



THE SEALING INNOVATION TIMES N° 3/2009

Rubbercompounds for chemical resistance at low temperatures

ERIKS Material Development Team developed four new compounds which combine the chemical resistance and low temperature resistance maintaining a good sealing performance in as well static as dynamic applications.

FKM 514322, a fluorelastomer with a TR 10 of -40°C , ten degrees lower than the best low temperature compound actually.

PVMQ 714319, a phenyl silicone, resistant down to -90°C

FFKM Kalrez® 0040, a perfluorelastomer for resistance down to -42°C .

The Teflex Cryogenic, the best seal for cryogenic applications. This Teflex Cryogenic comprises a 302 stainless steel wound ribbon spring encapsulated in a FEP or PFA jacket.

More technical details you can find in the added data sheets.

Data Sheet FKM 75-compound 514322

1. Introduction

FKM fluoroelastomer designed for high demanding sealing applications in aggressive chemicals at low temperature.

2. Product Description

Chemical Composition	: Low temperature fluoroelastomer, 65% fluorine, peroxide cured
Physical form	: O-Rings, cord
Colour	: Black
Odour	: None
Storage stability *	: Excellent

* : Following ISO 2230 conditions

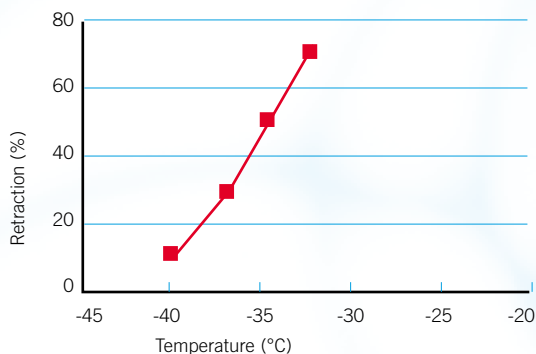


3. Physical Properties

Test Method	Norm	Test Values
Hardness	ISO 868	75 ± 5 Shore A
Density	ISO 2781	1,8 g/cm ³
Modulus at 100%	ISO 37	2,4 MPa
Tensile Strength	ISO 37	15,0 MPa
Elongation	ISO 37	min.180%
Compression Set 70h/200°C	ISO 815	<22,5%
Low Temperature Resistance TR10	ASTM D 1329	-40°C
Heat Ageing in air 168h/200°C		
Hardness Change	ISO 188	+3 Shore A
Tensile Strength Change	ISO 188	+10%
Ultimate Elongation Change	ISO 188	-15%
Aging in Fuel C 70h/23°C		
Hardness Change	ASTM D 471	-8 Shore A
Tensile Strength Change	ASTM D 471	-25%
Ultimate Elongation Change	ASTM D 471	-15%
Volume Swell	ASTM D 471	+6,0%

4. Temperature Resistance

- -45 to +200°C



5. Chemical Resistance

Concentrated acids	: excellent
Acetone	: bad
Hydroxides	: excellent
Benzene	: excellent
Crude oil	: excellent
Toluene	: excellent
Fuel C	: excellent
Gasoline	: very good
BTM oil 3	: excellent
Methylene chloride	: very good
MEK	: bad
MTBE	: bad
Water <100°C	: good

Data Sheet PVMQ-Silicone compound 714319

1. Introduction

Phenyl Silicone compound 65-75 IRHD. Silicone rubber with phenyl, vinyl, methyl substituent groups on the polymer chain.

2. Product Description

Chemical Composition	: Silicone Rubber having phenyl, vinyl and methyl groups on the Polymer Chains
Physical form	: O-Rings
Colour	: Red
Odour	: None
Storage stability *	: 10 years

* : Following ISO 2230 conditions



3. Physical Properties

Test Method	Norm	Test Values
Hardness	ISO 48 Method M	70 ± 5 IRHD
Tensile Strength at break	ISO 37	8,5 MPa
Elongation at break	ISO 37	450%
Specific Weight	ISO 2781	1,25
Compression Set 25% compression - 70h/100°C	ISO 815	21%
Heat Ageing 70h/200°C		
Hardness Change	ISO 48	+6
Tensile Strength Change	ISO 37	-18%
Elongation at break Change	ISO 37	-30%
Low Temperature Resistance Non-brittle after 3 min. at		-90°C

4. Temperature Resistance

- -100° to +250°C

5. Chemical Resistance

Air	: excellent
Alcohol	: satisfactory
Hydrocarbons	: unsatisfactory
Fats	: good
Vegetable oils	: good
Silicone oils	: unsatisfactory
Ethers/esters	: unsatisfactory
Acids	: good
Steam	: poor at high temperatures; ok up to 130°C

6. Advantages

- Low temperature resistance
- Excellent heat resistance plus ultra low temperature flexibility
- Used for dry static seals

7. Other Information

- Meets UK Ministry of Defence Aerospace specification DTD818 class M4..

Data Sheet FFKM Kalrez® 0040 For Low Temperature Applications

1. Introduction

Kalrez® 0040 Perfluoroelastomer Parts are specially designed for low temperature environments where significant chemical resistance is required. Its ground-breaking polymer and cure technology takes low temperatures sealing performance (-42°C) to an area once thought unattainable for perfluoroelastomer parts. Kalrez® 0040 is an excellent choice in applications such as couplings for the chemical transportation industry, where elasticity is required in some of the coldest environments. With regards to chemical resistance, Kalrez® 0040 will seal against a wide array of chemicals over all temperature ranges. As an example of its chemical performance, the table below shows that volume swell is about 10% when exposed to Nitric Acid at 110°C for 168 hours.



2. Typical Physical Properties¹

Colour	Black
Hardness, Durometer Shore A ²	70
100% Modulus ³ , MPa (psi)	6,6 (959)
Tensile Strength at Break ³ , MPa (psi)	13,7 (1885)
Elongation at Break ³ , %	180
Compression Set ⁴ , %	
70h/200°C (392°F)	41
336h/200°C (392°F)	57
672h/200°C (392°F)	62
Upper Service Temperature, °C (°F) ⁵	220 (428)
Lower Service Temperature, °C (°F) ⁵	-42 (-43,6)
Tg °C (°F) ⁵	-27 (-16,6)
Volume Swell (% Change) ⁶ , 168 h	
Nitric Acid, 110°C (230°F)	10
Ethylenediamine, 90°C (194°F)	19

¹ Not to be used for specification purposes

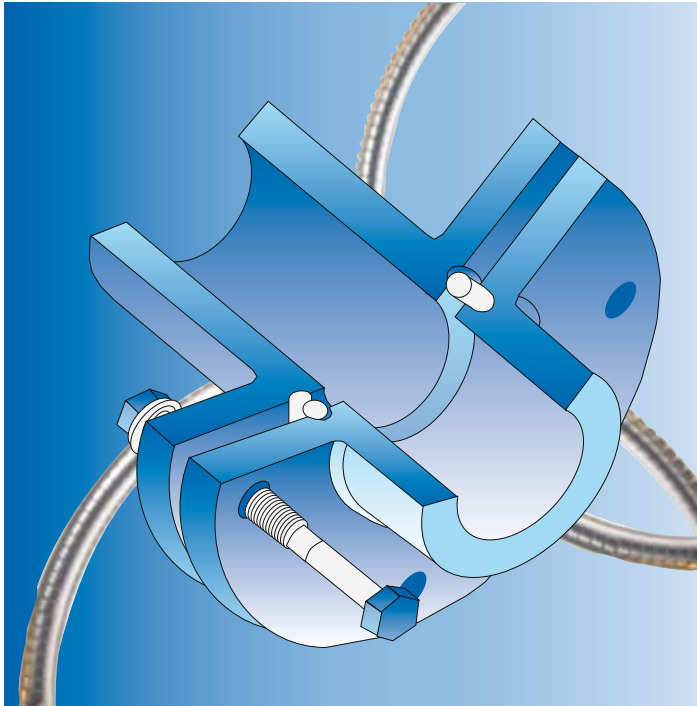
² ASTM D2240 (pellet test specimens)

³ ASTM D412 500mm/min (dumbbell test specimens)

⁴ ASTM D395B (AS568 K214 O-ring test specimens)

⁵ DuPont Performance Elastomers proprietary test method

⁶ AS568 K214 O-ring test specimens



Teflex Cryogenic encapsulated O-ring

There is simply no better seal for cryogenic applications!

Definition

The Teflex Cryogenic seal is an O-ring made from FEP or PFA encapsulated precision-rolled stainless steel springs. These engineered Teflex O-rings provide extremely high compression set resistance, even with long-term exposure to cryogenic temperatures.

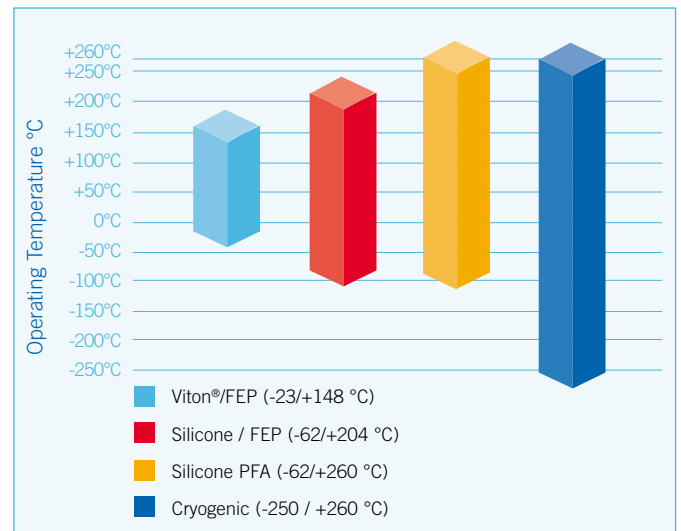
The Teflex Cryogenic seal resists temperatures from $-250\text{ }^{\circ}\text{C}$ up to $+260\text{ }^{\circ}\text{C}$.

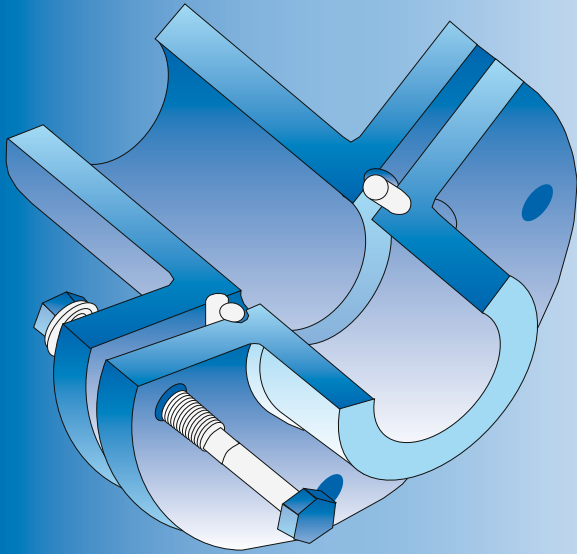
There is simply no better seal for cryogenic applications.

Due to the metal spring the low temperatures don't influence the elasticity of the O-ring.



Teflex O-ring Temperature Range





Teflex Cryogenic encapsulated O-ring

Although solid elastomer O-rings are suitable for a broad range of applications, there are limitations.

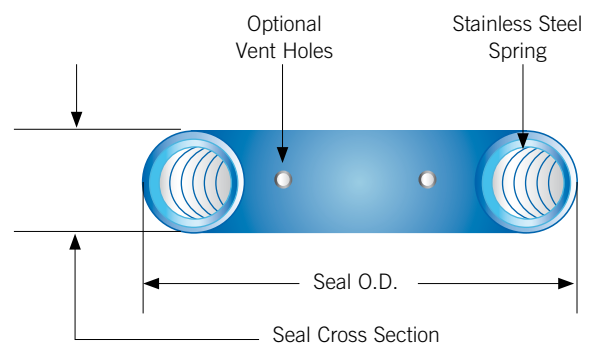
Consider Teflex Cryogenic O-rings as the choice which permits your equipment to perform in a broader range of hostile environments and temperatures while retaining their sealing capabilities.

Typical Applications

- Mechanical Seals
- Seals in Diaphragm Pumps
- Cryogenics
- Mechanical Pumps
- Filter Elements, Filter Housings
- Reusable Syringes
- Air-operated Vents
- Gas Service
- Corrosive Fluid Seals
- High Purity Water
- Low Pressure, Quick Disconnect Piping Systems
- Vacuum Service
- Relief and Emergency Valves
- Large Diameter Access Covers
- Pressure Vessels
- Compressors
- Face Flange Seals
- Glass Heat Exchanger Tube/Tubesheet Seals
- Dairy and Beverage Services
- Butterfly Valves

Teflex Cryogenic Seal

To overcome pressures exceeding 100 bar, the Teflex Cryogenic seals utilize vent holes on the I.D. to equalize the pressure.



AVAILABLE CROSS SECTIONS AND FORCE REQUIRED TO COMPRESS KG/CM

Cross Section mm	Squeeze mm	Groove Depth mm	Groove Width mm	Minimum ID mm	Force kg/cm
1,91	0,56	1,35	2,67	12,7	7,2
2,40	0,61	1,78	3,18	19,05	7,2
2,62	0,71	1,90	3,53	19,05	8
2,93	0,76	2,16	3,94	31,75	7,2
3,00	0,76	2,24	3,96	31,75	8
3,10	0,76	2,34	4,07	31,75	8,9
3,53	0,76	2,79	4,95	31,75	11,6
3,76	0,84	2,92	4,95	38,10	15,18
4,00	0,89	3,10	5,08	38,10	12,5
4,32	1,02	3,30	5,84	38,10	16,07
4,50	1,02	3,48	6,02	38,10	17,9
4,88	1,12	3,76	6,48	44,45	19,6
5,34	1,14	4,19	7,11	50,80	25
5,59	1,14	4,44	7,37	50,80	25
5,72	1,14	4,75	7,49	50,80	26,8
6,35	1,27	5,08	8,25	76,20	19,6
6,69	1,27	5,71	8,89	88,90	17
8,00	1,52	6,48	9,90	101,60	14,3

Quality

All our products are manufactured through our world class quality system; our quality rating is so high that we achieve a reject rate of less than 0,03%.

Please note:

Excessive stretching must be avoided when installing Teflex Cryogenic seals to ensure the coils do not separate.
Teflex Cryogenic seals are best used in OD sealing applications.



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