

CIVIL AVIATION AUTHORITY, PAKISTAN

Air Navigation Order

No : 91.0019

Date : 6th June, 2000

Issue : One

ALL - WEATHER OPERATIONS AND LIMITATIONS

CONTENTS

SECTIONS

1. Authority
2. Scope
3. Effective date
4. Definitions
5. Aerodrome Facilities
6. Airborne Equipment
7. Pilot Training and Qualifications
8. Operational Requirements - Categories I, II and III
9. Continuous Monitoring
10. Aerodrome Operating Minima
11. Low Visibility Take-offs
12. Transitional Period

CIVIL AVIATION AUTHORITY, PAKISTAN

Air Navigation Order

No : 91.0019
Date : 6th June, 2000
Issue : One

ALL - WEATHER OPERATIONS AND LIMITATIONS

1. Authority

- 1.1 This ANO is issued under Rule 200 sub rule 2 of CARs 1994 by the Director General Civil Aviation Authority in pursuance of the powers vested in him under Rule-4 of Civil Aviation Rules 1994

2. SCOPE

- 2.1 Any taxi, take-off or landing operations in conditions where visual reference is limited by weather conditions.
- 2.2 A State of the operator has an obligation under Annex-6, Part-1 in respect of Aerodrome Operating Minima. States can meet this obligation either by supervising the determination of Operating Minima by operators or by directly determining minima for their use.
- 2.3 The State of the operator must ensure it has the basic legislation to provide for certification of operators, determination of minima and for inspection and revision as needed. For the supervision of all-weather operations, there must be clear and specific references in law to provide for establishment of the necessary rules to ensure safe conduct of the intended operations, such as those for take-off and landing minima, flight crew qualifications and aeroplane airworthiness.
- 2.4. Likewise, as State of the aerodrome, it must have regulations concerning the installation and maintenance of the necessary ground facilities, the development of appropriate procedures, and the timely dissemination of information.

NEED FOR SPECIFIC RULES

- 2.5 The need for Specific Rules and Regulations is implied by the provisions of Annex-6, Part-1. The Basic Aviation Law of the State should:
- (a) Require Commercial Air Transport Operations to be conducted in accordance with conditions the State may consider applicable in the interest of safety;

- (b) Make provision for the adoption of operating Regulations compatible with the provisions of the Annexes to the convention on International Civil Aviation;
 - (c) Make provision for the delegation to a designated official of the authority to develop and amend Operating Rules consistent with Operating Regulations; and
 - (d) Make provision for the enforcement of the Operating Regulations and Rules.
- 2.6 In the establishment of Aerodrome Operating Minima as part of a State's Regulatory System it is assumed that two basic prerequisites, are understood and accepted, these are:
- (a) The provision exists in the Basic Aviation Law of the State for a code of Operating Regulation and the Promulgation thereof; and
 - (b) The State establishes an appropriate entity with necessary powers to ensure compliance with the regulations.
- 2.7 In accordance with these concepts of Basic Aviation Law, a state's administration is empowered to formulate specific rules for the implementation of all-weather operations within its area of jurisdiction. These rules should apply to its own operators. While such requirements may also apply to foreign operators to the extent necessary to fulfil a State's obligation in respect of the convention on International Civil Aviation. It should be noted that the primary responsibility for the safety of take-off and landing operations resides with the State of the operator.
- 2.8 The primary responsibility of the State in which the operation takes place is the provision and maintenance of facilities and services, provision of meteorological information, and promulgation in AIPs and NOTAM of information concerning instrument procedures together with obstacle information. The principle aim of these rules is to ensure an adequate level of safety, but they also establish the legal requirements and provide specific guidance to operators and aerodrome authorities proposing to participate in such operations. The specific rules relating to all-weather operations form part of those which generally relate to the authorization and control of Flight Operations. The rules should cover:-
- (a) **The Operations, taking account of:**
 - 1) Airworthiness Requirements
 - 2) Flight Crew Qualification and Training
 - 3) Operating Procedures and their Validation
 - 4) Aerodrome Operating Minima

(b) **Aerodrome, taking account of:**

- (1) Adequacy of Runways and Taxiways;
- (2) Visual and Non-visual Aids;
- (3) Control of Obstacles;
- (4) Meteorological Service and Assessment and Dissemination of RVR;
- (5) Air Traffic Service, including surface movement control.

(c) **Certification and/or authorization in relation to:**

- (1) The Aeroplane
- (2) The Aerodrome
- (3) The Operator
- (4) The Flight Crew

(d) **Requirement for compliance with Operating Minima**

- 2.9 This ANO has been developed to specify regulatory requirements and as a condition for authorizing all weather operation including low visibility take-off and landing to Air Carrier and flight crew engaged in regular public transport operations holding Air Operator Certificate (AOC) issued under Part-XI of Civil Aviation Rules, 1994.

ALL WEATHER OPERATIONS

3. Effective Date

- 3.1 This ANO shall come into effect on 6th June 2000.

4. Definitions

- (i) **Aerodrome Operating Minima**:- The limits of usability of an aerodrome for either take-off or landing, usually expressed in terms of visibility or runway visual range (RVR), decision altitude/height (DA/H) or minimum descent altitude/height (MDA/H) and cloud conditions.
- (ii) **Category-I (CAT I) Operation**:- A precision instrument approach and landing with a decision height not lower than 60M (200 ft) and with either a visibility not less than 800M, or a runway visual range not less than 550 M.
- (iii) **Category-II (CAT II) Operation**:- A precision instrument approach and landing with a decision height lower than 60M (200 ft) but not lower than 30M (100 ft), and a runway visual range not less than 350M.
- (iv) **Category III A (CAT IIIA) Operations**:- A precision instrument approach and landing with:

- (a) A decision height lower than 30H (100 ft) or no decision height; and
- (b) A runway visual range not less than 200M.
- (c) **Category III B (CAT IIIB):-** Operations:- A precision instrument approach and landing with:
 - A decision height lower than 15m (50 ft), or no decision height; and
 - A runway visual range less than 200m but not less than 50m.
- (v) **Fail Operational Automatic Landing System:-** If in the event of a failure, the approach, flare and landing can be completed by the remaining part of the automatic system.
- (vi) **Fail Passive Automatic Landing System:-** In the event of a failure, there is no significant deviation of aeroplane trim, flight path or altitude but the landing will not be completed automatically. For a fail passive system the pilot assumes control of the aircraft after failure.
- (vii) **Alert Height (AH):-** Height above the runway based on the characteristics of the aeroplane and its fail operational automatic landing system, above which a CAT III approach would be discontinued and a missed approach initiated if a failure occurred in one of the redundant parts of the automatic landing system, or in the relevant ground equipment. Above AH, go around must be made if a failure affects the fail operational system. Below AH, the approach will be continued.
- (viii) **Circling:-** The visual phase of an instrument approach to bring an aircraft into position for landing on a runway not suitably located for a straight-in-approach
- (ix) **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.
- (x) **Low Visibility Take-off (LVTO):-** A take-off where the Runway visual Range (RVR) is less than 400M.
- (xi) **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 with visual reference to the terrain.

5. Aerodrome Facilities.

- 5.1 An operator shall not use an airfield for any operations including CAT II and CAT III unless it is approved for such operations by the state in which the airfield is located.
- 5.2 An operator shall verify that Low Visibility Procedures (LVP) has been established, and will be enforced, at those aerodromes where low visibility operations are to be conducted.

6. Airborne Equipment.

- 6.1 Approval of Category-I, Category-II and Category-III minima is based on installation of the equipment specified in Table 1-1. In order to perform a CAT II or CAT III approach and automatic landing, the equipment listed in the AFM is required to be operative.
- 6.2 If one of these equipments/systems is listed in the airline MEL with associated dispatch conditions, the MEL must clearly indicate that CAT II or CAT III operations are not authorized.

**Table 1-1
Airborne Equipment Requirements**

| Equipment Type/Specification | CAT I | CAT II | | CAT IIIA | | CAT IIIB Operations |
|---|-------|-------------|------------|-----------------|----------------------------|---------------------|
| | | Manual Mode | Auto. Mode | DH 50ft or more | DH less than 50FT or on DH | |
| Raw data display | X | X | X | X | X | X |
| ILS Receiver | | | | | | |
| Dual with dual displays | X1 | X | X | X | X | X |
| Excess deviation warning | | X | X | X | X | X |
| Radio Altimeters | | | | | | |
| Single self monitored with dual display | | X | X | | | |
| Dual with dual displays | | | | X | X | X |
| Flight Director System (FDS) | | | | | | |
| Single Self Monitored with dual displays | X2 | | X | | | |
| Dual with dual displays | | X | | X | X | X |
| Automatic Flight Control System with ILS Coupled Approach Mode | | X3 | | | | |
| Automatic Landing System | | | | | | |
| Fail Passive | | | X | X | | |
| Fail Operational | | | | | X | |
| Fail Operational with Automatic Roll out | | | | | | X |
| Automatic Go-around Mode | | | | | X | X |
| Auto-Throttle Mode | | | | X | X | X |

Notes to Table 1-1

1. Single ILS or MLS receiver required
2. Single with single display for CAT t or Automatic Flight Control System with ILS/MLS coupled approach mode.
3. Automatic Flight Control System with TLS/MLS coupled approach mode upto DH followed by manual landing or G/A

7. Pilot Training and Qualification

- 7.1 It is essential that flight crew are trained and qualified in all aspects of all weather operations appropriate to the intended instrument operations.
- 7.2 The operator's approved training program must include training for Pilots-in-Command and Seconds-in-Commands in the following two parts:
 - (a) Ground instruction in the background and philosophy of all-weather operations
 - (b) Flight training, which may be carried out in approved flight simulator and/or during airborne training.

7.3 Ground Training Programme

The Ground Training Programme to include the following items:

- i. The characteristics and limitations of the ILS and/or MLS.
- ii. The characteristics of the visual aids.
- iii. The characteristics of fog.
- iv. The operational capabilities and limitations of the particular airborne system.
- v. The effects of precipitation, ice accretion, low-level wind shear and turbulence.
- vi. The effects of specific aircraft malfunctions.
- vii. The use and limitations of RVR assessment system.
- viii. The principles of obstacle clearance requirement.
- ix. Recognition of and action to be taken in the event of failure of ground equipment.
- x. The procedures and precautions to be followed with regard to surface movement during operations when the RVR is 400M or less.
- xi. 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 system.
- xii. The importance and significance of alert height, when applicable and the action in the event of any failure above and below the alert height.
- xiii. The importance of correct seating and eye position.
- xiv. The qualification requirements for pilots to obtain and retain approval to conduct CAT 1I and CAT III operations.

7.4 Simulator and/or Flight Training Programme

7.4.1 The Training Programme for CAT II and CAT III must include in flight or in simulator the following items:

- 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 Annunciators 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 of Flight Control System.
- v. The effect of known un-service abilities and use of Minimum Equipment Lists.
- vi. Operating limitation resulting from airworthiness certification.
- vii. Guidance on the visual cues required at DH together with information on maximum deviation allowed from guide path or localizer.
- viii. The importance and significance of AH if applicable.
- ix. Where take-offs are conducted in RVR of 400 M and below, training must be established to cover system failures and engine failure resulting in continued as well as rejected take-offs.

7.4.2 The Training Programme must train each Flight Crew Member to carry out his duties and the co-ordination with either Crew Member.

7.4.3 The training must be divided into phases covering normal operation with no aircraft or equipment failures, but including all weather conditions which may be encountered and detailed scenarios of aircraft and equipment failure which could effect CAT II or CAT III operations.

7.4.3 Incapacitation procedures appropriate to CAT II and CAT III operations shall be practiced.

7.4.5 For aircraft with no specific simulator, operators must ensure that the initial flight training phase specific to the visual scenarios of CAT II operations is conducted in a simulator approved for that purpose by CAA. The training and procedures that are type specific shall be practiced in the aircraft.

7.4.6 The initial CAT II and CAT III training phase will normally be conducted on completion of type conversion training and shall include at least the following exercises:

- (i) Approach using the appropriate flight guidance, autopilot and control system installed in the aircraft, to the appropriate DH and to include transition to visual flight and landing.
- (ii) Approach with alt engines operating using the appropriate flight guidance systems, autopilots and control system installed in the

aircraft down to the appropriate DH followed by missed approach, all without external visual reference.

- (iii) Where appropriate, approach utilizing automatic flight system to provide automatic flare, landing and rollout.
- (iv) Normal operation of the applicable system both with and without acquisition of visual cues at DH.
- (v) Approaches with engine failure at various stages on the approach.
- (vi) Approaches with critical equipment failures (e.g. Electrical System, Auto flight Systems, ground and/or airborne [LS/MLS systems and status monitors).
- (vii) Approaches where failures of auto flight equipment at low level require either.
 - Reversion to manual flight to control flare, landing and rollout or missed approach.
 - Reversion to manual flight or a downgraded automatic mode to control missed approaches from, at or below DH including those, which may result in a touchdown on the runway.
- (viii) Failures of the systems which will result in excessive localizer and/or glide deviation, both above and below DH, in the minimum visual conditions authorized for the operation.
- (ix) Failures and procedures specific to aircraft.
- (x) The Training Programme must provide in handling faults which require a reversion to higher minima.
- (xi) The Training Programme is to include the handling of the aircraft when, during a fail-passive CAT III approach, the fault causes the autopilot to disconnect at or below DH when the last reported RVR is 3501'4 or less.

7.5 Line Under supervision Flying

An operator must ensure that:

- 7.5.1 Where CAT II manual landings are required, a minimum of three such landings from autopilot disconnect must be carried out.
- 7.5.2 For CAT III, a minimum of three auto land must be carried out, except that only one auto land is required when the training required in simulator has been carried out in a full flight simulator usable for zero flight time training.

7.6 Type and Command Experience

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

- 7.6.1 50 hours as Pilot-in-Command on the type before performing any CAT II or CAT III operation.

- 7.6.2 Until 100 hours as Pilot-in-Command on the type has been achieved, 50 ft. must be added to the applicable CAT II or CAT III DH unless he has previously qualified for CAT II or CAT IIT operations.

7.7 Flight Crew Qualification

An operator must ensure that a Flight Crew Member has completed a check before conducting CAT II or CAT III operations.

Successful completion of the initial simulator and/or flight training will constitute the check.

7.8 Recurrent Training and Checking

An operator must ensure that, in conjunction with normal training and checking of Pilot Proficiency Check, a pilot knowledge and ability to perform the tasks associated with the particular Category of operation for which he is authorized is demonstrated. The required number of approaches to be conducted during such recurrent training is to be a minimum of three, one of which is to be a missed approach.

7.9 Recency Requirements

To retain CAT II or CAT III operations recency, a pilot must participate in approved simulator cyclic and Proficiency Programme and complete an auto coupled ILS approach to touchdown at least every 45 days. If an auto land using low visibility procedures has not been completed in the preceding 45 days, recency can be up-dated by:

- (a) Completing an auto land in the aircraft in CAT I or better conditions using low visibility procedures, or
- (b) Completing an auto land in an approved flight simulator to the approved minima, or
- (c) Viewing a video detailing low visibility procedures. Where recency is up-dated by this method, the succeeding up-date must be in the aircraft or flight simulator.

8. Operational Requirements

- 8.1 The operator's Minimum Equipment List (MEL) and Operations Manual to include the following as appropriate.

- 8.1.1 The MEL should clearly define the effects of equipment redundancy on approach Category status of the aircraft.

- 8.2 The Operations Manual to include, procedures, instructions and information to be used by flight crews for:

8.2.1 All Weather Operations

- i. CAT I
- ii. CAT II
- iii. CAT III
- iv. Decision Height
- v. Alert Height
- vi. Runway Visual Range
- vii. Operating Minima
- viii. Low Visibility Take-off
- ix. Visual Manoeuvring (Circling)
- x. Visual Approach
- xi. Non-precision Approach
- xii. Effect of Failed Downgraded Ground Equipment

8.2.2 Flight Preparation

8.2.3 Approach Preparation

- a) Aircraft Status
- b) Weather
- c) Approach Ban (Limitations on approach and landing)
- d) ATC Calls
- e) Seat Positions
- f) CAT II or CAT III Crew Briefing

8.2.4 Approach Procedures

- (a) Task Sharing
- (b) Visual References
- (c) Loss of Visual References
- (d) Flight Parameters Deviation Calls

8.2.5 Failure and Associated Actions

- (a) General
- (b) Abnormal Procedures

8.2.6 ATC Procedure

8.3 Operational Requirements

8.3.1 General Operating Rules

No operator shall conduct Category I or II operations unless.

- (a) Each aeroplane is certified for operations with decision height below 200 ft, or no decision height, and equipped in accordance with airworthiness ANO or an equivalent approved by the CAA.
- (b) The operation is approved by CAA

8.3.2 No operator shall conduct low visibility take-offs in less than 150 m RVR (category A, B and C aeroplanes) or 200 m RVR (category D aeroplanes) unless approved by CAA.

Note: RVR and runway facilities requirements are given in Appendix A.

9. Continuous Monitoring

After obtaining the initial authorization, the operations must be continuously monitored by the operator to detect any undesirable trends before they become hazardous.

9.1 An operator must prove that he can perform CAT II or CAT III operations with the appropriate success rate and level of safety. For this purpose, he must carry out a proving programme called "Operational Demonstration" or "In-service Proving" to demonstrate that, in line service, the performance and the reliability of the aircraft and its systems meet the airworthiness certification criteria. Particular attention will also be given to the flight procedures as established by the operator and to the way the operator uses pilot's reports and applies his maintenance procedures.

9.2 Successful Approach and Landing

The CAA will take into account flight reports or recordings and the resulting approach/landing success rate.

9.2.1 Successful Approach

An approach is considered to be successful if:

From 500 ft to start of flare

- (a) Speed is maintained within + 5kt disregarding rapid functions due to turbulence.
- (b) No relevant system failure occurs.

From 300 ft to DH

- (a) No excessive deviation occurs
- (b) No centralized warning gives a go-around order.

9.2.2 Successful Landing

An automating landing is considered to be successful if:

- a) No system failure occurs
- b) No flare failure occurs
- c) No decrab failure occurs
- d) Main-wheel touchdown occurs between 150M (500 ft) and 750M (2500 ft) from runway threshold,
- e) Assuming a normal GS Antenna location.
- f) Nose-wheel touchdown occurs within 8M (27 ft) of runway centre line
- g) Touchdown vertical speed does not exceed 360 ft. /min
- h) Bank angle at touchdown does not exceed 7 degrees
- i) Pitch angle does not exceed to maximum value for a safe tail clearance
- j) Roll out lateral deviation does not exceed 8M (27 ft)
- k) No roll out failure occurs

- 9.2.3 The following information must be retained for a period of 12 months.
- (i) The total number of approach, 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 to III minima; and
 - (ii) Reports of unsatisfactory approach and/or automatic landings by, aerodrome and aeroplane registration, in the following Categories:
 - (a) Airborne Equipment Faults
 - (b) Ground Facility Difficulties
 - (c) ATC Factors
- 9.2.4 An operator must establish a procedure to monitor the performance of the automatic landing system of each aeroplane.

10. Aerodrome Operating Minima

- 10.1 An operator shall establish, for each aerodrome planned to be used, aerodrome-operating minima which is not lower than the values given in appendix 'A'. The method of determination of such minima shall not be lower than any that may be established for such aerodromes by the state in which the aerodrome is located.
- 10.2 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 flight crew, their competence and experience;
 - (3) The dimensions and characteristics of the runways, which may be selected for use;
 - (4) The adequacy and performance of the visual and non-visual ground aids;
 - (5) The equipment available on the aeroplanes for the purpose of navigation and/or control of flight path, as appropriate, during take-off, the approach, the flare, the landing, 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 necessary clearance;
 - (7) The obstacle clearance altitude/height for the instrument approach procedures; and
 - (8) The means to determine and report meteorological conditions.
- 10.3 The aeroplane categories referred to in 10.2 (1) must be derived in accordance with the method given in Appendix 'B' Table 10.

11. Low Visibility Take-off

- 11.1 Take-off with RVR less than 400 M is considered as LVTO.
- A. LVTO with RVR between 400 M and 150 M.**

- i. The minimum RVR in this range of value is a function of the aircraft category and of the runway equipment (as specified in appendix A table 1).
- ii. No operational approval is required from CAA to perform LV-FO with RVR 400 M to 150 M.
- iii. Flight crew members have satisfactorily completed training in a simulator approved for this purpose.

B. LVTO with RVR between 150 H and 125 M.

- i. Operational approval is required from CAA to perform LVTO with RVR 150 M to 125 M.
- ii. A visual segment of 90 M is required from the cockpit during the take-off run with the minimum RVR.
- iii. Low visibility procedures are in force.
- iv. High intensity runway centre line lights spaced 15 M or less and high intensity edge lights spaced 60 M or less are in operation.
- v. The 125 M RVR value has been achieved for all of the relevant RVR reporting points.
- vi. Flight crew member have satisfactorily completed training in a simulator approved by CAA for this purpose.

12. Transitional Periods

12.1 Operators with no previous Category II or III experience.

12.1.1 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 Category I operations on the aeroplane type.

12.1.2 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 CAA may impose higher minima than the lowest applicable for an additional period.

12.2 Operators with previous Category II or III experience

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

12.2.2 Maintenance of Category II, Category III and LVTO equipment. Maintenance instructions for on-board guidance systems must be established by the operator, in liaison with the manufacturer, and included in the operator's aeroplane maintenance program, which must be approved by CAA.



(ALIUDDIN)
Air Marshal (Retd)
Director General

**Appendix 'A' to
ANO 91.0019**

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.
 - (a) Within one hour for two engines aeroplanes
 - (b) Within two hours for four engine aeroplanes
 - (c) Within the maximum approved diversion time for aircraft qualified for **ETOPS**, but not more than two hours.
- (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 takeoff, the aeroplane can either stop or continue the take-off to a height of 1500 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 for take-off | |
|---|-------------------------|
| Facilities | RVR/Visibility (Note 3) |
| Nil (Day only) | 500 m |
| Runway edge lighting and/or centre line marking | 250/300 m (Notes 1 & 2) |
| Runway edge and centre line lighting | 200/250 m (Notes 1) |
| Runway edge and centre line 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 sub-paragraph (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.

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 |
| 201 - 300 ft | 1000 m |
| > 300 ft | 1500 m (Note 1) |

Note 1: 1500 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 can determine that the actual conditions satisfy the applicable take-off minima
- (4) Exceptions to sub-paragraph (A) (3) (i) above:
 - (i) Subject to the approval of the CAA, 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 centre line lights spaced 15 m or less and high intensity edge lights spaced 60 m or less are in operations;
 - (c) Flight crew members have satisfactorily completed training in a simulator approved for this procedure;
 - (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 CAA, 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.

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, SPA 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 PC |
| SPA (terminating at 1/2 NM) | 250 fl |
| SPA (terminating at 1 NM) | 300 PC |
| SPA (terminating at 2 NM) | 350 ft |
| VOR | 300 Pc |
| VOR/DME | 250 Pc |
| NDB | 300 Pc |
| 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
 - (x) Other visual references accepted by the CAA.
- (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 | 1200 m |
| 330 – 449 ft. | 900 m | 1000 m | 1000 m | 1400 m |
| 450 – 649 ft | 1000 m | 1200 m | 1200 m | 1600 m |
| 650 ft. and Above | 1200 m | 1400 m | 1400 m | 1800 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. | 1000 m | 1100 m | 1200 m | 1400 m |
| 330 – 449 ft. | 1200 m | 1300 m | 1400 m | 1600 m |
| 450 – 649 ft. | 1400 m | 1500 m | 1600 m | 1800 m |
| 650 ft. and Above | 1500 m | 1500 m | 1800 m | 2000 m |

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. | 1200 m | 1300 m | 1400 m | 1600 m |
| 330 – 449 ft. | 1300 m | 1400 m | 1600 m | 1800 m |
| 450 – 649 ft. | 1500 m | 1500 m | 1800 m | 2000 m |
| 650 ft. and Above | 1500 m | 1500 m | 2000 m | 2000 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. | 1500 m | 1500 m | 1600 m | 1800 m |
| 330 – 449 ft. | 1500 m | 1500 m | 1800 m | 2000 m |
| 450 – 649 ft. | 1500 m | 1500 m | 2000 m | 2000 m |
| 650 ft. and Above | 1500 m | 1500 m | 2000 m | 2000 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 tables are only applicable to conventional approaches with a nominal descent slope of not greater than 3.80. 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 refer 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 1 operations

(1) General: A Category 1 operation is a precision instrument approach and landing using TLS, 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 1 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 1 decision height, determined in accordance with sub-paragraph (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 1 operations is given in table 5 below:

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

| Category I minima | | | | |
|--------------------------|-------------------------|---------------------|-------------------|-----------------|
| Decision Height (Note 7) | Facilities/RVR (Note 5) | | | |
| | Full (Notes 1&6) | Interm. (Notes 2&6) | Basic (Notes 3&6) | Nil (Notes 4&6) |
| 200 ft. | 550 m | 700 m | 800 m | 1000 m |
| 201 – 250 ft. | 600 m | 700 m | 800 m | 1000 m |
| 251 – 300 ft | 650 m | 800 m | 900 m | 1200 m |
| 301 ft. and Above | 800 m | 900 m | 1000 m | 1200 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 3.0°. An ILS glide path in excess of 3.0° is used only where alternate means of satisfying obstacle clearance requirements are impractical.

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)

D. Precision approach - Category II operations

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

- (i) A decision height below 200 ft but not lower than 100 ft', and
- (ii) A runway visual range of not less than 350 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 authorized 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 sub-paragraph (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 barrette of the touchdown zone lighting.
- (4) **Required RVR:** The lowest minima to be used by an operator for Category II operations is given below in table 6.

Table 6 - RVR for Cat II approach Vs DH

| Category II minima | | |
|--------------------|--------------------------------------|--------------------------|
| Decision Height | Auto-coupled to below DH (Note 1) | |
| | RVR/Aeroplane Category A,B & C | RVR/Aeroplane Category D |
| 100 - 120 ft. | 350 m | 350 m |
| 121 - 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.

E. Precision approach - Category III operations

- (1) General Category III operations are subdivided as follows.
- (i) **Category III A operations:** A precision instrument approach and landing using ILS or MLS with:
 - (a) A decision height lower than 100 ftc; 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 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 specified in the AFM, if stated;
 - (ii) The minimum height to which precision approach aid can be used without the required visual reference; or
 - (iii) The decision height to which 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; 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 III A operations, a pilot may not continue an approach below the decision height determined in accordance with subparagraph (E)(2) above unless a visual reference containing segment of at least 3 consecutive lights being the centre line of the approach lights, touchdown zone lights, or runway centre line lights, or runway edge lights, or a combination of these is attained and can 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 sub-paragraph (E)(2) above, unless a visual reference containing at least one centre line 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
 - (5) Required RVR: The lowest minima to be used by an operator for Category III operations is given below in table 7.

Table 7 - RVR for Cat III approach Vs flight control system and DH

| Category III Minima | | | | | |
|---------------------|----------------------|------------------------------------|-------------------------|--|------------------|
| | | Flight Control System/RVR (metres) | | | |
| | | Fail Passive | Fail Operational | | |
| | | | Without roll-out system | With roll-out guidance or control system | |
| Approach Category | Decision Height (ft) | | | Fail Passive | Fail Operational |
| IIIA | Less than 100 ft | 200 m (Note 1) | 200 m | 200 m | 200 m |
| IIIB | Less than 50 ft. | Not . authorized | Not . authorized | 125 m | 75 m |
| IIIB | No DH | Not . authorized | Not . authorized | Not . authorized | 75 m |

Note 1: For operations to actual RVR values less than 350m, a go-around is assumed in the event of an autopilot failure at or below DH.

F. Circling

- (1) The lowest minima to be used by an operator for circling are given below in table 8.

Table 8 - Visibility and MDH for circling Vs aeroplane category

| | Aeroplane Category | | | |
|-----------------------------------|--------------------|----------|----------|----------|
| | A | B | C | D |
| MDH | 44ft. | 500ft. | 600ft. | 700ft. |
| Minimum meteorological visibility | 1500 ft. | 1600 ft. | 2400 ft. | 3600 ft. |

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

G. Visual Approach: An operator shall not use an P, VR 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.
- (2) When converting meteorological visibility to RVR in all other circumstances than those in sub-paragraph (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 |

Example: If visibility reported is 800 M, in order to achieve RVR value during day with High Intensity Approach lights and runway lighting multiply the factor 1.5 with 800 which comes to 1200 M.

Appendix 'B'
ANO 91.0019

CATEGORIES OF AIRCRAFT - ALL WEATHER OPERATIONS

Classification of Aeroplanes.

1. Aircraft performance has a direct effect on the airspace and visibility needed to perform the various manoeuvres associated with the conduct of instrument approach procedures. The most significant performance factor is aircraft speed. Accordingly, the following five Categories of typical aircraft have been established, based on 1.3 times stall speed in the landing configuration at maximum certificated landing mass, to provide a standardized basis for relating aircraft manoeuvrability to specific instrument approach procedures (Table 10)

Table 10 - Aeroplane Category

| Aeroplane Category | Vat |
|---------------------------|----------------------|
| A | Less Than 91 kts |
| B | From 91 to 120 kts |
| C | From 121 to 140 kts |
| D | From 141 to 165 kts |
| E | From 166 to 210 kts. |

The landing configuration which is to be taken into consideration shall be given by the operator or by the aeroplane manufacturer.

2. The instrument approach chart will specify the individual categories of aircraft for which the procedure is approved. Normally, procedures will be designed to provide protected airspace and obstacle clearance for aircraft upto and including category D. However, where airspace requirements are critical, procedures may be restricted to lower speed categories. Alternately, the procedure may specify a maximum IAS for a particular segment without reference to aircraft category. In any case it is essential that pilots comply with the procedures and information depicted on instrument approach charts and the appropriate speeds shown in table II below, if the aircraft is to remain in the areas developed for obstacle clearance purpose.

Table 11 - Speed for Procedure Calculation in Knots

| Aircraft Category | VAT | Range of speed for initial approach | | Max speed for visual manoeuvring (circling) | Max speeds for missed approach | |
|--------------------------|------------|--|---------|--|---------------------------------------|--------------|
| | | | | | Intermediate | Final |
| A | <91 | 90/150 (110°) | 70/100 | 100 | 100 | 110 |
| B | 91/120 | 120/180 (140°) | 85/130 | 135 | 130 | 150 |
| C | 121/140 | 160/240 | 115/160 | 180 | 160 | 240 |
| D | 140/165 | 185/250 | 130/185 | 205 | 185 | 265 |
| E | 166/210 | 185/250 | 155/230 | 240 | 230 | 275 |