

GOVERNMENT OF INDIA  
CIVIL AVIATION DEPARTMENT

CIVIL AVIATION REQUIREMENTS  
SECTION 2 - AIRWORTHINESS  
SERIES 'S' PART I  
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EFFECTIVE : FORTHWITH

Subject : Storage conditions and storage/service life of Rubber parts and aircraft components containing rubber parts.

This part of Series 'S' of Civil Airworthiness Requirements 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 civil aircraft. These are general requirements and should only be followed in the absence of any specific requirements from the manufacturers of the aircraft part or component concerned.

#### STORAGE CONDITIONS

General requirements :

1. The aircraft parts must be stored in a clean and well ventilated room. Unusually heavy and long parts should be adequately supported, while in storage, so that maintain the intended shape without strain. Manufacturers' instructions in this regard should be followed.

Tyres should be stored vertically in racks having support tubes, so that each tyre is supported at two points on the tread. This support tubes should be close enough so that major portion of the tyres is above the tubes. The tyres should be turned to a new position every three months or so.

Aircraft hoses and hose assemblies should be stored uncoiled and supported so as to release stresses.

2. Temperature : The storage temperature should be between 50 deg. F and 70 deg. F and the distance between the stored articles and the source of heat should be more than 3 feet.
3. Humidity : The relative humidity in the store room should be around 65 per cent.
4. Light : Rubber parts should not be exposed to strong light e.g. direct rays of sun. The store rooms should be kept as dark as practicable.
5. Oxygen : Isolation from atmospheric oxygen greatly increases the storage limiting period of rubber parts. Where possible parts should be racked in airtight containers, or wrappings and liberal use of talc or french chalk is also recommended. If parts are packed in airtight tins, they should be lined with wax paper or polythene to avoid direct contact with the metal.
6. Ozone : Exposure to air containing ozone even in minute quantities, should be avoided. Storage rooms should not contain any apparatus that is capable of generating ozone, such as high voltage electrical equipment, electric motors or other plant which may give rise to electric sparks. Free access to outdoor air, which in temperate climate always

contains ozone, should be avoided. Still indoor air is normally ozone-free because most wall and ceiling coverings and organic materials rapidly destroy ozone.

7. Deformation : Rubber parts should, wherever possible, be stored in a 'relaxed' position free from compression or distortion, and in all cases with the least possible deformation, since deformation greatly aggravates the action of ozone and can also lead to permanent changes in shape and dimensions. Articles received pre-packed in a strain free condition can, with advantage, be stored in their original packing. Spring loaded seals should, if stored for any length of time, have the spring removed.
8. Contamination : Rubber parts should not come in contact with liquids or vapour concentrations of any kind during storage even though they may be subsequently used in contact with a similar fluid. Contact with copper, brass or rusty iron, or with any compounds of manganese, should be avoided.

#### HOSES : STORAGE AND SERVICE LIVES

9. The storage and service life of aircraft/engine hoses should be normally guided by the manufacturer's recommendations. Whenever 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.

Shelf Life :

10. The total storage/shelf life of both types of hoses shall be limited to 10 years from the cure date of manufacture provided they are stored under standard conditions of storage.
11. During storage, periodic inspection should be carried out once a year for signs of deterioration, weather cracks, signs of corrosion on end fittings etc. and hose pressure tested to 1-1/2 times the working pressure every two years.
12. Before installation on aircraft pressure test should be carried out at 1-1/2 times the working pressure.

Service Life :

13. Several factors determine the service life of aircraft system hoses. In some cases the service life is fixed by the manufacturers taking into consideration the specific applications. Wherever such information is available, this should be 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. Thereafter the service life of the hoses can be developed to 6 years for Group A hoses and 8 years for Group B hoses subject to accomplishment of the following life development programme as per the procedure given below :-

- (a) Critically examine all the hoses in question for life development for external defects such as:-
- (i) rubber coating or protective shields separating from the inner tube or from the metal core.
  - (ii) Hardening or lack of flexibility.
  - (iii) Evidence of ageing cracks, kinks, chaffing, blisters and poor condition of the unions.
- (b)
- (i) Subject the hoses to a full specifications test, for the purpose of life escalation.
  - (ii) If full specification tests are not spelt out for the particular hose, subject these to any other rigorous test, specified by the manufacturer.
  - (iii) In absence of any reference on items (i) & (ii) above, subject one sample hose each from different batch of the hoses in storage to destructive test to determine its life for escalation.
  - (iv) If none of the above tests are feasible, due to non availability of specific recommendations the hoses may be pressure tested twice the operating pressure and retained at the elevated pressure for five minutes and checked for external visible signs of cracks/damages/deformity etc. for determination of escalated life.
- (c) Hoses passing tests at (a) & (b) above may be permitted to operate under the life development programme with the escalated life in the respective group, i.e. 4-6 years in case of Group 'A' and 6-8 years in the case of Group 'B' with the prior concurrence of the Regional/Sub-Regional Airworthiness Office.

Note : Any hose whose identification is impossible or questionable shall not be considered for life development programme.

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

Shelf Life :

14. Except where otherwise stated or specified by the manufacturers, storage/shelf life of rubber parts for hydraulic and pneumatic components shall be limited to 6 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.

Service Life :

15. In case the manufacturers have fixed the service life of components and such TBO lists are approved by DGCA, 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 manufacturers have fixed the service life of the components involving rubber components as less than 4 years, the manufacturers recommendations shall be followed. However, the TBOs of such components may be developed limited to maximum service life of rubber components/seals as 4 years, under a life development programme mutually agreed by the Regional Airworthiness Office and the aircraft operator.

Sd/-

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