ADVISORY CIRCULAR

CAA-AC-OPS030
November 2022

OPERATING MINIMA FOR AEROPLANE AND HELICOPTER OPERATIONS

1.0 PURPOSE

1.0.1 This Advisory Circular gives guidance to the Operators on the procedures and methods used to determining operating minima for aeroplanes and helicopters.

1.0.2 This Advisory Circular (AC) cancels CAA-AC-OPS034 dated July 2020.

2.0 REFERENCE

I The Civil Aviation (Air Operators Certification and Administration) Regulations, 2022;
II Regulation 35, 89 and 90 of the Civil Aviation (Operation of Aircraft - Commercial Air Transport Aeroplanes) Regulations, 2022;
III Regulation 17, 35, 89 and 95 of the Civil Aviation (Operation of Aircraft) (Commercial Air Transport) (General Aviation) (Helicopters) Regulations, 2022;

3.0 DEFINITIONS AND ABBREVIATIONS

3.0.1 "aerodrome operating minima" means the limits of usability of an aerodrome for: -

a) take-off, expressed in terms of runway visual range and/or visibility and, if necessary, cloud conditions;
b) landing in two-dimensional (2D) instrument approach operations, expressed in terms of visibility and/or runway visual range minimum descent altitude/height (MDA/H) and, if necessary, cloud conditions; and
c) landing in three-dimensional (3D) instrument approach operations, expressed in terms of visibility and/or runway visual range and decision altitude/height (DA/H) as appropriate to the type and/or category of the operation.

3.0.2 Continuous descent final approach (CDFA)" means a technique, consistent with stabilized approach procedures, for flying the final approach segment of a non- precision instrument approach procedure as a continuous descent, without level-off, from an altitude/height at or above the final approach fix altitude/height to a point

approximately 15 m (50 ft) above the landing runway threshold or the point where the flare maneuver should begin for the type of aircraft flown;

3.0.3 "Converted meteorological visibility (CMV)". A value (equivalent to an RVR) which is derived from the reported meteorological visibility, as converted in accordance with the requirements in Section 11.

3.0.3.1 Heliport operating minima" means the limits of usability of a heliport for—

3.0.3.2 take-off, expressed in terms of runway visual range or visibility and, if necessary, cloud conditions;

3.0.3.3 landing in 2D instrument approach operations, expressed in terms of visibility or runway visual range, Minimum Descent Altitude/Height (MDA/H) and, if necessary, cloud conditions; and

3.0.3.4 landing in 3D instrument approach operations, expressed in terms of visibility or runway visual range and Decision Altitude/Height (DA/H) as appropriate to the type or category of the operation.

For convenience, the term "aerodrome operating minima" shall be used throughout this order to mean "heliport operating minima" as well.

3.0.3.5 "Instrument Approach Procedure (IAP)" means a series of predetermined maneuvers by reference to flight instruments with specified protection from obstacles from the initial approach fix, or where applicable, from the beginning of a defined arrival route to a point from which a landing can be completed and thereafter, if a landing is not completed, to a position at which holding or en-route obstacle clearance criteria apply. Instrument approach procedures are classified as follows—

3.0.3.6 Non-Precision Approach (NPA) procedure An instrument approach procedure designed for 2D instrument approach operations Type A;

3.0.3.7 Approach Procedure with Vertical guidance (APV). A Performance -Based Navigation (PBN) instrument approach procedure designed for 3D instrument approach operations Type A;

3.0.3.8 Precision Approach (PA) procedure. An instrument approach procedure based on navigation systems (ILS, MLS, GLS and SBAS CAT I) designed for 3D instrument approach operations Type A or B;

3.1 The following are not intended to be formal definitions but rather descriptions intended to enhance the understanding of flexible aerodrome operating minima:

3.1.1 "Basic" aircraft — an aircraft which has the minimum equipment required for the type and/or category of approach and landing operation intended.

3.1.2 "Advanced" aircraft — an aircraft with equipment additional to that required for the basic aircraft. Such equipment could be auto-flight systems capable of coupled approaches and/or autoland, head-up display (HUD), enhanced vision system

(EVS), combined vision system (CVS) or synthetic vision system (SVS). There are no specific classes of advanced aircraft Instead consideration is given to what, if any, operational credit may be granted for each additional piece of equipment.

3.2 Abbreviations

APV	Approach Procedure with Vertical guidance
A-SMGCS	Advanced surface movement guidance and control system
ATC	Air traffic control
ATIS	Automatic terminal information
service ATS	Air traffic services
BALS	Basic approach lighting system
CAT I	Category I
CAT II	Category II
CAT III	Category III
CDFA	Continuous descent final approach
CMV	Converted meteorological visibility
CVS	Combined Vision System
DA	Decision altitude
DA/H	Decision altitude/height
DH	Decision height
DME	Distance measuring equipment
EVS	Enhanced vision system
FAF	Final approach fix
FALS	Full approach lighting system
FATO	Final Approach and Take-Off Area
GNSS	Global navigation satellite system
GS	Glide slope
HATh	Height above threshold
HIALS	High intensity approach lighting
system HUD	Head-up display
HUDLS	Head-up display landing system
IALS	Intermediate approach lighting
system IAS	Indicated airspeed
IFR	Instrument flight rules
ILS	Instrument landing system
IMC	Instrument meteorological conditions
LOC	Localizer
LNAV	Lateral navigation
LVP	Low visibility procedures
MAPt	Missed approach point
MDA	Minimum descent altitude
MDA/H	Minimum descent altitude/height
MDH	Minimum descent height

MET	Meteorological
METAR	Aviation routine weather report
MIALS	Medium intensity approach and lighting system
MID	Midpoint
MLS	Microwave landing system
MOC	Minimum obstacle clearance
MTBO	Mean time between outages
NALS	No approach lighting system
NDB	Non-directional beacon
OCA	Obstacle clearance altitude
OCA/H	Obstacle clearance altitude/height
OCH	Obstacle clearance height
OFZ	Obstacle-free zone
OLS	Obstacle limitation surface
PAR	Precision approach radar
RCLL	Runway centre line lights
RNAV	Area navigation
RNP	Required navigation performance
RTZL	Runway touchdown zone lights
RVR	Runway visual range
SID	Standard instrument departure
SIGMET	Significant weather report
SMGCS	Surface movement guidance and control system
SRA	Surveillance radar approach
STAR	Standard instrument arrival
SVR	Slant visual range
TDZ	Touchdown zone
THR	Threshold
VFR	Visual flight rules
VIS	Visibility
VMC	Visual meteorological conditions
VNAV	Vertical navigation
VOR	Very high frequency omnidirectional radio range
VSS	Visual segment surface

Guidance on operational credit for aircraft equipped with automatic landing systems, a HUD or equivalent displays, EVS, SVS and CVS is contained in UCAA All-Weather Operations Manual.

4.0 AIP AND COMMERCIALLY AVAILABLE INFORMATION

An acceptable method of specifying aerodrome operating minima is through the use of the local Aeronautical Information Publication (AIP) or commercially available information such as Jeppesen.

5.0 VISUAL APPROACH OPERATIONS

(a) For a visual approach operation, the runway visual range (RVR) should not be less than 800 m.
(b) The aerodrome operating minima should not be lower than as specified in the regulations.
(c) Whenever practical, approaches should be flown as stabilised approaches (SAps). Different procedures may be used for a particular approach to a particular runway.
(d) Whenever practical, non-precision approaches should be flown using the continuous descent final approach (CDFA) technique. Different procedures may be used for a particular approach to a particular runway.

6.0 TAKE-OFF OPERATIONS WITH LARGE AIRCRAFT

(a) General:

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

(b) Visual reference:

1) The take-off minima should be selected to ensure sufficient guidance to control the aircraft in the event of both a rejected take-off in adverse circumstances and a continued take-off after failure of the critical engine.
2) For night operations, ground lights should be available to illuminate the runway/final approach and take-off area (FATO) and any obstacles.

(c) Required RVR/visibility:

1) Aeroplanes:

(i) For aeroplanes, the take-off minima specified by the operator should be expressed as RVR/VIS values not lower than those specified in Table 1.A.

(ii) When reported RVR or meteorological visibility is not available, the pilot-in-command should not commence take-off unless he/she can determine that the actual conditions satisfy the applicable take-off minima.

2) Helicopters:

(i) For helicopters having a mass where it is possible to reject the take-off and land on the FATO in case of the critical engine failure being recognised at or before the takeoff decision point (TDP), the operator should specify an RVR/VIS as take-off minima in accordance with Table 1.H.

(ii) For all other cases, the pilot-in-command should operate to take-off minima of 800 m RVR/VIS and remain clear of cloud during the take-off manoeuvre until reaching the performance capabilities of (c)(2)(i).

Table 1.A: Take-off — aeroplanes (without low visibility take-off (LVTO) approval) — RVR/VIS

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

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

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

Table 1.H: Take-off — helicopters (without LVTO approval) — RVR/Visibility

Onshore aerodromes with instrument flight rules (IFR) departure procedures	**RVR/VIS (m)**
No light and no markings (day only)	400 or the rejected take-off distance, whichever is the greater
No markings (night)	800
Runway edge/FATO light and centreline marking	400
Runway edge/FATO light, centreline marking and relevant RVR information	400
Offshore helideck *	
Two-pilot operations	400
Single-pilot operations	500

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

7.0 TAKE-OFF OPERATIONS WITH OTHER-THAN LARGE AIRCRAFT

(a) General:

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

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

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

(b) Visual reference:

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

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

8.0 CRITERIA FOR ESTABLISHING RVR/CMV

(a) In order to qualify for the lowest allowable values of RVR/CMV specified in Table 4.A, the instrument approach should meet at least the following facility requirements and associated conditions:

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

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

(ii) approach procedure with vertical guidance (APV); and where the final approach track is offset by not more than 15° for Category A and B aeroplanes or by not more than 5° for Category C and D aeroplanes.

(2) Instrument approach operations flown using the CDFA technique with a nominal vertical profile, up to and including 4.5° for Category A and B aeroplanes, or 3.77° for Category C and D aeroplanes, where the facilities are non-directional beacon (NDB), NDB/distance measuring equipment (DME), VHF omnidirectional radio range (VOR), VOR/DME, localiser (LOC), LOC/DME, VHF direction finder (VDF), surveillance radar approach (SRA) or global navigation satellite system (GNSS)/lateral navigation (LNAV), with a final approach segment of at least 3 NM, which also fulfil the following criteria:

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

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

(iii) the missed approach point (MAPt) is determined by timing, the distance from FAF to THR is ≤ 8 NM.

(3) Instrument approaches where the facilities are NDB, NDB/DME, VOR, VOR/DME, LOC, LOC/DME, VDF, SRA or GNSS/LNAV, not fulfilling the criteria in (a)(2), or with an minimum descent height (MDH) ≥ 1 200 ft.

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

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

(a) The minimum RVR/CMV/VIS should be the highest of the values specified in Table 3 and Table 4.A but not greater than the maximum values specified in Table 4.A, where applicable.

(b) The values in Table 2 should be derived from the formula below:

required RVR/VIS (m) = [(DH/MDH (ft) x 0.3048) / tanα] — length of approach lights (m);
where α is the calculation angle, being a default value of 3.00° increasing in steps of 0.10° for each line in Table 3 up to 3.77° and then remaining constant.

(c) If the approach is flown with a level flight segment at or above MDA/H, 200 m should be added for Category A and B aeroplanes and 400 m for Category C and D aeroplanes to the minimum RVR/CMV/VIS value resulting from the application of Table 3 and Table 4.A.

(d) An RVR of less than 750 m as indicated in Table 3 may be used:

(1) for CAT I operations to runways with full approach lighting system (FALS), runway touchdown zone lights (RTZL) and runway centreline lights (RCLL);

(2) for CAT I operations to runways without RTZL and RCLL when using an approved head-up guidance landing system (HUDLS), or equivalent approved system, or when conducting a coupled approach or flight-director-flown approach to a DH. The ILS should not be published as a restricted facility; and

(3) for APV operations to runways with FALS, RTZL and RCLL when using an approved headup display (HUD).

(e) Lower values than those specified in Table 3 may be used for HUDLS and auto-land operations if approved in accordance with Annex V (Part-SPA), Subpart E.

(f) The visual aids should comprise standard runway day markings and approach and runway lights as specified in Table 2.

(g) For night operations or for any operation where credit for runway and approach lights is required, the lights should be on and serviceable, except as provided for in Table 6.

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

(1) an RVR of less than 800 m as indicated in Table 3 may be used for CAT I approaches provided any of the following is used at least down to the applicable DH:

(i) a suitable autopilot, coupled to an ILS, MLS or GLS that is not published as restricted; or

(i) an approved HUDLS, including, where appropriate, enhanced vision system (EVS), or equivalent approved system;

(2) where RTZL and/or RCLL are not available, the minimum RVR/CMV should not be less than 600 m; and

(3) an RVR of less than 800 m as indicated in Table 3 may be used for APV operations to runways with FALS, RTZL and RCLL when using an approved HUDLS, or equivalent approved system, or when conducting a coupled approach to a DH equal to or greater than 250 ft.

Table 2: Approach lighting systems

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

Note: HIALS: high intensity approach lighting system;
MIALS: medium intensity approach lighting system; ALS: approach lighting system.

Table 3: RVR/CMV vs DH/MDH

DH or MDH			**Class of lighting facility**			
			FALS	**IALS**	**BALS**	**NALS**
			See (d), (e), (h) above for RVR < 750/800 m			
ft			**RVR/CMV (m)**			
200	-	210	550	750	1 000	1 200
211	-	220	550	800	1 000	1 200
221	-	230	550	800	1 000	1 200

231	-	240	550	800	1 000	1 200
241	-	250	550	800	1 000	1 300
251	-	260	600	800	1 100	1 300
261	-	280	600	900	1 100	1 300
281	-	300	650	900	1 200	1 400
301	-	320	700	1 000	1 200	1 400
321	-	340	800	1 100	1 300	1 500
341	-	360	900	1 200	1 400	1 600
361	-	380	1 000	1 300	1 500	1 700
381	-	400	1 100	1 400	1 600	1 800
401	-	420	1 200	1 500	1 700	1 900
421	-	440	1 300	1 600	1 800	2 000
441	-	460	1 400	1 700	1 900	2 100

DH or MDH			**Class of lighting facility**			
			FALS	**IALS**	**BALS**	**NALS**
			See (d), (e), (h) above for RVR < 750/800 m			
ft			**RVR/CMV (m)**			
461	-	480	1 500	1 800	2 000	2 200
481		500	1 500	1 800	2 100	2 300
501	-	520	1 600	1 900	2 100	2 400
521	-	540	1 700	2 000	2 200	2 400
541	-	560	1 800	2 100	2 300	2 500
561	-	580	1 900	2 200	2 400	2 600
581	-	600	2 000	2 300	2 500	2 700
601	-	620	2 100	2 400	2 600	2 800
621	-	640	2 200	2 500	2 700	2 900
641	-	660	2 300	2 600	2 800	3 000
661	-	680	2 400	2 700	2 900	3 100
681	-	700	2 500	2 800	3 000	3 200
701	-	720	2 600	2 900	3 100	3 300
721	-	740	2 700	3 000	3 200	3 400
741	-	760	2 700	3 000	3 300	3 500

761	-	800	2 900	3 200	3 400	3 600
801	-	850	3 100	3 400	3 600	3 800
851	-	900	3 300	3 600	3 800	4 000
901	-	950	3 600	3 900	4 100	4 300
951	-	1 000	3 800	4 100	4 300	4 500
1 001	-	1 100	4 100	4 400	4 600	4 900
1 101	-	1 200	4 600	4 900	5 000	5 000
DH or MDH			**Class of lighting facility**			
			FALS	**IALS**	**BALS**	**NALS**
			See (d), (e), (h) above for RVR < 750/800 m			
ft			**RVR/CMV (m)**			
1 201 and above			5 000	5 000	5 000	5 000

Table 4.A: CAT I, APV, NPA — aeroplanes Minimum and maximum applicable RVR/CMV (lower and upper cut-off limits)

Facility/conditions	RVR/CMV (m)	Aeroplane category			
		A	**B**	**C**	**D**
ILS, MLS, GLS, PAR, GNSS/SBAS, GNSS/VNAV	Min	According to Table 3			
	Max	1 500	1 500	2 400,	2 400
NDB, NDB/DME, VOR, VOR/DME, LOC, LOC/DME, VDF, SRA, GNSS/LNAV with an approved procedure that fulfils the criteria in 8.0 (a)(2) above.	Min	750	750	750	750
	Max	1 500	1 500	2 400	2 400
For NDB, NDB/DME, VOR, VOR/DME, LOC, LOC/DME, VDF, SRA, GNSS/LNAV: — not fulfilling the criteria in 8.0 (a)(2) above or — with a DH or MDH ≥ 1 200 ft	Min	1 000	1 000	1 200	1 200
	Max	According to Table 3, if flown using the CDFA technique, otherwise an add-on of 200/400 m applies to the values in Table 3 but not to result in a value exceeding 5 000 m.			

10.0 DETERMINATION OF RVR/CMV/VIS MINIMA FOR NPA, CAT I — HELICOPTERS

(a) For non-precision approach (NPA) operations, the minima specified in Table 4.1.H should apply:

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

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

(3) for single-pilot operations, the minimum RVR is 800 m or the minima in Table 4.2.H, whichever is higher.

(b) For CAT I operations, the minima specified in Table 4.2.H should apply:

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

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

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

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

Table 4.1.H: Onshore NPA minima

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

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

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

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

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

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

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

Table 4.2.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 glide slope up to and including 4°.

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

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

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

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

11.0 CONVERSION OF REPORTED METEOROLOGICAL VISIBILITY TO RVR/CMV

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

(1) when reported RVR is available;

(2) for calculating take-off minima; and

(3) for other RVR minima less than 800 m.

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

(c) When converting meteorological visibility to RVR in circumstances other than those in (a), the conversion factors specified in Table 5 should be used.

Table 5: Conversion of reported meteorological visibility to RVR/CMV

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

12.0 EFFECT ON LANDING MINIMA OF TEMPORARILY FAILED OR DOWNGRADED GROUND EQUIPMENT — COMPLEX MOTOR-POWERED AIRCRAFT

(a) General

These instructions are intended for both pre-flight and in-flight use. It is however not expected that the pilot-in-command would consult such instructions after passing 1 000 ft above the aerodrome. If failures of ground aids are announced at such a late stage, the approach could be continued at the pilot-in-command's discretion. If failures are announced before such a late stage in the approach, their effect on the approach should be considered as described in Table 6and, if considered necessary, the approach should be abandoned.

(b) Conditions applicable to Table 6:

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

Table 6: Failed or downgraded equipment — effect on landing minima

Failed or downgraded equipment	**Effect on landing minima**	
	CAT I	**APV, NPA**
ILS/MLS standby transmitter	No effect	
Outer marker	No effect if replaced by height check at 1 000 ft	APV — not applicable
		NPA with FAF: no effect unless used as FAF
		If the FAF cannot be identified (e.g. no method available for timing of descent), non-precision operations cannot be conducted
Middle marker	No effect	No effect unless used as MAPt
RVR Assessment Systems	No effect	
Approach lights	Minima as for NALS	
Approach lights except the last 210 m	Minima as for BALS	
Approach lights except the last 420 m	Minima as for IALS	
Failed or downgraded equipment	**Effect on landing minima**	
	CAT I	**APV, NPA**
Standby power for approach lights	No effect	
Edge lights, threshold lights and runway end lights	Day — no effect Night — not allowed	
Centreline lights	No effect if flight director (F/D), HUDLS or autoland; otherwise RVR 750 m	No effect

Centreline lights spacing increased to 30 m	No effect	
Touchdown zone lights	No effect if F/D, HUDLS or autoland; otherwise RVR 750 m	No effect
Taxiway lighting system	No effect	

13.0 EFFECT ON LANDING MINIMA OF TEMPORARILY FAILED OR DOWNGRADED GROUND EQUIPMENT — OTHER-THAN LARGE AIRCRAFT

(a) Non-precision approaches requiring a final approach fix (FAF) and/or MAPt should not be conducted where a method of identifying the appropriate fix is not available.
(b) A minimum RVR of 750 m should be used for CAT I operations in the absence of centerline lines and/or touchdown zone lights.
(c) Where approach lighting is partly unavailable, minima should take account of the serviceable length of approach lighting.

14.0 AIRCRAFT CATEGORIES

Aircraft categories are as follows:

Table 1: Aircraft categories

Category A	less than 91 kt indicated airspeed (IAS)
Category B	91 kt or more but less than 121 kt IAS
Category C	121 kt or more but less than 141 kt IAS
Category D	141 kt or more but less than 166 kt IAS
Category E	166 kt or more but less than 211 kt IAS

15.0 CONTINUOUS DESCENT FINAL APPROACH (CDFA) — AEROPLANES

(a) Introduction

(1) Controlled flight into terrain (CFIT) is a major hazard in aviation. Most CFIT accidents occur in the final approach segment of non-precision approaches; the use of stabilised-approach criteria on a continuous descent with a constant, predetermined vertical path is seen as a major improvement in safety during the conduct of such approaches. 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 NPA operation.

(4) The advantages of CDFA are as follows:

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

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

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

(iv) the technique may reduce pilot workload;

(v) the approach profile is fuel efficient;

(vi) the approach profile affords reduced noise levels; and

(vii) the technique affords procedural integration with APV operations.

(b) CDFA

(1) An approach is only suitable for application of a CDFA technique when it is flown along a nominal vertical profile; a nominal vertical profile is not forming part of the approach procedure design, but can be flown as a continuous descent. The nominal vertical profile information may be published or displayed on the approach chart to the pilot by depicting the nominal slope or range/distance vs height. Approaches with a nominal vertical profile are considered to be:

(i) NDB, NDB/DME;

(ii) VOR, VOR/DME;

(iii) LOC, LOC/DME;

(iv) VDF, SRA; and

(v) GNSS/LNAV.

(2) Stabilised approach

(i) The control of the descent path is not the only consideration when using the CDFA technique. Control of the aeroplane's configuration and energy is also vital to the safe conduct of an approach.

(ii) The control of the flight path, described above as one of the requirements for conducting a stabilized approach, should not be confused with the path requirements for using the CDFA technique.

(iii) The predetermined approach slope requirements for applying the CDFA technique are established by the following:

(A) the published 'nominal' slope information when the approach has a nominal vertical profile; and

(B) the designated final-approach segment minimum of 3 NM, and maximum, when using timing techniques, of 8 NM.

(iv) A stabilized approach will never have any level segment of flight at DA/H or MDA/H, as applicable. This enhances safety by mandating a prompt missed approach procedure manoeuvre at DA/H or MDA/H.

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

16.0 TAKE-OFF MINIMA — OPERATIONS WITH COMPLEX HELICOPTERS

(a) To ensure sufficient control of the helicopter in IMC, the speed, before entering in IMC, should be above the minimum authorised speed in IMC, V_{mini}. This is a limitation in the AFM. Therefore, the lowest speed before entering in IMC is the highest of V_{toss} (velocity take-off safety speed) and V_{mini}.

(b) As example, V_{toss} is 45 kt and V_{mini} 60 kt. In that case, the take–off minima have to include the distance to accelerate to 60 kt. The take-off distance should be increased accordingly.

17.0 SUPPLEMENTAL INFORMATION

(a) The purpose of this section is to provide operators with supplemental information regarding the application of aerodrome operating minima in relation to circling approaches.

(b) Conduct of flight — general:

1) the MDH and obstacle clearance height (OCH) included in the procedure are referenced to aerodrome elevation;
2) the MDA is referenced to mean sea level;
3) for these procedures, the applicable visibility is the meteorological visibility; and

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

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

1) When the aeroplane is on the initial instrument approach, before visual reference is stabilised, but not below MDA/H, the aeroplane should follow the corresponding instrument approach procedure until the appropriate instrument MAPt is reached.
2) At the beginning of the level flight phase at or above the MDA/H, the instrument approach track determined by the radio navigation aids, RNAV, RNP, ILS, MLS or GLS should be maintained until the pilot:
   (i) estimates that, in all probability, visual contact with the runway of intended landing or the runway environment will be maintained during the entire circling procedure;
   (ii) estimates that the aeroplane is within the circling area before commencing circling; and
   (iii) is able to determine the aeroplane's position in relation to the runway of intended landing with the aid of the appropriate external references.
3) When reaching the published instrument MAPt and the conditions stipulated in (c)(2) are unable to be established by the pilot, a missed approach should be carried out in accordance with that instrument approach procedure.
4) After the aeroplane has left the track of the initial instrument approach, the flight phase outbound from the runway should be limited to an appropriate distance, which is required to align the aeroplane onto the final approach. Such manoeuvres should be conducted to enable the aeroplane:
   (i) to attain a controlled and stable descent path to the intended landing runway; and
   (ii) 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.
2) Flight manoeuvres should be carried out at an altitude/height that is not less than the circling MDA/H.
3) Descent below MDA/H should not be initiated until the threshold of the runway to be used has been appropriately identified. The aeroplane should be in a position to continue with a normal rate of descent and land within the touchdown zone.

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

1) The aeroplane should remain on the initial instrument approach procedure until one of the following is reached:
   (i) the prescribed divergence point to commence circling on the prescribed track; or
   (ii) the MAPt.

2) The aeroplane should be established on the instrument approach track determined by the radio navigation aids, RNAV, RNP, ILS, MLS or GLS in level flight at or above the MDA/H at or by the circling manoeuvre divergence point.
3) If the divergence point is reached before the required visual reference is acquired, a missed approach should be initiated not later than the MAPt and completed in accordance with the initial instrument approach procedure.
4) When commencing the prescribed circling manoeuvre at the published divergence point, the subsequent manoeuvres should be conducted to comply with the published routing and published heights/altitudes.
5) Unless otherwise specified, once the aeroplane is established on the prescribed track(s), the published visual reference does not need to be maintained unless:
   (i) required by the State of the aerodrome; or
   (ii) the circling MAPt (if published) is reached.
6) If the prescribed circling manoeuvre has a published MAPt and the required visual reference has not been obtained by that point, a missed approach should be executed in accordance with (e)(2) and (e)(3).
7) Subsequent further descent below MDA/H should only commence when the required visual reference has been obtained.
8) Unless otherwise specified in the procedure, final descent should not be commenced from MDA/H until the threshold of the intended landing runway has been identified and the aeroplane is in a position to continue with a normal rate of descent to land within the touchdown zone.

(e) Missed approach

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

   (i) if the missed approach procedure is required to be flown when the aeroplane is positioned on the instrument approach track defined by the radio navigation aids, RNAV, RNP, ILS, MLS or GLS, and before commencing the circling manoeuvre, the published missed approach for the instrument approach should be followed; or
   (ii) if the instrument approach procedure is carried out with the aid of an ILS, MLS or a stabilized approach, the MAPt associated with an ILS or MLS procedure without glide path (GP out procedure) or the stabilized approach, where applicable, should be used.

2) If a prescribed missed approach is published for the circling manoeuvre, this overrides the manoeuvres prescribed below.
3) If visual reference is lost while circling to land after the aeroplane has departed from the initial instrument approach track, the missed approach specified for that particular instrument approach should be followed. It is expected that the pilot will make an initial climbing turn toward the intended landing runway to a position overhead of the aerodrome where the pilot will establish the aeroplane in a climb on the instrument missed approach segment.

(2) The aeroplane should not leave the visual manoeuvring (circling) area, which is obstacle protected, unless:

   (i) established on the appropriate missed approach procedure; or

(ii) at minimum sector altitude (MSA)

4) All turns should be made in the same direction and the aeroplane should remain within the circling protected area while climbing to either:

   (i) the altitude assigned to any published circling missed approach manoeuvre if applicable;
   (ii) the altitude assigned to the missed approach of the initial instrument approach;
   (iii) the MSA;
   (iv) the minimum holding altitude (MHA) applicable for transition to a holding facility or fix, or continue to climb to an MSA; or
   (v) as directed by ATS.

   When the missed approach procedure is commenced on the 'downwind' leg of the circling manoeuvre, an 'S' turn may be undertaken to align the aeroplane on the initial instrument approach missed approach path, provided the aeroplane remains within the protected circling area.

   The pilot-in-command should be responsible for ensuring adequate terrain clearance during the above-stipulated manoeuvres, particularly during the execution of a missed approach initiated by ATS.

5) Because the circling manoeuvre may be accomplished in more than one direction, different patterns will be required to establish the aeroplane on the prescribed missed approach course depending on its position at the time visual reference is lost. In particular, all turns are to be in the prescribed direction if this is restricted, e.g. to the west/east (left or right hand) to remain within the protected circling area.
6) If a missed approach procedure is published for a particular runway onto which the aeroplane is conducting a circling approach and the aeroplane has commenced a manoeuvre to align with the runway, the missed approach for this direction may be accomplished. The ATS unit should be informed of the intention to fly the published missed approach procedure for that particular runway.
7) The pilot-in-command should advise ATS when any missed approach procedure has been commenced, the height/altitude the aeroplane is climbing to and the position the aeroplane is proceeding towards and/or heading the aeroplane is established on.