



KAF SEAL INC.

A universal seal eliminating need for multiple MOC

**CHEM-RING
FEP / PFA ENCAPSULATED
'O'-RINGS**





ABOUT US

We at KAF SEAL INC offer sealing solutions for a sustainable future. We combine both our own success with environmental protection and through our investment in innovative new sealing solutions we enable our customers in a wide range of industries to meet the complex needs of society both now and in the future.

It is our focus on customer service and quality that has seen us grow year on year since est. 2004.

What makes us different:

Growth in industrial technology has always remained to be dependent upon local availability of consumables this not only brings limitation to technology migration but also keeps industries under-developed holding back efficiency attracting no potential demands keeping skillset poor. This was soon realized by KAF-SEALS asking to bring world leaders in sealing technology across the globe together by collaborating fostering a culture of innovation that springs from a deep understanding of our customers industries and their unique sealing challenges that introduces industry specific designs from exceptional food-grade gaskets to metal gasketing for Oil & Gas, Pharma, Semiconductor, Marine, Refrigeration, Power and Process Industry with all required certifications in demand. As such, we continually work to introduce products that are environmentally friendly while also meeting our customers sealing objectives. Therefore we stand for key values like responsibility, continuity, the spirit of innovation & flexibility in thought & action.

Our business: We develop practical solutions to address goals of our changing world

Why people like us: We always stick to offer standard MOC to our customers covering wide temperature & chemical range that eliminates the need to check material compatibility each time in case of multiple MOC's to choose from.

Core Values:

1. We pursue excellence in order to continually improve
2. We promote, embrace and manage change
3. We champion honesty and fairness
4. We are committed to protecting the environment





FEP/PFA Encapsulated O-ring

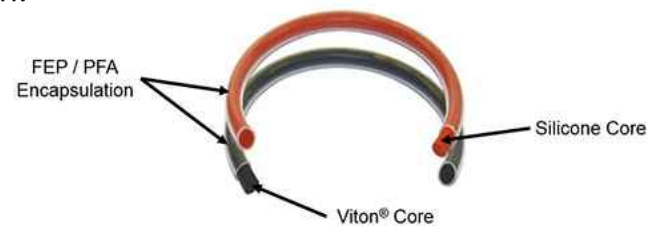


What is encapsulated O-ring ?

An Encapsulated 'O'-Ring is an 'O'-Ring bound by a seamless and uniform FEP/PFA encapsulation, which encloses an elastomeric core, completely protecting it from the media. They combine the energising properties of an elastomeric 'O'-Ring with the resilience to extreme temperatures and hostile chemicals of FEP/PFA.

Why encapsulated O-ring ?

Standard elastomer O-rings often react with the chemicals in contact or atmospheric gases resulting into hardening or embrittlement due to inadequate resistance to solvent & working temperature while the encapsulated O-rings prevents direct contact of inner-core with medium & its superior resin properties makes its suitable for any given application.



Benefits of Encapsulated 'O'-Rings and Seals

- Exceptional resistance to aggressive chemicals and gas permeability
- Low coefficient of friction allowing reduced wear of equipment
- Adaptive sealing force of an elastomeric 'O'-Ring
- Maintain standard MOC eliminating need of multiple MOC's
- Resistant to compression set/cold flow issues of solid 'O'-Rings
- Withstanding severe CIP/SIP regimes
- Unsusceptible to corrosive surface
- 3-A Sanitary, USP Class VI ,FDA Regulation 21.CFR.177.1550, BSE/TSE , EU VO 1935/2004

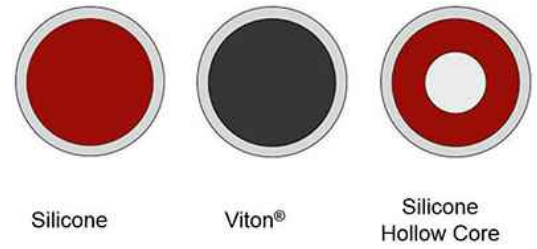




Hardness:

- 85-90 Shore A for solid core Silicone
- 90-95 Shore A for solid core Viton
- 75-80 Shore A for hollow core Silicone

Inner core / Profile options:



Temperature Range

FEP Encapsulation

-60°C to +205°C (-75°F to +400°F) Short durations to +260°C. (+500°F)

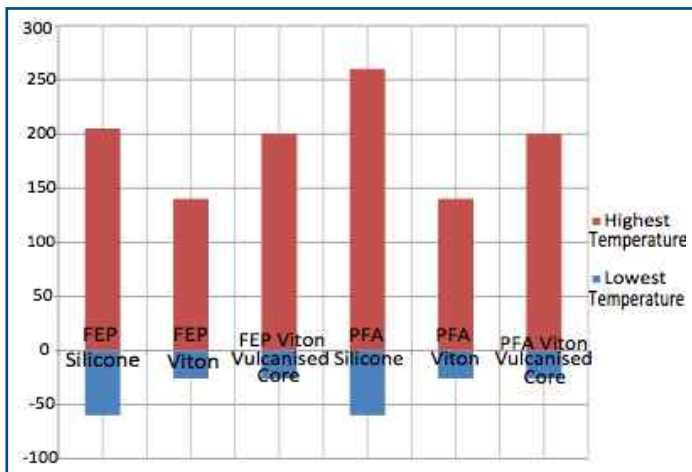
PFA Encapsulation

-60°C to +260°C (-75°F to +500°F) Short durations to +300°C. (+575°F)

The degree of squeeze best recommended is;

- 15/22% for static applications
- 10/15% for dynamic applications
- 8/10% for pneumatic applications

FEP Encapsulated O-rings Vs conventional elastomers O-rings



Types	Chemical Compatibility	Pressure Range (psi)	Temperature °C	Seamless O-ring Size capability
FEP Silicone / Viton	Excellent	1800	-60 TO +205	1.5 to 3250mm
PFA Silicone / Viton	Excellent	2000	-60 TO +300	1.5 to 3250mm
EPDM	Moderate	1400	-50 TO +150	1 to 600mm
NBR	Moderate	1460	-30 TO +120	1 to 600mm
Silicone	Good	725	-40 TO +200	1 to 600mm
Viton	Good	1400	-20 TO +200	1 to 600mm

Certificates we offer:

- ISO 9001:2015
- FDA Regulation 21.CFR.177.1550
- USP Class VI
- 3A Sanitary
- VU Tolerance Report
- Certificate of Conformity
- Engineering Test Certificate
- Leach Certificate
- BSE/TSE Certificate

CIP/SIP Results

CIP Category	Typical Media	VITON FKM	Silicone VMQ	FFKM	Teflon FEP / PFA
Alkaline	NaOH	-	-	+	+
Acidic	HNO3 H3PO4	-	-	+	+
Acidic + Active Oxygen	Acetic Acid H2O2 PAA	0	0	+	+
Polar Solvents	Acetone MEK	-	-	+	+
Non-Polar Solvents	Toluene	+	-	+	+
Steam	+150 C /+302 F	+/0	0	+	+

- + Excellent
- 0 Adequate
- Unsuitable

*Depending on temperature and concentration of fluids.



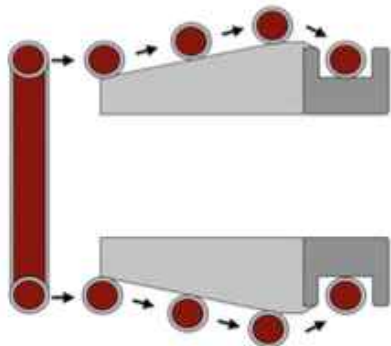
Instructions for installing Encapsulated O-rings

External Groove

Ensure an even stretch of the 'O'-Ring by use of a tapered fitting tool until it drops into the target groove. Heating of the ring prior to installation is recommended to prevent damage.

Once installed, and if needed, external pressure can be applied evenly across the entire circumference of the ring to ensure it returns to its original diameter. To avoid sealing performance issues and failures, the tool used to apply this pressure should be smooth and not cause damage to the ring's encapsulation.

Ensure the 'O'-Ring groove is free from sharp edges and burrs before and after installation.



Typical Applications

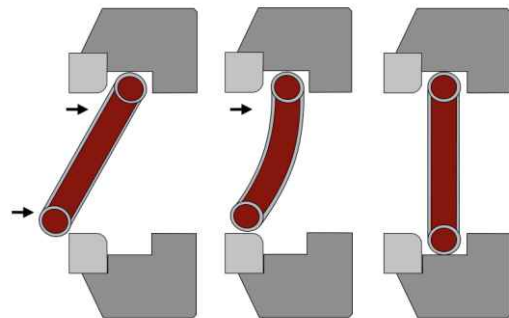
- Cartridge filters
- Drum/barrel caps and connectors
- Valves
- Mechanical Seals

Internal Groove

An Encapsulated 'O'-Ring must be temporarily collapsed into an oval for it to be installed into an internal groove. Heating of the ring prior to installation is recommended to prevent damage kinking of the encapsulation.

Once collapsed, push one side of the ring into the opening where the internal groove is situated. Push until the leading edge of the ring fits into the groove. Then, ideally using a suitable pushing tool, push the trailing edge of the ring into the opening until the entire ring is fitted into the groove.

Ensure the 'O'-Ring groove is free from sharp edges and burrs before and after installation.



Typical Applications

- Mechanical Seals
- Valves

Micro VU Inspection

- Exceptionally accurate and precise measurements 3-16 microns using 3x50mp camera & bespoke software.
- Cross-section measured at 0.5 degree increments (minimum 720 points of measurements per ring).
- Simple Green & Red color coding identifying & discarding out of tolerance O-ring ensuring only tightest tolerance is passed.
- Capacity to inspect several million O-rings each year.





Chemical Resistance, Restricted Permeability and Absorption

Typical Chemicals with which PFA resins are compatible

The FEP / PFA encapsulation is the essential component of the Chem-Ring and it is resistant to practically all chemicals.

Within normal use temperatures, FEP/PFA resins are attacked by so few chemicals that it is more practical to describe the exceptions rather than to tabulate the chemicals with which they are compatible. Molten alkali metals, fluorine and several complex halogen compounds (chlorinetrifluoride) are incompatible with FEP/PFA resins.

In some instances, at or near the suggested service limit temperatures of FEP (204°C./400°F.) and PFA (260°C./500°F.), a few chemicals at high concentrations have been reported to be reactive.

Attack has been produced at such high temperatures by 80% NaOH or KOH, metal hydrides such as Borane (e.g. - B₂H₆), aluminium chloride, ammonia (NH₃), and certain amines (R - NH₂) and Imine (R = NH). Also, slow oxidative attack has been observed, by 70% nitric acid under pressure at 250°C./480°F.

Special testing is required when such extremes of reducing or oxidizing conditions are approached. Except for such chemicals under the conditions mentioned, it can be said that the Vulcan Chem-Ring R, is chemically inert.

Gas Permeability

All thermoplastics have some permeability to gases primarily through intermolecular migration. In the case of our FEP or PFA encapsulation, any gas permeation is at a substantially lower rate than most other plastics. Whilst highly corrosive gases do not normally chemically successfully attack, the FEP / PFA encapsulation, they may eventually permeate through and damage the elastomer core, and hence affect the seal's mechanical properties. Thus in addition to chemical resistance, permeability effects may have to be considered in some aggressive gas sealing systems.

Abietic acid	Bromine	Diethyl carbonate
Acetic acid	N-Butyl amine	Dimethyl ether
Acetic anhydride	Butyl acetate	Dimethyl formamide
Acetone	Butyl methacrylate	Di-isobutyl formamide
Acetophenone	Calcium chloride	Dimethylformamide
Acrylic anhydride	Carbon Disulfide	Dimethyl hydrazine
Alkyl methacrylate	Cetane	
Ammonia, liquid	Chlorine	Dioxane
Ammonium chloride	Chloroacetic Acid	Ethyl acetate
Aniline	Chloroform	Ethyl alcohol
Aqua Regia	Chlorosulfonic acid	Ethyl ether
Benzoyl chloride	Chromic acid	Ethyl hexanoate
Benzyl alcohol	Cyclohexane	Ethyl bromide
Benzoyl Peroxide	Cyclohexanone	Ethylene glycol
Borax	Dibutyl Phthalate	Ferric Chloride
Boric acid	Dibutyl sebacate	Freons
Ferric phosphate	2-nitro-butanol	Potassium permanganate
Fluoronitrobenzene	Nitromethane	Pyridine
Formaldehyde	Nitrogen tetroxide	Soap and detergents
Formic acid	2-nitro-a2-methyl Propanal	Sodium Fluoride
Furane	N-Octadecyl alcohol	Sodium hydroxide<80%
Gasoline	Diesel	Sodium hypochlorite
Hexachloroethane	Nitric acid	Sodium peroxide
Hexane	Nitrobenzene	Solvents, aliphatic ²
Hydrazine	Oils, animal and vegetable	and aromatic ²
Hydrochloric acid	Oleum	Stannous Chloride
Hydrochloric acid	Ozone	Sulphur
Hydrochloric acid	concentrate Perchloroethylene	Sulphuric acid
Hydrogen peroxide	Pentachloro-Benzamide	Tetrabromoethylene
Isopropyl alcohol	Perfluoroxylyene	Tetrachloroacetic acid
Isocyanates	Phenol	Trichloroacetic acid
Lead compounds	Phosphoric acid	Trichloroethylene
Magnesium chloride	Phosphorus	Tricresyl phosphate
Mercury	Pentachloride	Triethanolamine
Methyl ethyl Ketone	Phthalic acid	Turpentine
Methacrylic acid	Pinene	Unleaded fuel
Methanol	Piperidine	Vinyl methacrylate
Methyl methacrylate	Polyacrylonitrile	Water
Napthalene	Potassium acetate	Xylene
Naphthols	Potassium hydroxide<50%	Zinc chloride



SIZE RANGE AND LEAD TIMES CHEM RING FEP / PFA ENCAPSULATED

Standard Cross Sections Metric mm	CORE ID SIZE RANGE; GUARANTEED EX-STOCK supply from Vulcan in one of, either Silicone OR Viton Core; Q Grade Production		10 day PRODUCTION FROM EX-WORKS UK FOR ID AND CROSS SECTION RANGE SHOWN BELOW. Supply from Vulcan in one of either Silicone OR Viton Core; Q Grade and BLF Grade		Standard Production; Minimum ID Q Grade and BLF Grade Non Ex-stock supply = 15 Working days from the Friday of the week of your order		Special Production; Minimum ID Usually Q Grade Only Non Ex-stock supply = 35 Working days from the Friday of the week of your order		Hollow SIL only Minimum ID Usually Q Grade Only Non Ex-stock supply = 25 to 35 Working days from the Friday of the week of your order			
	FEP mm		FEP mm		FEP / PFA mm		FEP ONLY		Special Production + 35 days	Standard Production + 25 days		
	FROM ID	TO ID	FROM ID	TO ID	SIL	VIT	SIL	VIT				
**1.5	-----	-----	-----	-----	16.00	16.00	6.00	6.00	-----	-----		
**1.6	-----	-----	-----	-----	16.00	16.00	5.31	5.31	-----	-----		
1.78	6.00	50.00	140.00	3000.00	16.00	16.00	5.31	5.31	-----	20.35		
1.80	6.00	50.00	140.00	3000.00	16.00	16.00	6.00	6.00	-----	20.35		
1.90	-----	-----	-----	-----	16.00	16.00	6.00	6.00	-----	-----		
2.00	9.00	50.00	-----	-----	16.00	16.00	6.00	6.00	9.53	28.00		
2.40	9.00	50.00	-----	-----	16.00	16.00	6.00	6.00	10.77	28.00*		
2.50	9.00	50.00	140.00	3000.00	16.00	16.00	6.00	6.00	10.77	30.00		
2.62	9.00	150.00	140.00	3000.00	18.00	18.00	6.00	6.00	10.77	29.83		
3.00	14.00	150.00	140.00	3000.00	22.00	22.00	9.20	9.20	12.37	30.00		
3.15	-----	-----	-----	-----	22.00	22.00	9.20	10.00	12.37	30.00*		
3.50	14.00	350.00	140.00	3000.00	24.00	24.00	9.20	12.30	12.37	31.34		
3.53	14.00	350.00	140.00	3000.00	24.00	24.00	9.20	12.30	13.87	31.34		
3.80	-----	-----	-----	-----	32.00*	32.00*	18.00	18.00	19.05	35.00*		
4.00	18.00	250.00	140.00	3000.00	32.00	32.00	18.00	18.00	19.05	40.00		
4.30	-----	-----	-----	-----	35.00	35.00	18.00	20.00	20.62	42.00*		
4.50	-----	-----	150.00	3000.00	37.00	37.00	18.00	20.00	20.62	45.00		
4.75*	-----	-----	-----	-----	37.00	37.00	18.00	20.00	24.77	50.00*		
5.00	18.00	250.00	150.00	3000.00	37.00	37.00	18.00	20.00	24.77	60.00		
5.33	28.00	250.00	150.00	3000.00	37.00	37.00	20.00	20.00	24.77	62.87		
5.50	-----	-----	150.00	3000.00	48.00	48.00	20.00	20.00	24.77	65.00		
5.70	60.00	250.00	150.00	3000.00	52.00	52.00	20.00	27.00	44.45	70.00*		
6.00	60.00	250.00	150.00	3000.00	53.00	53.00	20.00	27.00	44.45	80.00*		
6.30	-----	-----	150.00	3000.00	-----	-----	27.00	35.00	57.79	90.00*		
6.50	-----	-----	150.00	3000.00	55.00	55.00	36.00	37.46	57.79	126.00*		
6.99	60.00	350.00	150.00	3000.00	60.00	60.00	36.00	37.46	57.79	126.37		
7.00	60.00	350.00	150.00	3000.00	60.00	60.00	36.00	37.46	57.79	126.37		
7.50	-----	-----	150.00	3000.00	75.00	75.00	50.80	60.00	88.27	140.00*		
8.00	-----	-----	160.00	3000.00	85.00	85.00	50.80	60.00	88.27	150.00*		
8.40	-----	-----	160.00	3000.00	105.00	105.00	50.80	73.00	95.25	155.00*		
9.00	-----	-----	200.00	3000.00	110.00	110.00	50.80	73.00	95.25	160.00*		
9.50	-----	-----	200.00	3000.00	110.00	110.00	50.80	73.00	95.25	162.00*		
10.00	-----	-----	200.00	3000.00	125.00	125.00	57.00	74.00	100.97	170.00*		
11.00	-----	-----	250.00	3000.00	135.00	135.00	70.00	102.00	127.00	180.00*		
12.00	-----	-----	250.00	3000.00	145.00	145.00	70.00	102.00	127.00	190.00*		
12.70	-----	-----	250.00	3000.00	170.00	170.00	70.00	102.00	127.00	200.00*		
14.00/14.30 mm			230.00	3000.00	ENQUIRE FOR 14.3MM							
15.00	-----	-----	250.00	490.00	280.00	280.00	150.00	177.80	152.40	300.00*		
16.00	-----	-----	250.00	3000.00	280.00	280.00	150.00	177.80	-----	NOTE: RED ABOVE; "Volume only - Enquire on Purchasing first".		
18.00	-----	-----	230.00	3000.00	340.00	340.00	150.00	177.80	203.00			
19.00	-----	-----	-----	-----	350.00	350.00	203.20	203.20	-----			
20.00	-----	-----	230.00	1000.00	370.00	370.00	203.20	203.20	-----			
25.40	-----	-----	228.00	525.00	-----	-----	228.60	-----	-----			
31.75	-----	-----	400.00	516.00	-----	-----	400.00	-----	-----			

PLEASE NOTE : ALL SIZES SHOWN ARE IN MM

LIGHT GREEN : NOT AVAILABLE IN PFA

LIGHT BLUE : ENQUIRE FOR VOLUME SUPPLY

Cross-sections 20.00, 25.40 & 31.75mm are available in PFA/SIL only.



Applications :



Agitated Nutsche Filter



Rotary Vacuum Paddle Dryer



Vertical Ribbon Vacuum Dryer



Code-7 Filter Cartridge



API Adapter Valve



Hot Melter O-rings



Sparkler Filter



Centrifuge



Mechanical Seals



Applications :



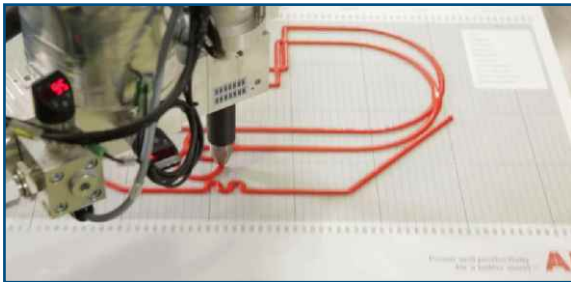
Valve Stem



Process Pump



Magnetic Drives



Gluing & Dispensing

Example Applications

- Pumps & Valves
- Filters
- Reactor Vessels
- Pressure Vessels
- Mechanical Seals
- Heat Exchangers
- Autoclaves
- Cryogenics
- Tank Lid
- Pressure Release Valves

Example Industries

- Chemical Process
- Aircraft & Aerospace
- Oil Refineries
- Semi-Conductor Manufacture
- Photochemical
- Refrigeration
- Polymer Production
- Paint & Coating Operation
- Pharmaceuticals
- Petroleum & Chemical Transport



AODD Pump



Painting Robotics





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Networking Distribution

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