

Viton® Chemical Resistance

The range of chemicals to which Viton® fluoroelastomer is resistant is one of the broadest in the industry. DuPont Performance Elastomers has introduced several Viton® products that will give the compounder a greater flexibility in formulating parts requiring chemical resistance.

General Chemical Resistance:



Viton® is resistant to oils, aqueous media and most other fluids. The range of chemicals to which Viton® is resistant is so broad that it is by far easier to list the few chemicals in which Viton® will be chemically attacked or swollen.

In general, low molecular weight ketones and esters will swell a vulcanizate of Viton® and, in fact, ketones such as methyl ethyl ketones are used as solvents for uncured Viton®. Esters such as ethyl acetate are also used as solvents for Viton® (uncured). The more polar a material the more likely it will swell Viton®. Much work is being done in the area of solubility parameters to characterize the swelling behavior of various fluids by comparison of dispersion, hydrogen bonding and dipole parameters to the corresponding parameters of the elastomer.

Amines affect Viton® differently from the ketones and esters. Generally, amines will react with the polymer backbone and result in embrittlement of the vulcanizate. The elongation will drop off significantly and hardness will increase. Amines are just one kind of base. In general, strong bases such as sodium hydroxide at relatively high concentrations will degrade Viton®. In summary, a basic understanding of chemistry is helpful in judging an elastomer's resistance to swelling or degradation.

Broad Chemical Compatibility

Because Viton® is compatible with a very wide range of chemicals, fuels and solvents, it can reduce costs through extended service life and reduce unscheduled downtime for seals and components. Broad compatibility also increases product versatility to extend applications.

Figure 1. Heat Resistance of Viton®

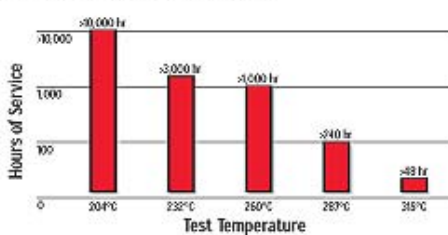
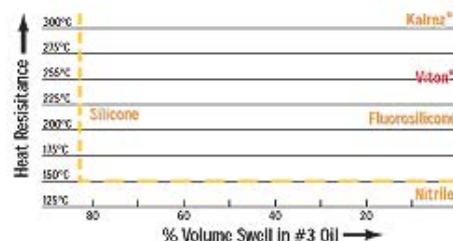


Figure 2. Heat and Oil Resistance of Specialty Elastomers (ASTM D2000/SAE J200)



Compounding:

A typical recipe for Viton® will contain, besides the polymer, curatives (diamines, polyols, or peroxides), metal oxides (calcium oxide, magnesium oxide in combination with calcium hydroxide, oxides of lead), reinforcing fillers (carbon blacks, diatomaceous earth, and other mineral fillers) and processing aids as necessary. The use of these different compounding materials in formulating compounds based on Viton® can have a significant effect on the performance of the vulcanizate in service.

The volume of elastomer in the compound, much more than the degree of crosslinking, can have a marked effect on volume swell after fluid immersion.

In general, the oxides of lead, and in particular litharge, are used when resistance to aqueous media is

of primary importance. Peroxide-cured compounds of Viton® are usually more resistant to aqueous media than compounds cured with either diamines or polyols. Bear in mind that a standard formulation of Viton®, such as one using a polyol, magnesium oxide/calcium hydroxide cure system, still has excellent resistance to most fluids. Compounding bulletins on the various types of Viton® and curing systems are available from Problem Solving Products, Inc. and provide more detailed information on formulations.