

# Innovative Sealing Solutions

Total integrity for the most  
demanding applications

# O-Rings



O-rings are the most commonly used sealing products. They are very effective as well as being relatively inexpensive and reliable.

O-rings are designed to offer sealing in both static and dynamic applications.

A wide range of elastomers are available including Nitrile (NBR), Hydrogenated Nitrile (HNBR), Silicone (VMQ), Polyurethane (PU), Perfluoroelastomer (FFKM), Viton®/FKM and PTFE. As well as standard grades many derivatives are also available.

Our current stock of over 80 million rings across 10,000 individual sizes ensures that we can remain competitive for both the largest and smallest enquiries.

We can provide same day despatch for stock items and offer relatively short lead times on non-stock items.

We can pack to individual specifications / requirements, providing all certification upon request.

All our products are clearly marked with part numbers, batch numbers and cure dates both in text and, if required, barcode formats. All products are fully traceable.

## PERFLUOROELASTOMER/ FFKM

As standard, FFKM has excellent resistance to extreme temperatures -10°C to +260°C and some special compounds can operate beyond 330°C.

It offers resistance to almost all chemicals, including inorganic acids, alkalines, ketones, esters, alcohols, fuels, and hot water and is used for applications in aggressive chemical environments.

Our standard FFKM compound (FFKM75B) has outstanding heat resistance with a service temperature of -10°C to +310°C, and offers very good chemical resistance.

In addition, we have many other FFKM materials to suit a range of applications.

## AED / EDR / RGD

Explosive decompression (ED), also known as rapid gas decompression (RGD), is a failure of elastomeric O-Rings, where Gas can be absorbed into the material under high-pressures at elevated temperatures. If the rate of decompression occurs quickly the gas expands beyond the materials ability to contain the gas bubbles, causing fissuring and resulting in seal failure.

We supply Norsok M-710 Certified Anti-Explosive Decompression (AED), Explosive Decompression Resistant (EDR) O-Rings at very competitive pricing.

## AEROSPACE / MILITARY SPEC

We can supply from Precix Inc. a major provider of high-specification O-rings for the demanding environments of Aerospace and Defence applications.

We supply O-rings approved to the latest Aerospace / Military specifications. All parts are manufactured in the USA within Quality Management System to ISO/TS 16949:2009 & AS9100.

“ We supply **NORSOK M-710 RGD resistant** seals to many major companies across the globe, operating in high pressure gas environments. ”



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# O-Rings

Material	Shore Hardness	Standard Compound Working Temperature	FDA	WRAS	Peroxide Cured	USP	AED / NORSOK	Metal Detectable
Nitrile (NBR)	40-90	-40°C to +110°C	•	•	•			•
Silicone (SIL)	30-90	-50°C to +204°C	•	•	•	•		•
Fluorocarbon (Viton® / FKM)	60-90	-20°C to +204°C	•		•	•	•	•
Ethylene-Propylene (EPDM)	40-90	-55°C to +135°C	•	•	•	•		
Neoprene (CR)	40-90	-32°C to +149°C	•					
Hydrogenated Nitrile (HNBR)	70-90	-30°C to +150°C					•	
Fluorosilicone (F-SIL)	50-80	-55°C to +177°C						
Perfluoroelastomer (FFKM)	75-90	-10°C to +260°C	•		•	•	•	
Polyacrylate (ACM)	60-80	-10°C to +149°C						
Ethylene Acrylate / Vamac® (AEM)	60-70	-40°C to +149°C						
Aflas® (TFE / P)	70-80	-9°C to +204°C						
Epichlorohydrin (ECO)	50-90	-40°C to +121°C						
Butyl (IIR)	60-70	-50°C to +121°C						
Natural Rubber (NR)	50-80	-50°C to +70°C						
Polyurethane (PU)	70-90	-40°C to +80°C						
Styrene Butadiene (SBR)	50-80	-45°C to +100°C						
Carboxylated Nitrile (XNBR)	70-80	-30°C to +150°C						

Within the Materials section on our website, you will find further information on the many types of compounds we supply.

Downloadable datasheets are also available for these materials. There are so many possible variations that we have listed only the most popular materials. If you require further details regarding any of our compounds, please contact us.

The following is a summary of compounds we supply:

**FDA**  
Compliant for use with Food stuffs.

**WRAS**  
Approved for the use of Potable water.

**USP Class VI**  
Often requested by end users such as medical or pharmaceutical processing companies as it provides added assurance for the quality and performance of utilised materials.

**PEROXIDE CURE**  
Most compounds are usually sulphur cured. Some materials (as detailed in the above list), are available as peroxide cured on request.

**COLOURS AVAILABLE**  
Generally: Black is the standard colour for most compounds, red for Silicone. Other colours can be supplied on request.

**METAL DETECTABLE**  
Metal detectable compounds are also available - contact us for more information.

**WORKING TEMPERATURES**  
For guidance purposes we have shown the working temperatures of our standard compounds. Where a lower or higher temperature is required, specially formulated compounds are available on request. For example FFKM is available for a high temperature of -330°C.

“ You tell us the **ID, Cross Section and material**, and **we will do the rest.** ”

# Encapsulated Rings (FEPs)



An encapsulated O-ring comprises of an elastomer core which has been seamlessly encapsulated in a jacket of Teflon® fluoropolymer. The core is either Viton® (FKM), Silicone (VMQ) or EPDM, and the jacket FEP or PFA.

Encapsulated O-rings are recommended when a standard O-ring has inadequate chemical resistance for an application and a solid PTFE O-ring does not have the elasticity for reliable, long term fluid sealing.

They are often used in the chemical, petrochemical, food and pharmaceutical industries, where chemical resistance and / or hygiene are required.

We can provide practically any size of encapsulated rings, with many sizes held in stock. We can offer both solid and hollow core styles as well as Cam and Groove gaskets.

Encapsulated O-rings are available in Cross Sections from 1.78mm - 25.4mm. The only limits to size are with the smaller ID's, please check our website for size limitation chart as the diameter of the cord dictates the smallest possible ID.

FEP Encapsulated O-rings offer excellent resistance to a wide range of chemicals and typical temperature ranges of:

- -60°C to +200°C with Silicone core
- -20°C to +200°C with Viton® core

They offer low friction and low 'stick-slip' effect.

PFA Encapsulated O-rings offer extra abrasion resistance and when combined with the Silicone core offer a flexible temperature range of -60°C to +260°C.

We also supply PFA Encapsulated O-rings with a Viton® core that offer a variable temperature range of -20°C to +200°C. Viton® core PFA Encapsulated O-rings provide extra abrasion resistance.

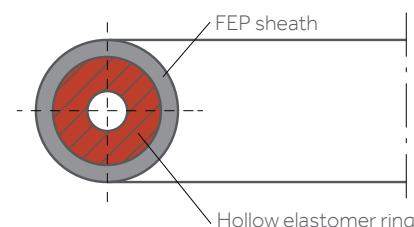
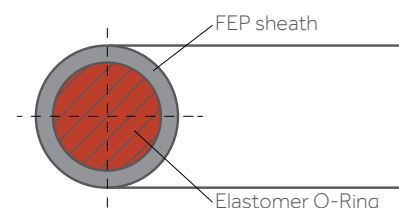


Figure 1.1 Different versions of FEP O-ring

“We supply a wide range of custom **encapsulated O-rings** available on short lead times, and can provide **bespoke CSD profiles / shapes** for our encapsulated seals.”



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# Spring O-rings™



Spring O-rings™ are an ideal product for the demanding challenges encountered in Cryogenic Sealing.

Today, even traditional markets such as transportation, food processing, pharmaceutical, medical and chemical processing industries encounter low temperature cryogenic conditions, where it is very difficult to achieve effective liquid or gas sealing.

Elastomers that we usually consider good at low temperatures (i.e. Silicone and Fluorosilicone) can quickly become brittle and lose the ability to provide resilience resulting in premature leakage.

However, the Spring O-ring™ utilises a precision rolled flat strip spring in 301 stainless steel (AMS 5519N) specially formed to energize a seamless jacket of Fluoropolymer (FEP or PFA). This composite assembly provides effective sealing in face type applications as low as -250°C.

## STRETCHING

Spring O-rings™ should have a split housing design that does not require the stretch of the part on fitting. A small amount of stretch can be tolerated but never greater than 4% of the seals inside diameter. Standard static groove conditions apply with a minimum surface finish of 20 micro-inches.

## PRESSURE VENTING

For pressures greater than 60 bar, we recommend that the jacket of the Spring O-ring™ is vented. Vents are a series of small holes through the wall of the encapsulating jacket, and prevent any pressure rupture.

## TEMPERATURE RANGE

- FEP / Spring O-ring: 250°C to +204°C (-420°F to +428°F)
- PFA / Spring O-ring: 250°C to +260°C (-420°F to +500°F)

Lead times are approximately 14 - 21 days for sizes from the standard range, and prices (on application) are very reasonable considering the technical merits of this product.

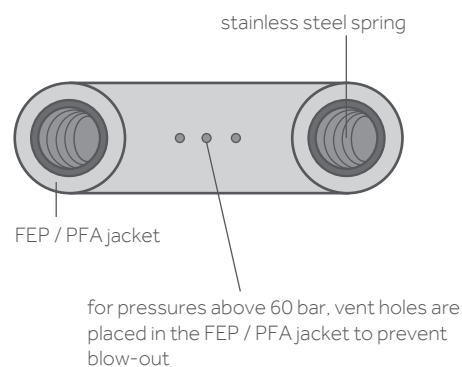


Fig 1.1 Spring O-ring™ jacket venting

There is simply **no better seal for cryogenic applications**. These specialised seals are well suited for use at **extreme low temperatures**.



# NORSOK Approved Compounds



Originally developed by the Norwegian petroleum industry, the NORSOK M-710 specification has become an internationally recognised standard for non-metallic sealing materials. Conforming materials afford Oil and Gas companies, in particular, explicit assurance of quality, performance and durability

In today's Oil and Gas industry, the application environments are constantly changing with increasing demands to improve seal elastomer performance.

To meet the NORSOK M-710 standard, materials must achieve accepted criteria for both rapid gas decomposition (RGD)/explosive decomposition (ED), and sour gas ageing (H2S). Both are proven indicators of long-term performance and life expectancy.

## RGD TESTING

RGD is a structural failure caused by gas permeation into the seal material. Gas in contact with elastomer surfaces can be absorbed into the material.

At high pressures this gas is compressed within the elastomer. When the systems pressure is reduced or falls quickly, the gas expands within the elastomer. This causes degradation and blisters which appear on the surface of the elastomer seal.



The seal may exhibit many signs of degradation including blisters, cracks, voids or discoloration.

Figure 1.1 Explosive Decompression (ED / RGD)

RGD testing establishes a material's resistance to cracking and blistering under sudden changes in pressure and temperature. It conforms to M-710 providing measurable assurance of structural resilience and seal integrity in hostile sub-sea applications.

## SOUR AND SWEET GAS TESTING

Sour gas testing (H2S) relates to the potential degradation over an extended period of time. The tests quantify criteria such as tensile strength, hardness, swelling and elongation to ensure continuing predictable performance far beyond the practical life of a particular component.

We supply a wide range of NORSOK approved materials, including formulations within the HNBR, FKM, Viton GLT and FFKM materials that have passed the NORSOK M-710 requirements.

## FEATURES AND BENEFITS

- High tensile properties
- Low compression set
- Good low temperature properties
- Excellent heat resistance
- Good resistance to aggressive / crude oils
- Good chemical compatibility
- Long life in aggressive media



Our range of formulations includes **HNBR, Viton B, Viton GLT and FFKM** materials. All have passed the strict **NORSOK M-710** requirements.



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# NORSOK Approved Compounds

## ENGINEERED FOR DEMANDING APPLICATIONS AND EXTREME ENVIRONMENTS

Advanced elastomers developed for Oil and Gas applications

ES Ref	Colour	Temperature Range	Shore	Notes
V90 AED GLT	Black	-30°C to +250°C (Static) -40°C to +220°C (Dynamic)	90	NORSOK M-710 Approved.
V90 AED Type B	Black	-30°C to +250°C (Static) -15°C to +220°C (Dynamic)	90	NORSOK M-710 Approved. Provides low and stable compression set at high temperature.
FKM90 LT60 AED	Black	-60°C to +225°C (+250°C for short periods)	90	This compound is suitable for Ultralow temperature applications. It has good permeability to hydrocarbons ethane – propane). NORSOK M-710 Approved (Rev.2 October 2001). NACE TM0187 Tested – Sour Fluid test.
FKM90 LT50 AED	Black	-50°C to +225°C (+250°C for short periods)	90	NORSOK M-710 Approved (Rev.2 October 2001).
FFKM8717	Black	-10°C to +230°C continuous (260°C Peak)	90	NACE TM0187 Tested – Sour Fluid test.
FFKM8732	Black	-45°C to +250°C continuous	90	High chemical resistance and low temperature capability. Developed for the Oil & gas Industry. Explosive decompression resistant, tested to NORSOK M-710.
HNBR90 AED	Black	-30°C to +150°C	90	NORSOK M-710 Approved.
HNBR90 AED LT	Black	-55°C to +160°C	90	This peroxide cured compound has 19% ACN content, with carbon black reinforcement. It provides low temperature capability and rapid gas decompression (RGD) resistance. NACE TM0187 Tested – Sour Fluid test.

# FFKM (Perfluoroelastomer)



FFKM compounds are exceptionally resistant to degradation by aggressive fluids and gases. They fill an important niche for applications that involve severe chemicals at temperatures up to 330°C.

Perfluoroelastomers (FFKM) provide outstanding chemical and thermal resistance. They can withstand many aggressive chemicals making them ideal for use in the most demanding Chemical sealing applications.

Our competitively priced standard compound FFKM3152 offers broad chemical resistance, and combines excellent heat resistance with low temperature flexibility (-30°C to +230°C continuous.).

We can supply direct FFKM equivalents to many Kalrez® Simrez® Perlast® Chemraz® grades.

“All FFKM compounds are individually bagged to avoid contamination.”

ES Ref	Colour	Standard Compound Working Temperature	Shore	Notes
FFKM3152	Black	-30°C to +230°C	75	Broad chemical resistance. Used as a standard compound in a variety of applications. This compound meets the FDA requirements according to CFR 177.2600 in regard to global migration. Low temperature flexibility.
FFKM3153	White	-30°C to +230°C	75	Broad chemical resistance. Used as a standard compound in a variety of applications. This compound meets the FDA requirements according to CFR 177.2600 in regard to global migration. Low temperature flexibility.
FFKM8701	Black	-10°C to +230°C continuous (260°C Peak)	60	For general use offering universal chemical resistance
FFKM8702	Black	-10°C to +230°C continuous (260°C Peak)	70	For general use with outstanding resistance to aggressive media.
FFKM8703	Black	-10°C to +230°C continuous (260°C Peak)	80	Developed for food and pharmaceutical processing, automated CIP and SIP systems and is FDA compliant to 21 CFR 177.2600. Offers outstanding resistance to aggressive media.
FFKM8705	Black	-10°C to +230°C continuous (260°C Peak)	75	High chemical resistance, particularly in hydrofluoric acid (HF). Optimum performance in photovoltaic (PV) processing environments. Low particle generation.
FFKM8706	Black	-10°C to +230°C continuous (260°C Peak)	90	For general use with outstanding resistance to aggressive media.
FFKM8707	White	-10°C to +230°C continuous (260°C Peak)	70	Outstanding resistance to aggressive media. Developed for food and pharmaceutical processing, automated CIP and SIP systems. In accordance with USP Class VI and FDA 21 CFR 177.2600 requirements.



# FFKM (Perfluoroelastomer)

ES Ref	Colour	Standard Compound Working Temperature	Shore	Notes
FFKM8708	White	-10°C to +230°C continuous (260°C Peak)	80	Developed for food and pharmaceutical processing, automated CIP and SIP systems. In accordance with FDA 21 CFR 177.2600 requirements.
FFKM8713	Black	-10°C to +230°C continuous (260°C Peak)	75	FFKM 75 ± 5 Shore A black, upper chemical resistance grade. Developed for very demanding sealing applications. Hot amines and steam resistant.
FFKM8714	White	-10°C to +230°C continuous (260°C Peak)	60	General use - with high chemical resistance.
FFKM8716	Ivory	-10°C to +230°C continuous (260°C Peak)	75	Very high chemical resistance and developed for very demanding sealing applications. Resistant to hot amines.
FFKM8717	Black	-10°C to +230°C continuous (260°C Peak)	90	High chemical resistance; Developed for the Oil & gas Industry. Explosive decompression resistant (Norsok M-710 Annex B approved).
FFKM8720	Black	-40°C to +230°C continuous (260°C Peak)	75	High chemical resistance, in particular to oilfield fluid. Good sealing performance when operating conditions change during the process lifetime. Very low temperature capability.
FFKM8722	Black	-40°C to +230°C continuous (260°C Peak)	75	Developed for Oil and Gas Industries. High chemical resistance. Very low temperature capability.
FFKM8726	Ivory	-10°C to +230°C continuous (260°C Peak)	80	Specifically developed for semiconductor applications. Good mechanical properties, low particle generation and low weight loss in plasmas. Specific cleaning and packaging in ultra pure environment.
FFKM8727	Ivory	-5°C to +300°C continuous (320°C Peak)	70	Good mechanical properties, low particulate generation and low weight loss in plasmas. Specific cleaning and packaging in ultra pure environment.
FFKM8732	Black	-45°C to +250°C continuous	90	High chemical resistance and low temperature capability. Developed for the Oil and Gas Industry. Explosive decompression resistant, tested to Norsok M-710.
FFKM8733	Black	-10°C to +230°C continuous (260°C Peak)	80	An upper chemical resistant material, developed for very demanding sealing applications. Hydrofluoric acid resistant.
FFKM8740	Black	-5°C to +230°C continuous (260°C Peak)	75	Our most economical grade - Outstanding resistance to aggressive media. Optimized formulation for the largest range of applications.
FFKM8741	Black	-5°C to +275°C continuous	75	Improved chemical resistance grade. Designed for mid and high temperature chemical resistant applications. Excellent compression set and long term performance. Compound is certifies as USP Class VI for pharmaceutical industry.
FFKM8742	Black	-30°C to +200°C continuous (220°C Peak)	75	General purpose material, with outstanding resistance to aggressive media. Low temperature applications.
FFKM8748	White	-10°C to +230°C continuous (260°C Peak)	70	Specific compound for Quad Ring / X Rings. Developed for food and pharmaceutical processing, automated CIP and SIP systems. In accordance with FDA 21 CFR 177.2600 requirements.
FFKM8749	White	-5°C to +300°C continuous (320°C Peak)	60	Low sealing force applications in semiconductor thermal processes. Low outgassing properties at elevated temperatures.
FFKM8753	Black	-10°C to +300°C continuous (330°C Peak)	70	This compound is recommended for General use for high temperatures. It has broad chemical resistance and excellent steam resistance.
FFKM8755	Black	-10°C to +300°C continuous (330°C Peak)	80	This compound is recommended for General use for high temperatures. It has broad chemical resistance and excellent steam resistance.
FFKM8759	Light Grey	-10°C to +300°C continuous ( 330°C Peak)	80	For high upper temperatures with broad chemical resistance. Developed for various semiconductor processes, very low extractable metal ions.
FFKM8760	Beige Translucent	-5°C to +300°C continuous (320°C Peak)	75	Developed for Semicon Industry and suitable for dry and wet applications. This is a high purity compound without filler. Outstanding resistance to aggressive chemicals and high temperature conditions.

# O-ring Cord



O-Ring Cord is supplied as a continuous extruded cord and can be used to make custom sized O-Rings when standard sizes are not suitable.

O-Ring Cord, or extruded cord is one of our major stock lines. We hold large stocks of Nitrile, FKM and Silicone Cords from 1.00 mm - 25.00 mm in standard shore hardness's with larger diameters available on request. Additional materials including DuPont Viton® Cord are also available on request.

We also have an expanding stock range of both Silicone and EPDM cords. Our vast availability of cord stocks ensures we can provide same day despatch and next day delivery at competitive prices.

Square Section and 4 Lobed Profile (Quad-ring®) Cord is also available in sizes up to 25 mm and various shore hardness's.

Additional materials can be supplied on short lead times upon request:

- Aflas® (in both 75 and 90 Shore)
- Fluorosilicone
- Polyurethane
- HNBR 70

All our cord can be supplied in bulk on spools or cut to length as required; the spool lengths vary by size, so ask when ordering.

Butt joined rings are available upon request and can be turned round within 24 hours or less.

We can also supply standard spicing kits in Viton® and Nitrile, however, other materials can be provided.



Figure 1.1 Splicing Kits available

“We hold **large stocks of Nitrile and Viton® O-ring Cord**, as well as other materials including **Silicone and EPDM**. We also supply **Vulcanised O-rings**.”



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# Vulcanised / Scarf Jointed Rings



The process of scarf joining and vulcanising can produce O-rings of virtually any size without the need for tooling.

In addition to no tooling cost, the other advantages of scarf joined and vulcanised rings are that no flash is present on the ring.

The lead times are normally quicker than starting from scratch with a moulded O-ring and there are no upper limits on ID.

Vulcanised O-rings are readily available in cross sections from 1.78mm-25.4mm, with larger cross sections available on request. The only limits to size are with the smaller ID's, please check our website for our size limitation chart as the diameter of the cord dictates the smallest possible ID.

Central to the quality of this product is the cord that is used to make the rings. The extrusion lines used to produce the cord used in our scarf joined and vulcanised rings is laser controlled, meaning that cross sections up to 6.35mm are to DIN7715 E1, above this they are to E2 tolerances.

The process used to join the ring again is very important, tight quality control means that often the join is at least 90% as strong as the cord itself.

Materials available include:

- Viton®, Nitrile, EPDM, Silicone Neoprene®, HNBR, Aflas®, Viton® Extreme.
- FDA grades of EPDM, Silicone and Viton®, as well as USP Class VI EPDM readily available.
- Low temperature FKM, high fluorine FKM or vacuum quality semiconductor FKM are also available.



Figure 1.1 Scarf-jointed O-ring profile

“ Our large stocks give us the capability to provide you with a **24-48 hour emergency service** on a wide range of sealing products. ”



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# Quad-Rings® (X-Rings)



Quad-rings® are often referred to as X-rings, Nu-Lips®. Occasionally they are identified by a '4 - (dash)' reference. They can be used in a wide variety of static and dynamic sealing applications.

The four-lobed design provides twice the sealing surface in comparison to a standard O-ring. The double-seal action requires less squeeze to maintain an effective seal. This reduction in squeeze means less friction and improved seal life.

Quad-ring® parting lines are between the lobes, away from the sealing surface, thus eliminating the problems of leakage often resulting from a parting line's irregular surface as found on an O-ring.

Quad-rings® are designed to outperform a standard O-ring in rotary seal applications.

The four-lobed configuration creates a more stable seal avoiding spiral twisting. This allows the use of a narrower groove width than a standard O-ring groove, however, it can also be used in a standard O-ring groove.

Quad-rings® have the same dimensions as the AS568A O-ring sizes, also referred to as standard size O-rings, and are available in a variety of materials.

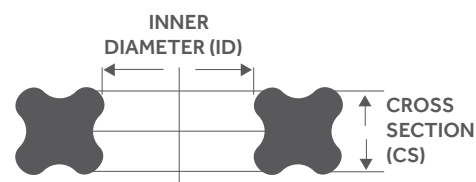


Figure 1.1 Quad-ring® measurements

“ We hold a **wide range of Quad-rings® in stock**. All are fully traceable by their unique batch number for complete confidence. ”

# Back-Up Rings



Back-up rings or anti extrusion rings as they are sometimes called have been used for many years in conjunction with O-rings in high pressure applications.

A back-up ring is a rigid ring that holds an elastomeric seal to its designed shape and in its correct place. Back-up rings are most commonly used with O-rings to prevent extrusion at high pressures.

When sealing the piston inside a pneumatic cylinder, a soft and flexible material is required to prevent leakage, but those same properties may leave the seal material vulnerable to being pulled out of its seat and then pinched or torn in the narrow space between piston and cylinder wall. If the joint cannot be redesigned, or a more resistant elastomer used, then the solution may be direct reinforcement with a stiffer material - in the form of a hard inner ring in this case.

In general terms, for dynamic applications over 100 bar, and static applications around 950 bar, back-up rings should be used. Each application can vary so you must check and use this as a general guideline only.

Traditionally PTFE has been used for these items, but in recent years contoured elastomer rings have been developed and are now very widely used. We hold large stocks of Contoured rings in both Nitrile and Viton®.

Depending on the fitting arrangement either Solid, Split or Spiral PTFE rings are used, or the contoured alternative. We can supply which ever type you require.



Fig 1.1 Rectangular, uncut



Fig 1.2 Rectangular, cut



Fig 1.3 Spiral

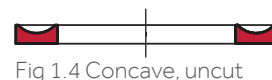


Fig 1.4 Concave, uncut



Fig 1.5 Concave, cut

Fig 1 Back-up ring types

“ We hold **large stocks** of Contoured rings in both **Nitrile and Viton®**. We have the capability to supply any type you require. ”



# Bonded Seals



Bonded Seals are commonly known as Dowty Seals or Dowty Bonded Washers. They are high pressure seals used in the Mechanical, Hydraulic and Pneumatic sectors.

Bonded Seals have generally replaced copper washers in high pressure applications.

A trapezoidal shaped rubber sealing element is bonded to the inner of a metal washer to produce the finished part. Used in circumstances where high pressures demand greater sealing capacity than can be obtained with Copper washers. The metal ring prevents over compression and extrusion of the pliable ring.

#### CHARACTERISTICS OF BONDED SEALS

- Ideal Pressure Gasket
- Reliable sealing at high & low pressure
- High & low temperature capability
- Reduced bolt torque with no loss of tightening loads
- Metal ring prevents rubber compression

The most common washer types are Mild Steel or Stainless steel, however, other metals can be supplied.

The most common rubber types used are Nitrile (NBR) and FKM (Viton®).

Different combinations of metal washer to rubber sealing elements can be produced.

Bonded Seals are available in a choice of materials including:

- |                   |            |
|-------------------|------------|
| • Mild Steel      | • Nitrile  |
| • Stainless Steel | • Viton    |
| • Brass           | • EPDM     |
| • Aluminium       | • Silicone |

#### WHY USE BONDED SEALS?

Bonded Seals were originally designed to replace copper type washers in high pressure systems. Bonded Seals comprise of a metal washer and an elastomeric ring bonded inside the diameter. The metal washer prevents over-compression and limits deformation of the elastomeric ring.

We can supply Bonded Seals in both standard and Self Centering styles to in the following ranges:

- Inch
- BSP
- German Metric
- French Metric

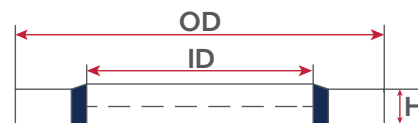


Fig 1.1 Standard bonded seal type

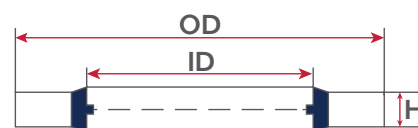


Fig 1.2 Self-entering bonded seal type

“We are dedicated suppliers of **high quality products**. **Certificate of Conformity** comes as **standard**, and we offer special labelling and bagging services.”

# Gamma Seals

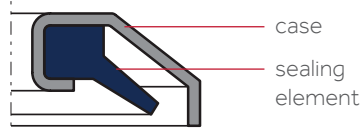


The Gamma Seal is designed to provide an uncomplicated and efficient rotary shaft seal, that excludes contamination, moisture and grease. It is used to protect bearings and conventional radial seals in dirty and demanding applications. It consists of an elastomer sealing lip contained in a metal carrier. This design copes with arduous static and dynamic conditions in mobile hydraulics and power transmission applications

Gamma Seals are used in a wide range of applications. They are produced in shaft diameters from 10mm and 225mm. The two part seal comprised of an elastomer sealing member and metal case, is intended to seal against foreign matter, liquid splatter, and grease.

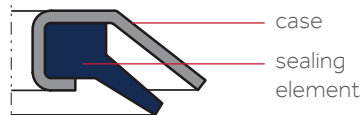
## GAMMA SEAL PROFILES

### 9RB GAMMA SEAL



The shape of the metal case allows a supplementary barrier via the labyrinth in the housing groove - this is very effective for heavy-duty applications.

### RB GAMMA SEAL



The metal case protects the seal from solids and contributes in excluding other dirt by centrifusion. This allows good drainage after immersion in liquids.

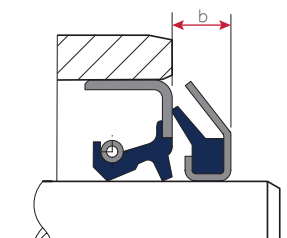


Fig 1.1 Gamma Seal fitted on shaft end

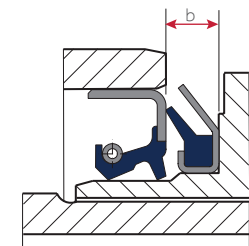


Fig 1.2 Gamma Seal fitted on shaft boss

“ The GAMMA Seal gives **excellent protection against dirt** from the outside. ”

# Hydraulic Seals



Hydraulic cylinders operate in a variety of applications and environmental conditions, including exposure to dust, debris or outside weather conditions.

Piston seals maintain sealing contact between the piston and the cylinder bore. The pressure acting on the piston seal increases contact forces between the piston seal and cylinder surface. The surface properties of the sealing surfaces are therefore critical to proper seal performance.

Piston seals are typically classified into single-acting (pressure acting on one side only) and doubleacting (pressure acting on both sides) seals.

Rod seals maintain sealing contact in sliding motion between the cylinder head and the piston rod. A rod sealing system can consist of a rod seal and a buffer seal or a rod seal only.

Wiper seals maintain a seal with the piston rod in both static and dynamic positions. Without a wiper seal, the retracting piston rod could transport contaminants into the cylinder seal.

They also assist in preventing moisture or particles from entering around the outside of the wiper seal.

Heavy duty applications typically consist of a combination of both seal types. Rod seals also provide a thin lubrication film on the piston rod that lubricates themselves and the wiper seals, helping to prevent corrosion of the piston rod surface.

UK Seals can also supply seals for telescopic cylinders. Telescopic cylinders are available in single acting, a single acting / double acting combination, or a double acting design. A double acting Telescopic cylinder is a more complex design and involves additional sealing within the internal body of the cylinder to seal off the different stages.

Although the price of a seal is relatively inexpensive, choosing the wrong seal / material for use in a telescopic cylinder can prove costly should it fail. It's for these reasons that it's important to ensure you select a high quality seal that is the right material.

UK Seals supply a range of Rod seals for use in one piece gland that are specifically designed for sealing in telescopic cylinders.

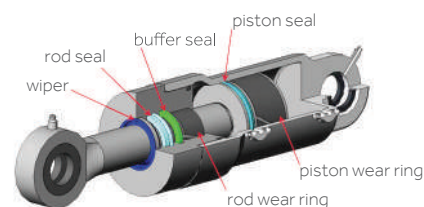


Fig 1.1 Hydraulic seal types  
(see diagram overleaf for more details)

“ Our Hydraulic Seals ensure **maximum durability** and **performance** with minimum maintenance. ”

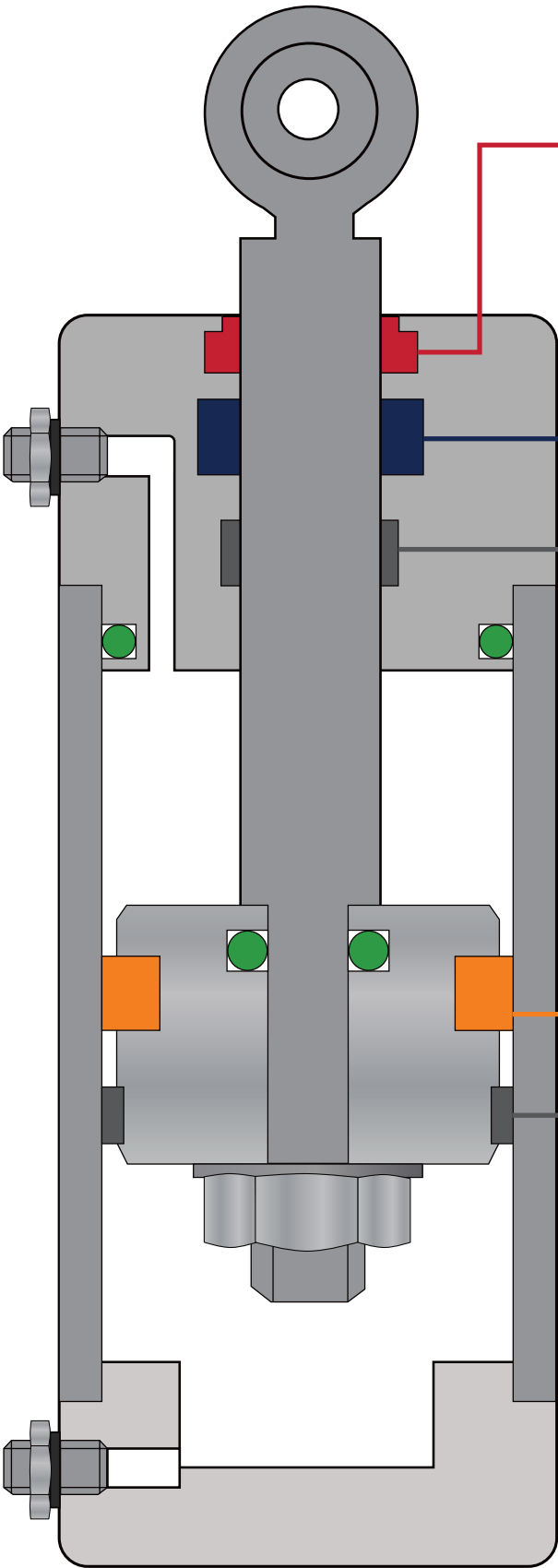


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# Hydraulic Seals



ROD WIPERS

WRT

WRC

WDA

WTD

WCB

WCC

ROD SEALS (SINGLE ACTING)

SUA

RTA

SFD

RFD

RUL

RVB

PISTON SEALS (SINGLE ACTING)

SFC

SFD

SUA

SUN

PBE

PPB

PISTON SEALS (DOUBLE ACTING)

SFB

PCS

PFB

PCA

PEE

PTA

WEARINGS / BEARINGS

Materials available:

Acetal

Phenolic

Fabric / Polyester Resin

Filled PTFEs

PEEK

UK Seals supply a wide range of Hydraulic seals including; PTFE seals, U Seals, fabric seals, compact seals, cup seals and V packs. Our products range from standard hydraulic seals to heavy duty, large diameter, custom solutions.

Contact UK Seals for additional profiles. Non-standard sizes are our strength.

- Rod Wipers

Rod Seals single acting

Piston Seals single acting

Piston Seals double acting

Wear Rings / Bearings

O-Rings

# Rotary Shaft Seals



ELASTOMER MATERIALS	TEMP RANGE
Viton®/Fluorocarbon	-20°C to +220°C
Nitrile	-30°C to +100°C
HNBR	-40°C to +150°C

Often called oil seals, grease, fluid or dirt seals, rotary shaft seals close spaces between stationary and moving components in mechanical equipment, helping prevent lubricant escape.

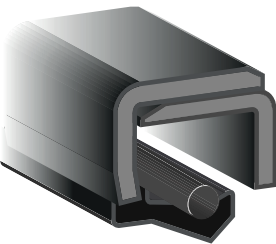
Rotary shaft seals are used to seal fluids on rotating shafts at various speeds. Rotary shaft seals are available with either a single or double sealing lip. In most cases the function of the secondary sealing lip on double lipped seals is used as an excluder to keep contaminants from entering the system. Common rotary seal applications include: gear boxes, electric motors and pumps.

Rotary shaft seals are produced by vulcanising an elastomer, most commonly Nitrile, to a metal ring which acts as a stiffener and utilises a metal tensioning spring behind the sealing lip.

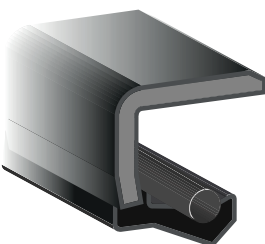
Rotary shaft seals for use on external rotation applications are available upon request.

We also offer a range of large diameter seals (available in imperial and metric sizes) for heavy duty applications such as equipment used in steel mills, pulp / paper plants and turbines. See overleaf for more information.

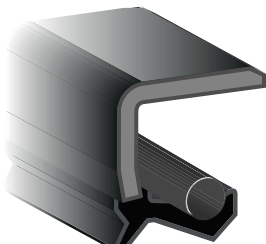
## Common Rotary Seal Profiles



**ACB**  
Fully metal encased single rubber lip rotary seal. Spring loaded primary seal lip additional reinforcing metal insert.



**ACA**  
Metal case, single rubber lip rotary seal. Spring-loaded primary seal lip.



**ACC**  
Metal case, double rubber lip rotary seal. Spring-loaded primary seal lip with additional dust lip.



**AIA**  
Rubber covered metal inner single sealing lip rotary seal. Spring-loaded primary seal lip.



**AIB**  
Rubber covered metal inner double lip seal. Spring-loaded primary seal lip. Additional dust lip.

Sealing can be affected by the following and must always be taken into consideration when selecting the correct profile and material for optimum performance:

- Shaft rotational speed / direction
- Operating temperature
- Application hardware details
- Medium being sealed both internally and externally
- Pressure seen within sealed unit

“ Rotary shaft seals conform to **DIN 3760** and are available in **many different designs** to suit a range of applications. ”



# Large Diameter Seals

UK Seals offer a range of heavy duty and large diameter seals of upto 3000 mm in high end rubber and plastic materials in endless (one piece) for any industry.

Large Diameter Seals are available in metric or imperial sizes, and are utilised for many applications including:

- Mild Steel
- Oil and Water Hydraulic Presses
- Forging Presses
- Wind Turbines
- Heavy Duty Presses
- Steel Mills
- Pulp and Paper Plants
- Automotive Stamping Presses
- Cement Plant
- Ship Hydraulics
- Shears

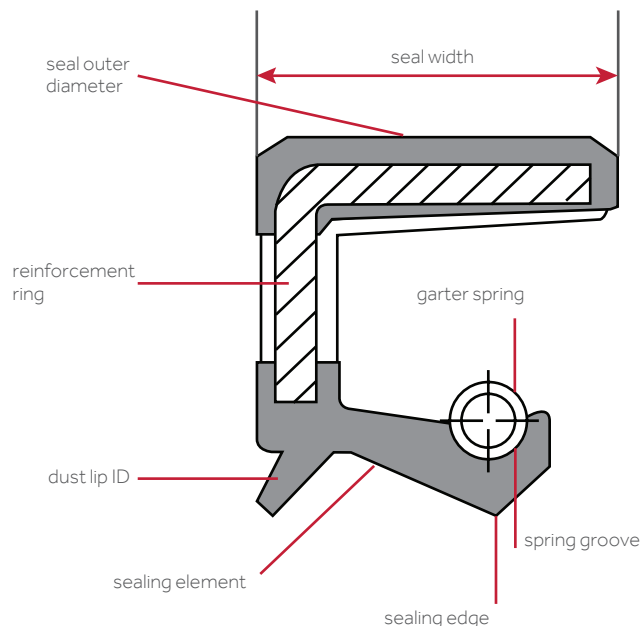


Fig 1.1 Typical rotary shaft seal components

## Common Large Diameter Profiles

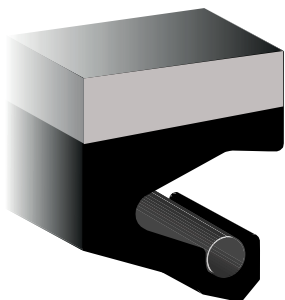


### AFP

Internal fabric shaft seal similar to the AFA profile but produced without a garter spring. Due to its construction, it can be used to control grease, light and dust. The seal lip is flexible, and the outside body is made from fabric to minimise damage during installation.

#### TYPICAL APPLICATIONS

Suitable for very small sections. This seal is typically used where space is limited.

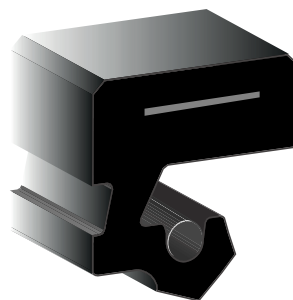


### AFA

Highly successful general purpose standard design seal. It is suitable for the majority of bearing protection duties and other radial lip seal applications across all industry sectors. The lip profile minimises heat generation and shaft wear.

#### TYPICAL APPLICATIONS

Used in all types of marine propulsion systems including bearings, gearboxes and associated equipment.



### AFJ

This is a widely used seal and offers a robust profile with a pressure-resistant lip that prevents the ingress of liquid or solid contaminants in aggressive industrial environments. It's flexible yet robust lip maintains sealing contact on slightly misaligned or eccentric shafts.

#### TYPICAL APPLICATIONS

Suitable for ships, stabilisers, blow thrusters, as well as numerous process plant and transmission system duties.



### AIG

A full rubber seal combined with a flexible steel band. This seal does not require a retainer ring, and can be assembled easily in open housing.

#### TYPICAL APPLICATIONS

Suitable for hot rolled or cold rolled steel rolling mills.



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# Mechanical Seals



MATERIAL	STANDARD RECOMMENDATION	TEMP RANGE
Nitrile	For general duties	-30°C to +120°C
Ethylene Propylene	For general duties especially hot water	-40°C to +140°C
Viton®	For general chemical applications	-30°C to +230°C
Neoprene	For refrigeration applications	-50°C to +100°C
FEP / PFA	For near universal chemical resistance	-60°C to +205/260°C
Kalrez®	For absolute chemical and temperature capability	-50°C to +310°C

We offer an extensive range of Mechanical Seals in all sizes and materials. Our range is divided into four main methods of shaft sealing, namely; rubber diaphragm, rubber bellows, O-ring mounted and PTFE wedge seals.

Our range of mechanical seals is designed to service the global pump market. All our seals are totally interchangeable with all other manufacturer’s equivalent seals, without any modification to the existing seals housings and gland plates. We can replace any single spring seal and seat, in most cases, straight from stock.

Material quality is vital to the capability, performance and life of a seal. We only specify superior quality materials. We have heavily invested in even further developing reaction and sintered SIC and Nickel and Cobalt TC sintering processes, so that we can exceed previous single spring seal norms.

This focus on the best quality face materials is standard throughout our mechanical seal range.

Exceptional design capability combined with a company-wide quality ethos, as well as extensive in-house inspection control systems gives us absolute quality, traceability and cost control of our products. This gives you assured consistency of supply, quality and reliability.

We supply all common industry standard Mechanical Seal types and dimensional standards, in addition to providing the largest range of equipment-specific Mechanical Seal replacements for all major global pump manufacturers. Please refer to the next page to see our range.

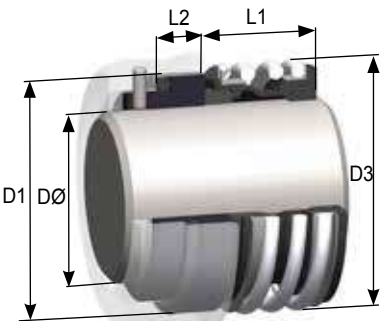


Fig 1.1 Measurements for mechanical seals

“ Our focus on the best quality face materials is standard across our range of mechanical seals. ”

# Mechanical Seals

Our range of mechanical seals includes:



## OEM REPLACEMENT SEALS

UK Seals supplies a large range of seal designs for specific pumps and applications across all industries. We also supply FDA specified compliant materials for all Seals commonly used within the Food and Beverage industry.



## CARTRIDGE MECHANICAL SEALS

Modular design, balanced, multiple spring, O-Ring mounted cartridge seals with various bolt holes and flush port combinations. Designed for easy installation with gland dimensions for near universal fitting.



## CONICAL O-RING MOUNTED

Robust design for DIN and standard housing dimensions. Wide choice of face materials, it is suitable for a large variety of applications - pumps, mixers, agitators, compressors and other rotary shaft equipment.



## ELASTOMERIC BELLOWS

Technically efficient and highly versatile. Suitable for virtually any application, especially pumping media containing solids for hygienic applications due to non-clogging, self-adjusting design.



## DIAPHRAGM

The accommodating single springs and elastomer diaphragms make this type ideal for general and demanding conditions. Highly proficient sealing covering all standard pump shaft working lengths and housing sizes.



## PARALELL O-RING MOUNTED

Robust design suitable for standard metric and imperial housing sizes. Commonly found in marine, textile, paper, refrigeration, waste water industries and many more.



## MULTIPLE SPRING

Balanced and unbalanced Multiple Spring seal range for corrosive and demanding applications. Available as internal component and external Cartridge Seals, as standard with 316SS and triple phenolic carbon.



## WATER PUMP

Cost effective and reliable seal used in high volume water systems, e.g. swimming pools, shower pumps, central heating and irrigation. Designed to improve seal performance and life where water interferes with seal faces.



## WAVE SPRING

Compact bidirectional seal originally designed for short working length and hygienic requirements, e.g. rotary lobe pumps. Ideal for pumping viscous liquids in the food, dairy, brewery and pharmaceutical industries.



## STATIONARY SEALS

Wide range of stationary seals in different styles and materials to help you find the best combination of sealing faces for your application requirements.



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# Bespoke Rubber Mouldings / Bellows



We work with a select number of quality orientated factories that can produce both small volumes and large volumes from your drawing or in some cases to sample.

The presses used for our custom mouldings are from 200 - 500 tonnes and can produce varying sizes as required.

When producing bespoke rubber mouldings it is always best to work with a drawing; the reason being is that rubber does not have as tight tolerances as plastic or metal parts, meaning you can never be sure if the sample is on the upper, lower or mid-range of its tolerance.

The mouldings can be made by either Injection or Compression moulding depending on the volumes and size of the product

and our suppliers' strict quality procedures ensure we supply to the very highest quality.

We can turn round quotations for bespoke rubber mouldings in 24 hours for simple shapes and materials. More complex mouldings may require a little more time.

Rubber bellows (also known as Boots) are an essential part of many different industrial systems. They are flexible seals used as protective covers for rod-ends, ball joints and numerous situations requiring the maximum possible protection from dirt or oil penetration.

Bellows can be manufactured in various rubber compounds, shapes and sizes to suit your application.



RUBBER BELLOWS



COUPLING RUBBER



DIAPHRAGM

Fig 1.1 Examples of bespoke mouldings

“The shape and material is down to **your design**, so send us the drawing and let us do the rest.”

# Rubber to Metal Bonded Parts

---



Rubber to metal bonding is an ideal process for manufacturing components and parts including; valve assemblies, shafts and rollers. Additional uses for this process include rubber components bonded to steel, aluminium and brass. These parts are commonly used in the Rail and Transport industries.

Rubber to metal bonding is a method where rubber is mechanically bonded to metal during the rubber moulding process. By combining components into one part rather than have two or three separate components not only results in potential cost savings, but also provides a more consistent and technically superior solution.

Rubber to metal bonded parts can be produced in a wide array of sizes and shapes.

The process used to bond rubber to metal depends on the application, specifically how the finished part will be used.

To achieve a successful bond, much of the value lies in mould tooling design, surface preparation processes, primer selection and curing configuration (temperature, pressure and duration).

We supply customised rubber to metal bonded solutions to meet customer requirements. Our knowledgeable technical staff can assist with product development, design and select the right rubber to metal bonding agents for the performance requirements of the application. Our goal with every project is to produce high quality products as efficiently as possible.

We supply rubber to metal bonded parts to the following industries:

- Food
- Automotive
- Valve
- Packaging
- Water and Sewage
- Railway and General Engineering
- 

Materials used include;

- Mild steel
- Carbon steel
- Aluminium
- Brass

“Typical applications for rubber to metal bonding include any part requiring the **flexibility of rubber**, yet the **stability of a metal**.”



# Gaskets / Washers



A gasket is a mechanical seal which fills the space between two or more mating surfaces, generally to prevent leakage from or into the joined objects while under compression.

Gaskets allow "less-than-perfect" mating surfaces on machine parts where they can fill irregularities. Gaskets are commonly produced by cutting from sheet materials. In the past Asbestos was a common gasket material for specific applications such as high pressure steam systems, but due to the health hazards associated with it, compressed non asbestos fibres (CNAF) are now used in its place.

It is usually desirable that the gasket be made from a material that is to some degree yielding, such that it is able to deform and tightly fills the space it is designed for, including any slight irregularities. Some joints may also require an application of sealant

directly to the gasket surface to function properly.

A washer is a thin plate (typically disk-shaped) with a hole that is normally used to distribute the load of a threaded fastener, such as a screw or nut. Other uses are as a spacer, spring, wear pad, preload indicating device, locking device, and to reduce vibration.

Washers are usually metal or plastic. Rubber or fiber gaskets used to stop the flow of water are sometimes referred to colloquially as washers; but, while they may look similar, washers and gaskets are usually designed for different functions. They are made differently, and are very reasonably priced considering the technical merits of this product.



Figure 1.1 Some of the washers available in our range

“ We have the capability to **supply any type of washer or gasket** you require, and at very competitive prices. ”

# V-Rings



V-rings are axial seals for shafts and bearings. They fit on a rotating shaft and seal against a counter-face. This type of seal has proved to be reliable and effective against dust, dirt, water, oil splash and other media.

V-ring shaft seals provide effective protection against dry and wet contamination. V-rings also reduce wear and extend the service life of the oil seal and bearings. They also perform well in dry running applications. Because they are all rubber and very elastic, they can be stretched over flanges or other components for easy installation with very little disassembly.

## V-A

V-ring type A with bevel back serves as a pressureless, axial rod seal with a very short mounting length, which is clamped on a shaft. The flexible sealing lip seals a counterface at a right angle to the shaft preventing dirt, dust and splash to enter the construction. Available in the widest range of sizes from .110" (2.7mm) shaft to 79.530" (2020mm) nitrile and fluoroelastomer. Ideal for protecting gearboxes, electric motors and drives.

## V-S

V-ring type S with bevel back serves as a pressureless, axial rod seal which is clamped on a shaft. The flexible sealing lip seals a counterface at a right angle to the shaft, preventing dirt, dust and splash to enter the construction.

Available in sizes from .180" (4.5mm) shaft to 8.270" (210mm). Commonly used in agricultural and automotive applications.

## V-L

V-ring type L with straight back serves as a pressureless axial rod seal with a very small mounting length, which is clamped on the shaft. The flexible sealing lip seals a counterface at a right angle to the shaft preventing dirt, dust and splash to enter the construction.



V-A STYLE



V-S STYLE



V-L STYLE

Figure 1.1 Standard V-ring shapes available

“We hold a **wide range of V-rings in stock**. All are **quality checked** and are **fully traceable** by their unique batch number for complete confidence.”

# Gland Packing



Our Gland packings are square braided on the most advanced braiding machines available. Twenty-four and Thirty-six track braiders are utilised to produce four ply, square inter-braid packings on all sizes from 3/8" (10mm) upwards.

Fibres are run from the core of the packing section to the cornerposts and surfaces, whilst being crosslocked in a square, lattice construction, to produce maximum resilience and a highly dense, square packing.

The quality of a packing's braiding significantly affects the service life of the packing. Packings produced using smaller or outdated braiding machines lack the strength of true cross-lock construction, are less dense and are not as square in cross-section. The looser the braid of the packing, the lower its durability will be.

Additionally greater gland pressure is required to perform a seal, resulting in increased mechanical stress. As the packing deteriorates, frequent gland adjustments are required causing more mechanical stress on the packing, leading to accelerated failure.

Our packings show a high degree of resilience and consistency of volume. Their superior, lattice, square inter-braided construction needs less gland pressure to seal, resulting in reduced equipment wear, reduced gland maintenance and increased packing life.

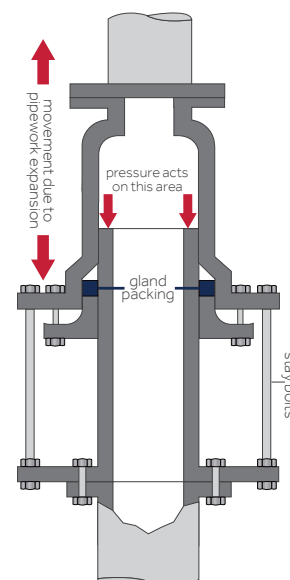


Figure 1.1 Example packing application

“ Our packings have a **proven high degree of volume consistency and resilience** due to their inter-braided construction. ”



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# Extrusions



Rubber Extrusions are used to create objects of a fixed cross-sectional profile. A material is pushed or pulled through a die of the desired cross-section. The main advantage of this process is its ability to create very complex cross-sections.

We can provide round, square and rectangular sections through to complex shapes with internal bridge work.

Using the best quality materials and low set up cost ensures that you benefit not only from high quality and high performance materials but also closely controlled costs and timelines.

We supply industries as diverse as food and pharmaceutical, building, transportation, marine and defence.

We can offer an array of standard extruded profile shapes including, but not limited to the following:

- D - Profiles
- e - Profiles
- Half Round - Profiles
- J - Profiles
- L - Profiles
- P - Profiles
- T - Profiles
- U - Channels

Extrusions are suitable for many applications including marine, motor vehicles, fork-lift trucks, factory walls, loading bays, container door seals & channel edging strips.

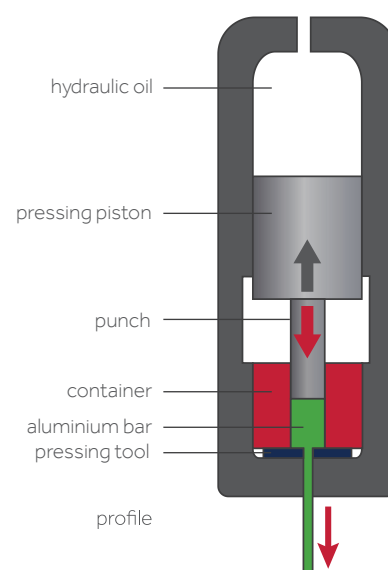


Fig 1.1 Extrusion process

“Quality products,  
**custom made** to your  
**precise** requirements.”

# Retaining Rings / Circlips



A fastener that holds components or assemblies onto a shaft or in a housing / bore when installed in a groove. Once installed, the exposed portion acts as a shoulder which retains the specific component or assembly.

The standard material for most Circlip and retaining rings is carbon spring steel (CS). All Circlip made from this material are austempered so as to give optimum ductility at the high hardness values necessary for correct function. Other materials and finishes available.

External Circlip	Internal Circlip	Internal Balanced Lug	External Balanced Lug	Metric E-clip	Imperial E-clip	Crescent Ring
D1400/N1400	D1300/N1300	M1408/N1408	M1308/N1308	D1500	N1500	M1800
External Snap Ring	Internal Snap Ring	External Bevelled Ring	Internal Bevelled Ring	Shim Washers		
M2400	M2300	N1402	M1302/N1302	988		
Metric External Push-on Fix	Internal Push-on Fix	Grip Rings	External Special	Wire Rings		
M1455	M1355	M1440/N1440	A1200	A1100		

Figure 1.1 Retainer ring / circlip types

“ Different **types of rings** are available to **solve issues** such as tolerance take-up, clearance diameter, **thrust load capacity**, flexible and radial installation. ”



# Grease Nipples



A grease nipple is a metal fitting used in mechanical systems to feed lubricants, usually lubricating grease, under moderate to high pressure, into a bearing using a grease gun.

The fitting is permanently installed by a threaded connection, leaving a nipple connection that the grease gun attaches to.

Our range of hydraulic Grease nipples are manufactured to international standards and supplied across a wide range of thread types, styles and materials.

## 1. HARDENING

In Seal Quench Furnaces  
Eliminates Scaling, and ensures perfect control of Case Depth.

## 2. HARDNESS

Controlled to a minimum of 83 on rockwell 15N scale.

## 3. CASE DEPTH

0.005" - 0.009" (0.13mm - 0.23mm).

## 4. TESTING

Grease fittings are tested with 6.6 lbs load dropped at 90° to the fittings center line, to ensure proper heat treatment and resistance of the fitting to impact.

## 5. CONCENTRICITY OF BALL

Within 0.00004" (1 micron).

## 6. PLATING

Exceeds ASTM B117 standards.  
Salt spray life of 75 hrs to red rust  
Plating thickness within (5 microns)  
\*Trivalent plating (Cr 6+ free & RoHS Compliant).

## 7. SPRING

Special grade 3 German Music Wire ensures accurate.

## 8. SIZE

Controlled within +/- 0.001" (25 microns).  
(12 times tighter than SAEJ534 tolerance).

## 9. THREADS

Super strong rolled threads.

## 10. LIP

Formed in turning perfect concentricity with threads.

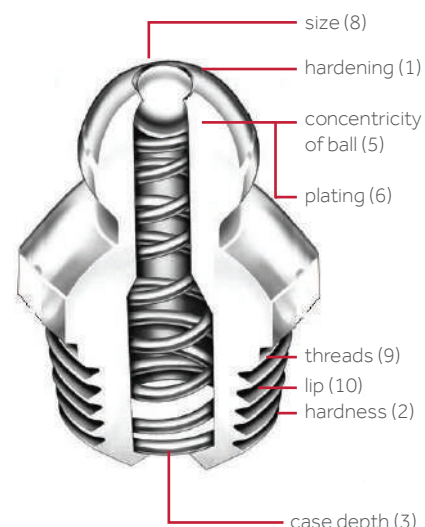


Figure 1.1 Grease nipple profile

“ Our range of grease nipples are of the **highest specification** and manufactured to **international standards**. ”



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## Your group for sealing technology

We appreciate that not everyone requires the same thing and that flexibility is the key; so whether you prefer to deal with us over the phone, by e-mail or fax we are ready and prepared to help.

**You tell us what you want and we will take care of the rest.**



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