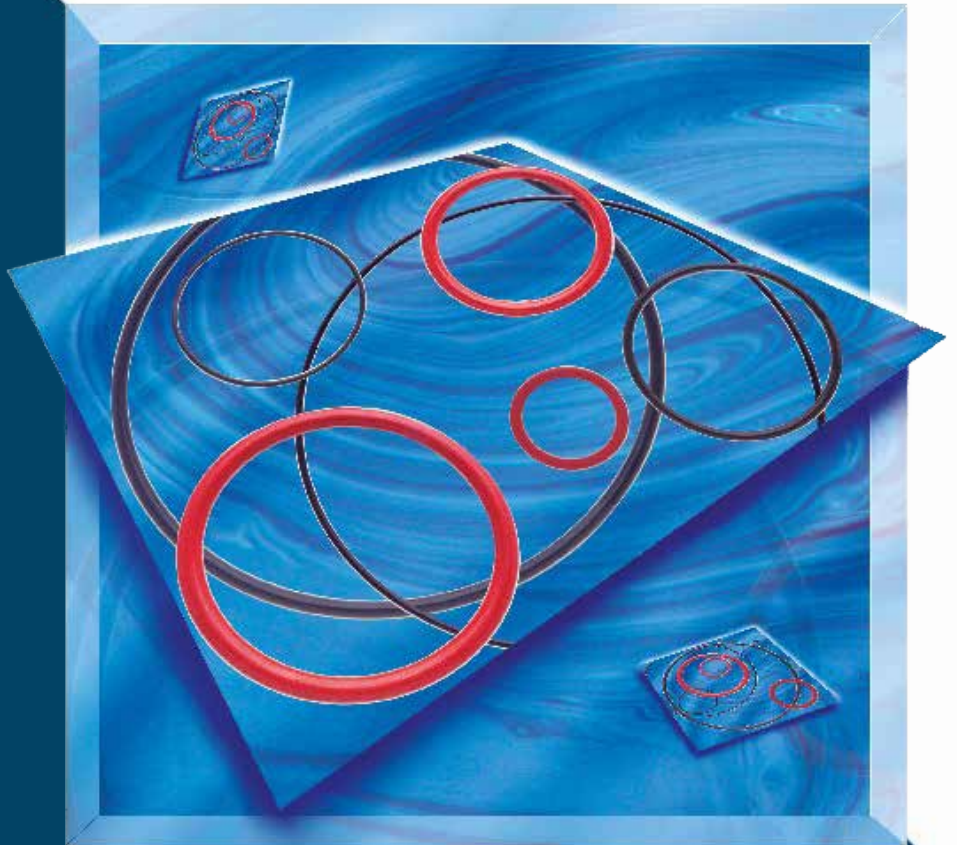
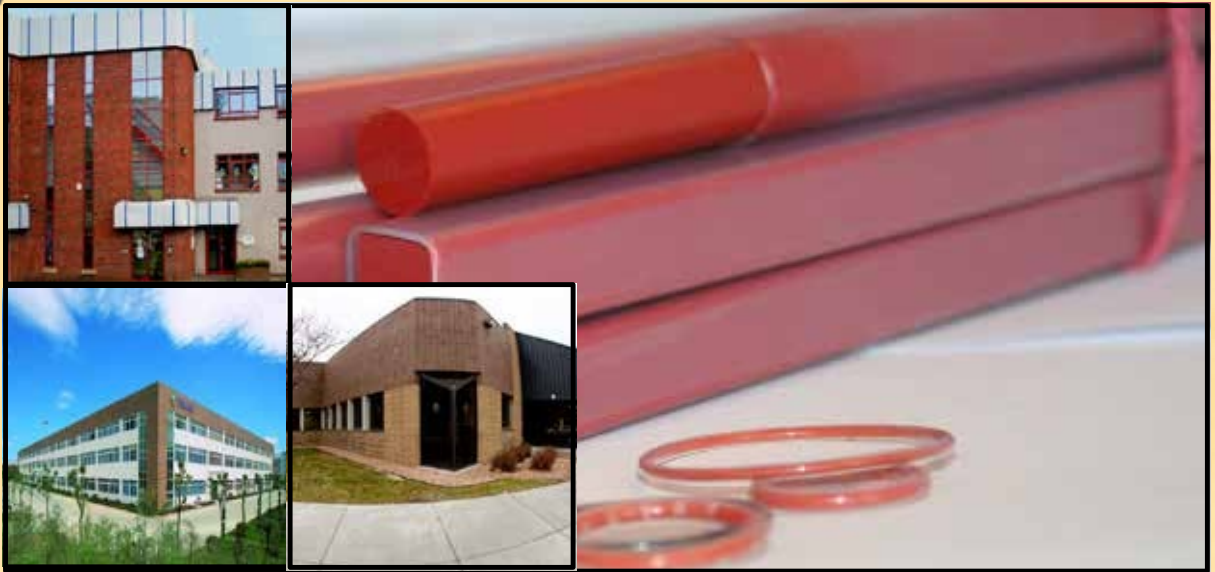


# VULCAN<sup>®</sup> CHEM-RINGS<sup>®</sup> FEP/PFA ENCAPSULATED 'O'-RINGS

VULCAN



Embrace Excellence - Vulcan Service, Quality and Value



The Vulcan Group, with some way over four hundred staff, in our six mechanical seal and Encapsulated seal factories and our distribution centres, are one of the worlds leading Encapsulated 'O'-Ring and Mechanical Seal manufacturers and suppliers.

#### 'The Vulcan Commitment'

Founded in 1987, Vulcan continues to rapidly grow through our exceptional investments in new product development, vertically integrated, advanced, modern factories with increasingly automated manufacturing machinery, and electronically controlled, extensive stock holding and distribution. Vulcan has established new industry standards, with our product range, performance/quality, ex-stock service and price. We are immensely motivated and dedicated to being the World's Best Encapsulated Seal Company.

Vulcan guarantee to have the widest range of FEP/ PFA Encapsulated Seals available from stock, of any manufacturer in the world, all backed by our unique stock guarantee policy. Vulcan's complete vertically integrated manufacturing allows us to produce both standard and special designs of Seals at any quantity with costs and lead times lower than our competitors. When you purchase from Vulcan, we will ensure that you will receive the best product range, quality, service and prices.

#### Electronically Controlled Manufacture.

Vulcan's six modern production factories exceed 15,000 square meters of total floor space for production and storage of our range of seals, with three production units dedicated to FEP / PFA Encapsulated 'O'-Rings. The factories were architecturally designed and built to create world-class facilities. We continue to heavily invest in our production processes, machinery, systems and people. This focus has naturally led to extra-ordinary annual rates of growth in our factories capacity and employment. Growth needed to meet the growth in our customer demands.

Globally Vulcan has dedicated Service Centres and Manufacturing on 3 continents, in each of the World's main business time zones, to service the global market.

#### The key features of our Service are:

- Unique Stock Guarantee: Vulcan have over 20,000 sizes and around 2 million FEP/PFA Encapsulated 'O'-Rings in stock to back our Stock Guarantee to have every size range I.D. of every Cross-Section up to 0.275"/7mm in stock
- Advanced production facilities, automated wherever possible.
- Development of in-house component and material manufacture.
- The very best quality and inspection systems, CMM checked and electronically controlled.
- The widest range and stock of Encapsulated Seals, available from any company, accessible to our customers from stock.
- Well motivated and rewarded staff working in excellent facilities.
- Fully computer controlled, integrated and automated seal ordering, stocking and supply systems.
- To be the electronic seal warehouse to the industry.



# FEP / PFA Encapsulated 'O'-Rings

## Electronic Investment

Vulcan is firmly focused on the future. Our philosophy is to heavily invest in IT, automation, technology and our people, in order to be the world leaders in Mechanical and Encapsulated Seals Manufacture and Supply.

## Supply Philosophy

Our Ethos is to do extraordinarily well, whatever the customer reasonably requires. We have a can do mentality, backed by truly exceptional customer service. Vulcan's commercial policy is to focus on our products, manufacture, stock holding and supply to the seal trade.

It is not our intention to be diverted into becoming a sales organisation. Our strengths lie in our unrivalled product range, quality, service and prices.

Vulcan will maintain its strong distributor and trade sales focus. Our vision is to be The Electronic Seal Warehouse to the trade and continue to provide increasing levels of service, product and information to our customers in, already, over ninety countries.

## Research and Development

Vulcan are always on hand to assist with any enquiry. We are continuously working to make improvements and have a designated research and development teams to work on new developments that come our way.



## What is a Chem-Ring®?

Vulcan Chem-Ring® seals combine the resilience and sealing force of an elastomer with the chemical resistance of Teflon®. They consist of an elastomeric core of Silicone or Viton® with a relatively thin, moulded encapsulation of FEP or PFA polymer.

## Function

The seamless, uniform FEP/PFA encapsulation provides the Chem-Ring's near universal sealing capability, whilst the continuous reset, and the constant pressure of the encapsulation onto the sealing point, is performed by the elastomeric core.

The result is an overall sealing compression that increases the media pressure. The Chem-Ring behaves like a highly viscous fluid, any pressure exerted on the seal is transmitted practically undiminished in all directions.

## Example Applications

- Pumps and Valves
- Filters
- Reactor Vessels
- Pressure Vessels
- Mechanical Seals
- Heat Exchangers
- Autoclaves
- Cryogenics
- Hose Coupling Seals
- Pipelines
- Gas Compressors
- Access covers
- Pressure Relief Valves
- Tank Lids

## Example Industries

- Chemical Process
- Aircraft and Aerospace
- Oil Refineries
- Semi-Conductor Manufacture
- Photochemical
- Refrigeration Engineering
- Food Stuff Industries
  - Polymer Production
- Dye Manufacture
- Paint and Coating Operations
- Pharmaceutical Production
- Petroleum and Chemical Transport





## FEP / PFA Encapsulated 'O'-Ring Benefits

Vulcan FEP/PFA Encapsulated 'O'-Rings seal stronger and last longer than any other fluoroelastomer, rubber or solid Teflon® 'O'-Rings especially in tough applications.

The Principal advantages are;

- Outstanding chemical and corrosion resistance
- Wide temperature range
- High pressure capability
- Non-stick/low-friction resistance
- High compression set retention
- Performs as an elastomeric P.T.F.E
- Economical, assured seal
- Self lubricating smooth surface

This combination of the best qualities of the FEP / PFA encapsulation with the Silicone or Viton® rubber core creates an inexpensive, high performance solution to many critical sealing problems.

Utilise Vulcan FEP/PFA Encapsulated 'O'-Rings to replace standard material 'O'-Rings when they suffer from:

- Chemical Attack
- 'O'-Ring swell
- 'O'-Ring compression set
- Gas permeation
  - or where sterility is needed (Food, Pharmaceutical, Chemical manufacturing Industries).
  - or where standard materials cause problems related to surface friction (Eg. Reciprocating Movement).
  - or where standard materials cause problems related to surface friction (Eg. Reciprocating Movement).
- Provide an alternative to Kalrez® and similar Perfluoroelastomers - where Kalrez® may be not necessary ie. Vastly reducing the seal's cost.
- Replace solid P.T.F.E rings - these hard, unforgiving seals suffer from cold flow and creep and should not be used, given the superior capabilities and performance of FEP/PFA Encapsulated 'O'-Rings.
- Replace envelope gaskets in vessel lid seals to provide full seal integrity - avoiding possible product contamination or seal failure.

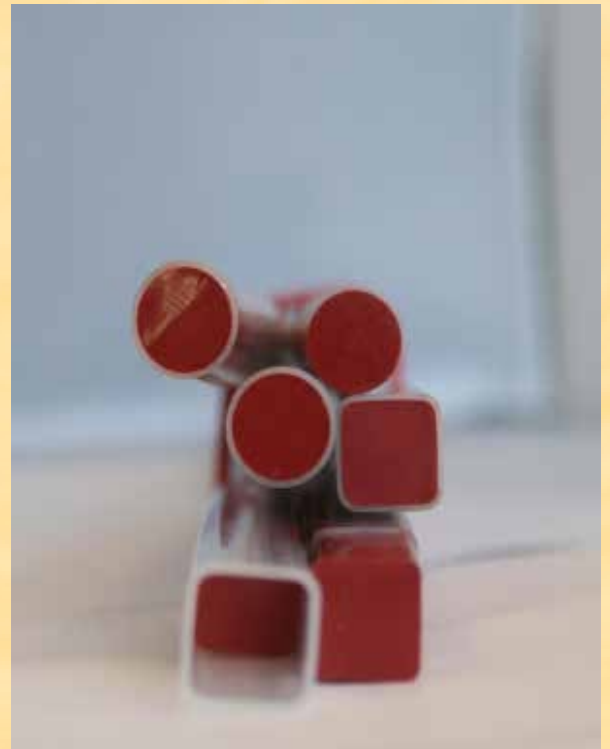
### Materials

Vulcan Chem-Rings® are available with FEP or PFA Polymer encapsulation. The capabilities of these two polymers are essentially similar, except that P.F.A exhibits better heat resistance once above 200°C/400°F. FEP Encapsulation is the preferred standard for all applications below 200°C/400°F. continuous temperature.

### Warranty

Vulcan FEP/PFA Encapsulated 'O'-Rings are produced under stringent Quality Controlled conditions. Vulcan FEP/PFA Encapsulated 'O'-Rings are warranted to be free of all defects in material and workmanship. Vulcan's liability there under is limited to the purchase price on any seals proved defective, or at our option, their replacement.

All information in this brochure is given in good faith, but without warranty, and is based on our functional evaluations, experience and published technical data. The purchaser should, however, thoroughly test any application and independently conclude satisfactory product performance for its intended use.





# FEP / PFA Encapsulated 'O'-Ring Technical Details

## Minimum ID Sizes

Virtually any size of I.D or Cross-Section of FEP / PFA Encapsulated 'O'-Ring can be made using existing stocks of material. The only possible normal limitation is the minimum size of I.D that can be physically encapsulated without kinking. This varies with the Cross-Section of the ring and developments in manufacturing methods. The table to the right shows our Minimum Possible I.D's at the time of printing this brochure. Refer to our Technical Data sheet Ref:70/4 documents for our latest standards. Those dimensions shown in the Special Production columns have increased lead-times and prices, compared to the standard production sizes, due to the increased complexity of manufacture.

## Design, Range and Guaranteed Stock holding.

All Vulcan Chem-Rings are manufactured in-house to our own exacting production requirements. We have eliminated the faults common in some Encapsulated 'O'-Ring manufacture, through close attention to production detail and material inspection. Vulcan have the widest range of FEP/PFA Encapsulated Seals, available from stock, from any manufacturer in the world. We back this very extensive range with a guaranteed ex-stock holding, that is accessible to our customers to view on the internet via our Portal. All seal types, in all sizes and material, shown in this FEP / PFA Encapsulated 'O'-Ring brochure, are available ex-stock, if previously sold three times. In total well over 2 million FEP Encapsulated 'O'-Rings alone. We can also manufacture practically any special and will even stock them for you, to agreement, for repeat requirements.



Cross Section	Standard Production;		Special Production;	
	SIL	VIT	SIL	VIT
1.50	16.00	16.00	5.31	5.31
1.60	16.00	16.00	5.31	5.31
1.78	16.00	16.00	5.31	5.31
1.80	16.00	16.00	6.00	6.00
2.00	16.00	16.00	6.00	6.00
2.40	16.00	16.00	6.00	6.00
2.50	16.00	16.00	6.00	6.00
2.62	18.00	18.00	6.00	6.00
3.00	22.00	22.00	8.89	8.89
3.15	22.00	22.00	9.20	10.00
3.50	24.00	24.00	9.20	12.30
3.53	24.00	24.00	9.20	12.30
3.80	32.00	32.00	18.00	18.00
4.00	32.00	32.00	18.00	18.00
4.30	35.00	35.00	18.00	20.00
4.50	37.00	37.00	18.00	20.00
4.75	37.00	37.00	18.00	20.00
5.00	37.00	37.00	18.00	20.00
5.33	37.00	37.00	20.00	20.00
5.50	48.00	48.00	20.00	20.00
5.70	52.00	52.00	20.00	27.00
6.00	53.00	53.00	20.00	27.00
6.30	55.00	55.00	27.00	35.00
6.50	55.00	55.00	36.00	37.46
6.99	60.00	60.00	36.00	37.46
7.00	60.00	60.00	36.00	37.46
7.50	75.00	75.00	50.80	60.00
8.00	85.00	85.00	50.80	60.00
8.40	105.00	105.00	50.80	73.00
9.00	110.00	110.00	50.80	73.00
9.50	110.00	110.00	50.80	73.00
10.00	125.00	125.00	57.00	74.00
11.00	135.00	135.00	70.00	102.00
12.00	145.00	145.00	70.00	102.00
12.70	170.00	170.00	70.00	102.00
14.00	250.00	250.00	130.00	130.00
15.00	280.00	280.00	150.00	177.80
16.00	280.00	280.00	150.00	177.80
18.00	340.00	340.00	150.00	177.80
19.00	340.00	340.00	203.20	203.20
20.00	370.00	370.00	203.20	203.20
25.40	-----	-----	228.60	-----
31.75	-----	-----	400.00	-----



# FEP / PFA Encapsulated 'O'-Ring Technical Details

## Section

Sections available are standard round Cross-Section ('O'-Ring), square section and rectangular section. Round 'O'-Ring sections are specified as standard and are utilised for practically all sealing applications. Square section seals are available for certain applications where a larger sealing surface is necessary to effect a more positive seal. These square section Chem-Rings utilise the same size 'O'-Ring groove as 'O'-Rings but require less squeeze to seal.

Round section seals, once energised, present a flat face to the groove and housing surfaces to seal. The necessary use of square section seals to achieve additional performance benefits is limited to very few, particular situations. Please consult Vulcan, or our distributors, for advice before specifying a square section.

Rectangular section seals are manufactured primarily for use in quick release hose couplings. Designed to suit all standard nominal bore sizes, they are available ex-stock as seals. A limited range of Fep/Silicone rectangular Cross-Sections are also available for manufacture into any size I.D. Seals.

## FDA Compliance

The clear FEP/PFA Encapsulation of the Vulcan Chem-Ring® FEP / PFA Encapsulated 'O'-Ring complies with Part 177 of Title 21 of the F.D.A. Regulations, for safe use as articles (or components of articles) for producing, manufacturing, processing, preparing, treating, packaging, transport or holding food in accordance with F.D.A. Regulation 21 CFR 177.1550. Vulcan Chem-Rings® comply with many other international standards and regulations. Please contact us for further information.



## Thickness of Encapsulation

Cross Section	FEP/PFA Encapsulation Thickness	Cross Section	FEP/PFA Encapsulation Thickness
0.070"/1.78 mm	0.008"/0.203 mm	0.225"/5.70 mm	0.020"/0.508 mm
0.078"/2.00 mm	0.008"/0.203 mm	0.275"/6.99 mm	0.020"/0.508 mm
0.095"/2.40 mm	0.010"/0.254 mm	0.312"/8.00 mm	0.020"/0.508 mm
0.103"/2.62 mm	0.010"/0.254 mm	0.330"/8.40 mm	0.020"/0.508 mm
0.118"/3.00 mm	0.010"/0.254 mm	0.375"/9.50 mm	0.020"/0.508 mm
0.139"/3.53 mm	0.012"/0.305 mm	0.393"/10.00 mm	0.020"/0.508 mm
0.157"/4.00 mm	0.012"/0.305 mm	0.472"/12.00 mm	0.030"/0.762 mm
0.196"/5.00 mm	0.015"/0.381 mm	0.708"/18.00 mm	0.030"/0.762 mm
0.210"/5.33 mm	0.020"/0.508 mm	0.787"/20.00 mm	0.030"/0.762 mm

The above table shows the variance in thickness of FEP or PFA Encapsulation with different BS 1806/ AS 568, BS 4518 and International Metric Standard 'O'-Ring Cross-Sections. For square sections, please contact our Technical Department.

## Hardness

Shore Hardness average of the seal  
 85-90 Shore A for solid core Silicone  
 90-95 Shore A for solid core Viton®  
 75-80 Shore A for hollow core Silicone  
 This applies for round, square and rectangular sections

## Temperature Range

### FEP Encap

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

### PFA Encap

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







# Application Information

## Instructions for installing FEP / PFA Encapsulated 'O'-Rings

1. All surfaces that the 'O'-Ring will contact in operation should be smooth and free from sharp edges, burrs and deep scratches. A 30 micro-inch finish is best recommended on the bore, 15 micro-inch finish on the shaft.

2. Lubricate the 'O'-Ring and all contact surfaces with a clean light oil or grease.

3. If it is difficult to install the 'O'-Ring over a shaft, it may be 'stretched' by first immersing the 'O'-Ring in boiling water for a few minutes. This softens and enlarges the 'O'-Ring and allows it to be fitted more easily. Install the 'O'-Ring when it is still hot and it will return to its original size when cooled. Elongation at Break is 108 to 150% but it is strongly preferable not to stretch the 'O'-Ring more than 20% for Silicone core and 7% for Viton® core 'O'-Rings.

4. Do not bend the 'O'-Ring too sharply as the FEP / PFA will tend to kink under the strain. If it does become kinked however, it will not effect the operation in most applications.

The degree of squeeze best recommended is:  
 15/22% for static applications  
 10/15% for dynamic applications  
 8/10% for pneumatic applications

The amount of squeeze required varies with many factors, most critically, the pressure to be sealed.

Recommended Maximum Design Radial Clearance Gap To Prevent Extrusions			
Maximum Pressure PSI	Encapsulated 'O'-Ring Type		
	Hollow Core	FEP/PFA Silicone	FEP/PFA Viton®
100	0.011" / 0.279mm	0.015" / 0.381mm	0.018" / 0.457mm
250	0.010" / 0.254mm	0.014" / 0.355mm	0.016" / 0.406mm
500	0.009" / 0.228mm	0.012" / 0.304 mm	0.014" / 0.355mm
750	0.008" / 0.203mm	0.010" / 0.254mm	0.012" / 0.304mm
1000	0.006" / 0.152mm	0.009" / 0.228mm	0.011" / 0.279mm
1500	0.004" / 0.101mm	0.006" / 0.152mm	0.009" / 0.228mm
2000	0.003" / 0.076mm	0.005" / 0.127mm	0.006" / 0.152mm
3000	0.001" / 0.025mm	0.003" / 0.076mm	0.004" / 0.101mm

## Compression Set

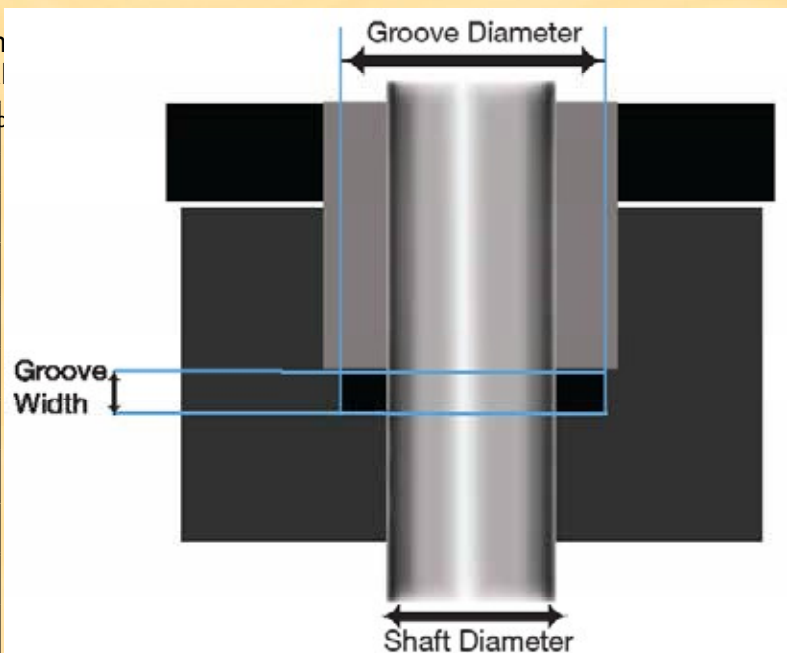
Vulcan Chem-Ring® resist hardening and embrittlement due to the FEP / PFA encapsulation. The 'O' Seals retained elasticity and recovery properties at temperatures up to 205°C/401°F is due to the Silicone or Viton® core material.

The results of compression set tests, which compare the retained Sealing force of perfluoroelastomers, fluoroelastomer and FEP Encapsulated 'O'-Rings show the benefits of using these rings in compression to others.

The results of these tests demonstrate that, by combining the mechanical properties of Viton® or Silicone elastomers and the chemical resistance of FEP/PFA resins, the Chem-Ring possesses the ability to resist compression set and retain its mechanical properties.

## 'O'-Ring Groove Size

Vulcan Chem-Ring are designed to be used in all standard 'O'-Ring grooves with the same housing dimensions and clearances as for standard elastomeric seals. Our recommendations for BS 1806/AS 568 Imperial Standard 'O'-Ring grooves are tabulated below for the standard groove design show below.





# Advanced Production Intense Inspection

## Exceptional Materials

We are one of the world's highest volume manufacturers of Encapsulated 'O'-Rings and Mechanical Seal products.

Vulcan's policy is to produce a superior quality of and stock the widest range of, all common Encapsulated 'O'-Rings, manufactured extremely well and specified to contain high quality materials, especially on the critical tolerances. So Vulcan only use DuPont® genuine Viton®, and high specification FEP resin to ensure we start with the best quality materials.

Encapsulated 'O'-Rings and KamLock® Gaskets are manufactured from extruded FEP/PFA tube and Viton®/Silicone cords. Our material tolerance requirements, necessary to produce a close-tolerance finished ring, are extremely exacting and difficult to manufacture on a consistent basis. We set exacting standards and control them through tight specification and electronic material inspection.

## Unbeatable Production

All standard Vulcan "Chem-Rings are produced in our own four modern, advanced factories. These four facilities are situated on multiple continents, in order that we can produce volume, quality FEP/PFA Encapsulated 'O'-Rings at the most competitive prices, whilst offering fast, special-sizes manufacture, to service our key markets and customers around the Globe.

We strongly complement these unrivalled production facilities with an industry leading, ex-stock service. Fully integrated, electronic, bar-coded, computerised stock control and supply management systems are utilised to guarantee an ex-stock service.

This is backed by a stock of about 2 million Encapsulated 'O'-Rings, viewable on our web-site and web-portal on all repeat sale sizes and types.

## Quality Assurance

All Vulcan Chem-Rings are manufactured in Vulcan's high-spec factories, to our exacting Quality Requirements and Standards. All Vulcan production sites and our world-wide distribution centre to ISO9002. (ISO9001.2000 from 01/01/04).

Our manufacturing facilities and our distribution operations are examined and certified to ISO9001.2000. Vulcan have extremely extensive and intensive quality, inspection and work documentation systems. In-depth, electronically integrated process documents and assessment systems govern all aspects of manufacture, assembly, inspection and supply.

Every Vulcan component and seal is produced and processed via our Global inspection System.

This system incorporates all of the above controls and cumulating in 100% inspection of each and every FEP / PFA Encapsulated 'O'-Rings batch and EASON® computer controlled shadow-graph, Mitutoyo® CNC Co-ordinate measuring and particularly Micro-Vu® digital imaging machines, prior to despatch from our factories.

Copies of our SKIS inspection forms and procedures are available upon request. Vulcan can provide Certification with supply to cover inspection, size/tolerance, F.D.A. Compliance, materials etc.

Thus a Vulcan Seal Means Quality and Reliability Assured.







# Advanced Production Intense Inspection

## Comprehensive Engineering Standards

Vulcan's Engineering Department produces and documents, in our Engineering Standards Electronic System and Library, extensive and complete details on all the key technical features of our FEP / PFA Encapsulated 'O'-Ring, Manufacture, Assembly, Moulding and Inspection. Please contact us for details on any aspect.

### Electronic Inspection

The superb Quality of a Vulcan FEP / PFA Encapsulated 'O'-Ring starts with fully electronically documented, control and traceability, throughout the complete manufacturing process. Excellent staff training, management and motivation, tied to a stringent focus on Quality and Reliability Assured at every stage of the process, are the key foundations of our production of this intricate product. Computerised, automatic, electronic inspection machines (Micro- VU® and Mitutoyo®) are utilised to inspect and control every batch of receipt of raw material and final inspection of a Vulcan FEP / PFA Encapsulated 'O'-Ring.

### Q Standard

All Vulcan FEP/PFA encapsulated 'O'-Rings are manufactured to Q grade standard, controlled and inspected to BS 1806/AS 568 tolerances and supplied with a Q suffix on the stock-code.

## Manufacturing Standards

The Chem-Ring is an 'O'-Ring, consisting of a seamless and uniform FEP / PFA encapsulation, which completely encloses the core material of Silicone or Viton®. In brief, the seal is manufactured by pressure injecting the rubber core material into thin wall FEP / PFA tubing. This eliminates any potential gap between the core and the tube wall.

The FEP / PFA tubing is joined by a special heat moulding process to give a true, seamless encapsulation. On our Vulcan Chem-Ring, the mould area exhibits no discernible different characteristics to the rest of the circumference of the seal. There are no joints nor ridges to affect the seal's performance nor life.

The nature of the moulding process is critical to the quality of the Ring. Standards for the manufacture of moulded rubber 'O'-Rings call for close tolerances on the I.D's and, particularly, the Cross-Sections of the rings. Outside these tolerances, any step in the Cross-Section can severely affect the 'O'-Rings ability to seal.

FEP / PFA Encapsulated 'O'-Rings are hand moulded in a very precise and skilled operation. Traditional production processes have been previously unable to guarantee absolutely the tolerances in the join area.





# Chemical Resistance, Restricted Permeability and Absorption

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 (chlorotrifluoride) 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 hydrides such as Borane, aluminium chloride, ammonia and certain amines (R - NH<sub>2</sub>) and KOH metal phosphates (e.g. Fluoroborane (NH<sub>3</sub>), and Formaldehyde (R - NH<sub>2</sub>)). 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®, 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.

## Typical Chemicals with which 'FEP / PFA' resins are compatible

Abietic acid	Bromine	Diethyl carbonate
Acetic acid	N-Butyl amine	Dimethyl ether
Acetic anhydride	Butyl acetate	Dimethyl formamide
Acetone	Butyl methacrylate	Di-isobutyl adipate
Acetophenone	Calcium chloride	Dimethylformamide
Acrylic anhydride	Carbon Disulfide	Dimethyl hydrazine
Alkyl methacrylate	Cetane	Dioxane
Ammonia, liquid	Chlorine	Ethyl acetate
Ammonium chloride	Chloroacetic Acid	Ethyl alcohol
Aniline	Chloroform	Ethyl ether
Aqua Regia	Chlorosulfonic acid	Ethyl hexanoate
Benzoyl chloride	Chromic acid	Ethylene bromide
Benzyl alcohol	Cyclohexane	Ethylene glycol
Benzoyl Peroxide	Cyclohexanone	Ferric chloride
Borax	Dibutyl phthalate	Freons
Boric acid	Dibutyl sebacate	Potassium permanganate
Fluoroborane (NH <sub>3</sub> )	2-Nitro-butanol	Pyridine
Formaldehyde (R - NH <sub>2</sub> )	Nitromethane	Soap and detergents
Formic acid	Nitrogen tetroxide (NH <sub>4</sub> )	Sodium Fluoride
Furane	2-nitro-a2-methyl propanol	Sodium hydroxide < 80%
Gasoline	N-Octadecyl alcohol	Sodium hypochlorite
Hexachloroethane	Nitric acid	Sodium peroxide
Hexane	Nitrobenzene	Solvents, aliphatic and aromatic
Hydrazine	Oils, animal and vegetable	Stannous chloride
Hydrochloric acid	Oleum	Sulphur
Hydrocyanic acid	Ozone	Sulphuric acid
Hydrofluoric acid concentrate	Perchlorethylene	Tetrabromoethane
Hydrogen peroxide	Pentachloro-Benzamide	Tetrachloroethylene
Isopropyl alcohol	Perfluoroxylene	Trichloroacetic acid
Isocyanates	Phenol	Trichlorethylene
Lead compounds	Phosphoric acid	Tricresyl phosphate
Magnesium chloride	Phosphorus	Triethanolime
Mercury	Pentachloride	Turpaentine
Methyl ethyl ketone	Phthalic acid	Unleaded fuel
Methacrylic acid	Pinene	Vinyl methacrylate
Methanol	Piperidene	Water
Methyl methacrylate	Polyacrylonitrile	Xylene
Napthalene	Potassium acetate	Zinc chloride
Napthols	Potassium hydroxide < 50%	



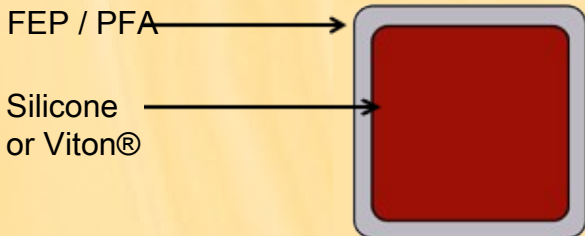
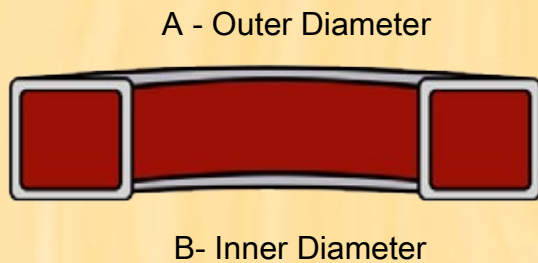


# Vulcan Kamlock® Seals

Vulcan Encapsulated Gaskets for KAMLOCK® Couplings are designed as universal, non-contaminating hose coupling seals. They eliminate the need to specify different elastomers for differing applications and eliminate coupling leakage through seal gasket failure, due to chemical attack or creep of solid Teflon® gasket seals. Vulcan KAMLOCK® seals provide a superior seal for any bulk liquid transfer coupling in manufacturing, distribution or storage.

- Universal Gasket as Extreme chemical resistance and wide temperature range.
- Leak Free Service Low compression set and elastomer core energiser avoids cold flow leakage of solid P.T.F.E.
- Non-Stick Surface Low co-efficient of friction (0.1 to 0.2) allows easy installation and removal.
- Sanitary, Sterilizable and F.D.A. Compliant Encapsulation eliminates contamination.

C - Cross Section



## Rectangular FEP Gasket For Kamlock® Couplings

Coupling Nominal Size		Dimensions					
		Inches			mm		
Inches	mm	A	B	C	A	B	C
0.500"	12.70	1.024"	0.669"	0.157"	26.0	17.0	4.0
0.750"	19.00	1.375"	0.875"	0.218"	35.0	22.2	5.54
1.000"	25.40	1.563"	1.063"	0.250"	39.7	27.0	6.35
1.250"	31.70	1.938"	1.359"	0.250"	49.2	34.5	6.35
1.500"	38.00	2.188"	1.625"	0.250"	55.6	41.3	6.35
2.000"	50.80	2.625"	2.000"	0.250"	66.7	50.8	6.35
2.500"	63.50	3.125"	2.375"	0.250"	79.4	60.3	6.35
3.000"	76.20	3.719"	3.000"	0.250"	94.5	76.2	6.35
4.000"	101.60	4.875"	4.000"	0.250"	123.6	101.6	6.35

## F.E.P. Encapsulation Thickness Tolerances

A	=	0.020" /	0.508mm
B	=	+/- 0.030" /	0.762mm
C	=	+/- 0.010" /	0.254mm



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