



بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

DEPARTMENT OF CIVIL AVIATION

Male'
Republic of Maldives

AIR SAFETY CIRCULAR

No. AW 05
Issue: 01
24 December 1991

STORAGE CONDITION AND STORAGE/SERVICE LIFE OF RUBBER PARTS AND AIRCRAFT COMPONENT CONTAINING RUBBER PARTS

1. APPLICABILITY

- 1.1 This Circular specifies the procedure concerning storage conditions and storage/service life in respect of rubber parts and aircraft components containing rubber parts, which are required for use on aircraft on the Maldivian register. These are general requirement and should only be followed in the absence of any specific requirements from the manufacture of the aircraft part or component concerned.

2. BACKGROUND

- 2.1 A split diaphragm in the fuel pump of a piston-engined aircraft resulted in over-rich operations, which led to a fatal accident. The cause of deterioration and failure on the diaphragm was attributed to ageing as a result of extended calendar time between overhaul. In another incident fuel pressure hose of one of the turbine-engined helicopter had burst during starting for similar reasons resulting in fuel leak.

3. PURPOSE

3. The procedure is intended to ensure continuing airworthiness of aircraft and to avoid recurrence of failures as mentioned under sub-para 2.1 above by having adequate storage facilities and well defined service lives for rubber parts and aircraft components containing rubber.

4. STORAGE CONDITIONS

The following storage conditions are generally acceptable for the wide range of components containing rubber in their construction or parts made of rubber. Wherever manufactures have made any special recommendations, they should also be adhered to.

4.1 **GENERAL CONDITIONS**

- 4.1.1 Aircraft parts must be stored in a clean room. Unusually heavy and long parts should be adequately supported, while in storage, so that they maintain the intended shape without strain.
- 4.1.2 Tyres should be stored vertically in special racks embodying support tubes, so that each tyre is supported at two points. Two-thirds of the tyre should be above the support tubes and one-third below. By this method the weight of the tyre is taken by the tread and distortion is reduced to a minimum. The tyres should be turned to a new position every 2 or 3 months.
- 4.1.3 Inner tubes should be stored in the cartons in which they were received, but where this is not possible the tubes should be lightly inflated and stored inside covers of appropriate sizes to prevent damage.
- 4.1.4 Aircraft hoses and hose assemblies should be stored uncoiled and supported to relieve stresses. Air should circulate freely about the hoses unless they are contained in plastic envelopes. The correct sealing blanks should always be fitted to items in store.

4.2 **TEMPERATURES**

The storage temperature should be controlled between 10° and 21°C and sources of heat should be at least 3 feet from the stored article (unless screened) to minimize exposure to radiant heat.

4.3 **HUMIDITY**

The relative humidity in the store room should be about 75%.

4.4 **LIGHT**

Rubber parts should not be exposed to direct day light or sun light. Unless the articles are packed in opaque containers, store room windows or skylights should be screened or covered with a suitable transparent red or amber coating. Store rooms should be kept as dark as practicable.

4.5 **OXYGEN**

Isolation from atmospheric oxygen greatly increases the storage limiting period of rubber part. Where possible, parts should be packed in airtight containers or wrapping using talc or French chalk. Where parts are packed in airtight tins, the tins should be lined with wax paper or polythene to avoid direct contact with the metal.

4.6 **OZONE**

Exposure to air containing ozone even in minute quantities should be avoided. Storage rooms should not contain any apparatus liable to generate ozone, such as high voltage

electrical equipment, electric motors or other plant which may give rise to electrical sparks. Free access to outdoor air, which in temperate climates always contains ozone, should be avoided. Still indoor air is normally ozone-free because wall and ceiling coverings and organic materials rapidly destroy ozone.

4.7 **DEFORMATION**

Rubber parts should be stored in a 'relaxed' position free from compressions or distortion, with the least possible deformation. Deformation greatly aggravates the action of ozone and also leads to permanent changes in shape and dimension. Articles received prepacked in a strain-free condition can, with advantage, be stored in their original packing, as long as they are clearly identified and labelled.

4.8 **CONTAMINATION**

Rubber parts should not come in contact with liquids or vapour concentrations, during storage even though they may be subsequently used in contact with a similar fluid. Contact with copper, brass or corroded iron or steel, or with any compounds of manganese should be avoided.

5. **STORAGE AND SERVICE LIFE OF RUBBER HOSES**

- 5.1 The storage and service life of aircraft and engine hoses should be normally guided by the manufacturer's recommendations. Wherever such information is not available, the following instructions should be adhered to.

The hoses have been classified in two groups:

GROUP A: Fuel, Oil, Pneumatic and Hydraulic Pressure hoses.

GROUP B: All other hoses like hydraulic return line and instruments hoses etc.

5.2 **SHELF LIFE**

- 5.2.1 Hoses made of polytetrafluoroethylene (PTFE) material do not normally have a specified storage life but the storage life of rubber or synthetic rubber hoses is limited to 5 years provided they are stored under standard conditions of storage. The storage life of hose supplied in bulk is calculated from the cure date and the storage life of hose assemblies is calculated from the date of manufacture or an assembly.

- 5.2.2 During storage, periodic inspections should be carried out once a year for signs of deterioration, weather cracks, signs of corrosion on the end fittings etc. and hose pressure tested to 1.5 times the maximum working pressure every two years.

- 5.2.3 Before installation on aircraft, pressure tests should be carried out at 1.5 times the maximum working pressure.

5.3 SERVICE LIFE

5.3.1 Several factors determine the service life of aircraft system hose. In some cases the service life is fixed by the manufacturers taking into consideration the environmental and operating conditions. Wherever such information is available, the same should be reflected in the approved Maintenance Schedule and followed. In the absence of such information initial life of hoses should not exceed 4 years to start with for group 'A' hoses and 6 years for group 'B' hoses. However, regular inspections for the condition of the hose assembly should be carried out and care should be exercised during the service life to prevent deterioration through abuse.

6. RUBBER PARTS, VALVE SEATS, SEALS ETC. IN HYDRAULIC AND PNEUMATIC SYSTEM COMPONENTS

6.1 SHELF LIFE

6.1.1 Except where otherwise stated or specified by the manufacturers, storage/shelf life or rubber parts for hydraulic and pneumatic components shall be limited to 7 years from the cure date provided they are stored under standard conditions of storage. The date of cure should be available on the original documents from the makers. Rubber parts/seals which have been stored for more than 4 years should be subjected to detailed examination and stretch test prior to use as indicated below:

- (i) Seals which give evidence of hardening or softening, blistering or peeling should be discarded.
- (ii) A sample seal from each batch should be checked for deterioration by stretching the seal to 20% of their internal diameter. If cracks are visible under X10 magnification, the seals should be rejected.

6.2 SERVICE LIFE

6.2.1 In case the manufacture have fixed the service life of components involving rubber parts and such TBO lists are approved by the Director of Civil Aviation as part of Maintenance Schedule, the approved lives shall be followed and all the seals shall be renewed at the time of overhaul of the components. However, the maximum service life of the seals shall not exceed 4 years wherever such information is not available. In case the manufactures have fixed the service life of components involving rubber parts as less than 4 year, the manufacturer's recommendations shall be followed.



Mohamed Shareef
DIRECTOR OF CIVIL AVIATION