Rotary Shaft Seals

ceetak
sealing solutions

We offer a range of shaft seals for rotating applications. Specialist designs and configurations based on the type of service, speed, pressure and dynamic run-out for which the seal is designed.

Available in a wide variety of profiles and seal lip configurations.

Huge range of case materials, and polymer based lip materials depending on application parameters.

Broad size range - we can manufacture 4 mm to 800 mm internal diameter.

Complete seal design service from experienced application engineers.

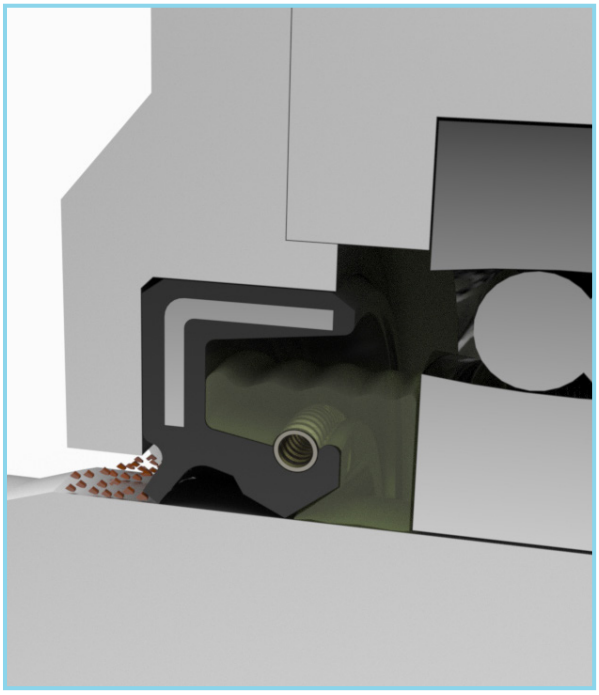
What are rotary shaft seals?

Rotary shaft seals are used throughout many industries in a variety of different application conditions. These conditions can vary from high-speed shaft rotation with light oil mist, to a low speed reciprocating shaft in muddy environments with medium to high pressure.

Rotary seals can be found in any equipment with a rotating shaft, and must be designed to be able to withstand the critical requirements of each individual application. Rotary seals can be used to separate two different fluids, to retain internal pressure or exclude an external pressure.

They work by squeezing and maintaining the lubricant in a thin layer between the lip and the shaft. Sealing is aided by the hydrodynamic action caused by the rotating shaft which creates a slight pump action.

Typical rotary shaft seal components include a rigid outer component and a flexible, elastomeric inner lip. The seal lip can be springless or spring-loaded. The outer rigid material can range from carbon steel, aluminium and stainless steel or can be a non-metallic composite. The purpose of the outer component is to position and retain the seal in the housing, and it is also important to maintain a leak-free fit between the seal and the housing.



Choosing rotary seals

In rotating applications, the seal can impact the service life of indirect components such as gearboxes, couplings, pulleys or other in-line coupled equipment. If a seal leaks and allows the system lubricant to run below safe levels, or allows foreign materials to enter the bearing cavity, the bearing will soon begin to show signs of failure. As the bearing fails, vibration from excessive shaft runout will be transferred to all other in-line components and will shorten their service life as well.
The amount of frictional heat that is generated in an application is dependant on a combination of many operating parameters: shaft surface, internal pressure, operating speed, lubricant type, lubricant levels, lip geometries and lip materials are just a few conditions that should be considered, and it is important to note that these conditions are interactive.

Rotary seal profiles

We have a range of seal profiles available for rotary shaft sealing applications; below is a basic overview of the main types of profiles. For further profile information and seal recommendation please contact our Application Engineers for guidance.

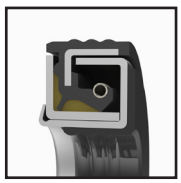
Springless Profiles: General purpose, springless design, most commonly used for grease retention.
Materials: Rubber covered metal case, elastomer lip.

Spring Loaded Profiles: General purpose, spring loaded design, most commonly used for grease retention with an additional dust lip for applications potentially exposed to high levels of contamination.
Materials: Rubber covered metal case, elastomer lip.

Spring Loaded Profiles: General purpose, spring loaded design - most commonly used for grease retention.
Materials: Rubber covered metal case, elastomer lip.

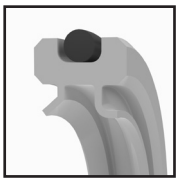
Dual Spring Loaded Profiles: Dual spring loaded lips are generally used where separation of two fluids is required and can also be used for high contamination applications.
Materials: Metal case, elastomer lip (rubber covered metal case available).

Medium Pressure Profiles: For medium pressure applications. Double lip profiles incorporate a secondary lip on heel for exclusion of light dust and fluids.
Materials: Rubber covered metal case, elastomer spring-loaded lip.

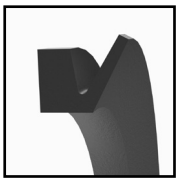


Cassette Seal Profiles: For heavy duty applications - also referred to as "labyrinth" seals. Feature multiple sealing points with fully incorporated design. Sealing elements ride on an internal sealing surface, minimising shaft surfacing requirements with no shaft grooving.

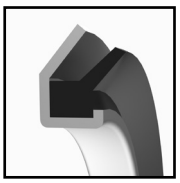
PTFE FlexiSeal Profiles: For demanding, low speed/high pressure applications.
Materials: Wide variety of PTFE composites, standard o-ring materials and spring materials available.



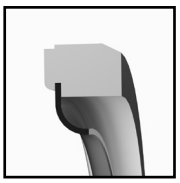
PTFE FlexiLip Seal Profiles: For demanding, high speed/low pressure applications.
Materials: Wide variety of PTFE composites/ machinable plastic materials, and standard o-rings include fluorocarbon, silicone, nitrile and EPDM.



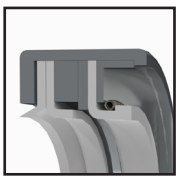
V-Ring Profiles: Axial (face) seals, external protection. Suitable for high velocity, low friction applications.
Materials: Wide variety of elastomeric compounds available.



Shielded V-Seal: Increased external sealing capability, e.g. high pressure water hosing applications.
Materials: Metal casing with wide range of elastomeric lips available.



Special Profiles: For example "crimped" design, suitable for high pressure and high velocity applications.
Materials: Metal casing with PTFE lip.

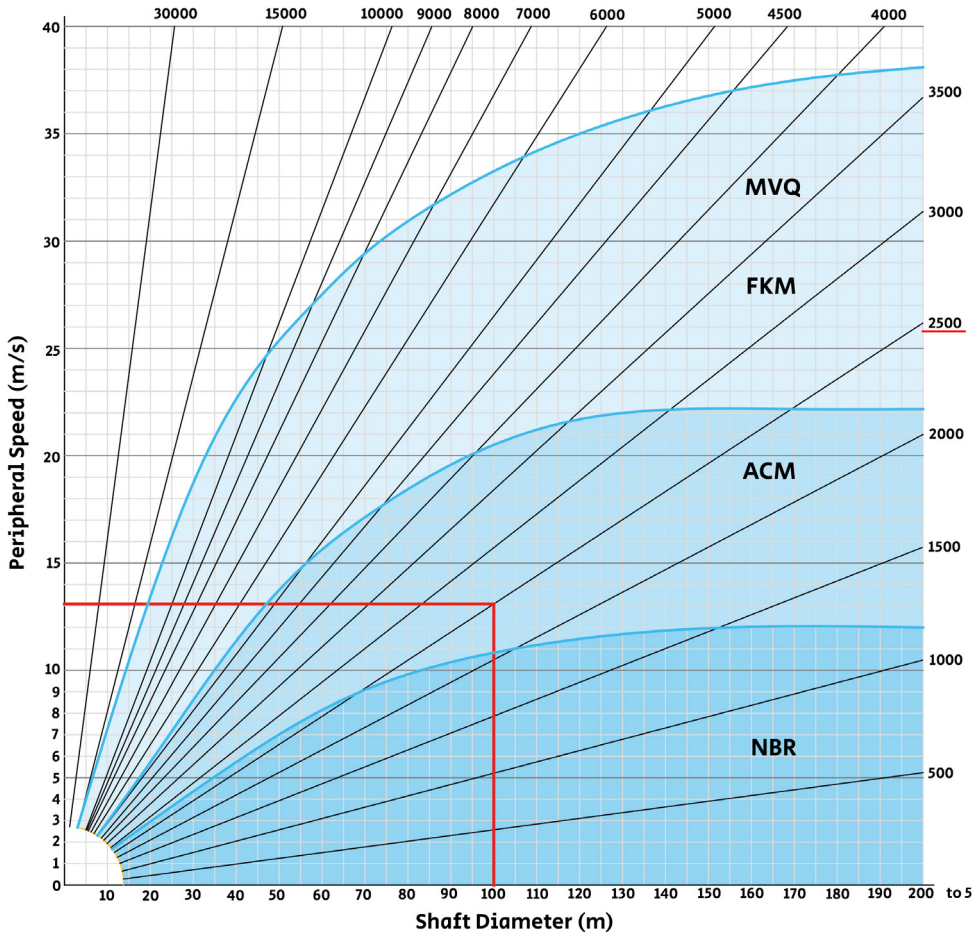


PTFE FlexiCase Seal Profiles: For demanding, high speed/low pressure applications.
Materials: PTFE composites/machinable plastics. Standard gasket choices of FKM, silicone, NBR & EPDM. Casing materials include stainless steel, cold-rolled steel, aluminium & zinc plated cold rolled steel.

This graph shows the approximate maximum allowable peripheral speed for rotary shaft sealing elements manufactured from NBR (Nitrile), ACM (Polyacrylate), FKM (Fluorocarbon) and MVQ (Silicone) materials.
This is with no differential pressure and not exceeding material operating temperatures.

Example shown in red: 100mm shaft diameter @ 2500 rpm = 13 m/s peripheral speed.

Therefore ACM material would be suitable for this application.



Material overview

There are different components of rotary shaft seals to consider when specifying materials. Where an elastomeric lip is specified, there are a wide variety of compounds available for manufacture depending on the application parameters; the table below shows common elastomer compounds, with characteristics and operating temperature ranges.

Material	Temperature range	Characteristics
Nitrile (NBR)	-30°C to +100°C	Most commonly used in rotary shaft sealing industries. Good resistance to oil, fuel and alkali solutions. Excellent resistance to petroleum based hydraulics and is resistant to hydrocarbon solvents. Good mechanical properties, abrasion resistance and tear strength. Poor resistance to ozone, ketones, automotive or aircraft brake fluids, and steam and hot water.
Carboxylated Nitrile (XNBR)	-35°C to +100°C	Used in applications where particles may collect at the point of shaft contact. Greatly enhanced abrasion resistance over standard NBR, whilst maintaining similiar chemical compatibility. Less resilient and flexible at low temperatures than standard NBR.
Hydrogenated Nitrile (HNBR)	-40°C to +150°C	Offers improved abrasion resistance, excellent chemical resistance and higher operating temperatures than standard NBR.
Fluorocarbon (FKM)	-40°C to +200°C	Excellent resistance to oils, fuels and hydraulic fluids at high temperatures. Good resistance to flame and excellent impermeability to gases and vapours. Limited cold flexibility.
Ethylene Propylene (EPDM)	-50°C to +150°C	Offers excellent heat, ozone and sunlight resistance. Good low temperature flexibility, good resistance to alkalis, acids and oxygenated solvents. Improved resistance in water and steam in applications where NBR and FKM exhibit poor service life. Not recommended for petroleum oil.
Polyacrylate (ACM)	-20°C to +150°C	Recommended for higher operating temperatures or applications where extreme pressure lubricants are used. Also offers additional resistance over standard NBR to ozone and weather attack. Poor abrasion resistance compared to NBR.
Silicone (VMQ)	-60°C to +200°C	Generally recommended for high temperature, low friction applications. Resistant to weather, ozone, water, bases and alcohols. Not recommended with steam, acids, aliphatic hydrocarbons, aromatic hydrocarbons, halogenated hydrocarbons, phosphate ester or polar solvents. Poor abrasion resistance.
Neoprene (CR)	-40°C to +100°C	Good resistance to weather, ozone and natural ageing, moderate resistance to oil and gasoline.Good abrasion, flex and cracking resistance.
Polytetrafluoroethylene (PTFE)	-250°C to + 260°C (depending on filler)	Recommended for use with virtually any fluid. Extremely low friction and very wide temperature range. Excellent mechanical properties achieved when blended with fillers such as carbon, glass, bronze, graphite and many others.

Springs are available in a wide range of materials depending on the style of seal specified. The table below shows a range of materials and suitable applications.

Wire Type	Max Service Temperature		Application
	°C	°F	
Carbon Steel	120	250	General Purpose
Monel 400	230	450	Saltwater
Inconel 750	675	1250	Extreme Temperature
Phosphor Bronze	95	200	Saltwater
302/304 Stainless Steel	260	500	Corrosion Resistance
316 Stainless Steel	315	600	High temperature corrosion resistance
Hastelloy®	315	600	Corrosion Resistance
Elgiloy®	260	500	Corrosion Resistance

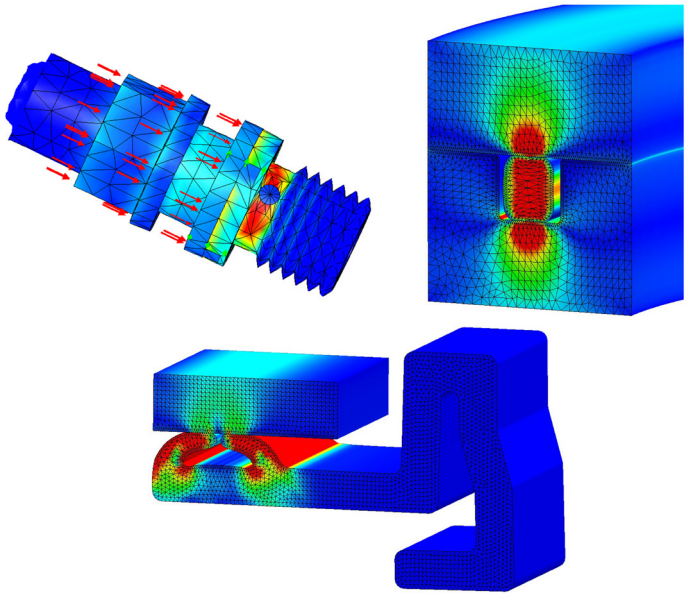
Design & Development

We provide unrivalled technical and engineering support to ensure our customers benefit from the best possible seal performance at optimum cost.

We are dedicated to providing a complete design service; from initial seal geometry and profile choice, to material selection and prototyping, through to final production.

We work closely with your engineers to provide the most effective sealing solutions for each bespoke application.

Our Application Engineers utilise years of seal design experience and materials expertise, alongside technology such as 2D/3D CAD and FEA analysis programs to simulate performance before finalising each individual seal design.

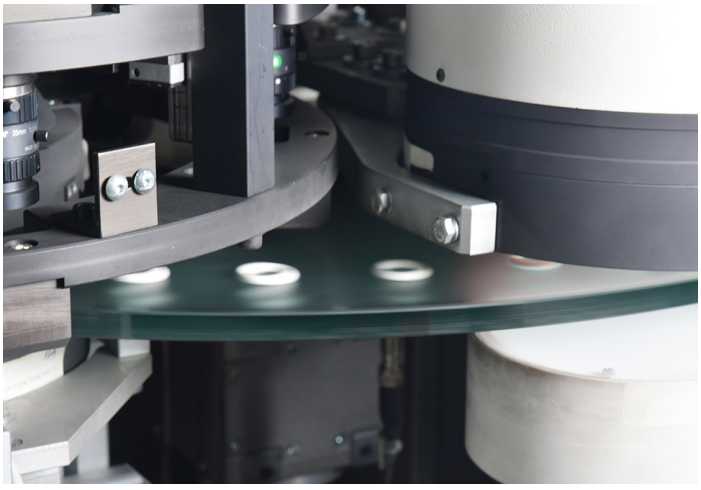


Quality Assurance

We maintain strict quality procedures at all stages of our design, development and manufacture processes. We are ISO9001:2015, ISO13485:2016 and ISO14001:2015 approved, and our manufacturing facilities approved to IATF16949:2016.

Our stringent quality principles and proactive controls mean our customers have reduced claims (and associated costs), increased change control, and prevention of productivity loss and line-stops.

With our manufacturing facilities we develop continuous improvements to processes such as follow up-audits, implementation of adequate prevention measures, analysis and review of similar products to prevent future issues, effective root cause analysis and preventative actions review.



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