



## NAR HARDWARE GROUP NH-2006.1 Pressure Relief Valve / O-Rings Sub-Group

### **Background:**

Presently, there exist various types of both perfluoroelastomer and fluoroelastomer that have minimum low temperature limits of ~ 0 to minus 20 Fahrenheit. While these high performance elastomers have a much broader chemical resistance than their Hydrocarbon counterparts (Nitrile, EPDM, etc); they do have a reduced low temperature glass transition phase. The glass transition phase occurs when the temperature falls below minimum temperature limit. At this point an elastomer will become brittle and stop behaving as an elastomer.

Since tank cars operate in extreme temperature climates, there exists the possibility for an elastomer to operate outside its specified minimum low temperature limit. This could involve an elastomer seal functioning as a Manway Gasket or in a pressure relief device. The Manway gasket would be considered a static seal, but the pressure relief device (reclosing) would be considered a dynamic seal, which must be available to perform its intended function at all times.

### **Current Status:**

The group wants to provide a caution (or notice) to the industry when selecting these types of seals for their temperature services along with a general guideline to follow. The list is intended to be a general guideline to follow.

O-Ring Material	Comments	Min. Temp	Max Temp
Nitrile	Standard Industrial	-40°F	250°F
Nitrile	High Temp	-25°F	300°F
Nitrile	Low Temp	-50°F	230°F
Neoprene	Standard Industrial	-40°F	250°F
Hypalon®		-45°F	315°F
EPDM	Standard Industrial	-65°F	300°F
EPDM Peroxide Cured	Standard Industrial	-60°F	300°F
Butyl	Standard Industrial	-60°F	250°F
FKM (Fluoroelastomer)		-15°F	400°F
FKM (Fluoroelastomer)	Low Temp	-40°F	400°F
Fluorosilicone		-90°F	350°F
Silicone		-60°F	440°F
FFKM (Perfluoroelastomer)		-15°F	600°F

### Note:

Polymer manufacturers have different grades of materials with varying maximum and minimum temperature limits.