

Fusion™ 935

Explosive Decompression Resistant



Applications

- Compressor components
- Valves
- Pumps

Availability

- O-rings
- G-T® rings
- Custom-molded shapes

Sealing Solutions

Greene Tweed's Fusion™ 935 is a fluorocarbon elastomer specifically designed for RGD (rapid gas decompression) resistance, aka explosive decompression, in compressor components, valves, and pumps in hydrocarbon refining, pipeline, and oilfield applications.

RGD is a phenomenon that often occurs when high-pressure gas molecules migrate into an elastomer at a compressed state. When the pressure surrounding the elastomer is suddenly released, the compressed gas inside the elastomer tries to expand and exit the elastomer, thus causing RGD.

Most elastomers experience severe blistering or cracking when the forces of these expanding gases overcome the strength of the surrounding material, but Fusion™ 935 provides superior RGD-resistant properties.

Fusion™ 935 offers superior RGD properties, broader chemical compatibility, and an improved lower temperature operating window. For example, it offers much better resistance to methanol, sour gas, hot water, steam, and corrosion inhibitors than conventional fluorocarbon elastomers. In addition, its compression set delivers improved sealing and leak prevention unmatched by the leading competitive material.

Features and Benefits

- Provides reliable RGD resistance at low temperatures down to -35°F (-37°C), so parts maintain sealing properties and equipment life is extended
- Offers reliable RGD resistance with compression set values that are much lower than existing material while preventing product leakage and contamination
- Extends the life of refining, pipeline, and oilfield equipment exposed to unanticipated process upsets that result in pressure drops
- Reduces maintenance cost
- Increases mean time between failure (MTBF)

Contact Us

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Typical Properties	
Physical Properties (ASTM Standard)	Typical
Color	Black
Hardness, Shore A, Points (D2240)	90
Mechanical (ASTM Standard)	
Compression Set, 22 Hours @ 392°F (200°C) @ 25% Deflection, % of Original Deflection (D395 Method B)	9
O-ring Properties (ASTM Standard)	
Elongation @ Break, % (D1414)	100
Tensile Strength, psi (MPa) (D1414)	3,140 (21.6)
Slab Properties (ASTM Standard)	
Elongation @ Break, % (D412)	85
Tensile Strength, psi (MPa) (D412)	3,070 (21.2)
Thermal	
Service Temperature Range, °F (°C)	-35°F to 450°F (-37°C to 232°C)

Chemical Compatibility			
Media	935	Media	935
Sour gas (H ₂ S) < 10%	1	Steam (203 psi/1.4 MPa)	1
Methanol	1	Sulfur dioxide (wet)	1
High CO ₂	1	Mercaptans	2
Methane	1		
1 = Swell < 10% after exposure. Suitable.			
2 = Swell > 10% & < 20% after exposure. Generally suitable.			

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Fusion™ 935 has been successfully tested under the following conditions:

Test	Temperature	Pressure, psi (MPa)	Media	Decompression Rate, psi (MPa)	Cycles	Configuration
A	Ambient	800 (5.52)	CO ₂	260 (1.79)/sec.	1	Open
B	160°F (71°C)	2,400 (16.5)	CO ₂ /N ₂	1,000 (6.89)/min.	3	Gland
C	150°F (66°C)	2,000 (13.8)	CO ₂ /CH ₄	1,000 (6.89)/min.	5	Gland
D	150°F (66°C)	2,000 (13.8)	CO ₂ /N ₂	1,200 (8.27)/min.	5	Open

Test Results

Because of the relationship of pressure and volume in near ideal gases, RGD damage is realized near the lower end of a decompression cycle. If the gases trapped in the elastomer are assumed to be ideal, the damage due to RGD is highly dependent on absolute pressures rather than the pressure change.

Test Details

Test A

- Standard NACE TM0192-98
- Single-cycle, 24-hour pressure soak with near instantaneous (3-second) pressure drop
- Seals are placed in a pressure vessel and are unrestrained with pressure on all sides
- Results*: -214 o-rings: Internal 1,1; External 1,1 (2 samples)
- Results*: -325 o-rings: Internal 1,1; External 1,1 (2 samples)

Test B

- Test based on Shell DODEP 02.01B.03.02 requirements
- -214 o-rings
- 3 cycles, consisting of a 48-hour hold at elevated pressure and temperature. Each decompression is at a rate no less than 1000 psi/min. Entire fixture is maintained @ ambient pressure for a minimum of 1 hour between cycles
- Seals are constrained as a face seal with no back-up ring. Nominal squeeze and gland fill are 17% and 77%, respectively
- Fluid media is approximately 30% CO₂ (by volume), balance N₂
- Results*: Internal: 1,1; External: 1,1 (2 samples tested)

Test C

- Test based on Shell DODEP 02.01B.03.02 requirements
- -214 o-rings
- 5 cycles, consisting of a 48-hour hold at elevated pressure and temperature. Each decompression is at a rate no less than 1000 psi/min. Entire fixture is maintained @ ambient pressure for a minimum of 1 hour between cycles
- Seals are constrained as a face seal with no back-up ring. Nominal squeeze and gland fill are 17% and 77%, respectively
- Fluid media is approximately 30% CO₂ (by volume), balance CH₄ (Methane)
- Results*: Internal: 1,1,1; External: 1,1,2 (3 samples tested)

Test D

- Test based on Shell DODEP 02.01B.03.02 requirements
- -214 o-rings
- 5 cycles, consisting of a 48-hour hold at elevated pressure and temperature. Each decompression is at a rate between 1000 -1200 psi/min. Entire fixture is maintained @ ambient pressure for a minimum of 1 hour between cycles
- Fluid media is approximately 5% CO₂ (by volume), balance N₂
- Results*: Internal: 1,1,1; External: 1,1,1 (3 Samples tested).

Damage Rating Scale*	
External Visual Damage	Internal Visual Damage
1. No visible damage	1. No visible damage
2. Less than or equal to 2 pimples or cracks	2. Slight damage. One split/blister per cut surface
3. 3-10 pimples or 1-2 blisters	3. Moderate damage. Less than 50% of surface cut
4. Less than 50% of surface subjected to blistering	4. Severe damage. More than 50% of surface cut
5. Considerable damage. More than 50% of surface covered with blisters or splits	

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