



# **NAMIBIA CIVIL AVIATION AUTHORITY**

Advisory Pamphlet (AP)

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## **FUELING OF AIRCRAFT AT AERODROMES**

**Explanation of Advisory Pamphlets (AP) system.**

*The Namibia Civil Aviation Authority (NCAA) issues advisory pamphlets to inform the aviation public in a systematic way of non-regulatory material. Unless incorporated into a regulation by reference, the contents of an advisory pamphlet are not binding on the public. Advisory pamphlets are issued in a numbered-subject system corresponding to the subject areas of the Namibia Civil Aviation Regulations (NAMCARs).*

*Advisory Pamphlets are intended to provide information and guidance to illustrate a means but not necessarily the only means of complying with the Regulations, or to explain certain regulatory requirements by providing interpretative and explanatory material. Where an AP is referred to in a 'Note' below the regulation, the AP remains as guidance material.*

*APs should always be read in conjunction with the referenced regulations.*

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2. *Effective date:* 14/07/2021

  


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# 1. INTRODUCTION AND BACKGROUND

## 1.1. Introduction

This Advisory Pamphlet (AP) provides guidance on procedures and safety measures to be observed during aircraft fueling. The AP outlines vital safety procedures in order to protect people, aircraft and other property during ground fuel servicing of aircraft.

This Advisory Pamphlet does not apply to any of the following:

- a) In-flight fueling;
- b) Fuel servicing of amphibious aircraft on water;
- c) Draining or filling of aircraft fuel tanks incidental to aircraft fuel system maintenance operations;

This Advisory Pamphlet does not address requirements for environmental protection, fuel quality, or other issues not directly related to fire safety.

## **1.2. Background**

The NAMCARs, Part 139.16.7 requires a person approved to supply fuel to any aircraft at an aerodrome to comply with such conditions as the aerodrome operator may consider necessary for the purpose of safety.

NAMCARs, Part 139.16.7 also requires an aerodrome operator to develop procedures to be followed for refueling of aircraft at the aerodrome and to institute measures for monitoring the fueling process. NAMCARs, Part 139 in addition requires that the aerodrome operator establishes a means of quickly summoning the rescue and firefighting service in the event of a fire or major fuel spill.

NAMCARs, Part 139.16.7 further requires ground equipment to be positioned in such a manner as to allow the use of a sufficient number of exits for expeditious evacuation and ready escape route from each of the exits in an emergency when aircraft refueling operations take place while passengers are embarking, on board or disembarking.

## **1.3. Purpose**

This Advisory Pamphlet (AP) provides guidance on procedures to be followed and safety measures to be observed during fueling of aircraft at aerodromes to meet the requirements of the NAMCARs, Part 139 and the associated technical standards.

## **1.4. Applicability**

This advisory pamphlet is applicable to all aerodromes in Category A, Category B and Category C. However, this advisory pamphlet is also recommended for implementation by aerodromes under Category D and E in the interest of aviation safety.

## **1.5. Description of Amendments**

There are no amendments.

## **2. REQUIREMENTS AND REFERENCES**

### **2.1. Regulatory reference**

- NAMCARs, PART 139.01.26 and NAMCARs, PART 139.16.7

### **2.2. Reference documents**

- Namibia Civil Aviation Regulations (NAMCARs) 2018

### 3. PROCEDURES DURING AIRCRAFT REFUELING

Aerodrome operators, aircraft operators and approved fuel suppliers are responsible for the observance of safety procedures during the fueling of aircraft. Aerodrome operators have the responsibility of making arrangements for enforcement of safety precautions during aircraft refueling operations. All personnel working on aprons should also be made aware of the major safety measures to be observed during aircraft fueling and should be required to report any apparent breach to the person in charge of the fueling operations.

The following are the main points to be observed during aircraft refueling:

- a) no smoking or naked lights shall be allowed within the fueling zone;
- b) auxiliary power units and ground power units shall not be started during the fueling operation;
- c) a clear exit path shall be maintained to and from the aircraft to allow the quick removal of fueling equipment and persons in an emergency;
- d) aircraft and supply sources shall be correctly bonded and the correct earthing procedures employed;
- e) fire extinguishers of a suitable type should be readily available; and
- f) fuel spillage should be immediately brought to the attention of the person in charge of the fueling operation. Detailed instructions should be laid down for dealing with fuel spillage.

The aerodrome operator should give aircraft fueling companies instructions with respect to the acceptable positioning of vehicles relative to the aircraft to ensure that taxiing clearance limits are not infringed.

## **4. AIRCRAFT FUELING PRACTICES**

### **4.1. Introduction**

The aerodrome operator, aircraft operator and the fuel supplier each has responsibilities in respect of the safety measures to be taken during fueling operations. These safety measures include:

- a) general precautionary measures to be taken during aircraft fueling operations;
- b) additional precautionary measures to be taken when passengers remain on board or embark/disembark during refueling operations; and
- c) sources and dissipation of electrical energy that may develop during aircraft fueling operations.

The fuel supplier should in addition develop procedures to enable them meet requirements imposed by special equipment and the applicable national regulations.

### **4.2. General Precautionary Measures to be taken during aircraft fueling operations**

The following general precautionary measures should be taken during aircraft fueling operations:

- a) aircraft fueling operations should be done outdoors;
- b) bonding and/or grounding, as appropriate, should be done in accordance with the procedures described in section 4.4 of this AP;
- c) aircraft fueling vehicles should be positioned so that:
  - i) accessibility to aircraft by rescue and fire fighting vehicles is not interrupted,

- ii) a cleared path is maintained to permit rapid removal of fueling vehicles from an aircraft in an emergency;
  - iii) they do not obstruct evacuation from occupied portions of the aircraft in the event of a fire; and
  - iv) the vehicle engines are not under the wing.
- d) all vehicles performing aircraft servicing functions other than fuel servicing (e.g. baggage trucks, etc.) should not be driven or be parked under aircraft wings while fueling is in progress;
- e) the exhaust systems of all vehicles required to operate in the fueling zone must be subjected to the most stringent and regular maintenance to eliminate defects which may result in the emission of sparks or flames capable of igniting fuel or fuel vapour;
- f) aircraft-borne auxiliary power units which have an exhaust efflux discharging into the zone should be started before filler caps are removed or fueling connections made;
- g) if an auxiliary power unit is stopped for any reason during a fueling operation, it should not be restarted until the flow of fuel has ceased and there is no risk of igniting fuel vapours;
- h) aircraft should not be fuelled within the immediate vicinity of radar equipment under test or in use in aircraft or ground installations;
- i) aircraft batteries should not be installed or removed nor should battery chargers be connected, operated or disconnected;
- j) connecting of ground power generators should not be done during this period;

- k) electrical tools, drills or similar tools likely to produce sparks or arcs should not be used;
- l) photographic flash bulbs or electronic flash equipment should not be used in the immediate vicinity of the fueling equipment or of the fill or vent points of the aircraft;
- m) open flames and lighted open flame devices should be prohibited on the apron and in other locations within 15 m of any aircraft fueling operation. Included in the category of open flames and lighted open flame devices are the following:
  - i) lighted cigarettes, cigars, pipes;
  - ii) exposed flame heaters;
  - iii) welding or cutting torches, etc.; and
  - iv) flare pots or other open flame lights;
- n) cigarette lighters or matches should not be carried or used by anyone while engaged in aircraft fueling operations;
- o) extreme caution should be used when fueling during lightning and electrical storms. The fueling operations should be suspended during severe lightning disturbances in the immediate vicinity of the aerodrome;
- p) when any part of an aircraft undercarriage is abnormally heated, the aircraft rescue and fire fighting service should be called and fueling should not take place until the heat has dissipated; and
- q) portable fire extinguishing equipment suitable for at least initial intervention in the event of a fuel fire and personnel trained in its use shall be readily available and there shall

be a means of quickly summoning the rescue and fire-fighting services in the event of a fire or major fuel spill. It should be ensured by regular inspection and maintenance that this equipment is maintained in a fully serviceable condition.

#### **4.3. Additional precautionary measures to be taken when passengers remain on board or embark/disembark during refueling operations**

Because of the importance of reducing transit times and for security reasons, passengers may be allowed to stay on board during refueling operations while other passengers are allowed to embark or disembark. An aircraft shall however not be refueled when passengers are embarking, on board or disembarking unless it is properly staffed by qualified personnel ready to initiate and direct an evacuation of the aeroplane by the most expeditious means available.

The following additional precautions must be observed during refueling operations while passengers remain on board or embark/disembark.

- a) passengers must be warned that refueling will take place and that they must not smoke, operate switches or otherwise produce sources of ignition;
- b) the illuminated "No smoking" signs and exit lighting should be switched on;
- c) aircraft equipped with integral stairs should have them deployed, or if aircraft stairways are used, these should be positioned at each of the main doors normally used for passenger embarkation or disembarkation which should be open or ajar and free from obstruction; and
  - i) where it is found desirable to close the main doors for climatic or any other particular operational reason, these doors should never be locked and a cabin attendant should at all times be stationed at each door during any operation with passengers on board; and

- ii) where powered gangways (nose loaders or aerobridges) are employed, the deployment of integral stairs or off-aircraft stairways is not necessary; and
  - iii) when only one powered gangway or stairway is available, the other main door(s) should be unobstructed by ground equipment to permit the use of the escape slide at that door; and
  - iv) a cabin attendant should be available to operate the slide in the event of an emergency; and
  - v) an adequate number of cabin attendants or other staff suitably trained in emergency evacuation procedures for the particular type aircraft and in communication with the flight crew should at all times remain in the aircraft to direct an evacuation should the need arise;
- d) if, during refueling, the presence of fuel vapour is detected in the aircraft interior, or any other hazard arises, refueling and all cleaning activities using electrical equipment within the aircraft should be stopped until conditions permit resumption;
- e) ground servicing activities and the work within the aircraft should be conducted in such a manner that they do not obstruct exits;
- f) where passengers are embarking or disembarking during refueling, their route should avoid areas where fuel vapours are likely to be present and this movement should be under the supervision of a responsible person;
- g) the “No smoking” rule should be strictly enforced during such passenger movements;
- h) (two-way) communication shall be maintained by the aeroplane intercommunications system or other suitable means between the ground crew supervising the refueling and qualified personnel on board the aeroplane; and

- i) ground equipment shall be positioned so as to allow:
  - i) the use of a sufficient number of exits for expeditious evacuation; and
  - ii) a ready escape route from each of the exits to be used in an emergency.

It is important to note that an aircraft should not be defuelled when passengers remain on board or are embarking or disembarking. The normal surge tanks and automatic shut-off features of the refueling process are not incorporated in the defueling systems on aircraft. This presents a greater potential for an accident from the sources described in Section 4.4 of this AP.

#### **4.4. Sources and dissipation of electrical energy that may develop during aircraft fueling operations**

Distinct types of electrical energy with the associated hazard of spark discharge are possible during fueling operations. This section provides a description of each type together with the practices used to prevent its occurrence.

*Electrostatic charge which may be accumulated on the surface of the aircraft or fueling vehicle, when conditions are favourable.*

The hazard of sparking can be eliminated by ensuring that the fueling vehicle is bonded to the aircraft so that a difference in electrical potential cannot occur between the two. Bonding between the aircraft and vehicle is made by connecting a conductor between designated points on clean and unpainted metal surfaces of both the aircraft and the fueling vehicle.

Where overwing refueling is employed, the nozzle of the hose is normally bonded to the aircraft before the filler cap is removed; however, when underwing fueling is employed, the automatic metal-to-metal contact between the aircraft fitting and the coupling eliminates the need for separate bonding connection.

Drag chains on fueling vehicles or conductive tires on fueling vehicles and aircraft may be used as additional safeguard in the event that the aircraft/vehicle bonding is broken or faulty and electrostatic charge is discharged from the aircraft or vehicle through their respective tires or drag chains.

As an additional safety measure, individual electrical grounding of aircraft and vehicle may be done to prevent any possible hazard caused by broken or faulty bonding.

In summary:

- a) Where no electrical grounding is specified, the normal order of procedures to eliminate electrostatic discharge during fueling operations is as follows:
  - i) bonding of aircraft and fueling vehicle to one another;
  - ii) bonding of fuel nozzle to aircraft for overwing fueling arrangements; and
  
- b) where electrical grounding is specified, the normal order of procedure is as follows:
  - (i) grounding of fueling vehicle;
  - (ii) grounding of aircraft;
  - (iii) bonding of aircraft and fueling vehicle to one another; and
  - (iv) bonding of fuel nozzle to aircraft for overwing fueling arrangements.

On completion of fueling operations, the disconnections should be made in reverse order.

*Electrostatic charge which may also build up in the fuel during the fueling operations.*

If electrostatic charge is of sufficient potential, it can cause sparking within the aircraft tank. The charge density in the fuel and the possibility of sparks inside the tanks are not affected by bonding or grounding of the aircraft or the fueling vehicle. The use of anti-static additives in fuel can contribute materially to reducing the risk involved.

*Stray currents which may occur because of short circuits or other faults in the electrical power supply for the aircraft.*

Stray currents are dissipated by ensuring an effective bonding between the fueling vehicle and the aircraft. Hazards due to stray currents are eliminated by bonding of the aircraft to the fueling vehicle.

When the aircraft is bonded to the fueling vehicle, and the fueling vehicle is grounded, large currents may flow through the bonding wire via the vehicle to the ground. When the ground is disconnected, severe sparking can occur at the break point. To avoid this, it is recommended that grounding of aircraft should be direct and not through the bonding wire and fueling vehicle. When a hydrant is used, the fueling hydrant pit should not be used for the aircraft grounding because the sparks from stray currents could be dangerous. Where a hydrant system is used, it is also advisable to connect the grounding devices of the refueling system and the grounding devices of an electrical system used for supplying electrical power to the aircraft to avoid damage to the aircraft in the event of a short circuit.