



REPUBLIC OF MAURITIUS
Flight Safety Division
Department of Civil Aviation
SSR International Airport
Tel: 603 2000 - Fax: 637 3164 - Email civil-aviation@mail.gov.mu

NOTICE TO AIRCRAFT OPERATORS

Subject: Calculation of Aerodrome Operating Minima	Number: 01/2010
	Number of pages: 13
	Issue date: 26 July 2010

Background:

The DCA has not previously published guidance on the establishment of aerodrome operating minima but has relied on the approval of individual operator's manuals. This notice is published to give guidance to all operators on an acceptable method for the calculation of take-off and landing minima. It is based on EC regulation 859/2008 ('EU-Ops') Appendix 1 (old) to 1.430 and is compatible with ICAO requirements. The Air Operator Certification Requirements (AOCR) will be updated in due course.

Applicability:

All commercial and non-commercial aeroplane operators.

Authority:

Issued by the Director of Civil Aviation.

Andrew M McKechnie

Captain Andrew McKechnie.
for Director of Civil Aviation

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Content:

- (a) Take-off Minima
- (1) General
- (i) Take-off minima established by the operator must be expressed as visibility or RVR limits, taking into account all relevant factors for each aerodrome planned to be used and the aeroplane 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) must be specified.
- (ii) The commander shall 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 suitable take-off alternate aerodrome is available.
- (iii) When the reported meteorological visibility is below that required for take-off and RVR is not reported, a take-off may only be commenced if the commander can determine that the RVR/visibility along the take-off runway is equal to or better than the required minimum.
- (iv) When no reported meteorological visibility or RVR is available, a take-off may only be commenced if the commander can determine that the RVR/visibility along the take-off runway is equal to or better than the required minimum.
- (2) Visual reference. The take-off minima must be selected to ensure sufficient guidance to control the aeroplane in the event of both a discontinued take-off in adverse circumstances and a continued take-off after failure of the critical power unit.
- (3) Required RVR/Visibility
- (i) For multi-engined aeroplanes, whose performance is such that, in the event of a critical power unit 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 established by an operator must be expressed as RVR/Visibility values not lower than those given in Table 1 below except as provided in paragraph (4) below:

Table 1
RVR/Visibility for take-off

Take-off RVR/Visibility	
Facilities	RVR/Visibility (Note 3)
Nil (Day only)	500 m
Runway edge lighting and/or centreline marking	250/300 m (Notes 1 & 2)
Runway edge and centreline lighting	200/250 m

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	(Note 1)
Runway edge and centreline lighting and multiple RVR information	150/200 m (Notes 1 & 4)

Note 1: The higher values apply to Category D aeroplanes.

Note 2: For night operations at least runway edge and runway end lights are required.

Note 3: The reported RVR/Visibility value representative of the initial part of the take-off run can be replaced by pilot assessment.

Note 4: The required RVR value must be achieved for all of the relevant RVR reporting points with the exception given in Note 3 above.

- (ii) For multi-engined aeroplanes whose performance is such that they cannot comply with the performance conditions in subparagraph (a)(3)(i) above in the event of a critical power unit failure, there may be a need to re-land immediately and to see and avoid obstacles in the take-off area. Such aeroplanes may be operated to the following take-off minima provided they are able to comply with the applicable obstacle clearance criteria, assuming engine failure at the height specified. The take-off minima established by an operator must be based upon the height from which the one engine inoperative net take-off flight path can be constructed. The RVR minima used may not be lower than either of the values given in Table 1 above or Table 2 below.

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Table 2
Assumed engine failure height above the runway versus RVR/Visibility

Take-off RVR/Visibility – flight path	
Assumed engine failure height above the take-off runway	RVR/Visibility (Note 2)
< 50 ft	200 m
51 – 100 ft	300 m
101 – 150 ft	400 m
151 – 200 ft	500 m
201 – 300 ft	1 000 m
> 300 ft	1 500 m (Note 1)

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

Note 2: The reported RVR/Visibility value representative of the initial part of the take-off run can be replaced by pilot assessment.

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

(4) Exceptions to paragraph (a)(3)(i) above:

(i) Subject to the approval of the Authority, and provided the requirements in paragraphs (A) to (E) below have been satisfied, an operator may reduce the take-off minima to 125 m RVR (Category A, B and C aeroplanes) or 150 m RVR (Category D aeroplanes) when:

(A) Low Visibility Procedures are in force;

(B) High intensity runway centreline lights spaced 15 m or less and high intensity edge lights spaced 60 m or less are in operation;

(C) Flight crew members have satisfactorily completed training in a Flight Simulator;

(D) A 90 m visual segment is available from the cockpit at the start of the take-off run; and

(E) The required RVR value has been achieved for all of the relevant RVR reporting points.

(ii) Subject to the approval of the Authority, an operator of an aeroplane using an approved lateral guidance system for take-off may reduce the take-off minima to an RVR less than 125 m (Category A, B and C aeroplanes) or 150 m (Category D aeroplanes) but not lower than 75 m provided runway protection and facilities equivalent to Category III landing operations are available.

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(b) Non-Precision approach

(1) System minima

- (i) An operator must ensure that system minima for non-precision approach procedures, which are based upon the use of ILS without glide path (LLZ only), VOR, NDB, SRA and VDF are not lower than the MDH values given in Table 3 below.

Table 3
System minima for non-precision approach aids

System minima Facility	Lowest MDH
ILS (no glide path – LLZ)	250 ft
SRA (terminating at ½ NM)	250 ft
SRA (terminating at 1 NM)	300 ft
SRA (terminating at 2 NM)	350 ft
VOR	300 ft
VOR/DME	250 ft
NDB	300 ft
VDF (QDM & QGH)	300 ft

- (2) Minimum Descent Height. An operator must ensure that the minimum descent height for a non-precision approach is not lower than either:
- (i) The OCH/OCL for the category of aeroplane; or
 - (ii) The system minimum.
- (3) Visual Reference. A pilot may not continue an approach below MDA/MDH unless at least one of the following visual references for the intended runway is distinctly visible and identifiable to the pilot:
- (i) Elements of the approach light system;
 - (ii) The threshold;
 - (iii) The threshold markings;
 - (iv) The threshold lights;
 - (v) The threshold identification lights;
 - (vi) The visual glide slope indicator;
 - (vii) The touchdown zone or touchdown zone markings;
 - (viii) The touchdown zone lights;
 - (ix) Runway edge lights; or

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- (x) Other visual references accepted by the Authority.
- (4) Required RVR. The lowest minima to be used by an operator for non-precision approaches are:

Table 4a
RVR for non-precision approach – full facilities

Non-precision approach minima Full facilities (Notes (1), (5), (6) and (7))				
MDH	RVR/Aeroplane Category			
	A	B	C	D
250 – 299 ft	800 m	800 m	800 m	1 200 m
300 – 449 ft	900 m	1 000 m	1 000 m	1 400 m
450 – 649 ft	1 000 m	1 200 m	1 200 m	1 600 m
650 ft and above	1 200 m	1 400 m	1 400 m	1 800 m

Table 4b
RVR for non-precision approach – intermediate facilities

Non-precision approach minima Intermediate facilities (Notes (2), (5), (6) and (7))				
MDH	RVR/Aeroplane Category			
	A	B	C	D
250 – 299 ft	1 000 m	1 100 m	1 200 m	1 400 m
300 – 449 ft	1 200 m	1 300 m	1 400 m	1 600 m
450 – 649 ft	1 400 m	1 500 m	1 600 m	1 800 m
650 ft and above	1 500 m	1 500 m	1 800 m	2 000 m

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Table 4c
RVR for non-precision approach – basic facilities

Non-precision approach minima Basic facilities (Notes (3), (5), (6) and (7))				
MDH	RVR/Aeroplane Category			
	A	B	C	D
250 – 299 ft	1 200 m	1 300 m	1 400 m	1 600 m
300 – 449 ft	1 300 m	1 400 m	1 600 m	1 800 m
450 – 649 ft	1 500 m	1 500 m	1 800 m	2 000 m
650 ft and above	1 500 m	1 500 m	2 000 m	2 000 m

Table 4d
RVR for non-precision approach – Nil approach light facilities

Non-precision approach minima Nil approach light facilities (Notes (4), (5), (6) and (7))				
MDH	RVR/Aeroplane Category			
	A	B	C	D
250 – 299 ft	1 500 m	1 500 m	1 600 m	1 800 m
300 – 449 ft	1 500 m	1 500 m	1 800 m	2 000 m
450 – 649 ft	1 500 m	1 500 m	2 000 m	2 000 m
650 ft and above	1 500 m	1 500 m	2 000 m	2 000 m

- Note 1: Full facilities comprise runway markings, 720 m or more of HI/MI approach lights, runway edge lights, threshold lights and runway end lights. Lights must be on.
- Note 2: Intermediate facilities comprise runway markings, 420–719 m of HI/MI approach lights, runway edge lights, threshold lights and runway end lights. Lights must be on.
- Note 3: Basic facilities comprise runway markings, <420 m of HI/MI approach lights, any length of LI approach lights, runway edge lights, threshold lights and runway end lights. Lights must be on.
- Note 4: Nil approach light facilities comprise runway markings, runway edge lights, threshold lights, runway end lights or no lights at all.

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Note 5: 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. PAPI) is also visible at the Minimum Descent Height.

Note 6: The above figures are either reported RVR or meteorological visibility converted to RVR as in subparagraph (h) below.

Note 7: The MDH mentioned in Table 4a, 4b, 4c and 4d 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 ten feet, which may be done for operational purposes, e.g. conversion to MDA.

(5) Night operations. For night operations at least runway edge, threshold and runway end lights must be on.

(c) Precision approach – Category I operations

(1) General. A Category I operation is a precision instrument approach and landing using ILS, MLS or PAR with a decision height not lower than 200 ft and with a runway visual range not less than 550 m.

(2) Decision Height. An operator must ensure that the decision height to be used for a Category I precision approach is not lower than:

(i) The minimum decision height specified in the Aeroplane Flight Manual (AFM) if stated;

(ii) The minimum height to which the precision approach aid can be used without the required visual reference;

(iii) The OCH/OCL for the category of aeroplane; or

(iv) 200 ft.

(3) Visual Reference. A pilot may not continue an approach below the Category I decision height, determined in accordance with subparagraph (c)(2) above, unless at least one of the following visual references for the intended runway is distinctly visible and identifiable to the pilot:

(i) Elements of the approach light system;

(ii) The threshold;

(iii) The threshold markings;

(iv) The threshold lights;

(v) The threshold identification lights;

(vi) The visual glide slope indicator;

(vii) The touchdown zone or touchdown zone markings;

(viii) The touchdown zone lights; or

(ix) Runway edge lights.

(4) Required RVR. The lowest minima to be used by an operator for Category I operations are:

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Table 5
RVR for Cat I approach vs. facilities and DH

Category I minima				
Decision height (Note 7)	Facilities/RVR (Note 5)			
	Full (Notes 1 & 6)	Intermediate (Notes 2 & 6)	Basic (Notes 3 & 6)	Nil (Notes 4 & 6)
200 ft	550 m	700 m	800 m	1 000 m
201-250 ft	600 m	700 m	800 m	1 000 m
251-300 ft	650 m	800 m	900 m	1 200 m
301 ft and above	800 m	900 m	1 000 m	1 200 m

Note 1: Full facilities comprise runway markings, 720 m or more of HI/MI approach lights, runway edge lights, threshold lights and runway end lights. Lights must be on.

Note 2: Intermediate facilities comprise runway markings, 420-719 m of HI/MI approach lights, runway edge lights, threshold lights and runway end lights. Lights must be on.

Note 3: Basic facilities comprise runway markings, <420 m of HI/MI approach lights, any length of LI approach lights, runway edge lights, threshold lights and runway end lights. Lights must be on.

Note 4: Nil approach light facilities comprise runway markings, runway edge lights, threshold lights, runway end lights or no lights at all.

Note 5: The above figures are either the reported RVR or meteorological visibility converted to RVR in accordance with paragraph (h).

Note 6: The Table is applicable to conventional approaches with a glide slope angle up to and including 4° (degree).

Note 7: The DH mentioned in the Table 5 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 ten feet, which may be done for operational purposes, (e.g. conversion to DA).

(5) Single pilot operations. For single pilot operations, an operator must calculate the minimum RVR for all approaches in accordance with OPS 1.430 and this Appendix. An RVR of less than 800 m is not permitted except when using a suitable autopilot coupled to an ILS or MLS, in which case normal minima apply. The Decision Height applied must not be less than 1,25 x the minimum use height for the autopilot.

(6) Night operations. For night operations at least runway edge, threshold and runway end lights must be on.

(d) Precision approach – Category II operations

(1) General. A Category II operation is a precision instrument approach and landing using ILS or MLS with:

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- (i) A decision height below 200 ft but not lower than 100 ft; and
 - (ii) A runway visual range of not less than 300 m.
- (2) Decision Height. An operator must ensure that the decision height for a Category II operation is not lower than:
- (i) The minimum decision height specified in the AFM, if stated;
 - (ii) The minimum height to which the precision approach aid can be used without the required visual reference;
 - (iii) The OCH/OCL for the category of aeroplane;
 - (iv) The decision height to which the flight crew is authorised to operate; or
 - (v) 100 ft.
- (3) Visual reference. A pilot may not continue an approach below the Category II decision height determined in accordance with subparagraph (d)(2) above unless visual reference containing a segment of at least 3 consecutive lights being the centre line of the approach lights, or touchdown zone lights, or runway centre line lights, or runway edge lights, or a combination of these is attained and can be maintained. This visual reference must include a lateral element of the ground pattern, i.e. an approach lighting crossbar or the landing threshold or a barette of the touchdown zone lighting.
- (4) Required RVR. The lowest minima to be used by an operator for Category II operations are:

Table 6
RVR for Cat II approach vs DH

Category II minima		
	Auto-coupled to below DH (see Note 1)	
Decision height	RVR/Aeroplane Category A, B & C	RVR/Aeroplane Category D
100 ft-120 ft	300 m	300 m (Note 2) /350 m
121 ft-140 ft	400 m	400 m
141 ft and above	450 m	450 m

Note 1: The reference to "auto-coupled to below DH" in this table means continued use of the automatic flight control system down to a height which is not greater than 80 % of the applicable DH. Thus airworthiness requirements may, through minimum engagement height for the automatic flight control system, affect the DH to be applied.

Note 2: 300 m may be used for a Category D aeroplane conducting an auto land.

(e) Precision approach – Category III operations

- (1) General. Category III operations are subdivided as follows:

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- (i) Category III A operations. A precision instrument approach and landing using ILS or MLS with:
 - (A) A decision height lower than 100 ft; and
 - (B) A runway visual range not less than 200 m.
- (ii) Category III B operations. A precision instrument approach and landing using ILS or MLS with:
 - (A) A decision height lower than 50 ft, or no decision height; and
 - (B) A runway visual range lower than 200 m but not less than 75 m.

Note: Where the decision height (DH) and runway visual range (RVR) do not fall within the same category, the RVR will determine in which category the operation is to be considered.

- (2) Decision Height. For operations in which a decision height is used, an operator must ensure that the decision height is not lower than:
 - (i) The minimum decision height specified in the AFM, if stated;
 - (ii) The minimum height to which the precision approach aid can be used without the required visual reference; or
 - (iii) The decision height to which the flight crew is authorised to operate.
- (3) No Decision Height Operations. Operations with no decision height may only be conducted if:
 - (i) The operation with no decision height is authorised in the AFM;
 - (ii) The approach aid and the aerodrome facilities can support operations with no decision height; and
 - (iii) The operator has an approval for CAT III operations with no decision height.

Note: In the case of a CAT III runway it may be assumed that operations with no decision height can be supported unless specifically restricted as published in the AIP or NOTAM.

- (4) Visual reference
 - (i) For Category IIIA operations, and for category IIIB operations with fail-passive flight control systems, a pilot may not continue an approach below the decision height determined in accordance with subparagraph (e)(2) above unless a visual reference containing a segment of at least 3 consecutive lights being the centreline of the approach lights, or touchdown zone lights, or runway centre line lights, or runway edge lights, or a combination of these is attained and can be maintained.
 - (ii) For Category IIIB operations with fail-operational flight control systems using a decision height, a pilot may not continue an approach below the Decision Height, determined in accordance with subparagraph (e)(2) above, unless a visual reference containing at least one centreline light is attained and can be maintained.
 - (iii) For Category III operations with no decision height there is no requirement for visual contact with the runway prior to touchdown.

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- (5) Required RVR. The lowest minima to be used by an operator for Category III operations are:

Table 7
RVR for Cat III approach vs. DH and roll-out control/guidance system

Category III minima			
Approach Category	Decision Height (ft) (Note 2)	Roll-out Control/ Guidance System	RVR (m)
III A	Less than 100 ft	Not required	200 m
III B	Less than 100 ft	Fail-passive	150 m (Notes 1)
III B	Less than 50 ft	Fail-passive	125 m
III B	Less than 50 ft or no Decision Height	Fail-operational	75 m

Note 1: For aeroplanes certificated in accordance with CS-AWO on all weather operations 321(b)(3).

Note 2: Flight control system redundancy is determined under CS-AWO on all weather operations by the minimum certificated decision height.

- (f) Circling

- (1) The lowest minima to be used by an operator for circling are:

Table 8
Visibility and MDH for circling vs. aeroplane category

	Aeroplane Category			
	A	B	C	D
MDH	400 ft	500 ft	600 ft	700 ft
Minimum meteorological visibility	1 500 m	1 600 m	2 400 m	3 600 m

- (2) Circling with prescribed tracks is an accepted procedure within the meaning of this paragraph

- (g) Visual Approach. An operator shall not use an RVR of less than 800 m for a visual approach.

- (h) Conversion of Reported Meteorological Visibility to RVR

- (1) An operator must ensure that a meteorological visibility to RVR conversion is not used for calculating take-off minima, Category II or III minima or when a reported RVR is available.

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Note: If the RVR is reported as being above the maximum value assessed by the aerodrome operator, e.g. "RVR more than 1 500 metres", it is not considered to be a reported RVR in this context and the Conversion Table may be used.

- (2) When converting meteorological visibility to RVR in all other circumstances than those in subparagraph (h)(1) above, an operator must ensure that the following Table is used:

Table 9
Conversion of visibility to RVR

Lighting elements in operation	RVR = Reported Met. Visibility x	
	Day	Night
HI approach and runway lighting	1·5	2·0
Any type of lighting installation other than above	1·0	1·5
No lighting	1·0	Not applicable