Fusion™ 944

Unrivaled Rapid Gas Decompression Resistance

Features and Benefits

- Provides reliable RGD resistance at low and high temperatures from -35°F to 450°F (-37°C to 230°C), maintaining sealing properties and extending equipment life
- Enables sealing integrity and equipment safety with decompression rates up to 2,175 psi (150 bar)/min.

Applications

- Drilling tools
- Completion equipment
- Valves
- Pumps

Sealing Solutions

Fusion™ 944 is specifically designed to handle RGD (rapid gas decompression) in extreme environments, enhancing safety and reliability in compressors, mechanical seals, and valves. RGD occurs when gas molecules permeate an elastomer while in a compressed state. If the pressure surrounding the elastomer is suddenly released, the compressed gas will expand and try to escape the material, often resulting in o-ring failure.

Various FKM elastomers have been developed to resist RGD in the past, but new trends of drilling deeper and extracting lower quality gases have made conditions in oil and gas exploration, production, and refining increasingly challenging.

Additionally, new markets like EOR (enhanced oil recovery) and CSS (carbon capture and storage) are generating more demanding RGD conditions. As temperatures, pressure, and media all become more severe in these processes, a need has arisen for new elastomers capable of performing in exceptionally harsh RGD environments.

The ideal RGD elastomer combines high tensile strength to prevent crack propagation with high elongation to dissipate the energy associated with an RGD event. Because tensile strength and elongation are mutually exclusive, the challenge is to improve both parameters within the same material.

Fusion™ 944 is the first elastomer to achieve both high tensile strength and elongation, enabling it to withstand the most extreme RGD conditions. It has passed ISO 23936-2 with zero damage at 390°F (200°C), 2,175 psi (150 bar) and at a decompression rate of 2,175 psi (150 bar)/minute (see Test 5). Fusion™ 944 is the first elastomer ever to attain this status, making it exceptionally well suited for applications in extreme environments.

Contact Us

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08/18-GT EN-DS086-US-08-29-2016

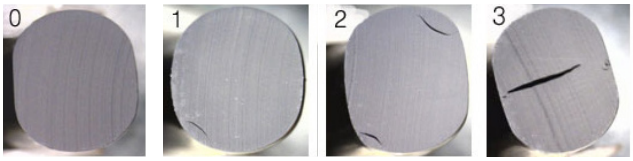
Typical Properties	
Physical Properties (ASTM Standard)	**Typical**
Color	Black
Hardness, Shore A, Button (D2240)	90
Mechanical (ASTM Standard)	
Compression Set, 70 Hours @ 400°F (205°C) @25% Deflection, % of Original Deflection[1] (D395)	37
O-ring Properties (ASTM Standard)	
Elongation, % (D412)	170
Tensile Strength, psi (MPa) (D412)	2750 (19)
Thermal	
Service Temperature Range	-35°F to 450°F (-37°C to 230°C)
Chemical Compatibility (ASTM Standard)	
Methanol 70 Hours @ 275°F (135°C), % Swell (D471)	12

1 Unless otherwise noted, all tests performed on slabs and buttons per ASTM D412. Low-temp o-ring tested on AS 568214 o-rings. RGD test run using four o-rings -AS568-312, compressed 13.5% in 80% groove fill.

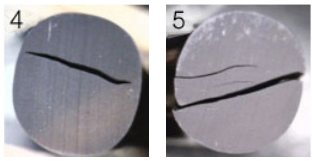
Passing Criterion for ISO 23936-2

Results from ISO 23936-2 are rated on a scale of 0 – 5, based on visual assessment. A score of 0 – 3 is considered passing; a score of 4 or 5 is considered failing. Examples of each may be seen below, with a 0 being free of any cracks, holes, or blisters, and a 5 being split through.

Passing

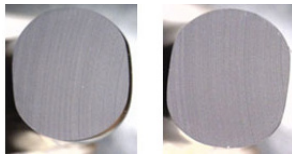


Failing

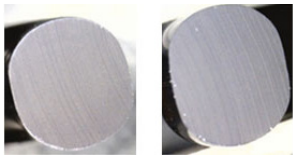


Results for Greene Tweed's Fusion™ 944

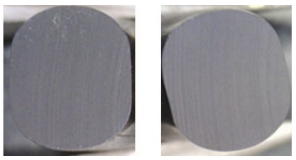
Fusion™ 944 has successfully passed the ISO 23936-2 and three other more difficult tests described below with ratings of 0. There were no cracks, holes, or blisters in any of the samples tested and all exposed surfaces were intact. Fusion™ 944 also passed a fifth test (Test 4) with ratings of 1-1-0-0. Additional tests will be performed to define the limit of this material.



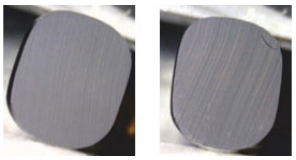
Test 1: Representative seal sections of Fusion™ 944 after ISO test at 210°F (100°C) and 290 psi (20 bar)/min decompression rate



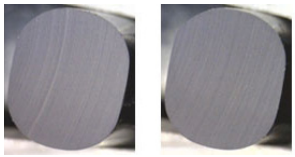
Test 2: Representative seal sections of Fusion™ 944 after ISO test at 355°F (180°C) and 290 psi (20 bar)/min decompression rate



Test 3: Representative seal sections of Fusion™ 944 after ISO test at 355°F (180°C) and 1,450 psi (100 bar)/min decompression rate



Test 4: Representative seal sections of Fusion™ 944 after ISO test at 450°F (230°C) and 1,450 psi (100 bar)/min decompression rate



Test 5: Representative seal sections of Fusion™ 944 after ISO test at 390°F (200°C) and 2,175 psi (150 bar)/min decompression rate

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ISO Test Results					
	Test 1	Test 2	Test 3	Test 4	Test 5
Number of cycles	8				
Gas mixtures	90% CH_4/10% CO_2				
O-ring size	-312				
Pressure	2,175 psi (150 bar)				
Temperature	210°F (100°C)	355°F (180°C)	355°F (180°C)	450°F (230°C)	390°F (200°C)
Decompression rate	290 psi (20 bar)/min.	290 psi (20 bar)/min.	1,450 psi (100 bar)/min.	1,450 psi (100 bar)/min.	2,175 psi (150 bar)/min.
Rating	0.0.0.0	0.0.0.0	0.0.0.0	1.1.0.0	0.0.0.0

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