Annex IV to ED Decision 2022/012/R

'AMC & GM to Annex IV (Part-CAT) to Commission Regulation (EU) No 965/2012 — Issue 2, Amendment 21'

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

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

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

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

Note to the reader

In amended, and in particular in existing (that is, unchanged) text, 'Agency' is used interchangeably with 'EASA'. The interchangeable use of these two terms is more apparent in the consolidated versions. Therefore, please note that both terms refer to the 'European Union Aviation Safety Agency (EASA)'.

The Annex to Decision 2014/015/R of 24 April 2014 of the Executive Director of the Agency is amended as follows:

GM1 CAT.OP.MPA.101(b) Altimeter check and settings

ALTIMETER SETTING PROCEDURES

The following paragraphs of ICAO Doc 8168 (PANS-OPS), Volume I provide recommended guidance on how to develop the altimeter setting procedure:

(a) 3.2 'Pre-flight operational test';

(b) 3.3 'Take-off and climb';

(c) 3.5 'Approach and landing'.

AMC1 CAT.OP.MPA.110 Aerodrome operating minima

TAKE-OFF OPERATIONS — AEROPLANES

(a) ~~General~~ Take-off minima

~~(1)~~ Take-off minima should be expressed as visibility (VIS) or runway visual range (RVR) limits, taking into account all relevant factors for each ~~aerodrome~~ runway planned to be used and aircraft characteristics and equipment. Where there is a specific need to see and avoid obstacles on departure and/or for a forced landing, additional conditions, e.g. ceiling, should be specified.

~~(2) The commander should not commence take-off unless the weather conditions at the aerodrome of departure are equal to or better than applicable minima for landing at that aerodrome unless a weather-permissible take-off alternate aerodrome is available.~~

~~(3) When the reported meteorological visibility (VIS) is below that required for take-off and RVR is not reported, a take-off should only be commenced if the commander can determine that the visibility along the take-off runway is equal to or better than the required minimum.~~

~~(4) When no reported meteorological visibility or RVR is available, a take-off should only be commenced if the commander can determine that the visibility along the take-off runway is equal to or better than the required minimum.~~

(b) Visual reference

(1) The take-off minima should be selected to ensure sufficient guidance to control the aircraft in the event of both a rejected take-off in adverse circumstances and a continued take-off after failure of the critical engine.

(2) For night operations, ~~ground~~ the prescribed runway lights should be ~~available to illuminate~~ in operation ~~the runway and any obstacles~~.

(c) Required RVR~~/~~ or VIS~~— aeroplanes~~

(1) For multi-engined aeroplanes, with performance such that, in the event of a critical engine failure at any point during take-off, the aeroplane can either stop or continue the

take-off to a height of 1 500 ft above the aerodrome while clearing obstacles by the required margins, the take-off minima specified by the operator should be expressed as RVR/CMV (converted meteorological visibility) or VIS values not lower than those specified in Table 1.A.

(2) For multi-engined aeroplanes without the performance to comply with the conditions in (c)(1), in the event of a critical engine failure, there may be a need to re-land immediately and to see and avoid obstacles in the take-off area. Such aeroplanes may be operated to the following take-off minima provided that they are able to comply with the applicable obstacle clearance criteria, assuming engine failure at the height specified. The take-off minima specified by the operator should be based upon the height from which the one-engine-inoperative (OEI) net take-off flight path can be constructed. The RVR minima used should not be lower than either of the values specified in Table 1.A or Table 2.A.

(3) For single-engined turbine aeroplane operations approved in accordance with Subpart L (SET-IMC) of Annex V (Part-SPA) to Regulation (EU) No 965/2012, the take-off minima specified by the operator should be expressed as RVR/CMV values not lower than those specified in Table 1.A below.

Unless the operator is making use of a risk period, whenever the surface in front of the runway does not allow for a safe forced landing, the RVR/CMV values should not be lower than 800 m. In this case, the proportion of the flight to be considered starts at the lift-off position and ends when the aeroplane is able to turn back and land on the runway in the opposite direction or glide to the next landing site in case of power loss.

(4) When RVR or VIS meteorological visibility is not available, the commander should not commence take-off unless he/ or she can determine that the actual conditions satisfy the applicable take-off minima.

Table 1.A

Take-off — aeroplanes (without an approval for low-visibility take-off (LVTO approval))

RVR/ or VIS

Facilities	**RVR/ or VIS (m) ***
Day only: Nil**	500
Day: at least runway edge lights or runway centreline markings Night: at least runway edge lights and runway end lights or runway centreline lights and runway end lights	400

Minimum RVR* or VIS*	Facilities
500 m (day)	Nil**
400 m (day)	Centre line markings or Runway edge lights or

	Runway centre line lights
400 m (night)	Runway end lights*** and Runway edge lights or runway centreline lights

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

**: The pilot is able to continuously identify the take-off surface and maintain directional control.

***: Runway end lights may be substituted by colour-coded runway edge lights or colour-coded runway centre line lights.

Table 2.A

Take-off — aeroplanes (without LVTO approval)

Assumed engine failure height above the runway versus RVR/ or VIS

Assumed engine failure height above the take-off runway (ft)	RVR/ or VIS (m)**
<50	400 (200 with LVTO approval)
51–100	400 (200 with LVTO approval)
101–150	400
151–200	500
201–300	1 000
>300 *or if no positive take-off flight path can be constructed	1 500

*: 1 500m is also applicable if no positive take-off flight path can be constructed.

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

AMC2 CAT.OP.MPA.110 Aerodrome operating minima

TAKE-OFF OPERATIONS — HELICOPTERS

(a) General

(1) Take-off minima should be expressed as visibility VIS or runway visual range (RVR) limits, taking into account all relevant factors for each aerodrome or operating site planned to be used and aircraft characteristics and equipment. Where there is a specific need to see and avoid obstacles on departure, and/or or for a forced landing, additional conditions, e.g. ceiling, should be specified.

(2) The commander should not commence take-off unless the weather meteorological conditions at the aerodrome or operating site of departure are equal to or better than

the applicable minima for landing at that aerodrome or operating site unless a weather-permissible take-off alternate aerodrome is available.

(3) When the reported ~~meteorological visibility (~~VIS~~)~~ is below that required for take-off and the RVR is not reported, a take-off should only be commenced if the commander can determine that the visibility or RVR along the take-off runway/area is equal to or better than the required minimum.

(4) When no reported ~~meteorological visibility~~ VIS or RVR is available, a take-off should only be commenced if the commander can determine that the visibility along the take-off runway/area is equal to or better than the required minimum.

(b) Visual reference

(1) The take-off minima should be selected to ensure sufficient guidance to control the aircraft in the event of both a rejected take-off in adverse circumstances and a continued take-off after failure of the critical engine.

(2) For night operations, ground lights should be available to illuminate the take-off runway/final approach and take-off area (FATO) and any obstacles.

(3) For point-in-space (PinS) departures to an initial departure fix (IDF), the take-off minima should be selected to ensure sufficient guidance to see and avoid obstacles and return to the heliport if the flight cannot be continued visually to the IDF. This should require a VIS of 800 m. The ceiling should be 250 ft.

(c) Required RVR~~/~~ or VIS ~~— helicopters:~~

(1) For performance class 1 operations, the operator should specify an RVR~~/~~ or a VIS as take-off minima in accordance with Table 3~~1.H~~.

(2) For performance class 2 operations onshore, the commander should operate to take-off minima of 800 m RVR~~/~~ or VIS and remain clear of cloud during the take-off manoeuvre until reaching performance class 1 capabilities.

(3) For performance class 2 operations offshore, the commander should operate to minima not less than ~~that~~ those for performance class 1 and remain clear of cloud during the take-off manoeuvre until reaching performance class 1 capabilities.

~~(4) Table 8 for converting reported meteorological visibility to RVR should not be used for calculating take-off minima.~~

Table 3~~1.H~~

Take-off — helicopters (without LVTO approval)

RVR or ~~/~~VIS

Onshore aerodromes with instrument flight rules (IFR) departure procedures	**RVR or ~~/~~VIS (m) ****
No light and no markings (day only)	400 or the rejected take-off distance, whichever is the greater

No markings (night)	800
Runway edge/FATO light and ~~centreline~~ centre line marking	400
Runway edge/FATO light, ~~centreline~~ centre line marking and relevant RVR information	400
Offshore helideck *	
Two-pilot operations	400
Single-pilot operations	500

* The take-off flight path to be free of obstacles.

** On PinS departures to IDF, VIS should not be less than 800 m and the ceiling should not be less than 250 ft.

AMC3 CAT.OP.MPA.110 Aerodrome operating minima

~~NPA, APV, CAT I OPERATIONS~~

DETERMINATION OF DH/MDH FOR INSTRUMENT APPROACH OPERATIONS — AEROPLANES

(a) The decision height (DH) to be used for a ~~non-precision approach (NPA)~~ 3D approach operation or a 2D approach operation flown using ~~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;~~

(1~~2~~) the obstacle clearance height (OCH) for the category of aircraft;

(2~~3~~) the published approach procedure DH or minimum descent height (MDH) where applicable;

(3~~4~~) the system minima~~um~~ specified in Table 4~~3~~; ~~or~~

(4) the minimum DH permitted for the runway specified in Table 5; or

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

(b) The ~~minimum descent height (~~MDH~~)~~ for a~~n NPA operation~~ 2D approach operation flown ~~without~~ not using the CDFA technique should not be lower than the highest of:

(1) the OCH for the category of aircraft;

(2) the published approach procedure MDH where applicable;

(3~~2~~) the system minima~~um~~ specified in Table 4~~3~~; ~~or~~

(4) the lowest MDH permitted for the runway specified in Table 5; or

(5~~3~~) the ~~minimum~~ lowest MDH specified in the AFM, if stated.

Table 4~~3~~

System minima — aeroplanes

Facility	Lowest DH/MDH (ft)
ILS/MLS/GLS	200
GNSS/SBAS (LPV)	200*
Precision approach radar (PAR)	200
GNSS/SBAS (LP)	250
GNSS (LNAV)	250
GNSS/~~Baro-VNAV~~ Baro VNAV (LNAV/VNAV)	250
LOC with or without DME	250
SRA (terminating at ½ NM)	250
SRA (terminating at 1 NM)	300
SRA (terminating at 2 NM or more)	350
VOR	300
VOR/DME	250
NDB	350
NDB/DME	300
VDF	350

* For localiser performance with vertical guidance (LPV), a DH of 200 ft may be used only if the published FAS datablock sets a vertical alert limit not exceeding 35 m. Otherwise, the DH should not be lower than 250 ft.

~~— DME: distance measuring equipment;~~

~~— GNSS: global navigation satellite system;~~

~~— ILS: instrument landing system;~~

~~— LNAV: lateral navigation;~~

~~— LOC: localiser;~~

~~— LPV: localiser performance with vertical guidance~~

~~— SBAS: satellite-based augmentation system;~~

~~— SRA: surveillance radar approach;~~

~~— VDF: VHF direction finder;~~

~~— VNAV: vertical navigation;~~

~~— VOR: VHF omnidirectional radio range.~~

Table 5

Runway type minima — aeroplanes

Runway type		**Lowest DH/MDH (ft)**
Instrument runway	Precision approach (PA) runway, category I	200
	NPA runway	250
Non-Instrument runway	Non-instrument runway	Circling minima as shown in Table 15

(c) Where a barometric DA/H or MDA/H is used, this should be adjusted where the ambient temperature is significantly below international standard atmosphere (ISA). GM8 CAT.OP.MPA.110 'Low temperature correction' provides a cold temperature correction table for adjustment of minimum promulgated heights/altitudes.

AMC4 CAT.OP.MPA.110 Aerodrome operating minima

DETERMINATION OF DH/MDH FOR INSTRUMENT APPROACH OPERATIONS — HELICOPTERS

(a) The DH or MDH to be used for a 3D or a 2D approach operation should not be lower than the highest of:

(1) the OCH for the category of aircraft;

(2) the published approach procedure DH or MDH where applicable;

(3) the system minima specified in Table 6;

(4) the minimum DH permitted for the runway/FATO specified in Table 7, if applicable; or

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

Table 6

System minima — helicopters

Facility	**Lowest DH/MDH (ft)**
ILS/MLS/GLS	200
GNSS/SBAS (LPV) *	200
Precision approach radar (PAR)	200
GNSS/SBAS (LP)	250
GNSS (LNAV)	250
GNSS/Baro VNAV (LNAV/VNAV)	250
Helicopter PinS approach	250**
LOC with or without DME	250
SRA (terminating at ½ NM)	250

Facility	Lowest DH/MDH (ft)
SRA (terminating at 1 NM)	300
SRA (terminating at 2 NM or more)	350
VOR	300
VOR/DME	250
NDB	350
NDB/DME	300
VDF	350

* For LPV, a DH of 200 ft may be used only if the published FAS datablock sets a vertical alert limit not exceeding 35 m. Otherwise, the DH should not be lower than 250 ft.

** For PinS approaches with instructions to 'proceed VFR' to an undefined or virtual destination, the DH or MDH should be with reference to the ground below the missed approach point (MAPt).

Table 7

Type of runway/FATO versus lowest DH/MDH — helicopters

Type of runway/FATO	Lowest DH/MDH (ft)
Precision approach (PA) runway, category I Non-precision approach (NPA) runway Non-instrument runway	200
Instrument FATO FATO	200 250

Table 7 does not apply to helicopter PinS approaches with instructions to 'proceed VFR'.

AMC5 ~~AMC4~~ CAT.OP.MPA.110 Aerodrome operating minima

~~CRITERIA FOR ESTABLISHING RVR/CMV~~

~~(a) Aeroplanes~~

~~The following criteria for establishing RVR/CMV should apply:~~

~~(1) In order to qualify for the lowest allowable values of RVR/CMV specified in Table 6.A, the instrument approach should meet at least the following facility specifications and associated conditions:~~

~~(i) Instrument approaches with designated vertical profile up to and including 4.5° for category A and B aeroplanes, or 3.77° for category C and D aeroplanes where the facilities are:~~

(A) ILS/microwave landing system (MLS)/GBAS landing system (GLS)/precision approach radar (PAR); or

(B) APV; and

where the final approach track is offset by not more than 15° for category A and B aeroplanes or by not more than 5° for category C and D aeroplanes.

(ii) Instrument approach operations flown using the CDFA technique with a nominal vertical profile, up to and including 4.5° for category A and B aeroplanes, or 3.77° for category C and D aeroplanes, where the facilities are NDB, NDB/DME, VOR, VOR/DME, LOC, LOC/DME, VDF, SRA or GNSS/LNAV, with a final approach segment of at least 3 NM, which also fulfil the following criteria:

(A) the final approach track is offset by not more than 15° for category A and B aeroplanes or by not more than 5° for category C and D aeroplanes;

(B) the final approach fix (FAF) or another appropriate fix where descent is initiated is available, or distance to threshold (THR) is available by flight management system/GNSS (FMS/GNSS) or DME; and

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

(iii) Instrument approaches where the facilities are NDB, NDB/DME, VOR, VOR/DME, LOC, LOC/DME, VDF, SRA or GNSS/LNAV, not fulfilling the criteria in (a)(1)(ii), or with an MDH ≥ 1 200 ft.

(2) The missed approach operation, after an approach operation has been flown using the CDFA technique, should be executed when reaching the DA/H or the MAPt, whichever occurs first. The lateral part of the missed approach procedure should be flown via the MAPt unless otherwise stated on the approach chart.

DETERMINATION OF RVR OR VIS FOR INSTRUMENT APPROACH OPERATIONS — AEROPLANES

(a) The RVR or VIS for straight-in instrument approach operations should be not less than the greatest of:

(1) the minimum RVR or VIS for the type of runway used according to Table 8;

(2) the minimum RVR determined according to the MDH or DH and class of lighting facility according to Table 9; or

(3) the minimum RVR according to the visual and non-visual aids and on-board equipment used according to Table 10.

If the value determined in (1) is a VIS, then the result is a minimum VIS. In all other cases, the result is a minimum RVR.

(b) For Category A and B aeroplanes, if the RVR or VIS determined in accordance with (a) is greater than 1 500 m, then 1 500 m should be used.

(c) If the approach is flown with a level flight segment at or above the MDA/H, then 200 m should be added to the RVR calculated in accordance with (a) and (b) for Category A and B aeroplanes and 400 m for Category C and D aeroplanes.

(d) The visual aids should comprise standard runway day markings, runway edge lights, threshold lights, runway end lights and approach lights as defined in Table 11.

Table 8

Type of runway versus minimum RVR or VIS — aeroplanes

Type of runway	**Minimum RVR or VIS (m)**
PA runway Category I	RVR 550
NPA runway	RVR 750
Non-instrument runway	VIS according to Table 15 (circling minima)

Table 9

RVR versus DH/MDH — aeroplanes

DH or MDH (ft)			**Class of lighting facility**			
			FALS	**IALS**	**BALS**	**NALS**
			RVR (m)			
200	-	210	550	750	1 000	1 200
211	-	240	550	800	1 000	1 200
241	-	250	550	800	1 000	1 300
251	-	260	600	800	1 100	1 300
261	-	280	600	900	1 100	1 300
281	-	300	650	900	1 200	1 400
301	-	320	700	1 000	1 200	1 400
321	-	340	800	1 100	1 300	1 500
341	-	360	900	1 200	1 400	1 600
361	-	380	1 000	1 300	1 500	1 700
381	-	400	1 100	1 400	1 600	1 800
401	-	420	1 200	1 500	1 700	1 900
421	-	440	1 300	1 600	1 800	2 000
441	-	460	1 400	1 700	1 900	2 100
461	-	480	1 500	1 800	2 000	2 200
481		500	1 500	1 800	2 100	2 300
501	-	520	1 600	1 900	2 100	2 400
521	-	540	1 700	2 000	2 200	2 400
541	-	560	1 800	2 100	2 300	2 400
561	-	580	1 900	2 200	2 400	2 400
581	-	600	2 000	2 300	2 400	2 400
601	-	620	2 100	2 400	2 400	2 400
621	-	640	2 200	2 400	2 400	2 400
641		660	2 300	2 400	2 400	2 400
661	and above		2 400	2 400	2 400	2 400

Table 10

Visual and non-visual aids and/or on-board equipment versus minimum RVR — aeroplanes

Type of approach	Facilities	Lowest RVR	
		Multi-pilot operations	Single-pilot operations
3D operations	runway touchdown zone lights (RTZL) and runway centre line lights (RCLL)	No limitation	
	without RTZL and RCLL but using HUDLS or equivalent system; coupled autopilot or flight director to the DH	No limitation	600 m
	No RTZL and RCLL, not using HUDLS or equivalent system or autopilot to the DH	750 m	800 m
2D operations	Final approach track offset ≤15° for category A and B aeroplanes or ≤5° for Category C and D aeroplanes	750 m	800 m
	Final approach track offset > 15° for Category A and B aeroplanes	1 000 m	1 000 m
	Final approach track offset > 5° for Category C and D aeroplanes	1 200 m	1 200 m

Table 11

Approach lighting systems — aeroplanes

Class of lighting facility	Length, configuration and intensity of approach lights
FALS	CAT I lighting system (HIALS ≥720 m) distance coded centre line, barrette centre line
IALS	Simple approach lighting system (HIALS 420–719 m) single source, barrette
BALS	Any other approach lighting system (HIALS, MALS or ALS 210–419 m)
NALS	Any other approach lighting system (HIALS, MALS or ALS <210 m) or no approach lights

(e) For night operations or for any operation where credit for visual aids is required, the lights should be on and serviceable except as provided for in Table 17.

(f) Where any visual or non-visual aid specified for the approach and assumed to be available in the determination of operating minima is unavailable, revised operating minima will need to be determined.

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

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

AMC6 CAT.OP.MPA.110 Aerodrome operating minima

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

(a) Helicopters

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

(1) For NPA operations operated in performance class 1 (PC1) or performance class 2 (PC2), the minima specified in Table 6.1.H should apply:

(i) where the missed approach point is within ½ NM of the landing threshold, the approach minima specified for FALS may be used regardless of the length of approach lights available. However, FATO/runway edge lights, threshold lights, end lights and FATO/runway markings are still required;

(ii) for night operations, ground lights should be available to illuminate the FATO/runway and any obstacles; and

(iii) for single-pilot operations, the minimum RVR is 800 m or the minima in Table 6.1.H, whichever is higher.

(2) For CAT I operations operated in PC1 or PC2, the minima specified in Table 6.2.H should apply:

(i) for night operations, ground light should be available to illuminate the FATO/runway and any obstacles;

(ii) for single-pilot operations, the minimum RVR/VIS should be calculated in accordance with the following additional criteria:

(A) an RVR of less than 800 m should not be used except when using a suitable autopilot coupled to an ILS, MLS or GLS, in which case normal minima apply; and

(B) the DH applied should not be less than 1.25 times the minimum use height for the autopilot.

Table 6.1.H: Onshore NPA minima

MDH (ft) *	Facilities vs RVR/CMV (m) **, ***			
	FALS	IALS	BALS	NALS
250–299	600	800	1 000	1 000
300–449	800	1 000	1 000	1 000
450 and above	1 000	1 000	1 000	1 000

*: 'MDH' refers to the initial calculation of MDH. When selecting the associated RVR, there is no need to take account of a rounding up to the nearest 10 ft, which may be done for operational purposes, e.g. conversion to MDA.

**: The tables are only applicable to conventional approaches with a nominal descent slope of not greater than 4°. Greater descent slopes will usually require that visual glideslope guidance (e.g. precision approach path indicator (PAPI)) is also visible at the MDH.

~~***: FALS comprise FATO/runway markings, 720 m or more of high-intensity/medium-intensity (HI/MI) approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights to be on.~~

~~IALS comprise FATO/runway markings, 420–719 m of HI/MI approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights to be on.~~

~~BALS comprise FATO/runway markings, <420 m of HI/MI approach lights, any length of low intensity (LI) approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights to be on.~~

~~NALS comprise FATO/runway markings, FATO/runway edge lights, threshold lights, FATO/runway end lights or no lights at all.~~

~~**Table 6.2.H: Onshore CAT I minima**~~

~~DH (ft) *~~	~~Facilities vs RVR/CMV (m) **, ***~~			
	~~FALS~~	~~IALS~~	~~BALS~~	~~NALS~~
~~200~~	~~500~~	~~600~~	~~700~~	~~1 000~~
~~201–250~~	~~550~~	~~650~~	~~750~~	~~1 000~~
~~251–300~~	~~600~~	~~700~~	~~800~~	~~1 000~~
~~301 and above~~	~~750~~	~~800~~	~~900~~	~~1 000~~

~~*: The 'DH' refers to the initial calculation of DH. When selecting the associated RVR, there is no need to take account of a rounding up to the nearest 10 ft, which may be done for operational purposes, e.g. conversion to DA.~~

~~**: The table is applicable to conventional approaches with a glideslope up to and including 4°.~~

~~***: FALS comprise FATO/runway markings, 720 m or more of HI/MI approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights to be on.~~

~~IALS comprise FATO/runway markings, 420 - 719 m of HI/MI approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights to be on.~~

~~BALS comprise FATO/runway markings, <420 m of HI/MI approach lights, any length of LI approach lights, FATO/runway edge lights, threshold lights and FATO/runway end lights. Lights to be on.~~

~~NALS comprise FATO/runway markings, FATO/runway edge lights, threshold lights, FATO/runway end lights or no lights at all.~~

The RVR/VIS minima for Type A instrument approach and Type B CAT I instrument approach operations should be determined as follows:

(a) For IFR operations, the RVR or VIS should not be less than the greatest of:

(1) the minimum RVR or VIS for the type of runway/FATO used according to Table 12;

(2) the minimum RVR determined according to the MDH or DH and class of lighting facility according to Table 13; or

(3) for PinS operations with instructions to 'proceed visually', the distance between the MAPt of the PinS and the FATO or its approach light system.

If the value determined in (1) is a VIS, then the result is a minimum VIS. In all other cases, the result is a minimum RVR.

(b) For PinS operations with instructions to 'proceed VFR', the VIS should be compatible with visual flight rules.

(c) For Type A instrument approaches where the MAPt is within ½ NM of the landing threshold, the approach minima specified for FALS may be used regardless of the length of the approach lights available. However, FATO/runway edge lights, threshold lights, end lights and FATO/runway markings are still required.

(d) An RVR of less than 800 m should not be used except when using a suitable autopilot coupled to an ILS, an MLS, a GLS or LPV, in which case normal minima apply.

(e) For night operations, ground lights should be available to illuminate the FATO/runway and any obstacles.

(f) The visual aids should comprise standard runway day markings, runway edge lights, threshold lights and runway end lights and approach lights as specified in Table 14.

(g) For night operations or for any operation where credit for runway and approach lights as defined in Table 14 is required, the lights should be on and serviceable except as defined in Table 17.

Table 12

Type of runway/FATO versus minimum RVR — helicopters

Type of runway/FATO	**Minimum RVR or VIS**
PA runway, category I NPA runway Non-instrument runway	RVR 550 m
Instrument FATO	RVR 550 m
FATO	RVR/VIS 800 m

Table 13

Onshore helicopter instrument approach minima

DH/MDH (ft)	**Facilities versus RVR (m)**			
	FALS	**IALS**	**BALS**	**NALS**
200	550	600	700	1 000
201–249	550	650	750	1 000
250–299	600*	700*	800	1 000
300 and above	750*	800	900	1 000

* Minima on 2D approach operations should be no lower than 800 m.

Table 14

Approach lighting systems — helicopters

Class of lighting facility	**Length, configuration and intensity of approach lights**
FALS	CAT I lighting system (HIALS ≥ 720 m) distance coded centre line, barrette centre line
IALS	Simple approach lighting system (HIALS 420–719 m) single source, barrette
BALS	Any other approach lighting system (HIALS, MALS or ALS 210–419 m)
NALS	Any other approach lighting system (HIALS, MALS or ALS < 210 m) or no approach lights

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 157; 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 higherst of:

(i) the circling VIS~~visibility~~ for the aeroplane category, if published; or

(ii) the minimum VIS ~~visibility~~ derived from Table 15~~7~~.~~; or~~

~~(iii) the RVR/CMV derived from Tables 5 and 6.A for the preceding instrument approach procedure.~~

Table 15~~7~~

Circling — aeroplanes

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

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

(b) Conduct of flight — general~~:~~

(1) the MDH and OCH included in the procedure are referenced to aerodrome elevation;

(2) the MDA is referenced to mean sea level;

(3) for these procedures, the applicable visibility is the ~~meteorological visibility~~ VIS; and

(4) operators should provide tabular guidance of the relationship between height above threshold and the in-flight visibility required to obtain and sustain visual contact during the circling manoeuvre.

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

(1) When the aeroplane is on the initial instrument approach, before visual reference is ~~stabilised~~ established, but not below the MDA/H, the aeroplane should follow the corresponding ~~instrument approach procedure~~ IAP until the appropriate instrument MAPt is reached.

(2) At the beginning of the level flight phase at or above the MDA/H, the instrument approach track ~~determined by radio navigation aids, RNAV, RNP, ILS, MLS or GLS~~ should be maintained until the pilot:

(i) estimates that, in all probability, visual contact with the runway of intended landing or the runway environment will be maintained during the entire circling procedure;

(ii) estimates that the aeroplane is within the circling area before commencing circling; and

(iii) is able to determine the aeroplane's position in relation to the runway of intended landing with the aid of the appropriate ~~external~~ visual references.

(3) If the pilot cannot comply with the conditions in (c)(2) at the MAPt ~~When reaching the published instrument MAPt and the conditions stipulated in (c)(2) are unable to be established by the pilot~~, then a missed approach should be ~~carried out~~executed in accordance with ~~that~~ the ~~instrument approach procedure~~ IAP.

(4) After the aeroplane has left the track of the initial instrument approach, the flight phase outbound from the runway should be limited to an appropriate distance, which is required to align the aeroplane onto the final approach. Such manoeuvres should be conducted to enable the aeroplane to:

(i) ~~to~~ attain a controlled and stable descent path to the intended landing runway; and

(ii) ~~to~~ remain within the circling area and in such way that visual contact with the runway of intended landing or runway environment is maintained at all times.

(5) Flight manoeuvres should be carried out at an altitude/height that is not less than the circling MDA/H.

(6) Descent below the MDA/H should not be initiated until the threshold of the runway to be used has been appropriately identified. The aeroplane should be in a position to continue with a normal rate of descent and land within the touchdown zone (TDZ).

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

(1) The aeroplane should remain on the initial ~~instrument approach procedure~~ IAP until one of the following is reached:

(i) the prescribed divergence point to commence circling on the prescribed track; or

(ii) the MAPt.

(2) The aeroplane should be established on the instrument approach track ~~determined by the radio navigation aids, RNAV, RNP, ILS, MLS or GLS~~ in level flight at or above the MDA/H at or by the circling manoeuvre divergence point.

(…)

(8) Unless otherwise specified in the procedure, final descent should not be commenced from the MDA/H until the threshold of the intended landing runway has been identified and the aeroplane is in a position to continue with a normal rate of descent to land within the ~~touchdown zone~~ TDZ.

(e) Missed approach

(1) Missed approach during the instrument procedure prior to circling~~:~~

(i) ~~if~~ If the missed approach(…)

(ii) ~~if~~ If the ~~instrument approach procedure~~ IAP is carried out with the aid of an ILS, an MLS or a~~n~~ stabilised approach (SAp), the MAPt associated with an ILS~~,~~ or an MLS procedure without glide path (GP-out procedure) or the SAp, where applicable, should be used.

(…)

AMC8 CAT.OP.MPA.110 Aerodrome operating minima

ONSHORE CIRCLING OPERATIONS — HELICOPTERS

For circling, the specified MDH should not be less than 250 ft, and the ~~meteorological visibility~~ VIS not less than 800 m.

AMC10 CAT.OP.MPA.110 Aerodrome operating minima

CONVERSION OF ~~REPORTED METEOROLOGICAL~~ VISIBILITY TO CMV~~RVR~~ — AEROPLANES

~~(a) A conversion from meteorological visibility to RVR/CMV should not be used:~~

~~(1) when reported RVR is not available;~~

~~(2) for calculating take-off minima; and~~

~~(3) for any RVR minima less than 800 m.~~

~~(b) If the RVR is reported as being above the maximum value assessed by the aerodrome operator, e.g. 'RVR more than 1 500 m', it should not be considered as a reported value for (a)(1).~~

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

The following conditions apply to the use of converted meteorological visibility (CMV) instead of RVR:

(a) If the reported RVR is not available, a CMV may be substituted for the RVR, except:

(1) to satisfy the take-off minima; or

(2) for the purpose of continuation of an approach in LVOs.

(b) If the minimum RVR for an approach is more than the maximum value assessed by the aerodrome operator, then CMV should be used.

(c) In order to determine CMV from visibility:

(1) for flight planning purposes, a factor of 1.0 should be used;

(2) for purposes other than flight planning, the conversion factors specified in Table 16 should be used.

Table 16~~8~~

Conversion of reported ~~meteorological visibility~~ VIS to RVR/CMV

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

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 before ~~pre-flight~~ and during ~~in-~~flight. It is, however, not expected that the commander would consult such instructions after passing 1 000 ft above the aerodrome. If failures of ground aids are announced at such a late stage, the approach could be continued at the commander's discretion. If failures are announced before such a late stage in the approach, their effect on the approach should be considered as described in Table 17~~9~~, and the approach may have to be abandoned.

(b) Conditions applicable to Table 17~~9~~:

(1) multiple failures of runway/FATO lights other than those indicated in Table 17~~9~~ should not be acceptable;

(2) deficiencies of approach and runway/FATO lights are acceptable at the same time, and the most demanding consequence should be applied ~~treated separately~~; and

(3) failures other than ILS, GLS, MLS affect the RVR only and not the DH.

Table 17~~9~~

Failed or downgraded equipment — effect on landing minima

Operations without ~~a low visibility operations (~~LVO~~)~~ approval

Failed or downgraded equipment	Effect on landing minima	
	~~**CAT I**~~ **Type B**	~~**APV, NPA**~~ **Type A**
Navaid stand-by transmitter	No effect	
Outer ~~M~~marker (ILS only)	Not allowed except if ~~replaced by height check at 1 000 ft~~ the required height versus glide path can be checked using other means, e.g. DME fix	APV —not applicable NPA with 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), NPA ~~approach~~ operations ~~using NPA procedures~~ cannot be conducted
Middle marker (ILS only)	No effect	No effect unless used as MAPt
RVR assessment systems	No effect	
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~~ Centre line lights	Aeroplanes: No effect if flight director (F/D), HUDLS or autoland; otherwise RVR 750 m Helicopters: No effect on CAT I and HELI SA CAT I approach operations	No effect
~~Centreline~~ Centre line lights spacing increased to 30 m	No effect	

Failed or downgraded equipment	Effect on landing minima	
	~~CAT I~~ Type B	~~APV, NPA~~ Type A
~~Touchdown zone~~ TDZ lights	Aeroplanes: No effect if F/D, HUDLS or autoland; otherwise RVR 750 m Helicopters: No effect	No effect
Taxiway lighting system	No effect	

GM2 CAT.OP.MPA.110 Aerodrome operating minima

APPROACH LIGHTING SYSTEMS — ICAO, FAA

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

Table 19 ~~*1*~~

Approach lighting systems — ICAO and FAA specifications

Class of lighting facility	Length, configuration and intensity of approach lights
FALS	ICAO: CAT I lighting system ~~(HIALS ≥ 900 m)~~ (HIALS ≥ 720 m) distance coded ~~centreline~~ centre line, barrette ~~centreline~~ centre line 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.~~

GM3 CAT.OP.MPA.110 Aerodrome operating minima

SBAS OPERATIONS

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

(…)

GM4 CAT.OP.MPA.110 Aerodrome operating minima

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

The values in Table 9 are derived from the formula below:

Minimum RVR (m) = [(DH/MDH (ft) x 0.3048)/tanα] — length of approach lights (m)

where α is the calculation angle, being a default value of 3.00° increasing in steps of 0.10° for each line in Table 9 up to 3.77° and then remaining constant. An upper RVR limit of 2 400 m has been applied to the table.

GM5 CAT.OP.MPA.110 Aerodrome operating minima

USE OF DH FOR NPAs 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 the CDFA using MDH as DH without any add-on is safer than the traditional step-down and level-flight NPA operation. A comparison has been made between the safety level of using MDH as DH without an add-on with the well-established safety level resulting from the ILS collision risk model. The NPA used was the most demanding, i.e. most tightly designed NPA, which offers the least additional margins. It should be noted that the design limits of the ILS approach design, e.g. the maximum GP angle of 3,5 degrees, must be observed for the CDFA in order to keep the validity of the comparison.

There is a wealth of operational experience in Europe confirming the above-mentioned analytical assessments. It cannot be expected that each operator is able to conduct similar safety assessments, and this is not necessary. The safety assessments already performed take into account the most demanding circumstances at hand, like the most tightly designed NPA procedures and other 'worst-case scenarios'. The assessments naturally focus on cases where the controlling obstacle is located in the missed approach area.

However, it is necessary for operators to assess whether their cockpit procedures and training are adequate to ensure minimal height loss in case of a go-around manoeuvre. Suitable topics for the safety assessment required by each operator may include:

— understanding of the CDFA concept including the use of the MDA/H as DA/H;

— cockpit procedures that ensure flight on speed, on path and with proper configuration and energy management;

— cockpit procedures that ensure gradual decision-making; and

— identification of cases where an increase of the DA/H may be necessary because of non-standard circumstances, etc.

GM6 ~~GM1~~ CAT.OP.MPA.110 ~~(a)~~ Aerodrome operating minima

INCREMENTS SPECIFIED BY THE COMPETENT AUTHORITY

Additional increments to the published minima may be specified by the competent authority to take into account certain operations, such as downwind approaches, ~~and~~ single-pilot operations or approaches flown not using the CDFA technique.

GM7 CAT.OP.MPA.110 Aerodrome operating minima

USE OF COMMERCIALLY AVAILABLE INFORMATION

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

The procedures in ORO.GEN.205 'Contracted activities' apply in this case.

GM8 CAT.OP.MPA.110 Aerodrome operating minima

LOW TEMPERATURE CORRECTION

(a) An operator may determine the aerodrome temperature below which a correction should be applied to the DA/H.

(b) Table 20 may be used to determine the correction that should be applied.

(c) The calculations in the table are for a sea-level aerodrome; they are therefore conservative when applied at higher-level aerodromes.

(d) Guidance on accurate corrections for specific conditions (if required) is available in PANS-OPS, Volume I (ICAO Doc 8168) Section 1 Chapter 4.

Table 20

Temperature corrections to be applied to barometric DH/MDH

Aerodrome temperature (°C)	*Height above the elevation of the altimeter setting source (ft)*													
	200	300	400	500	600	700	800	900	1 000	1 500	2 000	3 000	4 000	5 000
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

High vertical speeds should be avoided due to unstable aerodynamics and potential transient autorotation state of the main rotor.

Vertical speeds at or below 800 ft/min should be considered to be normal, and vertical speeds above 1 000 ft/min should be considered to be high.

The vertical speed on final approach increases with the descent angle and the ground speed (GS), including tailwinds. Whereas the helicopter should be manoeuvred into the wind during the visual segment of an instrument approach, tailwinds may be encountered during the instrument segments of the approach.

If the vertical speed is above 1 000 ft/min, a go-around should be considered. Greater vertical speeds may be used based on the available data in the rotorcraft flight manual.

Table 21 below gives an indication of the vertical speed based on the descent angles and ground speed.

Table 21

Examples of vertical speeds

Ground speed	Descent angle	Vertical speed
80 kt	5.7° (10 %)	800 ft/min
100 kt	5.7° (10 %)	1 000 ft/min
80 kt	7.5° (13.2 %)	1 050 ft/min
100 kt	7.5° (13.2 %)	1 300 ft/min

Note: A GS of 80 kt may be the result of an indicated airspeed (IAS) of 60 kt and a tailwind component of 20 kt.

GM1 CAT.OP.MPA.110(b)(6) 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.

AMC1 CAT.OP.MPA.115 Approach flight technique — aeroplanes

CONTINUOUS DESCENT FINAL APPROACH (CDFA)

~~(a) Flight techniques:~~

~~(1) The CDFA technique should ensure that an approach can be flown on the desired vertical path and track in a stabilised manner, without significant vertical path changes during the final segment descent to the runway. This technique applies to an approach with no vertical guidance and controls the descent path until the DA/DH. This descent path can be either:~~

~~(i) a recommended descent rate, based on estimated ground speed;~~

~~(ii) a descent path depicted on the approach chart; or~~

~~(iii) a descent path coded in the flight management system in accordance with the approach chart descent path.~~

~~(2) The operator should either provide charts which depict the appropriate cross check altitudes/heights with the corresponding appropriate range information, or such information should be calculated and provided to the flight crew in an appropriate and usable format. Generally, the MAPt is published on the chart.~~

~~(3) The approach should be flown as an SAp.~~

~~(4) The required descent path should be flown to the DA/H, observing any step-down crossing altitudes if applicable.~~

~~(5) This DA/H should take into account any add-on to the published minima as identified by the operator's management system and should be specified in the OM (aerodrome operating minima).~~

~~(6) During the descent, the pilot monitoring should announce crossing altitudes as published fixes and other designated points are crossed, giving the appropriate altitude or height for the appropriate range as depicted on the chart. The pilot flying should promptly adjust the rate of descent as appropriate.~~

~~(7) The operator should establish a procedure to ensure that an appropriate callout is made when the aeroplane is approaching DA/H. If the required visual references are not established at DA/H, the missed approach procedure is to be executed promptly.~~

~~(8) The descent path should ensure that little or no adjustment of attitude or thrust/power is needed after the DA/H to continue the landing in the visual segment.~~

~~(9) The missed approach should be initiated no later than reaching the MAPt or at the DA/H, whichever comes first. The lateral part of the missed approach should be flown via the MAPt unless otherwise stated on the approach chart.~~

~~(b) Flight techniques conditions:~~

~~(1) The approach should be considered to be fully stabilised when the aeroplane is:~~

~~(i) tracking on the required approach path and profile;~~

(ii) in the required configuration and attitude;

(iii) flying with the required rate of descent and speed; and

(iv) flying with the appropriate thrust/power and trim.

(2) The aeroplane is considered established on the required approach path at the appropriate energy for stable flight using the CDFA technique when:

(i) it is tracking on the required approach path with the correct track set, approach aids tuned and identified as appropriate to the approach type flown and on the required vertical profile; and

(ii) it is at the appropriate attitude and speed for the required target rate of descent (ROD) with the appropriate thrust/power and trim.

(3) Stabilisation during any straight-in approach without visual reference to the ground should be achieved at the latest when passing 1 000 ft above runway threshold elevation. For approaches with a designated vertical profile applying the CDFA technique, a later stabilisation in speed may be acceptable if higher than normal approach speeds are required by ATC procedures or allowed by the OM. Stabilisation should, however, be achieved not later than 500 ft above runway threshold elevation.

(4) For approaches where the pilot has visual reference with the ground, stabilisation should be achieved not later than 500 ft above aerodrome elevation. However, the aeroplane should be stabilised when passing 1 000 ft above runway threshold elevation; in the case of circling approaches flown after a CDFA, the aircraft should be stabilised in the circling configuration not later than passing 1 000 ft above the runway elevation.

(5) To ensure that the approach can be flown in a stabilised manner, the bank angle, rate of descent and thrust/power management should meet the following performances:

(i) The bank angle should be less than 30 degrees.

(ii) The target rate of descent (ROD) should not exceed 1 000 fpm and the ROD deviations should not exceed ± 300 fpm, except under exceptional circumstances which have been anticipated and briefed prior to commencing the approach; for example, a strong tailwind. Zero ROD may be used when the descent path needs to be regained from below the profile. The target ROD may need to be initiated prior to reaching the required descent point, typically 0.3 NM before the descent point, dependent upon ground speed, which may vary for each type/class of aeroplane.

(iii) The limits of thrust/power and the appropriate range should be specified in the OM Part B or equivalent document.

(iv) The optimum angle for the approach slope is 3° and should not exceed 4.5°.

(v) The CDFA technique should be applied only to approach procedures based on NDB, NDB/DME, VOR, VOR/DME, LOC, LOC/DME, VDF, SRA, GNSS/LNAV and fulfil the following criteria:

(A) ~~the final approach track off-set ≤ 5° except for Category A and B aeroplanes, where the approach-track off-set is ≤ 15°; and~~

(B) ~~a FAF, or another appropriate fix, e.g. final approach point, where descent initiated is available; and~~

(C) ~~the distance from the FAF or another appropriate fix to the threshold (THR) is less than or equal to 8 NM in the case of timing; or~~

(D) ~~the distance to the THR is available by FMS/GNSS or DME; or~~

(E) ~~the minimum final-segment of the designated constant angle approach path should not be less than 3 NM from the THR unless approved by the authority.~~

(7) ~~The CDFA techniques support a common method for the implementation of flight-director-guided or auto-coupled RNAV approaches.~~

The following criteria apply to CDFA:

(a) For each NPA procedure to be used, the operator should provide information allowing the flight crew to determine the appropriate descent path. This information is either:

(1) a descent path depicted on the approach chart including check altitude/heights against range;

(2) a descent path coded into the aircraft flight management system; or

(3) a recommended descent rate based on estimated ground speed.

(b) The information provided to the crew should observe human factors principles.

(c) The descent path should be calculated to pass at or above the minimum altitude specified at any step-down fix.

(d) The optimum angle for the descent path is 3° and should not exceed 4,5° except for steep approach operations approved in accordance with this Part.

(e) For multi-pilot operations, the operator should establish procedures that require:

(1) the pilot monitoring to verbalise deviations from the required descent path;

(2) the pilot flying to make prompt corrections to deviation from the required descent path; and

(3) a call-out to be made when the aircraft is approaching the DA/H.

(f) A missed approach should be executed promptly at the DA/H or the MAPt, whichever is first, if the required visual references have not been established.

(g) For approaches other than circling approaches, the lateral part of the missed approach should be flown via the MAPt unless otherwise stated on the approach chart.

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

~~NPA OPERATIONS WITHOUT APPLYING THE CDFA TECHNIQUE~~

APPROACH OPERATIONS USING NPA PROCEDURES FLOWN WITH A FLIGHT TECHNIQUE OTHER THAN THE CDFA

(…)

(d) In case the CDFA technique is not used and when the MDA/H is high, it may be appropriate to make an early descent to the MDA/H with appropriate safeguards such as the application of a significantly higher RVR~~/~~ or VIS.

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

(f) Operators should categorise aerodromes where there are approaches that require level flight at~~/~~ or above the MDA/H as B ~~and~~ or C. Such aerodrome categorisation will depend upon the operator's experience, operational exposure, training programme(s) and flight crew qualification(s).

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 operations manual ~~OM~~ and should include the duties of the flight crew during the conduct of such operations. The operator should ensure that the 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).~~

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 points referred to in (a) and (b). This should normally be the FAF.

(f) When the operator requests approval for an alternative to the stabilised approach criteria for a particular approach to a particular runway, the operator should demonstrate that the proposed alternative will ensure that an acceptable level of safety is achieved.

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

ACCEPTABLE TOLERANCES FOR STABILISED APPROACH OPERATIONS

(a) The requirement for the aircraft to be tracking within an acceptable tolerance of the required lateral path does not imply that the aircraft has to be aligned with the runway centre line by any particular height.

(b) The target rate of descent for the final approach segment (FAS) of a stabilised approach normally does not exceed 1 000 fpm. Where a rate of descent of more than 1 000 fpm will be required (e.g. due to high ground speed or a steeper-than-normal approach path), this should be briefed in advance.

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

(d) For operations where a level flight segment is required during the approach (e.g. circling approaches or approaches flown as non-CDFA), the criteria in point (b) of AMC1 CAT.OP.MPA.115(a) should apply from the predetermined point until the start of the level flight segment and again from the point at which the aircraft begins descent from the level flight segment down to a point of 50 ft above the threshold or the point where the flare manoeuvre is initiated, if higher.

GM1 CAT.OP.MPA.115(b) Approach flight technique — aeroplanes

CONTINUOUS DESCENT FINAL APPROACH (CDFA)

(a) Introduction

(1) Controlled flight into terrain (CFIT) is a major hazard in aviation. Most CFIT accidents occur in the ~~final approach segment~~ FAS of ~~non-precision approaches;~~ approach operations flown using NPA procedures. T~~t~~he use of stabilised-approach criteria on a continuous descent with a constant, predetermined vertical path is seen as a major improvement in safety during the conduct of such approaches. ~~Operators should ensure that the following techniques are adopted as widely as possible, for all approaches.~~

(2) The elimination of level flight segments at MDA close to the ground during approaches, and the avoidance of major changes in attitude and power/thrust close to the runway that can destabilise approaches, are seen as ways to reduce operational risks significantly.

(3) The term CDFA has been selected to cover a flight technique for ~~any type of~~ instrument approach operations using NPA procedures ~~operation~~.

(4) The advantages of CDFA are as follows:

(i) the technique enhances safe approach operations by the utilisation of standard operating practices;

(ii) the technique is similar to that used when flying an ILS approach, including when executing the missed approach and the associated missed approach procedure manoeuvre;

(iii) the aeroplane attitude may enable better acquisition of visual cues;

(iv) the technique may reduce pilot workload;

(v) the approach profile is fuel-efficient;

(vi) the approach profile affords reduced noise levels;

(vii) the technique affords procedural integration with ~~APV~~ 3D approach operations; and

(viii) when used and the approach is flown in a stabilised manner, CDFA is the safest approach technique for all ~~NPA operations~~ instrument approach operations using NPA procedures.

(b) ~~CDFA~~

~~(1) 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.~~

~~(3)~~ Stabilised approach (SAp) ~~is defined in Annex I to this Regulation~~.

(~~i~~1) 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~~2) 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~~3) 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~~4) ~~An SAp~~ Straight-in approach operations using CDFA ~~will never~~ do not have a~~ny~~ level segment of flight at ~~DA/H or~~ MDA/H ~~as applicable~~. This enhances safety by mandating a prompt missed approach procedure manoeuvre at DA/H ~~or the MDA/H~~.

(v5) An approach using the CDFA technique is will always be flown as an SAp, since this is a specification for applying CDFA. However, an SAp does not have to be flown using the CDFA technique, for example, a visual approach.

(c) Circling approach operations using the CDFA technique

Circling approach operations using the CDFA technique require a continuous descent from an altitude/height at or above the FAF altitude/height until MDA/H or visual flight manoeuvre altitude/height. This does not preclude level flight at or above the MDA/H. This level flight may be at MDA/H while following the IAP or after visual reference has been established as the aircraft is aligned with the final approach track. The conditions for descent from level flight are described in AMC7 CAT.OP.MPA.110.

AMC2 CAT.OP.MPA.126 Performance-based navigation

MONITORING AND VERIFICATION

[…]

(d) Altimetry settings for RNP APCH operations using Baro VNAV

[…]

(2) Temperature compensation

(i) For RNP APCH operations to LNAV/VNAV minima using Baro VNAV:

(A) […]

(B) when the temperature is within promulgated limits, the flight crew should not make compensation to the altitude at the FAF and DA/H;

[…]

AMC8 CAT.OP.MPA.182 Fuel/energy scheme — aerodrome selection policy — aeroplanes

BASIC FUEL SCHEME WITH VARIATIONS — PLANNING MINIMA

(…)

Row	Type of approach operation	Aerodrome ceiling (cloud base or vertical visibility)	RVR/VIS
1	Type B instrument approach operations	DA/H + 200 ft	RVR/VIS + 550 m
2	3D Type A instrument approach operations, based on a facility with a system minimum of 200 ft or less	DA/H or MDA/H* + 200 ft	RVR/VIS** + 800 m

3	Two or more usable type A instrument approach operations***, each based on a separate navigation aid	DA/H or MDA/H* + 200 ft	RVR/VIS** + 1 000 m
4	Other type A instrument approach operations	DA/H or MDA/H + 400 ft	RVR/VIS + 1 500 m
5	Circling approach operations	MDA/H + 400 ft	VIS + 1 500 m
Crosswind planning minima: see Table 1 of AMC3 CAT.OP.MPA.182			
Wind limitations should be applied taking into account the runway condition (dry, wet, contaminated).			

AMC9 CAT.OP.MPA.182 Fuel/energy scheme — aerodrome selection policy — aeroplanes

BASIC FUEL SCHEME WITH VARIATIONS — PLANNING MINIMA

(...)

Row	**Type of approach**	**Aerodrome ceiling (cloud base or vertical VIS)**	**RVR/VIS**
1	Two or more usable type B instrument approach operations to two separate runways***	DA/H* + 100 ft	RVR** + 300 m
2	One usable type B instrument approach operation	DA/H + 150 ft	RVR + 450 m
3	3D Type A instrument approach operations, based on a facility with a system minimum of 200 ft or less	DA/H ~~or MDA/H*~~ + 200 ft	RVR/VIS** + 800 m
4	Two or more usable type A instrument approach operations ***, each based on a separate navigation aid	DA/H or MDA/H* + 200 ft	RVR/VIS** + 1 000 m
5	One usable type A instrument approach operation	DA/H or MDA/H + 400 ft	RVR/VIS + 1 500 m
6	Circling approach operations	MDA/H + 400 ft	VIS + 1 500 m
Crosswind planning minima: see Table 1 of AMC3 CAT.OP.MPA.182			
Wind limitations should be applied taking into account the runway condition (dry, wet, contaminated).			

~~GM1 CAT.OP.MPA.185 Planning minima for IFR flights — aeroplanes~~

~~PLANNING MINIMA FOR ALTERNATE AERODROMES~~

~~Non-precision minima (NPA) in Table 1 of CAT.OP.MPA.185 mean the next highest minima that apply in the prevailing wind and serviceability conditions. Localiser only approaches, if published, are considered to be non-precision in this context. It is recommended that operators wishing to publish tables of planning minima choose values that are likely to be appropriate on the majority of occasions (e.g. regardless of wind direction). Unserviceabilities should, however, be fully taken into account.~~

~~As Table 1 does not include planning minima requirements for APV, lower than standard (LTS) CAT I and other than standard (OTS) CAT II operations, the operator may use the following minima:~~

~~(a) for APV operations — NPA or CAT I minima, depending on the DH/MDH;~~

~~(b) for LTS CAT I operations — CAT I minima; and~~

~~(c) for OTS CAT II operations — CAT II minima.~~

AMC1 CAT.OP.MPA.182(f) Fuel/energy scheme — aerodrome selection policy — aeroplanes

BASIC FUEL SCHEME — DESTINATION AERODROMES — PBN OPERATIONS

(a) `(…)

BASIC FUEL SCHEME — DESTINATION AERODROMES — OPERATIONAL CREDITS

(b) To comply with point CAT.OP.MPA.182(f), when the operator intends to use ‘operational credits’ (e.g. EFVS, SA CAT I, etc.), the operator should select an aerodrome as destination alternate aerodrome only if an ~~instrument~~ approach procedure that does not rely on the same ‘operational credit’ is available either at that aerodrome or at the destination aerodrome.

~~AMC1 CAT.OP.MPA.192(d) Selection of aerodromes and operating sites — helicopters~~

~~**DESTINATION AND DESTINATION ALTERNATE AERODROMES — PBN OPERATIONS**~~

~~To comply with CAT.OP.MPA.192(d), when the operator intends to use PBN, the operator should select an aerodrome as a destination alternate aerodrome only if an instrument approach procedure that does not rely on a GNSS is available either at that aerodrome or at the destination aerodrome.~~

AMC1 CAT.OP.MPA.192(d) Selection of aerodromes and operating sites — helicopters

PBN OPERATIONS

(a) To comply with CAT.OP.MPA.192(d), when the operator intends to use PBN, the operator should either:

(1) demonstrate that the GNSS is robust against loss of capability; or

(2) select an aerodrome as a destination alternate aerodrome only if an instrument approach procedure that does not rely on a GNSS is available either at that aerodrome or at the destination aerodrome.

GNSS ROBUSTNESS AGAINST LOSS OF CAPABILITY — HELICOPTERS

(b) The operator may demonstrate robustness against the loss of capability of the GNSS if all of the following criteria are met:

(1) SBAS or GBAS are available and used.

(2) The failure of a single receiver or system should not compromise the navigation capability required for the intended instrument approach.

(3) The temporary jamming of all GNSS frequencies should not compromise the navigation capability required for the intended route. The operator should establish a procedure to deal with such cases unless other sensors are available to continue on the intended route.

(4) The duration of a jamming event should be determined as follows:

(i) Considering the average speed and height of a helicopter flight, the duration of a jamming event may be considered to be less than 2 minutes.

(ii) The time needed for the GNSS system to re-start and provide the aircraft position and navigation guidance should also be considered.

(iii) Based on (i) and (ii) above, the operator should establish the duration of the loss of GNSS navigation data due to jamming. This duration should be no less than 3 minutes, and may be no longer than 4 minutes.

(5) The operator should ensure resilience to jamming for the duration determined in (4) above, as follows:

(i) If the altitude of obstacles on both sides of the flight path is higher than the planned altitude for a given segment of the flight, the operator should ensure no excessive drift on either side by relying on navigation sensors such as a inertial system with performance in accordance with the intended function.

(ii) If (i) does not apply and the operator cannot rely on sensors other than GNSS, the operator should develop a procedure to ensure that a drift from the intended route during the jamming event has no adverse consequences on the safety of the flight. This procedure may involve air traffic services.

(6) The operator should ensure that no space weather event is predicted to disrupt the GNSS reliability and integrity at both the destination and the alternate aerodrome.

(7) The operator should verify the availability of RAIM for all phases of flight based on GNSS, including navigation to the alternate aerodrome.

(8) The operator's MEL should reflect the elements in points (b)(1) and (b)(2).

OPERATIONAL CREDITS

(c) To comply with point CAT.OP.MPA.192(d), when the operator intends to use 'operational credits' (e.g. EFVS, SA CAT I, etc.), the operator should select an aerodrome as destination alternate aerodrome only if an approach procedure that does not rely on the same 'operational credit' is available either at that aerodrome or at the destination aerodrome.

GM2 CAT.OP.MPA.192(d) Selection of aerodromes and operating sites — helicopters

GNSS ROBUSTNESS AGAINST LOSS OF CAPABILITY — HELICOPTERS

(a) Redundancy of on-board systems ensures that no single on-board equipment failure (e.g. antenna, GNSS receiver, FMS, or navigation display failure) results in the loss of the GNSS capability.

(b) Any shadowing of the GNSS signal or jamming of all GNSS frequencies from the ground is expected to be of a very short duration and affect a very small area. Additional sensors or functions, such as inertial coasting, may be used during jamming events. Jamming should be considered on all segments of the intended route, including the approach.

(c) The availability of GNSS signals can be compromised if space weather events cause 'loss of lock' conditions and more than one satellite signal may be lost on a given GNSS frequency. Until space weather forecasts are available, the operator may use 'nowcasts' as short-term predictions for helicopter flights of short durations.

(d) SBAS also contributes to the mitigation of space weather effects, by both providing integrity messages and correcting ionosphere-induced errors.

(e) Even though SBAS should be available and used, RAIM should remain available autonomously. In case of loss of SBAS, the route and the approach to the destination or alternate aerodrome should still be flown with an available RAIM function.

(f) When available, GNSS based on more than one constellation and more than one frequency may provide better integrity and redundancy regarding failures in the space segment of GNSS, jamming, and resilience to space weather events.

AMC1 CAT.OP.MPA.265(a) Take-off conditions

METEOROLOGICAL CONDITIONS FOR TAKE-OFF — RUNWAYS

(a) The commander should not commence take-off unless the weather conditions at the aerodrome of departure are equal to or better than the applicable minima for landing at that aerodrome unless a weather-permissible take-off alternate aerodrome is available.

(b) If the reported VIS is below the minimum specified for take-off and RVR is not reported, then take-off should only be commenced if the commander can determine that the visibility along the take-off runway is equal to or better than the required minimum.

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

APPLICATION OF RVR OR VIS REPORTS — AEROPLANES

(a) There is no prohibition on the commencement of an approach based on the reported RVR or VIS. The restriction in CAT.OP.MPA.305 applies only if the RVR or VIS is reported and applies to the continuation of the approach past a point where the aircraft is 1 000 ft above the aerodrome elevation or in the FAS, as applicable.

APPLICATION OF RVR OR VIS REPORTS — HELICOPTERS

(b) There is no prohibition on the commencement of an approach based on the reported RVR. The restriction in CAT.OP.MPA.305 applies to the continuation of the approach past a point where the aircraft is 1 000 ft above the aerodrome elevation or in the final approach segment as applicable.

The prohibition to continue the approach applies only if the RVR is reported and it is below 550 m and below the operating minima. There is no prohibition based on VIS.

(c) If the reported RVR is 550 m or greater, but it is less than the RVR calculated in accordance with AMC5 CAT.OP.MPA.110, a go-around is likely to be necessary since visual reference may not be established at the DH or MDH. Similarly, in the absence of an RVR report, the reported visibility or a digital image may indicate that a go-around is likely. The commander should consider the available options, based on a thorough assessment of risk, such as diverting to an alternate, before commencing the approach.

APPLICATION OF RVR OR VIS REPORTS — ALL AIRCRAFT

(d) If a deterioration in the RVR or VIS is reported once the aircraft is below 1 000 ft or in the FAS, as applicable, then there is no requirement for the approach to be discontinued. In this situation, the normal visual reference requirements would apply at the DA/H.

(e) Where additional RVR information is provided (e.g. midpoint and stop end), this is advisory; such information may be useful to the pilot in order to determine whether there will be sufficient visual reference to control the aircraft during roll-out and taxi. For operations where the aircraft is controlled manually during roll-out, Table 1 in AMC1 SPA.LVO.100(a) provides an indication of the RVR that may be required to allow manual lateral control of the aircraft on the runway.

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

MINIMUM RVR FOR CONTINUATION OF APPROACH — AEROPLANES

(a) The touchdown RVR should be the controlling RVR.

(b) If the touchdown RVR is not reported, then the midpoint RVR should be the controlling RVR.

(c) Where the RVR is not available, CMV should be used except for the purpose of continuation of an approach in LVO in accordance with AMC10 CAT.OP.MPA.110.

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

MINIMUM RVR FOR CONTINUATION OF APPROACH — HELICOPTERS

(a) The touchdown RVR should be the controlling RVR.

(b) If the touchdown RVR is not reported, then the midpoint RVR should be the controlling RVR.

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

VISUAL REFERENCES FOR INSTRUMENT APPROACH OPERATIONS

~~(a) NPA, APV and CAT I operations~~

~~At DH or MDH, at least one of the visual references specified below should be distinctly visible and identifiable to the pilot:~~

For instrument approach operations Type A and CAT I instrument approach operations Type B, at least one of the visual references specified below should be distinctly visible and identifiable to the pilot at the MDA/H or the DA/H:

(a~~1~~) elements of the approach lighting system;

(b~~2~~) the threshold;

(c~~3~~) the threshold markings;

(d~~4~~) the threshold lights;

(e~~5~~) the threshold identification lights;

(f~~6~~) the visual glide path ~~slope~~ indicator;

(g~~7~~) the TDZ ~~touchdown zone~~ or TDZ ~~touchdown zone~~ markings;

(h~~8~~) the TDZ ~~touchdown zone~~ lights;

(i~~9~~) the FATO/runway edge lights; or

(j) for helicopter PinS approaches, the identification beacon light and visual ground reference;

(k) for helicopter PinS approaches, the identifiable elements of the environment defined on the instrument chart;

(l) for helicopter PinS approaches with instructions to 'proceed VFR', sufficient visual cues to determine that VFR criteria are met; or

(m~~10~~) other visual references specified in the operations manual.

~~(b) LTS CAT I operations~~

~~At DH, the visual references specified below should be distinctly visible and identifiable to the pilot:~~

~~(1) a segment of at least three consecutive lights, being the centreline of the approach lights, or touchdown zone lights, or runway centreline lights, or runway edge lights, or a combination of them;~~

~~(2) this visual reference should include a lateral element of the ground pattern, such as an approach light crossbar or the landing threshold or a barrette of the touchdown zone~~

~~light unless the operation is conducted utilising an approved HUDLS usable to at least 150 ft.~~

~~(c) CAT II or OTS CAT II operations~~

~~At DH, the visual references specified below should be distinctly visible and identifiable to the pilot:~~

~~(1) a segment of at least three consecutive lights being the centreline of the approach lights, or touchdown zone lights, or runway centreline lights, or runway edge lights, or a combination of them;~~

~~(2) this visual reference should include a lateral element of the ground pattern, such as an approach light crossbar or the landing threshold or a barrette of the touchdown zone light unless the operation is conducted utilising an approved HUDLS to touchdown.~~

~~(d) CAT III operations~~

~~(1) For CAT IIIA operations and for CAT IIIB operations conducted either with fail-passive flight control systems or with the use of an approved HUDLS: at DH, a segment of at least three consecutive lights being the centreline of the approach lights, or touchdown zone lights, or runway centreline lights, or runway edge lights, or a combination of these is attained and can be maintained by the pilot.~~

~~(2) For CAT IIIB operations conducted either with fail-operational flight control systems or with a fail-operational hybrid landing system using a DH: at DH, at least one centreline light is attained and can be maintained by the pilot.~~

~~(3) For CAT IIIB operations with no DH, there is no specification for visual reference with the runway prior to touchdown.~~

~~(e) Approach operations utilising EVS — CAT I operations~~

~~(1) At DH, the following visual references should be displayed and identifiable to the pilot on the EVS image:~~

~~(i) elements of the approach light; or~~

~~(ii) the runway threshold, identified by at least one of the following:~~

~~(A) the beginning of the runway landing surface,~~

~~(B) the threshold lights, the threshold identification lights; or~~

~~(C) the touchdown zone, identified by at least one of the following: the runway touchdown zone landing surface, the touchdown zone lights, the touchdown zone markings or the runway lights.~~

~~(2) At 100 ft above runway threshold elevation, at least one of the visual references specified below should be distinctly visible and identifiable to the pilot without reliance on the EVS:~~

~~(i) the lights or markings of the threshold; or~~

~~(ii) the lights or markings of the touchdown zone.~~

~~(f) Approach operations utilising EVS — APV and NPA operations flown with the CDFA technique~~

~~(1) At DH/MDH, visual references should be displayed and identifiable to the pilot on the EVS image as specified under (a).~~

~~(2) At 200 ft above runway threshold elevation, at least one of the visual references specified under (a) should be distinctly visible and identifiable to the pilot without reliance on the EVS.~~

~~GM1 CAT.OP.MPA.305(f) Commencement and continuation of approach~~

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. EFVSs cannot be used to extend the instrument segment of an approach and thus the DH for EFVS 200 operations is always the same as for the same approach conducted without EFVS.

(b) Equipment for EFVS 200 operations

(1) In order to conduct EFVS 200 operations, a certified EFVS is used (EFVS-A or EFVS-L). An EFVS is an enhanced vision system (EVS) that also incorporates a flight guidance system and displays the image on a head-up display (HUD) or equivalent display. The flight guidance system will incorporate aircraft flight information and flight symbology.

(2) In multi-pilot operations, a suitable display of EFVS sensory imagery is provided to the pilot monitoring.

(c) Suitable approach procedures

(1) Types of approach operation are specified in AMC1 CAT.OP.MPA.312(a)(2)

EFVS 200 operations should be conducted as 3D approach operations. This may include operations based on NPA procedures, approach procedures with vertical guidance and precision approach procedures including approach operations requiring specific approvals, provided that the operator holds the necessary approvals.

(2) Offset approaches

Refer to AMC1 CAT.OP.MPA.312(a)(2).

(3) Circling approaches

EFVSs incorporate a HUD or an equivalent system so that the EFVS image of the scene ahead of the aircraft is visible in the pilot's forward external FOV. Circling operations require the pilot to maintain visual references that may not be directly ahead of the aircraft and may not be aligned with the current flight path. EFVSs cannot therefore be used in place of natural visual reference for circling approaches.

(d) Aerodrome operating minima for EFVS 200 operations determined in accordance with AMC1 CAT.OP.MPA.312(a)(8).

The performance of EFVSs depends on the technology used and weather conditions encountered. Table 1 'Operations utilising EFVS: RVR reduction' has been developed after an operational evaluation of two different EVSs both using infrared sensors, along with data and support provided by the FAA. Approaches were flown in a variety of conditions including fog, rain and snow showers, as well as at night to aerodromes located in mountainous terrain. Table 1 contains conservative figures to cater for the expected performance of infrared sensors in the variety of conditions that might be encountered. Some systems may have better capability than those used for the evaluation, but credit cannot be taken for such performance in EFVS 200 operations.

(e) The conditions for commencement and continuation of the approach in accordance with CAT.OP.MPA.305

Pilots conducting EFVS 200 operations may commence an approach and continue that approach below 1 000 ft above the aerodrome or into the FAS if the reported RVR or CMV is equal to or greater than the lowest RVR minima determined in accordance with AMC1 CAT.OP.MPA.312(a)(8) and if all the conditions for the conduct of EFVS 200 operations are met.

Should any equipment required for EFVS 200 operations be unserviceable or unavailable, the conditions to conduct EFVS 200 operations would not be satisfied, and the approach should not be commenced. In the event of failure of the equipment required for EFVS 200 operations after the aircraft descends below 1 000 ft above the aerodrome or into the FAS, the conditions of CAT.OP.MPA.305 would no longer be satisfied unless the RVR reported prior to commencement of the approach was sufficient for the approach to be flown without EFVS in lieu of natural vision.

(f) EFVS image requirements at the DA/H specified in AMC1 CAT.OP.MPA.312(a)(4)

The requirements for features to be identifiable on the EFVS image in order to continue the approach below the DH are more stringent than the visual reference requirements for the same approach flown without EFVS. The more stringent standard is needed because the EFVS might not display the colour of lights used to identify specific portions of the runway and might not consistently display the runway markings. Any visual approach path indicator using colour-coded lights may be unusable.

(g) Obstacle clearance in the visual segment

The 'visual segment' is the portion of the approach between the DH or the MAPt and the runway threshold. In the case of EFVS 200 operations, this part of the approach may be flown using the EFVS image as the primary reference and obstacles may not always be identifiable on an EFVS image. The operational assessment specified in AMC1 CAT.OP.MPA.312(a)(2) is therefore required to ensure obstacle clearance during the visual segment.

(h) Visual reference requirements at 200 ft above the threshold

For EFVS 200 operations, natural visual reference is required by a height of 200 ft above the runway threshold. The objective of this requirement is to ensure that the pilot will have sufficient visual reference to land. The visual reference should be the same as that required for the same approach flown without EFVS.

Some EFVSs may have additional requirements that have to be fulfilled at this height to allow the approach to continue, such as a requirement to check that elements of the EFVS display remain correctly aligned and scaled to the external view. Any such requirements will be detailed in the AFM and included in the operator's procedures.

(i) Specific approval for EFVS

In order to use an EFVS without natural visual reference below 200 ft above the threshold, the operator needs to hold a specific approval in accordance with Part-SPA.

(j) Go-around

A go-around will be promptly executed if the required visual references are not maintained on the EFVS image at any time after the aircraft has descended below the DA/H or if the required visual references are not distinctly visible and identifiable using natural vision after the aircraft is below 200 ft. It is considered more likely that an EFVS 200 operation could result in the initiation of a go-around below DA/H than the equivalent approach flown without EFVS, and thus the operational assessment required by AMC1 CAT.OP.MPA.312(a)(2) takes into account the possibility of a balked landing.

An obstacle free zone (OFZ) may be provided for CAT I precision approach procedures. Where an OFZ is not provided for a CAT I precision approach, this will be indicated on the approach chart. NPA procedures and approach procedures with vertical guidance (APV) provide obstacle clearance for the missed approach based on the assumption that a go-around is executed at the MAPt and not below the OCH.

AMC1 CAT.OP.MPA.312(a)(1) EFVS 200 operations

EQUIPMENT CERTIFICATION

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

AMC1 CAT.OP.MPA.312(a)(2) EFVS 200 operations

AERODROMES AND INSTRUMENT PROCEDURES SUITABLE FOR EFVS 200 OPERATIONS

(a) For EFVS 200 operations, the operator should verify the suitability of a runway before authorising EFVS operations to that runway through an operational assessment taking into account the following elements:

(1) the obstacle situation;

(2) the type of aerodrome lighting;

(3) the available IAPs;

(4) the aerodrome operating minima; and

(5) any non-standard conditions that may affect the operations.

(b) EFVS 200 operations should only be conducted as 3D operations, using an IAP in which the final approach track is offset by a maximum of 3 degrees from the extended centre line of the runway.

(c) The IAP should be designed in accordance with PANS-OPS, Volume I (ICAO Doc 8168) or equivalent criteria.

AMC2 CAT.OP.MPA.312(a)(2) EFVS 200 operations

VERIFICATION OF THE SUITABILITY OF RUNWAYS FOR EFVS 200 OPERATIONS

The operational assessment before authorising the use of a runway for EFVS 200 operations should be conducted as follows:

(a) Check whether the runway has been promulgated as suitable for EFVS operations or is certified as a precision approach runway category II or III by the State of the aerodrome. If this is so, then check whether and where LED lights are installed in order to assess the impact on the EFVS equipment used by the operator.

(b) If the check in point (a) above comes out negative, then proceed as follows:

(1) For straight-in IAPs, US Standard for Terminal Instrument Procedures (TERPS) may be considered to be acceptable as an equivalent to PANS-OPS. If other design criteria than those in PANS-OPS or US TERPS are used, the operations should not be conducted.

(2) If an OFZ is established, this will ensure adequate obstacle protection from 960 m before the threshold. If an OFZ is not established or if the DH for the approach is above 250 ft, then check whether there is a visual segment surface (VSS).

(3) VSSs are required for procedures published after 15 March 2007, but the existence of the VSS has to be verified through the aeronautical information publication (AIP), operations manual Part C, or direct contact with the aerodrome. Where the VSS is established, it may not be penetrated by obstacles. If the VSS is not established or is penetrated by obstacles and an OFZ is not established, then the operations should not be conducted. Note: obstacles of a height of less than 50 ft above the threshold may be disregarded when assessing the VSS.

(4) Runways with obstacles that require visual identification and avoidance should not be accepted.

(5) For the obstacle protection of a balked landing where an OFZ is not established, the operator may specify that pilots follow a departure procedure in the event of a balked landing, in which case it is necessary to verify that the aircraft will be able to comply with the climb gradients published for the instrument departure procedures for the expected landing conditions.

(c) If the AFM stipulates specific requirements for approach procedures, then the operational assessment should verify that these requirements can be met.

AMC1 CAT.OP.MPA.312(a)(3) EFVS 200 operations

INITIAL TRAINING FOR EFVS 200 OPERATIONS

Operators should ensure that flight crew members complete the following conversion training before being authorised to conduct EFVS 200 operations unless credits related to training and checking for previous experience on similar aircraft types are defined in the operational suitability data established in accordance with Regulation (EU) No 748/2012:

(a) A ground training course including at least the following:

- (1) characteristics and limitations of HUDs or equivalent display systems including information presentation and symbology;
- (2) EFVS sensor performance in different weather conditions, sensor limitations, scene interpretation, visual anomalies and other visual effects;
- (3) EFVS display, control, modes, features, symbology, annunciations and associated systems and components;
- (4) the interpretation of EFVS imagery;
- (5) the interpretation of approach and runway lighting systems and display characteristics when using EFVS;
- (6) pre-flight planning and selection of suitable aerodromes and approach procedures;
- (7) principles of obstacle clearance requirements;
- (8) the use and limitations of RVR assessment systems;
- (9) normal, abnormal and emergency procedures for EFVS operations;
- (10) the effect of specific aircraft/system malfunctions;
- (11) human factors aspects of EFVS operations; and
- (12) qualification requirements for pilots to obtain and retain approval for EFVS 200 operations.

(b) An aircraft/FSTD training course in two phases as follows:

- (1) Phase one (EFVS 200 operations with aircraft and all equipment serviceable) — objectives:
  - (i) understand the operation of equipment required for EFVS 200 operations;
  - (ii) understand operating limitations of the installed EFVS;
  - (iii) practise the use of HUD or equivalent display systems;
  - (iv) practise the set-up and adjustment of EFVS equipment in different conditions (e.g. day and night);

(v) practise the monitoring of automatic flight control systems, EFVS information and status annunciators;

(vi) practise the interpretation of EFVS imagery;

(vii) become familiar with the features needed on the EFVS image to continue approach below DH;

(viii) practise the identification of visual references using natural vision while using EFVS equipment;

(ix) master the manual aircraft handling relevant to EFVS operations including, where appropriate, the use of the flare cue and guidance for landing;

(x) practise coordination with other crew members; and

(xi) become proficient at procedures for EFVS 200 operations.

(2) Phase one of the training should include the following exercises:

(i) the required checks for satisfactory functioning of equipment, both on the ground and in flight;

(ii) the use of HUD or equivalent display systems during at least approach, landing and go-around;

(iii) approach using the EFVSs installed on the aircraft to the appropriate DH and transition to natural vision for continuing approach and landing;

(iv) approach with all engines operating using the EFVS, down to the appropriate DH followed by a missed approach, all without external visual reference, as appropriate.

(3) Phase two (EFVS 200 operations with aircraft and equipment failures and degradations) — objectives:

(i) understand the effect of known aircraft unserviceabilities including use of the MEL;

(ii) understand the effect of failed or downgraded equipment on aerodrome operating minima;

(iii) understand the actions required in response to failures and changes in the status of the EFVS including HUD or equivalent display systems;

(iv) understand the actions required in response to failures above and below the DH;

(v) practise abnormal operations and incapacitation procedures; and

(vi) become proficient at dealing with failures and abnormal situations during EFVS 200 operations.

(4) Phase two of the training should include the following exercises:

(i) approaches with engine failures at various stages of the approach;

(ii) approaches with failures of the EFVS at various stages of the approach, including failures between the DH and the height below which an approach should not be continued if natural visual reference is not acquired, require either:

(A) reversion to head down displays to control missed approach; or

(B) reversion to flight with downgraded or no guidance to control missed approaches from the DH or below, including those which may result in a touchdown on the runway;

(iii) incapacitation procedures appropriate to EFVS 200 operations;

(iv) failures and procedures applicable to the specific EFVS installation and aircraft type; and

(v) FSTD training including minimum eight approaches.

AMC2 CAT.OP.MPA.312(a)(3) EFVS 200 operations

RECURRENT TRAINING AND CHECKING FOR EFVS 200 OPERATIONS

(a) The operator should ensure that the pilots' competence to perform EFVS 200 operations. To do so, pilots should be trained every 6 months by performing at least two approaches on each type of aircraft operated.

(b) The operator should ensure that the pilots' competence to perform EFVS 200 operations is checked at each required operator proficiency check by performing at least two approaches on each type of aircraft operated, of which one should be flown without natural vision to 200 ft.

AMC3 CAT.OP.MPA.312(a)(3) EFVS 200 operations

RECENT EXPERIENCE REQUIREMENTS FOR EFVS 200 OPERATIONS

Pilots should complete a minimum of four approaches using the operator's procedures for EFVS 200 operations during the validity period of the operator proficiency check unless credits related to currency are defined in the operational suitability data established in accordance with Regulation (EU) No 748/2012.

AMC4 CAT.OP.MPA.312(a)(3) EFVS 200 operations

DIFFERENCES TRAINING FOR EFVS 200 OPERATIONS

(a) The operator should ensure that the flight crew members authorised to conduct EFVS 200 operations are provided with differences training or familiarisation whenever there is a change to any of the following:

(1) the technology used in the flight guidance and flight control system;

(2) the HUD or equivalent display systems;

(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(a)(3) EFVS 200 operations

TRAINING FOR EFVS 200 OPERATIONS

If a flight crew member is to be authorised to operate as pilot flying and pilot monitoring during EFVS 200 operations, then the flight crew member should complete the required FSTD training for each operating capacity.

GM1 CAT.OP.MPA.312(a)(3) EFVS 200 operations

RECURRENT CHECKING FOR EFVS 200 OPERATIONS

In order to provide the opportunity to practise decision-making in the event of system failures and failure to acquire natural visual reference, the recurrent training and checking for EFVS 200 operations is recommended to periodically include different combinations of equipment failures, go-around due to loss of visual reference, and landings.

AMC1 CAT.OP.MPA.312(a)(4) EFVS 200 operations

OPERATING PROCEDURES FOR EFVS 200 OPERATIONS

(a) When conducting EFVS 200 operations:

(1) the pilot flying should use the EFVS throughout the approach;

(2) in multi-pilot operations, a suitable display of EFVS sensory imagery should be provided to the pilot monitoring;

(3) the approach between the FAF and the DA/H should be flown using vertical flight path guidance;

(4) the approach may be continued below the DA/H provided that the pilot can identify on the EFVS image either:

(i) the approach light system; or

(ii) both of the following:

(A) the runway threshold identified by the beginning of the runway landing surface, the threshold lights or the runway end identifier lights;

(B) the TDZ identified by the TDZ lights, the TDZ runway markings or the runway lights; and

(5) a missed approach should be executed promptly if the required visual reference is not distinctly visible and identifiable to the pilot without reliance on the EFVS by 200 ft above the threshold.

(b) Operating procedures for EFVS 200 operations should:

(1) be consistent with the AFM;

(2) be appropriate to the technology and equipment to be used;

(3) specify the duties and responsibilities of each flight crew member in each relevant phase of flight;

(4) ensure that the flight crew workload is managed to facilitate effective decision-making and monitoring of the aircraft; and

(5) deviate to the minimum extent practicable from normal procedures used for routine operations.

(c) Operating procedures for EFVS 200 operations should include:

(1) required checks for the satisfactory functioning of the aircraft equipment, both before departure and in flight;

(2) correct seating and eye position;

(3) determination of aerodrome operating minima;

(4) required visual references at the DH;

(5) the action to be taken if natural visual reference is not acquired by 200 ft;

(6) the action to be taken in the event of loss of the required visual reference; and

(7) procedures for balked landing.

(d) Operating procedures for EFVS 200 operations should be included in the operations manual.

AMC1 CAT.OP.MPA.312(a)(8) EFVS 200 operations

AERODROME OPERATING MINIMA — EFVS 200 OPERATIONS

When conducting EFVS 200 operations:

(a) the DA/H used should be the same as for operations without EFVS;

(b) the lowest RVR minima to be used should be determined by reducing the RVR presented in:

(1) Table 9 in AMC5 CAT.OP.MPA.110 in accordance with Table 1 below for aeroplanes;

(2) Table 13 in AMC6 CAT.OP.MPA.110 in accordance with Table 1 below for helicopters;

(c) in case of failed or downgraded equipment, Table 17 in AMC11 CAT.OP.MPA.110 should apply.

Table 1

Operations utilising EFVS: RVR reduction

RVR presented in Table 9 in AMC5 CAT.OP.MPA.110 and Table 13 in AMC6 CAT.OP.MPA.110	RVR (m) for EFVS 200 operations
550	550

RVR presented in Table 9 in AMC5 CAT.OP.MPA.110 and Table 13 in AMC6 CAT.OP.MPA.110	RVR (m) for EFVS 200 operations
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

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

EFVS 200 WITH EVSs MEETING THE MINIMUM CRITERIA

The EVS should be certified before 1 January 2022 as 'EVS with an operational credit'.

GM1 CAT.OP.MPA.312(c) EFVS 200 operations

The competent authority referred to in CAT.OP.MPA.312 point (c) is the competent authority for the oversight of the operator, as established in ORO.GEN.105.

~~AMC1 CAT.POL.A.230 & CAT.POL.A.235 Landing — dry runways & Landing — wet and contaminated runways~~

~~FACTORING OF AUTOMATIC LANDING DISTANCE PERFORMANCE DATA~~

~~In those cases where the landing requires the use of an automatic landing system, and the distance published in the AFM includes safety margins equivalent to those contained in CAT.POL.A.230(a)(1), CAT.POL.A.230(a)(2) and CAT.POL.A.235, the landing mass of the aeroplane should be the lesser of:~~

~~(a) the landing mass determined in accordance with CAT.POL.A.230 (a)(1), CAT.POL.A.230(a)(2) or CAT.POL.A.235, as appropriate; or~~

~~(b) the landing mass determined for the automatic landing distance for the appropriate surface condition, as given in the AFM or equivalent document. Increments due to system features such as beam location or elevations, or procedures such as use of overspeed, should also be included~~.

AMC1 CAT.POL.A.230 Landing — dry runways

FACTORING OF AUTOMATIC LANDING DISTANCE PERFORMANCE DATA

In those cases where the landing requires the use of an automatic landing system, and the distance published in the AFM includes safety margins equivalent to those contained in CAT.POL.A.230(a)(1) and CAT.POL.A.230(a)(2), the landing mass of the aeroplane should be the lesser of:

(a) the landing mass determined in accordance with CAT.POL.A.230(a)(1) and CAT.POL.A.230(a)(2); or

(b) the landing mass determined for the automatic landing distance for the appropriate surface condition, as given in the AFM or equivalent document. Increments due to system features such as beam location or elevations, or procedures such as use of overspeed, should also be included.

AMC2 CAT.POL.A.230 Landing — dry runways

FACTORING OF LANDING DISTANCE PERFORMANCE DATA WHEN USING A HEAD-UP DISPLAY (HUD) OR AN EQUIVALENT DISPLAY WITH FLARE CUE

In those cases where the landing requires the use of a HUD or an equivalent display with flare cue, and the landing distance published in the AFM includes safety factors, the landing mass of the aeroplane should be the lesser of:

(a) the landing mass determined in accordance with CAT.POL.A.230(a)(1); or

(b) the landing mass determined, when using a HUD or an equivalent display with flare cue for the appropriate surface condition, as given in the AFM or equivalent document.

AMC1 CAT.POL.A.235 Landing — dry runways

FACTORING OF AUTOMATIC LANDING DISTANCE PERFORMANCE DATA

In those cases where the landing requires the use of an automatic landing system, and the distance published in the AFM includes safety margins equivalent to those contained in CAT.POL.A.235, the landing mass of the aeroplane should be the lesser of:

(a) the landing mass determined in accordance with CAT.POL.A.235; or

(b) the landing mass determined for the automatic landing distance for the appropriate surface condition, as given in the AFM or equivalent document. Increments due to system features such as beam location or elevations, or procedures such as use of overspeed, should also be included.

AMC2 CAT.POL.A.235 Landing — wet and contaminated runways

FACTORING OF LANDING DISTANCE PERFORMANCE DATA WHEN A USING HEAD-UP DISPLAY (HUD) OR AN EQUIVALENT DISPLAY WITH FLARE CUE

In those cases where the landing requires the use of a HUD or an equivalent display with flare cue, and the landing distance published in the AFM includes safety factors, the landing mass of the aeroplane should be the lesser of:

(a) the landing mass determined in accordance with CAT.POL.A.235; or

(b) the landing mass determined, when using a HUD or an equivalent display with flare cue for the appropriate surface condition, as given in the AFM or equivalent document.

GM1 CAT.POL.H.400(c) General

THE TAKE-OFF AND LANDING PHASES (PERFORMANCE CLASS 3)

(…)

(c) (…)

(2) during landing, below 200 ft above the landing surface.

(ICAO Annex 6 Part III, defines en-route phase as being ~~“~~‘That part of the flight from the end of the take-off and initial climb phase to the commencement of the approach and landing phase.’ The use of take-off and landing phase in this text is used to distinguish the take-off from the initial climb, and the landing from the approach: they are considered to be comple~~i~~mentary and not contradictory.)

AMC2 CAT.IDE.A.190 Flight data recorder

OPERATIONAL PERFORMANCE REQUIREMENTS FOR AEROPLANES FIRST ISSUED WITH AN INDIVIDUAL CofA ON OR AFTER 1 APRIL 1998 AND BEFORE 1 JANUARY 2016

(…)

Table 2

FDR — Additional parameters for aeroplanes with an MCTOM of more than 27 000 kg

No	Parameter
18	Primary flight controls — control surface position and/or pilot input (pitch, roll, yaw)
19	Pitch trim position
20	Radio altitude
21	Vertical beam deviation (ILS or GLS glide path or MLS elevation)
22	Horizontal beam deviation (ILS localiser or GLS lateral deviation or MLS azimuth)
23	Marker beacon passage
24	Warnings
25	Reserved (navigation receiver frequency selection or GLS channel is recommended)
26	Reserved (DME or GLS distance is recommended)
27	Landing gear squat switch status or air/ground status
28	Ground proximity warning system
29	Angle of attack
30	Low pressure warning (hydraulic and pneumatic power)
31	Groundspeed
32	Landing gear or gear selector position

(…)

AMC3 CAT.IDE.A.190 Flight data recorder

PERFORMANCE SPECIFICATIONS FOR THE PARAMETERS TO BE RECORDED FOR AEROPLANES FIRST ISSUED WITH AN INDIVIDUAL CofA ON OR AFTER 1 APRIL 1998 AND BEFORE 1 JANUARY 2016

Table 1: FDR

(…)

21	Vertical beam deviation		1	As installed ±3 % recommended	0.3 % of full range	Data from all of ~~both~~ the ILS, GLS and MLS systems need not to be recorded at the

21a	ILS or GLS glide path	±0.22 DDM or available sensor range as installed				same time. The approach aid in use should be recorded. For autoland/ category III operations, each radio altimeter should be recorded, but arranged so that at least one is recorded each second.
21b	MLS elevation	0.9° to 30°				
22	Horizontal beam deviation	Signal range	1	As installed ±3 % recommended	0.3 % of full range	See parameter 21 remarks.
22a	ILS ~~L~~localiser or GLS lateral deviation	±0.22 DDM or available sensor range as installed				
22b	MLS azimuth	±62°				

(…)

GM1 CAT.IDE.H.125(b) Operations under VFR by day — flight and navigational instruments and associated equipment

MULTI-PILOT OPERATIONS

(a) Two pilots are required for the operation if required by the one of the following:

(1) the AFM;

(2) point ORO.FC.200.

MULTI-PILOT OPERATIONS ON A VOLUNTARY BASIS — HELICOPTERS OPERATED UNDER VFR BY DAY

(b) If the AFM permits single-pilot operations, and the operator decides that the crew composition is more than one pilot, then point CAT.IDE.H.125(b) does not apply. However, additional means to display instruments referred to in CAT.IDE.H.125(b) may be required by point CAT.IDE.H.100(d).

GM1 CAT.IDE.H.130(h) Operations under IFR or at night – flight and navigational instruments and associated equipment

MULTI-PILOT OPERATIONS

Two pilots are required for the operation if required by the one of the following:

(a) the AFM;

(b) the operations manual.