

Storage and Shelf Life of Rubber Elastomeric and PTFE Diaphragms

HC4 Diaphragm Valves

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The physical properties and therefore the performance of rubber articles can deteriorate during long periods of storage. This can lead to the rubber component becoming unsuitable for service because of excessive hardening, softening, cracking, crazing or other surface degradation. These changes may be the result of one factor or a combination of factors, for example the action of oxygen, ozone, light, heat and humidity.

Recommendations

Temperature

Storage temperature should be below 77°F (25°C). At higher temperatures certain forms of deterioration may occur sufficiently to affect the ultimate service life.

The effects of low temperature are not permanently damaging but articles may become stiffer so care should be taken to avoid distortion.

Humidity

Storage conditions should be such that condensation does not occur, store in a dry environment.

Light

Vulcanized rubber should be protected from light, in particular direct sunlight and strong artificial light with a high ultra-violet content. Unless the diaphragms are packed in opaque containers it is advisable to cover windows of storage rooms with an orange screen.

Oxygen and Ozone

Where possible cured or vulcanized rubber should be protected from circulating air by wrapping or storage in air-tight containers. This particularly applies to product with large surface areas.

Ozone is very aggressive to rubber and storage rooms should not contain any equipment capable of generating ozone such as mercury lamps, electric motors or other equipment that produces electric spark or discharge.

Deformation

Vulcanized rubber where possible should be stored in a relaxed condition free from tension, compression or other deformation.

Contact with Liquid or Semi-Solid Materials

Rubber should not be allowed to come into contact with liquid or semi solid materials, in particular solvents oils and greases, at any time during storage.

Contact with Metals

Certain metals, in particular copper, manganese and iron are known to have a damaging effect on rubber. Protection should be given by wrapping or separation with paper or polythene or using Spares Packed diaphragms.

Rotation of Stocks

Vulcanized or cured rubber should remain in store for as short a time as possible. Therefore articles should be issued from stores in strict rotation.

Cleaning

Care must be taken in cleaning vulcanized rubber. Cleaning with soap and water is least harmful. Organic solvents such as trichloroethylene, carbon tetrachloride, or petroleum spirit, must not be used.

Shelf life of Rubber (Elastomeric) Diaphragms

The shelf life of any article such as a diaphragm is dependent on many factors relating to the storage condition.

As a guide, the expected minimum storage life, if the conditions are followed and there are no extremes, are as follows.

Minimum Expected Life

5 Years + 2 Years Extension

- Q grade Natural/SBR.
- AA grade Natural.

7 Years + 3 Years Extension

- C grade Butadiene acrylonitrile.
- HT grade Polychloroprene.
- 300 grade Isobutylene isoprene.
- 214/300 grade PTFE/Butyl.
- 214K/PVDF/300 grade PTFE/PVDF/Butyl.
- 214S/TFM grade TFM/Butyl or EPM.

10 Years

- 237 grade Chlorosulphonated polyethylene.
- 226 grade Fluoroelastomer.
- 425 grade Ethylene propylene co-polymer.
- E3 grade Ethylene propylene co-polymer (post cured).
- E4 grade Ethylene propylene diene modified.
- 400 grade PTFE/EPDM.
- 214/425 grade PTFE/EPM.
- 214K/PVDF/425 grade PTFE/PVDF/EPM.
- 214S/425 grade TFM/EPM.
- 214/226 grade PTFE/Fluoroelastomer.

Note:

For actuator operating diaphragms and suffix "V" vacuum diaphragms see appropriate rubber grade in the list.

Life Extension

Shelf life can be extended depending on the storage conditions and inspection of the rubber article concerned.

Non destructive test where the diaphragm is visually inspected in a stressed condition for signs of splitting, cracks, crazing or hardening can be undertaken.

Destructive testing of a sample from the same batch involving rapid flex is another alternative method of assessment.

Depending on the results of the test the product can be re-lifed accordingly by up to 5 years.