

GHANA CIVIL AVIATION AUTHORITY



ALL WEATHER OPERATIONS

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ISSUED AND APPROVED BY:
DIRECTOR-GENERAL

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I. AERODROME OPERATING MINIMA – GENERAL

- (A) An operator shall establish aerodrome operating minima for each aerodrome planned to be used that are not lower than the values given in Appendix 1. The method of determination of such minima must be acceptable to the Ghana Civil Aviation Authority (GCAA). Such minima shall not be lower than any that may be established for such aerodromes by the State in which the aerodrome is located, except when specifically approved by that State.

Note: The above paragraph does not prohibit in-flight calculation of minima for a non-planned alternate aerodrome if carried out in accordance with an accepted method.

- (B) In establishing the aerodrome operating minima which will apply to any particular operation, an operator must take full account of:
- (1) The type, performance and handling characteristics of the aeroplane;
 - (2) The composition of the flight crew, their competence and experience;
 - (3) Their dimensions and characteristics of the runways which may be selected for use;
 - (4) The adequacy and performance of the available visual and non-visual ground aids (see Appendix 7);
 - (5) The equipment available on the aeroplane for the purpose of navigation and/ or control of the flight path, as appropriate, during the take-off, the approach, the flare, the landing, the roll-out and the missed approach;
 - (6) The obstacles in the approach, missed approach and the climb-out areas required for the execution of contingency procedures and the necessary clearance;
 - (7) The obstacle clearance altitude/ height for the instrument approach procedures; and
 - (8) The means to determine and report meteorological conditions.
- (C) The aeroplane categories referred to in this Circular must be derived in accordance with method given Appendix 2.

II. TERMINOLOGY

(A) Terms used in this Circular have the following meaning:

- (1) *Circling* – Circling is the term used to describe the visual phase of an instrument approach, to bring an aircraft into position for landing on a runway which is not suitably located for a straight-in approach.
- (2) *Low Visibility Procedures (LVP)* – Procedures applied at an aerodrome for the purpose of ensuring safe operations during Category II and III approaches and Low Visibility Take-offs.
- (3) *Low Visibility Take- Off (LVTO)*- A take-off on a runway where the RVR is less than 400m.
- (4) *Flight control system* – A system which includes and automatic landing system and/or a Hybrid Landing System
- (5) *Fail- Passive flight control system* – A flight control system is fail-passive if, in the event of a failure, there is no significant out-of-trim condition or deviation of flight path or altitude but the landing is not completed automatically. For a fail-passive automatic flight control system the pilot assumes control of the aircraft after a failure.
- (6) *Fail-Operational flight control system* – A flight control system is fail-operational if, in the event of a failure below alert height, the approach, flare and landing, can be completed automatically. In the event of a failure, the automatic landing system will operate as a fail-passive system.
- (7) *Fail Operational Hybrid Landing System* – A system which consists of a primary fail passive automatic landing and a secondary independent guidance system enabling the pilot to complete a landing or make a go-around manually after failure of the primary system.

Note: a typical secondary independent guidance system consists of a monitored head-up display providing guidance which normally takes the form of command information but it may alternatively be situation (or deviation) information.

- (8) *Visual approach*- An approach by an IFR flight when either part or all of an instrument approach procedure is not completed and the approach is executed in visual reference to terrain.

III. LOW VISIBILITY OPERATIONS - GENERAL OPERATING RULES

- (A) An operator shall not conduct Category II or III operations unless:
- (1) Each aeroplane concerned is certificated for operations with decision heights below 200ft, or no decision height, and equipped in accordance with GCAR-AWO or an equivalent accepted by the GCAA;
 - (2) A suitable system for recording approach success and failure is established and maintained to monitor the overall safety of the operation;
 - (3) The operations are approved by the GCAA, and
 - (4) The flight crew consists of at least 2 pilots.
 - (5) Decision height is determined by means of a radio altimeter.
- (B) An operator shall not conduct low visibility take-offs in less than 150m RVR (Category A, B and C aeroplanes) or 200m RVR (Category D aeroplanes) unless approved by the GCAA.
- (C) Acceptable means of compliance are developed in Appendix 3.

IV. LOW VISIBILITY OPERATIONS AERODROME CONSIDERATIONS

- (A) An operator shall not use an aerodrome for Category II or III operations unless the aerodrome is approved for such operations by the State in which the aerodrome is located.
- (B) An operator shall verify that Low Visibility Procedures (LVP) have been established at those aerodromes where low visibility operations are to be conducted.

V. LOW VISIBILITY OPERATIONS – TRAINING AND QUALIFICATIONS

An operator shall ensure that, prior to conducting Low Visibility Take-Off, Category II and III operations:

- (A) Each flight crew member:
- (1) Completes the training and checking requirements prescribed in Appendix 4 including simulator training in operating to the limiting values of RVR and Decision Height appropriate to the operator's Category II/III approval;

- (2) Is qualified in accordance with Appendix 4; and
- (B) The training is conducted in accordance with a detailed syllabus approved by the GCAA and included in the Operations Manual. This training is in addition to that prescribed in the training of the flight crews;
- (C) The flight crew qualification is specific to the operation and the aeroplane type.

VI. LOW VISIBILITY OPERATIONS – OPERATING PROCEDURES

- (A) An operator must establish procedures and instructions to be used for Low Visibility Take-Off and Category II and III operations. These procedures must be included in the Operations Manual and contain the duties of flight crew members during taxiing, take-off, approach, flare, landing, roll-out and missed approach as appropriate. See Appendix 5.
- (B) The commander shall satisfy himself that:
 - (1)The status of the visual and non-visual facilities is sufficient prior to commencing a Low Visibility Take-Off or a Category II or III approach;
 - (2)Appropriate LVPs are in force according to information received from Air Traffic Services, before commencing a Low Visibility Take-Off or a Category II or III approach.
 - (3)The flight crew members are properly qualified prior to commencing a Low Visibility Take-Off in an RVR of less than 150m (Category A, B and C aeroplane) or 200m (Category D aeroplane) or a Category II or III approach. (See Appendix 4.)

VII. LOW VISIBILITY OPERATIONS – MINIMUM EQUIPMENT

An operator must include in the Operations Manual the minimum equipment that has to be serviceable at the commencement of a Low Visibility Take-off or a Category II or III approach in accordance with the Aeroplane Flight Manual.

The commander shall satisfy himself that the status of the aeroplane and of the relevant airborne systems is appropriate for the specific operation to be conducted.

VIII. VFR OPERATING MINIMA

- (A) An operator shall ensure that VFR flights are conducted in accordance with the Visual Flight Rules and in accordance with the Table in Appendix 6.
- (B) An operator shall ensure that Special VFR flights are not commenced when the visibility is less than 3km and not otherwise conducted when the visibility is less than 1.5km.

APPENDIX 1 AERODROME OPERATING MINIMA

(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 no reported meteorological visibility or RVR is available, the commander may determine that sufficient visual reference exists to permit a safe take-off. 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 determines 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-engines 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 1,500ft 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:

Take-off RVR/visibility	
Facilities	RVR/Visibility (note 3)
Nil (day only)	500m
Runway edge lighting and/or centerline marking	250/300m (note 1 & 2)
Runway edge and centerline lighting	200/250m (note 1)
Runway edge and centerline lighting and multiple RVR information	150/200m (notes 1& 4)

Table 1 - RVR visibility for take-off

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

Note 2: For night operations at least runway edge and stop 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-engine aeroplanes whose performance is such that they cannot comply with the performance conditions in paragraph (i) above in the event of a critical power unit failure, there may be a need to reland immediately and to see and avoid obstacles in the take-off area. Such aeroplane 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.

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

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

Note 1: 1,500m 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.

Note 3: When reported RVR, or meteorological visibility is not available, the commander shall not commence take-off unless he can determine that the actual conditions satisfy the applicable take-off minima.

(4) *Exceptions to paragraph (3) (i) above*

- (i) Subject to the approval of the GCAA, and provided the requirements in paragraphs (a) to (e) below have been satisfied, an operator may reduce the take-off minima to 125m RVR (Category A, B and C aeroplane) or 150m RVR (Category D aeroplane) when:
 - (a) Low Visibility Procedures are in force;
 - (b) High intensity runway centerline lights spaced 15m or less and high intensity edge lights spaced 60m or less are in operation;
 - (c) Crews have satisfactorily completed training in a simulator approved for this procedure;
 - (d) A 90m visual segment is available from the cockpit at the start of the take-off run;
 - (e) The required RVR value has been achieved for all of the relevant RVR reporting points.
- (ii) Subject to the approval of the GCAA, 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 125m (Category A, B and C aeroplanes) or 150m (Category D aeroplanes) but not lower than 75m provided runway protection and facilities equivalent to Category III landing operations are available.

(B) NON-PRECISION APPROACH

(1) System minima

- (i) An operator must ensure that system minima for no-precision approach procedures, which are based upon the use of ILS without glide path (LLZ only), VOR, NOB, SRA and VOF are not lower than the MOH values given in Table 3 below.

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

Table 3 - System minima for non-precision approach aids

(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;

or

(ix) Runway edge lights.

(x) Other visual references accepted by the GCAA.

(4) *Required RVR.*

The lowest minima to be used by an operator for non-precision approaches are:

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

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

Non- precision approach minima Intermediate facilities (see notes (2), (5), (6) and (7))				
MDH	RVRI Aeroplane category			
	A	B	C	D
250-299ft	1 000m	1 100m	1 200m	1 400m
300-449ft	1 200m	1 300	1 400m	1 600m
450-649ft	1 400m	1 500m	1 600m	1 800m
650ft and above	1 500m	1 500m	1800m	2 000m

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

Non- precision approach minima Basic facilities (see notes (3), (5), (6))				
MDH	RVRI Aeroplane category			
	A	B	C	D
250-229ft	1 200m	1 300m	1 400m	1 600m
300-449ft	1 300m	1 400m	1 600m	1 800m
450-649ft	1 500m	1 500m	1 00m	2 000m
650ft and above	1 500m	1 500m	2 000m	2 000m

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

	Non- precision approach minima Nil approach light facilities (see notes (4)).			
MDH	RVR/Aeroplane category			
	A	B	C	D
250-299ft	1500m	1500m	1600m	1800m
300-449ft	1500m	1500m	1800m	2000m
450-649ft	1500m	1500m	2000m	2000m
650ft and above	1500m	1500m	2000m	2000m

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

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

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

Note 3: Basic facilities comprise runway markings, < 420m HI/MI approach lights, any length of LI approach lights, runway edge lights, threshold lights, 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 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 sub-paragraph (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 with using ILS, MLS or PAR with a decision height not lower than 200ft and with a runway visual range not less than 550m.

(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) 200ft.

(3) Visual Reference.

A pilot may not continue an approach below the Category I decision height, determined in accordance with paragraph 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;
- (ix) Runway edge lights.

(4) Required RVR.

The lowest minima to be used by an operator for Category I operations are:

Category I minima				
Decision height (see note 7)	Facilities/RVR (see note 5)			
	Full (notes 1 & 6)	Intermediate (notes 2 & 6)	Basic (notes 3 & 6)	Nil (notes 4 & 6)
200ft	550m	700m	800m	1000m
201-250ft	600m	700m	800m	1000m
251-300ft	650m	800m	900m	1200m
301ft and above	800m	900m	1000m	1200m

Table 5 - RVR for Cat 1 approach vs facilities and DH

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

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

Note 3: Basic facilities comprise runway markings, < 420m of HI/MI approach lights, any length of LI approach lights, runway edge lights, threshold lights and 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 above figures applicable to conventional approaches with a glide slope angle up to and including 4°.

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 this Appendix. An RVR of less than 800m 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 $1.25 \times$ 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:

- (i) A decision height below 200ft but not lower than 100ft; and
- (ii) The minimum RVR of 300m

(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;
- (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 authorized to operate;
- (v) 100ft.

(3) *Visual reference.*

A pilot may not continue an approach below the Category II decision height determined in accordance with paragraph (2) above unless visual reference containing a segment of at least 3 consecutive lights being the centerline of the approach lights, runway centerline lights, touchdown zone 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 barrette of the touchdown zone lighting.

(4) *Required RVR.*

The lowest minima to be used by an operator for Category II operations are:

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

Table 6 - RVR for CAT II approach vs DH

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

(E) PRECISION APPROACH CATEGORY III OPERATIONS

(1) General.

Category III operations are sub-divided as follows:

(i) Category III A operations.

A precision instrument approach and landing using ILS or MLS with:

- (a) A decision height lower than 100ft; and
- (b) A runway visual range not less than 200m

(ii) Category III B operations.

A precision instrument approach and landing using ILS or MLS with:

- (a) A decision height lower than 50ft, or no decision height; and
- (b) A runway visual range lower than 200m but not less than 75m.

(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 in the AFM;
- (ii) The minimum height to which the precision approach aid can be used solely by reference to instruments;
- (iii) The decision height to which the flight crew is authorized 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 authorized in the AFM;
- (ii) The approach aid and the aerodrome facilities can support operations with no decision height;

Note: In 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 and

- (iii) The operator has an approval for CAT III operations with no decision height.

(4) Visual reference

- (i) For Category III A operations, a pilot may not continue an approach below the decision height determined in accordance with paragraph 2 above unless a visual reference containing a segment of at least 3 consecutive lights being the centerline of the approach lights, or runway centerline lights, or touchdown zone

lights or runway edge lights, or a combination of these is attained and can be maintained.

- (ii) For Category III B operations with a decision height, a pilot may not continue an approach below the decision height, determined in accordance with paragraph (2) above, unless a visual reference containing at least one centerline 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.

(5) *Required RVR.*

The lowest minima to be used by an operator for Category III operations are:

Category III minima					
Approach Category	Decision height	Flight control system/RVR			
		Fail passive		Fail operational	
		Without roll-out system		With roll-out guidance or control system	
				Fail passive	Fail operational
IIIA	Less than 100ft	200m (note 1)	200m	200m	200m
IIIB	Less than 50ft	Not authorized	Not applicable	125m	75m
IIIB	no DH	Not authorized	Not authorized	Not authorized	75m

Table 7 - RVR for CAT III approach vs flight control systems and DH

Note 1: For operations to actual RVR values less than 300m, a go-around is assumed in the event of an autopilot failure at or below DH.

(F) CIRCLING.

The lowest minima to be used by an operator for circling are:

MDH	Aeroplane category			
	A	B	C	D
	400ft	500ft	600ft	700ft
Minimum meteorological visibility	1500m	1600m	2400m	3600m

Table 8 - Visibility and MDH for circling vs aeroplane category

(1) 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 800m 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.
- (2) When converting meteorological visibility to RVR in all other circumstances than those in sub- (1) above, an operator must ensure that the following Table is used:

Lighting elements in operation	RVR = Reported Met Visibility ×	
	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

Table 9 - Conversion of visibility to RVR

APPENDIX 2 AEROPLANE CATEGORIES – ALL WEATHER OPERATIONS

(A) CLASSIFICATION OF AEROPLANES

(1) The criteria taken into consideration for the classification of aeroplane by categories is the indicated airspeed at threshold (V_{AT}) which is equal to the stalling speed (V_{SO}) multiplied by 1.3 or V_{SIG} multiplied by 1.23 in the landing configuration at the maximum certificate landing mass. If both V_{SO} and V_{SIG} are available, the higher resulting V_{AT} shall be used. The aeroplane categories corresponding to V_{AT} values are in the Table below:

Aeroplane Category	V_{AT}
A	Less than 91 kts
B	From 91 to 120
C	121 to 140
D	141 to 165
E	166 to 210

(2) The landing configuration which is to be taken into consideration shall be defined by the operator or by the aeroplane manufacturer.

(B) PERMANENT CHANGE OF CATEGORY (MAXIMUM LANDING MASS)

- (1) An operator may impose permanent lower landing mass and use this for determining the V_{AT} as approved by the GCAA.
- (2) The category defined for a given aeroplane shall be a permanent value and thus independent of the changing conditions of day-to-day operations.

APPENDIX 3 LOW VISIBILITY OPERATIONS – GENERAL OPERATING RULES

(A) *General.*

The following procedures apply to the introduction and approval of low visibility operations.

(B) *Airborne Systems Operational Demonstration.*

An operator must comply in full with the requirements prescribed in paragraph (c) below when introducing an aeroplane type which is new to the GCAA into Category II or III service.

Note: for aeroplane types already used for category II or III operations in another ICAO State, the in-service proving programme in paragraph (f) applies instead.

(1) *Operational reliability.*

The Category II and III success rate must not be less than that required by GCAR-AWO.

(2) *Criteria for a successful approach.* An approach is regarded as successful, if:

- (i) The criteria are as specified in GCAR/AWO or its equivalent.
- (ii) No relevant aeroplane system failure occurs.

(C) *Data Collection During Airborne System Demonstration - General*

(1) An operator must establish a reporting system to enable checks and periodic reviews to be made during the operational evaluation period before the operator is authorized to conduct Category II or III operations. The reporting system must cover all successful and unsuccessful approaches, with reasons for the latter, and include a record of system component failures. This reporting system must be based upon flight crew reports and/or automatic recordings as prescribed in paragraphs (d) and (e) below.

(2) The recordings of approaches may be made either during normal line flights or during other flights performed by the operator.

(D) *Data Collection during Airborne System Demonstration - Operations with DH not less than 50ft*

(1) For operations with DH not less than 50ft, data must be recorded by the operator and evaluated by the GCAA, when necessary.

(2) It is sufficient for the following data to be recorded by the flight crew.

- (i) Aerodrome and runway used;
- (ii) Weather conditions;
- (iii) Time;
- (iv) Reason for failure leading to an aborted approach;
- (v) Adequacy of speed control;
- (vi) Trim at time of automatic flight control system disengage;
- (vii) Compatibility of automatic flight control system. Flight director and raw data;

- (viii) An indication of the position of the aeroplane relative to the ILS centerline when descending through 30m (100ft); and
- (ix) Touchdown position.

(3) The number of approaches, as approved by the GCAA, made during the initial evaluation must be sufficient to demonstrate that the performance of the system in actual airline service is such that a 90% confidence and a 95% approach success will result.

(E) *Data Collection during Airborne System Demonstration - Operations with DH less than 50ft or no DH*

(1) For operations with DH less than 50ft or no DH, a flight data recorder, or other equipment giving the appropriate information, must be used in addition to the flight crew reports to confirm that the system performs as designed in actual airline service. The following data is required:

- (i) Distribution of ILS deviations at 30m (100ft), at touchdown and, if appropriate, at disconnection of the roll out control system and the maximum values of the deviations between those points;
- (ii) Sink rate at touchdown.

(2) Any landing irregularity must be fully investigated using all available data to determine its cause.

(F) *In service proving*

Note: An operator fulfilling the requirements of sub-paragraph (b) above will be deemed to have satisfied the in-service proving requirements contained in this paragraph.

- (i) The system must demonstrate reliability and performance in line operations consistent with the operational concepts. A sufficient number of successful landings, as determined by the GCAA, must be accomplished in line operations, including training flights, using the auto land and roll-out system installed in each aeroplane type.
- (ii) The demonstration must be accomplished using a Category II or Category III ILS. However, if the operator chooses to do so, demonstrations may be made on other ILS facilities if sufficient data is recorded to determine the cause of unsatisfactory performance.
- (iii) If an operator has different variants of the same type of aeroplane utilizing the same basic flight control and display systems, or different basic flight control and display systems on the same type of aeroplane, the operator shall show that the variants comply with the basic system performance criteria, but the operator need not conduct a full operational demonstration for each variant.

- (iv) Where an operator introduces an aeroplane type which has already been approved by the Authority of any ICAO State for Category II and/or III operations a reduced proving program may be approved.

(G) *Continuous Monitoring*

- (1) After obtaining the initial authorization, the operations must be continuously monitored by the operator to detect any undesirable trends before they become hazardous. Flight crew reports may be used to achieve this.
- (2) The following information must be retained for a period of 12 months:
 - (i) The total number of approaches, by aeroplane type, where the airborne Category II or III equipment was utilized to make satisfactory, actual or practice, approaches to the applicable Category II or III minima;
 - (ii) The reports of unsatisfactory approaches and/or automatic landings by aerodrome and aeroplane registration, in the following categories:
 - (A) Airborne equipment faults;
 - (B) Ground facility difficulties;
 - (C) Missed approaches because of ATC instructions; or
 - (D) Other reasons.
- (3) An operator must establish a procedure to monitor the performance of the automatic landing system of each aeroplane.

(H) *Transitional periods*

(1) *Operators with no previous Category II or III experience*

- (i) An operator without previous Category II or III operational experience may be approved for Category II or IIIA operations, having gained a minimum experience of 6 months of Category I operations on the aeroplane type.
- (ii) On completing 6 months of Category II or IIIA operations on the aeroplane type the operator may be approved for Category IIIB operations. When granting such an approval, the GCAA may impose higher minima than the lowest applicable for an additional period. The increase in minima will normally only refer to RVR and/or a restriction against operations with no decision height and must be selected such that they will not require any change of the operational procedures.

Note 1: Consideration to be given to approved aeroplane groupings.

(2) *Operators with previous Category II or III experience.*

An operator with previous Category II or III experience may obtain authorization for a reduced transition period by application to the GCAA.

- (i) *Maintenance of Category II, Category III and LVTO equipment.*

A maintenance procedure programme for the on-board guidance systems must be established by the operator, in liaison with the manufacturer, and must be approved by the GCAA.

APPENDIX 4 LOW VISIBILITY OPERATIONS – TRAINING & QUALIFICATIONS

(A) General.

An operator must ensure that flight crew member training programmes for Low Visibility Operations include structured courses of ground, simulator and/or flight training. The operator may abbreviate the course content as prescribed by subparagraph (2) and (3) below provided the content of the abbreviated course is acceptable to the GCAA.

- (1) Flight crew members with no Category II or Category III experience must complete the full training programme prescribed in sub-paragraphs (b), (c) and (d) below.
- (2) Flight crew members with Category II or Category III experience with another ICAO operator may undertake an abbreviated ground training course.
- (3) Flight crew members with Category II or Category III experience with the operator may undertake an abbreviated ground, simulator and/or flight training course. The abbreviated course is to include at least the requirements of subparagraphs (d) (1), (d) (2) (i) or (d) (2) (ii) as appropriate and (3) (i).

(B) Ground training.

An operator must ensure that initial ground training course for Low Visibility Operations covers at least:

- (1) The characteristics and limitations of the ILS and/or MLS;
- (2) The characteristics of the visual aids;
- (3) The characteristics of fog;
- (4) The operational capabilities and limitations of the particular airborne system;
- (5) The effects of precipitation, ice accretion, low level wind shear and turbulence;
- (6) The effect of specific aeroplane malfunctions;
- (7) The use and limitations of RVR assessment systems;
- (8) The principles of obstacle clearance requirements;
- (9) Recognition of and action to be taken in the event of failure of ground equipment;
- (10) The procedures and precautions to be followed with regard to surface movement during operations when the RVR is 400m or less and any additional procedures required for take-off in conditions below 150m (200m for Category D aeroplanes);
- (11) The significance of decision heights based upon radio altimeters and the effect of terrain profile in the approach area on radio altimeter readings and on the automatic approach/landing systems;

- (12) The importance and significance of Alert Height if applicable and the action in the event of any failure above and below the Alert Height;
- (13) The qualification requirements for pilots to obtain and retain approval to conduct Low Visibility Take-Offs and Category II or III operations; and
- (14) The importance of correct seating and eye position.

(C) *Simulator training and/or flight training*

- (1) An operator must ensure that initial simulator and/or flight training for Low Visibility Operations includes:
 - (i) Checks of satisfactory functioning of equipment, both on the ground and in flight;
 - (ii) Effect on minima caused by changes in the status of ground installations;
 - (iii) Monitoring of automatic flight control systems and auto land status annunciations with emphasis on the action to be taken in the event of failures of such systems;
 - (iv) Actions to be taken in the event of failures such as engines, electrical systems, hydraulics or flight control systems;
 - (v) The effect of known unserviceabilities and use of minimum equipment lists;
 - (vi) Operating limitations resulting from airworthiness certification;
 - (vii) Guidance on the visual cues required at decision height together with information on maximum deviation allowed from glide path or localizer; and
 - (viii) The importance and significance of Alert Height if applicable and the action in the event of any failure above and below the Alert Height.
- (2) An operator must ensure that each flight crew member is trained to carry out his duties and instructed on the coordination required with other crew members, maximum use should be made of suitable equipped flight simulators for this purpose.
- (3) Training must be divided into phases covering normal operation with no aeroplane or equipment failures but including all weather conditions which may be encountered and detailed scenarios of aeroplane and equipment failure which could affect Category II or III operations. If the aeroplane system involves the use of hybrid or other special systems (such as head up displays or enhanced vision equipment) then flight crew members must practice the use of these systems in normal and abnormal modes during the simulator phase of training.
- (4) Incapacitation procedures appropriate to Low Visibility Take-offs and Category II and III operations shall be practiced.
- (5) For aeroplane with not type specific simulator, operators must ensure that the initial flight training phase specific to the visual scenarios of Category II operations is conducted in a simulator approved for that purpose by the GCAA. The training and procedures that are type specific shall be practiced in the aeroplane.

- (6) Category II and III training shall include at least the following exercises:
- (i) Approach using the appropriate flight guidance, autopilots and control systems installed in the aeroplane, to the appropriate decision height and to include transition to visual flight and landing;
 - (ii) Approach with all engines operating using the appropriate flight guidance systems, autopilots and control systems installed in the aeroplane down to the appropriate decision height followed by missed approach; all without external visual reference;
 - (iii) Where appropriate, approaches utilizing automatic flight systems to provide automatic flare, landing and rollout; and
 - (iv) Normal operation of the applicable system both with and without acquisition of visual clues at decision height.
- (7) Subsequent phases of training must include at least:
- (i) Approaches with engine failure at various stages on the approach;
 - (ii) Approaches with critical equipment failures (e.g., electrical systems, auto flight systems, ground and/or airborne ILS/MLS systems and status monitors);
 - (iii) Approaches where failures of auto flight equipment at low level require either:
 - (a) Reversion to manual flight to control flare, landing and roll out or missed approach; or
 - (b) Reversion to manual flight or a downgraded automatic mode to control missed approaches from, at or below decision height including those which may result in a touchdown on the runway;
 - (iv) Failures of the systems which will result in excessive localizer and/or glide slope deviation, both above and below decision height, in the minimum visual conditions authorized for the operation. In addition, a continuation to a manual landing must be practiced if a head-up display forms a downgraded mode of the automatic system or the head up display forms the only flare mode;
 - (v) Failures and procedures specific to aeroplane group, type or variant;
 - (vi) The training program must provide practice in handling faults which require a reversion to higher minima; and
 - (vii) The training program is to include the handling of the aeroplane when, during a fail passive Category III approach, the fault causes the autopilot to disconnect at or below decision height when the last reported RVR is 300m or less.
- (8) Where take-offs are conducted in RVRs of 400m and below, training must be established to cover systems failures and engine failure resulting in continued as well as rejected take-offs.

(D) Conversion Training Requirements to conduct Low Visibility Take-off and Category II and III Operations

An operator shall ensure that each flight crew member completes the following Low Visibility Procedures Training if converting to a new group or type or variant of aeroplane in which Low Visibility Take-Off ad Category II and III Operations will be conducted. The flight crew member experience requirements to undertake an abbreviated course are prescribed in subparagraphs (a) (2) and (a) (3):

(1) *Ground Training*

The appropriate requirements prescribed in subparagraph (b) above, taking into account the Category II and Category III training and experience.

(2) *Simulator Training and/or flight training.*

- (i) A minimum of 8 approaches and/or landings in a simulator approved for this purpose.
- (ii) Where no type specific simulator is available, a minimum of 3 approaches including at least one go-around is required on the aeroplane.
- (iii) Appropriate additional training if any special equipment is required such as head-up displays or enhanced vision equipment.

(3) *Flight Crew Qualification*

The flight crew qualification requirements are specific to the operator and the type of aeroplane operated:

- (i) The operator must ensure that each flight crew member completes a check before conducting Category II or III operations.
- (ii) The check prescribed in subparagraph (i) above may be replaced by successful completion of the simulator and/or flight training prescribed in subparagraph (d) (2) above.

(4) *Line flying under Supervision.*

An operator must ensure that each flight crew member undergoes the following line flying under supervision:

- (i) For Category II when a manual landing is required, a minimum of 3 landings from autopilot disconnect;
- (ii) For Category III, a minimum of 3 auto lands except that only one auto land is required when the training required in subparagraph (d) (2) above has been carried out in a full flight simulator usable for zero flight time training.

(E) *Type and command experience.*

The following additional requirements are applicable to commanders who are new to the aeroplane type:

- (1) 50 hours or 20 sectors as Pilot-in-Command on the type before performing any Category II and Category III operation; and

(2) Until 100 hours or 40 sectors as Pilot-in-Command on the type has been achieved, 100m be added to the applicable Category II or III RVR minima unless he has been previously qualified for Category II or III operations with a CAA operator.

(3) The GCAA may authorize a reduction in the above command experience for flight crew members who have Category II or Category III command experience.

(F) *Low Visibility Take-Off with RVR less than 150/200m*

(1) An operator must ensure that prior to authorization to conduct take-offs in RVRs below 150m (below 200m for Category D aeroplanes) the following training is carried out:

(i) Normal take-off in the minimum authorized RVR;

(ii) Take-off in the minimum authorized RVR with an engine failure between V₁ and V_R or as soon as safety considerations permit;

(iii) Take-off in the minimum authorized RVR with an engine failure before V₁, resulting in a rejected take-off.

(2) An operator must ensure that the training required by subparagraph (1) above is carried out in an approved simulator, this training must include the use of any special procedures and equipment. Where no approved simulator exists, the GCAA may approve such training in an aeroplane without the requirements for minimum RVR conditions.

(3) An operator must ensure that a flight crew member has completed a check before conducting low visibility take-offs in RVRs of less than 150m (less than 200m for Category D aeroplanes) if applicable. The check may only be replaced by successful completion of the simulator and/or flight training prescribed in subparagraph (f) (1) on initial conversion to an aeroplane type.

(G) *Recurrent Training and Checking - Low Visibility Operations*

(1) An operator must ensure that, in conjunction with the normal training and operator's proficiency checks, a pilot's knowledge and ability to perform the tasks associated with the particular category of operation, including LVTO, for which he is authorized is checked. The required number of approaches to be conducted during such recurrent training is to be a minimum of two, one of which is to be a missed approach and at least one low visibility take off to the lowest applicable minima. The period of validity for this check is the same as the period of validity of the operator proficiency check.

(2) For Category III operation an operator must use a flight simulator approved for Category III training.

(3) An operator must ensure that, for Category III operation on aeroplanes with a fail passive flight control system, a missed approach is completed at least once every 18 months as the result of an auto-pilot failure at or below decision height when the last report RVR was 300m or less.

(4) The GCAA may authorize recurrent training for Category II operations in an aeroplane type where no approved simulator is available.

(H) LVTO and Category II/III – Recency Requirements

- (1) An operator must ensure that, in order for pilots to maintain a Category II and Category III qualification, they have conducted a minimum of 3 approaches and landings using approved Category II/III procedures during the previous six month period, at least one of which must be conducted in the aeroplane.
- (2) Recency for LVTO is maintained by retaining the Category II or III qualification prescribed in subparagraph (1) above.
- (3) An operator may not substitute this recency requirement for recurrent training.

APPENDIX 5 LOW VISIBILITY OPERATIONS – OPERATING PROCEDURES

(A) General.

Low Visibility Operations include:

- (1) Manual take-off with or without electronic guidance systems ;
- (2) Auto-coupled approach to below DH, with manual flare, landing and rollout;
- (3) Auto-coupled approach followed by auto-flare, auto landing and manual rollout; and
- (4) Auto-coupled approach followed by auto-flare, auto landing and auto-rollout, when the applicable RVR is less than 400m.

Note 1: Hybrid system may be used with any of these modes of operations.

Note 2: Other forms of guidance systems or displays may be certificated and approved.

(B) Procedures and Operating instructions

- (1) The precise nature and scope of procedures and instructions given depend upon the airborne equipment used and the flight deck procedures followed, and operator must clearly define flight crew member duties during take-off, approach, flare, roll-out and missed approach in the Operations Manual. Particular emphasis must be placed on flight crew responsibilities during transition from non-visual conditions to visual conditions, and on the procedures to be used in deteriorating visibility or when failures occur. Special attention must be paid to the distribution of flight deck duties so as to ensure that the workload of the pilot making the decision to and or execute a missed

approach enables him to devote himself to, supervision and the decision making process.

- (2) An operator must specify the detailed operating procedures and instructions in the Operations Manual. The instructions must be compatible with the limitations and mandatory procedures contained in the Aeroplane Flight Manual and cover the following items in particular:
- (i) Checks for the satisfactory functioning of the aeroplane equipment, both before departure and in flight;
 - (ii) Effect on minima caused by changes in the status of the ground installations and airborne equipment;
 - (iii) Procedures for the take-off, approach, flare, landing, rollout and missed approach;
 - (iv) Procedures to be followed in the event of failures, warnings and other non-normal situations;
 - (v) The minimum visual reference required;
 - (vi) The importance of correct seating and eye position;
 - (vii) Action which may be necessary arising from a deterioration of the visual reference;
 - (viii) Allocation of crew duties in the carrying out of the procedures according to subparagraphs (i) to (iv) and (vi) above, to allow the Commander to devote himself mainly to supervision and decision making;
 - (ix) The requirement for all height calls below 200ft to be based on the radio altimeter and for one pilot to continue to monitor the aeroplane instruments until the landing is completed.
 - (x) The requirement for the Localizer Sensitive Area to be protected;
 - (xi) The use of information relating to wind velocity, winds shear, turbulence, runway contamination and use of multiple RVR assessments;
 - (xii) Procedures to be used for practice approaches and landing on runways at which the full Category II or Category III aerodrome procedures are not in force;
 - (xiii) Operating limitations resulting from airworthiness certification; and
 - (xiv) Information on the maximum deviation allowed from the LLS glide path and/or localizer.

APPENDIX 6 MINIMUM VISIBILITIES FOR VFR OPERATIONS

AIRSPACE CLASS	B C D E F	G
	ABOVE 900m (3,000ft) AMSL or above 300m (1000ft) above terrain, which ever is the higher	At and below 900m (3000ft) AMSL or 300m (1000ft) above terrain, whichever is the higher
Distance from cloud	Clear of cloud 1500m horizontally 300m (1000ft) vertically	Clear of clouds and in sight of the surface
Flight visibility	8km at and above 3,050m (10,000ft) AMSL* 5km below 3,050m (10,000ft) AMSL	5km**

* When the height of the transition altitude is lower than 3,050m (10,000ft) AMSL, FL 100 should be used in lieu of 10,000ft.

** CAT A and B aeroplane may be operated in flight visibilities down to 3,000m provided the appropriate ATS authority permit use of a flight visibility less than 5km and the circumstances are such, that the probability of encounters with other traffic is low, and the IAS is 140kts or less.

APPENDIX 7. EFFECT ON LANDING MINIMA OF TEMPORARILY FAILED OR DOWNGRADED GROUND EQUIPMENT

(A) Introduction

- (1) This Appendix provides operators with instructions for flight crews on the effects on landing minima of temporary failures or downgrading of ground equipment.
- (2) Aerodrome facilities are expected to be installed and maintained to the standards prescribed in ICAO Annexes 10 and 14. Any deficiencies are expected to be repaired without unnecessary delay.

(B) General

These instructions are intended for use both pre-flight and in flight. It is not expected however that the commander would consult such instructions after passing the outer marker or equivalent position. If failures of ground aids are announced at such a late stage, the approach could be continued at the commander’s discretion. If, however, failures are announced before such a late stage in the approach, their effect on the approach should be

considered as described in Tables 1^A and 1^C and the approach may have to be abandoned to allow this to happen.

(C) Operations with no Decision Height (DH)

(1) An operator should ensure that, for aeroplanes authorized to conduct no DH operations with the lowest RVR limitations, the following applies in addition to the content of Tables 1^A and 1^C:

- (i) RVR- at least one RVR value must be available at the aerodrome;
- (ii) Runway lights
 - (a) No runway edge lights, or no center lights - Day only min RVR 200m;
 - (b) No TDZ lights- No restrictions;
 - (c) No standby power to runway lights - Day only min RVR 200m.

(D) Conditions applicable to Tables 1^A & 1^C

- (1) Multiple failures of runway lights other than indicated in Table 1^B are not acceptable.
- (2) Deficiencies of approach and runway lights are treated separately.
- (3) Category II or III operations - A combination of deficiencies in runway lights and RVR assessment equipment is not allowed.
- (4) Failures other than ILS affect RVR only and not DH.

PRECISION APPROACHES TABLE 1^A

Failed / downgraded equipment		Effect on the Procedure or Published Minima				
		CAT IIIB No DH	CAT IIIB + DH	CAT IIIA	CAT II	CAT I (incl. PAR)
ILS	OM u/s, no equivalent pos. @ MM u/s	N/A	N/A	N/A	N/A	N/A
	ILS standby transmitter u/s	N/A	N/A	N/A	-	-
LIGHT	Approach lights u/s	-	N/A for operations with DH>50ft		N/A	RVR: as for Nil facilities
	Approach lights u/s except last 210m	-	-	-	N/A	RVR: as for Nil facilities
	Approach lights u/s except last 420m	-	-	-	-	RVR: as for Intermediate facilities
	Standby pwr for appr lights	-	-	-	RVR: as for Nil facilities	
	Standby pwr for rwy lights u/s	RVR 200m	N/A	N/A	N/A	-
		day only				
	REDL or threshold or end lights u/s	RVR 200m	Day only			
		day only				
	RCLL u/s	RVR 200m day only	RVR 300m day only	RVR 300 day only	RVR 300m day 500m night	-
	RCLL spacing 30m	-	RVR 150m	-	-	-
	TDZL u/s	-	RVR 200m day 300m night	RVR 300m 550m	RVR 300m day 550m night	-
	Taxiway light system u/s	-	-	-	-	-
	Whole runway light system	-@	N/A	N/A	N/A	RVR: as for Nil facilities@ Day only
	RVR	TDZ not available@	@	N/A@	N/A@	N/A@
Mid-point or Roll-out u/s		@	-	-	-	
OCH	CAT I OCH/OCA raised	-	-	-	-	Raise DA to OCA @@
	CAT II OCH raised to ≤100ft CAT II OCH raised to >100ft	-	-	-	- @	
		-	-	-		

Anemometer runway in use u/s	No effect if other ground sources are available
Ceilometer u/s	-

Legend

General

N/A = Procedure not authorized

- Corrections are not cumulative.

- = No effect on published minima and RVR ILS CAT II and III with DH N/A

- Multiple deficiencies in runway light systems

- 'RVR' value refers to TDZ RVR only.

@ If route documentation shows a higher value already, use that value.

@ Equivalent position: DME distance, suitably located NDB or VOR, SRE or PAR Fix or any other su Fix that independently establishes the position of the aircraft.

@N/A, unless a revised RA is published by the operator

@At least one RVR must be available at the AD

@RVR can be measured by transmissometer, television camera or human observer

@If REDL and RCLL u/s: N/A

@Correct RVR:

@When published in the route documentation, the TDZ RVR can be substituted by the MID RVR.

System: See AOM. Crew qualification: See BOM

Temperature below standard: TABLE 1^D

System: See AOM. Crew qualification: See BOM

Temperature below standard: TABLE 1^D

TABLE 1^B

Category	Limit of course structure	Level of integrity	Lowest CAT	Minima
I	A, B, C, T, D or E	1 to 4	1	P
I	T, D or E	1	I	P
	T	2 to 4	I	P
	D OR E	2 o 4	II	P
III	D	1	I	P
		2	II	P
		3	IIIB + DH	A RVR: P; B/C RVR:125m
		4	IIIB no DH	A RVR: P; B/C RVR:125m
	E	1	I	P
		2	II	P
		3	IIIB + DH	A RVR: P; B/C RVR:125m
		4	IIIB no DH	P

Temporary changes of ILS Classification

Effect on the procedures or published minima

Legend: P = Minima of lowest allowed (downgraded) ILS category.

@ CAT II only authorized when specifically published in the route documentation

NON-PRECISION APPROACHES

TABLE 1^C

	Failed/Downgraded Equipment	Effect on the procedure or published minima
LIZ/VOR/NDB/SRE	OCA raised above MDA	Raised MDA to OCA, if applicable increase RVR:
	KLM point 'D' not identifiable/not Published (VOR or NDB)	Radar fix may be used
	MM u/s	No effect, unless when used as MAPt
	Approach lights u/s or Approach lights u/s except last 210m	RVR as for Nil facilities
	Approach lights u/s except last 420m	RVR as for Nil facilities
	Standby power approach lights/ Runway lights Centerline lights u/s increase spacing TDZ lights u/s Taxiway light system u/s	No effect
	RDL or threshold or runway end lights u/s	Day only

Legend: N/A = Procedures not authorized; - = No effect on published minima.

If the route documentation shows a higher value already, use that value.

Aircraft System: See AOM

Temperature below standard: See altitude correction table 1^D

TABLE 1^D

LOW TEMPERATURE ALTITUDE CORRECTION – TMA

NOTE: Values are calculated for sea level. They are conservative for higher elevation airports.

HAA F AD° C	200	300	400	500	600	800	1000	1500	2000	3000	4000	5000
0	20	20	30	30	40	50	60	90	120	170	230	290
-10	20	30	40	50	60	80	100	150	200	290	390	490
-20	30	50	60	70	90	120	140	210	280	430	570	710
-30	40	60	80	100	120	150	190	280	380	570	760	950
-40	50	80	100	120	150	190	240	360	480	720	970	1210
-50	60	90	120	150	180	240	300	450	600	890	1190	1500

TABLE 1^E

CLIMB GRADIENT CONVERSION

%	GROUND SPEED							
	Ft/ NM	140	160	180	200	220	240	260
2.5	150	350	410	460	510	560	610	660
3.3	200	470	530	600	670	740	800	870
3.5	210	500	570	640	710	780	850	920
4.0	240	570	650	730	810	900	980	1060
4.5	270	640	730	820	910	1000	1100	1190
5.0	300	710	810	910	1020	1120	1220	1320
5.5	330	780	890	1000	1120	1230	1340	1450
6.0	360	850	970	1100	1220	1340	1460	1580
6.5	390	920	1050	1190	1320	1450	1580	1710
7.0	430	990	1130	1280	1420	1560	1700	1850
8.0	490	1130	1460	1460	1620	1790	1950	2110
9.0	550	1270	1460	1640	1830	2010	2190	2370
10.0	600	1420	1620	1830	2030	2230	2430	2630

TABLE 1^F

TEMPERATURE CONVERSION

°F → °C		→	
140	60	68	20
136	57.7	64	17.7
132	55.5	60	15.5
128	53.3	56	13.3
124	51.1	52	11.1
120	48.8	48	8.9
116	46.6	44	6.6
112	44.4	40	4.4
108	42.2	36	2.2
104	40	32	0
100	37.7	28	-2.2
96	35.5	24	-4.4
92	33.3	20	-6.6
88	31.1	16	-8.8
84	28.8	12	-11.1
80	26.6	8	-13.3
76	24.4	4	-15.5
72	22.2	0	-17.7

VERTICAL SPEED

TABLE 1^G

GS/AA	2.5°	2.6°	2.7°	2.8°	2.9°	3.0°	3.1°	3.2°	3.3°
110	480	500	520	540	560	580	600	620	640
120	540	560	580	600	620	640	660	680	700
130	580	600	620	640	660	680	720	740	760
140	620	640	660	700	720	740	760	800	820
150	660	680	720	740	760	800	820	840	880
160	700	740	760	800	820	860	880	900	940
170	760	780	820	840	880	900	940	960	1000
180	800	820	860	900	920	960	980	1020	1060

TABLE IH

VHF/HF DIRECTION FINDING ACCURACY CLASSES

BEARINGS

POSITIONS

A = within +/-2°

A = within 5NM

B = within +/-5°

B = within 20NM

C = within +/-10°

C = within 50NM

D = less than C°

D = less than C