Shelf Life and Proper Storage of Elastomeric Seals

Written by Dale T. McGrosky

Proper Storage

As rubber seals age the physical properties change and can cause the seals to be unusable. These changes are caused by many factors such as light, ozone, humidity, etc. These factors can cause the rubber to harden, soften, crack or cause other surface degradations. Proper storage is needed to reduce the effects these factors have on the rubber.

Proper storage is essential in extending the shelf life of O-rings. Rubber seals and molded rubber products, whether in bulk or in assemblies, should be places in sealed bags and kept in boxes out of sunlight and excessive temperatures and humidity. Temperatures should be higher than 59°F and below 100°F. 68°F-70°F is optimal with the humidity no greater than 75%, 65% for polyurethane seals.

When O-rings are exposed to extreme cold below their normal operating range they can Harden and there shape can become distorted. The effects of extreme cold are not damaging to most elastomeric seals and they usually return to their normal when they warm up. Exposure to excessive heat can accelerate the deterioration of the rubber. The effects caused by excessive heat usually are not reversible.

History of Age Control

Age control of elastomeric seals and assemblies started after World War II on hydraulic, fuel and lubrication seals on aircrafts. The first document on age control was release in 1958 and was a compilation of several studies on age control done since WWII. After several more studies and papers, MIL-STD 1523 was released in 1973 and gave 12 quarters as maximum shelf life. This was extended to 40 quarters in 1984 with the release of MIL-STD-1523A. This standard was cancelled in 1995 when the release of AS1933 was issued. AS1933, “Age Controls for Hose Containing Age-Sensitive Elastomeric Materials” only addressed elastomeric hoses and seals were essentially released from control.

To meet the demand of contractors and address the confusion of age control of elastomeric seals since the cancellation of MIL-STD1523A, ARP5316 was issued and addresses shelf life, traceability, proper storage and gives a reference source to work with.

ARP5316, Recommended Shelf Life

Material	Shelf Life, max
Chloroprene, CR	15 Years
Acrylonitrile Butadiene BN, NBR, N	15 Years
Fluorocarbon FKM, V	Unlimited
Butyl, IIR	Unlimited
Ethylene Propylene EPR, EPM, EPDM	Unlimited
Silicone, VMQ, MVQ, SIL	Unlimited
Fluorosilicone, FVMQ, FMVQ, FSIL	Unlimited
Polytetrafluoroethylene, PTFE	Unlimited
Perfluorocarbon, FFKM	Unlimited
Polyurethanes, AU, EU	2 to 5 years