



GOVERNMENT OF INDIA

OFFICE OF THE DIRECTOR GENERAL OF CIVIL AVIATION

TECHNICAL CENTRE, OPP. SAFDARJUNG AIRPORT, NEW DELHI-110 003

CIVIL AVIATION REQUIREMENTS

SECTION 2 - AIRWORTHINESS

SERIES 'O', PART X IV

19TH MARCH 2001

EFFECTIVE: FORTHWITH

Subject: AIRWORTHINESS AND MAINTENANCE REQUIREMENTS FOR CAT II & CAT III OPERATIONS

1. INTRODUCTION :

The existing Instrument Landing Systems (ILS) installed at some of the busy airports in India meet the Category I (Cat I) level requirement that permits landings up to Runway Visual Range (RVR) of 600m and above. In bad weather conditions similar to those that prevail in winter season in some parts of India when RVR is below 600m, aircraft can not land or takeoff. This causes considerable disruption of flights and extensive inconvenience to the travelling public. It is therefore necessary to develop the capability to operate flights meeting the requirements of Cat II or Cat III operations and lay down necessary regulatory requirements for such operations. In order to ensure safe operations even during poor weather/poor visibility conditions, individual aircraft deployed for carrying out Cat II or Cat III operations shall required to be specifically approved by DGCA. This part of the CAR provides an acceptable means but not the only means for obtaining airworthiness and maintenance approval of each aircraft for Cat II or Cat III operations and low visibility takeoff.

This CAR is issued under the provisions of Rule 133A of the Aircraft Rules 1937 for information, guidance and compliance by operators seeking approval for Cat II or Cat III operations.

2. DEFINITIONS:

Auto Land System:

The system which provides automatic control of the aeroplane during approach & landing.

Alert height (AH)

An alert height is a height above the runway based on the characteristics of the airplane and its fail operational automatic landing system, above

which a Category-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.

Category - II (Cat II) Operation:

A precision instrument approach and landing with decision height lower than 60m (200ft) but not lower than 30m(100ft), and a runway visual range not less than 350m.

Category - III (Cat III) Operation:

A precision instrument approach and landing with:

- (a) a decision height lower than 30m (100ft), but not lower than 15m (50ft); and
- (b) a runway visual range not less than 200m.

Note Where the decision height and runway visual range (RVR) do not fall within the same Category, either the decision height or the RVR may determine in which Category the operation is to be considered. The operation will be in the Category with the lower minima.

Decision altitude/height: (DA/H)

A specified altitude or height (A/H) in the precision approach at which a missed approach must be initiated if the required visual reference to continue the approach has not been established.

Note 1 Decision altitude (DA) is referenced to mean sea level (MSL) and decision height (DH) is referenced to the threshold elevation.

Note 2. The required visual reference means that section of the visual aids or of the approach area which shall have been in view for sufficient time for the pilot to have made an assessment of the aircraft position and rate of change of position, in relation to the desired flight path.

Runway Visual Range (RVR):

The range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centerline.

3. APPLICABILITY:

The requirements spelt out in this CAR are applicable for aircraft intended to be used for Cat II or Cat III operations.

4. GENERAL REQUIREMENTS

- (i) The aircraft shall have been duly type certified by the regulatory authority of the country of manufacture and meeting the design code followed by Joint Airworthiness Authority (JAA) of Europe or Civil Aviation Authority (CAA) of UK or Federal Aviation Administration (FAA) of USA or any other authority acceptable to DGCA.
- (ii) The aircraft shall be multiengine, duly equipped with an automatic landing system, which provides automatic control of the aircraft during approach and landing. The aircraft shall have been certified for Cat II/Cat III operations by the regulatory authority of the country of manufacture.
- (iii) Each aircraft intended to be operated for Cat II/Cat III operations shall be identified by registration number, make and model of the aircraft and requires approval by DGCA for such operations.
- (iv) The operator intending to carry out Cat II/Cat III operations shall seek approval for the same.
- (v) The operator shall prepare a Cat II or Cat III manual for each type of aircraft.
- (vi) The manual must contain the registration number, make and model of the aircraft to which it applies, detailed procedures, instructions, limitations and maintenance program to ensure continued serviceability, accuracy, reliability, characteristics in case of failures and degree of redundancy of the systems necessary for the Cat II/ Cat III operations and shall be approved by DGCA.
- (vii) The manual may form part of the Quality Control Manual. Any amendment to the approved manual requires DGCA approval.
- (viii) The instruments and equipment required for Cat II/Cat III operations for each type and model of the aircraft shall be listed by the operator in the manual prepared for obtaining DGCA approval for above operations.
- (ix) The manual shall also contain a flight schedule for checking the performance of the aircraft in case the aircraft has not performed Cat II/Cat III operations for a period of thirty days.

5. PROCEDURE FOR SEEKING APPROVAL FOR CAT II OR CAT III OPERATIONS:

Each operator seeking approval of aircraft for Cat II/Cat III operations shall comply with the requirements in respect of Manuals, Instruments, Equipment & Maintenance.

Application for approval:

An applicant seeking approval of aircraft for Cat II/Cat III operations, shall submit the application on a prescribed format along with the Cat II/Cat III manual to the Regional Airworthiness Office. A copy of the application is enclosed at Appendix-A.

6. APPROVAL OF INSTRUMENTS AND EQUIPMENT

(a) General

Before presenting an aircraft for approval of Cat II/Cat III operations, it must be shown by furnishing necessary documents that, since the beginning of the 12th calendar month before the date of submission, the following checks had been carried out: -

- (i) The ILS localizer and glide slope equipment shall have been bench checked according to the Manufacturer's stipulations.
- (ii) The altimeters and the static pressure systems shall have been tested and inspected in accordance with the procedure given in Appendix B of this circular **or** as per manufacturers recommendations **or** any other equivalent procedure acceptable to DGCA.
- (iii) All other instruments and items of equipment required for Cat II/Cat III operations shall have been maintained/ bench checked as per manufacturers requirements .

(b) Flight Control Guidance System

All components of flight control guidance system must have been approved for Cat II/III operations as applicable under type or supplemental type certification procedures. In addition, subsequent changes to make, model or design of these components must be approved by regulatory authority of the country of manufacture. Related systems or devices such as the auto throttle and computed missed approach guidance system must be approved in the same manner, if they are to be used for Cat II/Cat III operations.

(c) Radio Altimeter

A radio altimeter must meet the performance criteria as specified in "Minimum performance Standards - Airborne Low Range Radar Altimeter" given in RTCA/DO-155 dated 1.11.1974 and any subsequent amendments issued thereafter from time to time or manufacturer's

requirements for Cat II/Cat III operations or any other procedure acceptable to DGCA.

- (d) The operator shall ensure that any modification to systems and components approved for Cat II&III operations are not affected when incorporating software changes, service bulletins, etc. Any change to system, components shall have been approved by the manufacturer and the regulatory authority of the country of manufacture.

7. MAINTENANCE REQUIREMENTS:

The maintenance program shall ensure that the airborne equipment is maintained at an acceptable level of performance, reliability, and availability, consistent with the Maintenance Review Board (MRB) or equivalent requirements.

- (i) Maintenance of the aircraft shall be carried out by an approved firm holding required approval in accordance with the procedures, instructions and limitations contained in the manual specifically prepared by the operator for Cat II/ Cat III operations and approved by DGCA.
- (ii) The instruments & equipment required for Cat II / Cat III operations shall have been inspected and maintained in accordance with the maintenance programme contained in the approved manual.
- (iii) The operator shall ensure that tests, bench checks, overhaul, snag rectification of instruments and equipment listed in the manual are carried out by persons holding current ratings. In case the work is carried out by an outside party the operator shall ensure that such outside party is also approved by the regulatory authority of the country / DGCA India to undertake such work.
- (iv) Each operator shall keep a current copy of the Manual prepared for Cat II or Cat III operations at its principal base of maintenance and night halt stations.

8. MAINTENANCE PROGRAM

Each operator shall develop a maintenance program for Cat II / Cat III operations:

- 8.1** The maintenance program developed by the operator must contain the following:-

- a. A list of each instrument and item of equipment required for Cat II / Cat III operations.
- b. A maintenance schedule that provides for the performance of inspections under sub paragraph (e) of this paragraph within three calendar months after the date of the previous inspection. The inspection must be performed by licensed AMEs/approved persons, except that each alternate inspection may be replaced by a functional flight check. This functional flight check must be performed by a pilot holding at least a Cat II / Cat III pilot authorization for the type of aircraft checked.
- c. A maintenance schedule for the instrument and item of equipment as listed in (a) that provides for bench check every 12 months in case the manufacturer has not given any scheduled maintenance programme. However, in case the manufacturer has provided a scheduled maintenance programme, the same may be followed.
- d. A maintenance schedule that provides for the performance of a test and inspection of each static pressure system in accordance with Appendix. E of FAR Part 43 as given in Appendix B to this CAR or any equivalent method acceptable to DGCA within 12 calendar months after the date of the previous test and the inspection. However, in case the manufacturer has provided a scheduled maintenance programme, the same may be followed.
- e. The procedures for the performance of the periodic inspections and functional flight checks to determine the ability of each listed instrument and item of equipment specified in the manual of this circular to perform as approved for Cat II or Cat III operations including a procedure for recording functional flight checks.
- f. A procedure for assuring that the pilot is informed of all defects in listed instruments and items of checks.
- g. A procedure for assuring that the condition of each listed instrument and item of equipment upon which maintenance is performed is at least equal to its Cat II or Cat III approval condition before it is returned to service for Cat II or Cat III operations.
- h. A procedure for an entry in the maintenance records that shows the date, airport indicating satisfactory Cat II & III approaches and reasons for each unsatisfactory Cat II / Cat III operation because of a malfunction of a listed instrument or item of equipment. All such malfunctions shall be analyzed and appropriate preventive action taken to avoid recurrence. The

operator shall submit a monthly return to the regional office giving required data of number of satisfactory /unsatisfactory approaches made in each month and the total number of unscheduled removals of avionics components required for Cat II&III operations.

- a. Every operator shall establish a specific maintenance program in order to be able to check and demonstrate the full capability of the aircraft to perform Cat II/Cat III operations. A reliability program shall be developed/extended to monitor, track and control the maintenance status of the aircraft to achieve successful Cat II/ Cat III landings.
- b. The reliability program shall establish a specific procedure to govern maintenance capability of the operator to conduct Cat II/Cat III operations in the following conditions:
 - (i) Confirmed defect with corrective action carried out.
 - (ii) Unconfirmed defect but with corrective actions
 - (iii) Aircraft dispatch under MEL conditions.
 - (iv) Unable to correct defect and not under MEL conditions.
 - (v) Unable to perform the required test.
- k. Establish a procedure defining upgrading/downgrading capability so as to assist the dispatch of aircraft. The dispatch policy shall be based on the minimum equipment list (MEL) as it governs the basic criteria for operations. The dispatch criteria and status of aircraft must be recorded in the tech log/flight report book with reference to MEL. Any release of aircraft under MEL shall be intimated to the flight dispatch so that the flight crew is aware of the current aircraft status and its capability for CAT II/Cat III A operations while accepting the aircraft.
- l. Whenever the aircraft is released under MEL a prominent placard shall be displayed in the cockpit and provisions for release of the aircraft under MEL to be strictly adhered to.

8.2 Test equipment and standards:

The operators shall submit a program for maintenance/ calibrations of line (RAMP) test equipment, shop (bench) test equipment and listing of all primary and secondary standards utilised during maintenance / calibrations of such equipment which relates to Cat II/ Cat III operations. Tractability to a national standard or the manufacturers calibration standards shall be maintained at all times. This shall be submitted to DGCA for determination of its adequacy. Emphasis be given to standards associated with ILS receivers, flight directors, autopilot couplers, auto throttles and altimeter systems and maintenance techniques and procedures of associated redundant systems.

8.3 Training of Maintenance Personnel

Each operator has to establish an initial and recurrent training program acceptable to DGCA for personnel performing maintenance work on Cat II/Cat III airborne systems and equipment. Recurrent training shall be accomplished at least annually or when a person has not been involved in the maintenance of aircraft approved for Cat II & III operations. The training shall include classroom and hands on aircraft training leading to a certification for Cat II & III approval. Training record of such personnel have to be kept current and made available to DGCA for inspection on demand.

- 9 Escalation of maintenance cycle of twelve calendar months for checks, tests and inspections can be considered provided the operator provides necessary justification with documentary proof for such proposal. In such cases the operator is required to follow life development program as per CAR Sec-2, Series D Part VI.
- 10 Approval accorded to operators shall be deemed to be invalid if any of the requirements are not satisfied during the course of operation.
- 11 Notwithstanding the above, DGCA may specify any additional requirements or waive off any requirements if considered necessary.

Sd/-
(N. Ramesh)
Dy. Director General of Civil Aviation
for Director General of Civil Aviation

Appendix 'A'

1. Name of the operator:
2. Aircraft type, model & Registration Number:
3. Whether certified for Cat II/Cat III operations
(enclosed necessary documents)
4. Type of approval required: Cat II/Cat III
5. List of Equipment required for Cat II/Cat III operations:
6. Enclose copy of the manual for Cat II /Cat III operations:
7. Bench check status of the instruments and equipment required for Cat II/ Cat III operations during last twelve months:
8. Training status of personnel for certifying Cat II/ Cat III instruments and equipment:

I hereby certify that the requirements as laid down in the Airworthiness Circular 1 of 1999 for obtaining maintenance approval for Cat II/Cat III operation has been complied with.

Quality Control Manager

Appendix B

ALTIMETER SYSTEM TEST AND INSPECTION

Each person performing the altimeter system tests and' inspections shall comply with the following:

1. Static pressure system:

- i. Ensure freedom from entrapped. moisture and restrictions.
- ii. Determine that leakage is within the tolerances established by the manufacturer or as per FAR 23.1325.
- iii. Determine that the static port heater, if installed, is operative.
- iv. Ensure that no alterations or deformations of the airframe surface have been made that would affect the relationship between air pressure in the static pressure system and true ambient static air pressure for any flight condition

2. Altimeter:

- 2.1 Test by an appropriately rated repair facility in accordance with the following subparagraphs. Unless otherwise specified, each test for performance may be conducted with the instrument subjected to vibration. When tests are conducted with the temperature substantially different from ambient temperature of approximately 25 degrees C., allowance shall be made for the variation from the specified condition.

(i) SCALE ERROR.

With the barometric pressure scale at 29.92 inches of mercury, the altimeter shall be subjected successively to pressures corresponding to the altitude specified in Table I up to the maximum normally expected operating altitude of the airplane in which the altimeter is to be installed. The reduction in pressure shall be made at a rate not in excess of 20,000 feet per minute to within approximately 2,000 feet of the test point. The test point shall be approached at a rate compatible with the test equipment. The altimeter shall be kept at the pressure corresponding to each test point for at least 1 minute, but not more than 10 minutes, before a reading is taken. The error at all test points must not exceed the tolerances specified in Table 1.

(ii) HYSTERESIS.

The hysteresis test shall begin not more than 15 minutes after the altimeter's initial exposure to the pressure corresponding to the

upper limit of the scale error test prescribed in subparagraph (i); and while the altimeter is at this pressure, the hysteresis test shall commence. Assurance shall be increased at a rate simulating a descent in altitude at the rate of 5,000 to 20,000 feet per minute until within 3,000 feet of the first test point (50 percent of maximum altitude). The test point shall then be approached at a rate of approximately 3,000 feet per minute. The altimeter shall be kept at this pressure for at least 5 minutes, but not more than 15 minutes, before the test reading is taken. After the reading has been taken, the pressure shall be increased further, in the same manner as before, until the pressure corresponding to the second test point (40 percent of maximum altitude) is reached. The altimeter shall be kept at this pressure for at least 1 minute, but not more than 10 minutes, before the test reading is taken. After the reading has been taken, the pressure shall be increased further, in the same manner as before, until atmospheric pressure is reached. The reading of the altimeter at either of the two test points shall not differ by more than the tolerance specified in Table II from the reading of the altimeter for the corresponding altitude recorded during the scale error test prescribed in subparagraph (i).

(iii) AFTER EFFECT

Not more than 5 minutes after the completion of the hysteresis test prescribed in subparagraph (ii), the reading of the altimeter (corrected for any change in atmospheric pressure) shall not differ from the original atmospheric pressure reading by more than the tolerance specified in Table II.

(iv) FRICTION.

The altimeter shall be subjected to a steady rate of decrease of pressure approximating 750 feet per minute. At each altitude listed in Table III, the change in reading of the pointers after vibration shall not exceed the corresponding tolerance listed in Table III.

(v) CASE LEAK.

The leakage of the altimeter case, when the pressure within it corresponds to an altitude of 18,000 feet; shall not change the altimeter reading by more than the tolerances shown in Table II

(vi) BAROMETRIC SCALE ERROR

At constant atmospheric pressure, the barometric pressure scale shall be set at each of the pressures (falling within its range of adjustment) that are listed in Table IV, and shall cause the pointer

to indicate the equivalent altitude difference shown in Table IV with a tolerance of 25 feet.

2.2 Altimeters which are of the air data computer type with associated computer systems, or which incorporate air data correction internally, may be tested in a manner and to specifications developed by the manufacturer which are acceptable to the Administrator.

3. Automatic Pressure Altitude Reporting Equipment and ATC Transponder System Integration Test.

The test must be conducted by an appropriately rated person under the conditions specified in paragraph (a). Measure the automatic pressure altitude at the output of the installed ATC transponder when interrogated on Mode C at a sufficient number of test points to ensure that the altitude reporting equipment, altimeters, and ATC transponders perform their intended functions as installed in the aircraft. The difference between the automatic reporting output and the altitude displayed at the altimeter shall not exceed 125 feet.

4. Records:

Comply with the provisions of this chapter as to content, form, and disposition of the records. The person performing the altimeter tests shall record on the altimeter the date and maximum altitude to which the altimeter has been tested and the persons approving the airplane for return to service shall enter that data in the airplane log or other permanent record.

(Refer FAR PART 43-7, 43-2)

**TABLE 1
ALTITUDE V PRESSURE**

ALTITUDE (FEET)	EQUIVALENT PRESSURE (INCHES IN MERCURY)	TOLERANCE + (FEET)
-1000	31.018	20
0	29.921	20
500	29.385	20
1,000	28.856	20
1,500	28.335	25
2,000	27.821	30
3,000	26.817	30
4,000	25.842	35
6,000	23.978	40
8,000	22.225	60
10,000	20.577	80
12,000	19.029	90
14,000	17.577	100
16,000	16.216	110
18,000	14.942	120
20,000	13.750	130
22,000	12.636	140

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25,000	11.104	155
30,000	8.885	180
35,000	7.041	205
40,000	5.538	230
45,000	4.355	255
50,000	3.425	280

TABLE II

<u>Test</u>	<u>Tolerance feet</u>
Case Leak Test	+100
Hysteresis Test	75
First Test Point (50% of max altitude)	75
Second Test Point (40% of max altitude)	30
After Effect Test	

**TABLE III
FRICTION**

<u>Altitude (feet)</u>	<u>Tolerance (feet)</u>
1000	+70
2000	70
3000	70
5000	70
10000	80
15000	90
20000	100
25000	120
30000	140
35000	160
40000	180
50000	250

**TABLE IV
PRESSURE ALTITUDE DIFFERENCE**

<u>Pressure (inches of Hg)</u>	<u>Altitude difference (feet)</u>
28.10	-1727
28.50	-1340
29.00	-863
29.50	-392
29.92	0
30.50	+531
30.90	+893
30.99	+974