UNITED REPUBLIC OF TANZANIA
TANZANIA CIVIL AVIATION AUTHORITY
Aeronautical Information Services

AERONAUTICAL INFORMATION CIRCULAR

P.O. Box 2819 DAR ES SALAAM.
FAX: (255 22) 2118905
PHONE: (255 22) 2115079/80, 2111951.
COMM: DIRAIR
AFTN: HTDQYOYO
Email: tcaa@tcaa.go.tz
Web-site:< http//www.tcaa.go.tz

AIC
17/2000
(Pink 11)
7 September 2000

The following circular is hereby promulgated for information, guidance and necessary action.

M. Munyagi
Director General

ELECTRICAL GROUNDING OF AIRCRAFT AND FUEL SERVICE VEHICLES.

The information contained in this circular has been obtained from the ICAO following a study on the subject by the Air Navigation Commission.

Three distinct types of electrical potential difference, with the accompanying hazard of spark discharge, are possible during aircraft refuelling operations. A description of each type, together with the practice used to prevent its occurrence is given in the following paragraphs.

A. Electrostatic charge, which may be accumulated on the surface of the aircraft refuelling vehicle, when conditions are favourable. The hazard of sparking can be eliminated by ensuring that the refuelling vehicle is bonded to the aircraft so that a difference in electrical potential cannot occur between the two. This appears to be a world-wide accepted practice. Bonding between the aircraft and vehicle is made by connection on conductor between designated points on clean and unpainted metal surface of both the aircraft and the refuelling vehicle. Electrically conductive fuel hoses normally provide a back-up conductive path for discharge of any possible electrostatic charge, but aircraft refuelling procedures recommend that conductive hoses should not be regarded as adequate bonding between aircraft and refuelling vehicle.

Where over wing fuelling is employed; the nozzle of the hose is normally bonded to the aircraft before the filler cap is removed, however, where under wing fuelling is employed, the automatic metal-to-metal contact between the aircraft fitting and the coupling eliminates the need for separate bonding connexion.

Drag chains on refuelling vehicles or conductive tires on refuelling vehicles and aircraft, are often used as additional safeguards but are not considered effective by themselves. However, they are useful since, in the event the aircraft/vehicle bonding is broken or faulty, the electrostatic charge could be discharged from the aircraft or vehicle through their respective tires or drag chains. It has been found that it is normal for the resistance of the tires not to exceed one megahm in which circumstances the voltage and current involved in draining the charges is several orders of magnitude below the possible danger level at which discharge sparks could occur.

As an additional safety measure, some practices specify individual electrical grounding of aircraft and vehicle. This measure would prevent any possible hazard caused by a broken or faulty bonding. However, it appears that this possibility is negligible if proper maintenance and testing of the wire used for bonding purposes between aircraft and refuelling vehicle is carried out**.**

In summary:

a) Where no electrical grounding is specified, the normal order procedure to eliminate electrostatic discharge during refuelling operations is as follows:
   i) bonding of aircraft and refuelling vehicle or another ;
   ii) bonding of fuel nozzle to aircraft for over wing fuelling arrangements.

b) Where electrical grounding is specified, the normal order of procedure is as follows;

   i) grounding of refuelling vehicle;
   ii) grounding of aircraft;
   iii) bonding of aircraft and refuelling vehicle to one another, and
   iv) bonding of fuel nozzle to aircraft for over wing fuelling arrangements.

B. Stray current, 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 refuelling vehicle and the aircraft. In case the aircraft is bonded to the refuelling vehicle and the latter is grounded, large current may flow through the bonding wire via the vehicle to ground. When the ground is disconnected, several sparking can occur at the breaking point. To avoid this, it is normally recommended that grounding of aircraft, as prescribed, should be direct and not through the bonding wire and refuelling hydrant pit should not be dangerous. Moreover, it is not advisable to connect the grounding devices of the refuelling system, particularly where a hydrant system is used, and the grounding devices of an electrical system used for supplying electrical power to the aircraft since if a short circuit were to occur in the electrical system, then damage could occur to the aircraft.

In summary , it may be concluded that hazards due to stray currents are eliminated by bonding of the aircraft to the refuelling vehicle.

C. Electrostatic charge, which may build up in the fuel during the fuelling operation. If 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 refuelling vehicle. Manufacturers and fuel suppliers have studied this matter for a long time and have concluded that the use of ant-static additives in fuel can contribute materially to reducing the risk involved. In this connection it may be noted that the information received shows that there has been an accident to a commercial airliner because of electrostatic discharge in the aircraft fuel tank. In summary, it may be concluded that hazards due to this electrostatic charge are controlled by ant-static additives in fuel.

Cancel AIC 17/1979