

Parco

9162-95 Fluorocarbon Seals

Can Your Seals Resist Explosive Decompression?

With oil supplies scarce, drilling operations must enter more hostile environments. Those hostile environments present new challenges. Seals are more vulnerable to explosive decompression (ED), extrusion, and degradation from harsh chemicals. Parco's chemists have created another innovative compound for use in those conditions. That's why leading oilfield machinery companies rely on Parco for their seals.

9162-95 Meets Your Needs

Parco's 95-durometer fluorocarbon compound is tailored to the unique needs of oilfield machinery. Parco's 9162-95 compound provides these features:

- Excellent resistance to explosive decompression
- Outstanding resistance to compression set
- Enhanced resistance to extrusion
- Improved resistance to damage during installation

Parco's 9162-95 seals perform extremely well in high-pressure, caustic environments. That means less downtime and higher productivity for your down-hole equipment.

Fluorocarbon Outperforms Most Elastomers

Fluorocarbon elastomers command a substantial share of the seal market. Fluorocarbon compounds primarily use DuPont Dow's Viton® and Dyneon's Fluorel® as the base polymer. Fluorocarbon withstands a broad spectrum of chemicals over a temperature range second only to silicone. Fluorocarbons are commonly rated for continuous service temperatures from -20 to +400°F, with intermittent exposures as high as 600°F. Parco offers compounds with continuous service ratings to 500°F. In spite of its higher cost, fluorocarbon has replaced nitrile in many applications. Fluorocarbon offers superior resistance to compression set, high temperatures and a wide range of chemicals. Parco's most popular fluorocarbon compound is 9009-75.

Key Properties

The enhanced properties of Parco's 9162-95 compound make it ideal for high-pressure, dynamic applications. Parco recommends 9162-95 for measurement while drilling (MWD) tools, perforating equipment, production control valves, safety valves and natural gas equipment.

Excellent resistance to explosive decompression

Explosive decompression (ED) is a challenge in many oilfield applications. In high-pressure environments, gases can permeate a seal, causing leakage. If pressure in a well is released too quickly, the gases in the seal may expand, causing the seal to blister or tear. Parco's 9162-95 compound addresses those challenges.

After conducting a single-cycle, 24-hour pressure soak, Parco 9162-95 seals exhibited minimal explosive decompression damage (see Figure 1).

Fig. 1: **Explosive Decompression Resistance of 9162-95**

Rating Description	
4	Extensive damage
3	External and internal damage
2	Minimal surface damage
1	No visible damage

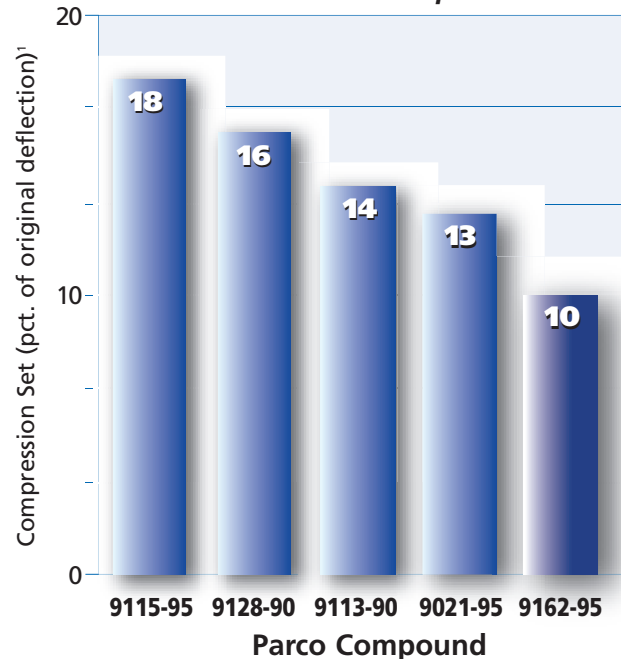
¹Explosive decompression resistance determined using National Association of Corrosion Engineers Test Method 0192-92, Section 8.6.3. Source: Parco Test Report 7334A.

Outstanding resistance to compression set

When installed, most seals must resist fluid under pressure to seal properly. When a seal takes a set from compression, it no longer exerts force on the mating surfaces, resulting in leakage. A compound with low compression set better maintains its elastic properties and original thickness, preserving seal integrity.

Parco's 9162-95 compound provides excellent resistance to compression set at higher temperatures. After testing 9162-95 for 22 hours at 392°F, it had compression set of only 10 percent (see Figure 2).

Fig. 2: **Compression Set of Typical Parco High-Durometer Fluorocarbon Compounds**



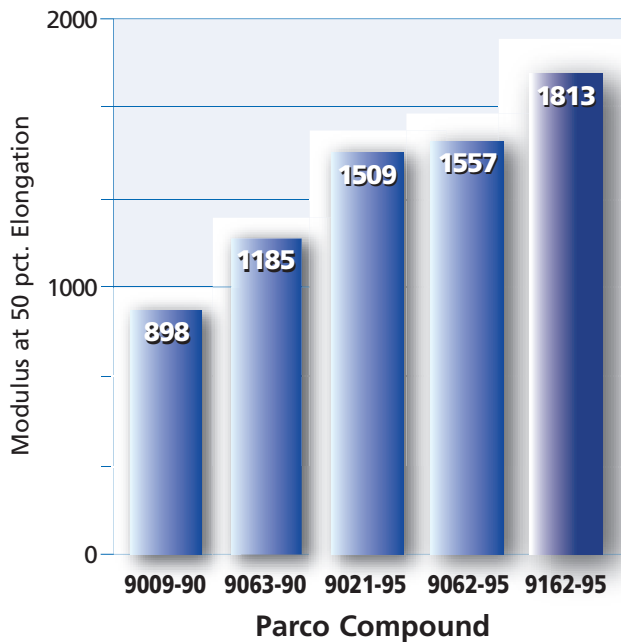
¹Compression set calculated after 22 hours at 200°C (392°F). Source: Parco Test Reports.

Enhanced resistance to extrusion

Modulus indicates the amount a seal resists deformation under stress. A seal with high modulus is more extrusion resistant than a seal with low modulus. Parco's extrusion-resistant 9162-95 seals are ideal for high-pressure oilfield machinery applications that cannot use contoured back-up rings. At 50 percent elongation, seals made from Parco's 9162-95 compound have a modulus of 1,813 psi (see Figure 3).

Fig. 3:

Modulus of Typical Parco High-Durometer Fluorocarbon Compounds



Source: Parco Test Reports 7372A & 7913.

Improved resistance to damage during installation

Ultimate elongation indicates how much an O-ring can be stretched before it breaks. A seal with a high ultimate elongation is more durable than a seal with a low ultimate elongation. Seals made from Parco's 9162-95 compound have an ultimate elongation of 143 percent, making seals less susceptible to damage during installation (see Figure 4).

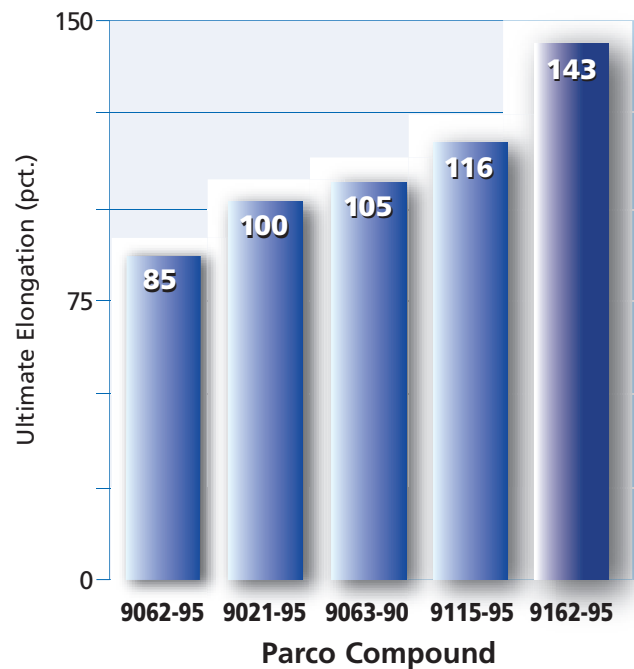
Rely on Parco

Parco is a leading manufacturer of high-performance seals. We specialize in developing proprietary elastomeric compounds and bonding techniques. Parco's seals are available in 340 compounds, more than 25 percent of which were developed in the last five years.

Founded in 1941, Parco was the first manufacturer to specialize in O-rings. Our new 154,000 square-foot

Fig. 4:

Ultimate Elongation of Typical Parco Fluorocarbon Compounds



Source: Parco Test Report 7913.

facility is one of the largest rubber seal plants in the world. Parco also manufactures custom-molded elastomeric products, including rubber-to-metal bonded parts. Our quality management system is certified to ISO/TS 16949:2002, AS7115, and AS9100B. Our R & D laboratory is certified to ISO/IEC 17025.

Parco products are available throughout the world from a network of knowledgeable distributors.

Parco Delivers Faster

Parco can provide samples of its 9162-95 fluorocarbon compound within 10 working days. If you need sample parts even faster, Parco can deliver them in as few as three days through its Rapid Prototype Program.

For more information on Parco's 9162-95 fluorocarbon compound or to obtain samples, please contact a Parco customer service representative or one of our distributors.

Key Features

Parco's 9162-95 fluorocarbon compound is designed for dynamic, high-pressure sealing applications. Key features include the following:

- **Excellent resistance to explosive decompression:**
After conducting a single-cycle, 24-hour pressure soak, Parco 9162-95 seals exhibited minimal explosive decompression damage.
- **Outstanding resistance to compression set:**
Parco 9162-95 seals have a compression set of only 10 percent after 22 hours at 392°F.
- **Enhanced resistance to extrusion:**
At 50 percent elongation, Parco 9162-95 seals have a modulus of 1,813 psi.
- **Improved resistance to damage during installation:**
Parco 9162-95 seals have an ultimate elongation of 143 percent.
- **Wide range of service temperatures:**
Parco 9162-95 seals can be used in applications ranging from -20 to +400°F.

Typical Values

Physical Property	Requirements	Compound 9162-95	ASTM Test Method
Original Properties			
Hardness, Shore A	95 ± 3	93	D2240
Tensile strength, MPa (psi), min.	14(2031)	23(3370)	D412
Ultimate elongation, pct., min.	100	143	D412
Modulus at 50 pct., elongation, min.	1200	1813	D412
Fluid Aging, IRM 903 Oil 70 hours at 150°C (302°F)¹			
Volume change, pct., max.	10	2	D471
Heat Aging 70 hours at 250°C (482°F)			
Hardness change, pts., Shore A, max.	10	2	D573
Tensile strength change, pct., max.	-25	-18	
Ultimate elongation change, pct., max.	-25	-7	
Compression Set, Plied pct. of original deflection			
22 hours at 175°C (347°F)	30	8	D395 Method B
22 hours at 200°C (392°F)	15	10	
70 hours at 204°C (400°F)	25	21	
Explosive Decompression, CO₂ at 750 psig 22 hours at 21°C (70°F) Immediately after decompression:			
Hardness change, pts., Shore A	Report	-15	NACE TM0192-92 D1414
Cross section change, pct.	Report	19	
Median Visual Rating*	Report	2	
10 minutes after decompression:			
Hardness change, pts., Shore A	Report	-8	
Cross section change, pct.	Report	8	
Median Visual Rating*	Report	2	
*Visual Rating System (NACE TM0192-92, Section 8.6)			
1 - No visible damage			
2 - Minimal damage confined to the surface (few blisters and cracks)			
3 - External and internal damage (many blisters and cracks)			
4 - Extensive damage, fragmentation.			

¹IRM is the acronym for Industry Reference Material.

Source: Parco Test Report 7372B.

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