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, %	+

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VP104-85 for Sour Gas Service

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Explosive Decompression

Resistance to the Explosive Decompression damage caused by high pressure hydrogen sulfide is one of the primary needs of the oilfield industry.

Sour gas, natural gas with a relatively high concentration of hydrogen sulfide (H_2S), 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 the Explosive Decompression problems are not as severe with HNBR and Nitrile (NBR) materials, they are limited in the their thermal stability and tend to harden and get brittle in long-term, high temperature exposure to H_2S.

Explosive Decompression is caused when a high pressure gas permeates slowly into a seal material. If the pressure is suddenly dropped, the gas becomes trapped within the bulk of the elastomer. (Permeation is a very slow process and cannot provide a rapid response to the rapid change in conditions.) The trapped gas expands as the external pressure drops. This quickly leads to localized areas where the rubber material is stretched beyond it's breaking point, forming blisters, splits, and cracks in the material.

The base polymer used in VP104-85, Solvay Solexis' SP9151 has been tested in various combinations of sour gas service and found to have outstanding resistance to Explosive Decompression in sour natural gas environments.

In addition to sour natural 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 customer-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 EOG industry compared with other elastomer seal materials:

Compared to perfluoroelastomer (FFKM)

- Better ED resistance in sour gas than FFKM
- Lower cost than FFKM

Compared to standard A-type fluorocarbon (FKM)

- Better ED resistance in sour gas than FKM
- Better amine resistance than FKM
- Better base resistance than FKM
- Better methanol resistance than FKM
- Better steam / hot water resistaance than FKM

Compared to hydrogenated nitrile (HNBR)

- Better ED resistance in sour gas than HNBR
- Better steam / hot water resistance than HNBR
- Better acid / base resistance than HNBR
- Better high temperature performance than HNBR

Compared to high-temperature nitrile (NBR)

- Better ED resistance in sour gas than NBR
- Better steam / hot water resistance than NBR
- Better acid / base resistance than NBR
- Better high temperature performance than NBR

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