AERODROME OPERATING MINIMUMS - EASA AIR OPERATIONS

General and Aeroplane Specific Material (2016)

1 GENERAL

On 5 October 2012 the Commission Regulation (EU) No 965/2012 and related documents were published, 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.

The European Aviation Safety Agency (EASA) publishes Regulations on Air Operations with the associated Decisions containing Acceptable Means of Compliance (AMC) and Guidance Material (GM).

On JEPPESEN approach and aerodrome charts an inverse printed **"Standard"** label in the upper left corner of the minimums band indicates that the minimums are derived according to the requirements described in EASA Air Operations documents.

The following explanation is an excerpt to summarize only the relevant parts of the EASA Air Operations (EASA Air OPS) regarding the methods used to determine Aerodrome Operating Minimums (Rules, AMC or GM). It is not intended to provide all the requirements of the EASA Air OPS related documents.

The publication of EASA Air Operations landing and take-off minimums on Jeppesen charts does not constitute authority for their use by every operator. Each individual operator is responsible for validating that the appropriate approval has been obtained for their use.

In addition, the minimums are only considered applicable if:

- the required ground equipment for the intended procedure is operative; and
- the required aircraft systems for the type of approach are operative; and
- the required aircraft performance criteria are met; and
- the crew is qualified accordingly.

2 TERMINOLOGY

Acceptable Means of Compliance (AMC) — means non-binding standards adopted by the Agency to illustrate means to establish compliance with Regulation (EC) No 216/2008 and its Implementing Rules.

CAT.OP.MPA.xxx — Implementing rule (IR) from regulation for PART-CAT (Commercial Air Transport Operations)

SPA.LVO.xxx — Implementing rule from regulation for PART-SPA (Specific Approvals)

AMC1 CAT.OP.MPA.115 — Acceptable Means of Compliance to the related IR CAT.OP.MPA.115

GM1 CAT.OP.MPA.110 — Guidance Material to the related IR CAT.OP.MPA.110

3 OPERATORS RESPONSIBILITY

CAT.OP.MPA.110 Aerodrome operating minimums

a. An operator shall establish aerodrome operating minimums for each departure, destination or alternate aerodrome planned to be used. These minimums 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 minimums.

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 minimums if approved in accordance with SPA.LVO.

c. When establishing aerodrome operating minimums, 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 (FATO) 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 navigation and/or control of the flight path during the take-off, the approach, the flare, the landing, the roll-out 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 the contingency procedures;
   7. the obstacle clearance altitude/height for the instrument approach procedure;
   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 minimums in the operations manual.

e. The minimums 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.

GM1 CAT.OP.MPA.110(a) Aerodrome operating minimums

INCREMENTS SPECIFIED BY THE COMPETENT AUTHORITY

Additional increments to the published minimums may be specified by the competent authority to take into account certain operations, such as downwind approaches and single-pilot operations.

4 LOW VISIBILITY OPERATIONS

SPA.LVO.100 Low visibility operations

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) minimums by no more than one third of the published RVR.

SPA.LVO.115 Aerodrome related requirements

a. The operator shall not use an aerodrome for LVOs below a visibility of 800m unless:
   1. the aerodrome has been approved for such operations by the State of the aerodrome; and
   2. low visibility procedures (LVP) have been established.
b. If the operator selects an aerodrome where the term LVP is not used, the operator shall ensure that there are equivalent procedures that adhere to the requirements of LVP at the aerodrome. This situation shall be clearly noted in the operations manual or procedures manual including guidance to the flight crew on how to determine that the equivalent LVP are in effect.

5 APPROACH FLIGHT TECHNIQUE

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

a. All approaches shall be flown as stabilised approaches 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. Nothwithstanding 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 200m for category A and B aeroplanes and by 400m 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.

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 stabilized manner, without significant vertical path changes during the final approach segment descent to the runway. This technique applies to an approach with no vertical guidance and controls the descent path until the DA/H. 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.
   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 minimums as identified by the operator's management system and should be specified in the OM (aerodrome operating minimums).
   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.
   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.

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

NPA OPERATIONS WITHOUT APPLYING THE CDFA TECHNIQUE

a. In case the CDFA technique is not used, the approach should be flown to an altitude/height at or above the MDA/H where a level flight segment at or above MDA/H may be flown to the MAPt.

e. The procedures that are flown with level flight at/or above MDA/H should be listed in the OM.

6 MET VISIBILITY/RVR/CMV

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

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

AMC10 CAT.OP.MPA.110 Aerodrome operating minimums

CONVERSION OF REPORTED METEOROLOGICAL VISIBILITY TO RVR

a. A conversion from meteorological visibility to RVR/CMV should not be used:

1. when reported RVR is available;
2. for calculating take-off minimums; and
3. for any RVR minimums less than 800m.

b. If the RVR is reported as being above the maximum value assessed by the aerodrome operator, e.g. “RVR more than 1500m”, it should not be considered as a reported value for a.1.

c. When converting meteorological visibility to RVR in circumstances other than those in a., the conversion factors specified in Table 8 should be used.

AMC10 CAT.OP.MPA.110 Table 8 Conversion of reported MET VIS to CMV

Light Elements in Operation	CMV = Reported Meteorological Visibility x Conversion Factor	
	Day	Night
High intensity 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

7 APPROACH LIGHT SYSTEMS

AMC5 CAT.OP.MPA.110 Aerodrome operating minimums

APPROACH LIGHTING SYSTEMS

AMC5 CAT.OP.MPA.110 Table 4 Approach Lighting Systems

Class of Lighting Facilities	Length, Configuration and Intensity of Approach Lights
FALS	CAT I approach lighting system (HIALS ≥ 720m) distance coded centerline, Barrette centerline
IALS	Simple approach lighting system (HIALS 420-719m) single source, Barrette
BALS	Any other approach lighting system (HIALS or MIALS or ALS 210-419m)
NALS	Any other approach lighting system (HIALS, MIALS or ALS < 210m) or no approach lights

8 DETERMINATION OF AOM FOR TAKE-OFF

AMC1 CAT.OP.MPA.110 Aerodrome operating minimums

TAKE-OFF OPERATIONS - AEROPLANES

a. General

1. Take-off minimums should be expressed as visibility or runway visual range (RVR) limits, taking into account all relevant factors for each aerodrome planned to be used and aircraft characteristics. Where there is a specific need to see and avoid obstacles on departure and/or for a forced landing, additional conditions, e.g. ceiling, should be specified.
2. The commander should not commence take-off unless the weather conditions at the aerodrome of departure are equal to or better than the applicable minimums for landing at that aerodrome unless a weather-permissible take-off alternate aerodrome is available.
3. When the reported meteorological visibility (VIS) is below that required for take-off and RVR is not reported, a take-off should only be commenced if the commander can determine that the visibility along the take-off runway is equal to or better than the required minimum.
4. When no reported meteorological visibility or RVR is available, a take-off should only be commenced if the commander can determine that the visibility along the take-off runway is equal to or better than the required minimum.

VISUAL REFERENCE

AMC1 CAT.OP.MPA.110 Aerodrome operating minimums

TAKE-OFF OPERATIONS - AEROPLANES

b. Visual Reference

1. The take-off minimums 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 and any obstacles.

REQUIRED RVR/VIS

AMC1 CAT.OP.MPA.110 Aerodrome operating minimums

TAKE-OFF OPERATIONS - AEROPLANES

c. Required RVR/VIS - aeroplane

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 that take-off to a height of 1500ft above the aerodrome while clearing obstacles by the required margins, the take-off minimums specified by the operator should be expressed as RVR/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 minimums provided they are able to comply with the applicable obstacle clearance criteria, assuming engine failure at the height specified. The take-off minimums 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 minimums used should not be lower than either of the values specified in Table 1.A or Table 2.A.

AMC1 CAT.OP.MPA.110 Table 1.A Take-off RVR/VIS - Aeroplanes (without an Approval for Low Visibility Take-off)

Facilities		RVR/VIS
Day only	NIL	500m
Day	at least runway edge lights or centerline marking	400m
Night	at least runway edge lights and runway end lights or runway centerline lights and runway end lights	

The reported RVR/VIS value representative of the initial part of the take-off run can be replaced by the pilot assessment.

During day with Nil facilities: The pilot is able to continuously identify the take-off surface and maintain directional control.

AMC1 CAT.OP.MPA.110 Table 2.A Take-off - Aeroplanes Assumed Engine Failure Height above the Runway versus RVR/VIS

Assumed Engine Failure Height above the Take-off Runway	RVR/VIS
≤ 50ft	400m (200m with LVTO approval)
51ft-100ft	400m (300m with LVTO approval)
101ft-150ft	400m
151ft-200ft	500m
201ft-300ft	1000m
More than 300ft	1500m

1500m is also applicable if no positive take-off flight path can be constructed.

The reported RVR/VIS value representative of the initial part of the take-off run can be replaced by pilot assessment.

AMC1 SPA.LVO.100 Low visibility operations

LVTO OPERATIONS - AEROPLANES

For a low visibility take-off (LVTO) with an aeroplane the following provisions should apply:

a. for an LVTO with a runway visual range (RVR) below 400m the criteria specified in Table 1.A below;

b. for an LVTO with an RVR below 150m but not less than 125m:

1. high intensity runway centerline lights spaced 15m or less apart and high intensity edge lights spaced 60m or less apart that are in operation;
2. a 90m visual segment that is available from the flight crew compartment at the start of the take-off run; and
3. the required RVR value is achieved for all of the relevant RVR reporting points;

c. for an LVTO with an RVR below 125m but not less than 75m:

1. runway protection and facilities equivalent to CAT III landing operations are available; and
2. the aircraft is equipped with an approved lateral guidance system.

AMC1 SPA.LVO.100 Table 1.A LVTO - Aeroplanes

Facilities	RVR
Day: runway edge lights and runway centerline markings	300m
Night: runway edge lights and runway end lights or runway centerline lights and runway end lights	
Runway edge lights and runway centerline lights	200m
Runway edge lights and runway centerline lights and relevant RVR	TDZ, MID, rollout 150m
High intensity runway centerline lights spaced 15m or less and high intensity edge lights spaced 60m or less are in operation	TDZ, MID, rollout 125m
Runway protection and facilities equivalent to CAT III landing operations are available **and** the aircraft is equipped either with an approved lateral guidance system or an approved HUD/HUDLS for take-off	TDZ, MID, rollout 75m

The reported RVR value representative of the initial part of the take-off run can be replaced by pilot assessment.

The RVR values are valid for multi-engined aeroplanes that in the event of an engine failure at any point during take-off can either stop or continue the take-off to a height of 1500ft above the aerodrome while clearing obstacles by the required margin.

The required RVR value to be achieved for all relevant RVRs.

9 DETERMINATION OF AOM FOR CIRCLING

AMC7 CAT.OP.MPA.110 Aerodrome operating minimums

CIRCLING OPERATIONS - AEROPLANES

a. Circling Minimums

The following standards should apply for establishing circling minimums 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; or
   iii. the DH/MDH of the preceding instrument approach procedure;
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 visibility for circling should be the highest of:
   i. the circling visibility for the aeroplane category, if published;
   ii. the minimum visibility derived from Table 7; or
   iii. the RVR/CMV derived from Tables 5 and 6.A for the preceding instrument approach procedure.

AMC7 CAT.OP.MPA.110 Table 7 Circling - Aeroplanes MDH and Minimum Visibility vs. Aeroplane Category

Aircraft Category	A	B	C	D
MDH (ft)	400	500	600	700
VIS (m)	1500	1600	2400	3600

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; 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 conduct during the circling maneuver.

c. Instrument approach followed by visual manoeuvring (circling) without prescribed tracks

1. When the aeroplane is on the initial instrument approach, before visual reference is stabilised, but not below MDA/H, the aeroplane should follow the corresponding instrument approach procedure until the appropriate instrument MAPt is reached.
2. At the beginning of the level flight phase at or above the MDA/H, the instrument approach track determined by radio navigation aids, 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 references.
5. Flight maneuvers should be carried out at an altitude/height that is not less than the circling MDA/H.
6. Descent below MDA/H should not be initiated until the threshold of the runway to be used has been appropriately identified.

The aeroplane should be in a position to continue with a normal rate of descent and land within the touchdown zone.

d. Instrument approach followed by a visual manoeuvring (circling) with prescribed tracks

1. The aeroplane should remain on the initial instrument approach procedure until one of the following is reached:
   i. the prescribed divergence point to commence circling on the prescribed track; or
   ii. the MAPt.
4. When commencing the prescribed circling maneuver at the published divergence point, the subsequent maneuvers should be conducted to comply with the published routing and published heights/altitudes.

AMC9 CAT.OP.MPA.110 Aerodrome operating minimums

VISUAL APPROACH OPERATIONS

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

10 DETERMINATION OF AOM FOR CAT I PRECISION, APV AND NON-PRECISION APPROACHES

DECISION HEIGHT/MINIMUM DESCENT HEIGHT

AMC3 CAT.OP.MPA.110 Aerodrome operating minimums

NPA, APV, CAT I OPERATIONS

a. The decision height (DH) to be used for a non-precision approach (NPA) flown with the continuous descent final approach (CDFA) technique, approach procedure with vertical guidance (APV) or 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 where applicable;
   4. the system minimum specified in Table 3; or
   5. 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 flown without the CDFA technique should not be lower than the highest of:
   1. the OCH for the category of aircraft;
   2. the system minimum specified in Table 3; or
   3. the minimum MDH specified in the AFM, if stated.

AMC3 CAT.OP.MPA.110 Table 3 System Minimums

Facility	Lowest DH/MDH (ft)
ILS/MLS/GLS/PAR GNSS/SBAS CAT I (LPV)	200
GNSS (LNAV) GNSS/Baro-VNAV (LNAV/VNAV) LOC with or without DME SRA (terminating at 0.5nm) VOR/DME	250
SRA (terminating at 1nm) VOR NDB/DME	300
SRA (terminating at 2nm or more) NDB VDF	350

GM3 CAT.OP.MPA.110 Aerodrome operating minimums

SBAS OPERATIONS

a. SBAS CAT I operations with a DH of 200ft depend on an SBAS system approved for operations down to a DH of 200ft.

REQUIRED RVR

AMC4 CAT.OP.MPA.110 Aerodrome operating minimums

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/MLS/GLS/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 cate-

gory 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 3NM, 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 the descent is initiated is available, or distance to threshold (THR) is available by flight management system/GNSS (FMS/GNSS) or DME; and

C. if missed approach point (MAPt) is determined by timing, the distance from FAF or another appropriate fix to THR is ≤ 8nm.

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 ≥ 1200ft.

AMC5 CAT.OP.MPA.110 Aerodrome operating minimums

DETERMINATION OF RVR/CMV MINIMUMS FOR NPA, APV, CAT I - AEROPLANES

a. Aeroplanes

The RVR/CMV/VIS minimums for NPA, APV and CAT I operations should be determined as follows:

1. The minimum RVR/CMV should be the highest of the values specified in Table 5 or Table 6.A but not greater than the maximum values specified in Table 6.A, where applicable.
3. If the approach is flown with a level flight segment at or above MDA/H, 200m should be added for category A and B aeroplanes and 400m for category C and D aeroplanes to the minimum RVR/CMV value resulting from the application of Tables 5 and 6.A.
4. An RVR of less than 750m as indicated in Table 5 may be used:
   i. for CAT I operations to runways with full approach lighting systems (FALS), runway touchdown zone lights (RTZL) and runway centerline lights (RCLL);
   ii. 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
   iii. for APV operations to runways with FALS, RTZL and RCLL when using an approved head-up display (HUD).
5. Lower values than those specified in Table 5, for HUDLS and auto-land operations may be used if approved in accordance with Annex V (Part-SPA), Subpart E (SPA. LVO) of the regulation.

RVR RELATED TO DH/MDH AND LIGHTING SYSTEM

AMC5 CAT.OP.MPA.110 Table 5 RVR vs. DH/MDH and Lights - All Aircraft Categories

	RVR (m) depending on Class of Lighting Facilities			
DH or MDH (ft)	**FALS**	**IALS**	**BALS**	**NALS**
200-210	550	750	1000	1200
211-220	550	800	1000	1200
221-230	550	800	1000	1200
231-240	550	800	1000	1200
241-250	550	800	1000	1300
251-260	600	800	1100	1300
261-280	600	900	1100	1300
281-300	650	900	1200	1400
301-320	700	1000	1200	1400
321-340	800	1100	1300	1500
341-360	900	1200	1400	1600
361-380	1000	1300	1500	1700
381-400	1100	1400	1600	1800
401-420	1200	1500	1700	1900
421-440	1300	1600	1800	2000
441-460	1400	1700	1900	2100
461-480	1500	1800	2000	2200
481-500	1500	1800	2100	2300

AERODROME OPERATING MINIMUMS - EASA AIR OPERATIONS

AMC5 CAT.OP.MPA.110 Table 5 RVR vs. DH/MDH and Lights - All Aircraft Categories (continued)

	RVR (m) depending on Class of Lighting Facilities			
DH or MDH (ft)	**FALS**	**IALS**	**BALS**	**NALS**
501-520	1600	1900	2100	2400
521-540	1700	2000	2200	2400
541-560	1800	2100	2300	2500
561-580	1900	2200	2400	2600
581-600	2000	2300	2500	2700
601-620	2100	2400	2600	2800
621-640	2200	2500	2700	2900
641-660	2300	2600	2800	3000
661-680	2400	2700	2900	3100
681-700	2500	2800	3000	3200
701-720	2600	2900	3100	3300
721-740	2700	3000	3200	3400
741-760	2700	3000	3300	3500
761-800	2900	3200	3400	3600
801-850	3100	3400	3600	3800
851-900	3300	3600	3800	4000
901-950	3600	3900	4100	4300
951-1000	3800	4100	4300	4500
1001-1100	4100	4400	4600	4900
1101-1200	4600	4900	5000	5000
1200 and above	5000	5000	5000	5000

AMC5 CAT.OP.MPA.110 Table 6.A CAT I, APV, NPA - Aeroplanes
Minimum and Maximum applicable RVR (lower and upper Cut-off Limits)

Facility/Conditions	RVR (m)	Aeroplane Category			
		A	**B**	**C**	**D**
ILS, MLS, GLS, PAR, GNSS/SBAS, GNSS/VNAV	Min	According to AMC5 CAT.OP.MPA.110 Table 5			
	Max	1500	1500	2400	2400
NDB, NDB/DME, VOR, VOR/DME, LOC, LOC/DME, VDF, SRA, GNSS/LNAV with a procedure that fulfils the criteria in AMC4 CAT.OP.MPA.110 a.1.(ii)	Min	750	750	750	750
	Max	1500	1500	2400	2400
NDB, NDB/DME, VOR, VOR/DME, LOC, LOC/DME, VDF, SRA, GNSS/LNAV: – not fulfilling the criteria in AMC4 CAT.OP.MPA.110 a.1.(ii); or – with a DH or MDH ≥ 1200ft.	Min	1000	1000	1200	1200
	Max	According to AMC5 CAT.OP.MPA.110 Table 5 if flown using the CDFA technique, otherwise an add-on of 200m for category A and B aeroplanes and 400m for category C and D aeroplanes applies to the values in AMC5 CAT.OP.MPA.110 Table 5 but not to result in a value exceeding 5000m.			

11 DETERMINATION OF AOM FOR LOWER THAN STANDARD CAT I OPERATIONS

SPA.LVO.100 Low visibility operations

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

b. Lower than standard category I (LTS CAT I) operations.

SPA.LVO.110 General operating 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 150ft above the threshold.

SPA.LVO.115 Aerodrome related requirements

a. The operator shall not use an aerodrome for LVOs below a visibility of 800m unless:

1. the aerodrome has been approved for such operations by the State of the aerodrome; and
2. low visibility procedures (LVP) have been established.

AMC3 SPA.LVO.100 Low visibility operations

LTS CAT I OPERATIONS

a. For lower than standard category I (LTS CAT I) operations the following provisions should apply:
   1. The decision height (DH) of an LTS CAT I operation should not be lower than the highest of:
      i. the minimum DH specified in the AFM, if stated;
      ii. the minimum height to which the precision approach aid can be used without the specified visual reference;
      iii. the applicable obstacle clearance height (OCH) for the category of aeroplane;
      iv. the DH to which the flight crew is qualified to operate; or
      v. 200ft.
   2. An instrument landing system/microwave landing system (ILS/MLS) that supports an LTS CAT I operation should be an unrestricted facility with a straight-in course ≤ 3° offset, and the ILS should be certified to:
      i. class I/T/1 for operations to a minimum of 450m RVR; or
      ii. class II/D/2 for operations to less than 450m RVR.

      Single ILS facilities are only acceptable if level 2 performance is provided.
   3. The following visual aids should be available:
      i. standard runway day markings, approach lights, runway edge lights, threshold lights and runway end lights;
      ii. for operations with an RVR below 450m, additionally touch-down zone and/or runway centerline lights.
   4. The lowest RVR minimums to be used are specified in Table 2.

AMC3 SPA.LVO.100 Table 2 RVR LTS CAT I Operation Minimums
RVR vs. Approach Lighting System

DH (ft)	RVR (m) depending on Class of Light Facility			
	FALS	IALS	BALS	NALS
200-210	400	500	600	750
211-220	450	550	650	800
221-230	500	600	700	900
231-240	500	650	750	1000
241-249	550	700	800	1100

12 DETERMINATION OF AOM FOR STANDARD AND OTHER THAN STANDARD CAT II OPERATIONS

SPA.LVO.110 General operating requirements

b. The operator shall only conduct CAT II, OTS CAT II … operations if:
   1. each aircraft concerned is certified for operations with a decision height (DH) below 200ft, 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 200ft above the aerodrome threshold elevation are determined by a radio altimeter.

AMC4 SPA.LVO.100 Low visibility operations

CAT II AND OTS CAT II OPERATIONS

a. For CAT II and other than standard category II (OTS CAT II) operations the following provisions should apply:
   1. The ILS/MLS that supports OTS CAT II operation should be an unrestricted facility with a straight-in course ≤ 3° offset and the ILS should be certified to class II/D/2.

      Single ILS facilities are only acceptable if level 2 performance is provided.
   2. The DH for CAT II and OTS CAT II operation should not be lower than the highest of:
      i. the minimum DH specified in the AFM, if stated;
      ii. the minimum height to which the precision approach aid can be used without the specified visual reference;
      iii. the applicable OCH for the category of aeroplane;
      iv. the DH to which the flight crew is qualified to operate; or
      v. 100ft.
   3. The following visual aids should be available:

i. standard runway day markings and approach and the following runway lights: runway edge lights, threshold lights and runway end lights;

ii. for operations in RVR below 450m, additionally touch-down zone and/or runway centerline lights;

iii. for operations with an RVR of 400m or less, additionally centerline lights.

4. The lowest RVR minimums to be used are specified:

i. for CAT II operations in Table 3; and

ii. for OTS CAT II operations in Table 4.

b. For OTS CAT II operations, the terrain ahead of the runway threshold should have been surveyed.

AMC4 SPA.LVO.100 Table 3 CAT II Operation Minimums
RVR vs. DH

DH (ft)	RVR (m)	
	CAT A, B, C	CAT D
100-120	300	300/350
121-140	400	
141-199	450	

Auto-coupled or approved HUDLS to below DH - This means continued use of the automatic flight control system or the HUDLS down to a height of 80% of the DH.

An RVR of 300m instead of 350m may be used for CAT D aircraft conducting an auto-land.

AMC4 SPA.LVO.100 Table 4 OTS CAT II Operation Minimums
RVR vs. Aproach Lighting System

DH (ft)	RVR (m)				
	FALS		IALS	BALS	NALS
	CAT A-C	CAT D	CAT A-D	CAT A-D	CAT A-D
100-120	350	400	450	600	700
121-140	400	450	500	600	700
141-160	450[1]	500	500	600	750
161-199	450[1]	500	550	650	750

[1] The EASA table shows 400m, but this would be lower than the Standard CAT II operations. This is already reported, but not yet corrected by EASA.

Auto-land or approved HUDLS utilised to touchdown.

13 DETERMINATION OF AOM FOR CAT III OPERATIONS

SPA.LVO.110 General operating requirements

b. The operator shall only conduct … CAT III operations if:

1. each aircraft concerned is certified for operations with a decision height (DH) below 200ft, 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 200ft above the aerodrome threshold elevation are determined by a radio altimeter.

AMC5 SPA.LVO.100 Low visibility operations

CAT III OPERATIONS

The following provisions should apply to CAT III operations:

a. Where the DH and RVR do not fall within the same category, the RVR should determine in which category the operation is to be considered.

b. For operations in which a DH is used, the DH should not be lower than:

1. the minimum DH specified in the AFM, if stated;
2. the minimum height to which the precision approach aid can be used without the specified visual reference; or
3. the DH to which the flight crew is qualified to operate.

c. Operations with no DH should only be conducted if:

1. the operation with no DH is specified in the AFM;
2. the approach aid and the aerodrome facilities can support operations with no DH; and
3. the flight crew is qualified to operate with no DH.

d. The lowest RVR minimums to be used are specified in Table 5.

AERODROME OPERATING MINIMUMS - EASA AIR OPERATIONS

AMC5 SPA.LVO.100 Table 5
CAT III Operations Minimums
RVR vs. DH and Rollout Control/Guidance System

CAT	DH (ft)	Rollout Control/ Guidance System	RVR (m)
IIIA	Less than 100	Not required	200
IIIB	Less than 100	Fail-passive	150
IIIB	Less than 50	Fail-passive	125
IIIB	Less than 50 or no DH	Fail-operational	75

Flight control system redundancy is determined under CS-AWO by the minimum certified DH.

RVR 150m is valid for aeroplanes certified in accordance with CS-AWO 321(b)(3) or equivalent.

The fail-operational system referred to may consist of a fail-operational hybrid system.

14 FAILED OR DOWNGRADED EQUIPMENT

CAT.OP.MPA.110 Aerodrome operating minimums

c. When establishing aerodrome operating minimums, the operator shall the following take-into account:

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

e. The minimums 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.

AMC11 CAT.OP.MPA.110 Aerodrome operating minimums

EFFECT ON LANDING MINIMUMS OF TEMPORARILY FAILED OR DOWNGRADED GROUND EQUIPMENT

AMC11 CAT.OP.MPA.110 Table 9 Failed or Downgraded Equipment - Effect on Landing Minimums Operations without a Low Visibility Operations Approval

Failed or Downgraded Equipment	Effect on Landing Minimums	
	CAT I	APV, NPA
ILS/MLS stand-by transmitter	No effect	
Outer Marker	Not allowed except if replaced by height check at 1000ft	APV - not applicable
		NPA with FAF - no effect unless used as FAF
		If the FAF cannot be identified (e.g. no method available for timing of descent), non-precision operations cannot be conducted
Middle Marker	No effect	No effect unless used as MAPt
RVR Assessment Systems	No effect	
Approach lights	Minimums as for NALS	
Approach lights except the last 210m	Minimums as for BALS	
Approach lights except the last 420m	Minimums as for IALS	
Standby power for approach lights	No effect	
Edge lights, threshold lights and runway end lights	Day: no effect Night: not allowed	
Centerline lights	No effect if F/D, HUDLS or autoland; otherwise RVR 750m	No effect
Centerline lights spacing increased to 30m	No effect	
Touchdown zone lights	No effect if F/D, HUDLS or autoland; otherwise RVR 750m	No effect
Taxiway lighting system	No effect	

AMC7 SPA.LVO.100 Low visibility operations

EFFECT ON LANDING MINIMUMS OF TEMPORARILY FAILED OR DOWNGRADED GROUND EQUIPMENT

AMC7 SPA.LVO.100 Table 7 Failed or downgraded Equipment - Effect on Landing Minimums Operations with an LVO Approval

Failed or downgraded equipment	Effect on Landing Minimums			
	CAT IIIB (no DH)	CAT IIIB	CAT IIIA	CAT II
ILS/MLS stand-by transmitter	Not allowed	RVR 200m	No effect	
Outer marker	No effect if replaced by height check at 1000ft			
Middle marker	No effect			
RVR assessment systems	At least one RVR value to be available on the aerodrome	On runways equipped with 2 or more RVR assessment units, one may be inoperative		
Approach lights	No effect	Not allowed for operations with DH > 50ft		Not allowed
Approach lights except the last 210m	No effect			Not allowed
Approach lights except the last 420m	No effect			
Stand-by power for approach lights	No effect			
Edge lights, threshold lights and runway end lights	No effect		Day: No effect Night: RVR 550m	Day: No effect Night: Not allowed
Centerline lights	Day: RVR 200m Night: Not allowed	Not allowed	Day: RVR 300m Night: RVR 400m	Day: RVR 350m Night: RVR 550m (RVR 400m with HUDLS or auto-land)
Centerline lights Spacing increased to 30m	RVR 150m		No effect	
Touchdown zone lights	No effect	Day: RVR 200m Night: RVR 300m	Day: RVR 300m Night: RVR 550m (RVR 350m with HUDLS or auto-land)	
Taxiway light system	No effect			

15 ENHANCED VISION SYSTEMS - RVR REDUCTION

CAT.OP.MPA.110 Aerodrome operating minimums

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 minimums if approved in accordance with SPA.LVO.

SPA.LVO.110 General operating requirements

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 550m, 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 100ft above the aerodrome threshold elevation;
4. for approach procedure with vertical guidance (APV) and non-precision (NPA) operations flown with CDFA technique, natural visual reference to runway cues is attained at least at 200ft 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 centerline 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.

AMC6 SPA.LVO.100 Low visibility operations

OPERATIONS UTILISING EVS

The pilot using a certified enhanced vision system (EVS) in accordance with the procedures and limitations of the AFM:

a. may reduce the RVR value in column 1 to the value in column 2 of Table 6 below for CAT I operations, APV operations and NPA operations flown with the CDFA technique;

b. for CAT I operations:

1. may continue an approach below DH to 100ft above the runway threshold elevation provided that a visual reference is displayed and identifiable on the EVS image; and
2. should only continue an approach below 100ft above the runway threshold elevation provided that a visual reference is distinctly visible and identifiable to the pilot without reliance on the EVS;

c. for APV operations and NPA operations flown with the CDFA technique:

1. may continue an approach below DH to 200ft above the runway threshold elevation provided that a visual reference is displayed and identifiable on the EVS image; and
2. should only continue an approach below 200ft above the runway threshold elevation provided that a visual reference is distinctly visible and identifiable to the pilot without reliance on the EVS.

AMC6 SPA.LVO.100 Table 6 Operations utilising EVS - RVR Reduction vs. Normal RVR

Required RVR (m)	Reduced RVR (m) when using EVS
550	350
600	400
650	450
700	450
750	500
800	550
900	600
1000	650
1100	750
1200	800
1300	900
1400	900
1500	1000
1600	1100
1700	1100
1800	1200
1900	1300
2000	1300
2100	1400
2200	1500
2300	1500
2400	1600
2500	1700
2600	1700
2700	1800
2800	1900
2900	1900
3000	2000
3100	2000
3200	2100
3300	2200
3400	2200

AMC6 SPA.LVO.100 Table 6 Operations utilising EVS - RVR Reduction vs. Normal RVR (continued)

Required RVR (m)	Reduced RVR (m) when using EVS
3500	2300
3600	2400
3700	2400
3800	2500
3900	2600
4000	2600
4100	2700
4200	2800
4300	2800
4400	2900
4500	3000
4600	3000
4700	3100
4800	3200
4900	3200
5000	3300

16 SINGLE PILOT OPERATIONS - ADDITIONAL CRITERIA

AMC5 CAT.OP.MPA.110 Aerodrome operating minimums

DETERMINATION OF RVR MINIMUMS FOR NPA, APV, CAT I - AEROPLANES

a. Aeroplanes

The RVR minimums for NPA, APV and CAT I operations should be determined as follows:

8. For single pilot operations, the minimum RVR should be calculated in accordance with the following additional criteria:
   i. An RVR of less than 800m as indicated in CAT.OP.MPA.110 Table 5 may be used for CAT I approaches provided any of the following is used at least down to the applicable DH:
      A. a suitable autopilot, coupled to an ILS, MLS or GLS that is not published as restricted; or
      B. an approved HUDLS, including, where appropriate, enhanced vision system (EVS), or equivalent approved system;
   ii. where RTZL and/or RCLL are not available, the minimum RVR should not be less than 600m; and
   iii. an RVR of less than 800m as indicated in CAT.OP.MPA.110 Table 5 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 250ft.

17 PLANNING MINIMUMS

CAT.OP.MPA.185 Planning minimums for IFR flights - aeroplanes

a. **Planning Minimums for a Take-off Alternate Aerodrome**

The operator shall only select an aerodrome as a take-off alternate aerodrome when the appropriate weather reports and/or forecasts indicate that, during a period commencing one hour before and ending one hour after the estimated time of arrival at the aerodrome, the weather conditions will be at or above the applicable landing minimums specified in accordance with CAT.OP.MPA.110. The ceiling shall be taken into account when the only approach operations available are non-precision approaches (NPA) and/or circling operations. Any limitation related to OEI (one engine inoperative) operations shall be taken into account.

b. **Planning Minimums for a Destination Aerodrome, other than an Isolated Destination Aerodrome**

The operator shall only select the destination aerodrome when:

1. the appropriate weather reports and/or forecasts indicate that, during a period commencing one hour before and ending one hour after the estimated time of arrival at the aerodrome, the weather conditions will be at or above the applicable planning minimums as follows:
   i. RVR/visibility (VIS) specified in accordance with CAT.OP.MPA.110; and
   ii. for an NPA or a circling operation, the ceiling at or above MDH;

   or
2. two destination alternate aerodromes are selected.

c. **Planning Minimums for a Destination Alternate Aerodrome, Isolated Aerodrome, Fuel Enroute Alternate (fuel ERA) Aerodrome, Enroute Alternate (ERA) Aerodrome**

The operator shall only select an aerodrome for one of these purposes when the appropriate weather reports and/or forecasts indicate that, during a period commencing one hour before and ending one hour after the estimated time of arrival at the aerodrome, the weather conditions will be at or above the planning minimums in Table 1.

CAT.OP.MPA185 Table 1 Destination Alternate Aerodrome, Isolated Destination Aerodrome, Fuel ERA and ERA Aerodrome

Type of Approach	Planning Minimums
CAT II and III	CAT I RVR
CAT I	NPA RVR/VIS Ceiling shall be at or above MDH
NPA	NPA RVR/VIS + 1000m Ceiling shall be at or above MDH + 200ft
Circling	Circling

GM1 CAT.OP.MPA.185 Planning minimums for IFR flights - aeroplanes

PLANNING MINIMUMS FOR ALTERNATE AERODROMES

As Table 1 does not include planning minimums requirements for APV, LTS CAT I and OTS CAT II operations, the operator may use the following minimums:

a. for APV operations - NPA or CAT I minimums, depending on the DH/MDH;

b. for LTS CAT I operations - CAT I minimums; and

c. for OTS CAT II operations - CAT II minimums.

SPA.ETOPS.115 ETOPS enroute alternate aerodrome planning minimums

a. The operator shall only select an aerodrome as an ETOPS enroute alternate aerodrome when the appropriate weather reports or forecasts, or any combination thereof, indicate that, between the anticipated time of landing until one hour after the latest possible time of landing, conditions will exist at or above the planning minimums calculated by adding the additional limits of Table 1 below.

b. The operator shall include in the operations manual the method for determining the operating minimums at the planned ETOPS enroute alternate aerodrome.

SPA.ETOPS.115 Table 1 Planning Minimums for ETOPS Enroute Alternate Aerodrome

Type of Approach	Planning Minimums
Precision approach	DA/H + 200ft RVR/VIS + 800m
Non-precision approach or circling approach	MDA/H + 400ft RVR/VIS + 1500m

18 COMMENCEMENT AND CONTINUATION OF APPROACH (APPROACH BAN)

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 1000ft above the aerodrome; or
   2. into the final approach segment in the case where DA/H or MDA/H is more than 1000ft above the aerodrome.

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

d. If, after passing 1000ft 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 125m or the RVR required for the touchdown zone if less, and 75m for the stopend. For aircraft equipped with a rollout guidance control system, the minimum RVR value for the midpoint shall be 75m.

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

VISUAL REFERENCES FOR INSTRUMENT APPROACH OPERATIONS

a. NPA, APV and CAT I operations

   At DH or MDH, at least one of the visual references specified below should be distinctly visible and identifiable to the pilot:
   1. elements of the approach lighting system;
   2. threshold;
   3. threshold markings;
   4. threshold lights;
   5. threshold identification lights;
   6. visual glide slope indicator;
   7. touchdown zone or touchdown zone markings;
   8. touchdown zone lights;
   9. FATO/runway edge lights; or
   10. other visual references specified in the operations manual.

b. Lower than Standard CAT 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 centerline of the approach lights, or touchdown zone lights, or runway centerline lights, or runway edge lights, or a combination of these;
   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 useable to at least 150ft.

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 centerline of the approach lights, or touchdown zone lights, or runway centerline lights, or runway edge lights, or a combination of these;
   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 centerline of the approach lights, or touchdown zone lights, or runway centerline 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 centerline light is attained and can be maintained by the pilot.
   3. For CAT IIIB 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; or
         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 lights, the touchdown zone markings or the runway lights.

2. At 100ft 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 reference should be displayed and identifiable to the pilot on the EVS image as specified under a.
    2. At 200ft 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.