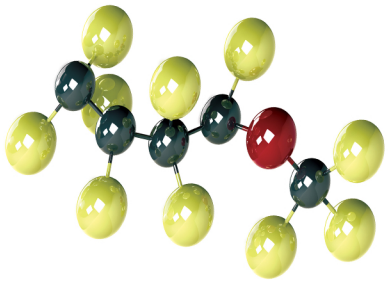
Technical Information

Kalrez® Spectrum™ perfluoroelastomer parts

A Product of DuPont Dow Elastomers



Kalrez® Spectrum™

Introduction

Kalrez® perfluoroelastomer parts have been the material of choice for mechanical seals, valves and other demanding chemical and hydrocarbon processing applications for over 25 years. Today, mechanical seals are becoming smaller and lighter, yet are required to perform just as efficiently as larger mechanical seals. This puts additional demands on elastomeric O-rings as their cross section decreases to accommodate the smaller design. Smaller O-rings are more prone to compression set which can reduce their functional effectiveness, and therefore reduce the operability of the mechanical seal.

With more expected from mechanical seals and their sealing components, DuPont Dow has developed a new product with improved sealing properties. Kalrez® Spectrum™ *B2* expands on the capabilities of Kalrez® 4079 by offering much lower compression set, increased seal force retention, broader chemical resistance and higher temperature stability. Kalrez® Spectrum™ is the newest developmental product from DuPont Dow Elastomers to meet the demanding requirements in new mechanical seal applications.

Kalrez® Spectrum™

Kalrez® Spectrum™ *B2* joins the family of Kalrez® Spectrum™ products designed specifically for the needs of the chemical processing industry. Compound *B2* broadens the family of Spectrum™ sealing options with a compound that has enhanced physical performance properties including very low compression set (*Figure 1*) and improved seal force retention (*Figure 2*). To provide even greater sealing performance in dynamic applications where low friction is required, *B2* O-rings have a glossier finish than other Kalrez® parts.

Kalrez® Spectrum™ *B2* is designed for general-purpose use as an O-ring or custom-sealing component in the chemical and hydrocarbon processing industries. It is a carbon-black filled compound with mechanical properties designed for improving sealing performance in temperature cycling applications. *B2* has improved thermal resistance that extends maximum service temperature to 327°C. It is recommended that in each application the chemicals, service temperature and pressure be reviewed for the optimal compound selection.

Typical Physical Properties[1]

Hardness, Shore A ± 5 (range 70–80 Shore A)	75
100% Modulus[2], MPa (psi)	7.6 (1100)
Tensile at break, MPa (psi)	17.9 (2600)
Elongation at Break, %	160
Compression Set, %	
70 hr at 204°C (400°F)[3]	15
70 hr at 204°C (400°F)[4]	12
Maximum Service Temperature, °C (°F)	327 (620)
Lower Service Temperature, °C (°F)	–20 (–4)

[1] Not to be used for specifications
[2] ASTM D412, 500 mm/min
[3] ASTM D395B, O-rings
[4] ASTM D345B, pellets

Figure 1. Compression Set at 204°C

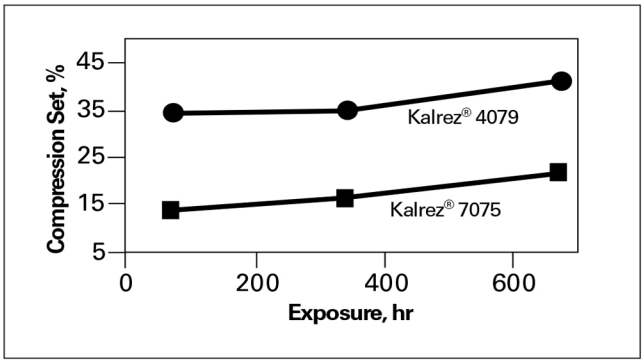
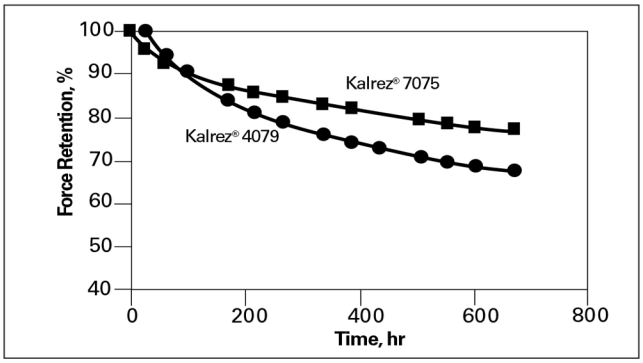


Figure 2. Seal Force Retention at 200°C*



*ISO 3384: 1991, Method A, 214 O-ring

Thermal, Chemical, and Mechanical Performance

Kalrez® Spectrum™ *B2* offers very low compression set (*Figure 1*) as measured by ASTM (American Society of Test Methods) D395 (for O-rings) to predict heat resistance. DuPont Dow and Kalrez® compression set testing extends the standard ASTM 70 hr protocol to include 336 and 672-hr compression set testing, which better predicts long-term O-ring performance. Kalrez® 4079, the standard in the sealing industry for severe service, now has a sister compound with nearly 50% less compression set. Less compression set results in improved sealing and longer service life. This feature augments the requirements of the sealing industry as smaller and lighter mechanical seals with reduced spring force tension dominant in the market.

Kalrez® Spectrum™ *B2* offers the enhanced elastomeric properties outlined above while providing chemical resistance better than the industry standard set by Kalrez® 4079.

The seal force retention (*Figure 2*) of Kalrez® Spectrum™ *B2* is about 10% improved over Kalrez® 4079. Improved seal force retention equates to better elastomeric properties at service temperature and pressure leading to reliable, long-term mechanical seal performance.

Table 2
Chemical Resistance

Compound	Kalrez® *B2*	Kalrez® *A2*	Kalrez® *B1*
Chemical Resistance to:			
Aromatic/Aliphatic Oils	++++	++++	++++
Acids	++++	++++	++++
Bases	+++	+++	++++
Alcohols	++++	++++	++++
Aldehydes	++++	+++	++++
Amines	++	+	++++
Ethers	++++	++++	++++
Esters	++++	++++	++++
Ketones	++++	++++	++++
Steam/Hot Water	++	+	++++
Strong Oxidizers	++	++	++
Ethylene Oxide	+++	+	++++
Hot Air	++++	++++	+++

++++ = Excellent +++ = Very Good
++ = Good + = Fair