbered to read 'Section 6':

POWERED-LIFT AIRCRAFT CATEGORY	PRACTICAL TRAINING					SKILL TEST OR PROFICIENCY CHECK	
	OTD	FTD	FFS	As	Instructor or initials when training completed	Checked in FFS As	Examiner initials when test completed
Manoeuvres/Procedures							
.....							
.....							
.....							
SECTION 6 — Additional authorisation on a type rating for instrument approaches down to a decision height of less than 60 m (CAT II/III)							
6. Additional authorisation on a type rating for instrument approaches down to a decision height of less than 60 m (CAT II/III). The following manoeuvres and procedures are the minimum training requirements to permit instrument approaches down to a DH of less than 60 m (200 ft). During the following instrument approaches and							



missed approach procedures all airship equipment required for the type certification of instrument approaches down to a DH of less than 60 m (200 ft) shall be used.							
6.1 Rejected take-off at minimum authorised RVR		P	→			M*	
6.2 ILS approaches in simulated instrument flight conditions down to the applicable DH, using flight guidance system. Standard procedures of crew coordination (SOPs) shall be observed		P	→	→		M*	
6.3 Go-around After approaches as indicated in 6.2 on reaching DH. The training shall also include a go-around due to (simulated) insufficient RVR, wind shear, aircraft deviation in excess of approach limits for a successful approach, and ground/airborne equipment failure prior to reaching DH and, go-around with simulated airborne equipment failure.		P	→	→		M*	
6.4 Landing(s) With visual reference established at DH following an instrument approach. Depending on the specific flight guidance system, an automatic landing shall be performed		P	→			M*	
SECTION 76 — Optional equipment							
7. 6. Use of optional equipment		P	→				

