



GOVERNMENT OF INDIA

OFFICE OF THE DIRECTOR GENERAL OF CIVIL AVIATION

TECHNICAL CENTRE, OPP SAFDURJUNG AIRPORT, NEW DELHI

CIVIL AVIATION REQUIREMENTS

SECTION 2 – AIRWORTHINESS

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SUBJECT: AIRCRAFT FUELLING PROCEDURES.

1. SCOPE

- 1.1 Rule 25A of the Aircraft Rules, 1937 prescribes the procedures of fuelling of aircraft. This part of CAR gives the procedures adopted for the fueling of aviation fuel and similar products of an aircraft. These standard procedures are recommended to provide guidance to the aircraft operators, oil companies and other concerned authorities in order to minimize the hazards arising out of fuelling operations.
- 1.2 Much of this guidance will also apply to fuelling of aircraft and to cases of maintenance of aircraft fuel systems. But supplementary instructions may generally be necessary to provide for specific cases.

2. DEFINITION

For the purpose of this CAR the following definitions shall apply.

- 2.1 Fuelling - shall mean dispensation of fuels and power boost fluids into an aircraft for the generation of engines power and augmentation of thrust, and shall include both fuelling and defuelling.
- 2.2 Fuelling Zone or Precautionary Area - is regarded as the area extending 6 metres radially from the aircraft fuelling point, venting point and fuelling equipment.

3. GENERAL

- 3.1 No persons shall fill or replenish the fuel tanks of an aircraft from vehicles or vessels containing petroleum in bulk or from fuel hydrant installations except from vehicles or installations of a type approved by the Chief Inspector of Explosives or from barges licenced under the Petroleum Rule 1937. The fuel and other products delivered by the oil companies shall be of a quality already

agreed to between the purchaser and the supplier but shall conform to approved specifications.

3.2 All the statutory rules regarding transportation, storage and handling of aviation fuels and similar products and for illumination of the fuelling zone as agreed by DGCA shall be followed by the concerned personnel.

3.3 No leaking or defective fuelling equipment shall be used.

4. SUPERVISION OF FUELLING

4.1 The fuelling of an aircraft shall be done under the supervision of a person nominated by operator or as specified in the Quality Control Manual and shall be carried out by authorised person from the oil company. The Operator's representative shall ensure that the fuelling of an aircraft is carried out in accordance with the prescribed manner, following the conditions laid down by the aircraft manufacturer. The approved personnel shall not move from the place of fuelling leaving the aircraft and fuelling vehicles unattended.

5. FUELLING CONDITIONS

5.1 The aircraft operator shall furnish written instructions to the fuelling company regarding the correct procedure of fuelling and precautions to be taken for particular types of aircraft. These instructions shall include the fuelling pressure, rate of delivery, etc. Special precautions, such as in the case of switch refuelling (see 20) shall also be intimated to the oil company in advance. All special conditions and requirements of aircraft manufacturers during their servicing and fuelling shall be followed by all concerned.

6. FUELLING PLACE

6.1 The refuelling of an aircraft shall be done in an open place so designated. As a general guide, the fuelling places should be at least 15 metres away from the nearest building except those parts of building, which are constructed for the purpose of direct loading/unloading of aircraft. The aircraft shall not be fuelled within 30 metres of radar equipment under test or in use in aircraft or ground installations. The refuelling shall be carried out on a level surface as far as possible. The nominated person shall ensure that there is adequate restraint of the aircraft by checking that the brakes are applied and the wheel chocks are placed properly before the fuelling operations are started.

7. APPROACH TO AN AIRCRAFT

7.1 While placing the refuelling equipment oblique approach to the aircraft shall be followed. The equipment driven shall be marshalled in position. Similarly withdrawal of refuelling equipment shall be done under supervision. The refuelling equipment shall never be reversed towards the aircraft.

8. POSITIONING OF FUELLING EQUIPMENT

- 8.1 The refuelling equipment shall be placed in such a way that a clear exit path is maintained all round the equipment to and from the aircraft to allow its quick removal in case of need.
- 8.1.1 In such cases when the fuelling vehicle is parked under the aircraft, it shall be ensured that any accidental spillage from the aircraft air vent does not fall on the fuelling equipment.
- 8.2 The vehicles and equipments shall not be placed where they may cause obstruction to the evacuation of persons from occupied portions of the aircraft in case of an emergency.

9. MANNING OF FUELLING VEHICLES

- 9.1 Every refuelling vehicle shall be manned by atleast one competent person. The operation of the vehicle shall be done only by the competent person(s). Adequate manpower shall be available to the competent person(s) in order to shut off the flow of fuel and or manoeuvre /retreat the equipment in case of an emergency.

10. FUEL QUANTITY DELIVERY

- 10.1 The exact quantity of fuel in terms of volume along with its break up distribution in various tanks if desired shall be detailed to the oil company representative. The oil company representative shall issue a delivery voucher indicating the quantity of fuel refuelled in the aircraft. The density of fuel supplied shall be declared on this receipt, if so desired.

11. APPROVAL OF FUEL SAMPLES AND STARTING OF FUELLING

- 11.1 Fuelling of an aircraft by the oil company shall be started only after the fuel samples have been approved by the aircraft operator and a clearance has been given to the oil company to start the fuelling operations and the confirmation of sample approval shall be duly signed by an authorized person of operator on the delivery voucher after completion of fuelling..
- 11.2 It shall be ensured that the fuel samples are free from water and other contaminants by suitable checks .

12. SPECIAL PRECAUTIONS TO BE TAKEN IN THE FUELLING ZONE

- 12.1 Within Fuelling Zone, smoking, the use of naked lights or operation of switches on lighting systems of other than approved pattern shall be forbidden.

- 12.2 Unless fuelling takes place in a designated 'No Smoking Area', 'No Smoking' signs shall be predominantly displayed not more than 15 metres away from the fuelling equipment and aircraft tank vents.
- 12.3 Persons engaged in fuelling operations shall not carry matches or other means of ignition. They shall also not use foot wear with exposed iron or steel studs, nails or lips.
- 12.4 Equipment with all metal wheels or rod capable or producing sparks shall not be moved in the fuelling zone while fuelling is in progress.
- 12.5 Aircraft borne auxiliary power units (APUs) which have an exhaust influx discharging into the zone shall be started before filler caps are removed or fuelling connections made.
- 12.6 No auxiliary power unit in the fuelling zone shall be started in the fuelling zone when fuelling operation has been commenced. If an APU has stopped for any reason, it shall not be started when the fuelling is continuing and there is a risk of fuel vapour ignition.
- 12.7 Ground Power Units (GPUs) whenever used shall be positioned not less than 6 metres from the aircraft filling and venting points and the fuelling equipment.
- 12.8 Only approved vehicles and equipment shall be run in the fuelling zone. These vehicles and equipments shall be subjected to regular inspection and maintenance to preserve their safety characteristics (see also 17.1).
- 12.9 Exhaust of the refuelling vehicle shall not pass over the fuelling hose intake hose.

**13. SAFETY PRECAUTIONS AGAINST STATIC ELECTRICITY
DISCHARGE BONDING AND EARTHING**

- 13.1 During fuelling, the prevention of fire risk due to static electricity discharge is dependent upon efficient bonding between the aircraft and the fuel supply source. Ideally, earthing should be through apron earthing points designed for this purpose. Dragchains and conductive tyres normally accepted for earthing purposes are seldom effective under all climatic conditions.
- 13.2 The aircraft, fueller, hose nozzle, filters, funnels or any other appliance through which fuel passes shall be electrically bonded throughout the fuelling operation. Connection shall be made to designated points on clean and unpainted metal surfaces of the aircraft and the fueller.
- 13.3 Before transfer of fuel commences, following procedures shall be carried out in respect of bonding the fueller and the aircraft.
- 13.3.1 Whenever apron earthing points exist the aircraft and fuelling equipment shall be earthed to them.

- 13.3.2 The aircraft shall be effectively bonded to the fuelling equipment.
- 13.3.3 Whenever wing fuelling is employed, the nozzle of the hose shall be bonded to the aircraft structure before filler cap is removed.
- 13.3.4 In case of pressure fuelling, metal to metal contact between the aircraft filling and the fuelling hose coupling shall be ensured. In addition a bonding pin or clip from the fuelling hose coupling to the aircraft structure near the fuel receptacle may be used to provide additional safeguard.
- 13.3.5 When refuelling from drums, barrels or similar equipment is carried out, similar precautions shall be taken to bond the pumping equipment, hose nozzle and fuel container.
- 13.3.6 Whenever funnels are used, they shall be bonded both to the nozzle of the hose or can and to the aircraft. If a chamois leather is used, the metal ring around the leather shall be bonded to the funnel.
- 13.4 The fuel valve shall not be opened before bonding connections are made. Similarly, at the end of the fuelling operations, first the fuel valve shall be closed, fuelling coupling disconnected or the fuelling nozzle removed as the case may be and then only shall the bonding connections be broken.
- 13.5 All cables, clips and plugs used for bonding or earthing shall be maintained in proper condition and regularly tested for electrical continuity and a record thereof maintained.

14. SAFETY PRECAUTIONS AGAINST FIRE HAZARD

- 14.1 When any part of undercarriage assembly has become abnormally heated during landing or taxiing, the aircraft shall not be fuelled until heat has dissipated. Fuelling equipment shall not be positioned until the Operator's representative has satisfied himself that there is no risk from heated components.
- 14.1.1 In checking for high temperatures, care shall be taken in approaching the wheels. The wheels shall be approached from the fore or aft and never from the sides.
- 14.2 Fire extinguishers of adequate capacity and approved type shall be readily available before the transfer of fuel begins. The straps securing them to the refuelling equipment shall be unfastened before the fuelling operations are started. Adequate number of trained persons shall be readily available to operate these units.
- 14.3 The fire extinguishers shall be maintained to the standards recommended by their manufacturers.
- 14.4 Fuelling crew shall be instructed in the procedure for summoning the aerodrome fire service.

- 14.5 Fuelling operation shall cease when a turbo prop jet aircraft manoeuvres so as to bring the rear jet outlets within 43 metres of the fuelling equipment or the aircraft fuelling point and vent system (see also 16.1).

15. SAFETY FROM ELECTRICAL STORMS/HEAVY RAIN

- 15.1 Extreme care shall be exercised while fuelling during electrical storms. Fuelling shall be suspended during severe lightning disturbances in the vicinity of the aerodrome or helipad.
- 15.2 Overwing fuelling shall not be carried out during electrical storms. Fuelling shall be suspended during heavy storm/rain.

16. HAZARDS FROM ADJACENT AIRCRAFT OPERATION

- 16.1 Before and during fuelling, it shall be ensured that no hazard arises to the personnel or equipment from the efflux from other aircraft or APUs. If the hazardous conditions exist, fuelling operation shall immediately be suspended until conditions permit resumption of fuelling operations (see also 14.5).

NOTE: It may be noted that the engine efflux of modern jet aircraft when taxiing could have speeds up to 65 knots and a temperature above 50 degree Celsius even at a distance of 30 metres from the exhaust point. This temperature may not be dangerous from the fire point of view, but the personnel and the equipment could be effected.

17. MAINTENANCE OF REFUELLING VEHICLE AND EQUIPMENT USED

- 17.1 All vehicles, their engines and equipment shall be subject to regular inspection and maintenance to preserve their safety characteristics. The engine, the electrical and exhaust systems of such vehicles shall not make any sparks or flames. Vehicles moving in the danger zone shall be fitted with spark arrestors and flame traps.

18. USE OF PHOTOGRAPHIC FLASH EQUIPMENT

- 18.1 No photographic flash bulbs and electronic flash equipments shall be permitted to be used within 6 metres filling or venting points of an aircraft or fuelling equipment.

19. OPERATION OF RADAR

- 19.1 Aircraft shall not be fuelled within 30 metres of radar equipment under test or in use in aircraft or ground installations.

20. SPECIFIC PRECAUTIONS IN CASE OF FUEL MIXTURES

- 20.1 Mixture of wide cut and kerosene turbine fuels could result in the air fuel mixture in the tank being in the combustible range at common ambient temperatures during fuelling. The risk of this type of sparking would be minimum if antistatic additive is present in fuel.
- 20.2 In cases of fuel mixtures a reduced rate of fuelling shall be adopted. The amount of reduction in flow rate needed is dependent upon the fuelling equipment in use and the type of filtration employed on the aircraft fuelling distribution system (see also 5.1).

21. SERVICING AND MAINTENANCE OF AIRCRAFT DURING FUELLING

- 21.1 While fuelling is in progress, servicing, maintenance test and repair activities shall be carried out subject to the conditions stipulated in 21.1 to 21.12. Aircraft or other maintenance work which may create a source of ignition shall not be carried out while fuelling is in progress.
- 21.2 All ground equipment, such as platform steps shall be clear of the aircraft. Because after fuelling, the aircraft has a tendency to settle down due to increase in weight and this changed attitude of the aircraft may thus cause damage to the aircraft/such equipment.
- 21.3 The main engines of the aircraft shall not be operated. Operation of APUs & GPUs shall be in accordance with the provisions of 12.6, 12.7 and 12.8.
- 21.4 Only those switches which are essential in carrying out the fuelling or servicing operation shall be operated when fuelling in progress.
- 21.5 Strobe lighting which is likely to give spark shall not be operated.
- 21.6 All connections between the ground equipment and the aircraft shall be made before the filler caps are removed and shall not be broken until the fuelling ceases.
- 21.7 In case of the use of battery trolleys, the electrical circuit shall remain unbroken till the fuelling operation is completed.
- 21.8 Vehicles operating in the fuelling zone shall not pass under or park near the aircraft unless specifically required to do so for maintenance or fuelling purposes.
- 21.9 Aircraft combustion heaters shall not be used.
- 21.10 Only checking and limited maintenance work such as the exchange of units shall be carried out on radio, radar and electrical equipment. Testing of such equipments shall be deferred until the fuelling is completed.

- 21.11 Portable Electronic Devices (Mobile phones, radio devices etc.) shall not be used in the fuelling zone except those essential for carrying out the fueling / defueling operation
- 21.12 All hand torches and inspection lamps and their cable connections used in the fuelling zone shall be of explosion proof/intrinsically safe type.
- 21.13 Only authorized persons and vehicles shall be permitted within the fuelling zone and their number shall be kept to the minimum.

22. FUELLING WITH PASSENGERS ABOARD AND DURING EMBARKATION AND DISEMBARKATION

- 22.1 To reduce transit time and for security reasons, sometimes airlines allow passengers to embark and disembark or remain on board during fuelling operations.
- 22.2 An operator shall ensure that no aeroplane is refueled /defueled with Avgas or wide cut type fuel or when a mixture with these types of fuel might occur, when passengers are embarking, on board or disembarking. In all other cases necessary precautions shall be taken and the aeroplane must be properly manned by qualified personnel ready to initiate and direct an evacuation of the aeroplane by the most practical and expeditious means available.

Note:- Qualified personnel mentioned above are those who are trained and assessed by the aircraft operator to assist the passengers in the event of emergency evacuation .

- 22.3 The decision to allow passengers to embark, disembark or remain on board during fuelling is the responsibility of the airline and following precautions shall be exercised by the airline concerned. Aircraft operators shall establish the procedures for the same in their manual.
- a) Passengers are warned that fuelling will take place and that they shall not smoke, operate switches or otherwise produce sources of ignition.
 - b) The `No Smoking' and `Exit' signs are illuminated.
 - c) Provision is made for safe evacuation of passengers via at least two of the main passenger embarkation and disembarkation doors in the event of the emergency. A responsible person should be positioned at each door in order to supervise evacuation of passengers, if needed.
 - d) If during fuelling, the presence of fuel vapor is detected in the aircraft interior, or any other hazard arises, fuelling should be stopped.
 - e) Ground servicing activities and work within the aircraft should be conducted in such a manner that they do not create a hazard or obstruct exits.

- f) Access to and egress from the areas where aircraft escape chutes may be deployed should be kept clean.
- g) When passengers are embarking or disembarking during fuelling, their route should avoid areas where fuel vapours are likely to be present and be under the supervision of an airline official. 'No smoking' should be enforced strictly during such passenger movements.

23. FUEL SPILLAGE


- 23.1 In the case of a spillage covering an area greater than 5 square metres, fuelling operations shall stop. All persons shall be evacuated from the effected area to a place at least 15 metres from the spillage. Movement of persons and vehicles in the affected area shall be avoided. It shall be ensured that all activities are restricted to reduce the risk of ignition.
- 23.2 Engines of vehicles within 6 metres of a spillage shall not be started until the area is declared safe.
- 23.3 Prior to recommencing fuelling, action must be taken to clean the spilled fuel. Fuel must not be washed into sewers or drains.

24. HELICOPTERS

- 24.1 Because of design features of helicopters namely close proximity of fuel intake and tanks to the passenger compartments, passengers shall not be allowed to remain in the aircraft and be away from the fuelling zone when fuelling is in progress. Engines should not be operated when fuelling is in progress.

25. TRAINING

- 25.1 It is essential that all personnel connected with the fuelling operations are adequately trained by their employers and are supplied with appropriate instructions and guidance on safe operating procedures. All such personnel shall be fully conversant with the operation of fire fighting equipment provided for the fuelling operations.



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