VP104-85 for Sour Gas Service

Technical Bulletin

No. ORD 5744

Explosive Decompression Resistance

Resistance to the explosive decompression (ED) damage caused by high pressure hydrogen sulfide is one of the primary requirements for seals in the oilfield.

Explosive decompression is caused when a high pressure gas permeates into a seal material. Because permeation is a very slow process, the gas becomes trapped within the bulk of the elastomer if the system pressure drops suddenly. The trapped gas expands as its pressure drops, quickly causing localized areas of extreme tension with the rubber material. If the material is stretched beyond the breaking point, blisters, splits, and cracks form in the material.

The relatively high concentration of hydrogen sulfide (H_2S) in sour natural gas is notorious for degrading elastomer seals used in downhole applications. Traditional fluorocarbon (FKM) and perfluoroelastomer (FFKM) seal materials tend to suffer from explosive decompression with exposure to H_2S. While this problem is not as severe with HNBR and Nitrile (NBR) elastomers, these materials are limited in the their thermal stability and tend to harden and get brittle in long-term, high temperature exposure to H_2S.

The base polymer used in VP104-85 has been tested in various combinations of sour gas service and has outstanding resistance to explosive decompression in sour gas.

In addition to sour gas, VP104-85 also has excellent resistance to acids, bases, amines, hot water, steam, hydrocarbons, and methanol.

VP104-85 is recommended for use in O-ring and energized lip seal applications as well as custom engineered seal and non-sealing elastomer applications.

Typical Applications Include:

- Exposure to high pressure sour gas
- Exposure to completion fluids
- Exposure to crude oil
- High temperature oilfield applications

VP104-85

+10°F to +400°F (-12°C to +200°C)

VP104-85 has significant advantages for the Energy, Oil and Gas industry compared with other elastomer seal materials:

Compared to perfluoroelastomer (FFKM)

- Better explosive decompression resistance in sour gas
- Lower cost

Compared to standard A-type fluorocarbon (FKM)

- Better explosive decompression resistance in sour gas
- Better amine resistance
- Better base resistance
- Better methanol resistance
- Better steam / hot water resistance

Compared to hydrogenated nitrile (HNBR)

- Better explosive decompression resistance in sour gas
- Better steam / hot water resistance
- Better acid / base resistance
- Better high temperature performance

Compared to high-temperature nitrile (NBR)

- Better explosive decompression resistance in sour gas
- Better steam / hot water resistance
- Better acid / base resistance
- Better high temperature performance

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VP104-85 Typical Test Data

Date: February 27, 2006

PROPERTY	VP104-85 Test Platen Results
Original Physical Properties ASTM D2240, D297	
Shore A hardness	85
Tensile strength, min., psi	2651
Ultimate elongation, min., %	132
50% Modulus, psi	626
Specific Gravity	1.83
Heat Age (70h @ 399°F) ASTM D573	
Hardness change, pts.	+5
Tensile strength change, max., %	+16
Ultimate elongation change, max., %	-5
Compression Set (70h @ 392°F) ASTM D395 Method B	
Loss of Original Deflection, %	55
Fluid Resistance IRM903 (70h @ 302°F) ASTM D471	
Hardness change, pts.	-1
Tensile strength change, max., %	-7
Ultimate elongation change, max., %	-5
Volume change, %	+3
Fluid Resistance Methanol (70h @ 73°F) ASTM D471	
Hardness change, pts.	-3
Tensile strength change, max., %	-10
Ultimate elongation change, max., %	+11
Volume change, %	+2
Fluid Resistance 10% NaOH / Water (70h @ 212°F) ASTM D471	
Hardness change, pts.	-2
Tensile strength change, max., %	-25
Ultimate elongation change, max., %	-25
Volume change, %	+2
Fluid Resistance 20% HCl / Water (70h @ 212°F) ASTM D471	
Hardness change, pts.	-6
Tensile strength change, max., %	+5
Ultimate elongation change, max., %	+5
Volume change, %	+15
Fluid Resistance ASTM Fuel C (70h @ 73°F) ASTM D471	
Hardness change, pts.	-5
Tensile strength change, max., %	-27
Ultimate elongation change, max., %	-4
Volume change, %	+5

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Printed in the USA.