



GOVERNMENT OF INDIA
CIVIL AVIATION DEPARTMENT
DIRECTOR GENERAL OF CIVIL AVIATION

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AIRWORTHINESS ADVISORY CIRCULAR

Subject: Unusable fuel supply-calibration of fuel quantity gauge of aircraft.

1. Introduction:

- 1.1 It is essential for the safe operation of aircraft that a continuous supply of fuel is available during all its phases of flight. Due to various factors such as routing of the pipelines, shape of tank, location of tank outlets and pumps etc. In most aircraft fuel systems, a certain quantity of fuel will not be available for use. The flying crew must have prior information and knowledge in regard to the amount of this "Unusable Fuel" to enable him to plan and carry out the flight accurately and with necessary safety margins. The Airworthiness authorities generally require that the quantity of unusable fuel shall be determined before Type Certification of the aircraft. The quantity of unusable fuel, in most cases is included in the appropriate "Flight Manual" of the aircraft and in some instances, placarding in the cockpit is also mandatory requirement so that the flying crew members are at all times aware of the unusable fuel. However, in some aircraft types this information may not be included in the Flight Manual or other technical publication of the Aircraft.
- 1.2 This Circular outlines the procedure to be followed for determining the unusable-fuel (where data is not available) and for calibration of fuel quantity gauges during installation and periodic maintenance of aircraft etc.

2. Definition:

- 2.1 Unusable-fuel : The quantity of fuel supply remaining in each tank under the most adverse feed condition in intended operations and flight maneuvers, at which the first evidence of engine malfunctioning occurs.

3. Method of determination of unusable fuel:

- 3.1 The unusable-fuel quantity for each tank must be established by conducting appropriate test flight during the Type Certification tests of aircraft. In the case of all Type Certificated Transport Aircraft and many light aircraft types,

data on unusable fuel quantity are available in the Flight Manual/Type Certification documents. In case of light aircraft not exceeding 5700 Kg. all up weight, where this data is not available, the procedure detailed below is recommended :-

3.2 With the aircraft in level flight attitude drain the fuel system from the lowest point in the supply line. Thereafter measure the quantity of residual fuel in each tank. Then at least 5 litres of fuel per main tank shall be added to arrive at the zero datum for the fuel quantity gauge.

4. Calibration of fuel quantity gauges:

4.1 The fuel gauges should be calibrated with this amount of unusable fuel as zero datum; alternatively the dial should be marked with a red arc to indicate unusable fuel range. Thereafter fuel-gauges are to be calibrated up to its total range adding known quantities of fuel in each tank. This procedure should be followed every time a fuel quantity gauge is installed or at the nearest major check.

4.2 The cockpit should be suitably placarded indicating the quantity of unusable fuel. Where the information regarding unusable fuel is already available in the Flight Manual, placarding of the cockpit may not be insisted upon.

4.3 However, the procedure laid down for adjustment of the set point and calibration of the quantity gauges should be followed as mentioned above. The quantity of unusable fuel thus determined should be deemed to be a part of the empty weight of the aircraft.

5. Fuel dip sticks and their calibration:

5.1 The fuel content gauges installed on certain types of light aircraft and helicopters may not be reliable, particularly at lower ranges. In such cases it will be the responsibility of the pilot-in-command to make sure that a properly calibrated dip stick is carried on board the aircraft so that at the time of refueling, correct quantity of unusable fuel available to the pilot is known without placing undue reliability on the fuel quantity gauge. The method of calibration of dip stick shall also be the same as in the case of fuel quantity gauge, stated in paragraph 4 above.

Sd/-
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