

# Industrial shaft seals



# Unit conversions

Quantity	Unit	Conversion			
<b>Length</b>	1 mm	inch	0.039 in	1 in	25,40 mm
	1 m	foot	3.281 ft	1 ft	0,3048 m
	1 m	yard	1.094 yd	1 yd	0,9144 m
	1 km	mile	0.6214 mile	1 mile	1,609 km
<b>Velocity, speed</b>	1 m/s	foot per second	3.28 ft/s	1 ft/s	0,30480 m/s
	1 m/s	foot per minute	196.8504 ft/min	1 ft/min	0,00508 m/s
	1 km/h	mile per hour	0.6214 mile/h (mph)	1 mile/h (mph)	1,609 km/h
<b>Force</b>	1 N	pound-force	0.225 lbf	1 lbf	4,4482 N
<b>Pressure, stress</b>	1 MPa	pounds per square inch	145 psi	1 psi	6,8948 × 10 <sup>3</sup> Pa
<b>Temperature</b>	Celsius	° (degree)	$t_C = 0,555 (t_F - 32)$	Fahrenheit	$t_F = 1,8 t_C + 32$



# SKF mobile app

SKF Seal Select is an online seal and accessory selection tool. Through several different input parameters you can easily find a suitable SKF sealing solution for a specific application. SKF Seal Select currently offers a selection tool for:

- SKF Speedi-Sleeve
- V-ring seals
- Radial shaft seals



*Apple App Store*

# This catalogue as PDF

To download a PDF document of this catalogue and for information about important updates, go to [skf.com/go/18729](http://skf.com/go/18729). Please note product data in this printed catalogue was accurate on the day of printing. The latest and most accurate product data is always available for you on [skf.com](http://skf.com).



*Catalogue as PDF*

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*Forum and Blog*

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# Foreword

This edition of the Industrial shaft seals catalogue supersedes the one published in June 2013 (publication number 10919/2). For this new edition, numerous revisions, additions and enhancements have been made to provide an even more comprehensive guide. Though the aim of this catalogue is to cover a very wide seal assortment, it still only includes a selection of our complete assortment of shaft seals and accessories.

The data in this catalogue may differ from that provided in earlier catalogues because of redesign, technological developments or revised methods of calculation. SKF reserves the right to make continuing improvements to SKF products without prior notice with respect to materials, design and manufacturing methods, as well as changes necessitated by technological developments.

### Catalogue overview

In order to emphasize the importance of studying the operating conditions of each application before selecting a sealing solution, this catalogue outlines the most important factors to consider. These are provided in the chapter Product data – general, along with basic shaft and housing bore requirements.

SKF industrial shaft seals and accessories are divided into three main groups:

- Radial shaft seals
- Axial shaft seals and
- Wear sleeves.

Different seal types within these groups are described with their respective design, materials and applications.

Product descriptions are followed by product tables. It should be noted, however, that these tables only cover a selection of available sizes.

## CR Seals®

Founded in 1878 as Chicago Rawhide, CR Seals has one of the longest histories in the seal industry. For the last 110 years, CR Seals has been setting performance and service life standards for industrial shaft seals.

CR Seals has also been part of SKF since 1990, a span during which we've developed new materials, manufacturing processes and designs to create some of the most robust seals on the market.



### Contact

Always contact your SKF sales representative for complete and updated availability information.

### The SKF Interactive Engineering Catalogue

SKF provides this catalogue in electronic format, the SKF Interactive Engineering Catalogue, online at [www.skf.com](http://www.skf.com).

### Units

The units in this catalogue are in accordance with ISO (International Organization for Standardization) standard 1000:1992, and SI (Système International d'Unités).

# SKF industrial shaft seals and accessories



A

Radial shaft seals

Seals for general industrial applications

Seals for heavy industrial applications

Cassette seals

B

Wear sleeves

SKF Speedi-Sleeve

Wear sleeves for heavy industrial applications (LDSL)

C

Axial shaft seals

Track pin seals

Metal face seals

V-ring seals

Axial clamp seals

# Catalogue overview

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# Important product updates

## HSS

HSS seals constitute a range of seals with a variety of design features and combinations of these, including solid and split versions, SKF Springlock, SKF Springcover, different spring connections and lubrications grooves.

The flexible manufacturing process enables the customization of sizes without minimum quantity and virtually without upper limits for both metric and inch sizes. This flexibility enables the same short delivery times for customized dimensions as for standard seals.



## HRS

HRS seals are machined seals and specially designed to cope with the harsh conditions of main shafts. They offer lubricant retention and contamination exclusion to reduce the risks of lubrication or contaminant-related bearing failures and their consequences, such as production downtime and repair costs. HRS seals are made of G-ECOPUR, a polyurethane with excellent abrasion resistance and tear strength.



## MUD11

SKF Mudblock seal design MUD11 is a new generation of cassette seals, specifically developed for oil-lubricated heavy-duty applications in harsh environments and tough operating conditions.

SKF Mudblock new generation seals last up to 50% longer and operate with up to 20% less friction than the competitor's seal. Yet SKF Mudblock seals also offer superior oil retention and contamination exclusion in the harshest, most contaminated conditions.



## TPM

SKF Trackstar seal TPM is a new solution for track pin seals, formed with a polyurethane sealing lip, a rubber energizer and a metallic part for increased robustness. It has an increased seal life time and subsequent track life, as well as a positive impact on maintenance cost reduction.

The seal has also been engineered with an integrated mounting lip feature in the rubber element, enabling easy and safe mounting, as well as making it suitable for robotized mounting.



# How to use

This catalogue is divided into four main parts:

## Product data – general

- A Radial shaft seals
- B Wear sleeves
- C Axial shaft seals

Please see paragraph *Catalogue overview* on **page 10** and **11**.

## Principles of seal selection

Selecting an appropriate seal design and material depends on the operating conditions of the application. Because the influence of one operating condition typically dominates the seal selection process, there are no universal rules for determining the appropriate seal type or design for a given application. **Pages 103 to 105** and **174 to 183** show the standard SKF radial shaft seals and their main features and permissible operating conditions

## Product register and index

The product register and index are marked with colored bars on the right edge of the page. The product index lists series designations, relates them to the seal type, and guides you to the relevant product section and product table. The text index lists entries in alphabetical order, including designation suffixes, and helps you locate information quickly (**page 407**).

## US Designation index

The catalogue contains a numerical size listing of US seal designations to identify our seal assortment fast and easy. The numerical listing include designation, seal design, material and dimensions. On the top corner you will find a overview line with the first and last designation on the page.

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A.1	Seals for general industrial applications
A.2	Seals for heavy industrial applications
A.3	Cassette seals
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B.1	SKF Speedi-Sleeve
B.2	Wear sleeves for heavy industrial applications (LDSL)
<b>C</b>	<b>Axial shaft seals</b>
C.1	Track pin seals
C.2	Metal face seals

mm	in	Dynamic runout (DRO) TIR		Pressure differential		Maximum shaft surface speed	
		mm	in	MPa	psi	m/s	ft/min
0.51	0.020	0.05	7	14	2 755		
0.51	0.020	0.07	10	18	3 600		
0.51	0.020	0.07	10	18	3 600		
1.3	0.005	0.35	50	10	2 000		
1	0.020	0.07	10	18	3 600		

Seals for general industrial applications A.1

Series	Designation	Material	Inner diameter	Outer diameter	Width	Metric or inch value
116	HUD9	Cassette seal				228
116	SKF Speedi-Sleeve	Cassette seal				228
116	SL	Cassette seal				228
154	SLA	Radial shaft seal				236
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Product index

Metric or inch value	Numerical designation	Material	Inner diameter	Outer diameter	Width	Metric or inch value
14780	CRSA1	NBR	1.491	2.191	0.250	Inch
14789	CRV1	NBR	1.494	2.060	0.270	Inch
14804	HM14	NBR	1.500	2.060	0.270	Inch
14807	HM14	NBR	1.500	1.874	0.188	Inch
14809	HM14	FKM	1.500	1.874	0.250	Inch
14810	CRW1	FKM	1.500	1.918	0.188	Inch
14816	HM14	NBR	1.500	1.874	0.250	Inch
14821	HM14	NBR	1.500	1.918	0.188	Inch
14824	CRW1	NBR	1.500	1.983	0.250	Inch
14840	CRW1	FKM	1.500	1.983	0.250	Inch
14844	HM14	NBR	1.500	1.983	0.250	Inch
14846	CRWAS	NBR	1.500	1.983	0.250	Inch
14848	CRWAS	FKM	1.500	1.983	0.250	Inch
14855	HM22	NBR	1.500	1.997	0.313	Inch
14857	CRW1	NBR	1.500	2.000	0.250	Inch
14858	HM14	NBR	1.500	1.999	0.313	Inch
14861	CRW1	NBR	1.500	2.000	0.250	Inch
14867	CRW1	NBR	1.500	2.000	0.250	Inch
14868	CRW1	FKM	1.500	2.000	0.313	Inch
14869	CRWAS	NBR	1.500	2.062	0.313	Inch
14875	HM8	FKM	1.500	2.062	0.313	Inch
14876	CRW1	NBR	1.500	2.064	0.313	Inch
14886	CRW1	NBR	1.500	2.000	0.313	Inch
14887	CRW1	NBR	1.500	2.125	0.188	Inch
14896	CRW1	FKM	1.500	2.125	0.313	Inch
14903	X1	FKM	1.500	2.125	0.313	Inch

US Designation index from 13588 to 15241

A close-up photograph of a mechanical component, likely a spring or a bearing. The image shows a series of dark, tightly packed coils of a metal spring, with a textured, metallic surface visible to the right. The lighting is soft, highlighting the metallic sheen and the intricate details of the spring's structure.

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Polyacrylate elastomer .....	33	Profile and materials selection .....	56
Silicone rubber .....	33	CNC manufacturing process .....	56
<b>Wear resistance</b> .....	<b>34</b>	Rapid delivery worldwide .....	56
<b>Operating temperatures</b> .....	<b>35</b>		

# Industrial shaft seals



Industrial shaft seals are used to seal the opening between a rotating and a stationary component, or between two components in relative motion. Primary seal functions include:

- **Retain the lubricant**
- **Exclude contaminants**
- **Separate two different media**
- **Seal under pressure**

To be effective, industrial shaft seals should operate with a minimum of friction and wear, even under unfavourable operating conditions. In order to meet the requirements of a variety of different applications and operating conditions, SKF industrial shaft seals for rotating machine components are manufactured from many different designs, materials and executions. Each of these designs and material combinations has specific properties, making them suitable for a particular application. The main groups of shaft seals and accessories are:

#### Radial shaft seals

- Seals for general industrial applications
- Seals for heavy industrial applications
- Cassette seals

#### Axial shaft seals

- Track pin seals
- Metal face seals
- V-ring seals
- Axial clamp seals

#### Wear sleeves

- SKF Speedi-Sleeve
- Wear sleeves for heavy industrial applications

#### Availability

The SKF assortment of industrial shaft seals comprises hundreds of different designs and material combinations. The products shown in this catalogue and listed in the product tables are the more commonly used seal types and sizes.

#### Guidance values

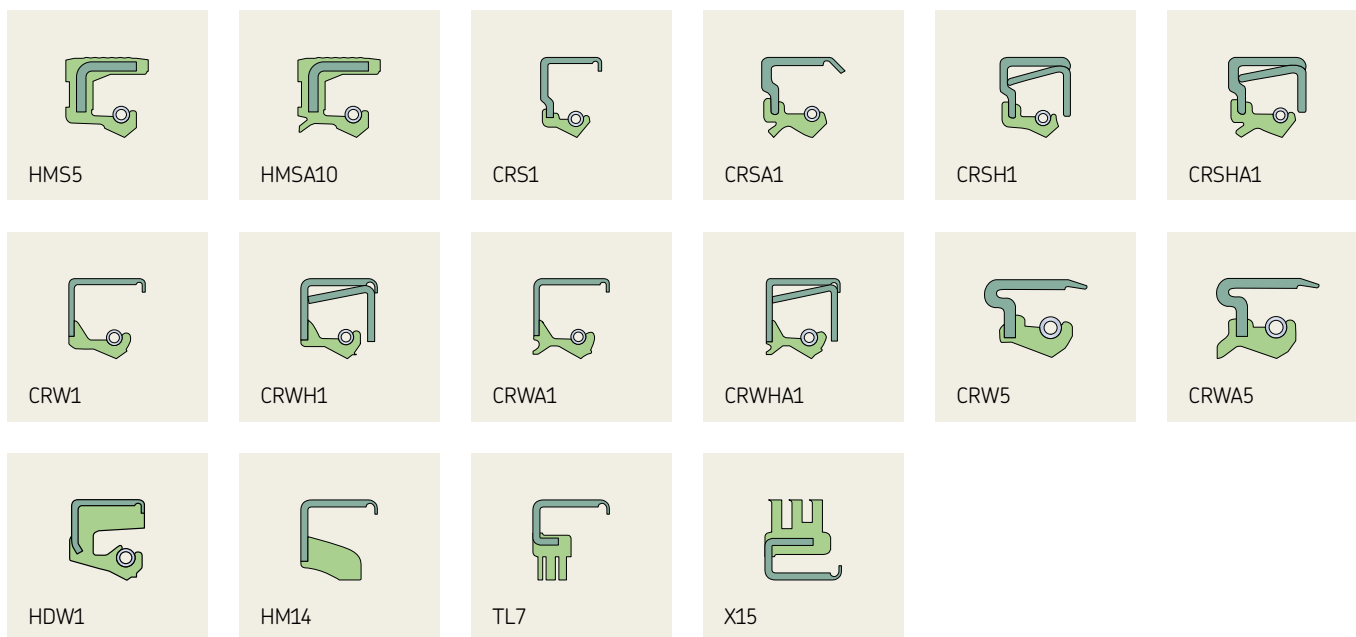
Since several factors simultaneously affect the sealing system and seal performance, all stated values in graphs and tables in this publication should be considered as guidelines only and not as absolute values for practical applications.



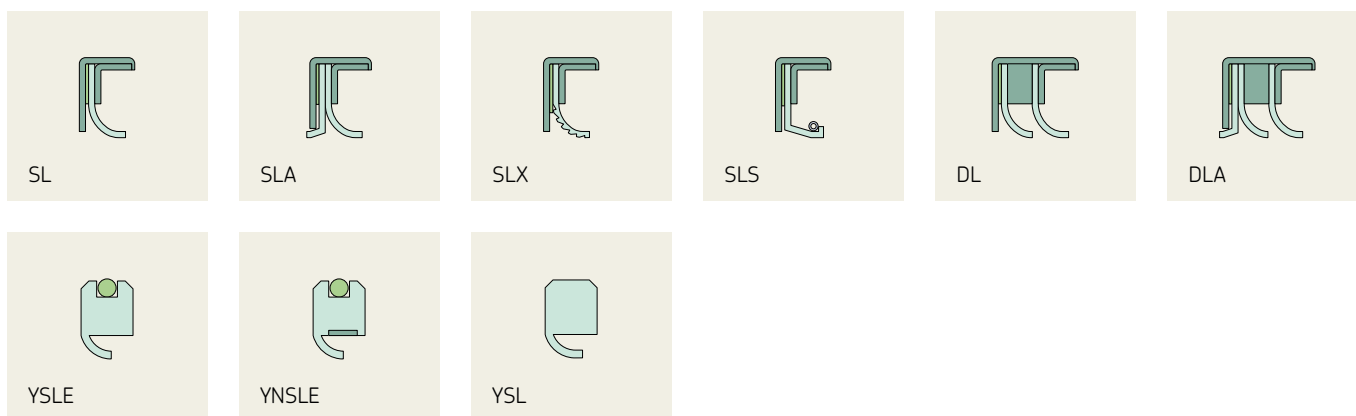
# Profile overview selection

## Radial shaft seals

### Seals for general industrial applications, elastomeric sealing lip(s)



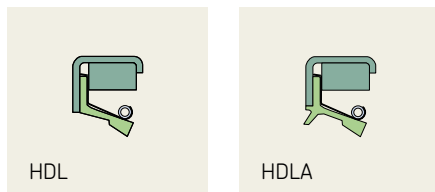
### Seals for general industrial applications, PTFE sealing lip(s)



Seals for heavy industrial applications, flex



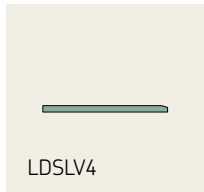
Seals for heavy industrial applications, high speed



Cassette seals, SKF Mudblock

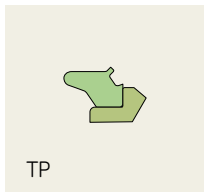


## Wear sleeves

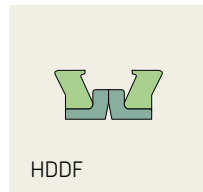


## Axial shaft seals

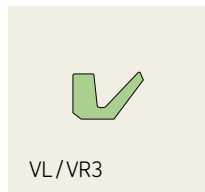
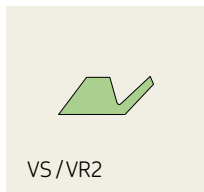
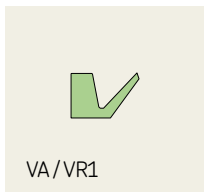
### Track pin seals, SKF Trackstar



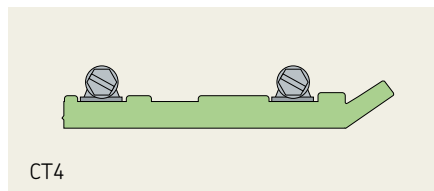
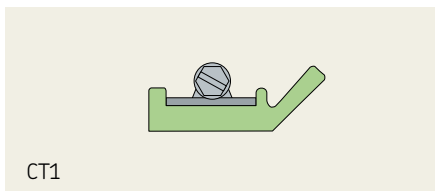
### Metal face seals



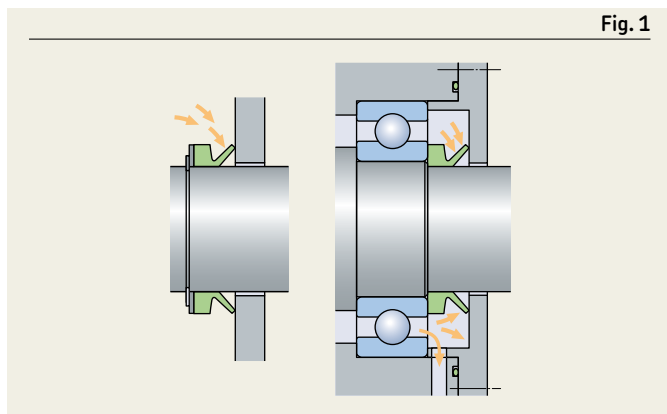
## V-ring seals



## Axial clamp seals



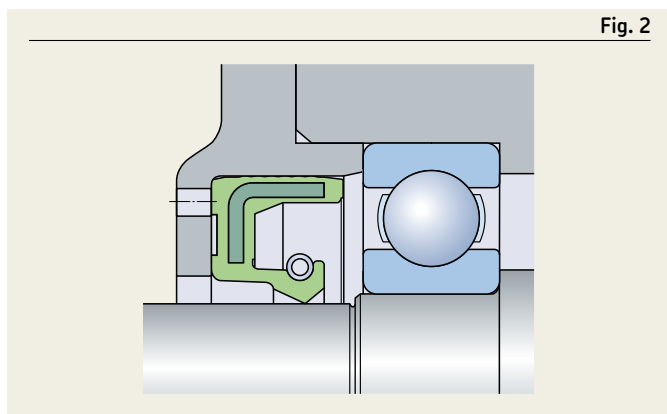
# Selection of seal design and material



V-ring

Selecting an appropriate seal design and material depends on the operating conditions of the application such as:

- Temperature
- Speed
- Pressure differential
- Type of lubricant
- Vertical or horizontal orientation
- Runout and shaft-to-bore misalignment



HMS5 seal

Because the influence of one operating condition typically dominates the seal selection process, there are no universal rules for determining the appropriate seal type or design for a given application. This section describes how operating conditions affect seal performance and service life and provides guidance on selecting the most appropriate seal for a given application.

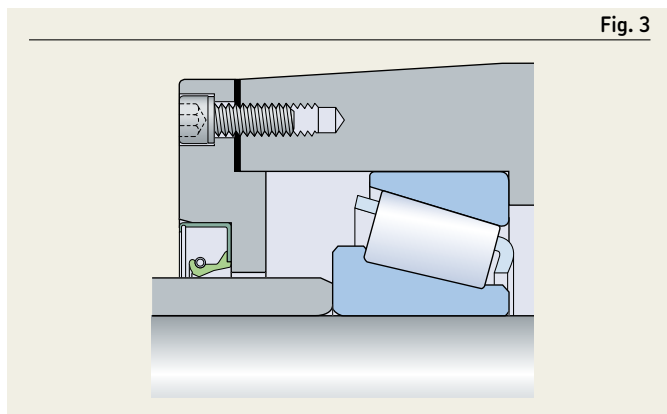
Pages 103 to 105 and 174 to 183 show the standard SKF radial shaft seals and their main features and permissible operating conditions.

## Grease retention

Greases have a relatively high viscosity and are relatively easy to retain in a bearing arrangement. In many grease lubricated applications, a non-spring-loaded sealing lip design or a V-ring can adequately retain the grease (→ fig. 1).

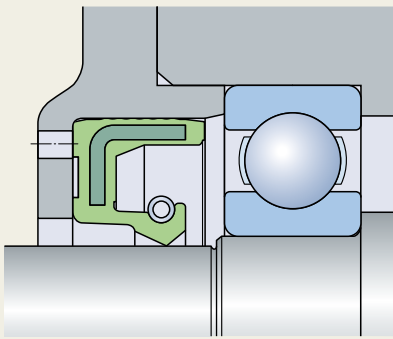
However, more demanding applications may require HMS5 or CRW1 spring-loaded radial shaft seals (→ figs. 2 and 3).

When frequent relubrication is required, the lip of at least one of the seals in the sealing arrangement should be directed toward the air side so that excess grease can escape via the sealing lip (→ fig. 3). This avoids grease build-up, which can retain heat and limit heat dissipation. For grease lubricated applications, SKF recommends calculating the permissible circumferential speed for oil and halving the result.



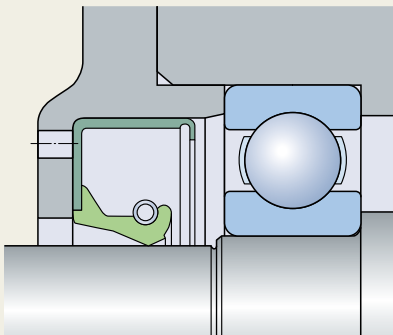
CRW1 seal

Fig. 4



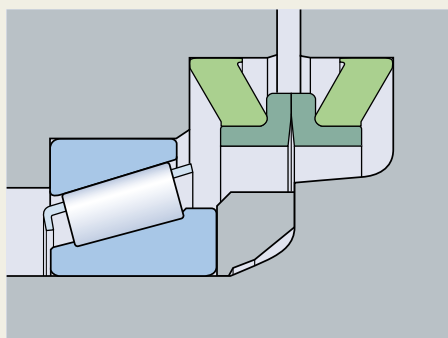
HMS5 seal

Fig. 5



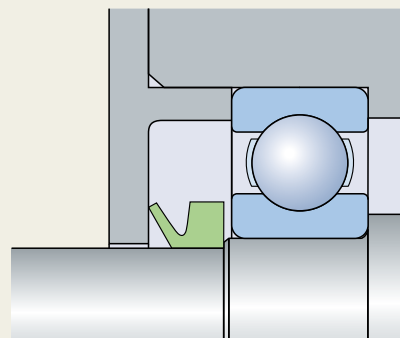
CRW1 seal

Fig. 6



HDDF metal face seal

Fig. 7



V-ring

## Oil retention

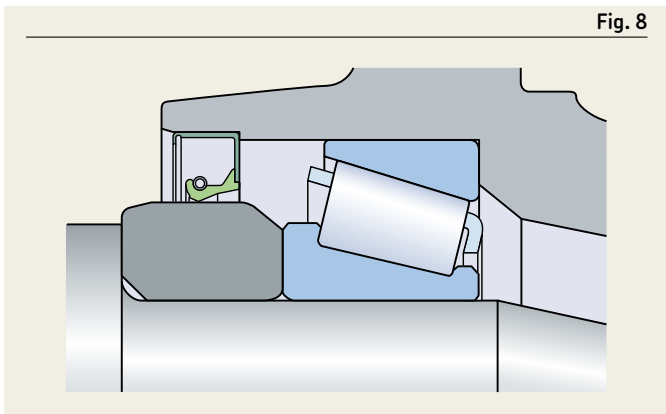
Lubricating oils, particularly relatively low-viscosity oils, are much more difficult to retain than greases. Therefore, HMS5 or CRW1 spring-loaded radial shaft seals (→ **figs. 4 and 5**) are recommended in order to achieve the necessary radial load and resistance to dynamic runout and shaft-to-bore misalignment for a satisfactory sealing performance.

Standard HMS5 seals have a straight lip while CRW1 seals are designed with SKF Wave lips to provide improved pumping ability, regardless of the direction of shaft rotation (→ **fig. 5 on page 21**). Another way of increasing a seal's pumping ability is to add a helix pattern, i.e. hydrodynamic features, to the sealing lip design.

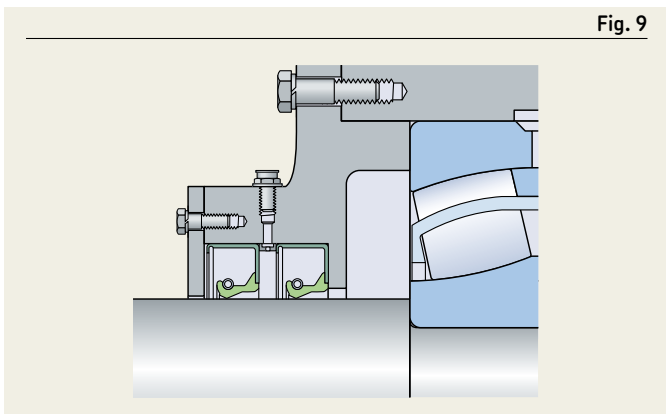
The rubber outside diameter, like the one found on HMS5 seals, helps compensate for small imperfections in the housing bore surface and is therefore recommended when the required housing bore surface is questionable.

For very tough operating conditions, where circumferential speeds are relatively low, metal face seals, like the HDDF seal (→ **fig. 6**), can be used for both oil or grease retention.

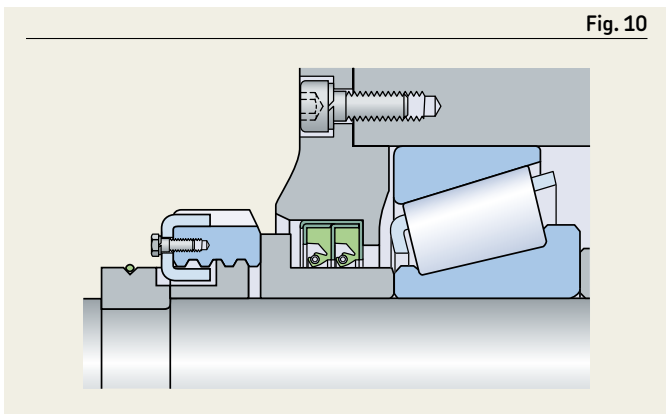
V-rings (→ **fig. 7**) may also be used to retain oil, provided they are installed on the oil side and supported axially on the shaft.



CRW1 seal



CRW1 seals in tandem



HDSE1 seal

## Contaminant exclusion

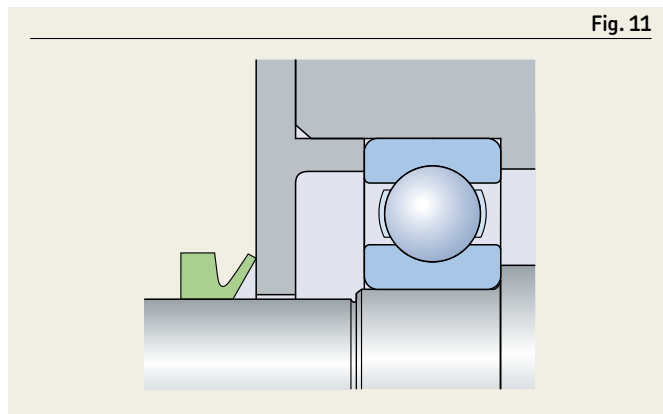
Radial shaft seals that are primarily used for contaminant exclusion should be installed with the lip pointing outward. When additional protection is needed, SKF recommends a seal design that incorporates an auxiliary lip, for example the HMSA10 or CRWA1 seals.

For tough operating conditions, SKF Wave seals (→ **fig. 8**) with hydrodynamic features are recommended. To further enhance sealing efficiency, two single-lip seals can be arranged in tandem (→ **fig. 9**) or a double-lip seal, like the HDSE1 seal, can be used (→ **fig. 10**).

V-rings (→ **fig. 11**) are used primarily to exclude contaminants. These seals, which act as flingers, rotate with the shaft and seal against a surface that is perpendicular to the shaft.

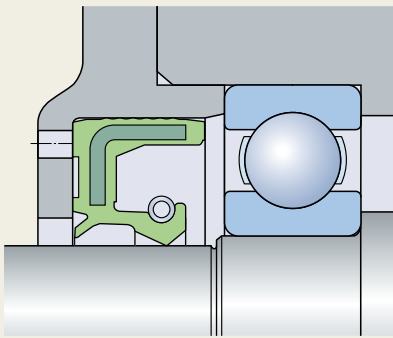
V-rings and axial clamp seals are often used as secondary seals to protect the primary seals from coarse contaminants.

V-ring seal arrangements are not intended for oil retention.



V-ring

Fig. 12



HMSA10 seal

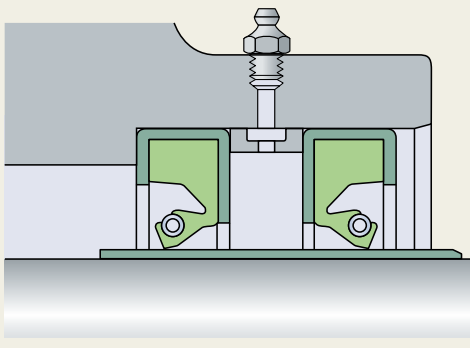
## Retention and exclusion

In many applications, the exclusion of contaminants is just as important as lubricant retention. Seals with an auxiliary lip, like the HMSA10 seals (→ **fig. 12**), are appropriate for these applications.

Another option is to use two seals installed in opposite directions (→ **figs. 13 and 14**) or two opposing V-rings (→ **fig. 15**) with a spacing washer.

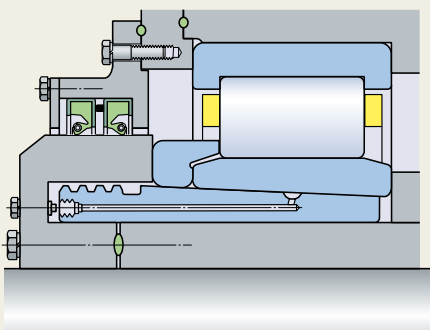
Under extremely tough operating conditions, SKF recommends using HDDF metal face seals (→ **fig. 6 on page 23**), provided that the sliding velocity of the mating surfaces lies within the permissible range.

Fig. 13



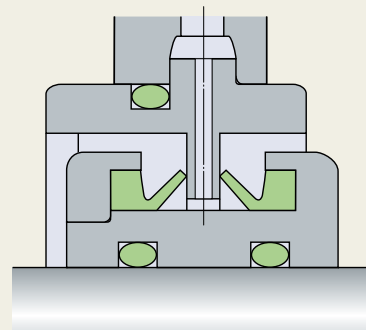
Two seals in opposite direction

Fig. 14

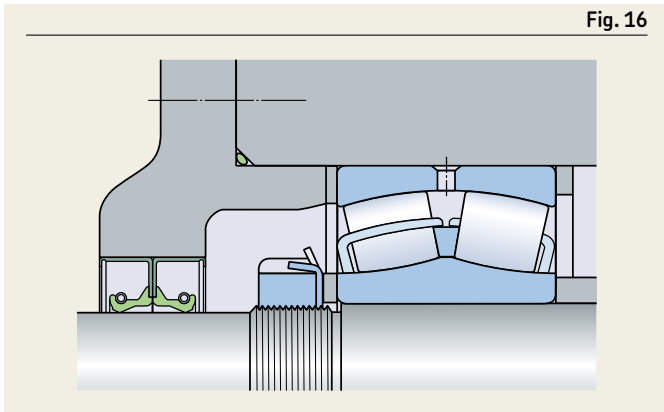


Two seals in opposite direction

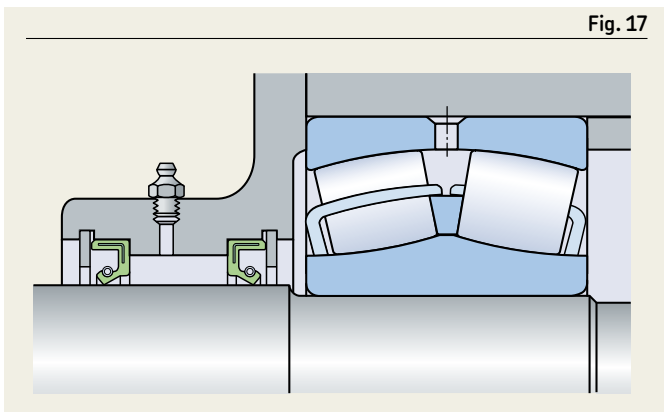
Fig. 15



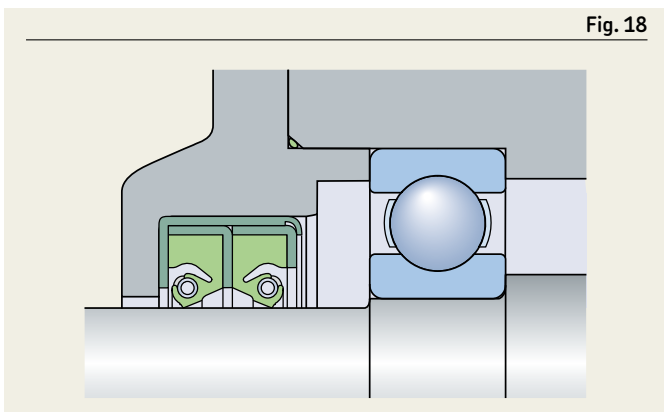
V-ring



CRW1 seals



HMS5 seals



HDSD2 seal

## Separating two liquids

When an application has to keep two liquids from coming into contact with each other, there are two suitable solutions. These solutions, which depend on the availability of space and required efficiency, include

- the use of two separate seals (→ **figs. 16** and **17**), positioned with their lips facing in opposite directions or
- the use of HDSD2 double-lip seals (→ **fig. 18**)

In both alternatives, the sealing lips must be spring-loaded. When using an HDSD seal, it is very important to provide a means to lubricate the sealing lips, i.e. the cavity between the sealing lips must be filled with grease prior to installation.



## Circumferential and rotational speed

The permissible speed of a seal is determined by its design and sealing lip material as well as the material and condition of the shaft. All of these factors influence the heat generation at the seal counterface. Lubrication of the sealing lip and the characteristics of the lubricant also have a direct influence on heat generation because they have a direct impact on heat dissipation.

**Diagram 1** compares the permissible circumferential speeds for various seal designs assuming normal seal operation, grease or oil retention and no pressure differential across the seal.

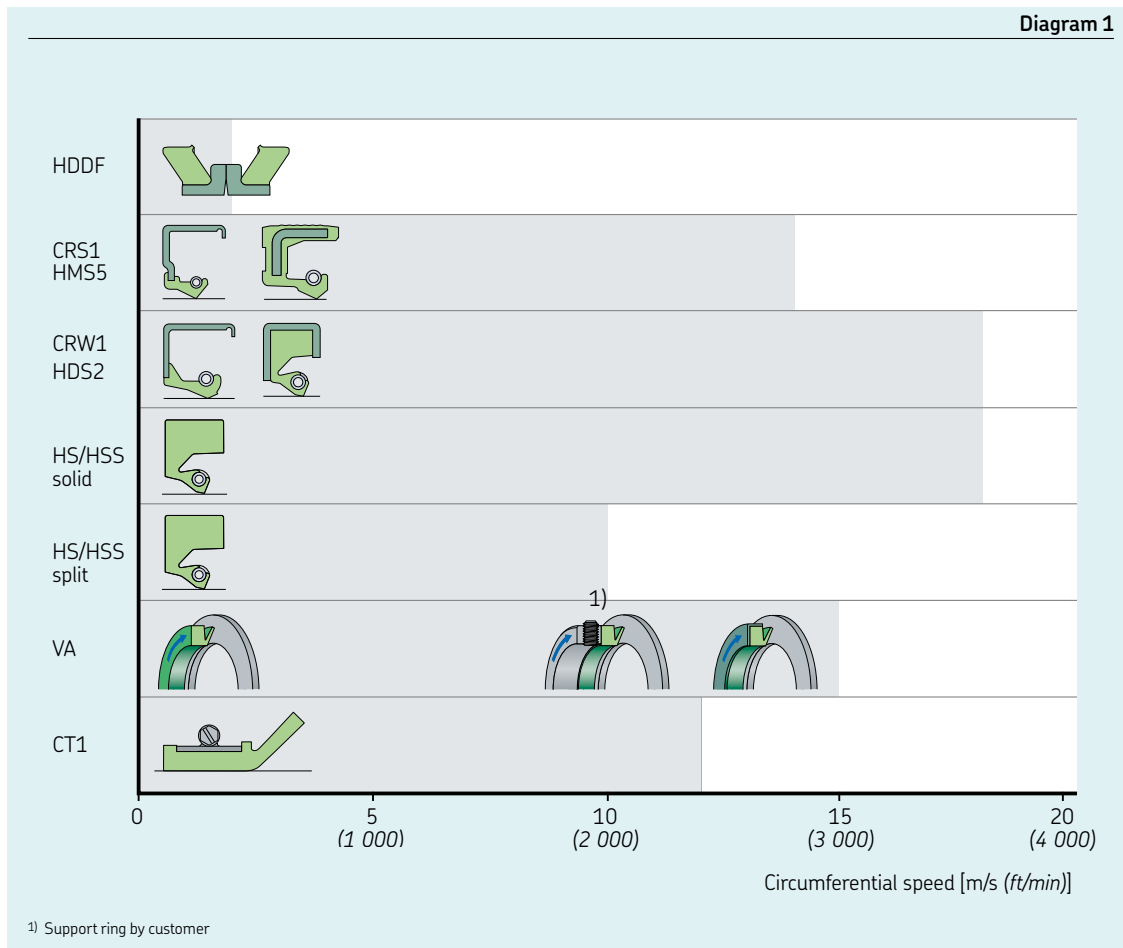
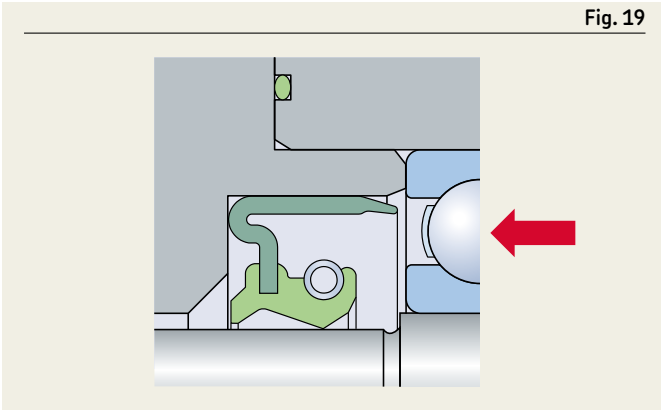


Fig. 19



CRWA5 seal

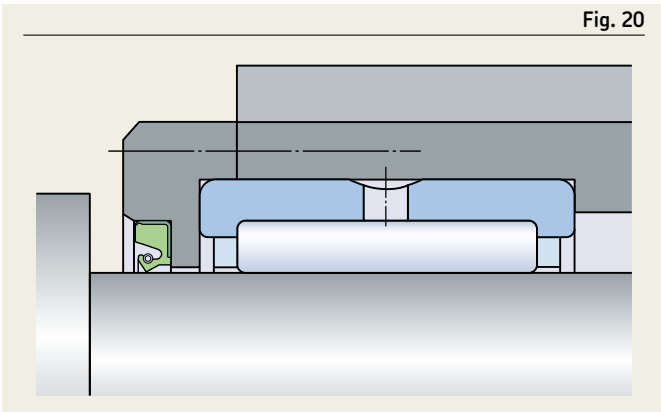
## Pressure differentials

When subjected to a pressure differential, the seal must resist the additional radial load generated by the pressure. If the seal is not designed to resist the pressure, it will be forced against the shaft, increasing the radial load, underlip temperature, friction and wear of the seal and the counterface, resulting in shortened service life.

Standard seals are rated for no more than 0,07 MPa at 5 m/s (10 psi at 1 000 ft/min), but SKF offers CRW5 and CRWA5 pressure profile seals that can accommodate 0,34 MPa at 5 m/s (50 psi at 1 000 ft/min). Beyond 0,34 MPa (50 psi), SKF offers a line of special order PTFE seals that can accommodate more than 3,5 MPa (500 psi).

In applications with pressure differentials, shaft seals should be secured axially from the low-pressure side to prevent them from moving axially. This can be accomplished by installing the seal into a counterbore (→ fig. 19) or by using a retaining ring.

Fig. 20

*Special seal design*

## Limited space

In many cases, the available space is insufficient for a radial shaft seal having dimensions in accordance with ISO 6194-1 or DIN 3670. In these situations, special radial shaft seal designs must be used (→ **fig. 20**).

V-rings (→ **fig. 21**) are also suitable for applications with limited space because they can be positioned outside the actual seal position. V-rings seal axially by exerting light pressure against the counterface that can be a stationary or rotating machine component.

In applications with large shaft diameters, HS8 seals are an appropriate choice when space is limited (→ **fig. 22**).

Fig. 21

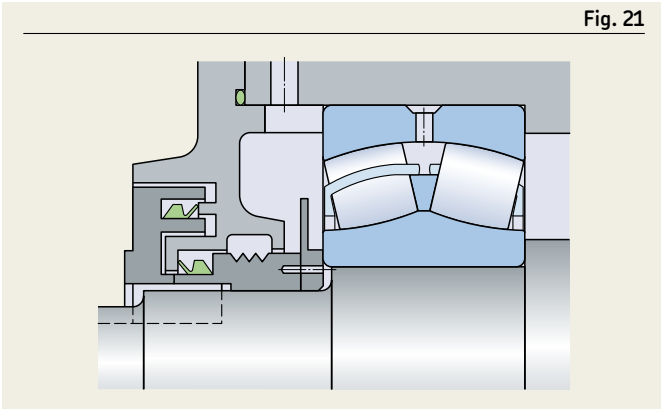
*V-ring seal*

Fig. 22

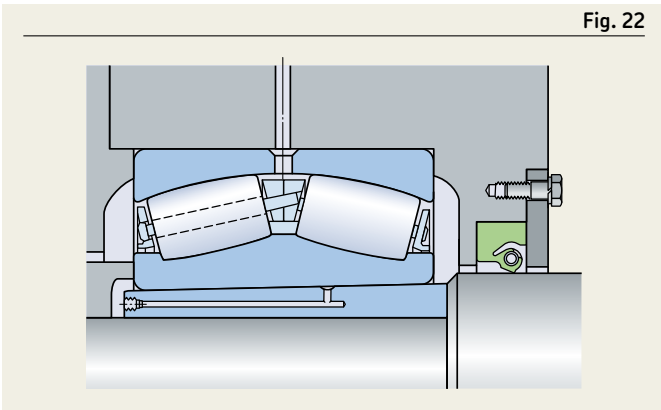
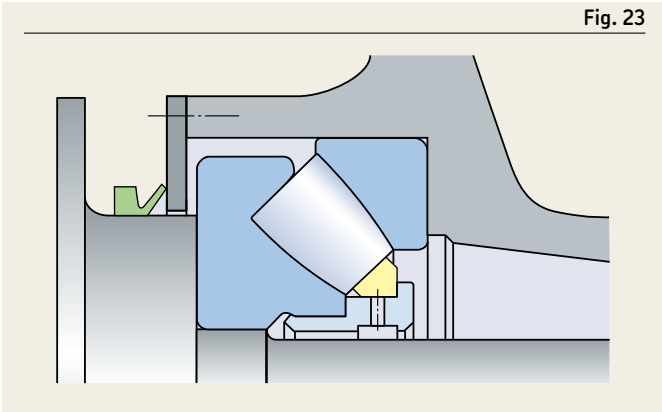
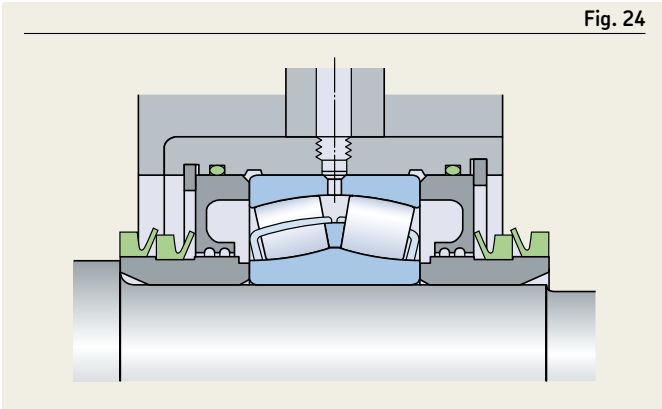
*HS8 seal*

Fig. 23



V-ring seal

Fig. 24



V-ring seals

## Installation restrictions

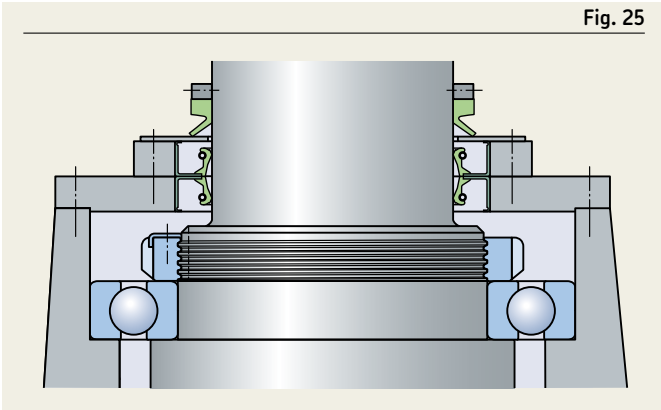
In applications where the seal cannot be installed via the shaft end, a V-ring or any of the split HS, HSS or HRS designs can be used (→ pages 192 to 199).

After being positioned on the shaft, HS, HSS and HRS seals are held together by a spring and spring connector. These seals should be retained axially in the housing bore by a one-piece or split cover plate.

Split HS radial shaft seals are suitable for circumferential speeds up to 7,5 or 10 m/s (1 480 or 1 970 ft/min), depending on their design, and are available for shaft diameters up to approximately 4 570 mm (180 in).

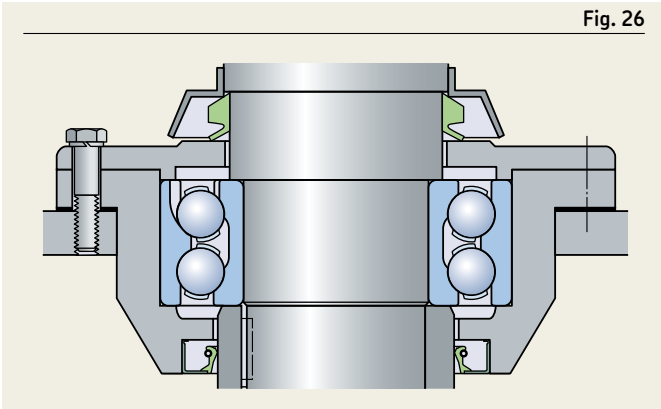
Since V-rings are elastic, they can be stretched and are therefore easy to install, even in applications where they have to be passed over other components (→ fig. 23). However, in the event that replacing a V-ring would require the time consuming removal of several components, it is advantageous to install one or two replacement V-rings on the shaft from the outset (→ fig. 24). When the time comes to replace a worn V-ring, it can be cut and removed and the replacement V-ring can be pushed into position.

Fig. 25



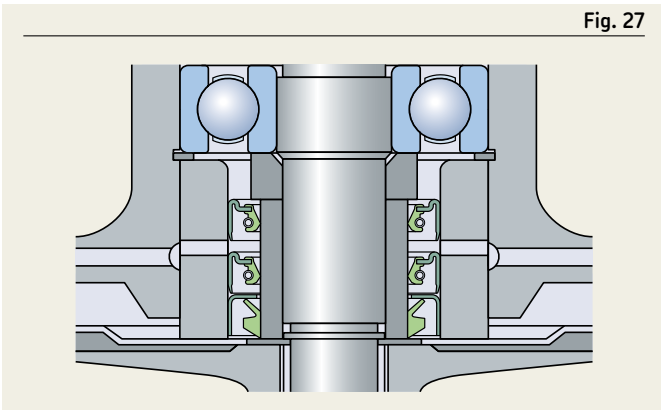
V-ring seal

Fig. 26



V-ring seal

Fig. 27



CRW5 seals + V-ring seal

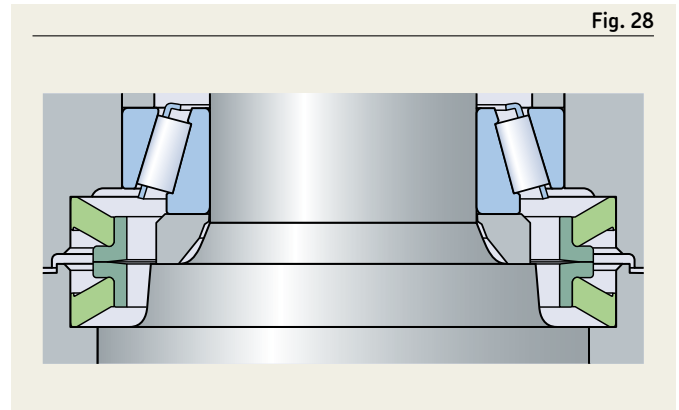
## Arrangement

Seals installed on vertical shafts are usually more exposed to contaminants like rain water than seals on horizontal shafts. Oil retention is also more challenging for seals installed on vertical shafts. In general, however, all seals listed in the product tables are suitable for use on both horizontal and vertical shafts.

V-rings (→ **figs. 25** and **26**) have an interference fit on the shaft and rotate with it. They act as flingers and are therefore particularly suitable as both primary and secondary seals on vertical shafts. Highly efficient sealing arrangements, like those found in submersible pumps, can be achieved using radial shaft seals in tandem with a V-ring for additional protection against contaminants (→ **fig. 27**).

At relatively low speeds, HDDF metal face seals (→ **fig. 28**) effectively retain grease or oil and prevent the ingress of contaminants on vertical shafts.

Fig. 28



HDDF metal face seal

## Counterface design

The service life and performance of a seal are largely influenced by:

- Shaft material and hardness
- Shaft surface finish and tolerance grade
- Dynamic runout and shaft-to-bore misalignment

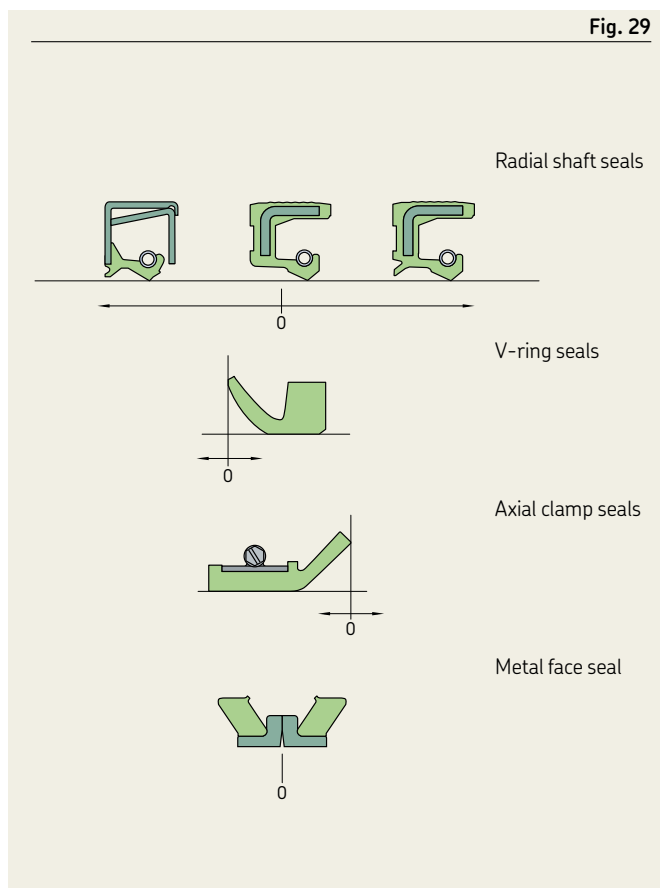
A shaft surface that is too smooth can lead to lubricant starvation, while a shaft surface that is too rough can accelerate sealing lip wear. The shaft surface should be machined without directionality as directionality can cause leakage depending on the direction of rotation. Dynamic runout and shaft-to-bore misalignment cause an uneven radial load on the circumference of the sealing lip. As a result, the sealing lip, particularly at high speeds, will not be able to follow the shaft. This, in turn, will result in a gap between the sealing lip and the shaft, causing reduced sealing ability.

Unlike radial shaft seals, V-rings and axial clamp seals are not affected by normal coaxiality deviations or runout.

## Axial movement

Axial movement of the shaft relative to the housing bore does not detract from the sealing ability of radial shaft seals (→ fig. 29), provided that the total surface in contact with the lip has the same quality with respect to hardness and surface finish.

The amount of axial movement that can be accommodated by V-rings, axial clamp seals and HDDF seals is limited by the permissible displacement of the seal relative to its counterface.



Axial movement

# Sealing materials

## Cases and inserts

Metal cases and reinforcements for SKF radial shaft seals are manufactured standard from deep-drawn carbon sheet steel. The exposed surfaces are treated to protect them from corrosion during normal handling and storage.

SKF radial shaft seals that will be used in corrosive environments can also be designed with a stainless steel case on request.

## Garter springs

The garter springs on SKF radial shaft seals are manufactured standard from cold-drawn steel wire. Exceptions are the metal-cased HDS seals, the all-rubber HS seals and the HMS5 / HMSA10 seals made from fluoro rubber that are designed with stainless steel garter springs.

## SKF Bore Tite Coating

SKF Bore Tite Coating is a water-based acrylic sealant available on most SKF metal-cased seals. The sealant is used as a coating on the outside diameter of the seal. SKF Bore Tite Coating is pliable with a thickness of 0,03 to 0,07 mm (*0.0012 to 0.0028 in*) to compensate for small imperfections in the housing bore surface. The general guideline in Rubber Manufacturers Association (RMA) is, that if the bore surface texture is greater than  $2,5 \mu\text{m}$  (*100 \mu\text{in}*)  $R_a$ , a sealant should be used. This sealant can be used at temperatures up to 200 °C (390 °F) and is compatible with most oils, greases, aqueous acids and alkalis, alcohols and glycols. Please note that SKF Bore Tite Coating is not compatible with aromatics, ketones or esters. Contact with these substances will, however, have little or no effect if wiped off quickly.

## Adhesives and bonding agents

Adhesives and bonding agents are used to achieve static sealing ability and satisfactory bonding between metal and elastomers in seal designs. Both of them can be solvent or water based depending on the metal and elastomer to be bonded.

## Sealing lip materials

In addition to its design, the material of a sealing lip can have a significant impact on sealing performance and reliability. SKF, therefore, manufactures seals using a variety of sealing lip materials to meet the needs of different applications.

The sealing lips of SKF seals are generally made of elastomer materials. However, thermoplastics like polytetrafluoroethylene (PTFE) are gaining in importance. PTFE is mainly used for special seals intended for particular applications where improved thermal or chemical resistance is demanded.

SKF industrial shaft seals are generally manufactured from the materials listed in **table 1** on **page 32**. These materials have characteristics that make them particularly suitable for specific applications.

By changing the actual formulation and blending, it is possible to modify the characteristics of the elastomers relative to:

- Resistance to swelling
- Elasticity
- Chemical resistance
- Thermal resistance
- Behaviour in the cold
- Gas permeability

Details about the chemical resistance of sealing lip materials to various media encountered in operation are provided in the section *Chemical resistance*, **page 37**.

A code is used to identify the sealing lip material of SKF seals (**→ table 1** on **page 32**). The code also appears in the designations of metric radial shaft seals. For seals manufactured from a combination of materials, a combination of code letters is used, like RD (nitrile rubber and SKF Duralip).

## Nitrile rubber (R)

The term nitrile rubber is used in this publication for acrylonitrile-butadiene rubber (NBR). This material has very good engineering properties and is a general-purpose sealing lip material. It is a copolymer manufactured from acrylonitrile and butadiene that provides good resistance to the following media:

- Most mineral oils and greases with a mineral oil base
- Normal fuels like gasoline, diesel and light heating oils
- Animal and vegetable oils, fats and hot water

Nitrile rubber also tolerates short-term dry running of the sealing lip. The permissible operating temperature range of nitrile rubber is  $-40$  to  $+100$  °C ( $-40$  to  $+210$  °F). For brief periods, temperatures of up to  $120$  °C ( $250$  °F) can be tolerated.

SKF also offers a special nitrile rubber compound with a temperature range between  $-55$  and  $+110$  °C ( $-65$  and  $+230$  °F).

## SKF Duralip (D)

SKF Duralip is a carboxylated nitrile rubber (XNBR) developed by SKF that combines the good technical properties of nitrile rubber with an increased resistance to wear (→ **diagram 2** on **page 34**). It is mainly used for seals for heavy industrial applications. Seals made of this material should be chosen when abrasive contaminants like sand, soil and scale could reach the seal counterface on the shaft.

## SKF Duratemp (H)

SKF Duratemp is a hydrogenated nitrile rubber (HNBR) developed by SKF that combines the wear resistance of SKF Duralip with increased high-temperature resistance (→ **diagram 3** on **page 35**). SKF Duratemp is also more resistant to chemical attack, weather, ageing and ozone. However, mixtures of oil in air may have a negative effect. The upper operating temperature limit is  $150$  °C ( $300$  °F), which is significantly higher than that of ordinary nitrile rubber. SKF Duratemp is mainly used for seals for heavy industrial applications or where extended service life is required.

Table 1

### SKF sealing lip materials

Composition of basic material	Designation according to SKF	ISO 1629 ISO 1043-1 DIN 7728 Part 1	ASTM <sup>1)</sup> D1418 ASTM D1600
Acrylonitrile-butadiene rubber (nitrile rubber)	R, RG	NBR	NBR
Hydrogenated acrylonitrile-butadiene rubber (SKF Duratemp)	H	HNBR	HNBR
Carboxylated nitrile rubber (SKF Duralip)	D	XNBR	XNBR
Polyacrylate elastomer	P	ACM	ACM
Silicone rubber	S	MVQ	VMQ
Fluoro rubber (SKF Duralife <sup>2)</sup> )	V	FPM	FKM
Polytetrafluoroethylene	T	PTFE	PTFE

<sup>1)</sup> American Society for Testing and Materials

<sup>2)</sup> Previously named *LongLife*



## SKF Duralife<sup>1)</sup> (V)

The fluoro rubber (FPM) compound, SKF Duralife, has been developed by SKF and is characterized by its very good wear, thermal and chemical resistance. Its resistance to weather and ageing from UV light and ozone is also very good and its gas permeability is very slight.

SKF Duralife has exceptional properties even under harsh environmental conditions and can withstand operating temperatures ranging from  $-20$  to  $+200$  °C ( $-5$  to  $+390$  °F). In applications with low dynamic runout, the temperature range can be extended down to  $-40$  °C ( $-40$  °F). SKF also offers special low-temperature fluoro rubber compounds on request.

SKF Duralife is also resistant to oils and hydraulic fluids, fuels and lubricants, mineral acids and aliphatics as well as aromatic hydrocarbons that would cause many other seal materials to fail. Seals made of SKF Duralife can also tolerate dry running of the lip for short periods. The seals should not be used in the presence of esters, ethers, ketones, certain amines and hot anhydrous hydrofluorides. Because of the compound's valuable properties, SKF manufactures seals with sealing lips made of SKF Duralife for all common shaft diameters.

## Polytetrafluoroethylene (PTFE)

PTFE is a thermoplastic polymer that is compatible with a wide assortment of lubricants and features chemical resistance that is far superior to that of any other sealing lip material. PTFE has a smooth, dirt-resistant surface. Seals with PTFE lips can accommodate high surface speeds while offering extended service life. The seals can tolerate dry running and are particularly valuable in highly contaminated applications because of their excellent exclusion ability. PTFE is used for auxiliary sealing elements or for primary sealing lips for special applications. For optimum performance, PTFE sealing elements require a high-quality sealing counterface and extra care during installation. The normal operating temperature range extends from  $-70$  to  $+200$  °C ( $-90$  to  $+390$  °F), but may go up to  $250$  °C ( $480$  °F).

## Polyacrylate elastomer

Polyacrylate elastomers are more heat resistant than nitrile rubber or SKF Duralip. The operating temperature range for polyacrylate elastomers lies between  $-40$  and  $+150$  °C ( $-40$  and  $+300$  °F) and in some fluids the upper limit may be extended to  $175$  °C ( $345$  °F). Seals of polyacrylate are resistant to ageing and ozone and are also suitable for use with lubricants containing EP additives. They should not be used to seal water, acids or alkalis etc. Dry running should be avoided.

## Silicone rubber

Silicone rubber is characterized by high thermal resistance and can withstand temperatures ranging from  $-60$  to  $+200$  °C ( $-76$  to  $+390$  °F). Silicone rubber absorbs lubricants, thereby minimizing friction and wear. SKF silicone rubber seals are particularly suitable for applications with very low or very high temperatures and for low-friction sealing of bearing arrangements. They are not very resistant to oxidized oils or certain EP additives and should be protected against abrasive substances. Sealing lips made of silicone rubber should not be exposed to dry running.

<sup>1)</sup> Previously named *LongLife*

### ⚠ WARNING

At temperatures above  $300$  °C ( $570$  °F), all fluoro elastomers and PTFE compounds give off dangerous fumes. This can occur, for example, if a welding torch is used when removing a bearing.

Although the fumes are only produced at such high temperatures, once heated, the seals will be dangerous to handle even when they have cooled down. If it is necessary to handle PTFE or fluoro elastomer seals that have been subjected to the high temperatures mentioned above, the following safety precautions should be observed:

- Protective goggles and gloves should always be worn.
- The remains of seals should be put in an airtight plastic container marked "Material will etch".
- Comply with the safety precautions included in the material safety data that can be provided upon request.

If there is contact with your skin, this should be washed with soap and plenty of water. Wash your eyes with plenty of water if these materials get into your eyes. A doctor should always be consulted. This also applies if the fumes have been inhaled.

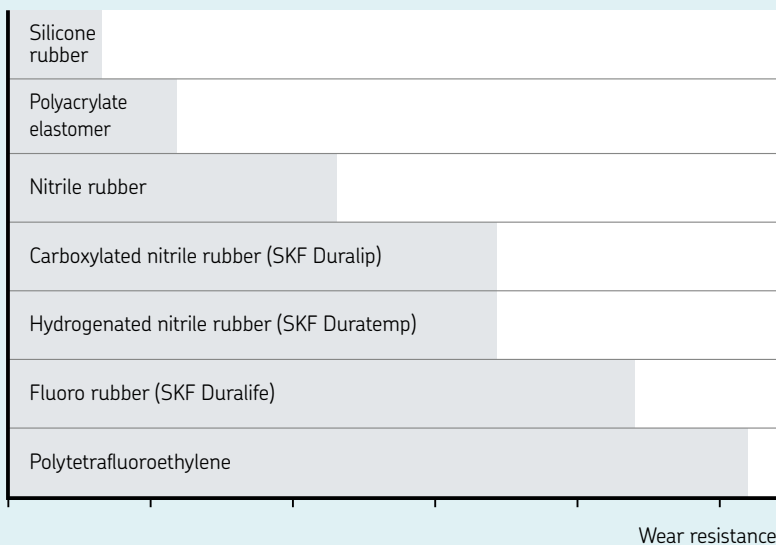
# Wear resistance

The wear resistance of a seal depends largely on the sealing lip material, as well as on the shaft surface finish, type of lubricant, circumferential speed, temperature and pressure differentials.

A comparison of wear resistance for various sealing lip materials used by SKF is provided in **diagram 2**. It is valid for seals of the same size, operating under identical conditions.

Diagram 2

Wear resistance for various sealing lip material



# Operating temperatures

Both low and high temperatures influence the sealing performance. At low temperatures, the sealing lip loses its elasticity and becomes hard and brittle. Sealing efficiency decreases and the seal becomes more susceptible to mechanical damage.

For applications where temperatures are continuously high, special high-temperature lip materials should be used, for example, PTFE or the SKF fluoro rubber material, compounds like SKF Duralife.

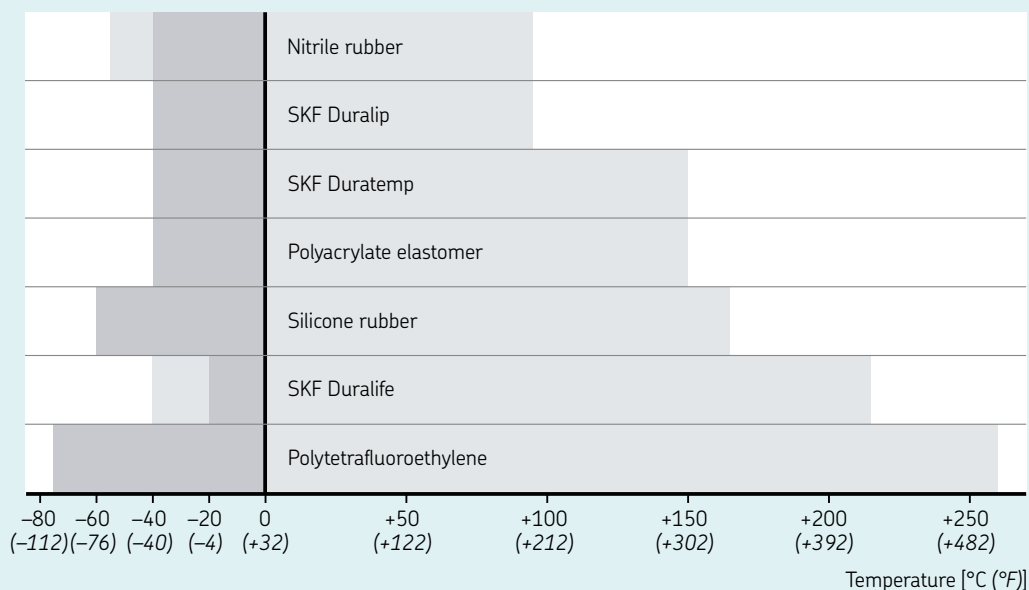
Friction, circumferential speed, viscosity of the medium being sealed as well as the specific heat transfer along the shaft influence the temperature at the sealing position and the temperature between the lip and lubricant film on the counterface. High temperatures generally lead to a breakdown of the lubricant film, resulting in insufficient lubrication, one of the most common causes of premature seal failure.

The static sealing ability between the outside diameter of the seal and the housing bore may also be affected if these components are made of different materials with significantly different coefficients of expansion and shrinkage.

Refer to **diagram 3** to view the permissible operating temperature ranges of sealing lip materials normally used by SKF.

Diagram 3

## Permissible operating temperatures



# Chemical resistance

In **table 2**, *Chemical resistance* (→ **pages 37 to 46**), information is provided regarding the resistance of SKF sealing lip materials to most of the substances encountered in industrial applications. The information is based on in-house testing and the experience of users, as well as information from the suppliers of the various materials. Unless otherwise stated, the information is valid for media of commercial purity and quality.

The chemical resistance of a seal is influenced by temperature, pressure and the amount of media present. Other important factors to consider when selecting a suitable sealing lip material include:

- Type of service (static or dynamic)
- Circumferential speed of the sealing lip
- Shaft and housing materials
- Surface finish of the seal counterface

Because the above mentioned factors also influence the service life and performance of the seal, the information contained in the table *Chemical resistance* can only be considered as a rough guide.

## **Explanation for table 2 (→ pages 37 to 46), *Chemical resistance***

RT = room temperature [20 °C (70 °F)]

1 = minor effect

2 = moderate effect

3 = static only

4 = not recommended

5 = insufficient data, test before use

Table 2

## Chemical resistance

Medium	Temperature	Medium's effect on sealing lip material			
		R, D, H	V	P	S
–	°C (°F)	–	–	–	–
<b>A</b>					
Acetaldehyde	RT	4	4	4	2
Acetamide	RT	1	2	4	2
Acetic acid, 100% (glacial)	60 (140)	3	3	4	2
Acetic acid, 30%	RT	2	2	4	1
Acetic acid, 3% (vinegar)	RT	2	1	4	1
Acetic anhydride	RT / 80 (175)	3	4	4	3
Acetone	RT	4	4	4	3
Acetophenone	RT	4	4	4	4
Acetylene	60 (140)	1	1	5	2
Acrylonitrile	RT / 60 (140)	4	3	4	4
Adipic acid (aq)	RT	1	1	5	5
Alum (aq)	100 (210)	1	1	4	1
Aluminium acetate (aq)	RT	2	4	4	4
Aluminium chloride (aq)	RT	1	1	1	2
Aluminium fluoride (aq)	RT	1	1	5	2
Aluminium nitrate (aq)	RT	1	1	5	2
Aluminium phosphate (aq)	RT	1	1	5	1
Aluminium sulphate (aq)	RT / 60 (140)	1	1	4	1
Ammonia (anhydrous)	RT	2	4	4	3
Ammonia gas	RT	1	4	4	2
Ammonia gas	80 (175) / 100 (210)	4	4	4	1
Ammonium carbonate (aq)	RT / 60 (140)	2	5	4	5
Ammonium chloride (aq)	RT / 60 (140)	1	1	5	5
Ammonium chloride (dry) (sal ammoniac)	RT	1	1	1	2
Ammonium nitrate (aq)	RT	1	5	2	5
Ammonium persulphate (aq)	RT	4	5	4	5
Ammonium phosphate (aq)	RT / 60 (140)	1	5	5	1
Ammonium sulphate (aq)	100 (210)	1	4	4	5
Amyl acetate	RT	4	4	4	4
Amyl alcohol	60 (140)	2	2	4	4
Aniline	60 (140) / 100 (210)	4	3	4	4
Aniline dyes	RT	4	2	4	3
Aniline hydrochloride	RT	2	2	4	4
Aniline hydrochloride	100 (210)	4	5	5	5
Animal fats	80 (175)	1	1	1	2
Aqua Regia	RT	4	5	4	4
Arsenic acid	RT / 60 (140)	1	1	3	1
Arsenic trichloride (aq)	RT	1	5	5	5
Asphalt (liquid)	100 (210)	2	2	4	4
<b>B</b>					
Barium chloride (aq)	RT / 60 (140)	1	1	1	1
Barium hydroxide (aq)	RT / 60 (140)	1	1	4	1
Barium sulphate	RT / 60 (140)	1	1	4	1
Barium sulphide (aq)	RT / 60 (140)	1	1	4	1
Beer	RT	1	1	4	1
Benzaldehyde	RT / 60 (140)	4	4	4	4
Benzene	RT	4	1	4	4
Benzene sulphonic acid	RT	4	1	4	4
Benzoic acid	RT / 60 (140)	4	1	4	4
Benzoyl chloride	RT	4	1	4	5
Benzyl alcohol	RT / 60 (140)	4	1	1	2
Benzyl benzoate	50 (120) / 60 (140)	4	1	4	5
Benzyl chloride	RT	4	1	4	4

## Chemical resistance

Medium	Temperature	Medium's effect on sealing lip material			
		R, D, H	V	P	S
–	°C (°F)	–	–	–	–
Blast furnace gas	100 (210)	4	1	4	1
Borax (aq)	RT / 60 (140)	2	1	5	2
Bordeaux mixture	RT	2	1	4	2
Boric acid	60 (140) / 100 (210)	1	1	4	1
Brake fluid, ATE	80 (175)	4	4	4	1
Brake fluid, glycoether	80 (175)	4	5	4	1
Brine (sodiumchloride, aq)	RT / 50 (120)	1	1	4	1
Bromine, anhydrous (liquid / gaseous)	RT / 50 (420)	4	1	4	4
Bromine trifluoride	RT	4	4	4	4
Bromine water	RT	4	1	4	4
Bromo benzene	RT	4	1	4	4
Bunker oil	60 (140)	1	1	1	2
Butadiene (gaseous or liquified)	RT	4	1	4	4
Butane (gaseous or liquified)	RT	1	1	1	4
Butter (animal fat)	RT / 80 (175)	1	1	1	2
Butyl acetate	RT	4	4	4	4
Butyl acrylate	RT	4	4	4	5
Butyl alcohol	RT	2	1	4	2
Butyl amines	RT	3	4	4	4
Butylene	RT	2	1	4	4
Butyl stearate	50 (120)	2	1	5	5
Butyr aldehyde	RT	4	4	4	4
<b>C</b>					
Calcium acetate (aq)	RT	2	4	4	4
Calcium bisulphite (aq)	RT	1	1	4	1
Calcium chloride (aq)	60 (140)	1	1	1	1
Calcium hydroxide (aq)	RT	1	1	4	1
Calcium hypochlorite (aq)	RT / 60 (140)	2	1	4	2
Calcium nitrate (aq)	RT / 40 (105)	1	1	1	2
Cane sugar liquors	RT / 60 (140)	1	1	4	1
Carbon dioxide	RT	1	1	5	2
Carbon disulphide	RT	3	1	3	4
Carbonic acid	RT	2	1	1	1
Carbon monoxide	60 (140)	1	1	5	1
Carbon tetrachloride	RT / 60 (140)	3	1	4	4
Castor oil	RT	1	1	1	1
Cellosolve (ethyl glycol)	RT	4	3	4	4
Cellosolve acetate (ethyl glycol acetate)	RT	4	4	4	4
Chlorine (dry)	RT	4	1	4	4
Chlorine (wet)	RT	4	1	4	4
Chlorine dioxide	RT	4	1	4	5
Chlorine trifluoride	RT	4	4	4	4
Chloroacetic acid	60 (140)	4	4	4	5
Chloroacetone	RT	4	4	4	4
Chlorobenzene	RT	4	1	4	4
Chlorobromomethane	RT	4	1	4	4
Chlorobutadiene	RT	4	1	4	4
Chloroform	RT	4	1	4	4
Chlorosulphonic acid	RT	4	4	4	4
Chlorotoluene	RT	4	1	4	4
Chromic acid	60 (140)	4	1	4	3
Citric acid	60 (140) / 70 (160)	1	1	1	1
Cobalt chloride (aq)	RT	1	1	4	2
Coconut oil	50 (120) / 70 (160)	1	1	1	1

## Chemical resistance

Medium	Temperature	Medium's effect on sealing lip material			
		R, D, H	V	P	S
–	°C (°F)	–	–	–	–
Cod liver oil	RT	1	1	1	2
Coke oven gas	80 (175)	4	1	4	2
Copper acetate (aq)	RT	2	4	4	4
Copper chloride (aq)	RT	1	1	1	1
Copper sulphate (aq)	60 (140)	1	1	4	1
Corn oil	RT / 60 (140)	1	1	1	1
Cottonseed oil	RT / 70 (160)	1	1	1	1
Cresol	50 (120) / 70 (160)	4	1	4	4
Cumene (isopropylbenzene)	RT	4	1	4	4
Cyclohexane	RT	1	1	1	4
Cyclohexanol	RT	3	1	5	4
Cyclohexanone	RT	4	4	4	4
p-Cymene	RT	4	1	4	4
<b>D</b>					
Decahydronaphthalene (decalin)	RT / 60 (140)	4	1	5	4
Detergent	RT	1	1	4	1
Developing fluids (photography)	RT	1	1	5	1
Diacetone alcohol	RT	4	4	4	2
Dibenzyl ether	RT	4	4	5	5
Dibutyl amine	RT	4	4	4	3
Dibutyl ether	RT	4	3	3	4
Dibutyl phthalate	RT / 60 (140)	4	3	4	2
Dibutyl sebacate	RT / 60 (140)	4	2	4	2
o-Dichlorobenzene	RT	4	1	4	4
Dicyclohexylamine	RT	3	4	4	5
Diethyl amine	RT	2	4	4	2
Diethyl benzene	RT	4	1	5	4
Diethyl ether	RT	4	4	3	4
Diethyl sebacate	RT	2	2	4	2
Diisopropyl benzene	RT	4	1	5	5
Dimethyl aniline (Xylidine)	RT	3	4	4	4
Dimethyl ether	RT	1	2	4	1
Dimethyl formamide	RT / 60 (140)	2	4	4	2
Dimethyl phthalate	RT	4	2	4	5
Dioctyl phthalate	RT / 60 (140)	3	2	4	3
Dioctyl sebacate	RT / 60 (140)	4	2	4	3
Dioxane	RT / 60 (140)	4	4	4	4
Dioxolane	RT	4	4	4	4
Dipentene	RT	2	1	4	4
Diphenyl oxide	RT	4	1	4	3
Dowtherm oils	100 (210)	4	1	4	3
Dry cleaning fluids	40 (105)	3	1	4	4
<b>E</b>					
Epichlorohydrin	RT	4	4	4	4
Ethane	RT	1	1	1	4
Ethanol (denatured alcohol)	RT	1	1	4	1
Ethanolamine (monoethanolamine)	RT	2	4	4	2
Ethanolamine (di-andtriethanolamine)	50 (120)	5	50	-120	5
Ethyl acetate	RT	4	4	4	2
Ethyl acrylate	RT	4	4	4	2
Ethyl benzene	RT	4	1	4	4
Ethyl benzoate	RT	4	1	4	4
Ethyl chloride	RT	1	1	4	4

## Chemical resistance

Medium	Temperature	Medium's effect on sealing lip material			
		R, D, H	V	P	S
–	°C (°F)	–	–	–	–
Ethylene	RT	1	1	5	5
Ethylene chloride	RT	4	2	4	4
Ethylene chlorohydrin	RT	4	1	4	3
Ethylene diamine	RT	1	4	4	1
Ethylene glycol	RT	1	1	2	1/2
Ethylene glycol	100 (210)	1	1	3	1/2
Ethylene oxide	RT	4	4	4	4
Ethylene trichloride	RT	4	1	4	4
Ethyl ether	RT	3	4	4	4
Ethyl formate	RT	4	1	5	5
Ethyl glycol (Cellosolve)	RT	4	3	4	4
Ethyl glycol acetate (Cellosolve acetate)	RT	4	4	4	4
Ethyl silicate	RT	1	1	5	5
<b>F</b>					
Fatty acids	100 (210)	2	1	5	3
Ferric chloride (aq)	RT	1	1	1	2
Ferric nitrate (aq)	RT	1	1	1	3
Ferric sulphate (aq)	RT	1	1	1	2
Fish oil	RT	1	1	5	1
Fluorine (liquified)	RT	4	2	4	4
Fluorobenzene	RT	4	1	4	4
Fluorosilic acid	60 (140)	1	1	5	4
Formaldehyde	RT	3	1	4	2
Formaldehyde, 37%	below 100 (210)	2	1	4	2
Formic acid	RT / 60 (140)	2	3	5	2
<b>Fuels</b>					
– Aeroenginefuels JP:					
– JP3 (MIL-J-5624 G)	RT	1	1	2	4
– JP4 (MIL-J-5624 G)	RT	1	1	2	4
– JP5 (MIL-J-5624 G)	RT	1	1	2	4
– JP6 (MIL-F-25656 B)	RT / 60 (140)	1	1	5	4
– ASTM reference fuels:					
– ASTM-A (MIL-S-3136B Typ 1)	RT / 60 (140)	1	1	2	4
– ASTM-B (MIL-S-3136B Typ 111)	RT / 60 (140)	1	1	5	4
– ASTM-C	RT / 60 (140)	2	1	4	4
– Diesel fuel	60 (140)	1	1	2	2
– Fuel oil	60 (140)	1	1	1	4
– Gasohol (10% ethanol or methanol)	RT	2	3	4	4
– Kerosene	RT	1	1	1	4
– Mineral oil	100 (210)	1	1	1	2
– Petrol	RT	1	1	4	4
Fumaric acid	RT	1	1	4	2
Furan	RT	4	5	4	5
Furfural	RT	4	4	4	4
Furfuran	RT	4	5	4	5
<b>G</b>					
Gelatine (aq)	40 (105)	1	1	4	1
Glucose	RT	1	1	5	1
Glue	RT	1	1	5	1
Glycerin	100 (210)	1	1	3	1
Glycols	100 (210)	1	1	4	1/2



## Chemical resistance

Medium	Temperature	Medium's effect on sealing lip material			
		R, D, H	V	P	S
–	°C (°F)	–	–	–	–
<b>H</b>					
n-Hexaldehyde	RT	4	4	5	2
Hexane	RT / 60 (140)	1	1	1	4
1-Hexene	RT	2	1	1	4
Hexyl alcohol	RT	1	1	4	2
Hydraulic fluids					
– Hydraulic oils (acc. to DIN 51524)	80 (175)	1	1	1	3
– Hydraulic fluids (acc. To DIN 51502)					
– HFA (oil in water emulsion)	55 (130)	1	1	5	5
– HFB (water in oil emulsion)	60 (140)	1	1	5	5
– HFC (aqueous Polymer solutions)	60 (140)	1	1	5	1
– HFD (phosphoric esters)	80 (175)	4	2 / 4	4	4
– Skydrol 500	80 (175)	4	4	4	3
– Skydrol 7000	80 (175)	4	2	4	3
Hydrazine	RT	2	4	5	3
Hydrobromic acid	RT / 60 (140)	4	1	4	4
Hydrochloric acid (conc.)	RT	3	1	4	3
Hydrochloric acid (conc.)	80 (175)	4	2	4	4
Hydrocyanic acid (Prussic acid)	RT	2	1	4	3
Hydrofluoric acid (conc.)	RT	4	1	4	4
Hydrofluoric acid (conc.)	100 (210)	4	3	4	4
Hydrofluoric acid (anhydrous)	100 (210)	4	4	4	4
Hydrogen gas	RT	1	1	2	3
Hydrogen peroxide (90%)	RT	4	2	4	2
Hydrogen sulphide (wet)	RT / 100 (210)	4	4	4	3
Hydroquinone	RT	4	2	4	5
Hypochlorous acid	RT	4	1	4	5
<b>I</b>					
Iodine pentafluoride	RT	4	4	4	4
Isobutyl alcohol	RT	2	1	4	1
Isooctane	RT	1	1	1	4
Isophorone	RT	4	4	4	4
Isopropyl acetate	RT / 80 (175)	4	4	4	4
Isopropyl alcohol	RT 60 (140)	2	1	4	1
Isopropyl chloride	RT	4	1	4	4
Isopropyl ether	RT / 60 (140)	2	4	3	4
<b>L</b>					
Lactic acid	RT	1	1	4	1
Lactic acid	100 (210)	4	1	4	2
Lard	80 (175)	1	1	1	2
Lavender oil	RT	2	1	2	4
Lead acetate (aq)	RT / 60 (140)	2	2	4	4
Lead nitrate (aq)	RT	1	5	5	2
Linoleic acid	RT	2	2	5	2
Linseed oil	RT 60 (140)	1	1	1	1
Lubricants					
– ASTM oil No.1	100 (210)	1	1	1	3
– ASTM oil No.2	100 (210)	1	1	1	3
– ASTM oil No.3	100 (210)	1	1	1	3
– ATF oils, type A	100 (210)	1	1	1	4
– ATF oils, type I	100 (210)	1	1	1	4
– ATF oils, type II	100 (210)	1	1	1	4
– ATF oils, type F	100 (210)	1	1	1	4

## Chemical resistance

Medium	Temperature	Medium's effect on sealing lip material			
		R, D, H	V	P	S
–	°C (°F)	–	–	–	–
–ATF oils, type Mercon	100 (210)	1	1	1	4
–EP lubes	100 (210)	2	1	1	4
–Fluorolube	100 (210)	1	2	5	1
–Grease MIL-G-7118A	80 (175)	1	1	3	3
–Grease MIL-G-7711A	80 (175)	1	1	1	3
–Lubricating oils (petroleum)	100 (210)	1	1	1	4
–Red oil (MIL-H-5606)	100 (210)	1	1	1	4
–RJ-1 (MIL-F-25558 B)	100 (210)	1	1	1	4
–RJ-1 (MIL-F-25576 C)	100 (210)	1	1	1	4
–Motor oil SAE 30	100 (210)	1	1	1	1
–Transmission oil SAE 90	100 (210)	1	1	1	4
–Transmission oil MIL-L-23699 A	100 (210)	1	1	3	3
–Silicone greases	120 (250)	1	1	1	3
–Silicone oils	120 (250)	1	1	1	3
–Transformer oil (Pyranol)	60 (140)	4	1	5	4
–Transformer oil	60 (140)	1	1	2	2
–Transmission fluid type A	RT	1	1	1	2
–Turbine oil	100 (210)	2	1	1	4
<b>M</b>					
Magnesium chloride (aq)	100 (210)	1	1	5	1
Magnesium hydroxide (aq)	100 (210)	2	1	4	5
Magnesium sulphate (aq)	100 (210)	1	1	4	1
Maleic acid	100 (210)	4	1	4	5
Maleic anhydride	60 (140)	4	4	4	5
Malic acid	RT	1	1	4	2
Mercury	RT / 60 (140)	1	1	5	5
Mercury chloride (aq)	RT / 60 (140)	1	1	5	5
Mesityl oxide	RT	4	4	4	4
Methane	RT	1	2	1	4
Methanol (methyl alcohol)	60 (140)	1	1	4	4
Methyl acetate	RT	4	4	4	4
Methyl acrylate	RT	4	4	4	4
Methyl aniline	RT	4	2	4	5
Methyl bromide	RT	2	1	3	5
Methyl cellosolve (methyl glycol)	RT	3	4	4	4
Methyl chloride	RT	4	2	4	4
Methyl cyclopentane	RT	4	2	4	4
Methylene chloride	RT	4	2	4	4
Methyl ethyl ketone	RT	4	4	4	4
Methyl formate	RT	4	5	5	5
Methyl glycol (Cellosolve)	RT	3	4	4	4
Methyl isobutyl ketone	RT	4	4	4	4
Methyl methacrylate	RT	4	4	4	4
Methyl salicylate	RT	4	5	5	5
Milk	RT	1	1	4	1
Mustard gas	RT	5	5	5	1
<b>N</b>					
Naphtha	RT	2	1	2	4
Naphthalene	60 (140)	4	1	5	4
Naphthalenic acid	RT	2	1	5	4
Natural gas	RT	1	1	2	1
Neat-s-foot oil	RT / 60 (140)	1	1	1	2
Nickel acetate (aq)	RT	2	4	4	4

## Chemical resistance

Medium	Temperature	Medium's effect on sealing lip material			
		R, D, H	V	P	S
–	°C (°F)	–	–	–	–
Nickel chloride	RT	1	1	4	1
Nickel sulphate (aq)	RT / 60 (140)	1	1	4	1
Nitric acid (conc.)	RT	4	3	4	4
Nitric acid (fuming)	RT	4	4	4	4
Nitric acid (dilute)	RT	4	1	4	2
Nitrobenzene	50 (120)	4	2	4	4
Nitroethane	RT	4	4	4	4
Nitrogen	RT	1	1	1	1
Nitrogen tetroxide	RT	4	4	4	4
Nitromethane	RT	4	4	4	4
<b>O</b>					
Octadecane	RT / 50 (120)	1	1	2	4
n-Octane	RT	2	1	4	4
Octyl alcohol	RT	2	1	4	2
Oleic acid	70 (160)	1	2	2	4
Olive oil	60 (140)	1	1	1	3
Oxalic acid	70 (160)	2	1	5	4
Oxygen	RT	2	1	2	1
Oxygen	> 100 (210)	4	2	4	2
Ozone	RT	4	1	2	1
<b>P</b>					
Palmitic acid	60 (140)	1	1	4	4
Peanut oil	RT / 50 (120)	1	1	1	1
Perchloric acid	RT	4	1	4	4
Perchloroethylene	RT / 60 (140)	2	1	4	4
Petroleum	below 120 (250)	1	1	2	2
Petroleum	above 120 (250)	4	2	4	4
Petroleum ether	RT / 60 (140)	1	1	1	4
Petroleum gas (liquified)	RT	1	1	3	3
Phenol	60 (140) / 100 (210)	4	1	4	4
Phenyl ethyl ether	RT	4	4	4	4
Phenyl hydrazine	RT / 60 (140)	4	1	4	5
Phoron (diisopropylidene acetone)	60 (140)	4	4	4	4
Phosphoric acid, 20%	50 (120) / 60 (140)	2	1	5	2
Phosphoric acid, 45%	50 (120) / 60 (140)	4	1	5	3
Phosphorus trichloride	RT	4	1	5	5
Pickling solution	RT	4	2	4	4
Picric acid	RT	4	1	5	4
Pinene	RT	2	1	4	4
Pine oil	RT	4	1	5	4
Piperidine	RT	4	4	4	4
Potassium acetate (aq)	RT	2	4	4	4
Potassium chloride (aq)	RT / 60 (140)	1	1	1	1
Potassium cyanide (aq)	RT / 50 (120)	1	1	1	1
Potassium dichromate (aq)	RT	1	1	1	1
Potassium hydroxide (aq)	60 (140)	2	4	4	4
Potassium nitrate (aq)	RT / 60 (140)	1	1	1	1
Potassium sulfate (aq)	RT / 60 (140)	1	1	4	1
Propane	RT	1	1	1	4
Propyl acetate	RT	4	4	4	4
Propyl alcohol	RT / 60 (140)	1	1	4	1
Propylene	RT	4	1	4	4
Propylene oxide	RT	4	4	4	4

## Chemical resistance

Medium	Temperature	Medium's effect on sealing lip material			
		R, D, H	V	P	S
–	°C (°F)	–	–	–	–
Prussic acid (hydrocyanic acid)	RT	2	1	4	3
Pyridine	RT	4	4	4	4
Pyroligneous acid	RT	4	4	4	5
Pyrrole	RT	4	4	4	2
<b>R</b>					
Rapeseed oil	RT	2	1	2	4
Refrigerants (acc.to DIN 8962)	RT	2	1	5	4
– R 11	RT	2	1	5	4
– R 12	RT	1	2	1	4
– R 13	RT	1	1	5	4
– R 13 B1	RT	1	1	5	4
– R 14	RT	1	1	5	4
– R 21	RT	4	4	5	4
– R 22	RT	4	4	2	4
– R 31	RT	4	4	5	5
– R 32	RT	1	4	5	5
– R 112	RT	3	1	5	4
– R 113	RT	1	2	5	4
– R 114	RT	1	2	5	4
– R 114 B	RT	2	2	5	4
– R 115	RT	1	2	5	5
– R C 318	RT	1	2	5	5
<b>S</b>					
Salicylic acid	RT	2	1	5	5
Sea water	RT	1	1	4	1
Silver nitrate (aq)	RT	2	1	1	1
Soap solution	RT	1	1	4	1
Sodium acetate (aq)	RT	2	4	4	4
Sodium bicarbonate (aq)	60 (140)	1	1	5	1
Sodium bisulphite (aq)	100 (210)	1	1	4	1
Sodium carbonate (soda)	RT / 60 (140)	1	1	5	1
Sodium chloride (aq)	RT / 100 (210)	1	1	5	1
Sodium cyanide (aq)	RT	1	1	5	1
Sodium hydroxide (aq)	RT	2	2	3	2
Sodium hypochlorite (aq)	RT / 50 (120)	2	1	4	5
Sodium metaphosphate	RT / 60 (140)	1	1	5	2
Sodium nitrate (aq)	RT / 60 (140)	2	5	5	4
Sodium phosphate (aq)	RT / 60 (140)	1	1	4	4
Sodium silicate (aq)	RT / 60 (140)	1	1	5	5
Sodium sulphate (aq) (Glauber's salt)	RT / 60 (140)	1	1	4	1
Sodium thiosulphate (aq)	RT / 50 (120)	2	1	4	1
Soyabean oil	RT	1	1	1	1
Stannic chloride (aq)	RT / 80 (175)	1	1	5	2
Stannous chloride (aq)	RT / 80 (175)	1	1	5	2
Steam	below 150 (300)	4	4	4	3
Steam	above 150 (300)	4	4	4	4
Stearic acid	60 (140)	2	2	4	2
Stoddard solvent	RT	1	1	1	4
Styrene	RT	4	2	4	4
Sucrose solution	RT / 60 (140)	1	1	4	1
Sulphur	RT / 60 (140)	4	1	4	3
Sulphur chloride (aq)	RT	3	1	4	3
Sulphur dioxide (dry)	RT / 60 (140)	4	1	4	2

## Chemical resistance

Medium	Temperature	Medium's effect on sealing lip material			
		R, D, H	V	P	S
–	°C (°F)	–	–	–	–
Sulphur dioxide (liquified)	RT / 60 (140)	4	1	4	2
Sulphur dioxide (wet)	RT / 60 (140)	4	1	4	2
Sulphur hexafluoride	RT	2	1	4	2
Sulphuric acid (conc.)	RT / 50 (120)	4	1	4	4
Sulphuric acid (20%) (battery acid)	60 (140)	4	1	4	4
Sulphuric acid (dilute)	RT	3	1	2	4
Sulphurous acid	RT / 60 (140)	4	1	4	4
Sulphur trioxide	RT	4	1	4	2
<b>T</b>					
Tannic acid	RT / 60 (140)	1	1	4	2
Tar, bituminous	RT	2	1	4	2
Tartaric acid	60 (140)	1	1	5	1
Tepineol	RT	2	1	5	5
Tetrabromoethane	RT	4	1	4	4
Tetrabromomethane	RT	4	1	5	4
Tetrabutyl titanate	RT	2	1	5	5
Tetrachloroethylene	60 (140)	4	2	4	4
Tetraethyl lead	RT	2	1	5	5
Tetrahydrofuran	RT	4	4	4	4
Tetrahydronaphthalene (Tetralin)	RT	4	1	5	4
Thionyl chloride	RT	4	2	4	5
Titanium tetrachloride	RT	2	1	4	4
Toluene	RT	4	1	4	4
Toluene diisocyanate	RT	4	4	4	4
Triacetin	RT	2	1	4	5
Tributoxy ethyl phosphate	RT	4	1	4	5
Tributyl phosphate	RT / 60 (140)	4	4	4	4
Trichloroacetic acid	60 (140)	5	4	4	4
Trichloroethane	RT	4	1	4	4
Trichloroethylene	RT	4	1	4	4
Tricresyl phosphate	RT / 60 (140)	4	1	4	3
Triethanol amine	RT	2	4	4	5
Triethyl aluminium	RT	4	2	4	5
Triethyl borane	RT	4	1	4	5
Trinitrotoluene	RT	4	2	4	5
Trioctyl phosphate	RT / 60 (140)	4	2	4	3
Tung oil (China wood oil)	RT	1	1	1	4
Turpentine	RT	1	1	2	4
<b>V</b>					
Varnish	RT	2	1	4	4
Vegetable oil	60 (140)	1	1	1	2
Vinyl acetylene	RT	1	1	5	2
Vinyl chloride	RT	4	1	5	5
<b>W</b>					
Water	100 (210)	1	1	4	1
Whisky	RT	1	1	4	1
White oil	RT / 80 (175)	1	1	1	4
Wine	RT	1	1	4	1
Wood oil	RT	1	1	1	4

## Chemical resistance

Medium	Temperature	Medium's effect on sealing lip material			
		R, D, H	V	P	S
–	°C (°F)	–	–	–	–
<b>X</b>					
Xylene	RT	4	1	4	4
Xylidine (di-methyl aniline)	RT	3	4	4	4
<b>Z</b>					
Zeolites	RT	1	1	5	5
Zinc acetate (aq)	RT	1	1	4	4
Zinc chloride (aq)	RT	1	1	4	1
Zinc sulphate (aq)	RT	1	1	4	1

# Storage and handling of seals

## General

The following guidelines for the storage and cleaning of seals are valid for natural and synthetic elastomeric materials and are in accordance with ISO 2230 and DIN 7716 standards. The storage guidelines set forth in DIN 7716 are valid for long-term storage.

Unfavourable storage conditions and improper handling can change the physical properties of most products made from natural or synthetic rubber. This can result in hardening or softening, permanent deformation, peeling or cracks, which can lead to a shortened service life or render the products altogether useless. These changes can be brought about by storing the products under stress or load or from the influence of oxygen, ozone, heat, light, moisture or solvents. When stored properly, elastomer products generally retain their properties for several years.

## Storage

The storage area should be cool, dry, moderately ventilated and there should be as little dust as possible. Outdoor storage without protection should be avoided.

The appropriate storage temperature depends on the elastomer. The most favourable storage temperature for synthetic rubber seals is 15 to 25 °C (60 to 80 °F).

Elastomers that have been subjected to low temperatures during transport or storage may become stiff. They should therefore be warmed and kept at a temperature of at least 20 °C (70 °F) before being unpacked and used in order to prevent exposure to condensation.

In heated storage rooms, the products should be shielded from the heat source. There should be at least 1 m (3 ft.) between the packages and the source of heat. In rooms where a heater with a fan is used, the distance should be greater. Storage in damp rooms should be avoided because of the risk of condensation. A storage facility with relative humidity below 65% is excellent.

Seals should be protected from light, particularly direct sunlight or artificial light with a high proportion of UV radiation. Any windows in the store should therefore be covered with a red or orange coating (never blue). Ordinary light bulbs are preferred for illumination.

Seals should be wrapped or stored in airtight containers, protecting them from atmospheric changes and particularly against drafts.

Because ozone is particularly damaging, steps must be taken to make sure that no ozone is produced in the storage facility as the result of using electric motors or other equipment that can produce sparks or other electric discharges. Combustion fumes and vapours that can produce ozone as the result of photochemical processes should be exhausted. For this reason, solvents, fuels, lubricants,

chemicals, acids, disinfectants etc. should not be stored in the same room as the seals.

Elastomer products should not be subjected to tension, compression or other forms of load during storage as this can produce permanent deformations and cracks. Seals should therefore not be hung on hooks during storage. Certain metals, especially copper and manganese, damage elastomer products. Contact with these metals should therefore be avoided and the seals should be covered with layers of paper or polyethylene to prevent such contact.

In case it is necessary to repack the seals, packaging and covering materials should not contain substances such as copper or alloys containing copper, petroleum, oil etc. that can cause damage to the seals. The packaging materials should not contain softeners.

If the products are powdered, suitable powders are talcum, chalk, finely divided glimmer and rice starch.

Seals made of different materials should not be in contact with each other. This is particularly important when the seals are different in colour as this will avoid discolouration.

Seals should be stored for the shortest period of time possible. Where long-term storage is involved, care should be taken that newly arrived products are kept separate from those already in storage to enable use of seals on a first in, first out basis.

## Cleaning and maintenance

In the event that cleaning is necessary, elastomers should be cleaned with warm, soapy water that does not exceed 30 °C (85 °F), and air dried at room temperature.

Solvents such as trichloroethylene, carbon tetrachloride or hydrocarbons should not be used, nor should sharp-edged objects, wire brushes, emery cloth or sandpaper.

Elastomer / metal combinations can be cleaned using a 1:10 mixture of glycerine and alcohol.

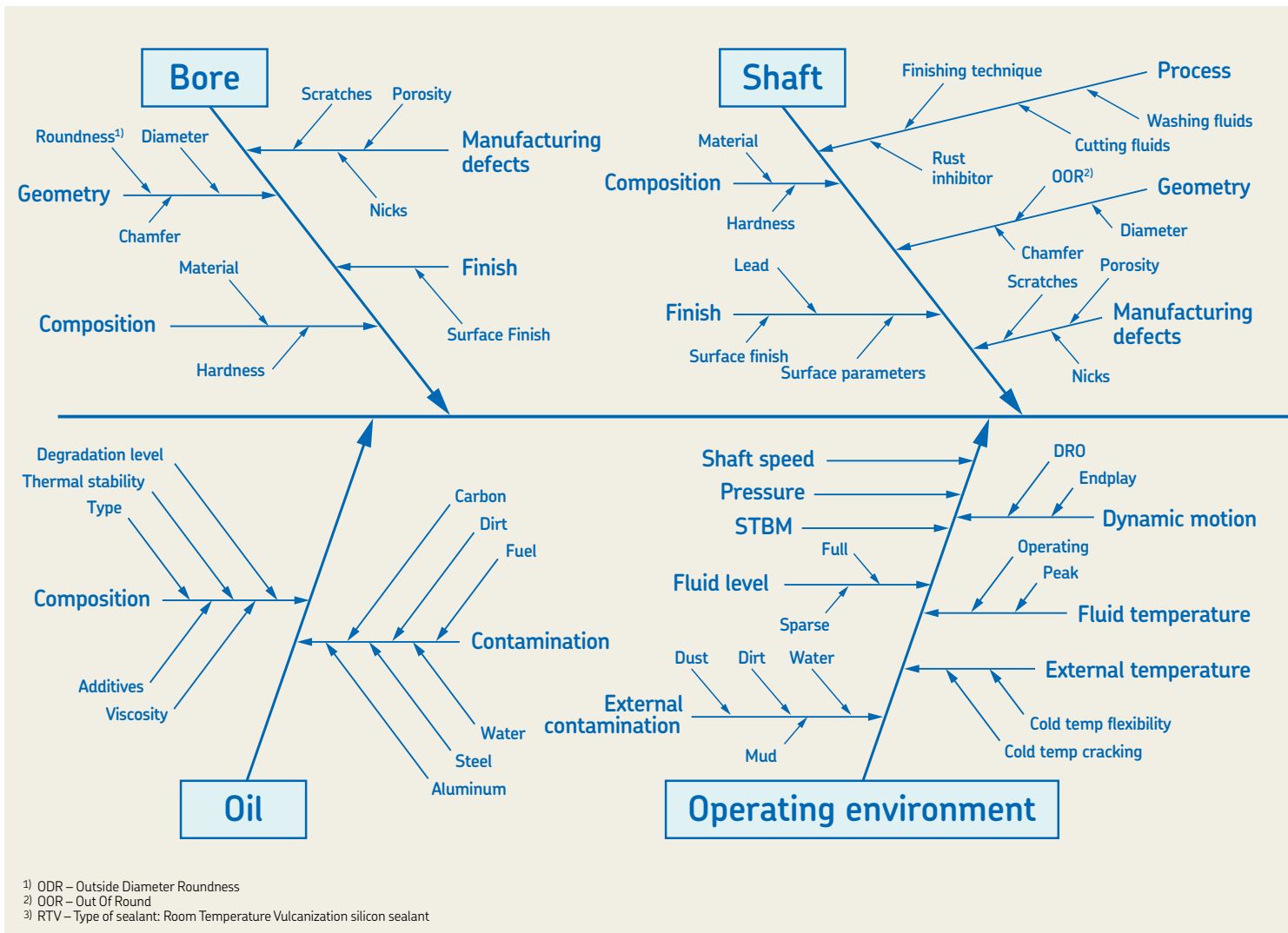
# Seal failure analysis

## Leaking seals are not inevitable

Attitudes about seal performance are influenced by industry expectations and personal habits. But no matter where you are on the spectrum between vigilance and indifference, understand that there is always a better way. After all, the definition of insanity is doing the same thing and expecting a different result.

## Consider the fishbone

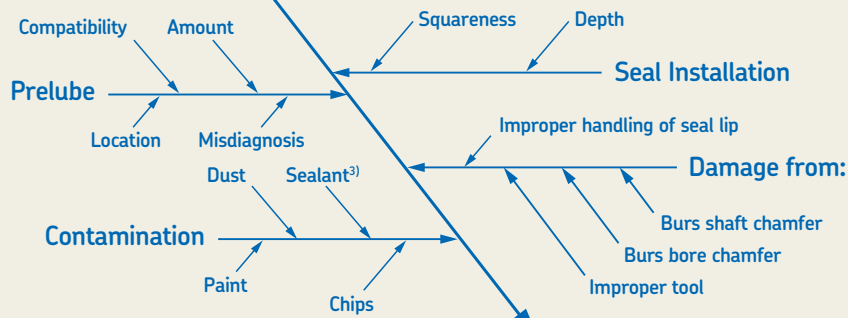
A leaking seal means a defective seal that must be replaced right? As the fishbone diagram below shows, there are several potential causes of a leaking seal, and only one of the six categories involves a problem with the actual seal. SKF is committed to helping you identify the root causes of failure and find a better way. Contact your local SKF application engineer for help with troubleshooting.



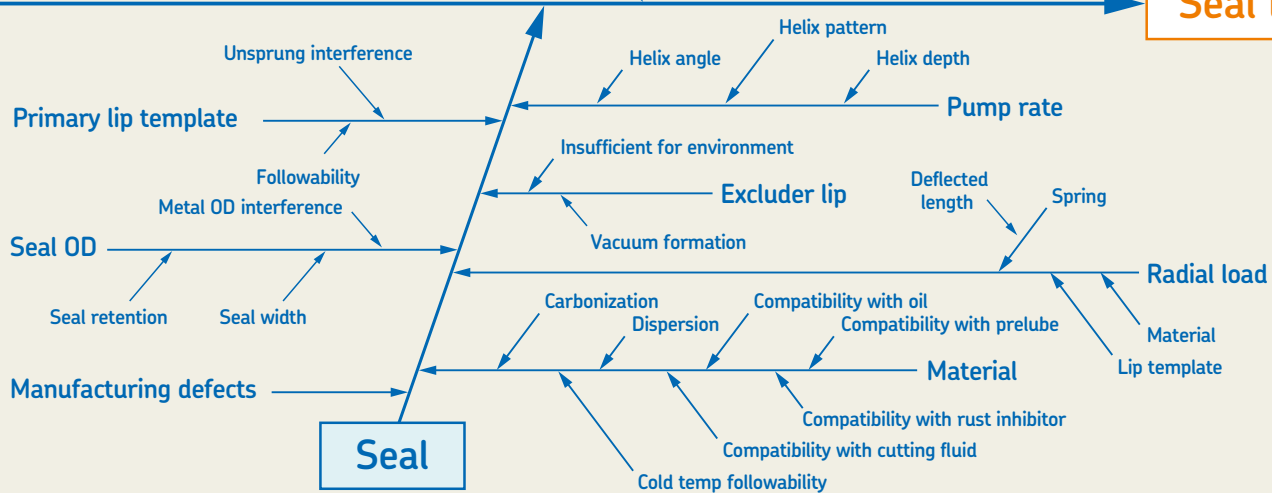




**Customer installation**



**Seal leaks**





## Excessive wear

### Possible root causes

- Elevated internal operating pressure
- External contaminant ingress
- Excessive radial load or interference
- Lack of adequate lubrication
- Internal contaminant ingress
- Incorrect material selected for the application
- Seal reached normal end of life
- Shaft running surface too rough

### Potential solutions

- Remove contamination
- Switch to high wear sealing material or increase lubrication at lip interface
- Follow RMA/ISO standards for surface finish
- Reduce radial load



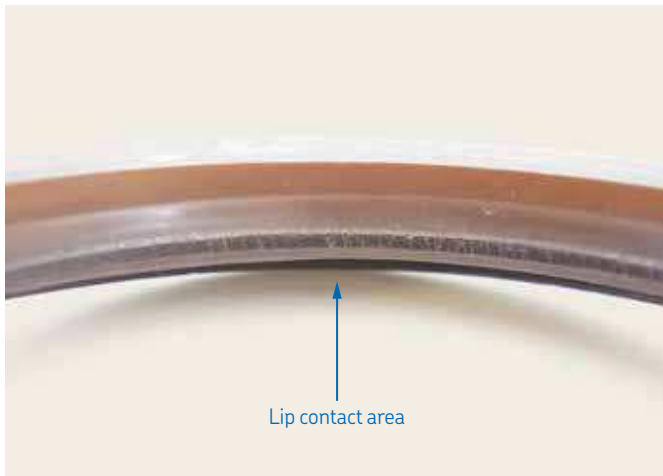
## Nicks, scratches, or cuts in lip contact area

### Possible root causes

- Installation tool or bullet with sharp edge
- Seal installed over defects in shaft
- Seal installed over shaft through hole, keyway, or splines
- Inconsistent manufacturing trimming operation
- Damage caused during packaging or handling

### Potential solutions

- Protect lip by covering splines, keyways and holes with chamfered sleeve or tape
- Keep screwdrivers and other sharp tools away from sealing lip
- Regularly inspect sealing lips before installation



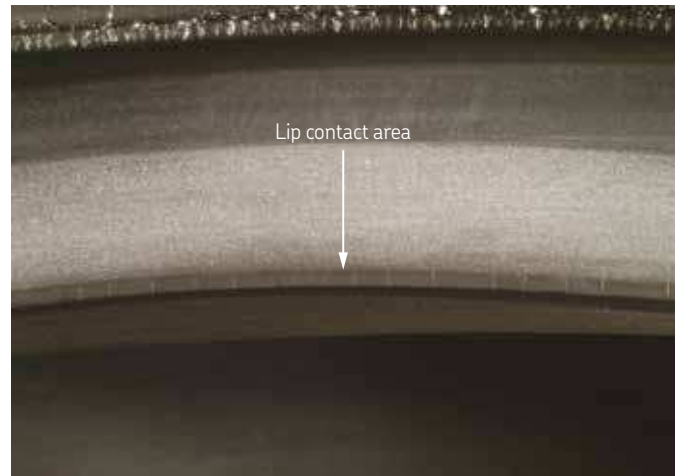
## Crosslink carbonization

### Possible root causes

- Chemical bond occurs between amines in oil additives and fluorine in FKM compounds
- Penetrates the elastomer and hardens until cracks form
- Generally requires temperatures of 100 °C (210 °F) or higher

### Potential solutions

- Switch material to HNBR if under-lip temperatures are below 95 °C (203 °F)
- Switch material to base-resistant FKM for higher temperatures
- Reduce interference or increase lubrication to decrease under-lip temperature



## Axial cracking on NBR lip contact area

### Possible root causes

- Elevated internal operating pressure
- High shaft speed
- Fluid compatibility
- Excessive under-lip temperature
- Insufficient lubrication at the lip interface

### Potential solutions

- Change material to HNBR or FKM
- Increase lubrication
- Reduce radial interference



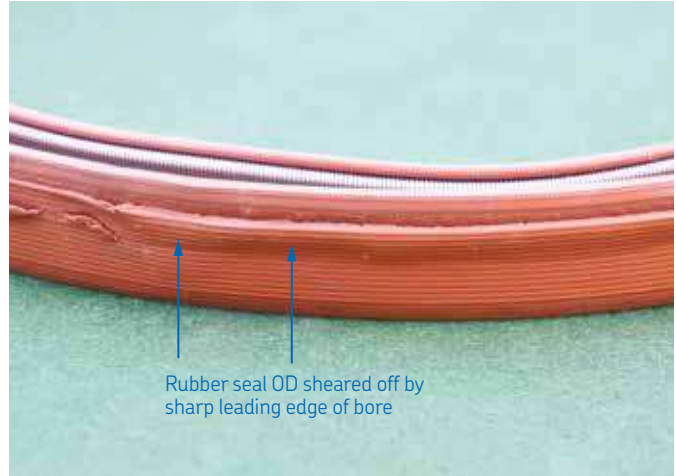
## Inverted sealing lip

### Possible root causes

- Poor assembly procedures
- High internal operating pressure

### Potential solutions

- Switch to HDS7 springless design, HDS2 garter spring design with spring-cover, or HSS5
- Modify installation tool and / or procedure
- If failure is pressure-induced, use pressure seal



## Seal damaged during installation

### Possible root causes

- Improper or worn installation tool
- Direct contact with hammer on seal
- Inadequate lead in chamfer on the bore
- Undersized bore

### Potential solutions

- Add proper bore chamfer per recommendations and check bore diameter
- Use installation tool designed for the specific installation procedure
- Reevaluate installation procedure



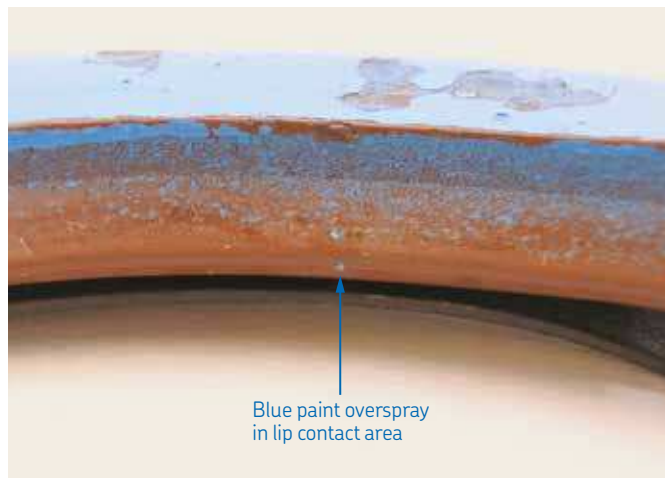
## Irregular / damaged shaft surface finish

### Possible root causes

- Excessively rough shaft may accelerate lip wear
- Overly smooth shaft may result in early leakage
- Poor shaft grinding process or none at all
- Change in shaft suppliers
- Installation or handling damage prior to assembly
- Contamination ingress
- Shaft hardness too soft for the application
- Hardened outer heat-treat layer too thin

### Potential solutions

- Measure surface finish and shaft lead and compare to RMA/ ISO standards
- Check for visual damage or irregular surface characteristics
- Reevaluate shaft packaging during handling and transport



## Paint overspray on sealing lip or contamination

### Possible root causes

- Inadequate seal protection during manufacturing paint process
- Loose paint / contaminants get trapped under sealing lip
- Seal failure caused by contamination ingress

### Potential solutions

- Use proper shielding during painting process
- Pack grease on air side to form a barrier from paint overspray
- Use v-ring on metal seal face to protect lip
- Choose seal with a dust lip to reduce contaminant ingress

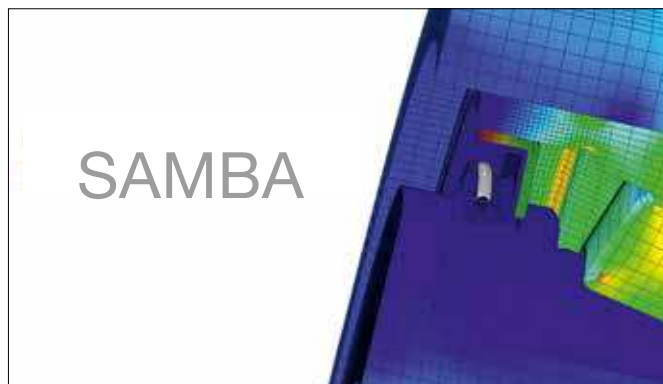
# FEA simulation in SKF

## A brief history of FEA

The origins of the finite element method (FEM) date back to the 1940s when the basic principle of dividing complex problems into simpler parts (finite elements) and mathematically describing their interaction was established.

SKF has been using FEA for many years in various engineering disciplines to aid the product development and improve the product quality while optimizing validation and testing costs.

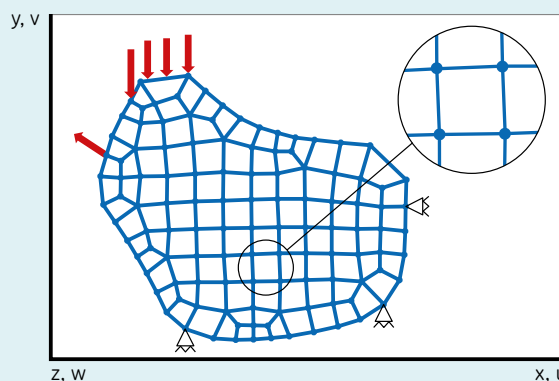
In particular the nonlinear and complex field of sealing technology led SKF to develop its own FEA tools, where available standard tools were impractical, inefficient or not powerful enough.



FEA Software “SAMBA” from SKF

Diagram 4

It's important to consider that a FEA simulation is a tool which needs to be used in the right way to really be of help for the product development and testing departments.



Body divided into finite elements called FE mesh

## FEA Simulation

### Simulation

#### Input

In the input phase the engineer feeds the tool with all data that shall be considered for the calculation.

#### Typical input:

- Models of deformable and rigid components with a suitable mesh
- Interactions and degrees of freedom
- Boundary conditions, loads, pressures, forces, movements and temperatures
- Time and the correct sequence of steps
- The right material data for the component
- Establishment of non-linear material models, especially for elastomeric materials, is key for reliable simulations. Preferably visco-elastic models should be applied for long-term prediction of contact force and strain. SKF uses extensive characterisation methods to establish accurate and close-to-reality models for its own materials

#### Calculation

The software tool (→ **figure 30**) is solving the equations based on the provided input.

It's important to know the available tools and choose the most fitting one for the task.

Both SealDesigner and SAMBA are SKF-developed software tools to perform FEA calculations but they serve a different purpose to solve another kind of problem.

#### Result

The output provided depends on the tool which has been used to perform the calculation.

Usually the results are values for strain and stress as well as element deformations and movements. Modern tools allow a colourful graphical representation of the output but still this is just a visualisation of vectors and values and requires the human mind to process the result, make sense of it and use it to understand and improve the system (→ **figure 31**).

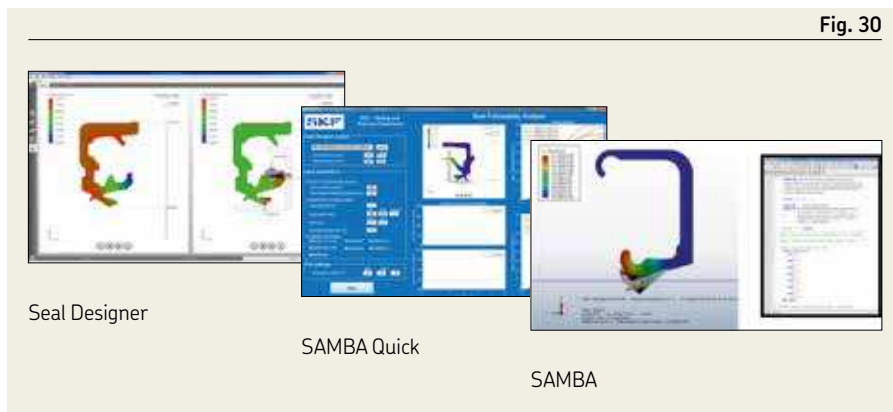


Fig. 30

FEA Software from SKF

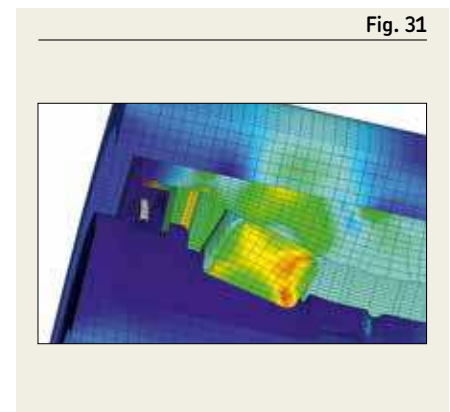


Fig. 31

FEA is used to simulate the impact of operating conditions, material selection and seal design on seal behaviour.

# Machined seals concept (MSC)

## Customized sealing solutions

### Manufacturing flexibility

Whether you need a single seal or a high-volume production run, SKF can support your needs. Our flexible seal production model combines moulded and machined manufacturing capabilities to accommodate virtually any demand.

With competencies in compression, injection and transfer moulding technologies, SKF can apply the most appropriate option for your requirements. With the machined seals concept, we are also able to provide machined seals very quickly, without tooling costs.

### Meeting unique sealing demands, on-demand

The machined seals concept provides a fast, flexible alternative to moulded seal production. With a unique combination of capabilities, we can deliver polymeric seals in a very short time, in almost any dimension and any design, for virtually any industrial application.

The machined seals concept combines several SKF strengths, including extensive application engineering support, a wide selection of seal profiles and materials, and worldwide availability. Together, these capabilities enable on-demand manufacturing for everything from a single seal to a low-volume series for fluid power, fluid handling and power transmission applications.

### Application engineering support

We begin with a consultative process through which our engineers gain an understanding of your particular sealing application challenges. Once we determine your unique requirements, we can develop a solution, choosing from the most appropriate seal profiles and materials.

### Profile and materials selection

We select your seal profiles from an array of designs that are pre-programmed in our proprietary machining system, or we can work with you to design a fully customized profile. Our engineers will also determine the optimum sealing material. Our world-class range of standard and special-grade machinable sealing materials includes many that comply with FDA, NSF, NORSOK, NACE, EU1935 and other key industry standards and government regulations.

### CNC manufacturing process

Featuring proprietary software and high-precision cutting tools, the SKF SEALJET manufacturing system uses Computer Numerical Control (CNC) technology to machine polymeric seals quickly. The system machines a seal from a semi-finished tube of your specially selected materials.

### Rapid delivery worldwide

The machined seals concept and related services are available globally at selected SKF Solution Factories and machined seals centres. Strategically positioned throughout the world's major industrial markets, these facilities enable rapid manufacturing and delivery.



Seal production – SKF machine seals







# Radial shaft seals

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# Radial shaft seals – general

Radial shaft seals are used between rotating and stationary machine components or between two components in relative motion and consist of two main parts:

- A cylindrical outer covering of sheet steel (case) or an elastomer that has the requisite interference fit to seal statically against the housing bore.
- A sealing lip made of an elastomeric or thermoplastic material that seals dynamically and statically against the shaft. The lip has a sealing edge that is formed by moulding, cutting or grinding. It is normally pressed against the counterface surface of the shaft, with a defined radial load, by a garter spring. The edge of the sealing lip and the shaft counterface surface form the most important functional area of a radial shaft seal. The sealing effect of the lip can be enhanced by designing the contact area of the lip with hydrodynamic features.



Some radial shaft seal designs have an auxiliary lip that protects the primary sealing lip from dust and other contaminants. A suitable lubricant in the space between the primary sealing lip and the auxiliary lip can reduce wear and delay corrosion. Contaminants that have passed the auxiliary lip will eventually cause damage in the counterface surface area. A build-up of heat can also occur between the two lips, resulting in premature wear.

Radial shaft seals are used in a multitude of applications. Because of the importance of radial shaft seals for the operational reliability and service life of machines and equipment, both seal manufacturers and users are equally interested, to some degree, in standardization. This has led to the establishment of national and international standards and guidelines listed in **table 1** on **page 64**. These cover boundary dimensions, tolerances, material specifications, test

methods and terminology as well as the basic outside diameter constructions and sealing lip arrangements.

See **figs. 1** and **2** on **page 63** for the terminology used in this publication.

Fig. 1

Metal-cased seal with spring-loaded sealing lip

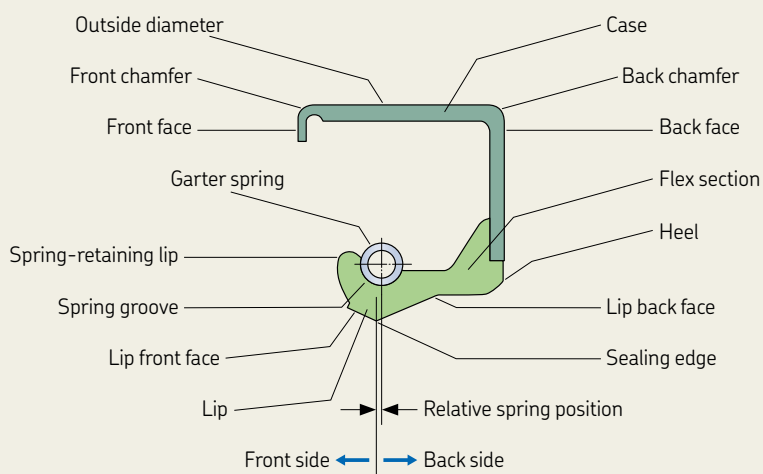


Fig. 2

Rubber outside diameter seal with spring-loaded sealing lip and auxiliary lip

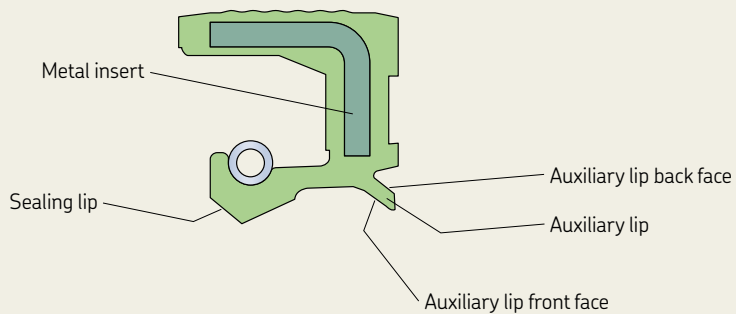


Table 1

**Standards and other documents relating to radial shaft seals**

Document <sup>1)</sup>	Title
ISO 2230	Rubber products – guidelines for storage
ISO 6194-1	Rotary shaft lip-type seals – Nominal dimensions and tolerances
ISO 6194-2	Rotary shaft lip-type seals – Vocabulary
ISO 6194-3	Rotary shaft lip-type seals – Storage, handling and installation
ISO 6194-4	Rotary shaft lip-type seals – Performance test procedures
ISO 6194-5	Rotary shaft lip-type seals – Identification of visual imperfections
SAE J946	Application guide to radial lip seals
RMA 05-1-1	Shaft requirements for rotary shaft seals
RMA 05-4	Application guide for radial lip type shaft seals
RMA 05-7	Storage and handling guide for radial lip type shaft seals
RMA 05-8	Visual variations guide for rotating shaft seals
DIN 3760	Radial-Wellendichtringe (Radial shaft seals)
DIN 3761	Radial-Wellendichtringe für Kraftfahrzeuge (Radial shaft seals for motor vehicles), Parts 1 to 15. This standard covers all aspects including vocabulary, material requirements and test methods.
DIN 7172	Tolerances and limit deviations for sizes above 3 150 mm up to 10 000 mm.
DIN 7716	Rubber products; requirements for storage, cleaning and maintenance.

<sup>1)</sup> RMA = Rubber Manufacturers Association  
SAE = Society of Automotive Engineers  
ISO = International Organization for Standardization  
DIN = Deutsches Institut für Normung



# Outside diameter design

The standard assortment of radial shaft seals manufactured by SKF for general industrial applications covers three different outside diameter executions (→ **figs. 3a to 3c**).

Seals with a rubber outside diameter (→ **fig. 3a**) are used in a wide range of applications. They maintain a tight fit in the housing bore when the housing material has a higher coefficient of thermal expansion than steel and / or when the housing is split. They are also recommended in all applications where the housing bore surface finish requirements cannot be met.

Metal-cased seals (→ **fig. 3b**) are multi-purpose seals that can be used for most applications. They are relatively easy to install and, provided the housing bore meets the requirements, will fit tightly and centrally in the housing bore.

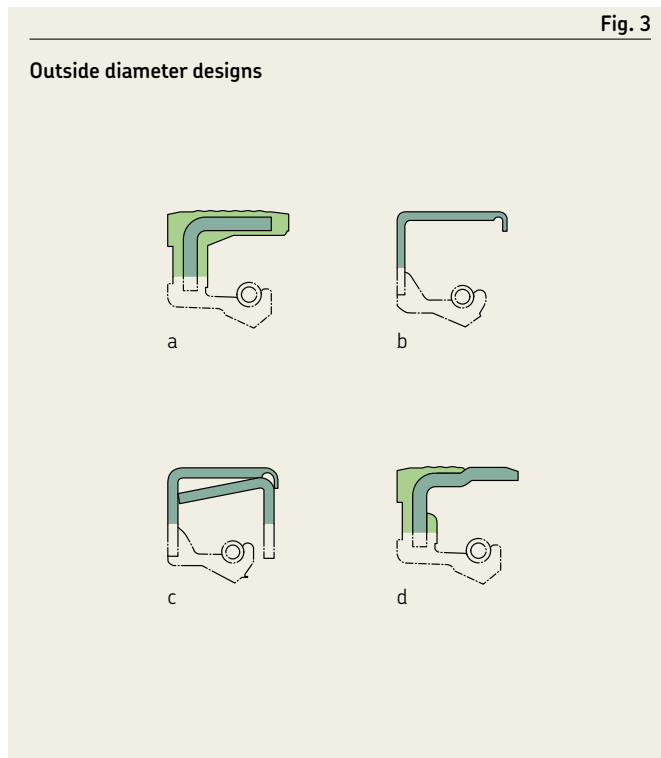
Radial shaft seals designed with a metal case and a secondary reinforcement in the side face (→ **fig. 3c**) offer advantages where operating conditions are severe. They have a higher radial stiffness and are available for shaft diameters  $\geq 50$  mm (2 in).

Besides these standard outside diameter designs, there is also a half rubber / half metal outside diameter design (→ **fig. 3d**) that is typically used in automotive applications.

In addition to the seal designs for general industrial applications described above, SKF also manufactures seals for heavy industrial applications with special features to meet specific requirements (→ **page 172**).

## SKF Bore Tite Coating

As the static sealing ability between a metal outside diameter and the housing bore is somewhat limited, particularly in the case of low-viscosity fluids and media that can “creep”, most SKF seals with a metal case feature SKF Bore Tite Coating, a water-based acrylic sealant. SKF Bore Tite Coating is green in colour, does not harden and serves to fill small imperfections in the housing bore. For additional details, refer to **page 31**.



# Garter springs

SKF radial shaft seals have garter springs made of drawn carbon steel or stainless steel spring wire. Carbon steel springs are standard unless otherwise specified.

# Dimensions

SKF radial shaft seals are manufactured for a wide range of shaft diameters, from 5 to 4 600 mm (*0.2 to 181 in*). The range also includes standard sizes in accordance with ISO 6194-1 and DIN 3760 for shafts ranging from 6 to 500 mm (*0.24 to 19.7 in*).

## Tolerances

SKF radial shaft seals are generally manufactured to the outside diameter tolerances listed in **table 2** on **page 67**, for metric seals, and **table 3** on **page 67** for inch-size seals. These are, where standardized, in accordance with ISO 6194-1, DIN 3760 and RMA OS-4.

Table 2

Outside diameter tolerances for metric seals

Nominal seal outside diameter		Seals with outside diameter of steel		elastomer <sup>1)</sup>	
D over	incl.	Seal outside diameter high	low	Seal outside diameter high	low
mm		mm		mm	
	50	+0,20	+0,08	+0,30	+0,15
50	80	+0,23	+0,09	+0,35	+0,20
80	120	+0,25	+0,10	+0,35	+0,20
120	180	+0,28	+0,12	+0,45	+0,25
180	300	+0,35	+0,15	+0,45	+0,25
300	500	+0,45	+0,20	+0,55	+0,30
500	630	+0,50	+0,22	–	–
630	800	+0,50	+0,24	–	–
800	1 000	+0,55	+0,25	–	–
1 000	1 250	+0,60	+0,27	–	–
1 250	1 600	+0,65	+0,30	–	–

<sup>1)</sup> Seals with beaded outside diameter require different tolerances. Contact SKF for sizes outside the listed range.

Table 3

Outside diameter tolerances for inch-size seals

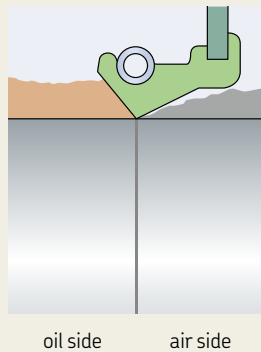
Bore diameter <sup>1)</sup>			Seals with outside diameter of steel		elastomer	
D over	incl.	Tolerance	Nominal seal outside diameter	Seal outside diameter tolerance	Nominal seal outside diameter	Seal outside diameter tolerance
in			in		in	
	2.000	±0.001	+0.005	±0.002	+0.008	±0.003
2.000	3.000	±0.001	+0.0055	±0.0025	+0.01	±0.003
3.000	4.000	±0.0015	+0.0065	±0.003	+0.0105	±0.003
4.000	5.000	±0.0015	+0.0065	±0.003	+0.0105	±0.003
5.000	7.000	±0.0015	+0.007	±0.003	+0.012	±0.004
7.000	9.000	±0.002	+0.0085	±0.0035	+0.0125	±0.004
9.000	10.000	±0.002	+0.0085	±0.0035	+0.0125	±0.004

<sup>1)</sup> Housing bores made of material other than steel may need a different nominal press-fit tolerance due to differences in thermal coefficients of expansion. Contact SKF for sizes outside the listed range.

# Sealing lip design

Fig. 4

Conventional sealing lip with straight edge



The form and design of a sealing lip is based on knowledge gained through research and development activities as well as wide practical experience obtained by SKF in close cooperation with users. The distance between the lip and the seal back face, the strength of the flex section, the angle of the lip (→ **fig. 1** on **page 63**) and the tension in the spring are all balanced so that the pressure applied by the garter spring provides a satisfactory sealing performance between the sealing lip and counterface.

The sealing lips of SKF radial shaft seals are manufactured from several materials and two different main designs. The various materials are described on **pages 31 to 33**. There are two main sealing lip designs that differ in the execution of the sealing lip edge. The “conventional” sealing lip (→ **fig. 4**) has a straight edge, whereas the SKF Wave lips (→ **fig. 5**) are moulded with a hydrodynamic feature that results in the lip taking a sinusoidal path on its counterface surface.

SKF Wave seals represent one of the most important developments in radial shaft seals. The sealing lip is moulded to a special form, producing a relative movement on the counterface, imparting hydrodynamic properties. SKF Wave seals are suitable for rotation in both directions. They pump the lubricant back into the bearing arrangement and expel contaminants. The sinusoidal form of the sealing lip considerably extends the path (→ **fig. 5**) on the counterface surface and at the same time reduces the specific surface pressure at the sealing lip / counterface contact.

As a consequence, SKF Wave seals produce up to 20% less friction resulting in up to 30% lower temperatures than conventional lip designs (→ **diagrams 1 and 2** on **page 69**). Reduced friction and the sinusoidal path of the sealing lips help prevent the formation of deep tracks in the counterface, resulting in significantly extended service life. SKF Wave seals are recommended where demands for operational reliability and long service life for machines and equipment are high.

SKF seals with conventional spring-loaded sealing lips meet general demands because they are able to provide efficient sealing even under unfavourable operating conditions. To improve sealing performance, some SKF radial shaft seals are designed with hydrodynamic features on the sealing lip. These have either a right-hand twist for shafts that rotate clockwise, or a left-hand twist for shafts that rotate counter-clockwise as seen from the air side. The degree to which the hydrodynamic feature improves the sealing ability depends on the form of the spiral flutes, the circumferential speed, the pressure conditions and the media being sealed. See also paragraph *Oil retention* on **page 21**.

Fig. 5

SKF Wave sealing lip with sinusoidal sealing lip edge

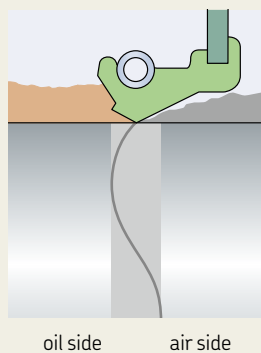


Diagram 1

Temperature rise at sealing lip / counterface contact for conventional and SKF Wave lips as a function of rotational speed for a 76 mm diameter shaft with SAE 30 engine oil

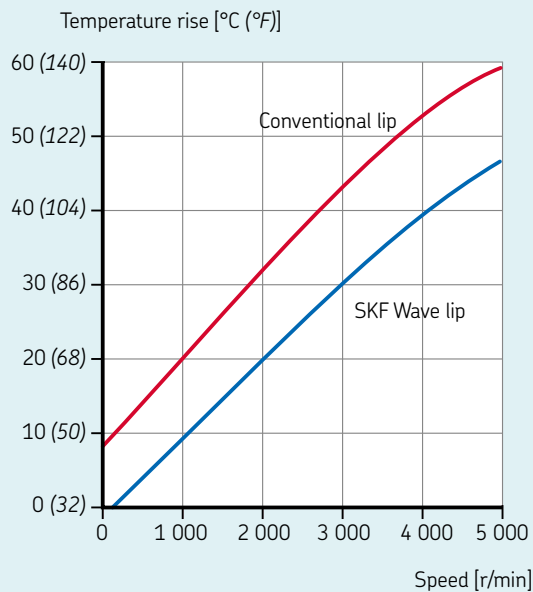
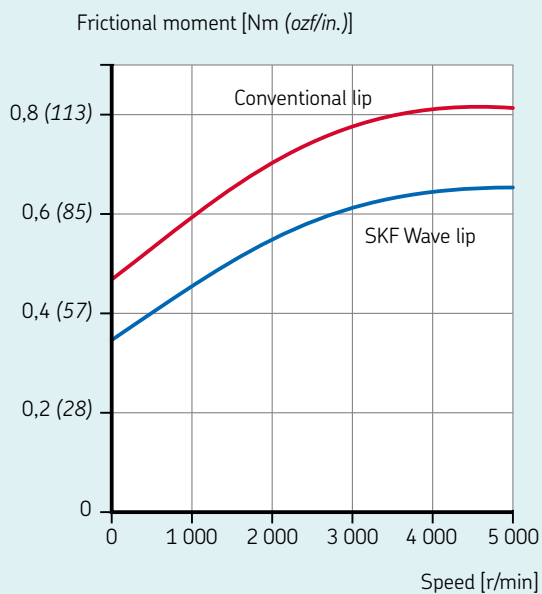


Diagram 2

Frictional moment at sealing lip / counterface contact for conventional and SKF Wave lips as a function of rotational speed for a 76 mm diameter shaft with SAE 30 engine oil



# Auxiliary lips

SKF radial shaft seals can also be designed with an auxiliary lip for increased protection against contaminants (→ **fig. 2** on **page 63**). These auxiliary lips are either contacting or non-contacting. Seal designs that incorporate contacting auxiliary lips are used in heavily contaminated environments, with the drawback, however, of creating increased friction and elevated underlip temperatures. The auxiliary lip of HMSA10 and CRWA1 / CRWHA1 seals is non-contacting, which means that these designs normally can be used at the same speeds as the single-lip designs HMS5 and CRW1 / CRWH1.

# Coaxiality and runout

Deviation from coaxiality and dynamic runout of the shaft are two of many operating parameters that affect seal performance and service life. They should therefore be kept within narrow limits, particularly when there is a pressure differential across the seal. The total deviation should never exceed 1,3 times the value of the permissible deviation from coaxiality.

## Coaxiality

Deviations from coaxiality, i.e. the difference between the centre lines of the shaft and housing bore (shaft-to-bore misalignment, STBM), cause force to be distributed irregularly on the sealing lip (→ **fig. 6**). This means that one section of the sealing lip will be subjected to more force, causing an enlargement of the contact area between lip and counterface surface, whereas the opposite section will be correspondingly unloaded and its sealing effect reduced. Guideline values for the permissible coaxiality deviations for SKF seals can be obtained from **diagram 3** on **page 71**.

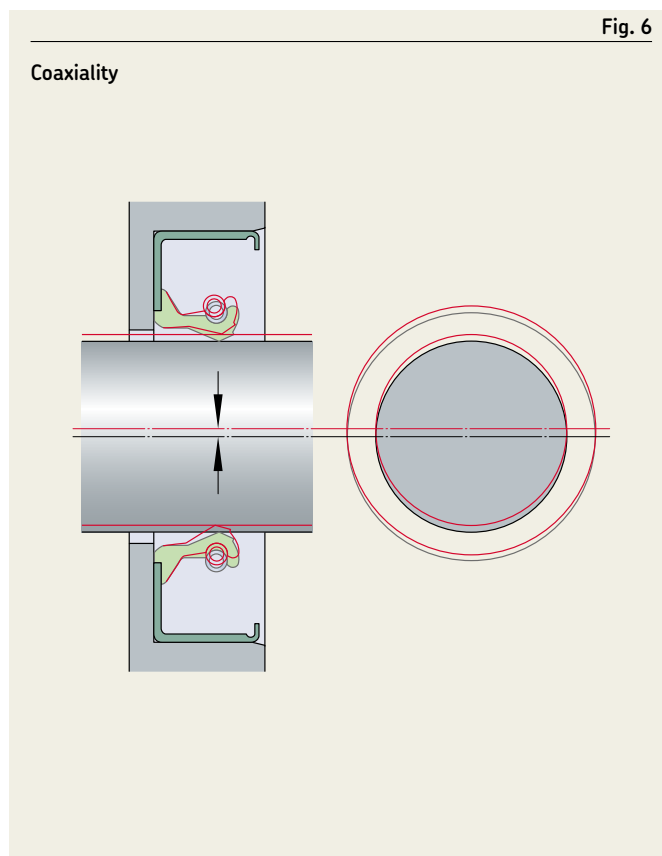
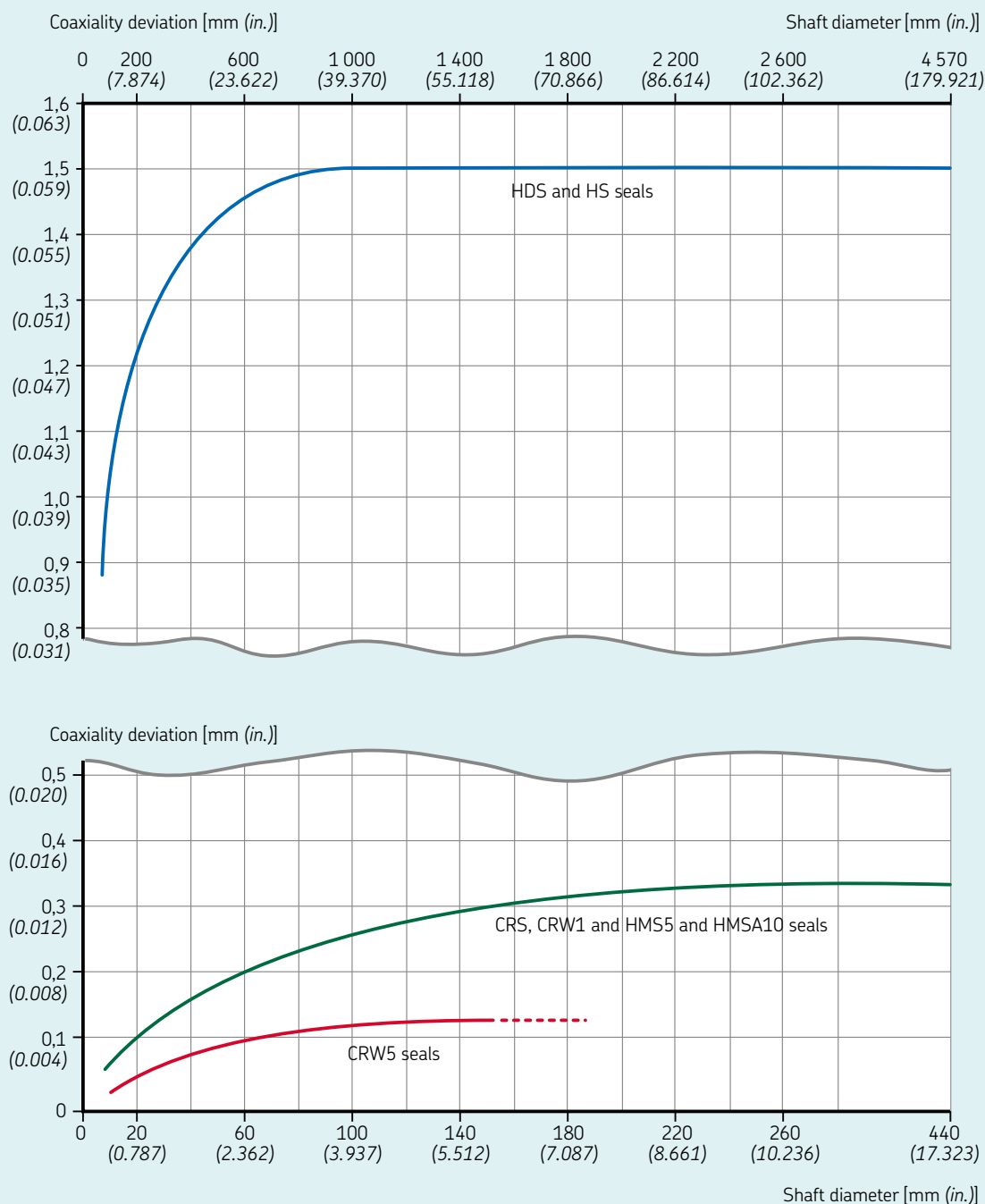


Diagram 3

Maximum permissible deviation from coaxiality as a function of shaft diameter



## Runout

Runout (or dynamic runout, DRO) describes the dynamic eccentricity of the shaft. Particularly at high speeds, there is a risk that the sealing lip, because of its inertia, will not be able to follow the shaft surface (→ **fig. 7**). If the eccentricity is such that the distance between the sealing lip and shaft becomes larger than that required to maintain a hydrodynamic lubricant film, the medium to be sealed will escape through the gap. It is therefore advisable to arrange the seal in close proximity to the bearing and to keep bearing operating clearance to a minimum.

Permissible runout values can be obtained from **diagram 4** on **page 73**. These values are normally lower for narrow seals and always depends on seal cross section, sealing lip material and operating temperature.

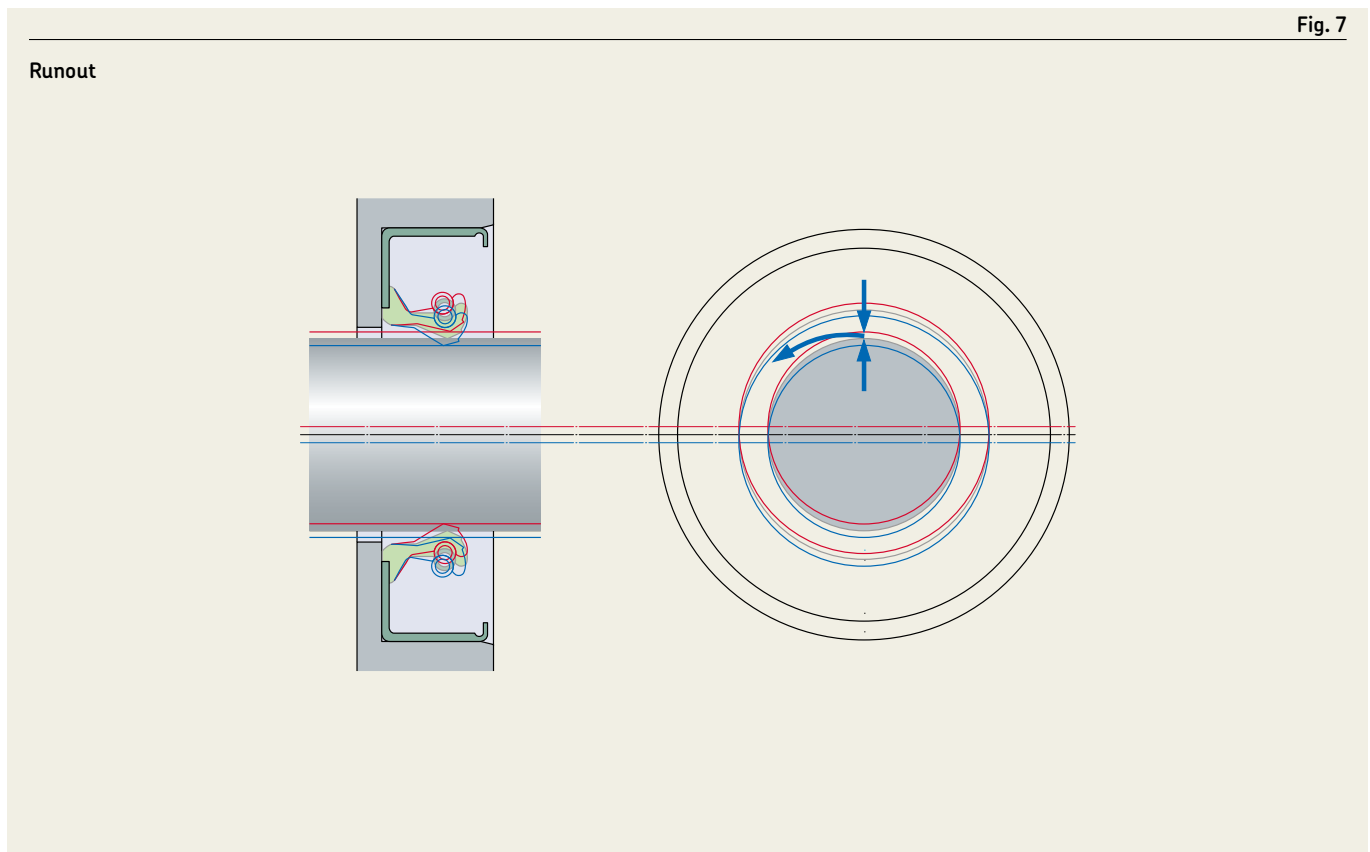
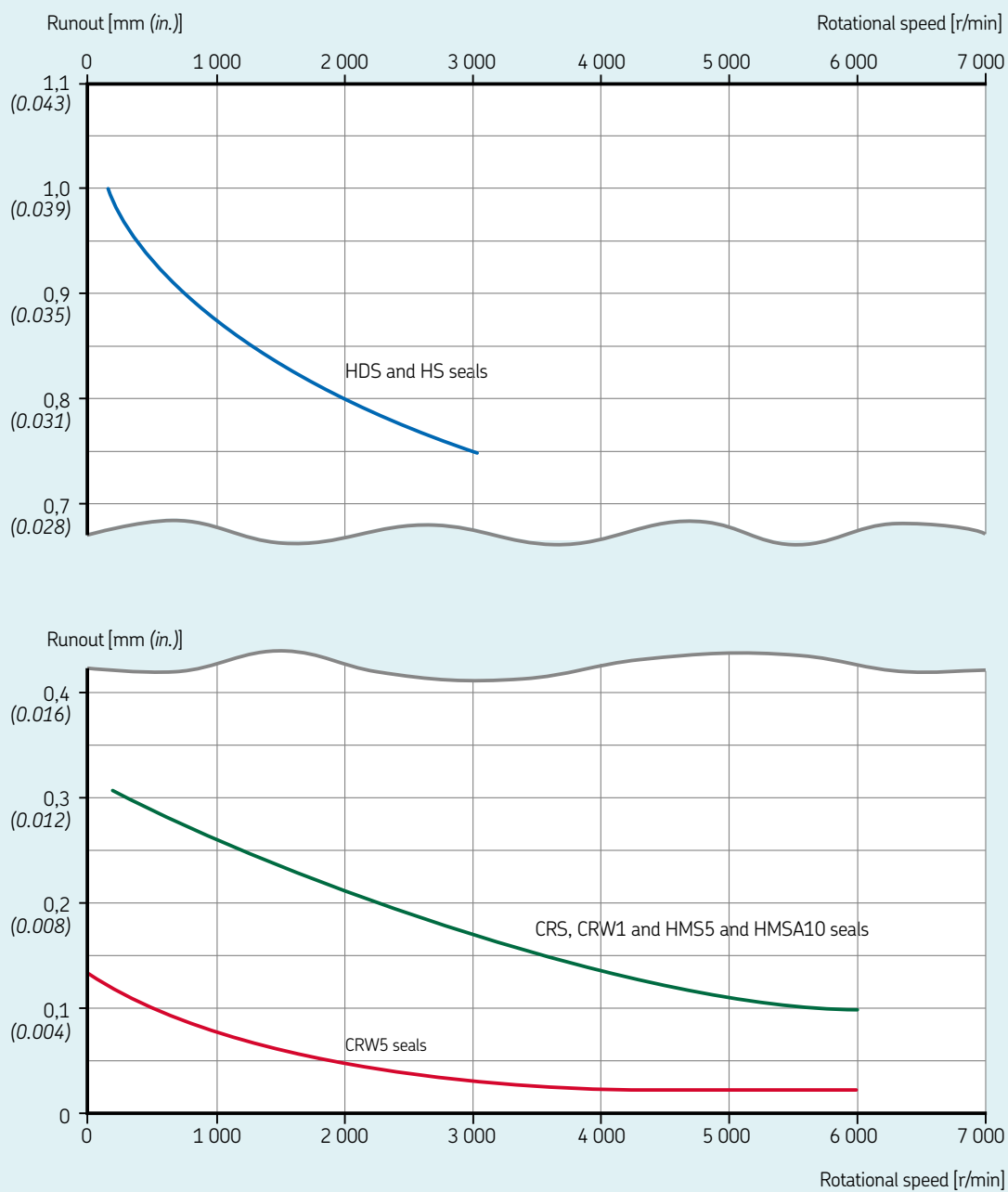




Diagram 4

Maximum permissible runout as a function of rotational speed



# Axial movement

Small movements of the shaft relative to the housing in the axial direction do not affect seal performance, provided that the total counterface surface meets the same demands regarding to hardness, accuracy and surface finish.

# Permissible speeds

Guideline values for the permissible rotational and circumferential speeds for different seal designs are provided in the seal selection charts (**matrix 2 on pages 176 to 183**). If the circumferential speeds provided in the matrix are not sufficient for a particular sealing position, **diagram 5** from DIN 3760 on **page 75** may be used. The diagram lists circumferential and rotational speeds related to the material of the sealing lip. The values are valid for spring-loaded sealing lips that are well-lubricated by a mineral oil, where adequate lubricant supply prevents heat build-up and where the pressure is the same on both sides of the seal (pressure differential = 0).

**Diagram 5 on page 75** shows that large diameter shafts can accommodate higher circumferential speeds than shafts with smaller diameters. This is because the cross section of the shaft does not increase linearly with the increase in diameter but by the square of the increase in diameter. Therefore, the heat dissipation of a large shaft is much better than that of a small shaft.

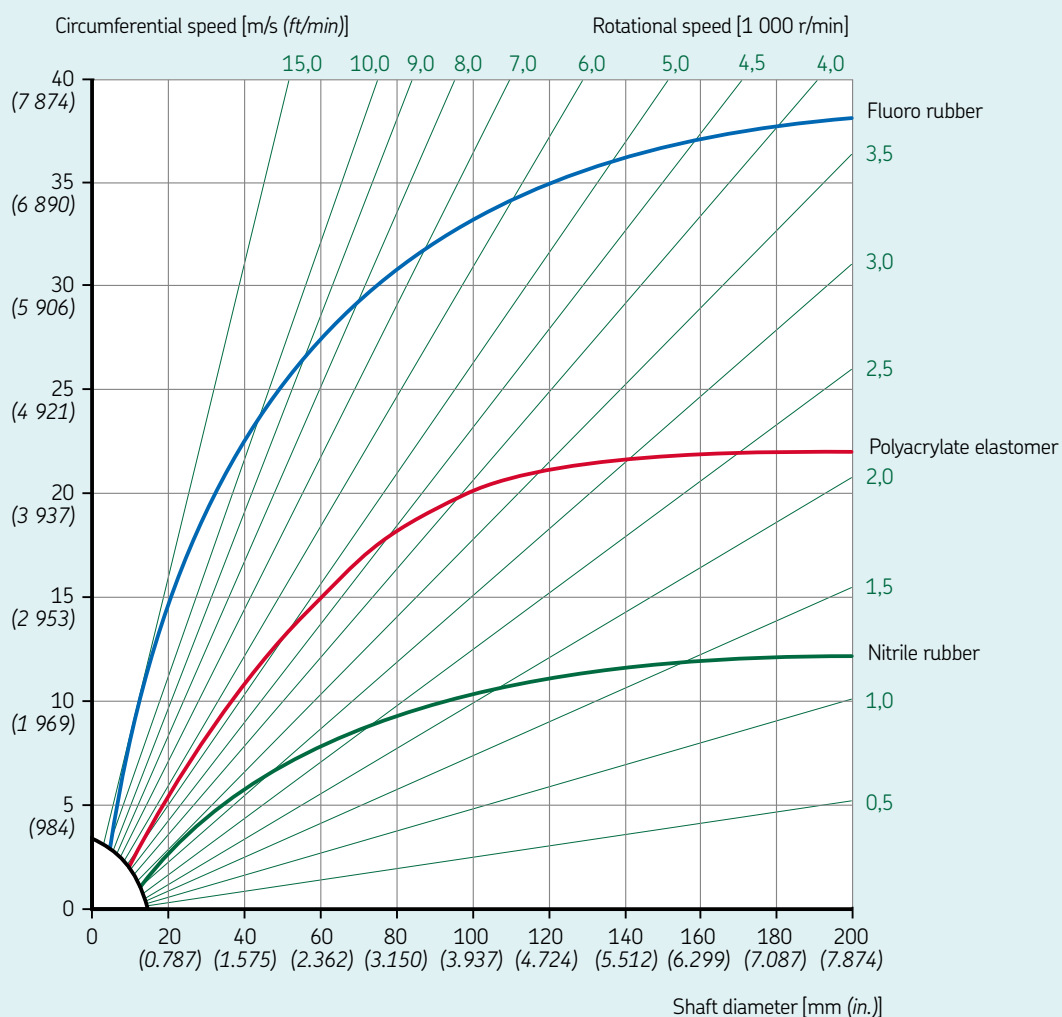
Generally, SKF Wave seals can be operated at higher circumferential speeds than those obtained from **diagram 5 on page 75** because of the hydrodynamic form of the lip.

The values obtained from **diagram 5 on page 75** should be reduced if

- radial shaft seals with an auxiliary, contacting lip are used,
- lubrication is inadequate or grease lubrication is used, i.e. when underlip temperatures increase due to poor heat dissipation,
- the counterface does not meet surface finish or running accuracy requirements or
- there is a pressure differential across the seal.

Diagram 5

Permissible speeds for spring-loaded sealing lips where no pressure differential exists across seal in operation  
 For permissible speeds for seals at shaft diameters > 200 mm, refer to seal selection chart starting on page 104.



Source: DIN standard 3760

# Lubrication

To seal efficiently over a long period, the sealing lip of a radial shaft seal must be lubricated. This reduces friction and wear to the sealing lip and shaft. Dry running of sealing lips made of standard materials should always be avoided. To prevent dry running, coat the counterface surface with a suitable lubricant prior to seal installation.

The lubricant not only lubricates the sealing lip to reduce friction and wear, but also dissipates heat generated by the seal. To promote heat dissipation, a sufficient quantity of lubricant needs to reach the sealing lip from start-up.

Some rolling bearings, such as angular contact ball bearings, tapered roller bearings and spherical roller thrust bearings, as well as gears, create a pumping action by virtue of their design. This means that the sealing lip can either be starved of lubricant, or subjected to excessive quantities of lubricant. In either case, steps must be taken during the design stage to make sure that the proper amount of lubricant reaches the sealing lip, as too much or too little can affect seal performance.

To prevent lubricant starvation, lubrication ducts can be provided. If the seal is subjected to excessive amounts of lubricant, a flinger can be installed between the bearing and the seal.

In applications where the sealing lip is not exposed to a lubricant, for example when two seals are installed in tandem, grease or oil must be separately supplied to provide sufficient lip lubrication. In some cases, it may be sufficient to provide an initial grease fill between the two lips.

## Lubrication of paired arrangements

When two radial shaft seals are installed back-to-back or in tandem, the space between the seals should be filled with a suitable lubricant to eliminate the risk of the sealing lip running dry.

To further prevent dry running, a spacing washer between the seals can also be used. This spacing washer should be provided with lubrication holes or an annular groove and lubrication holes so that grease can be supplied to the space between the seals via a grease fitting (→ **fig. 8**).

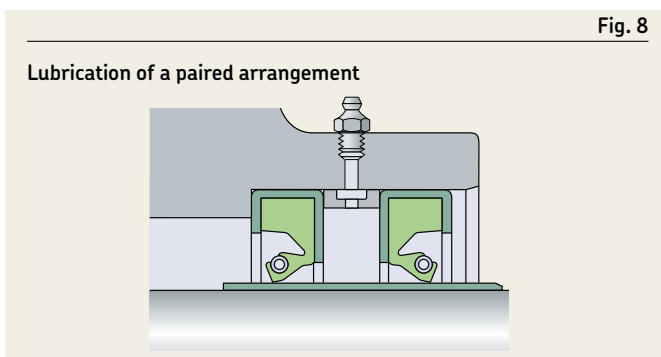


Fig. 8

# Friction

To be effective, the lip of a radial shaft seal must always exert a certain radial load on the counterface. The friction resulting from this radial load is only part of the total contact friction and power loss at the sealing position. Other contributing factors include:

- Type of medium being sealed
- Pressure differential across the seal
- Circumferential speed
- Ambient temperature
- Lubricant and lubrication method
- Condition of the counterface
- Sealing material
- Lip surface roughness
- Shaft roughness

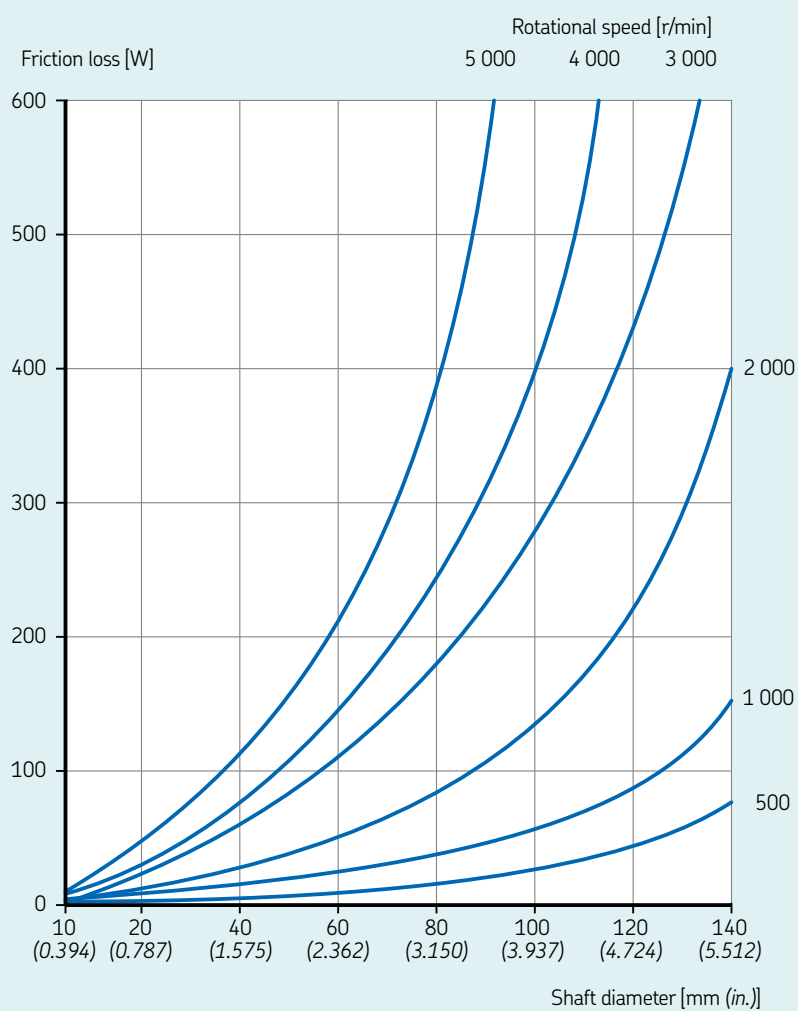
**Diagram 6 on page 77** provides an indication of the friction losses that may be expected when a radial shaft seal with a conventional sealing lip is properly installed and fully lubricated.

The running-in phase of the sealing lip lasts a few hours. During this time, the friction losses are somewhat higher than during normal operation.

Seals intended for applications with high pressure differentials typically have greater losses than specified in the diagram. SKF Wave seals, on the other hand, typically have losses lower than those indicated in the diagram.

Diagram 6

Friction losses of radial shaft seals as a function of rotational speed and shaft diameter



# Chemical and thermal resistance

The most important factor when selecting the appropriate elastomer for a radial shaft seal is its chemical resistance to the medium to be sealed or excluded. The operating temperature is another important factor. Heat accelerates ageing of the elastomer and increases the reactivity and aggressiveness of the sealed medium.

Radial shaft seals are mainly used to seal lubricating oils and greases as well as hydraulic fluids (including non-flammable fluids). Guideline values are provided in **table 4** for the permissible operating temperatures, i.e. temperatures at which the SKF seals are still chemically resistant. The temperature range stated for a group of media means that the sealing material is resistant when continuously operated within this particular range.

The □ means that, within the group, there are some media that are compatible with the elastomer, but also some that have a detrimental effect on the elastomer.

The ■ means that the seal material is not resistant to media belonging to this group.

For the resistance of sealing materials to media not listed in **table 4**, refer to the section *Chemical resistance* (→ **page 36**) or contact SKF.

Table 4

## Chemical and thermal resistance, radial shaft sealing lip materials

Medium to be sealed	Permissible operating temperatures (continuous) for SKF radial shaft sealing lip materials <sup>1)</sup>							
	R (NBR)		P (ACM)		S (MVQ)		V (FKM)	
	°C	°F	°C	°F	°C	°F	°C	°F
<b>Mineral oil based lubricants</b>								
Motor oils	100	210	130	270	150	300	170	340
Gear oils	80	175	120	250	130	250	150	300
Hypoid gear oils	80	175	120	250	■		150	300
Automatic transmission fluids (ATF oils)	100	210	130	270	□		170	340
Greases	90	195	□		□		□	
Hydraulic fluids	90	195	120	250	□		150	300
<b>Fire-resistant hydraulic fluids</b>								
Oil in water emulsions and aqueous polymer solutions	70	160	■		60	140	□	
Anhydrous fluids	■		■		■		150	300
<b>Other media</b>								
Fuel oils EL and L	90	195	□		■		N	
Water	90	195	■		■		100	210
Alkaline washing solutions	90	195	■		■		100	210
<b>Permissible temperature range</b>								
for sealing lip	min.: -40	-40	-40	-40	-60	-75	-40	-40
max.:	+100	+210	+150	+300	+160	+320	+200	+390

■ Lip material not resistant  
□ Lip material not resistant to some media in this group

<sup>1)</sup> R = nitrile rubber  
P = polyacrylate elastomer  
S = silicone rubber  
V = fluoro rubber

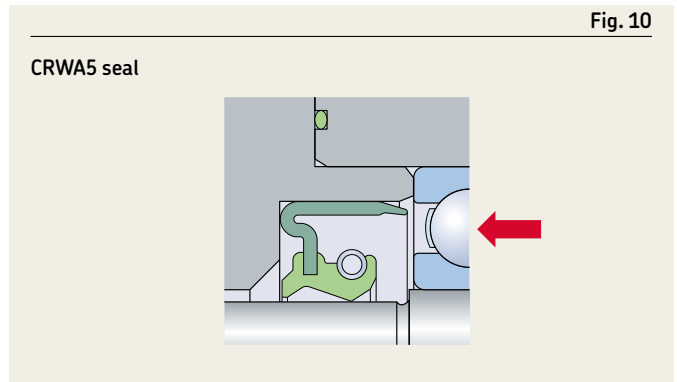
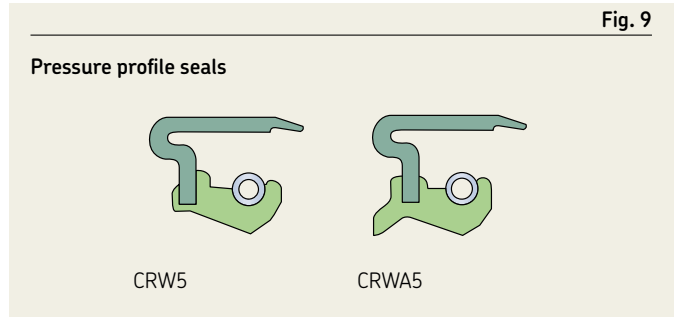
# Seals under pressure

When a seal is exposed to pressure, the radial load of the sealing lip increases. This in turn increases the actual sealing lip / shaft contact area, resulting in additional friction and elevated underlip temperatures. Therefore, the guideline values for speeds provided in **diagram 5** on **page 75** do not apply.

**Diagram 7** shows an example of lip distortion of a conventional sealing lip design. System pressure pushes the sealing lip onto the counterface and this leads to sealing lip distortion and increased radial force. This results in higher friction, more frictional heat and consequentially reduced seal service life.

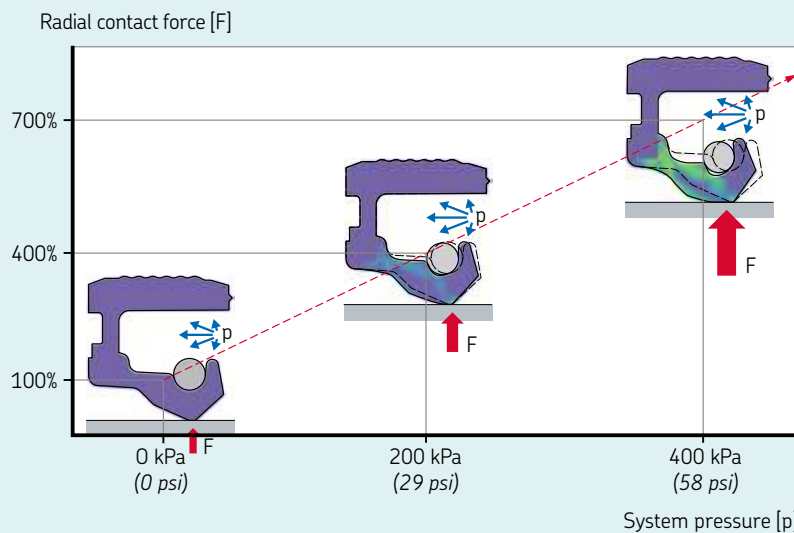
SKF CRW5 and CRWA5 pressure profile seals ( $\rightarrow$  **fig. 9**) are designed to withstand pressure differentials of 0,34 MPa (50 psi) at speeds up to 5 m/s (1 000 ft/min).

When there is a pressure differential across the seal, a shoulder or retaining ring should be used at the low-pressure side of the seal to prevent it from being pressed out of the housing bore ( $\rightarrow$  **fig. 10**).



**Diagram 7**

System pressure pushes the sealing lip onto the counterface and leads to sealing lip distortion and increased radial force. This results in higher friction, more frictional heat and – consequentially – reduced seal service life.



# Shaft requirements

## General

To achieve reliable sealing performance and maximum service life, the counterface for a radial shaft seal should meet the requirements outlined below. The seal counterface must be able to accommodate all permissible deviations and movements – surface SL and an additional surface SL' – which may be required in the case of repairs or inspection (→ fig. 11).

In cases where a shaft cannot be machined to meet the requirements, SKF recommends the use of SKF Speedi-Sleeve or a wear sleeve for heavy industrial applications (LDSL). Detailed information about sleeves is provided in the chapter Wear sleeves starting on page 232.

## Tolerances

The diameter of the shaft  $d_1$  at the counterface should be machined to the tolerances provided in table 6 on page 81 for metric shafts and table 7 on page 81 for inch-size shafts.

Out-of-roundness must be less than 0,005 mm (0.0002 in) at a maximum of 2 lobes or less than 0,0025 mm (0.0001 in) at a maximum of 7 lobes.

If components with an interference fit will pass over the counterface during installation, the shaft diameter should be reduced by 0,2 mm (0.008 in).

## Surface roughness

The surface roughness values of the counterface for radial shaft seals, calculated according to methods described in ISO 4288 (DIN 4768), should be kept within the limits specified in RMA OS-1-1 (→ table 5).

The lower value for  $R_a$  is a minimum value. Using a lower value will adversely affect the lubricant supply to the sealing lip. The temperature rise caused by inadequate lubrication, particularly at high circumferential speeds, can lead to hardening and cracking of the sealing lip which will eventually lead to premature seal failure. If the counterface is too rough, there will be excessive sealing lip wear and seal service life will be shortened. If the value  $R_{pm}$  is exceeded, the seal will leak or excessive sealing lip wear may occur.

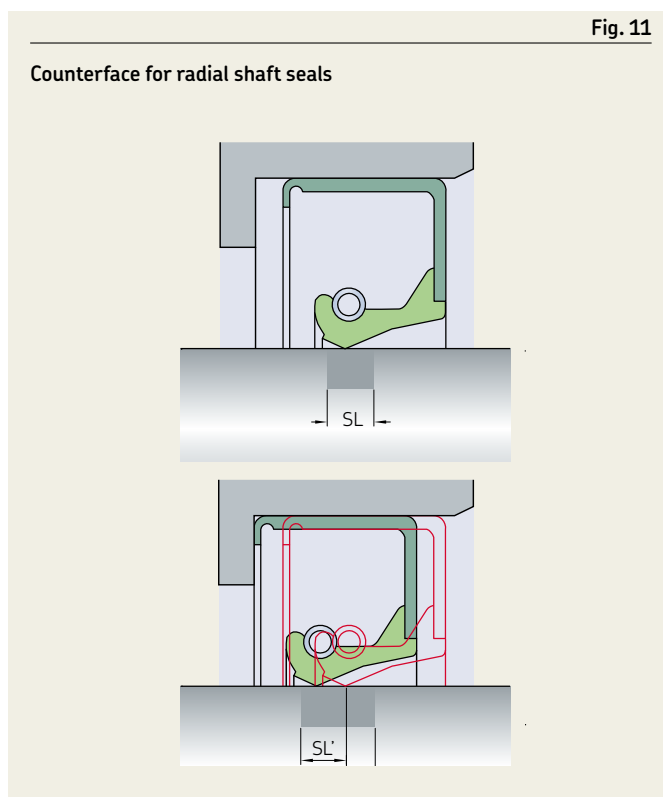


Fig. 11

Counterface for radial shaft seals

Table 5

### Recommended shaft surface roughness values

	ISO		DIN		RMA	
	$\mu\text{m}$	$\mu\text{in}$	$\mu\text{m}$	$\mu\text{in}$	$\mu\text{m}$	$\mu\text{in}$
$R_a$	0,2–0,5	8–20	0,2–0,8	8–32	0,2–0,43	8–17
$R_z$	1,2–3	48–120	1–5	40–200	1,65–2,9	65–115
$R_{pm}$	N/A	N/A	N/A	N/A	0,5–1,5	20–50



## Surface finish

Depending on the direction of rotation, directionality on the seal counterface may cause a seal to leak. Plunge grinding is the preferred machining method to minimize directionality ( $0 \pm 0,05^\circ$ ) on the seal counterface. When plunge grinding, whole number ratios of the grinding wheel speed to the work piece speed should be avoided. Run the grinding wheel until it “sparks out” completely, i.e. until there are no more sparks flying from the wheel, to ensure that all lead is removed. The grinding wheel should be dressed using a cluster head dressing tool and the smallest possible lateral feed, or a profile dressing roll without lateral feed. The negative influence of directionality in any particular case can only be ascertained by test running under conditions of alternating rotation.

The seal counterface surface should be free of any damage, scratches, cracks, rust or burrs and should be properly protected until final installation.

## Hardness and surface treatment

The surface hardness of the seal counterface should be at least 30 HRC (58 HRC for PTFE lip seals). If the counterface surface could be damaged during transport or installation, this value should be increased to 45 HRC (62 HRC for PTFE lip seals). Under certain conditions, where speeds are low, lubrication is good and contaminants are absent, counterface surfaces having a lower hardness may be suitable. Surfaces that are nitrided, phosphated or have a galvanized coating may also be suitable, but this must be determined for each specific case.

Table 6

### Counterface tolerances for metric shafts

Shaft diameter		Diameter tolerance (ISO h11) <sup>1)</sup>	
Nominal		Deviation	
d <sub>1</sub>	incl.	high	low
over			
mm		µm	
<b>6</b>	<b>10</b>	0	-90
<b>10</b>	<b>18</b>	0	-110
<b>18</b>	<b>30</b>	0	-130
<b>30</b>	<b>50</b>	0	-160
<b>50</b>	<b>80</b>	0	-190
<b>80</b>	<b>120</b>	0	-220
<b>120</b>	<b>180</b>	0	-250
<b>180</b>	<b>250</b>	0	-290
<b>250</b>	<b>315</b>	0	-320
<b>315</b>	<b>400</b>	0	-360
<b>400</b>	<b>500</b>	0	-400
<b>500</b>	<b>630</b>	0	-440
<b>630</b>	<b>800</b>	0	-500
<b>800</b>	<b>1 000</b>	0	-560
<b>1 000</b>	<b>1 250</b>	0	-660
<b>1 250</b>	<b>1 600</b>	0	-780
<b>1 600</b>	<b>2 000</b>	0	-920
<b>2 000</b>	<b>2 500</b>	0	-1 100
<b>2 500</b>	<b>3 150</b>	0	-1 350
<b>3 150</b>	<b>4 000</b>	0	-1 650
<b>4 000</b>	<b>5 000</b>	0	-2 000

<sup>1)</sup> For shaft diameters of 3 150 mm and above, refer to DIN 7172.

Table 7

### Counterface tolerances for inch-size shafts

Shaft diameter		Diameter tolerance (RMA 0S-4)	
Nominal		Deviation	
d <sub>1</sub>	incl.	high	low
over			
in		in	
-	<b>4</b>	+0.003	-0.003
<b>4</b>	<b>6</b>	+0.004	-0.004
<b>6</b>	<b>10</b>	+0.005	-0.005
<b>10</b>		+0.006	-0.006

## Lead-in chamfers

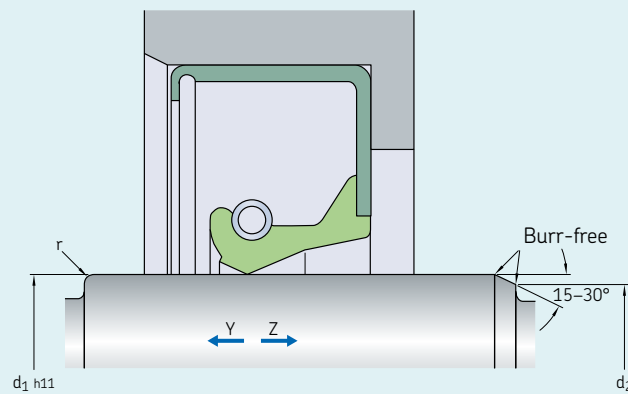
To install radial shaft seals without damaging the sealing lip, SKF recommends chamfering or rounding the shaft ends or shoulders (→ **table 8**).

If the direction of installation is Z, the values ( $d_1 - d_2$ ) provided in table 8 should be adhered to. If the direction of installation is Y, the shaft end could be either rounded ( $r$ ) or chamfered ( $d_1 - d_2$ ).

To install a seal over a shaft shoulder or end that has not been rounded or chamfered, SKF recommends using an installation sleeve. See section *Seal installation, heavy industrial applications* on **page 89**.

Table 8

### Lead-in chamfers and radii



Shaft diameter Nominal		Diameter difference <sup>1)</sup>		Radii Seal without auxiliary lip		Seal with auxiliary lip			
$d_1$ over	incl.	over	incl.	$d_1 - d_2$ min.	$r$ min.	$r$ min.	$r$ min.		
mm		in		mm	in	mm	in		
–	10	–	0.394	1,5	0.059	0,6	0.024	1	0.039
10	20	0.394	0.787	2	0.079	0,6	0.024	1	0.039
20	30	0.787	1.181	2,5	0.098	0,6	0.024	1	0.039
30	40	1.181	1.575	3	0.118	0,6	0.024	1	0.039
40	50	1.575	1.968	3,5	0.138	0,6	0.024	1	0.039
50	70	1.968	2.756	4	0.157	0,6	0.024	1	0.039
70	95	2.756	3.740	4,5	0.177	0,6	0.024	1	0.039
95	130	3.740	5.118	5,5	0.216	1	0.039	2	0.079
130	240	5.118	9.449	7	0.276	1	0.039	2	0.079
240	500	9.449	19.685	11	0.433	2	0.079	3	0.118
500	–	19.685	–	13	0.512	5	0.197	5	0.197

<sup>1)</sup> If the corner is blended rather than chamfered, the blended section should not be smaller than the difference in diameters  $d_1 - d_2$ .

# Housing bore requirements

## General

To reduce the risk of seal damage during installation, the housing bore should have a 15 to 30° lead-in chamfer. The chamfer should be free of burrs and the transition radius *r* between the seal seat and shoulder should be in accordance with the recommendations in **table 10** on **page 84**.

In order to facilitate seal removal, holes in the housing shoulder A can be incorporated during the design stage.

## Metal-reinforced seals

The depth of a metric housing bore B for metal-cased or metal-inserted seals should be at least 0,3 mm (0.012 in) larger than the nominal seal width *b* (→ **fig. 12**). The corresponding values for an inch housing bore B are 0,4 mm (0.016 in).

## Seals without metal-reinforcement

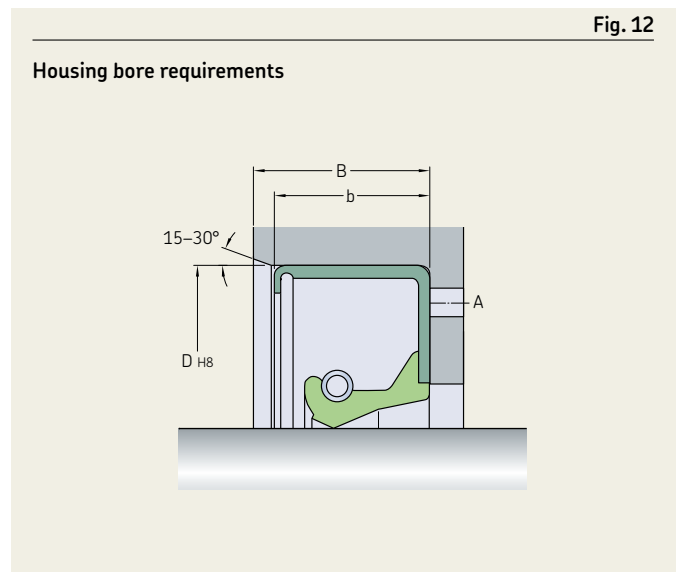
Seals without metal reinforcement are manufactured oversized relative to the housing bore diameter and depth to enable proper compression and stability. The actual seal width is approximately 0,4 to 0,8 mm (0.016 to 0.032 in) wider than the bore depth B. For all-rubber HS seals, the bore depth tolerance should be ±0,13 mm (0.005 in) and ±0,10 mm (0.004 in) for all-rubber reinforced HSS seals and fabric-reinforced HSF seals. For seals without metal reinforcement, a cover plate is required for a proper fit (→ **page 94**).

## Tolerances

The housing bore diameter D should be machined to tolerance H8 (→ **table 10** on **page 84**). Depending on the operating conditions, out-of-roundness should be 1 to 2 tolerance grades better than H8.

## Surface roughness

The surface roughness (to ISO 4288 or DIN 4768) of the housing bore should be kept within the limits specified in **table 9**.



**Fig. 12**

**Housing bore requirements**

**Table 9**

### Recommended housing bore surface roughness values

	ISO <sup>1)</sup>		DIN		RMA <sup>2)3)</sup>	
	μm	μin	μm	μin	μm	μin
R <sub>a</sub>	1,6–3,2	64–128	1,6–3,2	64–128	1–2,5	40–100
R <sub>z</sub>	6,3–12,5	252–500	10–20	400–800	N/A	N/A
R <sub>max</sub>	N/A	N/A	N/A	N/A	0,5–1,5	20–50

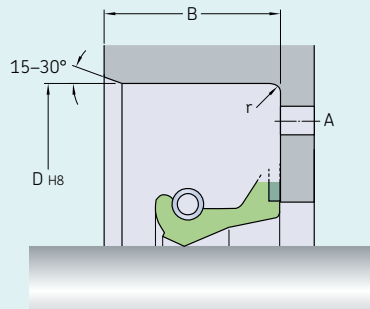
<sup>1)</sup> ISO – The housing bore surface roughness may require lower values when metal-cased seals are used, in which case they should be subject to agreement between the manufacturer and user.

<sup>2)</sup> RMA – If the bore surface texture is greater than 2,5 μm (100 μin) R<sub>a</sub>, a sealant should be used.

<sup>3)</sup> RMA – Turned bores, where a lubricant head of up to 0,20 bar (3,0 psi) is present at the seal. If this texture is maintained and tool removal marks or bore defects are not present, no outside diameter leakage should occur.

Table 10

Housing bore tolerances



Housing bore for metric seals (ISO)

Nominal diameter D	Housing bore tolerance (ISO tolerance H8)		Fillet radii r max.	
	over	incl.		
mm	µm		mm	
–	3	+14	0	0,3
3	6	+18	0	0,3
6	10	+22	0	0,3
10	18	+27	0	0,3
18	30	+33	0	0,3
30	50	+39	0	0,3
50	80	+46	0	0,4
80	120	+54	0	0,8
120	180	+63	0	0,8
180	250	+72	0	0,8
250	315	+81	0	0,8
315	400	+89	0	0,8
400	500	+97	0	0,8
500	630	+110	0	0,8
630	800	+125	0	0,8
800	1 000	+140	0	0,8
1 000	1 250	+165	0	0,8
1 250	1 600	+195	0	0,8
1 600	2 000	+230	0	0,8
2 000	2 500	+280	0	0,8
2 500	3 150	+330	0	0,8
3 150 <sup>1)</sup>	4 000	+410	0	0,8
4 000 <sup>1)</sup>	5 000	+500	0	0,8

Housing bore for inch-size seals (RMA)

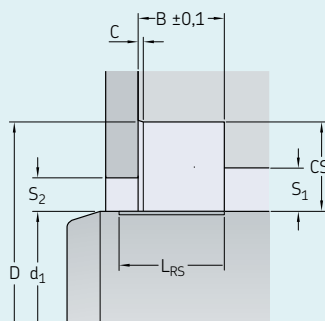
Nominal diameter D	Housing bore tolerance		Fillet radii r max.	
	over	incl.		
in	in		in	
–	3.000	+0.001	–0.001	0.031
3.000	7.000	+0.0015	–0.0015	0.031
7.000	10.000	+0.002	–0.002	0.031
10.000 <sup>2)</sup>	12.000	+0.002	–0.002	0.031
12.000 <sup>2)</sup>	20.000	+0.003	–0.003	0.031
20.000 <sup>2)</sup>	40.000	+0.004	–0.004	0.031
40.000 <sup>2)</sup>	60.000	+0.006	–0.006	0.031

<sup>1)</sup> SKF recommended bore specifications not covered in ISO 286-2

<sup>2)</sup> SKF recommended bore specifications not covered in RMA 05-4

Table 11

**Shaft and bore requirements for HRS seals**



**Housing bore for metric seals (ISO)**

Range incl.	up to	Tol	Tol	minimum (recommended)	HRS1 HRSA	HRS1 +HRE	HRS1	HRSA HRE	HRS1	HRSA	+HRE	HRS1 HRSA	HRE	
$d_1$			D	CS	B		$S_1$	$S_2$		$L_{RS}$		C		
mm														
350	900	-0,4	+0,4	≥ 20 (25)	≥ 20	≥ 25	≤ 12	≤ 12	7-12	≥ 15	≥ 25	≥ B + 10	≤ 10	≤ 1,5
900	1800	-0,5	+0,5	≥ 25 (32)	≥ 25	≥ 30	≤ 16	≤ 16	7-16	≥ 15	≥ 30	≥ B + 10	≤ 10	≤ 1,5
1800	3900	-0,7	+0,7	≥ 28 (32)	≥ 25	≥ 30	≤ 18	≤ 18	7-18	≥ 15	≥ 30	≥ B + 10	≤ 10	≤ 1,5

**Surface roughness**

The surface roughness values of the counterface for these radial shaft seals, calculated according to methods described in ISO 4288 (DIN 4768), should be:

$R_a \leq 0.8 \mu m$   
 Material ratio: 50...95% at 50% of  $R_z$ ,  
 $C_{ref} = 0\%$

If higher values are used, the seal life may be affected. If the counterface is too rough, there can be excessive sealing lip wear and seal service life might be shortened.

**Surface finish**

Depending on the direction of rotation, directionality on the seal counterface may cause a seal to leak. Plunge grinding is the preferred machining method to minimize directionality ( $0 \pm 0,05^\circ$ ) on the seal counterface.

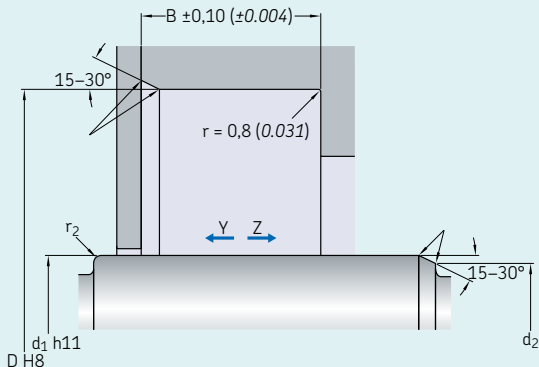
The seal counterface surface should be solid, free of any damage, scratches, cracks, rust or burrs and should be properly protected until final installation.

**Hardness and surface treatment**

The surface hardness of the seal counterface should be at least 45 HRC. Under certain conditions, such as where speeds are low, lubrication is good and contaminants are absent, counterface surfaces having a lower hardness may be suitable. Surfaces that are nitrided, phosphated or have a galvanized coating may also be suitable, but this must be determined for each specific case.

Table 12

Housing bore requirements for HS/SS seals



Lead-in chamfers and radii

Shaft diameter Nominal $d_1$		Diameter difference 1) $d_1 - d_2$		Radii $r_2$	
over	incl.	over	incl.	mm	in
mm		in		mm	in
165	240	6.500	9.499	1	0.039
240	500	9.449	19.685	2	0.079
500		19.685		5	0.197

1) If the corner is blended rather than chamfered, the blended section should not be smaller than the difference in diameter  $d_1 - d_2$ .

Lead-in chamfers

To reduce the risk of seal damage during installation, the housing bore should have a 15° to 30° lead-in chamfer. The chamfer should be free of burrs and the transition radius  $r$  between the seal seat and shoulder should be in accordance with the recommendations in table 12.

Tolerances

For all-rubber HSS seals, the bore depth tolerance should be 0,10 mm (0.004 in).

Table 13

Recommended housing bore surface roughness values

	ISO 1)		DIN		RMA 2) 3)		
	$\mu\text{m}$	$\mu\text{in}$	$\mu\text{m}$	$\mu\text{in}$	$\mu\text{m}$	$\mu\text{in}$	$\mu\text{m}$
$R_a$	1,6–3,2	64–128	1,6–3,2	64–128	1–2,5	40–100	0.039
$R_z$	6,3–12,5	252–500	10–20	400–800	N/A	N/A	0.079
$R_{pm}$	N/A	N/A	25	1 000	N/A	N/A	0.197

1) ISO – The housing bore surface roughness may require lower values when metal-cased seals are used, in which case they should be subject to agreement between the manufacturer and user.

2) RMA – If the bore surface texture is greater than 2,5  $\mu\text{m}$  (100  $\mu\text{in}$ )  $R_a$ , a sealant should be used.

3) RMA – Turned bores, where a lubricant head of up to 0,20 bar (3.0 psi) is present at the seal. If this texture is maintained and tool removal marks or bore defects are present, no outside diameter leakage should occur.

Surface roughness

The surface roughness (to ISO 4288, DIN 4768 or RMA 05-1-1) of the housing bore should be kept within the limits specified in table 13.

# Seal installation, general industrial applications

## General

To provide effective sealing, radial shaft seals must be installed properly. An experienced installer with suitable tools, working in a clean environment, is recommended to provide proper installation. The shaft counterface surface and housing bore should meet the demands specified under Shaft Housing bore requirements on pages 83 to 86.

To facilitate seal installation and to achieve initial lubrication, prior to installation, SKF recommends wiping the shaft and seal with the lubricant that is going to be retained. While the outside diameter of metal-cased seals can be lightly lubricated to ease installation, the outside diameter of rubber covered seals should always be lubricated.

Seals with an auxiliary, contacting lip can also be filled with grease between the sealing lip and auxiliary lip to reduce frictional moment. This does not apply to silicone rubber seals and seals with hydrodynamic features, other than SKF Wave lip designs.

SKF also recommends using a hydraulic press, with suitable tools, to install a seal in its housing bore. Pressure should be applied as close as possible to the outside diameter of the seal.

Seals that are designed to sit flush with the wall of the housing bore must be installed perpendicular to the housing bore axis. The outside diameter of the tool should be larger than the housing bore diameter (→ fig. 13).

When pressing seals up against a shoulder or retaining ring, it is advisable to use tools of the type shown in figs. 14 and 15. The necessary ring dimensions can be supplied on request.

Fig. 13

### Preferred installation method

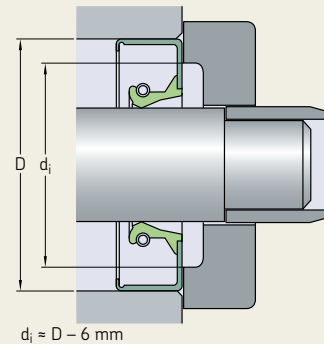


Fig. 14

### Alternative installation method

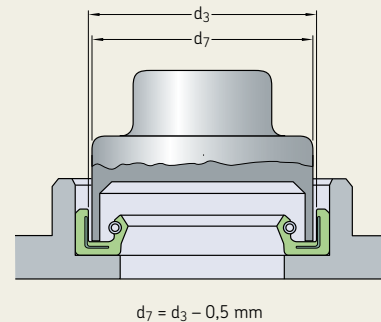


Fig. 15

### Alternative installation method

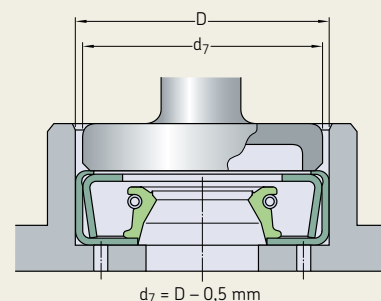
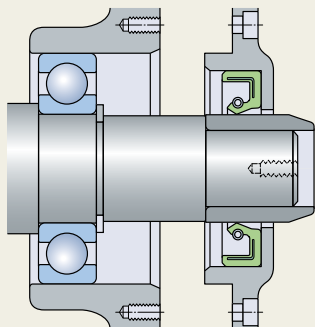


Fig. 16

Installation sleeve



When installing seals on stepped shafts, where the shoulders do not have the recommended chamfer or rounded transition, an installation sleeve as shown in **fig. 17** must be used. If the sealing lip has to pass over grooves, threads or gearing, thin-walled installation sleeves, like those shown in **fig. 18**, can be used to prevent the lip from being damaged. The outside surface of the sleeve should be coated with the same lubricant that is used to lubricate the seal and counterface surface.

Radial shaft seals with a sealing lip made of a sensitive material should always be installed using an installation sleeve.

The tools used to install a seal at a certain distance in a cylindrical opening in a housing are shown in **figs. 19 and 20**. Instructions for designing the tools can be supplied on request.

Fig. 17

Thin-walled installation sleeve

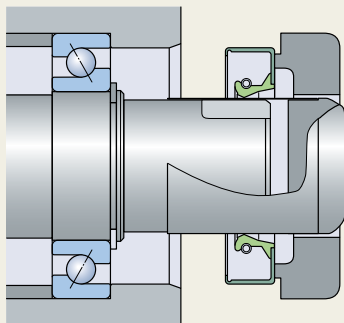


Fig. 18

Installation in a cylindrical opening

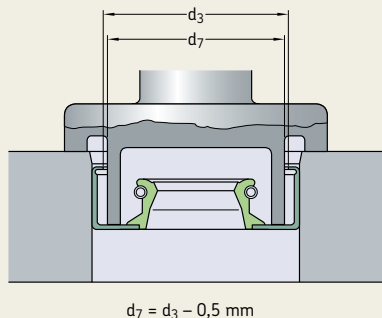
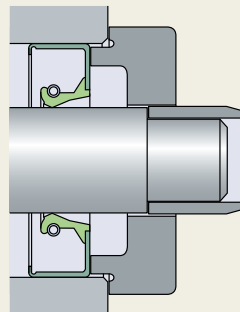


Fig. 19

Installation in a cylindrical opening





# Seal installation, heavy industrial applications

## General

- **Recommended seal installation temperature +5 to 40 °C**  
Polymeric materials shrink or expand depending on the environment temperature. Installing a seal at very low temperatures might lead to a gap between the ends of the seal. Installing a seal at very high temperatures might lead to a more difficult installation process. If seals have to or are installed in a very cold environment, warming the seals or the surroundings with a heating gun (max. 80 °C) until the cover plates are applied, is recommended.
- **Work clean**  
Before work begins, the cleanliness of the working environment must be checked. Dust and dirt that enters the application, or contaminates the seal or garter spring, during the seal replacement might lead to premature failure replacement.
- **Handle with care**  
Seals are fragile components that have to be handled with care. Dust and abrasive particles, a damaged or bent sealing lip or a carelessly installed spring can cause a service life reduction, leakage or consequential damage. Avoid contact with sharp objects. Do not slide the sealing edge over housing parts.
- **Do not install seal without visibility**  
It is crucial that the sealing lip is visible during the installation and that any installation failure (e.g. sealing lip bending) is avoided by supporting the sealing lip to slide onto the shaft as intended. Make sure that the garter spring stays in the spring groove and that the sealing lip is not damaged or bent backwards during the installation process.

## Preparation

Split seals are specially packed for up-tower service. The seals are delivered cut with the ends secured to avoid damage during transport. Prior to installation, the transportation protection must be removed.

Cut the tape with scissors to open the packaging. Avoid touching the seal with sharp tools.

## Instructions

Make sure that the necessary equipment is ready:

- Seal and garter spring in their respective package
- Knife or scissors to open the seal packaging
- Flashlight (to check the seal lip right after installation)
- Wood screw to dismount the used seal out of the housing bore
- A cleaning cloth to clean the housing bore during seal replacement
- Tools required to dismount and install the cover plates
- Optional but recommended: adhesive for securing the spring connection (PermaBond HM162, Marston-Domsel MD666.620 or Loctite 243)

## Metal-cased – HDS seals

When installing metal-reinforced seals, the first step is to check the shaft and housing bore for proper specifications and condition. Next, coat both the seal and bore lightly with a lubricant, preferably the same one that will be used to lubricate the application. For large diameter seals, a special installation tool may not be practical. In these cases, do not hit the seal or seal case directly. Instead, use a wooden block, long enough to span the seal's outside diameter. When using this method, it is important to apply hammer-blows evenly and sequentially to the wood piece around the seal circumference to prevent the seal from tilting or skewing. SKF also recommends the use of a dead blow hammer for full energy transfer with less impact (→ **fig. 20**).

In some applications, the housing is designed for two seals in tandem, or a seal might have to be recessed further into the bore depth. In those cases, first set the seal flush with the housing using the method described above. Then, use a shorter piece of wood to drive the seal deeper into the bore utilizing a sequential pattern (→ **fig. 21**).

Seals are installed differently depending on whether their main purpose in a specific application is to retain lubricant or to exclude contaminants (→ **fig. 22**).

Fig. 20

Use a dead blow hammer

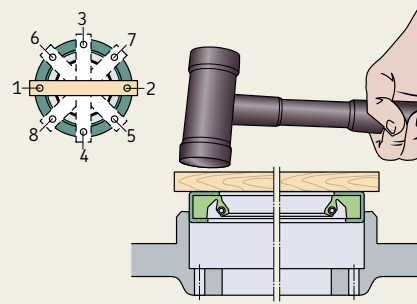


Fig. 21

Installation deeper into the bore

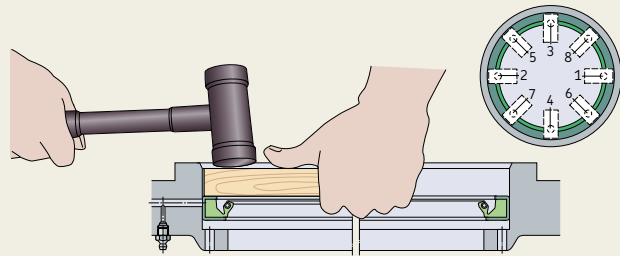
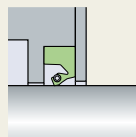
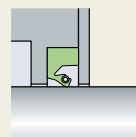


Fig. 22

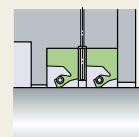
Ways of installing (e.g. all-rubber HS seals)



All-rubber seal installed to retain lubricant



All-rubber seal installed to exclude foreign material



All-rubber seals in tandem arrangement for maximum lubricant retention

## Split seals – HRS

Ensure shaft and housing bore requirements listed in the SKF drawing are met. Clean shaft surface and housing bore and make sure that they meet the specifications.

**1** Position the garter spring around the shaft at the installation position (→ **A** in **fig. 23**).

**2** Connect the spring (**A**)

a) Apply adhesive on open spring connection

b) Back-wind the spring 7 full turns

c) Screw the spring together leaving no gap

**3** Dismount the used seal from the housing bore.

**4** Lightly coat the counterface with a lubricant, preferably the same that will be used in the application (**B**).

**5** Position the seal joint on the shaft so that it is at the 12 o'clock position (**C**).

**6** Insert the garter spring into the groove trying to apply equal tension around the circumference.

**7** Compress and push both ends of the joint into the housing bore (**D**).

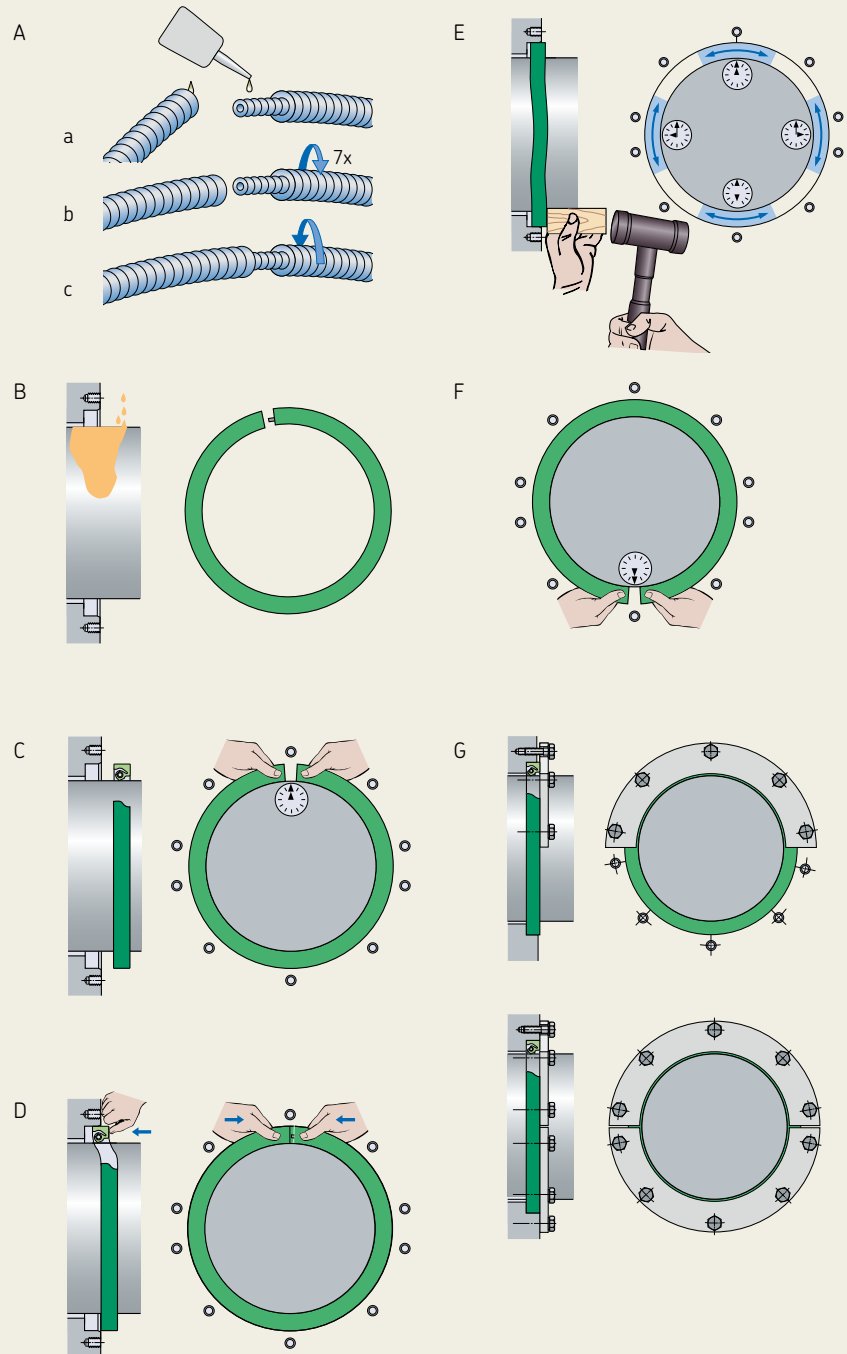
**8** Continue at the 6, 3 and 9 o'clock positions, push the rest of the seal into position and finish simultaneously. Use a small block of wood if needed to push the seal in the housing bore until it contacts the housing shoulder (**E**).

**9** If an excluder seal HRE1 is used, position it around the shaft and push it against the back of the installed primary seal with the sealing lip facing to the opposite direction. Position the joint at the 6 o'clock position. The excluder seal may try to go out of the housing. Hold it in place until the cover plates are installed (**F**).

**10** Check the seal condition, particularly at the joint, to make sure that it has been positioned properly. Install the cover plate on the housing face. Tighten the bolts evenly until the cover plate abuts the housing face (**G**).

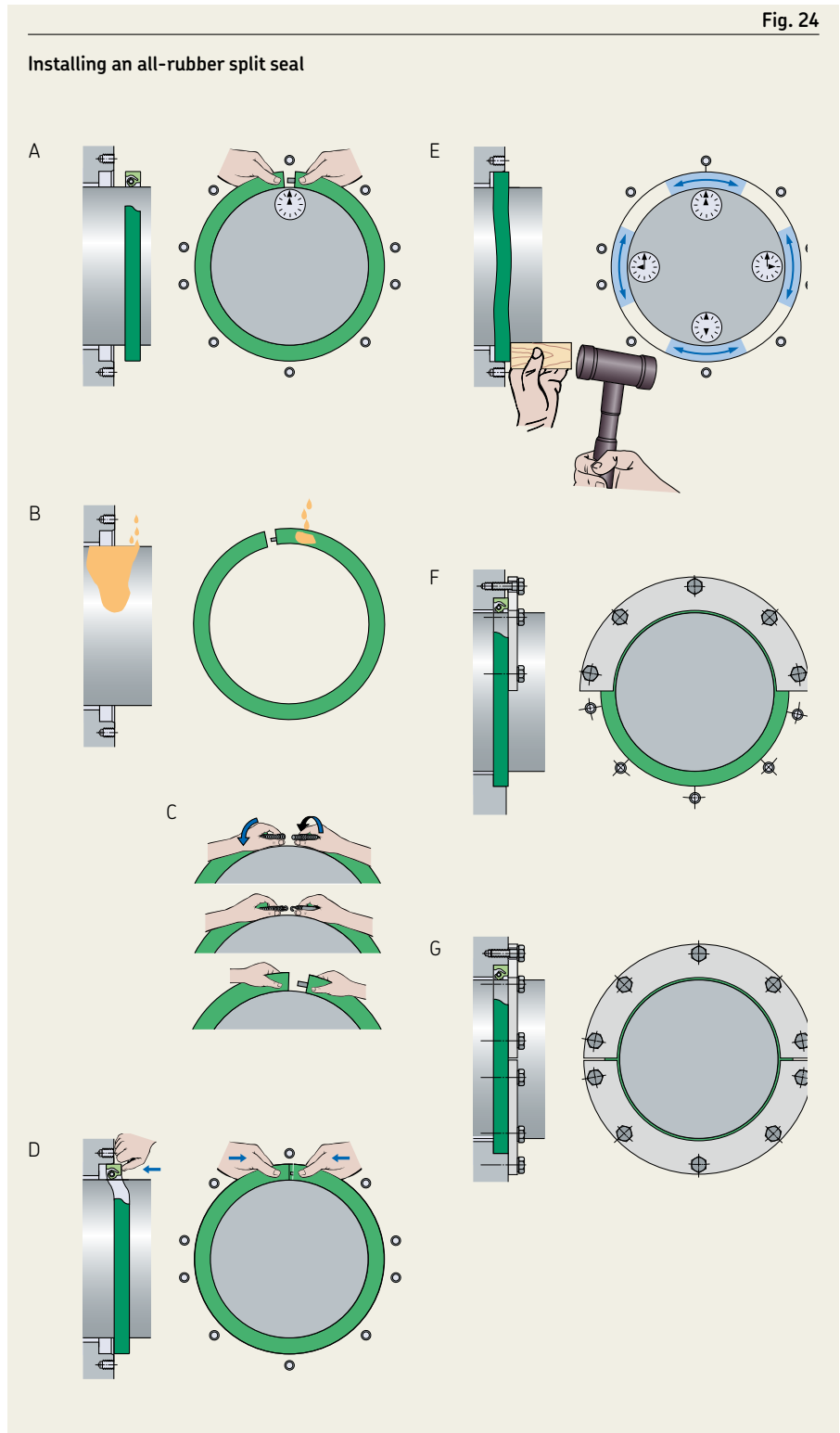
Installing a HRS split seal

Fig. 23



## Split seals – HS and HSS

- 1 Where appropriate, insert the spring in the SKF Springlock groove and position the spring connection, so that it is displaced with regard to the seal joint (→ **A** in **fig. 24**). This is standard with all HS8 seals. Put the seal in the correct position on the shaft.
- 2 Lightly coat both the seal and counterface surface with a lubricant, preferably the same lubricant that will be used to lubricate the application (**B**).
- 3 Join the ends of the garter spring by using the spring connector (**C**).
- 4 For threaded connectors, back-wind the spring a couple of turns before the ends are brought together and allowed to thread into each other. When using a hook-and-eye connector, draw the ends of the spring together and insert the hook into the eye, taking care not to overstretch the spring in the process, as this might impair seal performance. When using a control-wire connector, draw the seal ends together and insert the control wire into the centre of the spring coil.
- 5 Position the seal joint on the shaft so that it is at the 12 o'clock position and push both ends of the joint into the housing bore (**D**). Do not push only one joint and then work around the shaft as this will create an excess length, making installation difficult or impossible.
- 6 Continue at the 3 and 9 o'clock positions, push the rest of the seal into position (**E**) and finish simultaneously at the 6 and 12 o'clock positions. For shaft diameters  $\geq 1\,200\text{ mm}$  ( $47\text{ in}$ ), it is advisable to fix the seal at the 12, 3, 6 and 9 o'clock positions before locating the remaining sections of the seal.
- 7 Use a small block of wood to push the seal in the housing bore until it contacts the housing shoulder (**E**).



- 8 Check the seal condition, particularly at the joint, to make sure that it has been positioned properly.
- 9 Install the cover plate (see paragraph *Cover plates* on **page 94**) on the housing face. Tighten the bolts evenly until the end cover abuts the housing face (**F** and **G**).



*Installation of HRS and HSS split seals*



*Video of HRS split seals installation in a wind turbine*

## Cover plates

Seals without metal reinforcement, split and solid, are manufactured oversized relative to the housing bore diameter and depth to enable proper compression and stability. A cover plate (→ **fig. 25**) provides axial compression of the seal and stabilizes it in the housing bore to achieve maximum seal performance. The cover plate must be dimensioned properly to obtain the required fit. It should be thick enough not to bend or distort. Generally, a thickness of 6,35 to 12,7 mm (0.25 to 0.50 in) is sufficient.

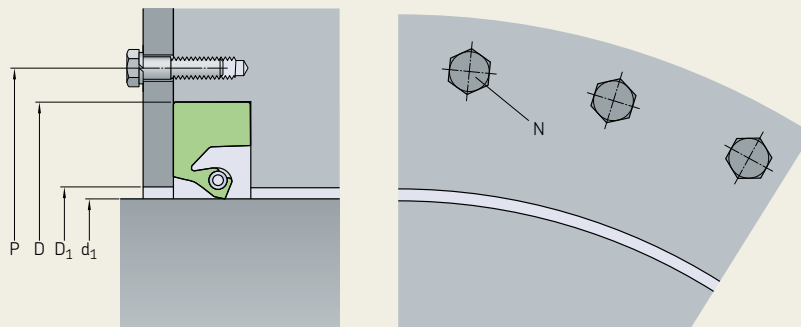
The plate should be fastened with bolts, no more than 150 mm (6 in) apart, on a bolt circle located as close to the seal housing bore as practical. The cover plate should be flat and the housing bore depth uniform. Splitting the cover plate at 180° will make seal replacement easier, particularly in confined areas.

To block surges of lubricant toward the seal from the inside and to protect the seal from damage from the outside, SKF recommends dimensioning the inside diameter of the cover plate so that it is 6 to 8 mm (0.25 to 0.30 in) greater than the shaft diameter to accommodate shaft-to-bore misalignment and runout (→ **fig. 25**).

In applications where supplementary sealing is necessary, and it is impractical to machine the original housing to provide a seal cavity, a seal cavity can be incorporated into a new plate that is bolted into place as illustrated in **fig. 26** on **page 95**.

Fig. 25

### Cover plate recommendations



Inside diameter of cover:  $D1 = d_1 + 6 \dots 8$  [mm]  
 Pitch circle diameter of screws:  $P = 1,1 D$  [mm]  
 No. of attachment screws:  $N = 0,02 P$

## Multiple HS seal installations

When installing two split all-rubber HS seals in one cavity, the locations of the split joints should be staggered by 30° to 60° to minimize the risk of leakage through the joints. The splits should be located toward the top of the bore. Grease the cavity between the seals to provide lubricant to the outer sealing lip.

When two HS seals, split or solid, are installed in the same housing bore, a spacing washer must be placed between the two seals (→ **fig. 27**). Suitable washer dimensions can be determined based on the shaft and housing bore diameters,  $d_1$  and  $D$ , respectively:

- Washer inside diameter  
=  $d_1 + 6$  to 10 mm (0.25 to 0.4 in)
- Washer outside diameter  
=  $D - 0,5$  to 1,5 mm (0.02 to 0.06 in)

The width of the washer is determined by the application conditions. There should, however, always be sufficient room for lubrication holes to be provided in the circumference, or lubrication grooves in one side face (→ **fig. 28**). These lubrication provisions must enable grease to be supplied from the housing to the sealing lips via a drilled passage or grease fitting (→ **fig. 29** on page 96). When determining what washer width is appropriate for the depth of a housing bore, it is necessary to consider the axial displacement required when clamping the seals.

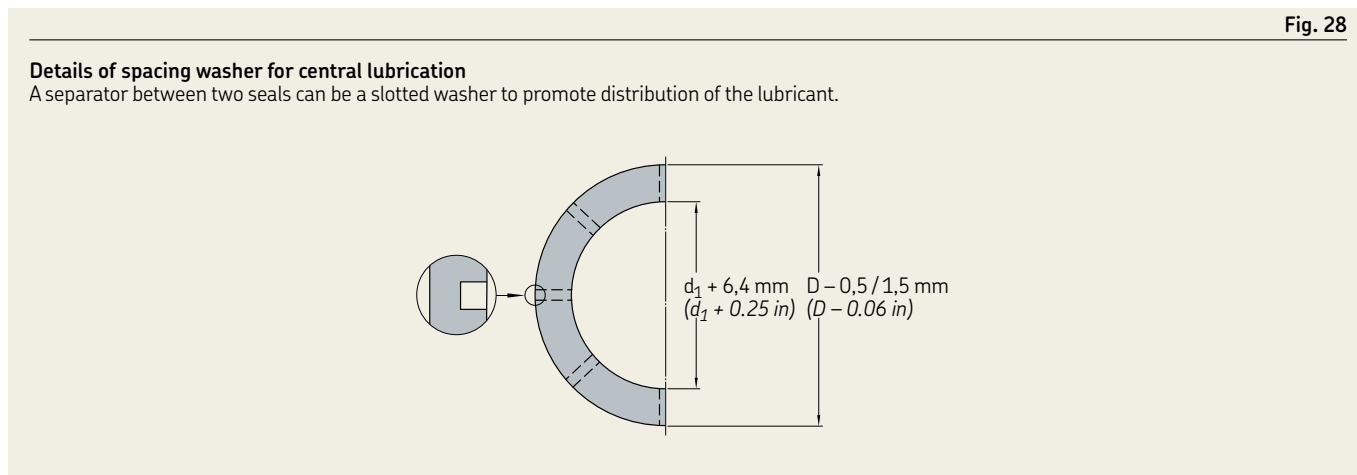
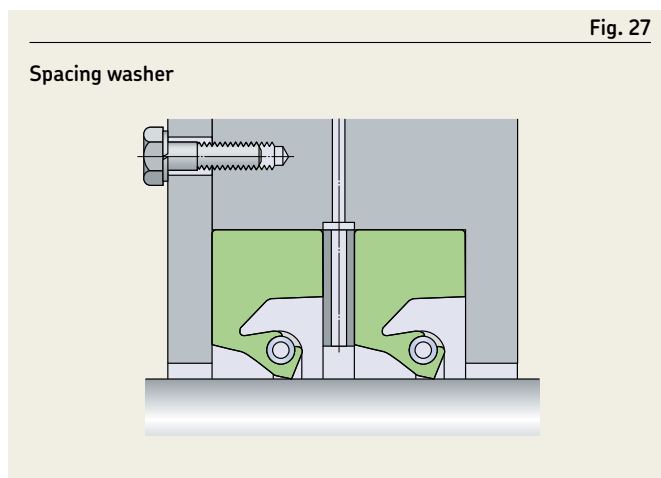
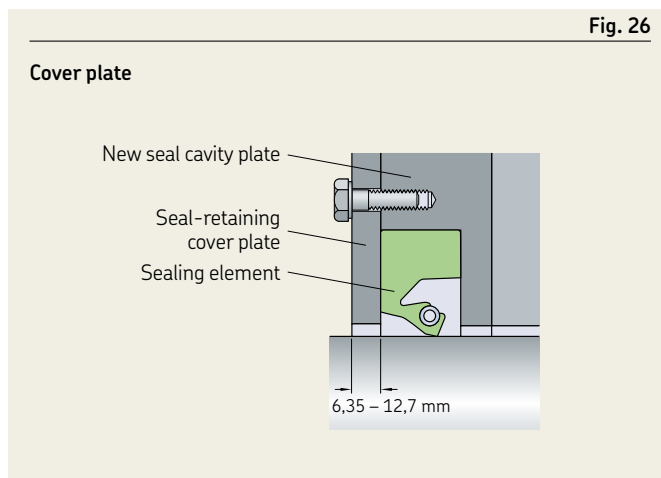


Fig. 29

## Spacing washer and grease fitting

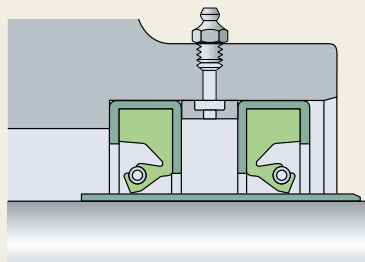
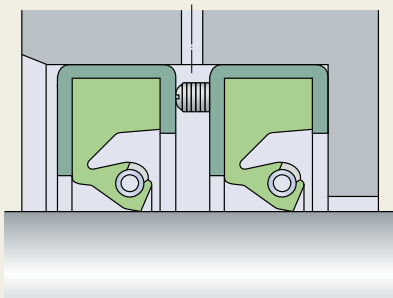


Fig. 30

## Spacer lug



## Multiple HDS seal installations

When installing two metal-cased radial shaft seals in the same housing bore, either in a tandem or back-to-back arrangement, care must be taken that neither of the sealing lips can run dry at any time. To reduce the risk of dry running, the space between the seals should be filled with a suitable grease.

To avoid dry running, SKF recommends using spacer lugs or a spacing washer between the two seals. The spacing washer should be provided with lubrication holes so that grease can be supplied to the space between the sealing lips via a grease fitting (→ fig. 29). No spacing washer is required when using seals that have spacer lugs built into the air side of the metal case (→ fig. 30). HDS and HDSE seals can be supplied from SKF with holes pre-drilled in the metal case to mate with corresponding passages in the housing bore.

## PTFE seals

In most cases, small diameter PTFE seals are shipped on a tube that maintains a nominal seal inside diameter (smaller than shaft diameter) during storage. Therefore, they should not be removed from the shipping tube until immediately prior to installation. Also, if quality inspections must be done, SKF recommends that the shipping tube remains in place. The seal inside diameter cannot be accurately measured anyway after manufacturing as the PTFE lip configuration changes over time as it relaxes.

PTFE formulations used for radial lip seals are generally more aggressive and abrasive to the shaft than standard elastomeric materials. Therefore, PTFE sealing lips require a surface hardness value of 58 to 62 HRC. An alternative to a hardened shaft surface is the use of an SKF wear sleeve, manufactured to the same high standards such as the inner rings of SKF needle roller bearings, offering an excellent sealing surface.

In applications where PTFE seals will be retaining a lubricant or be fully flooded with a fluid, the seals should be installed dry. In applications that run dry or will be starved for lubrication, the sealing lip should be pre-lubricated with a grease appropriate for the temperature conditions of the application.

**⚠ WARNING**

At temperatures above 300 °C (570 °F), all PTFE compounds give off dangerous fumes. For additional information, refer to page 33.



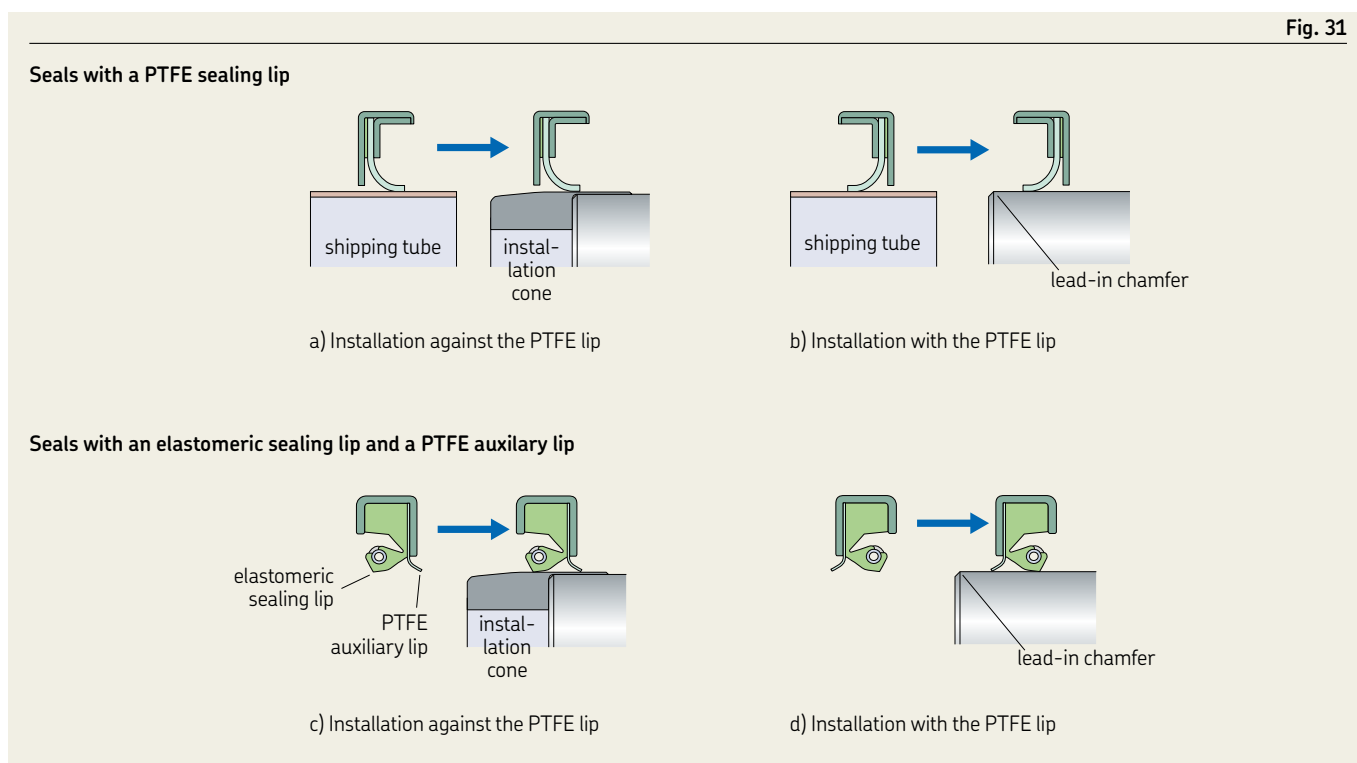
## Installation procedure

PTFE lips do not have the same elastic properties as rubber lips, which makes them more susceptible to damage. Therefore, special care must be taken during installation and handling to prevent damage and help ensure proper operation and function. Shaft features such as keyways and splines, as well as drill holes, ports and sharp-edged shaft steps have the potential to damage PTFE lips. Whenever possible, these obstructions can be covered by using thin-walled installation tools made from plastic or metal.

PTFE lip orientation during installation will determine the installation method. Installation is more difficult when the shaft is installed against the PTFE lip (→ fig. 31, a and c). This type of installation becomes even more complicated when the hardware is difficult to access or visually obstructed and may not be possible if an installation tool cannot be used. In any case, when the shaft is installed against the PTFE lip, SKF recommends the use of an installation cone or “bullet”. SKF can quote and manufacture installation cones if detailed drawings of the shaft and sealing areas are provided. In lieu of installation cones, longer than normal lead-in chamfers on the shaft would be required. However, shaft features that could damage the seal (keyways, etc.) must still be covered, possibly with tape.

If the shaft is installed with the PTFE lip, a smooth, burr-free radius or chamfer on the shaft end is all that is required, provided that no damaging shaft features are present as noted above (→ fig. 31, b and d).

Some seals have two PTFE lips facing opposite directions. In this case, installation is always against one of the lips and an installation cone is recommended.



# Protecting the counterface surface against corrosion

The seal counterface surface should be protected from corrosion until the machine is operational. Be sure to use a rust inhibitor that will last for a year, whether or not the shaft is exposed.

The protective coating should be soluble in the medium to be retained and must not cause any chemical separation as this can impair the sealing performance.

When machines are transported, stored under unfavourable conditions, or out of service for extended periods, special rust inhibitors should be used. These rust inhibitors should form a tough, pliable waxy film that can be removed using neutral solvents that leave an oily residue.

# Removal

Because radial shaft seals should never be reused, there is no need to worry about damaging the seal when removing it. However, prior to removal, it is advisable to note the direction in which the seal is installed so that the replacement seal can be installed in the same direction. Small seals can generally be removed using a screwdriver, taking care not to damage the shaft surface. The removal of large-size seals is made easier if holes have been provided in the housing shoulder A, see picture in **table 10, page 84**, allowing access for a drift.

# Replacement

The lip of the replacement seal should not run on the same path as the lip of the old seal. There are several ways to achieve this:

- Install SKF Speedi-Sleeve, see **page 240**.
- Rework or replace the counterface (this may entail removing the shaft).
- Install a spacing ring in the housing bore between the housing shoulder and the seal (→ **fig. 32**).
- Press the new seal to a different depth in a cylindrical opening in the housing, i.e. toward the medium to be sealed.

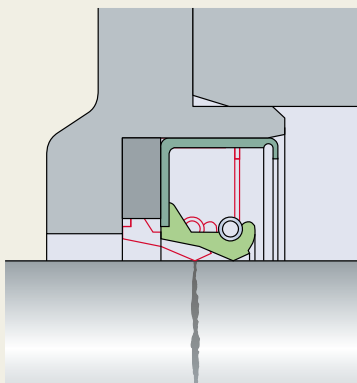
When choosing a replacement seal, be sure that its design and material correspond to the original seal. In case of doubt, select a seal that meets the operating conditions of the application, and that the seal materials are compatible with the lubricant.

Seals made from a different material should only be used when absolutely necessary. In these cases, the recommendations provided in **table 14** should be followed. The order in which the materials are listed is an indication of their suitability.

If a seal of the same design is not available in the same width as the original, then a somewhat narrower seal can be used, or if the depth of the housing bore allows, a somewhat wider seal can be selected as the replacement.

**Fig. 33**

Spacing ring



**Table 14**

Replacement sealing lip materials

Original	Replacement
<b>Felt</b>	Nitrile rubber Polyacrylate elastomer Fluoro rubber
<b>Leather</b>	Nitrile rubber Fluoro rubber
<b>Nitrile rubber</b>	Polyacrylate elastomer Fluoro rubber Silicone rubber
<b>Polyacrylate elastomer</b>	Fluoro rubber Silicone rubber
<b>Silicone rubber</b>	Fluoro rubber



# Seals for general industrial applications



**50%**  
OF PREMATURE  
BEARING FAILURE  
IS RELATED TO  
SEALING ISSUES



**Seals for general industrial applications**

- > Improved performance
- > Easy installation



# Designation system

## Metric radial shaft seals

Designations of all SKF metric radial shaft seals specify shaft diameter, housing bore diameter and nominal seal width (bore depth for HSF and HS seals) in millimetres, followed by design and the code of the sealing lip material (→ **table 1**).

## Inch-size radial shaft seals

Inch-size SKF radial shaft seals are identified by their stock number that consists of four to seven digits. The stock number provides an indication of seal size.

- Four-figure numbers are used for radial shaft seals for

shaft diameters:  $d_1 \leq 1$  in, e.g.  
 3680  $d_1 = 0.375$  in

- Five-figure numbers are used for radial shaft seals for

shaft diameters:  $d_1 \leq 10$  in, e.g.  
 41287  $d_1 = 4.125$  in  
 97545  $d_1 = 9.750$  in

- Six- and seven-figure numbers are used for radial shaft seals for

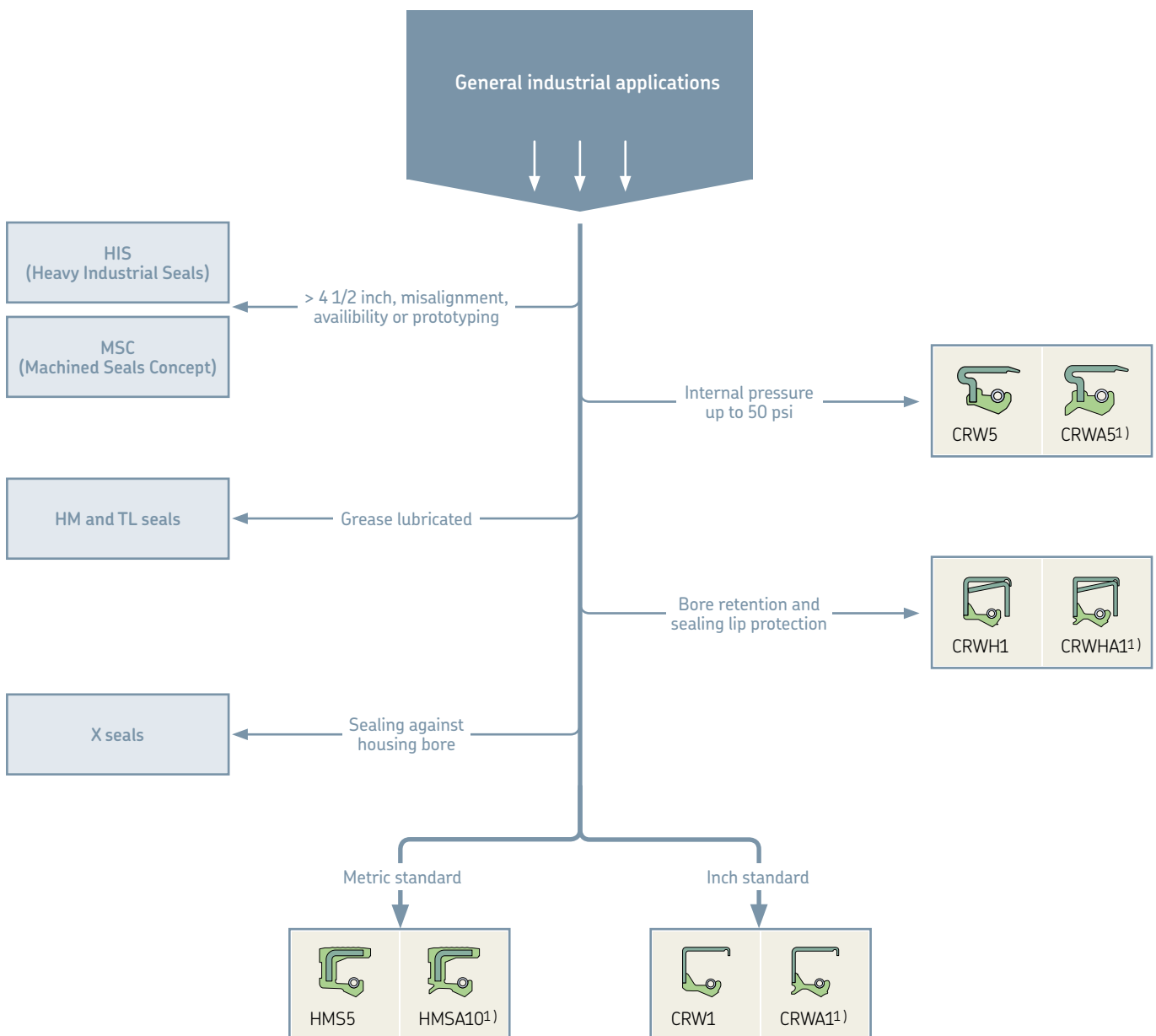
shaft diameters:  $d_1 \geq 10$  in, e.g.  
 120061  $d_1 = 12$  in  
 1375242  $d_1 = 13.75$  in

**Table 1**

Designation system for metric radial shaft seals		55	72	8	HMSA10	RG	1
<b>Dimensions</b>		55 72 8			HMSA10 RG 1		
55	Shaft diameter						
72	Housing bore diameter						
8	Nominal seal width (bore depth for HSF and HS seals)						
<b>Design</b>					HMSA10		
HMSA10							
<b>Lip material</b>					RG		
RG	Acrylonitrile-butadiene rubber, SKF developed, used for the HMS5 and HMSA10 seals						
<b>Execution</b>					1		
1, 2...	Seals of the same size and design that differ in execution from the basic design are identified by a number e.g. R1						

# Assortment, availability and classification

The SKF assortment of radial shaft seals comprises some 200 designs and executions for applications within basically all industries. The radial shaft seals described in this publication belong to the standard range and most of them are available in both metric and inch sizes. New seal designs and sizes are continually added. For additional information, contact SKF.


























¹) Same seal design with auxiliary lip for further protection

**Designation system for metric radial shaft seals**

RG, R Nitrile rubber  
 V Fluoro rubber  
 T Polytetrafluoroethylene (PTFE)

Seal designs	Design	Sealing lip	Auxiliary lip
	Outside diameter Configuration	Configuration	A = Contacting B = Non-contacting
	Material code	Material code	

—

		Rubber	RG, V	Straight	RG V	B (HMSA10)	
HMS5	HMSA10						
		Metal	N/A	SKF Wave	R V	N/A	
CRW1	CRWH1						
		Metal	N/A	SKF Wave	R V	B	
CRWA1	CRWHA1						
		Metal	N/A	SKF Wave	R V	A (CRWA5)	
CRW5	CRWA5						
		Metal	N/A	Straight	R V	N/A	
CRS1	CRSH1						
		Metal	N/A	Straight	R V	A	
CRSA1	CRSHA1						
		Metal	N/A	Straight	R V	N/A	
HM14							
		Rubber	R	Special	R	N/A	
X15							
			Metal	N/A	Special	T	N/A
SL	SLX	SLS					
			Metal	N/A	Special	T	A (SLA, DLA)
SLA	DL	DLA					
			Fluoroplastic / (rubber)	T (+ R, V)	Special	T	N/A
YSLE	YNSLE	YSL					

\* PTFE designs are made to order to handle temperatures, pressures and speeds that may exceed those stated for rubber sealing lip designs.



Operating temperature range				Shaft-to-bore mis-alignment (STBM) TIR		Dynamic runout (DRO) TIR		Pressure differential		Maximum shaft surface speed	
from	to	from	to								
°C		°F		mm	in	mm	in	MPa	psi	m/s	ft/min
-40	100	-40	210	0,38	0.015	0,51	0.020	0,05	7	14	2 755
-40	200	-40	390								
-40	100	-40	210	0,38	0.015	0,51	0.020	0,07	10	18	3 600
-40	200	-40	390								
-40	100	-40	210	0,38	0.015	0,51	0.020	0,07	10	18	3 600
-40	200	-40	390								
-40	100	-40	210	0,13	0.005	0,13	0.005	0,35	50	10	2 000
-40	200	-40	390								
-40	100	-40	210	0,38	0.015	0,51	0.020	0,07	10	18	3 600
-40	200	-40	390								
-40	100	-40	210	0,38	0.015	0,51	0.020	0,07	10	18	3 600
-40	200	-40	390								
-40	100	-40	210	0,13	0.005	0,08	0.003	0,07	10	10	2 000
-40	200	-40	390								
-40	100	-40	210	0,38	0.015	0,25	0.010	0,02	3	2,54	500
-70	250	-95	480	*	*	*	*	*	*	*	*
-70	250	-95	480	*	*	*	*	*	*	*	*
-70	250	-95	480	*	*	*	*	*	*	*	*

# HMS5 and HMSA10 seals

Fig. 1



HMS5

Fig. 2



HMSA10

## Main features

SKF metric rubber outside diameter radial shaft seals, HMS5 and HMSA10, are designed in accordance with ISO 6194-1 and DIN 3760 for use in a wide range of industrial applications. The available size range of HMS5 and HMSA10 seals includes a full coverage of the ISO 6194-1 and DIN 3760 dimensions for shaft diameters up to 250 mm (9.842 in) as well as an extensive range of dimensions commonly used in the market. New dimensions are continually added. Main features include:

- Optimized sealing lip material
- Spring-loaded sealing lip
- Optimally balanced sealing lip and flex section
- Beaded outside diameter
- Auxiliary lip (HMSA10 seals only)

## Design

The rubber outside diameter provides optimized sealing ability in the housing, also at considerable surface roughness or in split housings. The beads on the outside diameter provide improved sealing ability and retention in the bore. They also prevent spring-back during installation.

The spring-loaded sealing lip contributes to a quick response in handling dynamic runout and maintaining the sealing performance, even when sealing lip wear is excessive.

Sealing lip and flex section are optimally balanced to withstand both high dynamic runout and shaft-to-bore misalignment.

The auxiliary lip on HMSA10 seals is non-contacting, which means that the seals normally can operate at the same speeds as the single-lip HMS5 seals.

## Material

The optimized nitrile rubber compound used for the HMS5 and HMSA10 seals has the designation suffix RG. The compound is the result of long experience and the latest findings from the SKF sealing material developments. Advantages of this material include:

- Good resistance to ageing
- Very good compatibility with synthetic oils
- Very good pumping ability
- Good wear resistance

Pumping ability is defined as the time it takes for the seal to return a certain amount of oil from the air side to the oil side. The microstructure of SKF's RG nitrile rubber compound promotes rapid pumping of the oil, (→ **table 2 on page 107**). In **diagram 1 on page 107**, results from endurance tests show the extended service life of seals made of the optimized nitrile compound.

The complete range of HMS5 and HMSA10 seals is also available in a fluoro rubber compound with a stainless steel garter spring. This rubber compound has the designation suffix V and is used in applications where temperatures exceed the limits of nitrile rubber.

## Applications and operating conditions

HMS5 and HMSA10 seals are designed for oil or grease lubricated applications with operating temperatures ranging from  $-40$  to  $+100$  °C ( $-40$  to  $+210$  °F), short-term up to  $120$  °C ( $250$  °F). These seals are also appropriate for sealing lubricants within a wide range of viscosities.

- Circumferential speed: up to 14 m/s  
(2 755 ft/min)
- Operating pressure: max. 0,05 MPa  
(7 psi)

These values are the maximum value for each service condition and should not occur together. Consideration should be given as to how the operating conditions affect each other. For information on seals under pressure, see [page 79](#).

## New sizes

If the necessary size is not listed in the product tables on the following pages, we can add more sizes on request (also in inch size). Contact your local SKF representative.

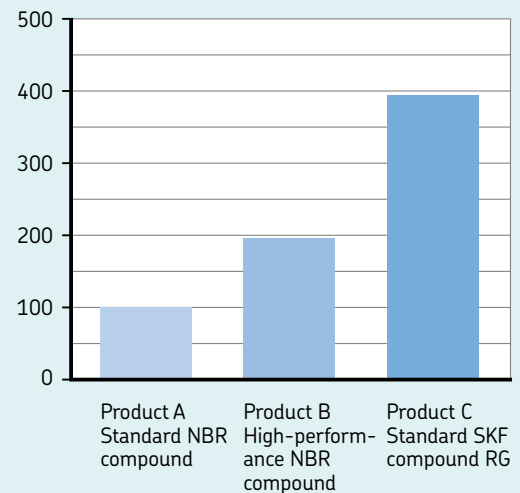
Table 2

Pumping ability			
Speed Rotating	Circumferential	Pumping time	
		Standard NBR	SKF compound RG
r/min	m/s	s	
<b>1 000</b>	3,1	–	117
<b>1 500</b>	4,7	280	69
<b>2 000</b>	6,3	186	50
<b>2 500</b>	7,9	130	40
<b>3 000</b>	9,4	102	31
<b>3 500</b>	11,0	82	25
<b>4 000</b>	12,6	68	21
<b>4 500</b>	14,1	57	18

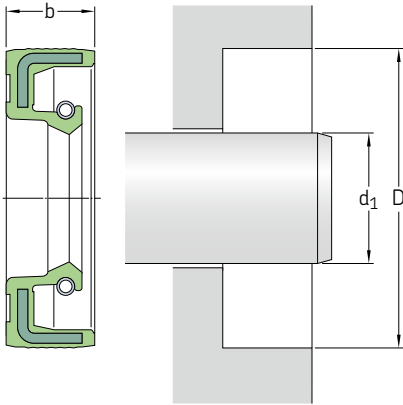
Shaft diameter 60 mm, engine oil SAE 30

Diagram 1

Average seal life  
(as a percentage of baseline, product A)



d<sub>1</sub> 6–25 mm



<sup>1)</sup> Designation to be followed by the design and material codes, indicating one of the four variants available for each dimension:

**HMS5 RG** without auxiliary lip, nitrile rubber  
**HMS5 V** without auxiliary lip, fluoro rubber  
**HMSA10 RG** with auxiliary lip, nitrile rubber  
**HMSA10 V** with auxiliary lip, fluoro rubber  
 Example: **6x16x5 HMSA10 RG**

<sup>2)</sup> Design execution differs from the basic design and is indicated by a number, see also **page 102**.

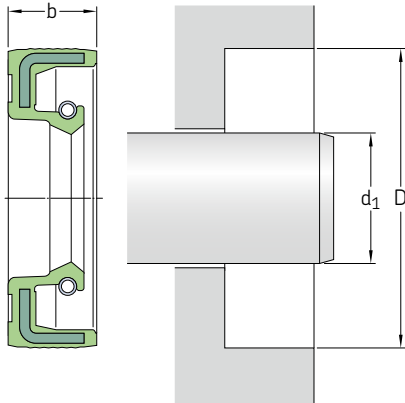


Please see **pages 85 and 86** for housing bore requirements.

Dimensions				Designation <sup>1)</sup>	ISO / DIN	Dimensions			
Shaft	Bore	Nominal seal width				Shaft	Bore	Nominal seal width	
d <sub>1</sub>	D	b			d <sub>1</sub>	D	b		
mm			–	–	mm			–	
<b>6</b>	16	5	<b>6x16x5</b>	•	<b>12 cont.</b>	30	7	<b>12x30x7</b>	•
	16	7	<b>6x16x7</b>			32	7	<b>12x32x7</b>	
	22	7	<b>6x22x7</b>			37	7	<b>12x37x7</b>	
<b>7</b>	16	7	<b>7x16x7<sup>2)</sup></b>	•	<b>13</b>	26	7	<b>13x26x7</b>	•
	22	7	<b>7x22x7</b>			24	7	<b>14x24x7</b>	
<b>8</b>	18	5	<b>8x18x5</b>	•	<b>14</b>	25	5	<b>14x25x5</b>	•
	18	7	<b>8x18x7</b>			28	7	<b>14x28x7</b>	
	22	7	<b>8x22x7</b>			30	7	<b>14x30x7</b>	
	24	7	<b>8x24x7</b>			<b>15</b>	24	7	
<b>9</b>	22	7	<b>9x22x7</b>	25	5		<b>15x25x5</b>		
	<b>10</b>	19	7	<b>10x19x7<sup>2)</sup></b>	25	6	<b>15x25x6</b>		
		20	6	<b>10x20x6</b>	26	7	<b>15x26x7</b>		
	20	7	<b>10x20x7</b>	•	30	7	<b>15x30x7</b>		
	22	7	<b>10x22x7</b>		32	7	<b>15x32x7</b>		
	<b>10</b>	24	7	<b>10x24x7</b>	•	<b>15</b>	35	7	<b>15x35x7</b>
25		7	<b>10x25x7</b>	40			7	<b>15x40x7</b>	
26		7	<b>10x26x7</b>	40			10	<b>15x40x10</b>	
30		7	<b>10x30x7</b>	<b>16</b>			24	7	<b>16x24x7<sup>2)</sup></b>
<b>12</b>	19	5	<b>12x19x5<sup>2)</sup></b>		28	7	<b>16x28x7</b>		
	22	5	<b>12x22x5</b>	•	30	7	<b>16x30x7</b>		
	22	6	<b>12x22x6</b>		32	7	<b>16x32x7</b>		
	22	7	<b>12x22x7</b>		35	7	<b>16x35x7</b>		
	24	7	<b>12x24x7</b>	•	<b>17</b>	28	7	<b>17x28x7</b>	
25	7	<b>12x25x7</b>							
28	7	<b>12x28x7</b>							

Dimensions			Designation <sup>1)</sup>	ISO / DIN	Dimensions			Designation <sup>1)</sup>	ISO / DIN
Shaft	Bore	Nominal seal width			Shaft	Bore	Nominal seal width		
d <sub>1</sub>	D	b		d <sub>1</sub>	D	b			
mm			–	–	mm			–	–
<b>17</b> cont.	29	5	17×29×5		<b>22</b>	32	7	22×32×7	
	30	7	17×30×7			35	7	22×35×7	•
	32	7	17×32×7			36	7	22×36×7	
	35	7	17×35×7			38	8	22×38×8	
	37	7	17×37×7			40	7	22×40×7	•
	40	7	17×40×7			40	10	22×40×10	
	40	10	17×40×10			42	10	22×42×10	
	47	7	17×47×7			45	7	22×45×7	
	47	10	17×47×10		47	7	22×47×7	•	
<b>18</b>	28	7	18×28×7		<b>23</b>	40	10	23×40×10	
	30	6	18×30×6		<b>24</b>	35	7	24×35×7	
	30	7	18×30×7	•	37	7	24×37×7		
	32	7	18×32×7		40	7	24×40×7		
	35	7	18×35×7	•	42	8	24×42×8		
	40	7	18×40×7		47	7	24×47×7		
<b>19</b>	30	7	19×30×7			50	10	24×50×10	
	30	8	19×30×8		<b>25</b>	35	6	25×35×6	
	32	7	19×32×7			35	7	25×35×7	•
42	6	19×42×6		37		5	25×37×5		
<b>20</b>	30	5	20×30×5		37	6	25×37×6		
	30	7	20×30×7	•	37	7	25×37×7		
	32	6	20×32×6		38	7	25×38×7		
	32	7	20×32×7		40	5	25×40×5		
	34	7	20×34×7		40	7	25×40×7	•	
	35	6	20×35×6		40	8	25×40×8		
	35	7	20×35×7	•	40	10	25×40×10		
	35	8	20×35×8		42	6	25×42×6		
	35	10	20×35×10		42	7	25×42×7		
	36	7	20×36×7		42	10	25×42×10		
	38	7	20×38×7		45	7	25×45×7		
	40	7	20×40×7	•	45	8	25×45×8		
	40	10	20×40×10		45	10	25×45×10		
	42	7	20×42×7		46	7	25×46×7		
	42	10	20×42×10		47	7	25×47×7	•	
				47	10	25×47×10			
	45	7	20×45×7		50	10	25×50×10		
	47	7	20×47×7		52	7	25×52×7	•	
	47	10	20×47×10		52	8	25×52×8		
					52	10	25×52×10		
	52	7	20×52×7		62	7	25×62×7		
	52	10	20×52×10		62	8	25×62×8		
<b>21</b>	35	7	21×35×7		62	10	25×62×10		
	40	7	21×40×7		72	7	25×72×7		

d<sub>1</sub> 26–40 mm



<sup>1)</sup> Designation to be followed by the design and material codes, indicating one of the four variants available for each dimension:

**HMS5 RG** without auxiliary lip, nitrile rubber  
**HMS5 V** without auxiliary lip, fluoro rubber  
**HMSA10 RG** with auxiliary lip, nitrile rubber  
**HMSA10 V** with auxiliary lip, fluoro rubber  
 Example: **6x16x5 HMSA10 RG**

<sup>2)</sup> Design execution differs from the basic design and is indicated by a number, see also **page 102**.

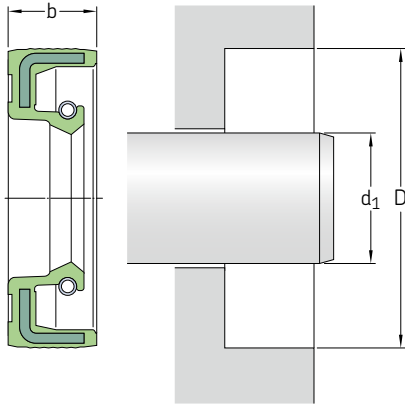


Please see **pages 85 and 86** for housing bore requirements.

Dimensions				Designation <sup>1)</sup>	ISO / DIN	Dimensions				Designation <sup>1)</sup>	ISO / DIN
Shaft	Bore	Nominal seal width	b			Shaft	Bore	Nominal seal width	b		
d <sub>1</sub>	D										
mm			–				–				–
26	37	7		26x37x7							
	38	5		26x38x5							
	38	7		26x38x7							
	42	7		26x42x7							
	47	7		26x47x7							
27	37	7		27x37x7							
	42	10		27x42x10							
	43	7		27x43x7							
	47	7		27x47x7							
	47	10		27x47x10							
28	38	7		28x38x7							
	38	8		28x38x8							
	40	7		28x40x7	•						
	40	8		28x40x8							
	42	7		28x42x7							
	42	8		28x42x8							
	44	6		28x44x6							
	45	8		28x45x8							
	47	7		28x47x7	•						
	47	10		28x47x10							
30	40	7		30x40x7	•						
	42	6		30x42x6							
	42	7		30x42x7	•						
	42	8		30x42x8							
	44	7		30x44x7							
30	45	7		30x45x7							
	45	8		30x45x8							
	46	7		30x46x7							
	47	6		30x47x6							
	47	7		30x47x7							
	47	8		30x47x8							
	47	10		30x47x10							
	48	8		30x48x8							
	50	5		30x50x5							
	50	7		30x50x7							
50	8		30x50x8								
50	10		30x50x10								
30	52	7		30x52x7							•
	52	8		30x52x8							•
	52	10		30x52x10							•
	55	7		30x55x7							•
	55	10		30x55x10							•
32	62	7		30x62x7							
	62	10		30x62x10							
	72	10		30x72x10							
	42	7		32x42x7							
	43	7		32x43x7							
	44	7		32x44x7							
	45	7		32x45x7							•
	45	8		32x45x8							•
	47	6		32x47x6							•
	47	7		32x47x7							•
47	8		32x47x8							•	
47	10		32x47x10								
48	8		32x48x8								

Dimensions			Designation <sup>1)</sup>	ISO / DIN	Dimensions			Designation <sup>1)</sup>	ISO / DIN		
Shaft	Bore	Nominal seal width			Shaft	Bore	Nominal seal width				
d <sub>1</sub>	D	b									
mm			–	–	mm			–	–		
<b>32</b> cont.	50	8	32×50×8		<b>36</b> cont.	58	10	36×58×10			
	50	10	32×50×10			62	7	36×62×7			
	52	7	32×52×7	•		<b>37</b>	50	6	37×50×6		
	52	8	32×52×8	•			<b>38</b>	50	7	38×50×7	
	55	10	32×55×10			52		7	38×52×7		
	62	10	32×62×10			52		8	38×52×8		
	72	7	32×72×7			54		10	38×54×10		
	80	7	32×80×7			55		7	38×55×7	•	
	<b>33</b>	45	7	33×45×7				55	8	38×55×8	•
		50	6	33×50×6				55	10	38×55×10	
<b>34</b>	44	8	34×44×8		58	8		38×58×8	•		
	48	8	34×48×8		58	10		38×58×10			
	52	8	34×52×8		60	10		38×60×10			
	62	10	34×62×10		62	7	38×62×7	•			
<b>35</b>	45	7	35×45×7		62	8	38×62×8	•			
	47	6	35×47×6		62	10	38×62×10				
	47	7	35×47×7	•	72	10	38×72×10				
	47	8	35×47×8	•	80	8	38×80×8				
	48	8	35×48×8		<b>38,5</b>	58	7	38.5×58×7			
	49	6	35×49×6			<b>40</b>	50	8	40×50×8		
	50	7	35×50×7	•	52		6	40×52×6			
	50	8	35×50×8	•	52		7	40×52×7	•		
	50	10	35×50×10		52		8	40×52×8	•		
	52	7	35×52×7	•	55		7	40×55×7	•		
	52	8	35×52×8	•	55		8	40×55×8	•		
	52	10	35×52×10		56		8	40×56×8			
	55	7	35×55×7	•	58		7	40×58×7			
	55	8	35×55×8	•	58		8	40×58×8			
	55	10	35×55×10		58		10	40×58×10			
	56	10	35×56×10		60	8	40×60×8				
	58	10	35×58×10		60	10	40×60×10				
	60	10	35×60×10		62	6	40×62×6				
	62	7	35×62×7		62	7	40×62×7	•			
	62	8	35×62×8		62	8	40×62×8	•			
	62	10	35×62×10		62	10	40×62×10				
	72	7	35×72×7		65	10	40×65×10				
	72	10	35×72×10		65	12	40×65×12				
	72	12	35×72×12		68	8	40×68×8				
	80	12	35×80×12		68	10	40×68×10				
	<b>36</b>	47	7	36×47×7		70	8	40×70×8			
		50	7	36×50×7		72	7	40×72×7			
		52	7	36×52×7		72	10	40×72×10			
					80	8	40×80×8				
					80	10	40×80×10				
				80	12	40×80×12					

d<sub>1</sub> 40–70 mm



<sup>1)</sup> Designation to be followed by the design and material codes, indicating one of the four variants available for each dimension:

**HMS5 RG** without auxiliary lip, nitrile rubber  
**HMS5 V** without auxiliary lip, fluoro rubber  
**HMSA10 RG** with auxiliary lip, nitrile rubber  
**HMSA10 V** with auxiliary lip, fluoro rubber  
 Example: **6x16x5 HMSA10 RG**

<sup>2)</sup> Design execution differs from the basic design and is indicated by a number, see also **page 102**.



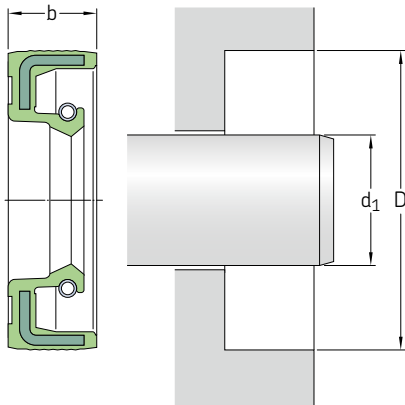
Please see **pages 85 and 86** for housing bore requirements.

Dimensions				Designation <sup>1)</sup>	ISO / DIN	Dimensions			
Shaft	Bore	Nominal seal width	b			Shaft	Bore	Nominal seal width	b
d <sub>1</sub>	D								
mm				–	–	mm			
<b>40</b>	90	10		<b>40x90x10</b>					
<b>cont.</b>	90	12		<b>40x90x12</b>					
<b>41</b>	56	7		<b>41x56x7</b>					
<b>42</b>	53	7		<b>42x53x7</b>					
	55	7		<b>42x55x7</b>	•				
	55	8		<b>42x55x8</b>					
	56	7		<b>42x56x7</b>					
	60	7		<b>42x60x7</b>					
	62	7		<b>42x62x7</b>					
	62	8		<b>42x62x8</b>	•				
	62	10		<b>42x62x10</b>					
	65	10		<b>42x65x10</b>					
	65	12		<b>42x65x12</b>					
	66	10		<b>42x66x10</b>					
	67	10		<b>42x67x10</b>					
	72	8		<b>42x72x8</b>					
	72	10		<b>42x72x10</b>					
<b>43</b>	62	8		<b>43x62x8</b>					
<b>44</b>	60	10		<b>44x60x10</b>					
	62	10		<b>44x62x10</b>					
	65	10		<b>44x65x10</b>					
<b>45</b>	55	7		<b>45x55x7</b>					
	58	7		<b>45x58x7</b>					
	60	7		<b>45x60x7</b>					
	60	8		<b>45x60x8</b>	•				
	60	10		<b>45x60x10</b>					
<b>45</b>	62	7		<b>45x62x7</b>					
<b>cont.</b>	62	8		<b>45x62x8</b>	•				
	62	10		<b>45x62x10</b>					
	65	8		<b>45x65x8</b>	•				
	65	10		<b>45x65x10</b>					
	68	7		<b>45x68x7</b>					
	68	10		<b>45x68x10</b>					
	68	12		<b>45x68x12</b>					
	72	8		<b>45x72x8</b>					
	72	10		<b>45x72x10</b>					
	75	8		<b>45x75x8</b>					
	75	10		<b>45x75x10</b>					
	80	10		<b>45x80x10</b>					
	85	10		<b>45x85x10</b>					
	100	10		<b>45x100x10</b>					
<b>46</b>	59	12		<b>46x59x12</b>					
	65	10		<b>46x65x10</b>					
<b>47</b>	65	10		<b>47x65x10</b>					
	70	10		<b>47x70x10</b>					
	90	10		<b>47x90x10</b>					
<b>48</b>	62	8		<b>48x62x8</b>	•				
	65	10		<b>48x65x10</b>					
	68	10		<b>48x68x10</b>					
	70	10		<b>48x70x10</b>					
	72	7		<b>48x72x7</b>					
	72	8		<b>48x72x8</b>					
	72	10		<b>48x72x10</b>					



Dimensions			Designation <sup>1)</sup>	ISO / DIN	Dimensions			Designation <sup>1)</sup>	ISO / DIN	
Shaft	Bore	Nominal seal width			Shaft	Bore	Nominal seal width			
d <sub>1</sub>	D	b								
mm			–	–	mm			–	–	
50	62	7	50×62×7		57	67	7	57×67×7		
	64	6	50×64×6			58	72	8	58×72×8	
	65	8	50×65×8	•			80	8	58×80×8	
	65	10	50×65×10				80	10	58×80×10	
	68	7	50×68×7			80	12	58×80×12		
	68	8	50×68×8	•		60	72	8	60×72×8	
	68	10	50×68×10				75	8	60×75×8	•
	70	10	50×70×10				80	7	60×80×7	
	72	8	50×72×8	•		80	8	60×80×8	•	
	72	10	50×72×10			80	10	60×80×10		
	72	12	50×72×12			82	12	60×82×12		
	75	10	50×75×10			85	8	60×85×8	•	
	80	8	50×80×8			85	10	60×85×10		
	80	10	50×80×10			90	8	60×90×8		
	85	10	50×85×10			90	10	60×90×10		
	90	10	50×90×10			95	10	60×95×10		
100	10	50×100×10		100	10	60×100×10				
52	63	8	52×63×8		110	8	60×110×8			
	65	8	52×65×8		110	8	60×110×10			
	68	8	52×68×8		62	80	10	62×80×10		
	72	8	52×72×8			85	10	62×85×10		
	72	10	52×72×10			90	10	62×90×10		
	80	10	52×80×10		63	85	10	63×85×10		
	85	10	52×85×10			90	10	63×90×10		
100	10	52×100×10		64	80	8	64×80×8			
55	68	8	55×68×8		65	80	8	65×80×8		
	70	8	55×70×8	•		85	8	65×85×8		
	70	10	55×70×10			85	10	65×85×10	•	
	72	8	55×72×8	•		85	12	65×85×12		
	72	10	55×72×10			88	12	65×88×12		
	75	8	55×75×8			90	10	65×90×10	•	
	75	10	55×75×10			95	10	65×95×10		
	78	10	55×78×10			97	7	65×97×7		
	78	12	55×78×12			100	10	65×100×10		
	80	8	55×80×8	•		110	10	65×110×10		
	80	10	55×80×10			120	12	65×120×12		
	85	8	55×85×8			140	12	65×140×12		
	85	10	55×85×10			68	90	10	68×90×10	
90	8	55×90×8		70	85		8	70×85×8		
90	10	55×90×10								
100	10	55×100×10								
100	12	55×100×12								
56	72	8	56×72×8							

d<sub>1</sub> 70–250 mm



<sup>1)</sup> Designation to be followed by the design and material codes, indicating one of the four variants available for each dimension:

**HMS5 RG** without auxiliary lip, nitrile rubber  
**HMS5 V** without auxiliary lip, fluoro rubber  
**HMSA10 RG** with auxiliary lip, nitrile rubber  
**HMSA10 V** with auxiliary lip, fluoro rubber  
 Example: **6x16x5 HMSA10 RG**

<sup>2)</sup> Design execution differs from the basic design and is indicated by a number, see also **page 102**.



Please see **pages 85 and 86** for housing bore requirements.

Dimensions				ISO / DIN	Dimensions				ISO / DIN	
Shaft	Bore	Nominal seal width	Designation <sup>1)</sup>		Shaft	Bore	Nominal seal width	Designation <sup>1)</sup>		
d <sub>1</sub>	D	b			d <sub>1</sub>	D	b			
mm				–	mm				–	
<b>70</b> cont.	90	7	<b>70x90x72)</b>	•	<b>80</b> cont.	105	10	<b>80x105x10</b>	•	
	90	10	<b>70x90x10</b>			110	10	<b>80x110x10</b>		
	90	12	<b>70x90x12</b>			110	12	<b>80x110x12</b>		
		92	12		<b>70x92x12</b>		115	12	<b>80x115x12</b>	
		95	10		<b>70x95x10</b>		125	12	<b>80x125x12</b>	
		100	10		<b>70x100x10</b>		170	13	<b>80x170x13</b>	
		110	10		<b>70x110x10</b>	<b>82</b>	120	12	<b>82x120x12</b>	
	110	12	<b>70x110x12</b>	160	15		<b>82x160x15</b>			
<b>72</b>	90	10	<b>72x90x10</b>	•	<b>85</b>	100	9	<b>85x100x9</b>	•	
	95	10	<b>72x95x10</b>			100	10	<b>85x100x10</b>		
	95	12	<b>72x95x12</b>		105	12	<b>85x105x12</b>			
	100	10	<b>72x100x10</b>		110	12	<b>85x110x12</b>			
<b>75</b>	140	12	<b>72x140x12</b>		115	12	<b>85x115x12</b>			
	90	10	<b>75x90x10</b>	•	120	12	<b>85x120x12</b>	•		
		95	10		<b>75x95x10</b>	130	12		<b>85x130x12</b>	
	95	12	<b>75x95x12</b>	•	140	12	<b>85x140x12</b>	•		
	100	10	<b>75x100x10</b>		150	12	<b>85x150x12</b>			
	100	12	<b>75x100x12</b>	<b>90</b>	110	10	<b>90x110x10</b>	•		
	105	10	<b>75x105x10</b>		110	12	<b>90x110x12</b>			
110	12	<b>75x110x12</b>	115		12	<b>90x115x12</b>				
	120	12	<b>75x120x12</b>		120	12	<b>90x120x12</b>			
	130	12	<b>75x130x12</b>	<b>95</b>	110	12	<b>95x110x12</b>	•		
<b>78</b>	100	10	<b>78x100x10</b>		115	12	<b>95x115x12</b>			
	<b>80</b>	95	10	<b>80x95x10</b>	120	12	<b>95x120x12</b>	•		
100		10	<b>80x100x10</b>							
100		12	<b>80x100x12</b>							

Dimensions				Designation <sup>1)</sup>	ISO / DIN	Dimensions			
Shaft	Bore	Nominal seal width				Shaft	Bore	Nominal seal width	
d <sub>1</sub>	D	b			d <sub>1</sub>	D	b		
mm				–	–	mm			
<b>95 cont.</b>	125	12	<b>95×125×12</b>	•	<b>135</b>	170	12	<b>135×170×12</b>	•
	140	12	<b>95×140×12</b>		<b>140</b>	160	12	<b>140×160×12</b>	
	145	12	<b>95×145×12</b>			170	12	<b>140×170×12</b>	•
	170	13	<b>95×170×13</b>			170	15	<b>140×170×15</b>	
<b>100</b>	120	10	<b>100×120×10</b>			180	12	<b>140×180×12</b>	
	120	12	<b>100×120×12</b>	•	<b>145</b>	175	15	<b>145×175×15</b>	•
	125	12	<b>100×125×12</b>	•		180	12	<b>145×180×12</b>	
	130	12	<b>100×130×12</b>	•	<b>148</b>	170	15	<b>148×170×15</b>	
	140	12	<b>100×140×12</b>		<b>150</b>	170	12	<b>150×170×12</b>	
	145	12	<b>100×145×12</b>			180	12	<b>150×180×12</b>	
	150	12	<b>100×150×12</b>			180	15	<b>150×180×15</b>	•
						200	12	<b>150×200×12</b>	
<b>105</b>	130	12	<b>105×130×12</b>	•	<b>155</b>	180	15	<b>155×180×15</b>	
	135	12	<b>105×135×12</b>		<b>160</b>	185	15	<b>160×185×15</b>	
	140	12	<b>105×140×12</b>			190	15	<b>160×190×15</b>	•
<b>108</b>	140	15	<b>108×140×15</b>	•	<b>165</b>	190	15	<b>165×190×15</b>	
	170	15	<b>108×170×15</b>		<b>170</b>	200	15	<b>170×200×15</b>	•
<b>110</b>	130	12	<b>110×130×12</b>	•	<b>175</b>	200	15	<b>175×200×15</b>	
	130	13	<b>110×130×13</b>		<b>180</b>	200	15	<b>180×200×15</b>	
	140	12	<b>110×140×12</b>	•		210	15	<b>180×210×15</b>	•
	150	12	<b>110×150×12</b>		<b>190</b>	220	15	<b>190×220×15</b>	•
<b>115</b>	140	12	<b>115×140×12</b>	•		225	15	<b>190×225×15</b>	
	145	12	<b>115×145×12</b>		<b>200</b>	230	15	<b>200×230×15</b>	•
	150	12	<b>115×150×12</b>		<b>210</b>	240	15	<b>210×240×15</b>	•
<b>118</b>	150	12	<b>118×150×12</b>		<b>220</b>	250	15	<b>220×250×15</b>	•
					<b>230</b>	260	15	<b>230×260×15</b>	•
<b>120</b>	140	12	<b>120×140×12</b>		<b>240</b>	270	15	<b>240×270×15</b>	•
	140	13	<b>120×140×13</b>		<b>250</b>	280	15	<b>250×280×15</b>	•
	150	12	<b>120×150×12</b>			285	15	<b>250×285×15</b>	
	160	12	<b>120×160×12</b>						
	180	15	<b>120×180×15</b>						
<b>125</b>	150	12	<b>125×150×12</b>	•					
	160	15	<b>125×160×15</b>						
	200	15	<b>125×200×15</b>						
<b>130</b>	160	12	<b>130×160×12</b>	•					
	160	15	<b>130×160×15</b>						
	170	12	<b>130×170×12</b>						
	180	12	<b>130×180×12</b>						
	190	12	<b>130×190×12</b>						

# CRW1, CRWA1, CRWH1 and CRWHA1 seals

Fig. 3



Fig. 4



## Main features

These radial shaft seals are low-friction seals with SKF Wave lip design for reduced heat generation. See **pages 68 and 69** for more information on SKF Wave lip design. They have a metal outside diameter for easy installation and a firm and accurate fit in the housing bore.

The seals feature SKF Bore Tite Coating on the outside diameter, a non-hardening, water-based acrylic sealant that helps fill small imperfections in the housing bore.

They are primarily designed to retain lubricants but are also suitable for contaminant exclusion, especially the CRWA1 and CRWHA1 seals designed with an auxiliary lip.



CRW1



CRWH1

Fig. 5



Fig. 6



## Design

- **CRW1:** Seal with a single steel case, SKF Wave lip and a carbon steel garter spring.
- **CRWH1:** Seal with a double steel case, SKF Wave lip and a carbon steel garter spring.
- **CRWA1:** Seal with a single steel case, SKF Wave lip, a carbon steel garter spring and an auxiliary, non-contacting lip.
- **CRWHA1:** Seal with a double steel case, SKF Wave lip, a carbon steel garter spring and an auxiliary, non-contacting lip.

All of these seals are available with sealing lips made of either nitrile rubber or the SKF developed fluoro rubber compound SKF Duralife. Other materials are also available on request.

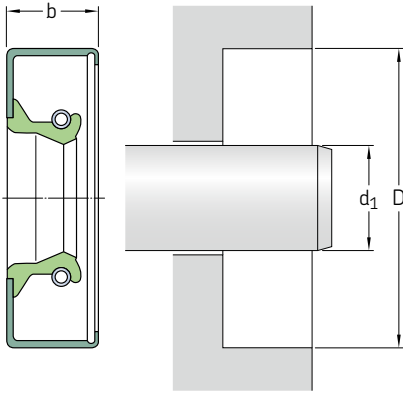
See **matrix 1** on **pages 104 and 105** for permissible operating conditions.



CRWA1



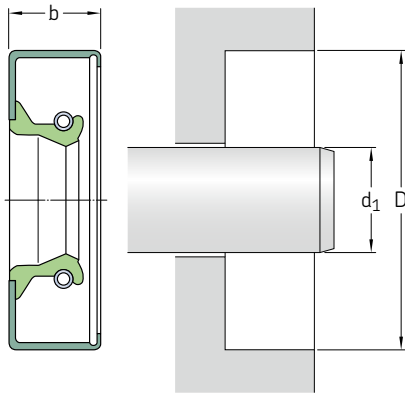
CRWHA1



Please see **pages 83 to 86** for housing bore requirements.

Dimensions		Nominal seal width b	Design and lip material	Designation	Dimensions		Nominal seal width b	Design and lip material	Designation			
Shaft	Bore				Shaft	Bore						
d <sub>1</sub>	D											
mm					mm							
12	22	7	CRW1 V	12×22×7 CRW1 V	18	30	7	CRW1 R	18×30×7 CRW1 R			
	22	7	CRW1 R	12×22×7 CRW1 R		30	7	CRW1 V	18×30×7 CRW1 V			
	25	7	CRW1 R	12×25×7 CRW1 R		32	7	CRW1 R	18×32×7 CRW1 R			
	26	7	CRW1 R	12×26×7 CRW1 R		32	7	CRW1 V	18×32×7 CRW1 V			
	28	7	CRW1 R	12×28×7 CRW1 R			35	7	CRW1 R	18×35×7 CRW1 R		
	28	7	CRW1 P	12×28×7 CRW1 P			40	7	CRW1 R	18×40×7 CRW1 R		
		32	7	CRW1 R		12×32×7 CRW1 R	19	35	7	CRW1 R	19×35×7 CRW1 R	
		32	7	CRW1 V		12×32×7 CRW1 V		20	30	7	CRW1 R	20×30×7 CRW1 R
		35	7	CRW1 R		12×35×7 CRW1 R			31	7	CRW1 R	20×31×7 CRW1 R
	14	26	7	CRW1 V		14×26×7 CRW1 V		32	7	CRW1 R	20×32×7 CRW1 R	
32		7	CRW1 R	14×32×7 CRW1 R	15	35	7	CRW1 R	20×35×7 CRW1 R			
15	25	7	CRW1 P	15×25×7 CRW1 P		35	7	CRW1 V	20×35×7 CRW1 V			
	28	7	CRW1 R	15×28×7 CRW1 R		36	7	CRW1 R	20×36×7 CRW1 R			
	32	7	CRW1 R	15×32×7 CRW1 R		36	7	CRW1 V	20×36×7 CRW1 V			
	32	7	CRW1 V	15×32×7 CRW1 V		37	7	CRW1 R	20×37×7 CRW1 R			
		35	7	CRW1 R		15×35×7 CRW1 R	38	7	CRW1 R	20×38×7 CRW1 R		
	35	7	CRW1 P	15×35×7 CRW1 P		16	40	7	CRW1 R	20×40×7 CRW1 R		
16	28	7	CRW1 R	16×28×7 CRW1 R			40	7	CRW1 V	20×40×7 CRW1 V		
	30	7	CRW1 R	16×30×7 CRW1 R	42		7	CRW1 R	20×42×7 CRW1 R			
	32	7	CRW1 R	16×32×7 CRW1 R	47		7	CRW1 R	20×47×7 CRW1 R			
	35	7	CRW1 R	16×35×7 CRW1 R			52	7	CRW1 R	20×52×7 CRW1 R		
	40	7	CRW1 R	16×40×7 CRW1 R			52	7	CRW1 P	20×52×7 CRW1 P		
	40	7	CRWA1 R	16×40×7 CRWA1 R	21		35	7	CRW1 R	21×35×7 CRW1 R		
17	27	6,35	CRW1 R	17×27×6 CRW1 R		35	7	CRW1 V	21×35×7 CRW1 V			
	28	7	CRW1 R	17×28×7 CRW1 R		40	8	CRW1 R	21×40×8 CRW1 R			
	28	7	CRW1 V	17×28×7 CRW1 V		22	31	7	CRW1 P	22×31×7 CRW1 P		
	30	7	CRW1 R	17×30×7 CRW1 R			32	7	CRW1 R	22×32×7 CRW1 R		
	32	7	CRW1 R	17×32×7 CRW1 R			35	7	CRW1 R	22×35×7 CRW1 R		
	35	7	CRW1 R	17×35×7 CRW1 R			35	7	CRW1 V	22×35×7 CRW1 V		
	35	7	CRW1 V	17×35×7 CRW1 V			38	7	CRW1 R	22×38×7 CRW1 R		
	40	7	CRW1 R	17×40×7 CRW1 R			38	7	CRW1 V	22×38×7 CRW1 V		
	47	7	CRW1 R	17×47×7 CRW1 R			40	6,35	CRW1 R	22×40×6 CRW1 R		
						40	6,35	CRW1 V	22×40×6 CRW1 V			

d<sub>1</sub> 22–40 mm



Please see pages 83 to 86 for housing bore requirements.

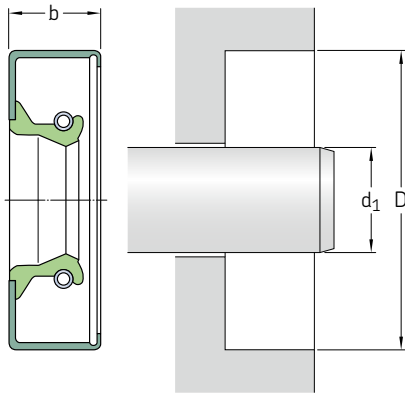
Dimensions		Nominal seal width b	Design and lip material	Designation	
Shaft d <sub>1</sub>	Bore D				
mm					
22 cont.	42	7	CRW1 R	22×42×7 CRW1 R	
	47	8	CRW1 R	22×47×8 CRW1 R	
	50	8	CRW1 R	22×50×8 CRW1 R	
24	36	7	CRW1 V	24×36×7 CRW1 V	
	38	7	CRW1 V	24×38×7 CRW1 V	
	47	8	CRW1 R	24×47×8 CRW1 R	
25	35	7	CRW1 R	25×35×7 CRW1 R	
	35	7	CRW1 V	25×35×7 CRW1 V	
	36	7	CRW1 R	25×36×7 CRW1 R	
	37	7	CRW1 R	25×37×7 CRW1 R	
	37	7	CRW1 V	25×37×7 CRW1 V	
	38	7	CRW1 R	25×38×7 CRW1 R	
	38	7	CRW1 V	25×38×7 CRW1 V	
	40	7	CRW1 R	25×40×7 CRW1 R	
	40	7	CRW1 R	25×40×7 CRW1 R	
	40	7	CRW1 V	25×40×7 CRW1 V	
	42	8	CRW1 V	25×42×8 CRW1 V	
	42	8	CRW1 R	25×42×8 CRW1 R	
	45	7	CRW1 R	25×45×7 CRW1 R	
	47	6,35	CRW1 R	25×47×6 CRW1 R	
	48	8	CRW1 R	25×48×8 CRW1 R	
48	8	CRW1 V	25×48×8 CRW1 V		
50	50	8	CRW1 R	25×50×8 CRW1 R	
	52	8	CRW1 R	25×52×8 CRW1 R	
	52	8	CRW1 V	25×52×8 CRW1 V	
	62	7	CRW1 R	25×62×7 CRW1 R	
	62	7	CRW1 V	25×62×7 CRW1 V	
	27	42	7	CRW1 R	27×42×7 CRW1 R
		42	7	CRW1 V	27×42×7 CRW1 V
		43	8	CRW1 V	27×43×8 CRW1 V
		45	8	CRW1 V	27×45×8 CRW1 V
		52	8	CRW1 R	27×52×8 CRW1 R

Dimensions			Design and lip material	Designation
Shaft d <sub>1</sub>	Bore D	Nominal seal width b		
mm				
28	40	7	CRW1 R	28×40×7 CRW1 R
	40	7	CRW1 V	28×40×7 CRW1 V
42	42	7	CRW1 R	28×42×7 CRW1 R
	42	7	CRW1 V	28×42×7 CRW1 V
	45	7	CRW1 V	28×45×7 CRW1 V
47	47	7	CRW1 V	28×47×7 CRW1 V
	47	8	CRW1 R	28×47×8 CRW1 R
	52	8	CRW1 R	28×52×8 CRW1 R
30	40	7	CRW1 R	30×40×7 CRW1 R
	40	7	CRW1 V	30×40×7 CRW1 V
42	42	7	CRW1 R	30×42×7 CRW1 R
	42	7	CRW1 V	30×42×7 CRW1 V
	45	8	CRW1 R	30×45×8 CRW1 R
	45	8	CRW1 P	30×45×8 CRW1 P
	47	7	CRW1 R	30×47×7 CRW1 R
47	47	8	CRW1 V	30×47×8 CRW1 V
	48	8	CRW1 R	30×48×8 CRW1 R
50	50	8	CRW1 R	30×50×8 CRW1 R
	50	8	CRW1 V	30×50×8 CRW1 V
	52	8	CRW1 R	30×52×8 CRW1 R
55	55	7	CRW1 R	30×55×7 CRW1 R
	56	8	CRW1 R	30×56×8 CRW1 R
	58	8	CRWA1 R	30×58×8 CRWA1 R
60	60	8	CRW1 R	30×60×8 CRW1 R
	62	7	CRW1 R	30×62×7 CRW1 R
	62	7	CRW1 V	30×62×7 CRW1 V
72	72	8	CRW1 R	30×72×8 CRW1 R
	72	12	CRWA1 V	30×72×12 CRWA1 V
32	42	7	CRW1 R	32×42×7 CRW1 R
	42	7	CRW1 V	32×42×7 CRW1 V
	45	8	CRW1 R	32×45×8 CRW1 R
47	47	8	CRW1 R	32×47×8 CRW1 R
	47	8	CRW1 V	32×47×8 CRW1 V

1) Without SKF Bore Tite Coating

Dimensions				Design and lip material	Designation	Dimensions				Design and lip material	Designation
Shaft	Bore	Nominal seal width				Shaft	Bore	Nominal seal width			
d <sub>1</sub>	D	b			d <sub>1</sub>	D	b				
mm			–	–	mm			–	–		
<b>32</b>	48	8		CRW1 R	32×48×8 CRW1 R	<b>38</b>	50	7		CRW1 R	38×50×7 CRW1 R
	cont. 48	8		CRW1 V	32×48×8 CRW1 V		50	7		CRW1 V	38×50×7 CRW1 V
	50	8		CRW1 R	32×50×8 CRW1 R		52	8		CRW1 R	38×52×8 CRW1 R
	50	8		CRW1 V	32×50×8 CRW1 V		52	8		CRWA1 R	38×52×8 CRWA1 R
	52	8		CRW1 R	32×52×8 CRW1 R		52	8		CRW1 V	38×52×8 CRW1 V
	52	8		CRW1 V	32×52×8 CRW1 V		53	8		CRW1 R	38×53×8 CRW1 R
	56	8		CRW1 R	32×56×8 CRW1 R		54	7		CRW1 P	38×54×7 CRW1 P <sup>1)</sup>
	62	6,35		CRW1 R	32×62×6 CRW1 R		55	8		CRW1 R	38×55×8 CRW1 R
<b>34</b>	48	8		CRW1 R	34×48×8 CRW1 R		55	8		CRW1 V	38×55×8 CRW1 V
	48	8		CRW1 V	34×48×8 CRW1 V		56	8		CRW1 V	38×56×8 CRW1 V
	55	8		CRW1 R	34×55×8 CRW1 R		56	8		CRW1 R	38×56×8 CRW1 R
	56	8		CRW1 R	34×56×8 CRW1 R		58	8		CRW1 R	38×58×8 CRW1 R
	56	8		CRW1 V	34×56×8 CRW1 V		58	8		CRW1 V	38×58×8 CRW1 V
	62	8		CRW1 R	34×62×8 CRW1 R		60	8		CRW1 R	38×60×8 CRW1 R
<b>35</b>	47	7		CRW1 R	35×47×7 CRW1 R		60	8		CRW1 V	38×60×8 CRW1 V
	47	7		CRW1 V	35×47×7 CRW1 V		62	8		CRW1 R	38×62×8 CRW1 R
	48	8		CRW1 R	35×48×8 CRW1 R		62	8		CRWA1 R	38×62×8 CRWA1 R
	48	8		CRW1 V	35×48×8 CRW1 V		62	8		CRW1 V	38×62×8 CRW1 V
	50	8		CRW1 R	35×50×8 CRW1 R		65	8		CRW1 R	38×65×8 CRW1 R
	50	8		CRW1 V	35×50×8 CRW1 V		68	8		CRW1 R	38×68×8 CRW1 R
	52	8		CRWA1 P	35×52×8 CRWA1 P		70	8		CRW1 R	38×70×8 CRW1 R
	52	8		CRW1 R	35×52×8 CRW1 R		72	8		CRW1 R	38×72×8 CRW1 R
	52	8		CRWA1 R	35×52×8 CRWA1 R		73	8		CRW1 R	38×73×8 CRW1 R
	54	7		CRW1 R	35×54×7 CRW1 R		74	11		CRWA1 R	38×74×11 CRWA1 R
	54	8		CRW1 V	35×54×8 CRW1 V		74	11		CRW1 V	38×74×11 CRW1 V
	55	8		CRW1 R	35×55×8 CRW1 R		80	8		CRW1 R	38×80×8 CRW1 R
	55	8		CRW1 V	35×55×8 CRW1 V <sup>1)</sup>		90	8		CRWA1 R	38×90×8 CRWA1 R
	56	8		CRW1 R	35×56×8 CRW1 R	<b>40</b>	52	7		CRW1 V	40×52×7 CRW1 V
	56	8		CRW1 V	35×56×8 CRW1 V		52	7		CRW1 R	40×52×7 CRW1 R
	62	8		CRW1 V	35×62×8 CRW1 V		54	7		CRW1 R	40×54×7 CRW1 R
	62	8		CRW1 R	35×62×8 CRW1 R		55	8		CRW1 R	40×55×8 CRW1 R
	64	8		CRW1 R	35×64×8 CRW1 R		55	8		CRW1 V	40×55×8 CRW1 V
	65	8		CRW1 V	35×65×8 CRW1 V		56	7		CRW1 V	40×56×7 CRW1 V
	68	8		CRW1 R	35×68×8 CRW1 R		56	8		CRW1 R	40×56×8 CRW1 R
	68	8		CRW1 V	35×68×8 CRW1 V		57	8		CRW1 R	40×57×8 CRW1 R
	69	8		CRW1 R	35×69×8 CRW1 R		58	8		CRW1 R	40×58×8 CRW1 R
	72	8		CRW1 V	35×72×8 CRW1 V		58	8		CRW1 V	40×58×8 CRW1 V
	72	8		CRW1 R	35×72×8 CRW1 R		60	8		CRW1 R	40×60×8 CRW1 R
	72	8		CRWA1 R	35×72×8 CRWA1 R		60	8		CRW1 V	40×60×8 CRW1 V
	78	8		CRW1 R	35×78×8 CRW1 R		62	8		CRW1 R	40×62×8 CRW1 R
	80	8		CRW1 R	35×80×8 CRW1 R		62	8		CRW1 V	40×62×8 CRW1 V
<b>36</b>	50	7		CRW1 R	36×50×7 CRW1 R		65	8		CRW1 R	40×65×8 CRW1 R
	50	8		CRW1 R	36×50×8 CRW1 R		68	8		CRW1 R	40×68×8 CRW1 R
	52	8		CRW1 R	36×52×8 CRW1 R		70	8		CRW1 R	40×70×8 CRW1 R
	52	8		CRW1 V	36×52×8 CRW1 V		72	8		CRW1 R	40×72×8 CRW1 R
	54	8		CRW1 R	36×54×8 CRW1 R		74	8		CRW1 R	40×74×8 CRW1 R
	54	8		CRW1 V	36×54×8 CRW1 V		75	8		CRW1 V	40×75×8 CRW1 V
	58	8		CRW1 R	36×58×8 CRW1 R		80	8		CRW1 R	40×80×8 CRW1 R
	60	8		CRW1 R	36×60×8 CRW1 R		80	8		CRW1 V	40×80×8 CRW1 V <sup>1)</sup>
	60	8		CRW1 V	36×60×8 CRW1 V		90	8		CRW1 R	40×90×8 CRW1 R
	62	8		CRW1 R	36×62×8 CRW1 R						
	65	8		CRW1 R	36×65×8 CRW1 R						
	68	8		CRW1 R	36×68×8 CRW1 R						

d<sub>1</sub> 41–70 mm



Please see pages 83 to 86 for housing bore requirements.

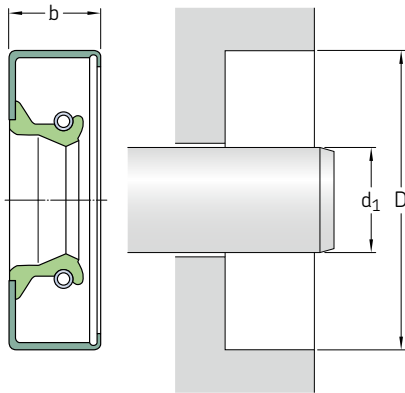
Dimensions					Design and lip material					
Shaft	Bore	Nominal seal width		Designation	Shaft	Bore	Nominal seal width		Designation	
d <sub>1</sub>	D	b			d <sub>1</sub>	D	b			
mm					mm					
41	53	7	CRW1 R	41×53×7 CRW1 R	45	62	8	CRWA1 V	45×62×8 CRWA1 V	
	55	8	CRW1 R	41×55×8 CRW1 R		cont.	62	8	CRW1 R	45×62×8 CRW1 R
	62	8	CRW1 R	41×62×8 CRW1 R			65	8	CRW1 R	45×65×8 CRW1 R
42	55	8	CRW1 R	42×55×8 CRW1 R		65	8	CRW1 V	45×65×8 CRW1 V	
	55	8	CRW1 V	42×55×8 CRW1 V		68	8	CRW1 R	45×68×8 CRW1 R	
	56	7	CRW1 V	42×56×7 CRW1 V		68	8	CRW1 V	45×68×8 CRW1 V	
	56	8	CRW1 R	42×56×8 CRW1 R		68	8	CRWA1 R	45×68×8 CRWA1 R	
	58	8	CRW1 R	42×58×8 CRW1 R		72	8	CRW1 V	45×72×8 CRW1 V	
	58	8	CRW1 V	42×58×8 CRW1 V		72	8	CRW1 R	45×72×8 CRW1 R	
	60	8	CRW1 R	42×60×8 CRW1 R		75	8	CRW1 R	45×75×8 CRW1 R	
	60	8	CRW1 V	42×60×8 CRW1 V		75	8	CRW1 V	45×75×8 CRW1 V	
	62	8	CRW1 R	42×62×8 CRW1 R		80	8	CRW1 R	45×80×8 CRW1 R	
	62	8	CRW1 V	42×62×8 CRW1 V		85	8	CRW1 R	45×85×8 CRW1 R	
	65	8	CRW1 R	42×65×8 CRW1 R	46	60	8	CRW1 R	46×60×8 CRW1 R	
	65	8	CRW1 V	42×65×8 CRW1 V			65	8	CRW1 R	46×65×8 CRW1 R
	72	8	CRW1 V	42×72×8 CRW1 V			68	8	CRW1 R	46×68×8 CRW1 R
	43	57	8	CRW1 R	43×57×8 CRW1 R		72	8	CRW1 R	46×72×8 CRW1 R
		60	8	CRW1 R	43×60×8 CRW1 R		73	8	CRW1 R	46×73×8 CRW1 R
69		8	CRW1 R	43×69×8 CRW1 R	47	60	7	CRW1 R	47×60×7 CRW1 R	
73	8	CRW1 R	43×73×8 CRW1 R			62	8	CRW1 R	47×62×8 CRW1 R	
						72	8	CRW1 R	47×72×8 CRW1 R	
44	60	8	CRW1 R	44×60×8 CRW1 R	48	62	8	CRW1 R	48×62×8 CRW1 R	
	60	8	CRW1 V	44×60×8 CRW1 V <sup>1)</sup>			62	8	CRW1 P	48×62×8 CRW1 P
	62	8	CRW1 R	44×62×8 CRW1 R			65	8	CRW1 R	48×65×8 CRW1 R
	65	8	CRW1 R	44×65×8 CRW1 R			65	8	CRW1 V	48×65×8 CRW1 V
	68	8	CRW1 V	44×68×8 CRW1 V			68	8	CRW1 V	48×68×8 CRW1 V
45	70	8	CRW1 R	44×70×8 CRW1 R		70	8	CRW1 R	48×70×8 CRW1 R	
	72	8	CRW1 R	44×72×8 CRW1 R		70	8	CRW1 V	48×70×8 CRW1 V	
	60	8	CRW1 R	45×60×8 CRW1 R		72	8	CRW1 R	48×72×8 CRW1 R	
	60	8	CRW1 V	45×60×8 CRW1 V		72	8	CRW1 V	48×72×8 CRW1 V	
						80	8	CRW1 R	48×80×8 CRW1 R	
				50	65	8	CRW1 R	50×65×8 CRW1 R		

<sup>1)</sup> Without SKF Bore Tite Coating



Dimensions		Nominal seal width b	Design and lip material	Designation	Dimensions		Nominal seal width b	Design and lip material	Designation
Shaft d <sub>1</sub>	Bore D				Shaft d <sub>1</sub>	Bore D			
mm		–	–	–	mm		–	–	–
	65	8	CRW1 V	50×65×8 CRW1 V	57	92	11	CRWH1 R	57×92×11 CRWH1 R
	68	8	CRW1 R	50×68×8 CRW1 R	cont.	92	11	CRWHA1 R	57×92×11 CRWHA1 R
	68	8	CRW1 V	50×68×8 CRW1 V					
	70	8	CRW1 R	50×70×8 CRW1 R	58	72	8	CRW1 R	58×72×8 CRW1 R
	70	8	CRW1 V	50×70×8 CRW1 V		72	8	CRW1 S	58×72×8 CRW1 S
						75	8	CRW1 R	58×75×8 CRW1 R
	72	8	CRW1 R	50×72×8 CRW1 R		80	8	CRW1 R	58×80×8 CRW1 R
	72	8	CRW1 V	50×72×8 CRW1 V		80	8	CRW1 V	58×80×8 CRW1 V
	75	8	CRWA1 R	50×75×8 CRWA1 R					
	80	8	CRW1 R	50×80×8 CRW1 R		85	8	CRW1 R	58×85×8 CRW1 R
	80	8	CRW1 V	50×80×8 CRW1 V		90	8	CRW1 R	58×90×8 CRW1 R
	82	8	CRWA1 R	50×82×8 CRWA1 R	60	75	8	CRW1 R	60×75×8 CRW1 R
	85	8	CRW1 R	50×85×8 CRW1 R		75	8	CRW1 V	60×75×8 CRW1 V
	90	8	CRW1 R	50×90×8 CRW1 R		80	8	CRW1 R	60×80×8 CRW1 R
	90	8	CRW1 V	50×90×8 CRW1 V		80	8	CRW1 V	60×80×8 CRW1 V
						82	8	CRWA1 R	60×82×8 CRWA1 R
51	65	7	CRWA1 R	51×65×7 CRWA1 R		85	8	CRW1 V	60×85×8 CRW1 V
	73	8	CRW1 R	51×73×8 CRW1 R		85	8	CRW1 R	60×85×8 CRW1 R
	80	9,53	CRW1 R	51×80×10 CRW1 R		90	8	CRW1 R	60×90×8 CRW1 R
	81	9,53	CRWH1 R	51×81×10 CRWH1 R					
	81	9,53	CRWHA1 R	51×81×10 CRWHA1 R		105	8	CRW1 R	60×105×8 CRW1 R
						110	8	CRW1 R	60×110×8 CRW1 R
	92	11,13	CRWH1 R	51×92×11 CRWH1 R					
52	68	8	CRW1 R	52×68×8 CRW1 R	62	80	8	CRW1 V	62×80×8 CRW1 V
	68	8	CRW1 V	52×68×8 CRW1 V		85	8	CRW1 R	62×85×8 CRW1 R
	70	8	CRW1 R	52×70×8 CRW1 R					
	72	8	CRWA1 V	52×72×8 CRWA1 V		90	8	CRW1 R	62×90×8 CRW1 R
	72	8	CRW1 R	52×72×8 CRW1 R		90	11,13	CRWH1 R	62×90×11 CRWH1 R
	72	8	CRW1 V	52×72×8 CRW1 V	63	78	8	CRW1 R	63×78×8 CRW1 R
	85	8	CRW1 R	52×85×8 CRW1 R		80	8	CRW1 R	63×80×8 CRW1 R
						85	8	CRW1 R	63×85×8 CRW1 R
						88	8	CRW1 R	63×88×8 CRW1 R
53	68	8	CRW1 V	53×68×8 CRW1 V					
54	65	8	CRW1 R	54×65×8 CRW1 R	65	80	8	CRW1 R	65×80×8 CRW1 R
	65	8	CRW1 V	54×65×8 CRW1 V		80	8	CRW1 V	65×80×8 CRW1 V
	73	11,13	CRW1 R	54×73×11 CRW1 R		85	8	CRW1 R	65×85×8 CRW1 R
	73	11,13	CRWA1 R	54×73×11 CRWA1 R		85	8	CRW1 V	65×85×8 CRW1 V
	81	9,53	CRWA1 R	54×81×10 CRWA1 R		88	8	CRW1 R	65×88×8 CRW1 R
55	70	8	CRW1 R	55×70×8 CRW1 R		90	8	CRW1 R	65×90×8 CRW1 R
	70	8	CRW1 V	55×70×8 CRW1 V		90	8	CRW1 V	65×90×8 CRW1 V
						92	11,13	CRWH1 R	65×92×11 CRWH1 R
	72	8	CRW1 R	55×72×8 CRW1 R		100	8	CRW1 R	65×100×8 CRW1 R
	72	8	CRW1 V	55×72×8 CRW1 V		100	8	CRW1 V	65×100×8 CRW1 V
	73	8	CRW1 V	55×73×8 CRW1 V		110	10	CRW1 R	65×110×10 CRW1 R
						120	8	CRW1 R	65×120×8 CRW1 R
	75	8	CRW1 R	55×75×8 CRW1 R	68	85	8	CRW1 R	68×85×8 CRW1 R
	75	8	CRW1 V	55×75×8 CRW1 V		88	8	CRW1 R	68×88×8 CRW1 R
	80	8	CRW1 R	55×80×8 CRW1 R					
	80	8	CRW1 V	55×80×8 CRW1 V		90	8	CRW1 R	68×90×8 CRW1 R
	85	8	CRW1 R	55×85×8 CRW1 R		90	8	CRW1 V	68×90×8 CRW1 V
	90	8	CRW1 R	55×90×8 CRW1 R		95	10	CRW1 R	68×95×10 CRW1 R
	100	8	CRW1 R	55×100×8 CRW1 R		95	10	CRW1 V	68×95×10 CRW1 V
						100	10	CRW1 R	68×100×10 CRW1 R
56	75	8	CRW1 R	56×75×8 CRW1 R					
57	81	11	CRW1 R	57×81×11 CRW1 R	70	85	8	CRW1 R	70×85×8 CRW1 R
	81	11	CRWA1 P	57×81×11 CRWA1 P		88	8	CRW1 R	70×88×8 CRW1 R
						88	8	CRW1 V	70×88×8 CRW1 V

d<sub>1</sub> 70–280 mm



Please see pages 83 to 86 for housing bore requirements.

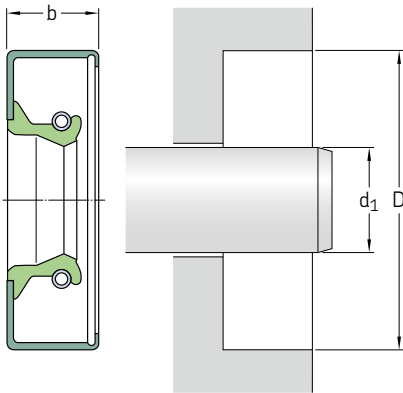
Dimensions		Nominal seal width b	Design and lip material	Designation
Shaft d <sub>1</sub>	Bore D			
mm				
<b>70</b> cont.	90	8	CRW1 R	70×90×8 CRW1 R
	90	10	CRW1 V	70×90×10 CRW1 V
	90	10	CRWHA1 P	70×90×10 CRWHA1 P
	92	11	CRWH1 R	70×92×11 CRWH1 R
	92	11	CRWH1 V	70×92×11 CRWH1 V
	95	10	CRW1 R	70×95×10 CRW1 R
	100	10	CRW1 R	70×100×10 CRW1 R
	105	10	CRW1 R	70×105×10 CRW1 R
	110	10	CRW1 R	70×110×10 CRW1 R
	110	12,70	CRWHA1 R	70×110×13 CRWHA1 R <sup>1)</sup>
<b>72</b>	88	8	CRW1 R	72×88×8 CRW1 R
<b>73</b>	92	11,13	CRWH1 R	73×92×11 CRWH1 R
	110	11,13	CRWA1 P	73×110×11 CRWA1 P
<b>75</b>	90	8	CRW1 R	75×90×8 CRW1 R
	95	10	CRW1 R	75×95×10 CRW1 R
	95	10	CRW1 V	75×95×10 CRW1 V
	100	10	CRW1 R	75×100×10 CRW1 R
	100	10	CRW1 V	75×100×10 CRW1 V
	105	10	CRW1 R	75×105×10 CRW1 R
	110	10	CRW1 R	75×110×10 CRW1 R
	115	12	CRW1 R	75×115×12 CRW1 R
<b>80</b>	100	10	CRW1 R	80×100×10 CRW1 R
	100	10	CRW1 V	80×100×10 CRW1 V
	105	10	CRW1 R	80×105×10 CRW1 R
	105	10	CRW1 V	80×105×10 CRW1 V
	110	10	CRW1 R	80×110×10 CRW1 R
	125	10	CRW1 R	80×125×10 CRW1 R
	125	10	CRW1 V	80×125×10 CRW1 V
	130	12	CRWA1 R	80×130×12 CRWA1 R
	140	12	CRW1 R	80×140×12 CRW1 R
<b>84</b>	127	11	CRWH1 R	84×127×11 CRWH1 R

Dimensions		Nominal seal width b	Design and lip material	Designation
Shaft d <sub>1</sub>	Bore D			
mm				
<b>85</b>	105	10	CRW1 R	85×105×10 CRW1 R
	105	10	CRW1 V	85×105×10 CRW1 V
	110	10	CRW1 R	85×110×10 CRW1 R
	110	10	CRWA1 V	85×110×10 CRWA1 V
	120	12	CRW1 R	85×120×12 CRW1 R
	130	12	CRW1 R	85×130×12 CRW1 R
<b>89</b>	127	11,13	CRWH1 R	89×127×11 CRWH1 R
<b>90</b>	110	12	CRW1 R	90×110×12 CRW1 R
	110	12	CRW1 V	90×110×12 CRW1 V
	115	12	CRWA1 R	90×115×12 CRWA1 R
	120	12	CRW1 R	90×120×12 CRW1 R
	120	12	CRW1 V	90×120×12 CRW1 V
	125	12	CRW1 R	90×125×12 CRW1 R
	125	12	CRW1 V	90×125×12 CRW1 V
	130	12	CRW1 R	90×130×12 CRW1 R
	140	12	CRWA1 R	90×140×12 CRWA1 R
<b>92</b>	127	11	CRWHA1 R	92×127×11 CRWHA1 R
	127	11,13	CRWH1 R	92×127×11 CRWH1 R
<b>95</b>	110	10	CRW1 R	95×110×10 CRW1 R
	115	12	CRW1 R	95×115×12 CRW1 R
	115	12	CRW1 V	95×115×12 CRW1 V
	120	12	CRW1 R	95×120×12 CRW1 R
	120	12	CRW1 V	95×120×12 CRW1 V
	120	12	CRWA1 V	95×120×12 CRWA1 V
	125	12	CRW1 R	95×125×12 CRW1 R
	130	12	CRW1 R	95×130×12 CRW1 R
	130	12	CRW1 V	95×130×12 CRW1 V
<b>98</b>	120	12	CRW1 V	98×120×12 CRW1 V
<b>100</b>	120	12	CRW1 R	100×120×12 CRW1 R
	120	12	CRW1 V	100×120×12 CRW1 V

<sup>1)</sup> Without SKF Bore Tite Coating

Dimensions		Nominal seal width b	Design and lip material	Designation
Shaft d <sub>1</sub>	Bore D			
mm		–	–	–
<b>100</b> cont.	125	12	CRW1 R	100×125×12 CRW1 R
	125	12	CRW1 V	100×125×12 CRW1 V
	127	11,13	CRWH1 R	100×127×11 CRWH1 R
	130	12	CRW1 R	100×130×12 CRW1 R
	135	12	CRWA1 R	100×135×12 CRWA1 R
	140	12	CRWA1 R	100×140×12 CRWA1 R
<b>105</b>	127	11,13	CRWH1 R	105×127×11 CRWH1 R
	130	12	CRW1 R	105×130×12 CRW1 R
	130	12	CRW1 V	105×130×12 CRW1 V
	135	12	CRWA1 R	105×135×12 CRWA1 R
	140	12	CRWA1 R	105×140×12 CRWA1 R
	160	12	CRW1 R	105×160×12 CRW1 R
<b>110</b>	130	12	CRW1 R	110×130×12 CRW1 R
	130	12	CRW1 V	110×130×12 CRW1 V
	135	12	CRW1 V	110×135×12 CRW1 V
	140	12	CRW1 V	110×140×12 CRW1 V
	140	12	CRW1 R	110×140×12 CRW1 R
	145	12	CRW1 R	110×145×12 CRW1 R
160	12	CRWH1 R	110×160×12 CRWH1 R	
<b>115</b>	135	12	CRW1 R	115×135×12 CRW1 R
	140	12	CRW1 R	115×140×12 CRW1 R
	140	12	CRW1 V	115×140×12 CRW1 V
	145	12	CRW1 R	115×145×12 CRW1 R
	150	12	CRW1 R	115×150×12 CRW1 R
	160	12	CRW1 R	115×160×12 CRW1 R
<b>120</b>	140	12	CRWA1 R	120×140×12 CRWA1 R
	145	12	CRW1 R	120×145×12 CRW1 R
	150	12	CRW1 R	120×150×12 CRW1 R
	160	12	CRWH1 R	120×160×12 CRWH1 R
<b>125</b>	150	12	CRW1 R	125×150×12 CRW1 R
	150	12	CRW1 V	125×150×12 CRW1 V
	160	12	CRW1 R	125×160×12 CRW1 R
<b>130</b>	160	12	CRW1 R	130×160×12 CRW1 R
	160	12	CRW1 V	130×160×12 CRW1 V
	170	12	CRW1 R	130×170×12 CRW1 R
<b>140</b>	160	12	CRW1 R	140×160×12 CRW1 R
	170	12	CRW1 R	140×170×12 CRW1 R
	170	12	CRW1 V	140×170×12 CRW1 V <sup>1)</sup>
<b>143</b>	181	12,70	CRWHA1 R	143×181×13 CRWHA1 R
<b>160</b>	190	15	CRW1 V	160×190×15 CRW1 V
<b>162</b>	200	14,30	CRWHA1 R	162×200×14 CRWHA1 R
	200	15,88	CRWH1 R	162×200×16 CRWH1 R
<b>188</b>	215	16	CRWH1 R	188×215×16 CRWH1 R
<b>203</b>	254	15,88	CRWHA1 R	203×254×16 CRWHA1 R <sup>1)</sup>
<b>216</b>	254	15,88	CRWH1 R	216×254×16 CRWH1 R
<b>220</b>	250	16	CRWH1 R	220×250×16 CRWH1 R
<b>280</b>	320	20	CRWA1 R	280×320×20 CRWA1 R
	320	20	CRWA1 V	280×320×20 CRWA1 V

d<sub>1</sub> 0.250–0.938 in



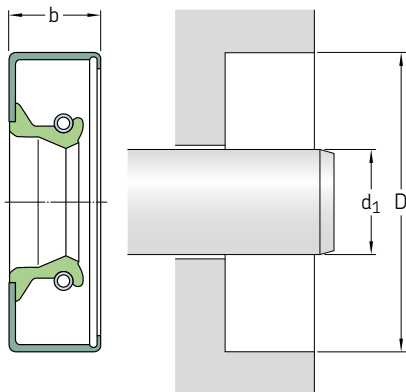
Please see pages 83 to 86 for housing bore requirements.

Dimensions					Dimensions				
Shaft	Bore	Nominal seal width	Design and lip material	Designation	Shaft	Bore	Nominal seal width	Design and lip material	Designation
d <sub>1</sub>	D	b			d <sub>1</sub>	D	b		
in			–	–	in			–	–
0.250	0.749	0.250	CRW1 V	2513 <sup>1)</sup>	0.500 cont.	1.250	0.250	CRW1 R	5133
	0.749	0.250	CRW1 R	2514		1.375	0.250	CRW1 R	5150
0.375	0.749	0.250	CRW1 R	3687 <sup>1)</sup>	0.531	0.999	0.250	CRWA1 S	5321
	0.749	0.250	CRW1 V	3688		0.546	0.875	0.250	CRW1 P
	0.750	0.250	CRWA1 R	3680	0.554		0.999	0.250	CRW1 R
	0.836	0.188	CRW1 P	3719		0.563	0.875	0.188	CRW1 D
	0.875	0.250	CRW1 R	3725	0.999		0.250	CRW1 R	5541
	0.999	0.250	CRW1 R	3751 <sup>1)</sup>	0.999		0.250	CRW1 V	5542
	0.999	0.250	CRW1 V	3752	0.999		0.250	CRW1 R	5543
	1.124	0.250	CRW1 R	3806 <sup>1)</sup>	0.999		0.250	CRWA1 R	5606
	0.438	0.875	0.250	CRW1 P	4249		1.124	0.250	CRW1 V
	0.875	0.250	CRW1 R	4251 <sup>1)</sup>	1.124	0.250	CRW1 R	5652	
0.875	0.375	CRWA1 R	4261 <sup>1)</sup>	1.124	0.250	CRWA1 R	5662		
0.875	0.375	CRWA1 V	4262	1.250	0.250	CRW1 R	5707		
0.999	0.250	CRW1 V	4356	1.375	0.250	CRW1 R	5756		
0.999	0.375	CRW1 P	4353	0.594	1.124	0.313	CRW1 R	5926	
0.999	0.375	CRW1 R	4355		1.124	0.313	CRW1 V	5927	
1.124	0.250	CRW1 R	4390	0.625	0.987	0.250	CRW1 R	6134	
0.500	0.875	0.250	CRW1 R		4931	0.999	0.250	CRWA1 V	6139
0.875	0.250	CRW1 V	4932		0.999	0.250	CRWA1 R	6141	
0.875	0.250	CRWA1 V	4933		0.999	0.250	CRW1 R	6143	
0.875	0.250	CRWA1 V	4935		1.063	0.250	CRW1 R	6157	
0.875	0.250	CRW1 D	4936		1.124	0.250	CRW1 R	6903	
0.875	0.313	CRWA1 R	4939	1.124	0.250	CRWA1 R	6904		
0.987	0.250	CRW1 R	4943	1.124	0.250	CRW1 V	6823		
0.999	0.250	CRW1 V	4980	1.124	0.250	CRWA1 V	6825		
0.999	0.250	CRW1 R	4984	1.181	0.250	CRWA1 R	6247		
0.999	0.250	CRWA1 R	4985	1.181	0.256	CRWA1 V	6248		
1.124	0.250	CRW1 P	5045	1.250	0.250	CRW1 V	6909		
1.124	0.250	CRWA1 R	5062	1.250	0.250	CRW1 R	6925		
1.124	0.250	CRW1 V	5066	1.250	0.250	CRWA1 R	6916		
0.500	1.124	0.250	CRWA1 V	5067					
	1.124	0.250	CRW1 R	5068					
	1.124	0.313	CRW1 P	5046					

<sup>1)</sup> Without SKF Bore Tite Coating

Dimensions		Nominal seal width b	Design and lip material	Designation	Dimensions		Nominal seal width b	Design and lip material	Designation	
Shaft d <sub>1</sub>	Bore D				Shaft d <sub>1</sub>	Bore D				
in					in					
<b>0.625 cont.</b>	1.375	0.250	CRW1 R	6372	<b>0.750 cont.</b>	1.624	0.250	CRW1 V	7623	
	1.375	0.250	CRWA1 R	6373		1.624	0.250	CRWA1 V	7624	
	1.375	0.250	CRW1 V	6979		1.624	0.250	CRW1 R	7627	
	1.375	0.250	CRWA1 V	6383		1.624	0.250	CRWA1 R	7628	
	1.377	0.250	CRWHA1 R	6391		1.752	0.250	CRW1 R	7636	
	1.499	0.250	CRW1 R	6422		1.752	0.250	CRWA1 V	7638	
<b>0.656</b>	1.124	0.313	CRW1 R	6523		1.828	0.250	CRW1 R	7661	
	1.250	0.250	CRW1 R	6541		1.874	0.250	CRW1 R	7690	
	1.375	0.313	CRW1 R	6556		2.047	0.313	CRW1 R	7693	
	1.575	0.250	CRW1 R	6582						
<b>0.669</b>	0.999	0.188	CRW1 R	6595	<b>0.781</b>	1.375	0.313	CRW1 V	7824	
	1.064	0.250	CRW1 R	6728		1.375	0.313	CRW1 R	7829 <sup>1)</sup>	
	1.064	0.250	CRW1 R	6729		1.499	0.313	CRW1 R	7849	
	1.573	0.281	CRW1 V	6597 <sup>1)</sup>		1.624	0.313	CRW1 R	7872	
					1.828	0.250	CRW1 P	7889		
<b>0.688</b>	1.124	0.190	CRW1 R	6738	<b>0.787</b>	1.124	0.188	CRW1 R	7740	
	1.124	0.250	CRW1 R	6741						
	1.124	0.250	CRW1 R	6743	<b>0.813</b>	1.187	0.313	CRWA1 V	8013	
	1.124	0.250	CRW1 V	6745		1.250	0.188	CRW1 R	8017 <sup>1)</sup>	
	1.187	0.188	CRW1 V	6770		1.250	0.188	CRW1 P	8018	
	1.188	0.188	CRW1 R	6763						
		1.250	0.256	CRWA1 R	6765		1.375	0.375	CRW1 V	8053
		1.250	0.256	CRWHA1 V	6751		1.375	0.375	CRW1 R	8060
		1.250	0.313	CRW1 R	6767		1.499	0.250	CRW1 R	8088 <sup>1)</sup>
		1.250	0.313	CRW1 V	6768					
		1.252	0.220	CRWH1 V	6769		1.624	0.250	CRW1 V	8178
							1.752	0.375	CRW1 R	8215
		1.375	0.250	CRWA1 R	6814	<b>0.875</b>	1.250	0.188	CRW1 R	8624
		1.375	0.313	CRW1 R	6816		1.250	0.250	CRW1 V	8621
	1.375	0.313	CRW1 V	6817						
	1.499	0.250	CRW1 R	6935		1.308	0.250	CRW1 V	8649	
	1.624	0.250	CRWA1 R	6990		1.375	0.250	CRW1 V	8646	
						1.375	0.250	CRW1 R	8648	
<b>0.750</b>	1.124	0.188	CRW1 R	7414		1.437	0.250	CRW1 R	8691	
	1.124	0.188	CRW1 V	7417		1.499	0.250	CRW1 R	8700	
		1.249	0.188	CRW1 V	7467 <sup>1)</sup>		1.499	0.250	CRWA1 R	8702
		1.250	0.188	CRW1 R	7439		1.499	0.250	CRW1 V	8704
		1.250	0.188	CRW1 R	7478 <sup>1)</sup>		1.499	0.250	CRWA1 V	8707
		1.250	0.250	CRW1 R	7438		1.499	0.313	CRW1 R	8703 <sup>1)</sup>
		1.250	0.250	CRW1 R	7440		1.502	0.313	CRWA1 R	8748
		1.250	0.250	CRWA1 R	7443		1.575	0.250	CRW1 R	8763
		1.250	0.250	CRW1 V	7450					
		1.250	0.250	CRWA1 V	7453		1.624	0.250	CRWA1 R	8782
		1.250	0.250	CRWA1 V	7455		1.624	0.250	CRW1 V	8795
							1.624	0.250	CRW1 R	8796
		1.252	0.188	CRW1 R	7469		1.752	0.250	CRW1 R	8821
	1.260	0.250	CRW1 R	7473		1.828	0.250	CRW1 R	8842	
						1.874	0.250	CRW1 R	8860	
	1.312	0.250	CRW1 R	7474	<b>0.875</b>	2.000	0.250	CRW1 R	8870	
	1.312	0.250	CRWA1 R	7475		2.050	0.375	CRWH1 V	8871	
	1.375	0.250	CRW1 R	7512						
<b>0.750</b>	1.375	0.250	CRWA1 R	7513	<b>0.882</b>	2.088	0.313	CRWHA1 R	9000	
	1.375	0.250	CRW1 V	7515						
	1.375	0.250	CRWA1 V	7517						
	1.375	0.250	CRWA1 P	7533	<b>0.938</b>	1.375	0.250	CRWA1 R	9244	
		1.499	0.250	CRW1 V		7567	1.500	0.250	CRW1 R	9303
		1.499	0.250	CRW1 R		7572 <sup>1)</sup>	1.500	0.250	CRW1 V	9304
		1.499	0.250	CRWA1 R	7573		1.624	0.250	CRW1 R	9307
		1.575	0.250	CRW1 R	7591		1.624	0.250	CRW1 V	9308
							1.752	0.250	CRW1 R	9347
						1.828	0.250	CRW1 R	9409	

d<sub>1</sub> 0.950–1.250 in



Please see pages 83 to 86 for housing bore requirements.

Dimensions		Nominal seal width b	Design and lip material	Designation
Shaft	Bore			
d <sub>1</sub>	D			
in			–	–

<b>0.950</b>	1.358	0.275	<b>CRW1 P</b>	<b>9520</b>
<b>0.969</b>	1.406	0.250	<b>CRWA1 P</b>	<b>9604</b>
	1.499	0.313	<b>CRW1 V</b>	<b>9611</b>
	1.499	0.313	<b>CRW1 R</b>	<b>9613<sup>1)</sup></b>
	1.624	0.250	<b>CRW1 R</b>	<b>9646</b>
	1.624	0.250	<b>CRW1 V</b>	<b>9647</b>
	1.686	0.313	<b>CRWA1 R</b>	<b>9663</b>
	1.686	0.313	<b>CRW1 R</b>	<b>9664</b>
	1.752	0.250	<b>CRW1 R</b>	<b>9667</b>
	1.828	0.313	<b>CRW1 R</b>	<b>9681</b>
<b>0.981</b>	1.376	0.313	<b>CRW1 V</b>	<b>9888<sup>1)</sup></b>
<b>0.984</b>	1.499	0.250	<b>CRW1 V</b>	<b>9686</b>
	1.749	0.375	<b>CRWA1 V</b>	<b>9803<sup>1)</sup></b>
<b>1.000</b>	1.367	0.313	<b>CRW1 R</b>	<b>9822</b>
	1.375	0.250	<b>CRW1 P</b>	<b>9826<sup>1)</sup></b>
	1.375	0.250	<b>CRW1 V</b>	<b>9831</b>
	1.437	0.250	<b>CRW1 V</b>	<b>9833</b>
	1.437	0.250	<b>CRW1 R</b>	<b>9837</b>
	1.437	0.250	<b>CRWA1 R</b>	<b>9838</b>
	1.437	0.250	<b>CRWA1 V</b>	<b>9847</b>
	1.496	0.390	<b>CRW1 R</b>	<b>9850</b>
	1.499	0.250	<b>CRW1 R</b>	<b>9852</b>
	1.499	0.250	<b>CRW1 V</b>	<b>9854</b>
	1.499	0.250	<b>CRW1 R</b>	<b>9876</b>
	1.499	0.250	<b>CRWA1 R</b>	<b>9878</b>
	1.499	0.250	<b>CRWA1 V</b>	<b>9879</b>
	1.499	0.315	<b>CRWA1 V</b>	<b>9862</b>
	1.499	0.315	<b>CRW1 V</b>	<b>9892</b>
	1.561	0.250	<b>CRW1 R</b>	<b>9894</b>
	1.575	0.313	<b>CRWA1 R</b>	<b>9907</b>

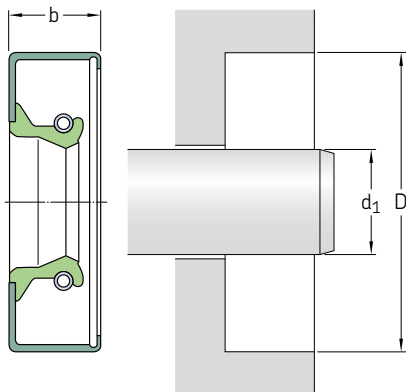
Dimensions		Nominal seal width b	Design and lip material	Designation
Shaft	Bore			
d <sub>1</sub>	D			
in			–	–

<b>1.000</b>	1.624	0.250	<b>CRW1 R</b>	<b>9934</b>
<b>cont.</b>	1.624	0.250	<b>CRWA1 R</b>	<b>9935</b>
	1.624	0.250	<b>CRW1 V</b>	<b>9937</b>
	1.624	0.250	<b>CRWA1 V</b>	<b>9939</b>
	1.686	0.250	<b>CRW1 R</b>	<b>9960</b>
	1.752	0.250	<b>CRW1 V</b>	<b>9982</b>
	1.752	0.250	<b>CRWA1 V</b>	<b>9983</b>
	1.752	0.250	<b>CRW1 R</b>	<b>9997</b>
	1.752	0.250	<b>CRWA1 R</b>	<b>9998</b>
	1.828	0.250	<b>CRW1 V</b>	<b>10058</b>
	1.828	0.250	<b>CRW1 P</b>	<b>10047</b>
	1.828	0.250	<b>CRW1 R</b>	<b>10049</b>
	1.828	0.250	<b>CRWA1 R</b>	<b>10050</b>
	1.851	0.250	<b>CRW1 R</b>	<b>10071</b>
	1.874	0.250	<b>CRW1 R</b>	<b>10075</b>
	1.938	0.250	<b>CRW1 R</b>	<b>10104</b>
	1.983	0.250	<b>CRWA1 V</b>	<b>10111</b>
	1.983	0.313	<b>CRWA1 R</b>	<b>10114</b>
	2.000	0.250	<b>CRW1 R</b>	<b>10123</b>
	2.000	0.250	<b>CRWA1 R</b>	<b>10124</b>
	2.000	0.250	<b>CRWA1 R</b>	<b>10127</b>
	2.000	0.250	<b>CRW1 V</b>	<b>10128</b>
	2.000	0.250	<b>CRWA1 V</b>	<b>10129</b>
	2.047	0.250	<b>CRWA1 R</b>	<b>10157</b>
	2.062	0.250	<b>CRW1 R</b>	<b>10158</b>
	2.250	0.250	<b>CRW1 R</b>	<b>10169</b>
<b>1.063</b>	1.499	0.250	<b>CRW1 R</b>	<b>10515</b>
	1.499	0.250	<b>CRW1 V</b>	<b>10518</b>
	1.512	0.256	<b>CRW1 P</b>	<b>532866</b>
	1.561	0.250	<b>CRW1 R</b>	<b>10581</b>
	1.577	0.250	<b>CRW1 R</b>	<b>10583</b>
	1.624	0.250	<b>CRW1 R</b>	<b>10598</b>
	1.686	0.250	<b>CRW1 R</b>	<b>10632</b>
	1.752	0.250	<b>CRW1 R</b>	<b>10653</b>

<sup>1)</sup> Without SKF Bore Tite Coating

Dimensions					Dimensions					
Shaft	Bore	Nominal seal width	Design and lip material	Designation	Shaft	Bore	Nominal seal width	Design and lip material	Designation	
d <sub>1</sub>	D	b			d <sub>1</sub>	D	b			
in			–	–	in			–	–	
<b>1.063 cont.</b>	1.828	0.250	CRW1 R	<b>10681</b>	<b>1.175</b>	2.031	0.500	CRW1 R	<b>11553</b>	
	1.828	0.250	CRW1 V	<b>10682</b>		<b>1.178</b>	2.073	0.335	CRW1 S	<b>11650</b>
	1.874	0.250	CRW1 R	<b>10700</b>			<b>1.188</b>	1.561	0.313	CRW1 V
1.979	0.250	CRW1 R	<b>10728</b>	1.686	0.250			CRW1 P	<b>11728</b>	
1.983	0.250	CRW1 R	<b>10733</b>	1.687	0.250	CRW1 R		<b>11730</b>		
<b>1.063</b>	2.000	0.250	CRW1 R	<b>10740</b>		1.752	0.250	CRW1 R	<b>11734</b>	
	2.062	0.250	CRW1 R	<b>10766</b>		1.752	0.250	CRW1 V	<b>11736</b>	
<b>1.125</b>	1.499	0.188	CRW1 V	<b>11059<sup>1)</sup></b>		1.828	0.375	CRW1 R	<b>11740</b>	
	1.499	0.188	CRW1 R	<b>11061<sup>1)</sup></b>		1.875	0.250	CRW1 P	<b>11763</b>	
<b>1.125</b>	1.561	0.250	CRW1 P	11066	1.875	0.375	CRW1 R	<b>11585</b>		
	1.561	0.250	CRW1 R	<b>11067</b>		1.983	0.250	CRW1 R	<b>11776</b>	
	1.561	0.250	CRW1 V	<b>11071</b>		1.983	0.250	CRWA1 R	<b>11777</b>	
	1.565	0.250	CRW1 R	<b>11082</b>		2.000	0.250	CRW1 R	<b>11800</b>	
	1.624	0.250	CRW1 P	<b>11111</b>		2.000	0.250	CRWA1 R	<b>11801</b>	
	1.624	0.250	CRW1 R	<b>11123</b>	2.000	0.250	CRW1 V	<b>11806</b>		
	1.624	0.250	CRWA1 R	<b>11124</b>	2.062	0.250	CRW1 R	<b>11878</b>		
	1.624	0.250	CRW1 V	<b>11133</b>	2.062	0.250	CRW1 P	<b>11879</b>		
	1.624	0.250	CRWA1 V	<b>11134</b>		2.125	0.313	CRW1 R	<b>11907</b>	
	1.733	0.375	CRW1 R	<b>11137</b>		2.165	0.250	CRW1 R	<b>11911</b>	
	1.752	0.250	CRW1 R	<b>11138</b>		2.250	0.250	CRW1 R	<b>11914</b>	
		1.752	0.250	CRW1 V	<b>11144</b>		2.437	0.250	CRW1 R	<b>11923</b>
		1.828	0.250	CRW1 R	<b>11170</b>		2.441	0.250	CRW1 R	<b>11930</b>
		1.828	0.250	CRWA1 R	<b>11171</b>	<b>1.190</b>	2.125	0.313	CRWHA1 R	<b>11908</b>
		1.828	0.250	CRW1 V	<b>11172</b>		<b>1.234</b>	2.250	0.250	CRW1 R
1.828	0.250	CRWA1 V	<b>11175</b>	<b>1.250</b>	1.625	0.188		CRW1 R	<b>12329</b>	
1.852	0.313	CRWH1 R	<b>11197</b>		1.687	0.250	CRW1 V	<b>12335</b>		
1.852	0.313	CRWHA1 R	<b>11200</b>		1.687	0.250	CRW1 R	<b>12336</b>		
<b>1.125</b>	1.874	0.250	CRW1 V	<b>11225</b>	1.687	0.250	CRWA1 V	<b>12337</b>		
	1.874	0.250	CRWA1 V	<b>11218</b>	1.687	0.313	CRWA1 R	<b>12350</b>		
	1.874	0.250	CRW1 R	<b>11224</b>	<b>1.250</b>	1.752	0.250	CRW1 V	<b>12340</b>	
	1.874	0.250	CRWA1 R	<b>11223</b>		1.752	0.250	CRWA1 V	<b>12343</b>	
	1.983	0.250	CRW1 R	<b>11299</b>		1.752	0.250	CRW1 R	<b>12363</b>	
	2.000	0.250	CRW1 R	<b>11340</b>	1.752	0.250	CRWA1 R	<b>12364</b>		
	2.000	0.250	CRW1 V	<b>11344</b>		1.874	0.250	CRW1 P	<b>12382</b>	
	2.000	0.374	CRWA1 V	<b>12138</b>		1.874	0.250	CRWA1 V	<b>12383</b>	
	2.000	0.375	CRWA1 R	<b>11343</b>		1.874	0.250	CRW1 R	<b>12384</b>	
	<b>1.125</b>	2.047	0.313	CRWA1 R	<b>11353</b>	1.874	0.250	CRWA1 R	<b>12386</b>	
2.062		0.250	CRWA1 V	<b>11368</b>		1.938	0.250	CRW1 R	<b>12391</b>	
2.062		0.313	CRW1 R	<b>11366</b>		1.955	0.250	CRWA1 R	<b>12396</b>	
2.125	0.313	CRW1 R	<b>11372</b>	1.983		0.250	CRW1 R	<b>12427</b>		
	2.125	0.313	CRW1 V	<b>11373</b>	1.983	0.250	CRWA1 R	<b>12428</b>		
	2.250	0.250	CRW1 R	<b>11378</b>	1.983	0.250	CRW1 V	<b>12432</b>		
	2.441	0.250	CRW1 R	<b>11392</b>		2.000	0.250	CRW1 V	<b>12445</b>	
<b>1.126</b>	1.575	0.236	CRWA1 R	<b>11086</b>		2.000	0.250	CRWA1 V	<b>12446</b>	
	<b>1.156</b>	1.686	0.250	CRWA1 R		<b>11518</b>	2.000	0.250	CRW1 R	<b>12456</b>
1.752		0.250	CRWA1 R	<b>11514</b>	2.000	0.250	CRWA1 R	<b>12458</b>		
<b>1.156</b>	1.874	0.250	CRW1 R	<b>11524</b>	2.000	0.438	CRW1 P	<b>12483</b>		
	1.875	0.375	CRWA1 R	<b>11536<sup>1)</sup></b>		2.062	0.250	CRWA1 V	<b>12531</b>	
	2.000	0.250	CRW1 R	<b>11544</b>		2.062	0.433	CRWHA1 V	<b>12533</b>	
	2.000	0.250	CRWA1 R	<b>11545</b>		2.062	0.438	CRWH1 R	<b>12530</b>	
	2.000	0.250	CRW1 V	<b>11550</b>		2.125	0.250	CRW1 V	<b>12544</b>	
	2.062	0.313	CRW1 R	<b>11558</b>		2.125	0.250	CRW1 R	<b>12545</b>	
	2.062	0.313	CRW1 R	<b>11558</b>		2.125	0.250	CRWA1 R	<b>12551</b>	

d<sub>1</sub> 1.250–1.563 in



Please see pages 83 to 86 for housing bore requirements.

Dimensions		Nominal seal width b	Design and lip material	Designation
Shaft d <sub>1</sub>	Bore D			
in			–	–
<b>1.250</b>	2.250	0.250	CRW1 R	<b>12577</b>
<b>cont.</b>	2.327	0.500	CRW1 R	<b>12610</b>
	2.374	0.313	CRW1 R	<b>12613</b>
	2.374	0.313	CRWA1 R	<b>12614</b>
	2.374	0.315	CRW1 V	<b>12612</b>
	2.437	0.250	CRW1 R	<b>12621</b>
	2.441	0.250	CRW1 R	<b>12631</b>
	2.500	0.310	CRW1 V	<b>12638</b>
	2.502	0.313	CRW1 R	<b>12637</b>
<b>1.301</b>	2.046	0.492	CRWA1 R	<b>12907</b>
<b>1.313</b>	1.828	0.375	CRW1 P	<b>13021</b>
	2.062	0.313	CRW1 R	<b>13050</b>
	2.062	0.313	CRWA1 R	<b>13052</b>
	2.062	0.313	CRW1 V	<b>13054</b>
	2.125	0.313	CRW1 R	<b>13092</b>
	2.250	0.313	CRW1 R	<b>13112</b>
	2.282	0.250	CRWA1 R	<b>13157</b>
<b>1.328</b>	2.031	0.313	CRW1 R	<b>13415<sup>1)</sup></b>
	2.061	0.313	CRW1 R	<b>13350</b>
	2.227	0.313	CRW1 R	<b>13418</b>
<b>1.344</b>	2.106	0.313	CRW1 R	<b>13421</b>
	2.125	0.313	CRW1 R	<b>13437</b>
<b>1.365</b>	1.956	0.438	CRW1 R	<b>13985</b>
	2.081	0.313	CRW1 R	<b>13598</b>
	2.261	0.313	CRW1 R	<b>13700</b>
<b>1.375</b>	1.750	0.250	CRW1 R	<b>13514</b>
	1.828	0.250	CRWA1 V	<b>13510</b>
	1.828	0.313	CRW1 R	<b>13537</b>
	1.835	0.250	CRW1 R	<b>13536</b>
	1.873	0.313	CRW1 V	<b>13511</b>

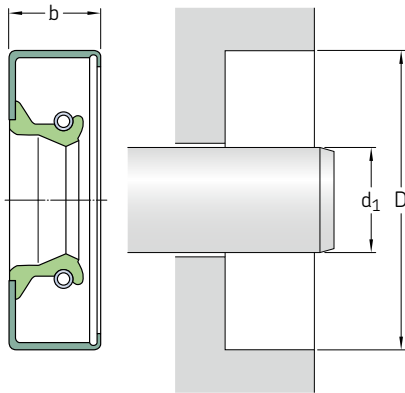
Dimensions		Nominal seal width b	Design and lip material	Designation
Shaft d <sub>1</sub>	Bore D			
in			–	–
<b>1.250</b>	1.874	0.250	CRW1 P	<b>13512</b>
<b>cont.</b>	1.874	0.250	CRW1 R	<b>13534</b>
	1.874	0.250	CRW1 V	<b>13538</b>
	1.874	0.313	CRWA1 R	<b>13535</b>
	1.938	0.250	CRWA1 R	<b>13552</b>
	1.955	0.433	CRWA1 P	<b>13527</b>
	1.983	0.313	CRW1 P	<b>13557</b>
	2.000	0.313	CRWA1 P	<b>13562</b>
	2.000	0.313	CRW1 R	<b>13568</b>
	2.000	0.313	CRWA1 R	<b>13569</b>
	2.000	0.313	CRWH1 R	<b>13571</b>
	2.000	0.313	CRW1 V	<b>13579</b>
	2.000	0.313	CRWA1 V	<b>13581</b>
	2.062	0.313	CRW1 V	<b>13582</b>
	2.062	0.313	CRW1 R	<b>13585<sup>1)</sup></b>
	2.062	0.313	CRWA1 P	<b>13588</b>
	2.062	0.315	CRWA1 V	<b>13607</b>
	2.106	0.313	CRWA1 R	<b>13602<sup>1)</sup></b>
	2.106	0.313	CRW1 P	<b>13614</b>
	2.125	0.313	CRW1 R	<b>13649</b>
	2.125	0.313	CRWA1 R	<b>13651</b>
	2.125	0.313	CRWA1 V	<b>13661</b>
	2.125	0.313	CRW1 V	<b>13663</b>
	2.250	0.250	CRWA1 R	<b>13698</b>
	2.250	0.313	CRW1 R	<b>13671</b>
	2.250	0.313	CRWA1 R	<b>13676</b>
	2.250	0.313	CRW1 V	<b>13688</b>
	2.250	0.313	CRWA1 V	<b>13691</b>
	2.250	0.313	CRW1 P	<b>13869</b>
<b>1.375</b>	2.374	0.313	CRW1 V	<b>13734</b>
	2.374	0.313	CRW1 R	<b>13738</b>
	2.374	0.313	CRWA1 R	<b>13739</b>
	2.437	0.250	CRW1 R	<b>13797</b>
	2.441	0.313	CRW1 R	<b>13810</b>
	2.441	0.313	CRWA1 R	<b>13812</b>

<sup>1)</sup> Without SKF Bore Tite Coating



Dimensions					Dimensions						
Shaft	Bore	Nominal seal width	Design and lip material	Designation	Shaft	Bore	Nominal seal width	Design and lip material	Designation		
d <sub>1</sub>	D	b			d <sub>1</sub>	D	b				
in			–	–	in			–	–		
<b>1.375 cont.</b>	2.5021.3	0.313	CRW1 R	13865	<b>1.500 cont.</b>	2.222	0.313	CRW1 R	14903		
	2.502	0.313	CRW1 V	13867		2.250	0.313	CRW1 S	14935		
	2.502	0.374	CRWA1 V	13856		2.250	0.313	CRW1 R	14938		
						2.250	0.313	CRWA1 R	14939		
	2.562	0.375	CRW1 R	13875							
	2.562	0.375	CRWA1 R	13876		2.250	0.313	CRW1 V	14940		
	2.562	0.375	CRWA1 V	13878		2.250	0.313	CRWA1 V	14942		
						2.260	0.406	CRW1 R	14968		
	2.623	0.313	CRWA1 V	13882							
	2.686	0.500	CRW1 R	13892		2.374	0.313	CRW1 V	14992		
	2.716	0.313	CRW1 R	13900		2.374	0.313	CRWA1 V	14994		
						2.374	0.313	CRW1 R	15004		
	2.812	0.375	CRWHA1 R	13912							
	2.835	0.313	CRWA1 R	13918		2.374	0.313	CRWA1 R	15005		
	2.835	0.313	CRW1 R	13920		2.374	0.500	CRWH1 R	15039		
2.835	0.313	CRWA1 P	13925	2.377	0.453	CRWA1 R	15041				
2.875	0.313	CRWA1 P	13929								
<b>1.378</b>	2.835	0.313	CRWA1 V	13926	2.437	0.313	CRW1 R	15076			
					2.441	0.313	CRW1 R	15092 <sup>1)</sup>			
<b>1.417</b>	2.616	0.313	CRW1 R	14092	2.441	0.313	CRWA1 R	15093			
					2.441	0.313	CRW1 V	15097			
<b>1.438</b>	2.062	0.313	CRW1 V	14212 <sup>1)</sup>	2.502	0.313	CRW1 V	15138			
			CRWA1 R	14214	2.502	0.313	CRW1 R	15141			
	2.125	0.313	CRW1 R	14223	2.502	0.313	CRWA1 R	15142			
			CRWA1 V	14225	2.561	0.313	CRW1 R	15176			
	2.250	0.313	CRWA1 R	14247							
			CRWA1 V	14259	2.623	0.313	CRW1 R	15194			
	2.250	0.313	CRW1 V	14260	2.686	0.500	CRW1 R	15207			
	2.250	0.313	CRW1 R	14262	<b>1.500</b>	2.716	0.438	CRW1 R	15204		
						2.750	0.313	CRW1 R	15214		
						2.758	0.313	CRW1 R	15230		
<b>1.438</b>	2.374	0.313	CRW1 R	14282							
			CRWA1 R	14285	2.835	0.313	CRW1 R	15234			
				2.875	0.313	CRW1 R	15235				
	2.437	0.313	CRW1 R	14363	<b>1.552</b>	2.502	0.500	CRWA1 R	15450		
			CRW1 R	14383				2.686	0.500	CRW1 R	15460
					2.750	0.500	CRWHA1 P	15462			
	2.623	0.313	CRW1 R	14404	<b>1.563</b>	2.062	0.250	CRW1 V	15506		
			CRW1 R	14423				2.062	0.250	CRW1 R	15508
			CRW1 R	14458							
<b>1.484</b>	2.254	0.313	CRW1 R	14907							
							2.125	0.313	CRW1 R	15517 <sup>1)</sup>	
<b>1.494</b>	2.060	0.270	CRW1 R	14789	2.125	0.313	CRWA1 P	15518			
					2.250	0.313	CRW1 R	15522			
<b>1.496</b>	2.165	0.315	CRWA1 R	550250							
							2.374	0.313	CRW1 P	15540 <sup>1)</sup>	
<b>1.500</b>	1.874	0.250	CRW1 R	14807 <sup>1)</sup>	2.374	0.313	CRW1 R	15542			
			CRW1 V	14809 <sup>1)</sup>	2.374	0.313	CRWA1 R	15543			
					2.374	0.313	CRWA1 V	15549			
	1.983	0.250	CRW1 V	14821							
	1.983	0.250	CRWA1 R	14824	2.437	0.313	CRW1 R	15592 <sup>1)</sup>			
	1.983	0.313	CRW1 R	14832	2.441	0.500	CRWA1 R	15620			
					2.465	0.374	CRWA1 P	15624			
	2.000	0.313	CRWA1 R	14846							
	2.000	0.313	CRW1 R	14855	2.502	0.313	CRWA1 R	15635			
	2.000	0.313	CRW1 V	14861	2.502	0.313	CRW1 R	15655			
					2.502	0.313	CRW1 V	15656			
	2.048	0.313	CRWA1 R	14858	2.561	0.313	CRW1 R	15677			
	2.062	0.313	CRW1 R	14864							
	2.062	0.313	CRW1 V	14867	2.623	0.313	CRW1 R	15699			
					2.686	0.313	CRW1 R	15707			
2.125	0.313	CRW1 R	14875								
2.125	0.313	CRWA1 R	14876	2.750	0.500	CRWH1 R	15761				
2.125	0.313	CRW1 V	14886	2.875	0.313	CRW1 R	15773				
2.125	0.313	CRWA1 V	14887	2.875	0.313	CRWA1 P	15779				

d<sub>1</sub> 1.578–1.875 in



Please see pages 83 to 86 for housing bore requirements.

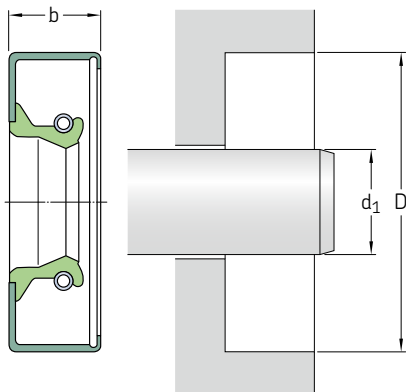
Dimensions		Nominal seal width b	Design and lip material	Designation
Shaft d <sub>1</sub>	Bore D			
in			–	–
<b>1.578</b>	2.082	0.250	CRW1 R	15510
	2.408	0.313	CRWHA1 R	15557
<b>1.594</b>	2.125	0.313	CRW1 P	15915
	2.437	0.313	CRW1 P	15940
	2.437	0.313	CRW1 R	15955
	2.502	0.313	CRW1 R	15960
	2.623	0.313	CRW1 R	15968
	2.758	0.313	CRW1 R	15975
<b>1.618</b>	2.531	0.438	CRWA1 R	16449
<b>1.625</b>	2.000	0.250	CRW1 V	16039
	2.000	0.250	CRW1 R	16046 <sup>1)</sup>
	2.116	0.313	CRWA1 R	16047
	2.125	0.250	CRW1 V	16048
	2.125	0.250	CRW1 R	16054
	2.248	0.313	CRWA1 R	16062
	2.250	0.313	CRW1 R	16061
	2.250	0.313	CRW1 V	16078 <sup>1)</sup>
	2.250	0.375	CRW1 P	16049
	2.282	0.313	CRW1 R	16083
	2.374	0.250	CRW1 R	16094 <sup>1)</sup>
	2.374	0.313	CRWH1 R	16072
	2.374	0.313	CRW1 V	16077
	2.374	0.313	CRW1 R	16084
	2.374	0.313	CRWA1 R	16085
	2.374	0.313	CRWA1 P	16091 <sup>1)</sup>
	2.374	0.500	CRWH1 R	16079
	2.437	0.313	CRW1 R	16113
	2.437	0.313	CRWA1 R	16128
	2.437	0.313	CRW1 V	16119
	2.437	0.313	CRWA1 V	16120
	2.441	0.313	CRW1 R	16180
	2.441	0.313	CRWA1 R	16201

Dimensions		Nominal seal width b	Design and lip material	Designation
Shaft d <sub>1</sub>	Bore D			
in			–	–
<b>1.625 cont.</b>	2.502	0.313	CRWA1 V	16243
	2.502	0.313	CRW1 R	16245
	2.502	0.313	CRWA1 R	16246
	2.502	0.313	CRWA1 P	16247 <sup>1)</sup>
	2.502	0.374	CRWHA1 V	16257
	2.502	0.375	CRWHA1 R	16254
	2.562	0.313	CRWA1 V	16290
	2.623	0.313	CRW1 R	16314
	2.623	0.313	CRWA1 R	16315
	2.623	0.313	CRW1 V	16316
	2.686	0.313	CRW1 R	16337
	2.686	0.313	CRW1 V	16338
	2.750	0.250	CRW1 R	16364
	2.750	0.313	CRWH1 R	16368
	2.758	0.313	CRW1 R	16374
	2.875	0.313	CRW1 R	16406
	3.000	0.313	CRWH1 R	16422
<b>1.645</b>	2.656	0.313	CRWA1 P	16500
<b>1.656</b>	2.623	0.375	CRWA1 P	16545
	2.686	0.313	CRW1 R	16556
<b>1.688</b>	2.279	0.500	CRWH1 R	16650
	2.328	0.313	CRWA1 R	16657
	2.437	0.250	CRW1 S	16692
	2.437	0.313	CRW1 R	16679
	2.437	0.313	CRWA1 R	16680
	2.437	0.469	CRW1 S	16696
	2.502	0.313	CRW1 R	16719
	2.623	0.313	CRWA1 R	16814
	2.623	0.500	CRW1 R	16816
	2.623	0.500	CRWA1 V	16817
	2.686	0.313	CRW1 R	16842
	2.716	0.313	CRW1 R	16854
	2.750	0.313	CRW1 R	16900 <sup>1)</sup>
	2.750	0.375	CRWA1 R	16903
	2.875	0.313	CRW1 R	16999

<sup>1)</sup> Without SKF Bore Tite Coating

Dimensions		Nominal seal width b	Design and lip material	Designation	Dimensions		Nominal seal width b	Design and lip material	Designation	
Shaft d <sub>1</sub>	Bore D				Shaft d <sub>1</sub>	Bore D				
in					in					
<b>1.688</b>	3.061	0.375	CRW1 R	17035	<b>1.768</b>	2.363	0.313	CRWHA1 V	17780	
	3.125	0.375	CRWA1 R	17038		<b>1.781</b>	2.252	0.313	CRWA1 R	17806
<b>1.704</b>	3.034	0.500	CRWA1 R	17100	2.502		0.313	CRWH1 R	17810	
	<b>1.719</b>	2.561	0.315	CRWA1 R	17144		2.502	0.313	CRWH1 V	17811
<b>1.750</b>		2.250	0.313	CRW1 R	17231	2.623	0.313	CRW1 R	17821	
	2.250	0.313	CRW1 V	17234	2.686	0.313	CRW1 R	17832 <sup>1)</sup>		
<b>1.750</b>	2.374	0.313	CRWA1 V	17261	<b>1.812</b>	2.623	0.374	CRWA1 V	17949	
	2.374	0.313	CRW1 R	17270		<b>1.813</b>	2.279	0.313	CRW1 R	18025
	2.374	0.313	CRWA1 R	17271			2.437	0.313	CRW1 R	18039
	2.411	0.375	CRW1 P	17280	2.562		0.313	CRWA1 V	18049	
	2.437	0.313	CRW1 R	17283	<b>1.813</b>	2.623	0.313	CRW1 R	18104	
	2.437	0.313	CRW1 R	17284		2.686	0.313	CRWA1 P	18114	
	2.437	0.313	CRWA1 R	17285	2.750	0.313	CRW1 R	18159		
		0.313	CRW1 V	17292	2.875	0.313	CRW1 R	18242		
	2.437	0.313	CRWA1 V	17293	3.000	0.375	CRWA1 P	18264		
	2.441	0.313	CRW1 R	17315	<b>1.844</b>	2.623	0.313	CRW1 R	18425	
	2.441	0.313	CRWA1 R	550154		2.750	0.313	CRW1 P	18444	
	2.441	0.375	CRWA1 V	17320	<b>1.868</b>	2.518	0.315	CRWA1 P	18492	
2.502	0.313	CRW1 V	17379	<b>1.875</b>		2.398	0.250	CRW1 R	18549	
2.502	0.313	CRWA1 V	17381		2.471	0.313	CRWA1 R	18545		
2.502	0.313	CRW1 R	17386	2.500	0.313	CRW1 P	18555			
2.502	0.313	CRWA1 R	17387	2.502	0.313	CRW1 R	18565			
2.502	0.375	CRWHA1 V	17395	2.562	0.313	CRWA1 V	18546			
2.502	0.375	CRW1 S	17399	2.562	0.313	CRW1 P	18562			
2.561	0.313	CRW1 R	17404	2.623	0.313	CRW1 R	18580			
2.565	0.313	CRWA1 R	17413	2.623	0.313	CRWA1 R	18581			
2.623	0.313	CRW1 R	17442	2.623	0.313	CRW1 V	18582			
2.623	0.313	CRWA1 R	17443	2.623	0.313	CRWA1 V	18584			
2.623	0.313	CRW1 S	17444	2.623	0.374	CRW1 S	18592			
2.623	0.313	CRWA1 V	17448	2.686	0.313	CRW1 R	18626			
2.623	0.375	CRWH1 R	17456	2.750	0.313	CRW1 V	18652			
2.686	0.313	CRW1 R	17484 <sup>1)</sup>	2.750	0.313	CRW1 R	18657			
2.717	0.438	CRWA1 R	17607	2.750	0.313	CRWA1 R	18658			
2.750	0.313	CRWA1 R	17523	2.750	0.313	CRW1 P	18666			
2.750	0.313	CRW1 R	17557	2.750	0.313	CRW1 R	18671			
2.750	0.313	CRW1 V	17558	2.758	0.313	CRW1 P	18679			
2.758	0.313	CRW1 R	17605	2.758	0.313	CRW1 S	18679			
2.810	0.313	CRWA1 R	17624 <sup>1)</sup>	2.782	0.438	CRWH1 R	18693			
2.810	0.313	CRWA1 V	17627	2.782	0.438	CRWHA1 R	18695			
2.875	0.313	CRW1 R	17653	2.875	0.313	CRW1 V	18732			
2.875	0.313	CRW1 V	17657	2.875	0.313	CRW1 R	18733			
2.875	0.375	CRWHA1 R	17645	2.875	0.313	CRWA1 R	18734			
2.981	0.438	CRWHA1 R	17675 <sup>1)</sup>	<b>1.875</b>	2.875	0.313	CRWA1 V	18737		
2.997	0.313	CRWHA1 R	17678		2.997	0.313	CRW1 R	18785		
2.997	0.313	CRW1 R	17695	3.000	0.313	CRW1 R	18817			
3.000	0.313	CRWA1 R	17699	3.000	0.313	CRW1 V	18818			
3.000	0.313	CRW1 R	17707	3.061	0.313	CRWA1 R	18872			
3.000	0.313	CRW1 V	17709	3.105	0.500	CRWA1 R	18880			
3.061	0.313	CRW1 R	17716	3.189	0.469	CRWH1 R	18899			
3.061	0.375	CRWA1 R	17718							
3.189	0.313	CRW1 R	17746							
3.543	0.438	CRW1 R	17756							
3.625	0.438	CRW1 R	17761							

d<sub>1</sub> 1.875–2.250 in



Please see pages 83 to 86 for housing bore requirements.

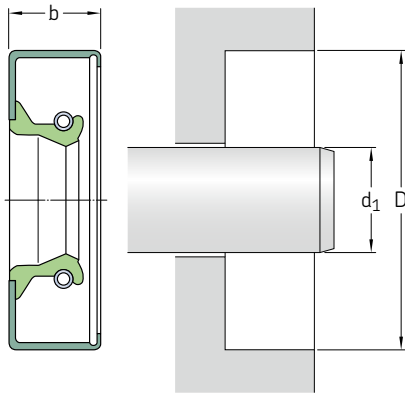
Dimensions		Nominal seal width b	Design and lip material	Designation
Shaft d <sub>1</sub>	Bore D			
in			–	–
<b>1.875</b>	3.249	0.484	CRWA1 R	<b>18922</b>
<b>cont.</b>	3.371	0.438	CRWH1 R	<b>18916</b>
	3.496	0.438	CRWA1 R	<b>18924</b>
	3.500	0.438	CRW1 R	<b>18926</b>
<b>1.893</b>	2.434	0.250	CRW1 R	<b>19000<sup>1)</sup></b>
<b>1.906</b>	2.752	0.375	CRWA1 P	<b>19017</b>
<b>1.915</b>	2.533	0.250	CRW1 R	<b>19010</b>
<b>1.938</b>	2.412	0.313	CRW1 R	<b>19215</b>
	2.437	0.250	CRW1 R	<b>19210</b>
	2.437	0.250	CRW1 R	<b>19212</b>
	2.502	0.375	CRWA1 R	<b>19220</b>
	2.563	0.313	CRW1 R	<b>19211</b>
	2.623	0.313	CRW1 R	<b>19226</b>
	2.623	0.313	CRWA1 V	<b>19227</b>
	2.623	0.313	CRWA1 R	<b>19229</b>
	2.686	0.300	CRW1 P	<b>19244</b>
	2.686	0.313	CRWA1 P	<b>19234</b>
	2.686	0.313	CRW1 R	<b>19236</b>
	2.686	0.313	CRWA1 R	<b>19237</b>
	2.686	0.313	CRWA1 V	<b>19243</b>
	2.686	0.375	CRW1 S	<b>19240</b>
	2.750	0.313	CRW1 R	<b>19264</b>
	2.750	0.313	CRW1 V	<b>19267</b>
	2.875	0.313	CRW1 R	<b>19300</b>
	2.875	0.313	CRWA1 R	<b>19301</b>
	2.875	0.313	CRWH1 V	<b>19304</b>
	2.884	0.313	CRWA1 P	<b>19310</b>
	2.997	0.313	CRW1 R	<b>19350</b>
	3.000	0.313	CRW1 R	<b>19359</b>
	3.000	0.313	CRWA1 R	<b>19360<sup>1)</sup></b>
	3.000	0.313	CRWA1 V	<b>19368</b>

Dimensions		Nominal seal width b	Design and lip material	Designation
Shaft d <sub>1</sub>	Bore D			
in			–	–
<b>1.938</b>	3.061	0.313	CRW1 R	<b>19380</b>
<b>cont.</b>	3.062	0.500	CRW1 S	<b>19438</b>
	3.125	0.500	CRW1 R	<b>19400</b>
	3.189	0.313	CRW1 R	<b>19407</b>
	3.251	0.313	CRWA1 V	<b>19433</b>
	3.251	0.313	CRW1 R	<b>19434</b>
	3.350	0.469	CRWHA1 R	<b>19445</b>
	3.543	0.313	CRW1 R	<b>19449</b>
<b>1.969</b>	2.623	0.313	CRWA1 R	<b>19607</b>
<b>2.000</b>	2.500	0.438	CRW1 S	<b>19739</b>
	2.502	0.313	CRW1 P	<b>19745</b>
	2.623	0.313	CRW1 R	<b>19760</b>
	2.623	0.313	CRWA1 R	<b>19762</b>
	2.623	0.313	CRWA1 V	<b>19777</b>
	2.623	0.313	CRWA1 V	<b>19782</b>
	2.686	0.375	CRW1 R	<b>19778</b>
	2.716	0.375	CRW1 R	<b>19785</b>
	2.716	0.375	CRWA1 R	<b>19786</b>
	2.746	0.375	CRW1 S	<b>19807</b>
	2.750	0.313	CRW1 V	<b>19823</b>
	2.750	0.313	CRW1 R	<b>19831</b>
	2.750	0.313	CRWA1 R	<b>19832</b>
	2.750	0.313	CRWA1 V	<b>19839</b>
	2.750	0.313	CRW1 V	<b>19840</b>
	2.835	0.469	CRWH1 R	<b>19848</b>
	2.875	0.313	CRW1 V	<b>19884</b>
	2.875	0.313	CRW1 R	<b>19886</b>
	2.875	0.313	CRWA1 R	<b>19887</b>
	2.875	0.375	CRWHA1 R	<b>19896</b>
	2.875	0.500	CRWH1 R	<b>19900</b>
	2.880	0.375	CRWA1 R	<b>19922</b>
	2.880	0.375	CRWA1 P	<b>19923</b>

<sup>1)</sup> Without SKF Bore Tite Coating

Dimensions					Dimensions				
Shaft	Bore	Nominal seal width	Design and lip material	Designation	Shaft	Bore	Nominal seal width	Design and lip material	Designation
d <sub>1</sub>	D	b			d <sub>1</sub>	D	b		
in			–	–	in			–	–
<b>2.000 cont.</b>	2.997	0.375	CRWH1 R	19969	<b>2.125 cont.</b>	3.061	0.438	CRWH1 V	21215
	2.997	0.375	CRWHA1 R	19970		3.061	0.500	CRW1 R	21210
	2.997	0.375	CRWH1 V	19979		3.061	0.500	CRWA1 R	21211 <sup>1)</sup>
						3.061	0.500	CRWHA1 R	21213
	3.000	0.313	CRW1 R	19992					
	3.000	0.313	CRWA1 R	19993		3.125	0.438	CRWH1 R	21234
	3.000	0.313	CRWA1 V	19995		3.125	0.438	CRWHA1 P	21245
<b>2.000</b>	3.000	0.375	CRWH1 V	20002		3.189	0.375	CRWA1 R	21267
	3.000	0.375	CRWH1 R	20004		3.189	0.375	CRWA1 V	21269
	3.000	0.375	CRWHA1 R	20005		3.189	0.469	CRWHA1 S	21270
						3.251	0.438	CRWH1 R	21302
	3.061	0.375	CRW1 R	20045					
	3.061	0.500	CRWH1 R	20055		3.350	0.438	CRWH1 R	21336
	3.061	0.500	CRWHA1 R	20059		3.371	0.375	CRWA1 R	21352
						3.371	0.438	CRWH1 R	21353
	3.125	0.375	CRW1 R	20070		3.543	0.438	CRWH1 R	21358
	3.150	0.375	CRW1 R	20079	<b>2.188</b>	2.875	0.438	CRWH1 R	21736
	3.189	0.469	CRWH1 R	20098		2.997	0.438	CRWH1 R	21749
	3.189	0.469	CRWHA1 R	20100					
	3.251	0.438	CRWH1 R	20109		3.000	0.375	CRWA1 R	21759
						3.000	0.375	CRWA1 V	21763
	3.371	0.438	CRW1 V	20122		3.000	0.500	CRWH1 R	21764
	3.371	0.438	CRWH1 R	20124		3.061	0.500	CRWH1 R	21787
	3.371	0.438	CRWHA1 R	20125					
	3.371	0.438	CRWH1 V	20127 <sup>1)</sup>		3.251	0.438	CRWH1 R	21840
						3.350	0.438	CRWH1 R	21890
	3.543	0.438	CRWH1 R	20140		3.371	0.438	CRWH1 R	21910
3.623	0.438	CRWH1 R	20144	<b>2.250</b>	2.875	0.313	CRWA1 R	22328	
4.003	0.438	CRWH1 R	20158		2.891	0.563	CRWA1 R	22347	
<b>2.047</b>	2.561	0.315	CRW1 R	20420					
<b>2.063</b>	2.561	0.313	CRW1 V	20520	2.997	0.438	CRWH1 R	22336	
	2.750	0.313	CRWH1 R	20530 <sup>1)</sup>	2.997	0.438	CRWHA1 R	22340	
	2.842	0.438	CRWH1 R	20538	3.000	0.375	CRW1 R	22353	
	2.875	0.438	CRWH1 R	20554	3.000	0.375	CRWA1 R	22354	
	2.997	0.438	CRWH1 R	20586	3.000	0.375	CRWA1 V	22361	
					3.000	0.375	CRW1 V	22363	
	3.000	0.375	CRW1 R	20594	<b>2.250</b>	3.000	0.438	CRWH1 R	22358
	3.000	0.375	CRWA1 V	20596		3.000	0.438	CRWHA1 R	22359
	3.061	0.313	CRWH1 R	20643		3.000	0.438	CRWH1 V	22367
3.125	0.375	CRW1 R	20659	3.061		0.375	CRW1 R	22382	
3.189	0.375	CRW1 R	20702	3.061	0.438	CRWH1 R	22390		
				3.061	0.438	CRWHA1 R	22391		
3.251	0.438	CRWHA1 R	20747	3.061	0.438	CRWHA1 S	22394		
3.251	0.438	CRWH1 R	20749						
<b>2.125</b>	2.750	0.375	CRW1 V	21063 <sup>1)</sup>	3.125	0.375	CRWA1 R	22400	
	2.750	0.500	CRWA1 R	21061	3.125	0.375	CRWA1 V	22405	
	2.763	0.250	CRW1 R	21069	3.125	0.500	CRWH1 R	22407 <sup>1)</sup>	
	2.875	0.375	CRW1 S	21103	3.189	0.438	CRW1 R	22424	
	2.875	0.438	CRW1 V	21091	3.189	0.438	CRWA1 P	22425	
	2.875	0.438	CRW1 R	21098					
	2.875	0.438	CRWA1 R	21100	3.251	0.375	CRW1 R	22440	
	2.875	0.438	CRWHA1 R	21108	3.251	0.375	CRWA1 R	22441	
	2.997	0.438	CRWH1 R	21134	3.251	0.438	CRWH1 R	22446	
	2.997	0.438	CRWHA1 R	21136	3.251	0.438	CRWHA1 R	22448	
					3.251	0.438	CRWH1 V	22449	
	3.000	0.313	CRWHA1 V	21167					
	3.000	0.375	CRW1 R	21163	3.350	0.375	CRW1 P	22484	
	3.000	0.375	CRWA1 R	21164	3.350	0.438	CRWH1 R	22492 <sup>1)</sup>	
					3.350	0.438	CRWHA1 R	22493	
3.000	0.438	CRWH1 V	21171	3.350	0.438	CRWH1 V	22495		
3.000	0.438	CRWH1 R	21172						
3.000	0.438	CRWHA1 R	21173						

d<sub>1</sub> 2.250–2.750 in



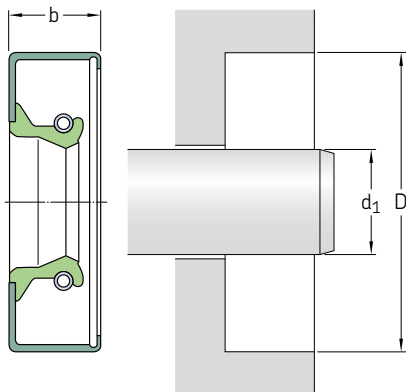
Please see pages 83 to 86 for housing bore requirements.

Dimensions					Designation					
Shaft	Bore	Nominal seal width	Design and lip material	Designation	Shaft	Bore	Nominal seal width	Design and lip material	Designation	
d <sub>1</sub>	D	b			d <sub>1</sub>	D	b			
in			–	–	in			–	–	
<b>2.250 cont.</b>	3.371	0.438	CRWA1 R	22532	<b>2.375 cont.</b>	3.125	0.375	CRW1 R	23646	
	3.371	0.438	CRWH1 R	22558		3.125	0.438	CRWH1 R	23652	
	3.371	0.438	CRWH1 V	22561		3.125	0.438	CRWA1 R	23654	
						3.125	0.438	CRWA1 V	23656	
	3.500	0.438	CRWA1 R	22582		3.189	0.438	CRWH1 R	23666	
	3.500	0.438	CRWH1 R	22583						
	3.500	0.438	CRWA1 V	22590		3.251	0.438	CRWA1 V	23678	
	3.565	0.438	CRWA1 R	22610		3.251	0.453	CRW1 P	23685	
	3.623	0.438	CRWH1 R	22618		3.350	0.375	CRW1 R	23701	
	3.623	0.438	CRWA1 R	22619		3.350	0.375	CRWA1 R	23702	
						3.350	0.375	CRW1 P	23703	
	3.751	0.438	CRWH1 R	22626						
	3.876	0.438	CRWH1 R	22644		3.350	0.375	CRW1 S	23706	
	4.003	0.438	CRWH1 R	22647		3.350	0.438	CRWH1 R	23708	
				3.350	0.438	CRWA1 R	23710			
<b>2.313</b>	2.997	0.375	CRW1 R	23030						
	3.000	0.438	CRWH1 V	23040	3.371	0.438	CRWH1 R	23742		
	3.061	0.313	CRW1 R	23046	3.371	0.438	CRWH1 V	23746		
	3.125	0.375	CRW1 R	23061	3.481	0.438	CRWH1 R	23755		
	3.125	0.375	CRWA1 V	23063	3.481	0.438	CRWA1 R	23756 <sup>1)</sup>		
	3.251	0.438	CRWH1 R	23093	3.500	0.375	CRWA1 P	23770		
	3.251	0.438	CRWA1 V	23099 <sup>1)</sup>	3.500	0.375	CRWH1 V	23771		
					3.500	0.375	CRWH1 R	23779		
	3.350	0.438	CRWH1 R	23152	3.500	0.438	CRWA1 R	23782		
	3.371	0.438	CRW1 R	23167						
	3.374	0.438	CRWA1 R	23169	3.543	0.438	CRWH1 R	23808		
					3.543	0.438	CRWA1 V	23809		
	3.500	0.313	CRW1 R	23184 <sup>1)</sup>						
3.751	0.500	CRW1 R	23277	3.601	0.438	CRW1 R	23820			
				3.623	0.438	CRWH1 R	23839			
<b>2.328</b>	3.000	0.395	CRW1 P	23300	<b>2.375</b>	3.623	0.438	CRWA1 P	23841	
						3.623	0.438	CRWA1 V	23843	
<b>2.375</b>	2.997	0.438	CRWH1 R	23632		3.876	0.438	CRWH1 R	23844	
	3.000	0.375	CRW1 V	23641						
					<b>2.438</b>	3.125	0.500	CRWH1 R	24255	
	3.061	0.438	CRWH1 R	23644		3.251	0.438	CRWH1 R	24263	
	3.061	0.438	CRWH1 P	23645						
3.061	0.438	CRWH1 V	23655							
					3.350	0.375	CRW1 R	24286		
					3.350	0.375	CRWA1 R	24287		
					3.371	0.438	CRWH1 R	24320		
					3.481	0.438	CRWH1 R	24340		

<sup>1)</sup> Without SKF Bore Tite Coating

Dimensions					Dimensions					
Shaft	Bore	Nominal seal width	Design and lip material	Designation	Shaft	Bore	Nominal seal width	Design and lip material	Designation	
d <sub>1</sub>	D	b			d <sub>1</sub>	D	b			
in			–	–	in			–	–	
<b>2.438 cont.</b>	3.500	0.438	CRWH1 R	24370	<b>2.607</b>	3.350	0.375	CRWH1 P	25950	
	3.500	0.438	CRWH1 V	24372		<b>2.625</b>	3.251	0.438	CRWH1 R	26110
	3.543	0.438	CRWH1 R	24445			3.350	0.375	CRW1 V	26122
<b>2.500</b>	3.189	0.438	CRWH1 R	24881	3.350		0.375	CRW1 R	26123	
	3.189	0.438	CRWH1 V	24883	3.350		0.375	CRWA1 R	26124	
	3.245	0.438	CRWH1 R	24889	3.350		0.438	CRW1 R	26128 <sup>1)</sup>	
	3.251	0.375	CRW1 R	24897	3.371		0.438	CRWHA1 R	26153	
	3.251	0.375	CRWA1 R	24898	3.374		0.438	CRWHA1 R	26141	
	3.251	0.375	CRWA1 V	24899	3.481		0.438	CRWH1 R	26163	
	3.251	0.438	CRWH1 R	24910						
	3.251	0.438	CRWHA1 R	24911	3.500		0.375	CRW1 V	26177	
	3.251	0.438	CRWH1 V	24914	3.500		0.375	CRWA1 R	26186	
	3.251	0.438	CRWHA1 V	24916	3.500		0.438	CRWH1 R	26189	
	3.251	0.500	CRW1 V	24913	3.500	0.438	CRWHA1 R	26190		
	3.350	0.438	CRWH1 R	24931	3.500	0.438	CRWA1 P	26191		
	3.350	0.438	CRWHA1 R	24932	3.543	0.438	CRWH1 R	26194		
	3.371	0.375	CRWHA1 R	24934 <sup>1)</sup>	3.623	0.375	CRW1 V	26204		
	3.371	0.438	CRWHA1 V	24936	3.623	0.375	CRWA1 P	26220		
	3.371	0.438	CRWH1 R	24954	3.623	0.375	CRW1 R	26237		
	3.428	0.375	CRWA1 P	24949	<b>2.625</b>	3.623	0.375	CRWA1 R	26238	
	3.428	0.375	CRWA1 R	24951		3.623	0.438	CRWH1 V	26208	
	3.500	0.375	CRWA1 V	24971		3.623	0.438	CRWH1 R	26209	
	3.500	0.438	CRW1 R	24980		3.623	0.438	CRWHA1 R	26211	
	3.500	0.438	CRWA1 R	24982	3.751	0.375	CRWA1 R	26284		
	3.500	0.438	CRWH1 V	24984	3.751	0.438	CRWH1 R	26297		
	3.500	0.438	CRWH1 R	24986	3.751	0.438	CRWHA1 R	26298		
	3.500	0.438	CRWHA1 R	24988	3.751	0.438	CRWHA1 V	26299		
	3.500	0.438	CRWH1 P	24989	3.876	0.438	CRWH1 R	26328		
	3.500	0.438	CRWHA1 V	24990	3.936	0.438	CRWH1 R	26346		
	3.502	0.406	CRW1 S	25082	4.003	0.375	CRWA1 R	26354		
	3.543	0.438	CRWH1 R	25043	4.003	0.438	CRWH1 R	26356		
	3.543	0.438	CRWHA1 P	25065 <sup>1)</sup>						
	3.544	0.433	CRWA1 V	25037	4.370	0.438	CRWHA1 R	26359		
	3.623	0.375	CRW1 R	25074	4.438	0.438	CRWH1 R	26368		
	3.623	0.375	CRWA1 R	25075	<b>2.688</b>	3.751	0.438	CRWH1 R	26761	
	3.623	0.375	CRWA1 V	25076		3.876	0.438	CRWH1 R	26921	
	3.623	0.438	CRWH1 R	25071 <sup>1)</sup>		4.003	0.469	CRWH1 R	26975	
	3.751	0.438	CRWH1 R	25091 <sup>1)</sup>	<b>2.750</b>	3.481	0.438	CRW1 R	27251 <sup>1)</sup>	
	3.876	0.438	CRWH1 R	25100		3.500	0.375	CRW1 R	27268	
	3.876	0.469	CRWHA1 P	25102		3.500	0.375	CRWA1 R	27269	
	4.003	0.375	CRWA1 R	25108		3.500	0.375	CRWA1 V	27272	
	4.003	0.375	CRWA1 V	25110		3.500	0.438	CRWH1 R	27280	
	4.003	0.375	CRWA1 V	25110		3.538	0.438	CRWH1 R	27284	
<b>2.563</b>	3.481	0.500	CRWHA1 R	25561	3.543	0.438	CRWH1 P	27292		
	3.500	0.438	CRWH1 R	25597	3.543	0.438	CRWH1 V	27293		
	3.623	0.438	CRWH1 R	25641	3.543	0.438	CRWHA1 P	27295		
	3.623	0.469	CRWA1 P	25661						
	3.751	0.438	CRWH1 R	25713	3.623	0.438	CRWH1 V	27324		
	3.751	0.438	CRWHA1 R	25714	3.623	0.438	CRWH1 R	27334		
	3.751	0.438	CRWH1 V	25725						
	3.873	0.438	CRWHA1 R	25745 <sup>1)</sup>	3.751	0.438	CRW1 R	27361		
	3.876	0.438	CRWH1 R	25748	3.751	0.438	CRWA1 R	27362		
	3.876	0.438	CRWH1 R	25748	3.751	0.438	CRWH1 V	27365		
<b>2.598</b>	3.481	0.438	CRWHA1 P	25970	3.751	0.438	CRWH1 R	27368		
					3.751	0.438	CRWHA1 R	27370		
					3.751	0.438	CRWA1 P	27377		

d<sub>1</sub> 2.750–3.438 in



Please see pages 83 to 86 for housing bore requirements.

Dimensions		Nominal seal width b	Design and lip material	Designation
Shaft	Bore			
d <sub>1</sub>	D			
in			–	–

<b>2.750</b> cont.	3.765	0.438	CRWH1 R	27426
	3.876	0.433	CRWA1 P	27452
	3.876	0.438	CRWA1 R	27467
	3.876	0.438	CRWH1 R	27470
	3.876	0.438	CRWA1 R	27471
	3.936	0.438	CRWH1 R	27525
	3.937	0.438	CRWA1 P	27526
	4.003	0.375	CRWA1 V	27539
	4.003	0.438	CRWH1 R	27541
	4.003	0.438	CRWA1 P	27565 <sup>1)</sup>
	4.249	0.438	CRWH1 R	27600
	4.249	0.438	CRWA1 P	27601
	4.331	0.500	CRWA1 R	27625
	4.500	0.469	CRWH1 R	28848
<b>2.813</b>	3.751	0.438	CRWH1 R	28035
	3.876	0.438	CRWH1 R	28116
	4.003	0.438	CRWH1 R	28175
	4.249	0.313	CRW1 R	28270
	4.249	0.438	CRWH1 R	28275
4.250	0.438	CRWH1 P	28276	
<b>2.844</b>	3.939	0.500	CRWA1 R	28425
	3.939	0.550	CRWA1 R	28426
	4.003	0.438	CRWH1 R	28464
4.003	0.500	CRWH1 V	28474	
<b>2.875</b>	3.623	0.438	CRWH1 R	28654
	3.623	0.438	CRWA1 R	28655
	3.751	0.375	CRWA1 R	28669
	3.751	0.375	CRWA1 V	28670
	3.751	0.438	CRWH1 R	28686

Dimensions		Nominal seal width b	Design and lip material	Designation
Shaft	Bore			
d <sub>1</sub>	D			
in			–	–

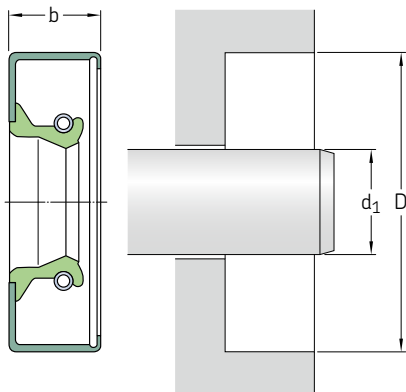
<b>2.875</b> cont.	3.751	0.438	CRWA1 R	28687
	3.751	0.438	CRWH1 P	28697
	3.751	0.438	CRWH1 V	28698
	3.751	0.438	CRWA1 V	28699
	3.876	0.438	CRWH1 R	28745
	3.876	0.438	CRWA1 R	28746
	3.876	0.438	CRWA1 V	28748
	4.003	0.375	CRWA1 R	28778
	4.003	0.375	CRWA1 V	28779
	4.003	0.438	CRWH1 R	28760
	4.003	0.438	CRWA1 R	28761
	4.125	0.375	CRWH1 R	28817
	4.331	0.438	CRWA1 P	28841
	<b>2.938</b>	3.623	0.375	CRW1 R
3.751		0.375	CRW1 R	29223
3.751		0.375	CRWA1 R	29224
3.751		0.375	CRWA1 V	29226
3.876		0.375	CRWA1 R	29263 <sup>1)</sup>
3.876		0.375	CRWA1 V	29262
3.937		0.438	CRWA1 P	29273
4.003		0.438	CRWH1 R	29316
4.003		0.438	CRWA1 R	29393 <sup>1)</sup>
4.003		0.438	CRWA1 P	29350
4.004	0.433	CRWA1 V	29383	
4.125	0.375	CRWH1 R	29184	
4.125	0.375	CRWA1 R	29385	
4.501	0.438	CRWH1 R	29465	
<b>3.000</b>	3.500	0.375	CRW1 V	29841
	3.751	0.375	CRW1 R	29865 <sup>1)</sup>
	3.751	0.375	CRWA1 R	29866
	3.751	0.375	CRWA1 P	29867
	3.751	0.375	CRW1 V	29868
	3.751	0.375	CRWA1 V	29870
	3.751	0.438	CRWH1 R	29871
	3.751	0.438	CRWA1 R	29872

<sup>1)</sup> Without SKF Bore Tite Coating



Dimensions					Dimensions					
Shaft	Bore	Nominal seal width	Design and lip material	Designation	Shaft	Bore	Nominal seal width	Design and lip material	Designation	
d <sub>1</sub>	D	b			d <sub>1</sub>	D	b			
in			–	–	in			–	–	
<b>3.000 cont.</b>	3.876	0.313	CRW1 V	29877	<b>3.250 cont.</b>	4.249	0.375	CRWA1 V	32392	
	3.876	0.438	CRWH1 R	29887		4.249	0.375	CRW1 R	32393	
	3.876	0.469	CRWH1 V	29891		4.249	0.375	CRWA1 R	32395	
						4.249	0.438	CRWH1 P	32380 <sup>1)</sup>	
	4.003	0.375	CRW1 R	29906						
	4.003	0.375	CRWA1 R	29907		4.249	0.438	CRWA1 P	32385	
	4.003	0.375	CRWA1 V	29912		4.249	0.438	CRWH1 R	32396	
	4.003	0.375	CRWH1 P	29950		4.249	0.438	CRWA1 R	32397	
						4.249	0.438	CRWH1 V	32403	
	4.003	0.438	CRWA1 P	29925 <sup>1)</sup>		<b>3.250</b>	4.376	0.438	CRWH1 R	32424
	4.003	0.438	CRWH1 R	29951 <sup>1)</sup>			4.500	0.438	CRWA1 P	32448
	4.003	0.438	CRWA1 R	29952						
	4.003	0.438	CRWH1 V	29958		4.501	0.375	CRW1 R	32477	
	4.125	0.438	CRWH1 R	30000		4.501	0.438	CRWH1 R	32501	
	4.125	0.438	CRWH1 V	30003		4.501	0.438	CRWA1 R	32502	
	4.249	0.438	CRWH1 R	30033 <sup>1)</sup>		4.626	0.433	CRWA1 R	32514 <sup>1)</sup>	
	4.249	0.438	CRWA1 P	30056		4.626	0.438	CRWH1 R	32540	
	4.331	0.438	CRWH1 R	30060						
	4.376	0.438	CRWH1 R	30070		4.718	0.438	CRWH1 R	32555	
				4.751	0.438	CRWH1 R	32560			
4.500	0.438	CRWH1 R	30087							
4.500	0.438	CRWA1 R	30095	4.999	0.438	CRWH1 R	32582			
4.501	0.438	CRWH1 V	30098	4.999	0.438	CRWA1 R	32583			
4.999	0.438	CRWH1 R	30125							
<b>3.125</b>	3.811	0.355	CRW1 V	31132	<b>3.313</b>	4.125	0.438	CRWH1 R	33033	
	3.811	0.355	CRW1 R	31135		4.249	0.438	CRWH1 R	33073	
						4.500	0.438	CRWH1 R	33136	
						4.999	0.438	CRWH1 R	33306	
	4.003	0.375	CRWA1 R	31139	<b>3.375</b>	4.125	0.375	CRW1 R	33645	
	4.003	0.375	CRWA1 V	31152		4.125	0.375	CRWA1 V	34647	
	4.003	0.438	CRWH1 R	31147						
	4.003	0.438	CRWA1 R	31148		4.249	0.438	CRWA1 R	33665	
						4.280	0.406	CRWA1 S	33654	
<b>3.125</b>	4.125	0.375	CRW1 R	31177	4.376	0.375	CRWA1 V	33699		
	4.125	0.375	CRWA1 V	31179	4.376	0.375	CRW1 R	33700		
	4.125	0.438	CRWA1 P	31173	4.376	0.375	CRWA1 R	33701		
	4.125	0.438	CRWA1 S	31185	4.376	0.438	CRWH1 R	33711		
	4.125	0.438	CRWH1 R	31189 <sup>1)</sup>	4.376	0.438	CRWA1 R	33712		
	4.249	0.438	CRWH1 R	31227	4.501	0.438	CRWA1 V	33733		
	4.249	0.438	CRWA1 R	31228	4.501	0.438	CRWH1 R	33735		
	4.249	0.438	CRWA1 V	31237						
					4.626	0.438	CRWH1 R	33772		
				4.626	0.438	CRWA1 R	33773			
				4.626	0.438	CRWA1 V	33775			
				4.686	0.438	CRWH1 R	33807 <sup>1)</sup>			
				4.999	0.438	CRWH1 R	33837 <sup>1)</sup>			
				5.251	0.438	CRWA1 R	33866			
<b>3.150</b>	3.946	0.394	CRW1 V	31511	<b>3.438</b>	4.249	0.375	CRW1 R	34256	
						4.501	0.375	CRWA1 R	34279	
<b>3.188</b>	4.249	0.438	CRWH1 R	31758		4.501	0.438	CRWH1 R	34282	
	4.376	0.438	CRWH1 R	31825		4.501	0.438	CRWA1 R	34283	
	4.501	0.438	CRWH1 R	31855						
	4.626	0.438	CRWH1 R	31870		4.626	0.438	CRWH1 R	34336	
	4.999	0.438	CRWH1 R	31955		4.626	0.438	CRWA1 R	34338	
<b>3.250</b>	3.876	0.375	CRW1 P	32330		4.751	0.438	CRWA1 R	34379	
	4.003	0.375	CRW1 R	32344		4.756	0.438	CRWH1 R	34383	
	4.003	0.375	CRWA1 P	32347	4.876	0.438	CRWH1 R	34398		
				4.999	0.438	CRWH1 R	34407			
				4.999	0.438	CRWA1 R	34408			

d<sub>1</sub> 3.438–4.500 in



Please see pages 83 to 86 for housing bore requirements.

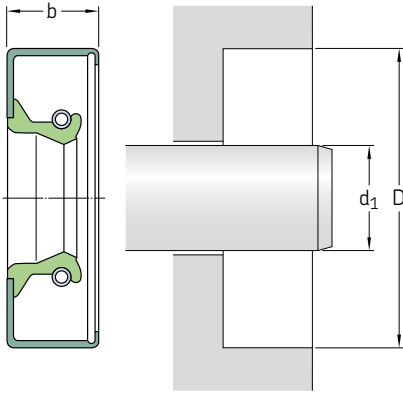
Dimensions		Nominal seal width b	Design and lip material	Designation	
Shaft d <sub>1</sub>	Bore D				
in			–	–	
<b>3.438 cont.</b>	4.249	0.438	CRWA1 V	34857	
	4.376	0.375	CRW1 R	34860	
	4.376	0.375	CRWA1 R	34861	
	4.376	0.375	CRWA1 V	34866	
	4.376	0.433	CRWA1 V	34869	
	4.376	0.438	CRWH1 R	34867	
	4.376	0.438	CRWA1 R	34868	
	<b>3.500</b>	4.501	0.375	CRWA1 V	34883
		4.501	0.375	CRW1 R	34886
		4.501	0.375	CRWA1 R	34887
4.501		0.438	CRWH1 R	34888	
4.501		0.438	CRWA1 R	34889	
4.501		0.438	CRWA1 P	34891 <sup>1)</sup>	
4.501		0.438	CRWH1 V	34892	
4.626		0.438	CRWH1 R	34985	
4.751		0.375	CRWA1 V	35039	
4.751		0.375	CRWA1 P	35040	
4.751	0.438	CRWH1 R	35012		
4.751	0.438	CRWA1 R	35020		
4.751	0.625	CRWH1 R	35029		
4.999	0.438	CRWA1 V	35080		
4.999	0.438	CRWH1 R	35082		
4.999	0.438	CRWA1 P	35083		
5.126	0.438	CRWH1 R	35086		
5.126	0.438	CRWA1 R	35095		
5.251	0.438	CRWH1 R	35096		
<b>3.563</b>	4.501	0.438	CRWH1 R	35556	
	4.626	0.438	CRWH1 R	35593	
	4.751	0.438	CRWH1 R	35649	
	4.876	0.438	CRWH1 R	35676	
	4.999	0.438	CRWH1 R	35716	
<b>3.625</b>	4.376	0.375	CRWA1 V	36153	
	4.376	0.375	CRWA1 R	36155	
	4.376	0.375	CRWH1 R	36157	
	4.376	0.375	CRWH1 P	36158	
	4.501	0.375	CRW1 R	36166	

Dimensions		Nominal seal width b	Design and lip material	Designation
Shaft d <sub>1</sub>	Bore D			
in			–	–
<b>3.625 cont.</b>	4.626	0.375	CRW1 R	36177
	4.626	0.375	CRWA1 V	36179
	4.626	0.438	CRWH1 R	36185
	4.626	0.438	CRWA1 R	36186
	4.751	0.438	CRWH1 R	36220
	4.751	0.500	CRWA1 S	36234
	4.876	0.438	CRWH1 R	36314
	4.999	0.375	CRWA1 V	36359
	4.999	0.375	CRWA1 R	36361
	4.999	0.438	CRWH1 R	36363
4.999	0.438	CRWA1 R	36364	
<b>3.688</b>	5.251	0.375	CRWA1 R	36382
	5.375	0.438	CRWA1 R	36391
	4.501	0.438	CRWA1 R	36740
	4.751	0.438	CRWH1 R	36770
	4.999	0.438	CRWH1 R	36880
<b>3.750</b>	5.126	0.438	CRWA1 R	36895
	5.626	0.438	CRWA1 R	36910
	4.501	0.375	CRW1 R	37327 <sup>1)</sup>
	4.501	0.375	CRW1 V	37328
	4.501	0.469	CRWA1 P	37330
4.502	0.469	CRWA1 V	37332	
4.750	0.438	CRWA1 P	37403	
4.751	0.375	CRW1 P	37387	
4.751	0.375	CRW1 R	37388	
4.751	0.375	CRWA1 R	37389	
4.751	0.438	CRWA1 P	37390	
4.751	0.438	CRWA1 S	37395	
4.751	0.438	CRWH1 R	37396	
4.751	0.438	CRWH1 V	37405	
4.876	0.438	CRWH1 R	37433	
4.999	0.375	CRW1 V	37524	
4.999	0.375	CRW1 R	37525	

<sup>1)</sup> Without SKF Bore Tite Coating

Dimensions					Dimensions				
Shaft	Bore	Nominal seal width	Design and lip material	Designation	Shaft	Bore	Nominal seal width	Design and lip material	Designation
d <sub>1</sub>	D	b			d <sub>1</sub>	D	b		
in			–	–	in			–	–
<b>3.750 cont.</b>	4.999	0.375	CRWA1 R	37526	<b>4.125</b>	4.999	0.438	CRWH1 R	41125
	4.999	0.438	CRWH1 R	37532		4.999	0.438	CRWH1 V	41126 <sup>1)</sup>
	4.999	0.438	CRWA1 R	37533					
	5.251	0.438	CRWH1 R	37574		5.126	0.438	CRWH1 R	41170
	5.251	0.438	CRWH1 V	37577		5.126	0.438	CRWH1 V	41171
<b>3.875</b>	4.751	0.375	CRW1 R	38646		5.251	0.438	CRWH1 R	41185
	4.751	0.375	CRWA1 R	38647		5.251	0.438	CRWH1 V	41186
	4.751	0.375	CRWA1 V	38649		5.501	0.438	CRWH1 R	41265
	4.751	0.438	CRWH1 R	38653		5.501	0.438	CRWH1 V	41266
	4.876	0.438	CRWA1 R	38673		5.751	0.438	CRWH1 R	41287
	4.876	0.500	CRWH1 R	38669		6.001	0.438	CRWH1 R	41305
	4.876	0.500	CRWA1 V	38678		6.001	0.438	CRWH1 V	41307
	4.999	0.375	CRW1 R	38691	<b>4.250</b>	5.251	0.375	CRWA1 R	42419
	4.999	0.375	CRWA1 R	38692		5.251	0.375	CRW1 S	42422
	4.999	0.375	CRWA1 V	38694					
	5.126	0.438	CRWA1 V	38702		5.251	0.438	CRWH1 R	42426
	5.126	0.438	CRWH1 R	38703		5.251	0.438	CRWA1 R	42427
	5.126	0.438	CRWA1 R	38713		5.251	0.438	CRWH1 V	42433
<b>3.875</b>	5.251	0.438	CRWH1 R	38730		5.373	0.438	CRWA1 V	42474
	5.251	0.438	CRWA1 R	38731		5.376	0.438	CRWH1 R	42475
	5.251	0.438	CRWA1 P	38739					
	5.376	0.438	CRWH1 R	38745		5.501	0.438	CRWH1 R	42528
	5.626	0.433	CRWA1 R	38758		5.626	0.438	CRWA1 R	42557
	5.690	0.500	CRWH1 R	38774		5.751	0.438	CRWH1 R	42573
			CRWH1 R	38774		5.876	0.500	CRWH1 V	42592
<b>3.938</b>	4.876	0.438	CRWH1 R	39245		6.001	0.500	CRWH1 R	42616
	4.999	0.438	CRWH1 R	39275		6.126	0.500	CRWH1 R	42635
	4.999	0.438	CRWH1 V	39276		6.250	0.500	CRWH1 R	42644
	4.999	0.438	CRWH1 R	39277	<b>4.313</b>	5.501	0.433	CRWA1 P	43072
				5.501		0.438	CRWA1 R	43073	
	5.126	0.472	CRWA1 V	39304	<b>4.331</b>	5.626	0.472	CRWA1 V	43345
	5.251	0.438	CRWH1 R	39320					
	5.375	0.438	CRWH1 R	39350	<b>4.375</b>	5.376	0.438	CRWH1 R	43650
	5.501	0.438	CRWH1 R	39423		5.501	0.438	CRWH1 R	43691
<b>4.000</b>	4.876	0.438	CRW1 R	39851	5.751	0.438	CRWH1 R	43751	
	4.999	0.375	CRW1 P	39895					
	4.999	0.375	CRWA1 V	39921		6.001	0.500	CRWH1 R	43771
	4.999	0.375	CRW1 R	39922		6.063	0.500	CRWH1 R	541974 <sup>1)</sup>
	4.999	0.375	CRWA1 R	39923		6.250	0.500	CRWH1 R	43820
	4.999	0.438	CRWA1 P	39930	<b>4.438</b>	5.501	0.500	CRWH1 R	44275
	4.999	0.438	CRWH1 V	39932		5.501	0.500	CRWH1 V	44276
						5.751	0.500	CRWH1 R	44295
	4.999	0.438	CRWH1 R	39933		6.001	0.500	CRWH1 R	44320
	4.999	0.438	CRWA1 R	39934		6.250	0.500	CRWH1 R	44350
	4.999	0.438	CRWH1 S	39935	<b>4.477</b>	6.250	0.500	CRWH1 R	44630
	5.126	0.438	CRWH1 R	39975					
	5.251	0.438	CRWH1 V	39996		<b>4.500</b>	5.251	0.438	CRWH1 R
	5.251	0.438	CRWH1 R	39997	5.251		0.438	CRWA1 V	44917
	5.251	0.438	CRWA1 R	40000					
	5.310	0.500	CRWA1 R	40020		5.376	0.438	CRWH1 R	44920
	5.376	0.438	CRWH1 R	40036		5.376	0.438	CRWA1 V	44926
	5.501	0.438	CRWH1 R	40049					
<b>4.000</b>	5.626	0.375	CRWA1 R	40077		5.501	0.375	CRW1 R	44959
	5.626	0.438	CRWH1 R	40078		5.501	0.375	CRWA1 R	44960
	5.751	0.438	CRWH1 R	40108		5.501	0.435	CRWH1 V	44980
	6.001	0.500	CRWH1 R	40138		5.501	0.438	CRWH1 R	44967
	6.250	0.500	CRWH1 R	40158		5.501	0.438	CRWA1 R	44968
						5.501	0.438	CRWH1 V	44973

d<sub>1</sub> 4.500–8.000 in



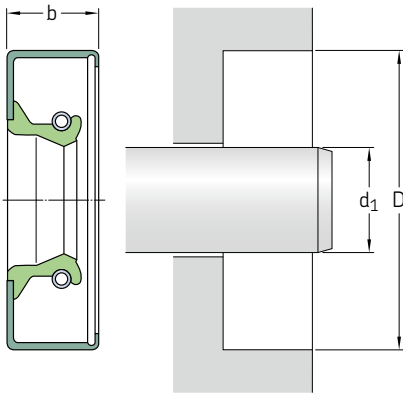
Please see pages 83 to 86 for housing bore requirements.

Dimensions					Designation				
Shaft	Bore	Nominal seal width	Design and lip material	Designation	Shaft	Bore	Nominal seal width	Design and lip material	Designation
d <sub>1</sub>	D	b			d <sub>1</sub>	D	b		
in			–	–	in			–	–
<b>4.500 cont.</b>	5.626	0.438	CRWH1 R	45032	<b>4.813</b>	5.751	0.563	CRWH1 P	48060
	5.626	0.438	CRWHA1 V	45033		5.751	0.563	CRWH1 V	48062
	5.751	0.375	CRWA1 V	45064		5.751	0.563	CRWH1 S	48065
	5.751	0.438	CRWH1 R	45069	<b>4.875</b>	6.001	0.500	CRWH1 V	48692
	5.751	0.438	CRWHA1 R	45070		6.001	0.500	CRWH1 R	48693
	6.126	0.500	CRWH1 R	45110		6.126	0.500	CRWH1 R	48726
	6.001	0.500	CRWHA1 R	45111		6.250	0.500	CRWHA1 R	48768
	6.001	0.500	CRWHA1 V	45112		6.250	0.500	CRWH1 R	48769
	6.001	0.500	CRWHA1 V	45112		6.250	0.500	CRWH1 V	48772
	6.126	0.563	CRWH1 R	45140	<b>4.921</b>	6.375	0.500	CRWHA1 V	49274
	6.250	0.500	CRWH1 R	45150					
<b>4.625</b>	5.626	0.500	CRWH1 R	46144	<b>4.938</b>	6.001	0.500	CRWH1 R	49251
	5.626	0.500	CRWH1 V	46155		6.250	0.500	CRWH1 R	49301
	5.751	0.500	CRWH1 R	46200	<b>5.000</b>	6.001	0.500	CRWHA1 V	49927
	5.751	0.500	CRWH1 S	46208		6.001	0.500	CRWH1 R	49928
	6.001	0.500	CRWH1 R	46285		6.001	0.500	CRWHA1 R	49929
	6.250	0.500	CRWH1 R	46324		6.126	0.500	CRW1 V	49960
<b>4.688</b>	5.751	0.512	CRWH1 S	46770		6.250	0.500	CRWH1 R	49966
	5.751	0.512	CRWH1 R	46800		6.250	0.500	CRW1 R	49984
	6.250	0.500	CRWH1 R	46950		6.250	0.500	CRWA1 R	49985
<b>4.750</b>	5.749	0.438	CRW1 P	47375		6.250	0.500	CRWH1 P	49990 <sup>1)</sup>
	5.751	0.500	CRW1 V	47379		6.250	0.500	CRWH1 V	49991
	5.751	0.500	CRWA1 V	47382		6.250	0.500	CRWHA1 R	49998
	5.751	0.500	CRW1 R	47383		6.375	0.500	CRWH1 R	50130
	5.751	0.500	CRWH1 R	47394		6.375	0.500	CRWHA1 R	50138
	5.751	0.500	CRWHA1 R	47395		6.500	0.500	CRWH1 R	50148
	5.875	0.500	CRWH1 R	47441		6.500	0.500	CRWH1 V	50151
	6.001	0.500	CRWH1 R	47474		6.750	0.500	CRWH1 R	50168
	6.001	0.500	CRWHA1 R	47475		6.750	0.500	CRWHA1 R	50172
	6.001	0.500	CRW1 V	47481					
6.250	0.500	CRWH1 R	47583	<b>5.063</b>	6.126	0.500	CRWH1 R	50618	
6.250	0.500	CRWHA1 V	47586		6.375	0.500	CRWH1 R	50650	
				<b>5.125</b>	6.126	0.500	CRWHA1 R	51240	
					6.126	0.500	CRW1 V	51243	
					6.126	0.500	CRW1 R	51247	

<sup>1)</sup> Without SKF Bore Tite Coating

Dimensions					Dimensions					
Shaft	Bore	Nominal seal width	Design and lip material	Designation	Shaft	Bore	Nominal seal width	Design and lip material	Designation	
d <sub>1</sub>	D	b			d <sub>1</sub>	D	b			
in			–	–	in			–	–	
<b>5.125 cont.</b>	6.250	0.500	CRWA1 R	51252	<b>6.000 cont.</b>	7.500	0.500	CRWA1 R	60016	
	6.250	0.500	CRWA1 V	51253		7.500	0.500	CRWHA1 V	60026	
	6.375	0.500	CRWH1 R	51248 <sup>1)</sup>		7.500	0.500	CRWHA1 R	60028	
	6.375	0.500	CRWH1 V	51255	<b>6.125</b>	7.125	0.625	CRWH1 R	61210 <sup>1)</sup>	
<b>5.188</b>	6.501	0.625	CRWH1 V	51852		7.625	0.625	CRWH1 R	61255 <sup>1)</sup>	
						7.625	0.625	CRWH1 P	61256 <sup>1)</sup>	
<b>5.250</b>	6.001	0.375	CRW1 R	52440	<b>6.250</b>	7.252	0.500	CRWH1 R	62482 <sup>1)</sup>	
	6.001	0.500	CRWH1 V	52443		7.500	0.500	CRWH1 R	62495 <sup>1)</sup>	
	6.250	0.500	CRWH1 R	52445		7.500	0.500	CRWH1 V	62497	
	6.250	0.500	CRWH1 V	52447		7.750	0.500	CRWH1 R	62535	
	6.500	0.500	CRWH1 R	52488		7.875	0.625	CRWH1 R	62572	
	6.500	0.500	CRWH1 V	52489	<b>6.375</b>	7.375	0.625	CRWH1 R	63700	
	6.750	0.500	CRWH1 R	52648			7.875	0.563	CRWHA1 R	63734
	6.750	0.500	CRWH1 V	52649		7.875	0.625	CRWH1 R	63733 <sup>1)</sup>	
<b>5.375</b>	6.625	0.500	CRWH1 R	53701	<b>6.500</b>	7.500	0.500	CRWA1 R	64993	
	6.625	0.500	CRWH1 V	53702		7.500	0.500	CRWH1 R	64994 <sup>1)</sup>	
	6.750	0.500	CRWH1 V	53771		7.500	0.500	CRWH1 V	64998	
	6.750	0.500	CRWH1 R	53775		8.000	0.500	CRW1 R	65021	
<b>5.500</b>	6.250	0.500	CRWA1 R	54925		8.000	0.500	CRWHA1 R	65037 <sup>1)</sup>	
	6.500	0.500	CRWH1 R	54931	<b>6.625</b>	8.125	0.500	CRWH1 R	66241 <sup>1)</sup>	
	6.500	0.500	CRWH1 V	54934		<b>6.750</b>	8.000	0.500	CRWH1 R	67515
	6.500	0.500	CRWH1 P	54936	8.250		0.500	CRWH1 R	67533 <sup>1)</sup>	
	6.750	0.500	CRW1 R	54959	<b>6.875</b>	8.375	0.500	CRWH1 R	68745 <sup>1)</sup>	
	6.750	0.500	CRWA1 R	54960		<b>7.000</b>	8.000	0.630	CRWH1 R	70016
	6.750	0.500	CRWHA1 R	54971	8.250		0.625	CRWH1 R	70028 <sup>1)</sup>	
	6.750	0.500	CRWH1 R	54972						
	6.750	0.500	CRWH1 V	54974						
<b>5.512</b>	6.693	0.472	CRWH1 V	546747 <sup>1)</sup>		8.500	0.500	CRWA1 R	70080	
<b>5.625</b>	6.625	0.500	CRWH1 R	56101		8.500	0.625	CRWH1 R	70052	
	6.625	0.500	CRWH1 V	56102		8.500	0.625	CRWHA1 R	70053	
	6.875	0.500	CRWH1 R	56136		8.500	0.625	CRWHA1 V	70054	
	6.875	0.500	CRWH1 V	56137	<b>7.125</b>	8.625	0.625	CRWH1 R	71245 <sup>1)</sup>	
<b>5.625</b>	7.125	0.500	CRWHA1 R	56160		<b>7.250</b>	8.250	0.625	CRW1 R	72515 <sup>1)</sup>
	7.125	0.500	CRWHA1 V	56161	8.750		0.625	CRWHA1 R	72539	
	7.125	0.500	CRWHA1 P	56161	8.750		0.750	CRWH1 P	72542 <sup>1)</sup>	
<b>5.750</b>	6.625	0.500	CRWH1 R	57505	9.055	0.625	CRWHA1 R	72570		
	6.625	0.500	CRW1 V	57506	<b>7.375</b>	8.875	0.625	CRWH1 R	73745 <sup>1)</sup>	
	6.750	0.500	CRWH1 R	57510		<b>7.500</b>	8.500	0.625	CRWH1 R	75030 <sup>1)</sup>
	6.750	0.500	CRWH1 V	57522			9.000	0.625	CRWH1 R	75050
	6.751	0.500	CRWHA1 R	57509 <sup>1)</sup>	9.000		0.625	CRWHA1 P	75052	
	7.000	0.500	CRWH1 R	57521	<b>7.625</b>	8.625	0.563	CRWH1 R	76215 <sup>1)</sup>	
	7.000	0.500	CRWH1 V	57523		9.125	0.625	CRWH1 R	76255 <sup>1)</sup>	
	7.000	0.500	CRWHA1 R	57531	<b>7.750</b>	9.250	0.625	CRWH1 R	77540 <sup>1)</sup>	
<b>5.875</b>	7.125	0.500	CRWH1 R	58716		<b>7.875</b>	9.250	1.000	CRWHA1 R	78725 <sup>1)</sup>
	7.125	0.500	CRWH1 V	58717	9.375		0.625	CRWH1 R	78738 <sup>1)</sup>	
	7.125	0.500	CRWHA1 R	58741	<b>8.000</b>	9.000	0.625	CRWH1 R	79960 <sup>1)</sup>	
	7.500	0.500	CRWH1 R	58760		9.000	0.625	CRWHA1 R	79961 <sup>1)</sup>	
<b>6.000</b>	6.750	0.500	CRWA1 V	59999			9.250	0.625	CRWH1 R	79997 <sup>1)</sup>
	6.750	0.500	CRW1 V	60000		9.250	0.625	CRWHA1 R	79998	
						9.500	0.625	CRWH1 R	80010	
						10.000	0.625	CRWHA1 R	80038 <sup>1)</sup>	

d<sub>1</sub> 8.125–12.250 in



Please see pages 83 to 86 for housing bore requirements.

Dimensions		Nominal seal width b	Design and lip material	Designation
Shaft d <sub>1</sub>	Bore D			
in		–	–	–
<b>8.125</b>	10.125	0.625	CRWH1 R	81245 <sup>1)</sup>
	10.125	0.625	CRWA1 R	81246 <sup>1)</sup>
<b>8.250</b>	9.250	0.625	CRWH1 R	82510 <sup>1)</sup>
	9.252	0.500	CRWH1 R	82527
	9.500	0.578	CRW1 R	541405 <sup>1)</sup>
	10.250	0.625	CRWH1 R	82560 <sup>1)</sup>
<b>8.500</b>	9.750	0.625	CRWH1 R	85002
	10.000	0.625	CRWH1 R	85009 <sup>1)</sup>
	10.500	0.625	CRWH1 R	85015 <sup>1)</sup>
	10.625	0.625	CRWA1 R	85085 <sup>1)</sup>
<b>8.625</b>	10.625	0.625	CRWH1 R	86260 <sup>1)</sup>
<b>8.750</b>	10.750	0.625	CRWH1 R	87541 <sup>1)</sup>
<b>8.875</b>	10.125	0.625	CRWH1 R	88710 <sup>1)</sup>
	10.875	0.625	CRWH1 R	88760 <sup>1)</sup>
<b>9.000</b>	10.000	0.625	CRWH1 R	90006 <sup>1)</sup>
	11.000	0.625	CRWH1 R	90036 <sup>1)</sup>
<b>9.250</b>	11.250	0.625	CRWA1 R	92536
	12.750	0.625	CRWA1 R	92570 <sup>1)</sup>
	12.750	1.250	CRWA1 R	92574 <sup>1)</sup>
<b>9.500</b>	10.500	0.438	CRW1 R	95048
	11.500	0.625	CRW1 R	95062
<b>9.625</b>	11.625	0.625	CRWH1 R	96245 <sup>1)</sup>
	11.125	0.625	CRWH1 R	97542 <sup>1)</sup>
	11.250	0.625	CRWH1 R	97545 <sup>1)</sup>
	11.750	0.625	CRWH1 R	97550 <sup>1)</sup>
<b>10.000</b>	11.252	0.625	CRWA1 R	100044 <sup>1)</sup>
	12.000	0.625	CRWH1 R	100051 <sup>1)</sup>
	12.000	0.625	CRWA1 R	100075
<b>10.250</b>	11.250	0.563	CRWH1 R	102520 <sup>1)</sup>
	12.250	0.625	CRWH1 R	102540 <sup>1)</sup>

Dimensions		Nominal seal width b	Design and lip material	Designation
Shaft d <sub>1</sub>	Bore D			
in		–	–	–
<b>10.500</b>	11.750	0.625	CRWH1 R	105010 <sup>1)</sup>
	12.500	0.625	CRWH1 R	105051 <sup>1)</sup>
<b>10.750</b>	12.750	0.625	CRWH1 R	107551 <sup>1)</sup>
<b>11.000</b>	12.250	0.625	CRWA1 R	110030 <sup>1)</sup>
	13.000	0.625	CRWH1 R	110051 <sup>1)</sup>
<b>11.375</b>	13.000	0.625	CRW1 R	113740 <sup>1)</sup>
	11.500	13.000	CRWH1 R	115021 <sup>1)</sup>
	13.500	0.625	CRWH1 R	115041 <sup>1)</sup>
<b>12.000</b>	14.000	0.625	CRW1 R	120060 <sup>1)</sup>
<b>12.250</b>	13.375	0.625	CRWH1 R	122555 <sup>1)</sup>
	13.813	0.625	CRW1 R	122580 <sup>1)</sup>
	14.250	1.000	CRWA1 R	122590 <sup>1)</sup>

<sup>1)</sup> Without SKF Bore Tite Coating



# CRW5 and CRWA5 seals

Fig. 7

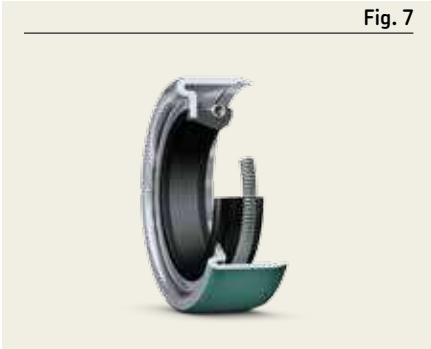
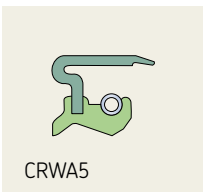
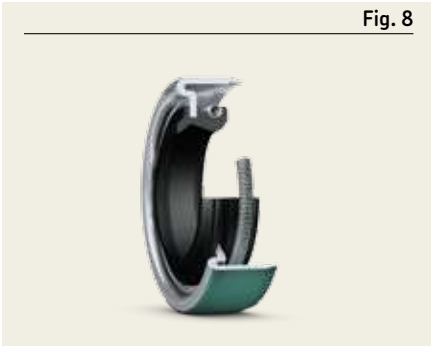


Fig. 8



## Main features

CRW5 and CRWA5 seals are designed to withstand moderate pressure differentials. They have an SKF Wave lip to reduce heat generation and a metal outside diameter for easy installation and a firm and accurate fit in the housing bore. See **pages 68 and 69** for more information on SKF Wave lip design. Most of them have SKF Bore Tite Coating on the outside diameter. The CRWA5 seals have an auxiliary lip, providing additional contaminant exclusion ability. A shoulder or retaining ring should be used at the low-pressure side of the seal to prevent it from being pressed out of the housing bore.

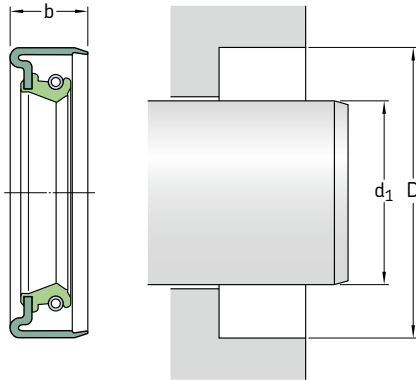
## Design

- **CRW5:** Seal with one steel case, SKF Wave lip and a carbon steel garter spring.
- **CRWA5:** Seal with one steel case, SKF Wave lip, a carbon steel garter spring and an auxiliary, contacting lip.

The CRW5 and CRWA5 seals are available in inch sizes with sealing lips made of either nitrile rubber or the SKF fluoro rubber compound SKF Duralife. Other materials are also available on request.

See **matrix 1** on **pages 104 and 105** for permissible operating conditions.





Please see pages 83 to 86 for housing bore requirements.

Dimensions					Dimensions				
Shaft	Bore	Nominal seal width	Design and lip material	Designation	Shaft	Bore	Nominal seal width	Design and lip material	Designation
$d_1$	D	b			$d_1$	D	b		
in			–	–	in			–	–
<b>0.313</b>	0.686	0.313	CRWA5 R	3094 <sup>1)</sup>	<b>1.000</b>	1.375	0.250	CRWA5 R	9814
	0.749	0.250	CRWA5 R	3101 <sup>1)</sup>		1.499	0.250	CRWA5 R	9843
	0.749	0.250	CRWA5 V	3103 <sup>1)</sup>		1.499	0.250	CRW5 R	9855 <sup>1)</sup>
	0.999	0.313	CRWA5 R	3171 <sup>1)</sup>		1.499	0.250	CRWA5 V	9858
<b>0.375</b>	0.749	0.250	CRW5 R	3689 <sup>1)</sup>		1.500	0.250	CRWA5 R	9863
	1.124	0.375	CRW5 V	3807		1.752	0.313	CRWA5 R	9967
<b>0.500</b>	0.875	0.313	CRWA5 R	4940		2.000	0.313	CRWA5 R	10131
	0.875	0.313	CRWA5 V	4941					
	0.999	0.250	CRWA5 V	4991					
	0.999	0.313	CRWA5 R	4996					
	1.124	0.250	CRWA5 R	5069					
	1.124	0.250	CRWA5 V	5072					
<b>0.625</b>	0.999	0.250	CRWA5 R	6151					
	1.124	0.250	CRW5 R	6191					
	1.124	0.374	CRWA5 V	6231					
	1.124	0.375	CRWA5 R	6229					
	1.126	0.250	CRW5 R	6242					
	1.250	0.313	CRWA5 R	6280 <sup>1)</sup>					
	1.250	0.313	CRWA5 V	6285 <sup>1)</sup>					
	1.375	0.250	CRW5 P	6371					
	1.375	0.375	CRWA5 R	6388					
	1.500	0.313	CRW5 V	6393					
<b>0.750</b>	1.250	0.250	CRWA5 R	7434					
	1.250	0.375	CRWA5 R	7449					
	1.375	0.250	CRWA5 V	7509					
<b>0.875</b>	1.250	0.250	CRWA5 V	8634					
	1.375	0.250	CRWA5 R	8660					
	1.375	0.250	CRWA5 V	8665					
	1.497	0.313	CRWA5 V	8694					
<b>0.984</b>	1.596	0.250	CRWA5 R	9700					
	1.752	0.313	CRWA5 V	9805					

<sup>1)</sup> Without SKF Bore Tite Coating

# HDW1 seals

Fig. 9



## Main features

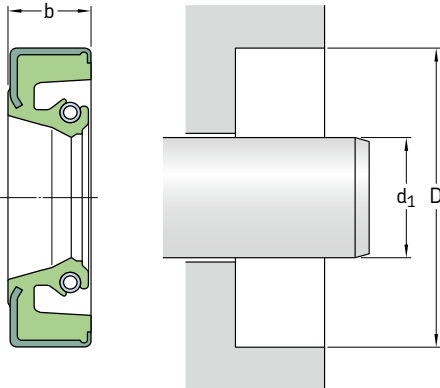
HDW1 seals are heavy-duty SKF Wave lip seals, designed for use in grease or oil lubricated applications. The seals are produced as a standard with a heavy-duty seal body, SKF Bore Tite Coating on the metal outside diameter, SKF Wave lip in nitrile rubber, and a carbon steel garter spring.

The rigid seal body can withstand operating pressures up to 0,24 MPa (35 *psi*), dynamic, and 0,34 MPa (50 *psi*), static, while withstanding shaft speeds up to 25 m/s (4 900 *ft/min*) at shaft diameters < 203 mm (8 *in*).

The HDW1 seals are available in inch sizes.



HDW1



Please see **pages 83 to 86** for housing bore requirements.

Dimensions					Dimensions				
Shaft	Bore	Nominal seal width	Design and lip material	Designation	Shaft	Bore	Nominal seal width	Design and lip material	Designation
d <sub>1</sub>	D	b			d <sub>1</sub>	D	b		
in					in				
<b>5.000</b>	6.125	0.500	<b>HDW1 R</b>	49951	<b>6.875</b>	8.250	0.500	<b>HDW1 R</b>	68730
	7.125	0.500	<b>HDW1 R</b>	50186		8.500	0.500	<b>HDW1 R</b>	68760
<b>5.063</b>	6.125	0.500	<b>HDW1 R</b>	50620	<b>7.125</b>	8.250	0.500	<b>HDW1 R</b>	71220
<b>5.125</b>	6.625	0.500	<b>HDW1 R</b>	51277	<b>7.375</b>	8.375	0.500	<b>HDW1 R</b>	73720
	7.000	0.500	<b>HDW1 R</b>	51330		8.500	0.500	<b>HDW1 R</b>	73730
<b>5.188</b>	6.250	0.500	<b>HDW1 R</b>	51800	<b>7.500</b>	8.750	0.500	<b>HDW1 R</b>	75046
<b>5.250</b>	6.750	0.500	<b>HDW1 R</b>	52651		9.250	0.500	<b>HDW1 R</b>	75069
	7.125	0.500	<b>HDW1 R</b>	52655	<b>7.625</b>	8.875	0.500	<b>HDW1 R</b>	76225
<b>5.313</b>	6.375	0.500	<b>HDW1 R</b>	53100	<b>7.750</b>	8.750	0.500	<b>HDW1 R</b>	77506
<b>5.438</b>	6.625	0.500	<b>HDW1 R</b>	54300	<b>7.875</b>	8.875	0.500	<b>HDW1 R</b>	78710
<b>5.875</b>	6.875	0.500	<b>HDW1 R</b>	58709 <sup>1)</sup>	<b>7.938</b>	9.125	0.500	<b>HDW1 R</b>	79620
	7.000	0.500	<b>HDW1 R</b>	58710					
<b>5.938</b>	7.000	0.500	<b>HDW1 R</b>	59300					
<b>6.000</b>	7.250	0.500	<b>HDW1 R</b>	60009					
<b>6.063</b>	7.500	0.500	<b>HDW1 R</b>	60650					
<b>6.125</b>	7.125	0.500	<b>HDW1 R</b>	61215					
	7.250	0.500	<b>HDW1 R</b>	61230					
	7.375	0.500	<b>HDW1 R</b>	61235					
<b>6.250</b>	7.250	0.500	<b>HDW1 R</b>	62480					
<b>6.375</b>	7.500	0.500	<b>HDW1 R</b>	63717					
<b>6.438</b>	7.500	0.500	<b>HDW1 R</b>	64330					
<b>6.625</b>	7.625	0.500	<b>HDW1 R</b>	66217					
	7.750	0.500	<b>HDW1 R</b>	66219					
	7.875	0.500	<b>HDW1 R</b>	66222					
	8.000	0.500	<b>HDW1 R</b>	66230					
<b>6.750</b>	7.750	0.500	<b>HDW1 R</b>	67510					
	8.750	0.500	<b>HDW1 R</b>	67600					

<sup>1)</sup> Stainless steel garter spring

# CRS1, CRSH1, CRSA1 and CRSHA1 seals

Fig. 10

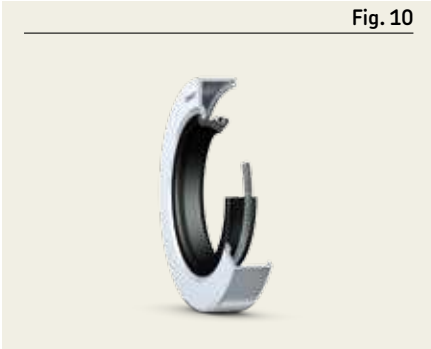
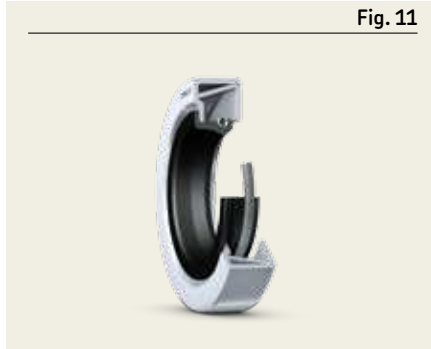


Fig. 11



## Main features

All CRS seals are designed with a metal case and a conventional spring-loaded sealing lip. Some of them have a sealant on the outside diameter to compensate for imperfections in the housing bore.

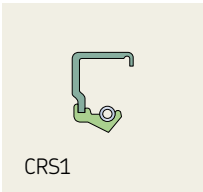
## Design

- **CRS1:** Seal with a single steel case, a conventional sealing lip and a carbon steel garter spring.
- **CRSA1:** Seal with a single steel case, a conventional sealing lip, a carbon steel garter spring and a contacting auxiliary lip.
- **CRSH1:** Seal with a double steel case, a conventional sealing lip and a carbon steel garter spring.
- **CRSHA1:** Seal with a double steel case, a conventional sealing lip, a carbon steel garter spring and a contacting auxiliary lip.

CRS seals are available with sealing lips made of nitrile rubber for general-purpose applications and of fluoro rubber, providing improved high temperature and chemical resistance.

See **matrix 1** on **pages 104** and **105** for permissible operating conditions.

CRS1



CRSH1



Fig. 12

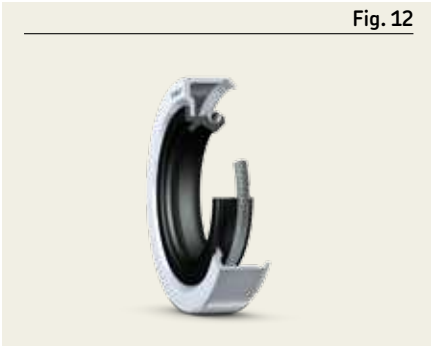


Fig. 13

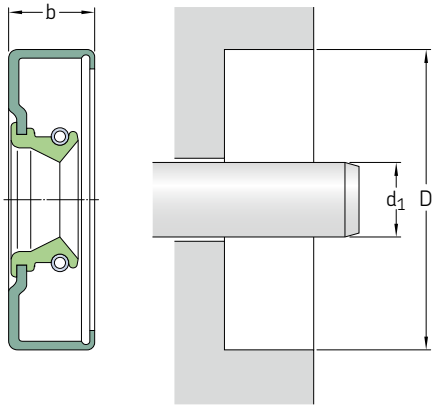


CRSA1



CRSHA1



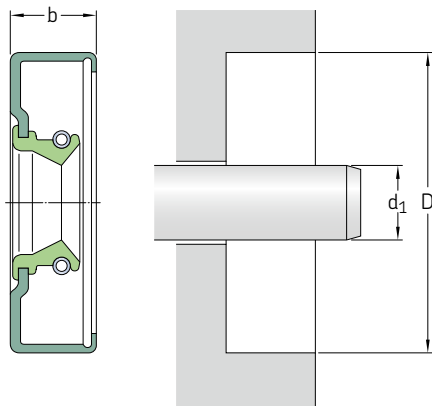


Please see **pages 83 to 86** for housing bore requirements.

Dimensions					Dimensions				
Shaft	Bore	Nominal seal width	Design and lip material	Designation	Shaft	Bore	Nominal seal width	Design and lip material	Designation
$d_1$	D	b			$d_1$	D	b		
mm					mm				
12	20	5	CRSA1 R	12×20×5 CRS1 R	40	55	10	CRS1 R	40×55×10 CRS1 R
13	28	7	CRS1 R	13×28×7 CRS1 R		60	10	CRSA1 R	40×60×10 CRS1 R
19	37	10	CRS1 V	19×37×10 CRS1 V	42	62	10	CRS1 R	42×62×10 CRS1 R
20	30	5	CRS1 R	20×30×5 CRS1 R	43	62	10	CRSH1 R	43×62×10 CRSH1 R
	30	7	CRS1 V	20×30×7 CRS1 V	45	58	9	CRSA1 R	45×58×9 CRS1 R
	32	7	CRS1 V	20×32×7 CRS1 V		62	7	CRSA1 R	45×62×7 CRS1 R
	42	7	CRS1 V	20×42×7 CRS1 V	48	70	9	CRSA1 R	48×70×9 CRS1 R
22	32	7	CRS1 V	22×32×7 CRS1 V	50	62	7	CRS1 R	50×62×7 CRS1 R
24	38	10	CRS1 R	24×38×10 CRS1 R		62	10	CRS1 R	50×62×10 CRS1 R
25	32	7	CRSA1 R	25×32×7 CRS1 R		85	13	CRSH1 R	50×85×13 CRSH1 R
	47	10	CRSA1 V	25×47×10 CRS1 V	54	72	10	CRSA1 R	54×72×10 CRS1 R
	52	7	CRS1 R	25×52×7 CRS1 R		80	10	CRSH1 R	54×80×10 CRSH1 R
26	35	7	CRS1 R	26×35×7 CRS1 R	57	72	10	CRSH1 R	57×72×10 CRSH1 R
	42	8	CRS1 R	26×42×8 CRS1 R	58	85	13	CRSH1 R	58×85×13 CRSH1 R
27	37	7	CRS1 V	27×37×7 CRS1 V	59	75	10	CRSA1 R	59×75×10 CRS1 R
	41	10	CRSH1 R	27×41×10 CRSH1 R	60	70	7	CRS1 R	60×70×7 CRS1 R
28	62	12	CRSH1 R	28×62×12 CRSH1 R		78	9	CRS1 R	60×78×9 CRS1 R <sup>1)</sup>
30	45	8	CRS1 V	30×45×8 CRS1 V		80	10	CRSHA1 R	60×80×10 CRSHA1 R
	52	9	CRSH1 R	30×52×9 CRSH1 R		90	10	CRSH1 R	60×90×10 CRSH1 R
32	46	8	CRS1 R	32×46×8 CRS1 R	62	75	10	CRS1 R	62×75×10 CRS1 R
34	52	10	CRS1 R	34×52×10 CRS1 R	66	80	8,9	CRSHA1 R	66×80×9 CRSHA1 R
	54	11	CRS1 R	34×54×11 CRS1 R		85	10	CRSHA1 R	66×85×10 CRSHA1 R
35	64	8	CRSA1 P	35×64×8 CRSA1 P		90	13	CRSH1 R	66×90×13 CRSH1 R
	65	12	CRSA1 R	35×65×12 CRSA1 R	68	85	10	CRS1 R	68×85×10 CRS1 R
36	46	9	CRS1 R	36×46×9 CRS1 R	74	100	13	CRSH1 R	74×100×13 CRSH1 R
	56	10	CRS1 R	36×56×10 CRS1 R	75	115	13	CRSH1 R	75×115×13 CRSH1 R
37	55	10	CRSH1 R	37×55×10 CRSH1 R	80	100	13	CRSA1 R	80×100×13 CRS1 R
						125	13	CRSH1 R	80×125×13 CRSH1 R

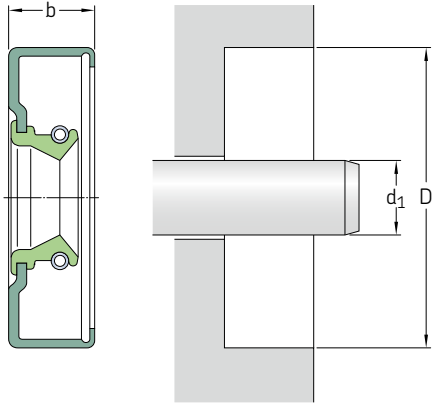
<sup>1)</sup> Sealant on outside diameter

d<sub>1</sub> 85–260 mm



Please see pages 83 to 86 for housing bore requirements.

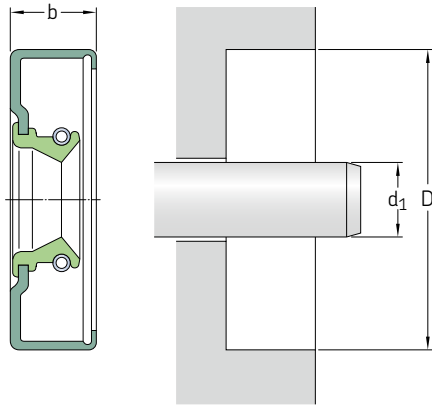
Dimensions					Design and lip material				
Shaft	Bore	Nominal seal width	Design and lip material	Designation	Shaft	Bore	Nominal seal width	Design and lip material	Designation
d <sub>1</sub>	D	b			d <sub>1</sub>	D	b		
mm			–	–	mm			–	–
85	100	9	CRS1 R	85×100×9 CRS1 R	154	175	13	CRSA1 R	154×175×13 CRSA1 R
88	110	13	CRSH1 R	88×110×13 CRSH1 R	160	185	13	CRSA1 V	160×185×13 CRSA1 V
90	125	13	CRSH1 R	90×125×13 CRSH1 R	168	200	15	CRSH1 R	168×200×15 CRSH1 R
95	110	9	CRS1 R	95×110×9 CRS1 R	170	190	15	CRSH1 R	170×190×15 CRSH1 R
100	120	13	CRSH1 R	100×120×13 CRSH1 R	180	200	12	CRS1 R	180×200×12 CRS1 R
105	125	12	CRS1 R	105×125×12 CRS1 R		215	16	CRS1 R	180×215×16 CRS1 R
107	123	11	CRSA1 R	107×123×11 CRSA1 R		220	16	CRSA1 R	180×220×16 CRSA1 R
108	130	13	CRSH1 R	108×130×13 CRSH1 R	190	215	16	CRSH1 R	190×215×16 CRSH1 R
113	140	13	CRSH1 R	113×140×13 CRSH1 R	195	230	15	CRSH1 R	195×230×15 CRSH1 R
115	160	15	CRSH1 R	115×160×15 CRSH1 R	200	250	15	CRSH1 R	200×250×15 CRSH1 R
120	150	15	CRSH1 R	120×150×15 CRSH1 R	260	300	20	CRS1 R	260×300×20 CRS1 R
125	146	14	CRSA1 P	125×146×14 CRSA1 P					
126	147	11	CRSA1 R	126×147×11 CRSA1 R					
130	150	10	CRSA1 R	130×150×10 CRSA1 R					
	150	14	CRSA1 R	130×150×14 CRSA1 R					
	155	10	CRSH1 R	130×155×10 CRSH1 R					
	160	13	CRS1 R	130×160×13 CRS1 R					
	160	13	CRSA1 R	130×160×13 CRSA1 R					
	165	13	CRSH1 R	130×165×13 CRSH1 R					
135	160	13	CRSH1 R	135×160×13 CRSH1 R					
	170	15	CRSH1 R	135×170×15 CRSH1 R					
138	152	12	CRSA1 R	138×152×12 CRSA1 R					
145	164	14	CRSA1 R	145×164×14 CRSA1 R					
	175	14	CRS1 R	145×175×14 CRS1 R					
150	170	15	CRSH1 R	150×170×15 CRSH1 R					
	180	13	CRSH1 R	150×180×13 CRSH1 R					
	200	15	CRSH1 R	150×200×15 CRSH1 R					



Dimensions					Dimensions				
Shaft	Bore	Nominal seal width	Design and lip material	Designation	Shaft	Bore	Nominal seal width	Design and lip material	Designation
$d_1$	D	b			$d_1$	D	b		
in			–	–	in			–	–
<b>0.531</b>	1.124	0.313	CRSA1 R	<b>5334</b>	<b>1.399</b>	2.292 2.292	0.469 0.500	CRSA1 R CRSA1 R	<b>13992<sup>1)</sup></b> <b>13990<sup>1)</sup></b>
<b>0.594</b>	1.250 1.375	0.313 0.313	CRSA1 R CRSA1 R	<b>5950</b> <b>5966<sup>1)</sup></b>	<b>1.414</b>	2.250	0.250	CRSHA1 R	<b>14035<sup>1)</sup></b>
<b>0.669</b>	1.339	0.311	CRSA1 P	<b>6992</b>	<b>1.469</b>	2.374	0.375	CRSA1 R	<b>14641<sup>1)</sup></b>
<b>0.709</b>	1.339	0.315	CRSA1 P	<b>7089</b>	<b>1.491</b>	2.191	0.250	CRSA1 R	<b>14780</b>
<b>0.781</b>	1.752	0.313	CRSHA1 R	<b>8213</b>	<b>1.500</b>	2.996 3.000	0.500 0.375	CRSH1 R CRSA1 R	<b>15240</b> <b>15241</b>
<b>0.844</b>	1.828	0.313	CRSA1 R	<b>8485</b>	<b>1.524</b>	2.374	0.500	CRSH1 R	<b>15343</b>
<b>0.945</b>	1.575	0.315	CRS1 R	<b>9515</b>	<b>1.563</b>	2.716	0.469	CRSH1 R	<b>15748<sup>1)</sup></b>
<b>0.969</b>	2.048	0.375	CRS1 R	<b>9688<sup>1)</sup></b>	<b>1.618</b>	2.575	0.500	CRSA1 R	<b>16404<sup>1)</sup></b>
<b>1.125</b>	2.835 2.875	0.375 0.469	CRSA1 R CRSH1 R	<b>11405<sup>1)</sup></b> <b>11410<sup>1)</sup></b>	<b>1.625</b>	2.437 2.835 3.062 3.251	0.469 0.469 0.500 0.500	CRSHA1 R CRSH1 R CRSH1 R CRSH1 R	<b>16121</b> <b>16386</b> <b>16431<sup>1)</sup></b> <b>16440<sup>1)</sup></b>
<b>1.156</b>	2.125	0.438	CRSH1 R	<b>11566<sup>1)</sup></b>	<b>1.656</b>	2.502	0.500	CRSH1 R	<b>16532<sup>1)</sup></b>
<b>1.219</b>	2.000	0.438	CRSH1 R	<b>12131<sup>1)</sup></b>	<b>1.688</b>	2.374 2.835	0.313 0.469	CRSA1 R CRSA1 R	<b>16669</b> <b>16960</b>
<b>1.250</b>	2.561 2.713 3.156	0.500 0.469 0.500	CRSH1 R CRSH1 R CRSH1 R	<b>12655</b> <b>12660<sup>1)</sup></b> <b>12678</b>	<b>1.705</b>	3.084	0.500	CRS1 R	<b>17053</b>
<b>1.301</b>	2.000	0.438	CRSA1 P	<b>12905</b>	<b>1.719</b>	2.623	0.500	CRSH1 R	<b>17136<sup>1)</sup></b>
<b>1.313</b>	1.874 2.000 2.106 2.996	0.375 0.313 0.375 0.500	CRSA1 R CRSA1 R CRSA1 R CRSH1 R	<b>13027<sup>1)</sup></b> <b>13037<sup>1)</sup></b> <b>13084<sup>1)</sup></b> <b>13275<sup>1)</sup></b>	<b>1.750</b>	2.328 3.154 3.937	0.438 0.313 0.313	CRS1 R CRS1 R CRSA1 R	<b>17257</b> <b>17726</b> <b>17771<sup>1)</sup></b>
<b>1.328</b>	2.312	0.433	CRS1 R	<b>13419<sup>1)</sup></b>	<b>1.781</b>	2.750 2.758	0.500 0.500	CRSH1 R CRSH1 R	<b>17847</b> <b>17851<sup>1)</sup></b>
<b>1.362</b>	2.191	0.250	CRS1 P	<b>13500</b>	<b>1.844</b>	2.502 2.750	0.375 0.375	CRSA1 R CRSA1 R	<b>18412<sup>1)</sup></b> <b>18446<sup>1)</sup></b>
<b>1.375</b>	2.750 3.000 3.125 3.350	0.500 0.500 0.500 0.469	CRSH1 R CRSHA1 R CRSH1 R CRSH1 R	<b>13906<sup>1)</sup></b> <b>13937</b> <b>13936</b> <b>13934<sup>1)</sup></b>	<b>1.875</b>	3.125	0.313	CRSA1 R	<b>18879<sup>1)</sup></b>

<sup>1)</sup> Sealant on outside diameter

d<sub>1</sub> 1.889–7.000 in



Please see pages 83 to 86 for housing bore requirements.

Dimensions					Dimensions				
Shaft	Bore	Nominal seal width	Design and lip material	Designation	Shaft	Bore	Nominal seal width	Design and lip material	Designation
d <sub>1</sub>	D	b			d <sub>1</sub>	D	b		
in			–	–	in			–	–
<b>1.889</b>	3.110	0.688	CRSA1 P	<b>18983</b>	<b>3.298</b>	4.125	0.563	CRSA1 R	<b>32815<sup>1)</sup></b>
<b>1.890</b>	2.874	0.276	CRSA1 P	<b>18979</b>	<b>3.469</b>	4.626	0.625	CRSA1 R	<b>34700</b>
<b>1.906</b>	3.189	0.313	CRSA1 P	<b>19062</b>	<b>3.500</b>	5.751	0.563	CRSH1 R	<b>35111<sup>1)</sup></b>
<b>1.938</b>	2.762	0.500	CRSA1 R	<b>19273<sup>1)</sup></b>	<b>3.504</b>	4.173	0.354	CRSA1 V	<b>35120</b>
	2.825	0.500	CRSH1 P	<b>19274</b>	<b>3.813</b>	4.999	0.469	CRSH1 R	<b>38160</b>
	3.751	0.500	CRSH1 R	<b>19466<sup>1)</sup></b>		5.251	0.469	CRSH1 R	<b>38220<sup>1)</sup></b>
<b>1.969</b>	2.638	0.354	CRSA1 R	<b>19628</b>	<b>3.875</b>	5.501	0.500	CRSHA1 R	<b>38749<sup>1)</sup></b>
	2.686	0.500	CRSH1 R	<b>19615</b>		5.751	0.563	CRSH1 R	<b>38810</b>
	2.742	0.500	CRSH1 P	<b>19620</b>	<b>3.898</b>	4.680	0.370	CRSA1 VR	<b>38770</b>
	2.875	0.469	CRSH1 R	<b>19643</b>	<b>4.188</b>	4.999	0.469	CRSHA1 R	<b>41751</b>
<b>2.008</b>	2.953	0.354	CRSA1 P	<b>20012</b>		5.251	0.469	CRSH1 R	<b>41761</b>
<b>2.063</b>	2.875	0.375	CRSA1 R	<b>550085<sup>1)</sup></b>		5.751	0.500	CRSHA1 R	<b>41833</b>
<b>2.125</b>	3.623	0.469	CRSA1 P	<b>21379</b>	<b>4.313</b>	5.751	0.500	CRSH1 R	<b>43231</b>
<b>2.145</b>	3.188	0.469	CRSH1 R	<b>21538</b>	<b>4.563</b>	5.751	0.500	CRSHA1 R	<b>45550</b>
<b>2.188</b>	3.623	0.500	CRSHA1 R	<b>21950</b>		6.250	0.500	CRSH1 R	<b>45560</b>
<b>2.432</b>	3.070	0.227	CRSA1 P	<b>24110</b>	<b>5.000</b>	7.000	0.500	CRSHA1 R	<b>50185</b>
<b>2.563</b>	3.500	0.500	CRSHA1 P	<b>25587</b>		7.500	0.500	CRSHA1 R	<b>50195</b>
<b>2.648</b>	3.812	0.500	CRS1 R	<b>26877</b>	<b>5.125</b>	6.500	0.500	CRSHA1 R	<b>51276</b>
<b>2.750</b>	4.125	0.438	CRS1 P	<b>27576<sup>1)</sup></b>	<b>5.313</b>	6.500	0.500	CRSHA1 R	<b>53151</b>
	4.125	0.563	CRSA1 R	<b>27577</b>	<b>5.375</b>	6.374	0.500	CRSHA1 R	<b>53688<sup>1)</sup></b>
<b>2.875</b>	3.434	0.294	CRSA1 R	<b>28646<sup>1)</sup></b>		6.499	0.563	CRSH1 R	<b>53692</b>
<b>2.913</b>	3.543	0.394	CRS1 P	<b>29105</b>	<b>5.500</b>	6.626	0.563	CRSHA1 R	<b>54949</b>
<b>3.125</b>	3.936	0.512	CRSA1 V	<b>31144<sup>1)</sup></b>		6.876	0.563	CRSHA1 R	<b>55157</b>
<b>3.250</b>	3.876	0.375	CRSA1 V	<b>32332<sup>1)</sup></b>		7.501	0.563	CRSH1 R	<b>55179</b>
	4.125	0.563	CRSH1 R	<b>32362<sup>1)</sup></b>	<b>5.750</b>	6.876	0.563	CRSHA1 R	<b>57519</b>
						7.126	0.563	CRSHA1 R	<b>57578</b>
						7.502	0.563	CRSHA1 R	<b>57584</b>

<sup>1)</sup> Sealant on outside diameter



Dimensions		Nominal seal width b	Design and lip material	Designation
Shaft	Bore			
$d_1$	D			
in			–	–
<b>6.000</b>	7.002	0.500	CRSHA1 R	<b>60006<sup>1)</sup></b>
<b>6.062</b>	6.772	0.551	CRSA1 R	<b>60620</b>
<b>6.125</b>	7.502	0.563	CRSHA1 R	<b>61248<sup>1)</sup></b>
<b>6.188</b>	7.500	0.563	CRSH1 P	<b>61740</b>
<b>7.000</b>	8.375	0.625	CRSHA1 R	<b>70034</b>

<sup>1)</sup> Sealant on outside diameter

# PTFE radial shaft seals



## Main features

Radial shaft seals with one or more PTFE sealing lip(s) are designed to withstand aggressive environments, high temperatures, high pressures and dry running that traditional radial shaft seals made of elastomeric sealing lip materials cannot withstand. Many of the PTFE compounds are FDA approved. Main advantages of PTFE seals include:

- High chemical resistance
- Withstand speeds up to 30 m/s (5 900 ft/min)
- Wide operating temperature range,  $-70$  to  $+250$  °C ( $-95$  to  $+480$  °F)
- Withstand pressures up to 3,5 MPa (500 psi)
- Withstand dry running

## Assortment

The profiles shown here are a selection of the most commonly used SKF seal designs with sealing lips made of PTFE. They can be installed in existing housing grooves where traditional radial seals are used, provided that the grooves are manufactured in accordance with international standards.

There are two main executions of PTFE seals: those with a metal case and those without a metal case. The metal case can be made of steel, aluminium or any of the stainless steel materials SS 304, SS 316 and SS 316 Ti. The PTFE material should be selected based on the needs of the application.

PTFE seals without a metal case can be designed with an O-ring in the outside diameter groove to provide static sealing ability. Both the PTFE and O-ring material can be selected to meet the demands of different operating conditions, e.g. in the food industry to enable disassembly of the equipment for cleaning.

## PTFE materials

The selection of sealing materials typically requires a compromise between advantages and disadvantages. There are hundreds of different PTFE materials with a variety of fillers. Common fillers include glass fibre, carbon, graphite, molybdenum disulphide, metal oxides and various polymers. Each possesses different properties, appropriate for different applications and service conditions. Common to all filled PTFE materials are their improved resistance to wear and deformation.

Unfilled PTFE provides, in most cases, a lower coefficient of friction than a filled PTFE material and the lowest degree of wear of the seal counterface. However, a sealing lip made of an unfilled PTFE material has limited resistance to wear and deformation under load.

The PTFE materials that SKF most often recommends are listed in **table 3** on **page 156**.

In addition to PTFE-based compounds, SKF also offers radial shaft seals in other modified plastics, some of which are listed in **table 4** on **page 157**.

Selecting the appropriate material for the metal case and the O-ring(s) is also of significant importance to achieving satisfactory sealing performance. Contact SKF for more information.



## Installation

Special care must be taken during handling and installation of PTFE seals. For more information, refer to **pages 96 and 97**.

## Size range and availability

The majority of PTFE radial shaft seals from SKF are made to order to meet the demands of each application. There are, however, certain standard sizes within the ranges of approximately 6 to 200 mm (*0.250 to 8 in*) shaft diameter and approximately 16 to 230 mm (*0.630 to 9 in*) bore diameter. Contact SKF for more information regarding designs and sizes.

Table 3

Material family	Description	Shaft hardness recommended <sup>1)</sup>
<b>PTFE, unfilled</b>	“Virgin” PTFE. FDA approved. Low-friction material. Used for general non-pressure applications on shafts with low hardness value. Excellent for cryogenics.	A
<b>PTFE + glass</b>	FDA approved. Glass can be in the form of beads or fibres. Glass is exceptionally strong and prolongs the life of the base PTFE. Due to its inherent hardness, it also adds an abrasive property and is not recommended on low-hardness shafts.	C
<b>PTFE + MoS<sub>2</sub></b>	Molybdenum disulphide (MoS <sub>2</sub> ) adds wear resistance to the base PTFE. Not as abrasive as glass.	C
<b>PTFE + glass + MoS<sub>2</sub></b>	Improved elongation characteristics and less abrasive to running surfaces compared to PTFE + glass.	C
<b>PTFE + carbon</b>	Carbon can be in the form of various grades of fibres or graphite powder, either natural or synthetic. Carbon is an excellent natural lubricant and provides wear resistance to enhance the low-friction base PTFE material. Increased percentage of carbon will increase the wear, creep, and extrusion resistance and improve performance in steam and chemical service at elevated temperatures and pressures.	A, B, C
<b>PTFE + carbon + MoS<sub>2</sub></b>	Excellent wear rate in non-lubricated services at high temperatures.	B, C
<b>PTFE + bronze</b>	Suitable for high-speed dynamic sealing of hydraulic media. Should not be used in chemical service, which could attack the bronze.	
<b>PTFE + bronze + MoS<sub>2</sub></b>	High degree of wear and extrusion resistance in high-pressure applications.	
<b>PTFE + polymer</b>	Polymers, such as polyoxybenzoate, polyimide and many others improve creep and wear resistance.	A, B, C
<b>PTFE + organic pigment</b>	FDA and / or USDA 3A approved.	

<sup>1)</sup> Material selection recommendations for counterface hardness ratings (Rockwell C scale) combined with surface speed. For material selection, please see **table 5** on **page 157**

Table 4

**Modified plastic materials**

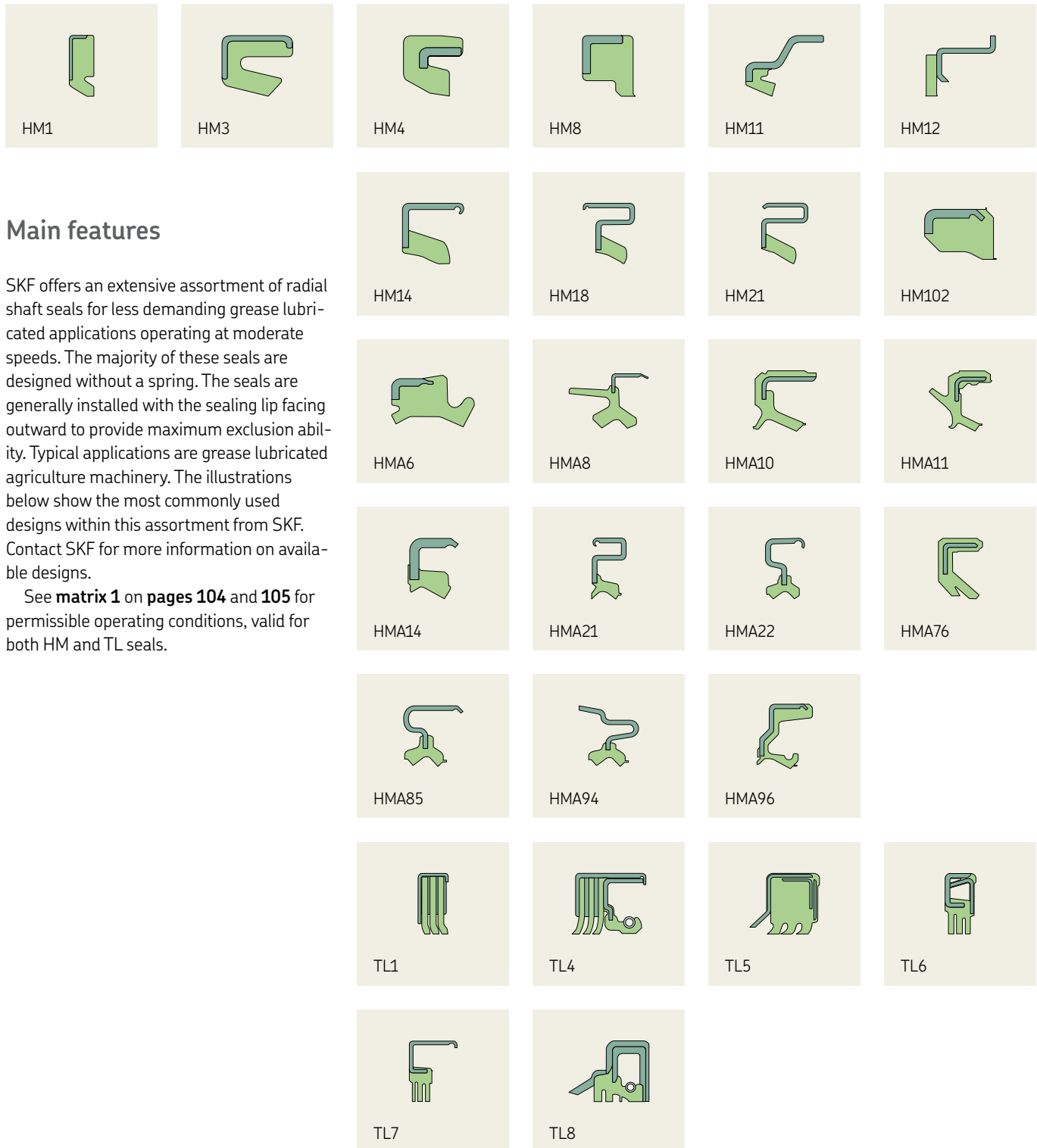
<b>UHMWPE</b>	Ultra-high molecular weight polyethylene. Significantly improved wear and abrasion resistance compared to PTFE-based materials in non-lubricated or abrasive media. FDA and USDA 3A approved. Fair media compatibility, limited to approximately 90 °C (195 °F).
<b>PA</b>	Polamide. Improved strength, limited media compatibility and temperature resistance. Hygroscopic. Used for plain bearings, bushings, back-up rings and some seals.
<b>POM</b>	Polyoxymethylene (a.k.a. polyacetal or just acetal). Similar to nylon but with significantly reduced water-absorption properties. Some grades are FDA and USDA 3A compliant. Typically used for plain bearings, bushings, and back-up rings.
<b>PETP</b>	Polyethylene-terephthalate. Similar to POM but offers improved media compatibility and improved wear resistance.
<b>PEEK</b>	Polyetheretherketone. Similar strength properties as PA and POM but with very good media compatibility and significantly better temperature properties. Some grades are FDA and USDA 3A compliant. Used for plain bearings, bushings, back-up rings and some seals.
<b>PPS</b>	Polyphenylene sulphide. Similar strength properties and chemical compatibility as PEEK-based compounds but offers improved wear resistance. Has better temperature capabilities than PA or POM materials but not as good as PEEK. Adding fillers can create a "bearing-grade" PPS for high-performance applications.
<b>PI</b>	Polyimide. Exceptional mechanical, thermal and chemical resistance properties.

Table 5

**Material selection with shaft hardness + velocity**

Surface speed	< 30 HRC	45 HRC	≥ 58 HRC
Low	A or B	A, B, C	A, B, C
Medium	A	A, B	A, B, C
High	A	A, B	A, B

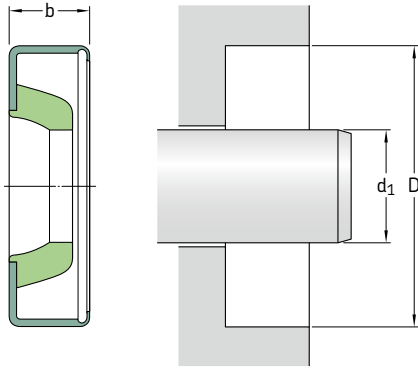
# HM and TL seals for grease lubricated applications



## Main features

SKF offers an extensive assortment of radial shaft seals for less demanding grease lubricated applications operating at moderate speeds. The majority of these seals are designed without a spring. The seals are generally installed with the sealing lip facing outward to provide maximum exclusion ability. Typical applications are grease lubricated agriculture machinery. The illustrations below show the most commonly used designs within this assortment from SKF. Contact SKF for more information on available designs.

See **matrix 1** on **pages 104 and 105** for permissible operating conditions, valid for both HM and TL seals.

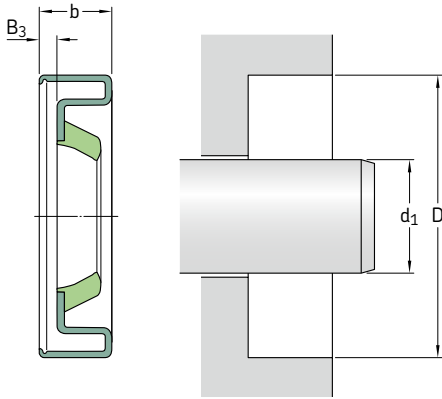


Please see pages 83 to 86 for housing bore requirements.

Dimensions		Nominal seal width b	Design and lip material	Designation	Dimensions		Nominal seal width b	Design and lip material	Designation
Shaft $d_1$	Bore D				Shaft $d_1$	Bore D			
mm			–	–	mm		–	–	
6	12	2	HM3 R	6×12×2 HM3 R	25	32	4	HM4 R	25×32×4 HM4 R
8	12	3	HM4 R	8×12×3 HM4 R		33	4	HM4 R	25×33×4 HM4 R
						35	4	HM4 R	25×35×4 HM4 R
9	13	3	HM4 R	9×13×3 HM4 R	26	34	4	HM4 R	26×34×4 HM4 R
10	14	3	HM4 R	10×14×3 HM4 R	28	35	4	HM4 R	28×35×4 HM4 R
	16	4	HM102 R	10×16×4 HM102 R		35	6	HM102 R	28×35×6 HM102 R
						37	4	HM4 R	28×37×4 HM4 R
12	16	3	HM4 R	12×16×3 HM4 R	30	37	4	HM4 R	30×37×4 HM4 R
	18	3	HM4 R	12×18×3 HM4 R		40	4	HM4 R	30×40×4 HM4 R
	19	3	HM4 R	12×19×3 HM4 R					
	22	4	HM4 R	12×22×4 HM4 R	32	42	4	HM4 R	32×42×4 HM4 R
14	20	3	HM4 R	14×20×3 HM4 R	35	42	4	HM4 R	35×42×4 HM4 R
	22	3	HM4 R	14×22×3 HM4 R		45	4	HM4 R	35×45×4 HM4 R
15	21	3	HM4 R	15×21×3 HM4 R		47	5	HM4 R	35×47×5 HM4 R
	23	3	HM4 R	15×23×3 HM4 R	37	47	4	HM4 R	37×47×4 HM4 R
	25	5	HMA10 R	15×25×5 HMA10 R	38	48	4	HM4 R	38×48×4 HM4 R
16	22	3	HM4 R	16×22×3 HM4 R	40	47	4	HM4 R	40×47×4 HM4 R
	22	4	HM4 R	16×22×4 HM4 R		50	4	HM4 R	40×50×4 HM4 R
	24	4	HM102 R	16×24×4 HM102 R		52	5	HM4 R	40×52×5 HM4 R
17	23	3	HM4 R	17×23×3 HM4 R		53	5	HMA76 R	40×53×5 HMA76 R
18	24	3	HM4 R	18×24×3 HM4 R		62	10	HMA10 R	40×62×10 HMA10 R
	26	4	HMA1 R	18×26×4 HMA1 R	42	52	4	HM4 R	42×52×4 HM4 R
19	27	4	HM4 R	19×27×4 HM4 R		55	6	HM1 R	42×55×6 HM1 R
20	26	4	HM4 R	20×26×4 HM4 R		64	6	HMA1 R	42×64×6 HMA1 R
	28	4	HM4 R	20×28×4 HM4 R	45	52	4	HM4 R	45×52×4 HM4 R
22	28	4	HM1 R	22×28×4 HM1 R		55	4	HM4 R	45×55×4 HM4 R
	28	4	HMA10 R	22×28×4 HM10 R		72	8	HMA22 R	45×72×8 HMA22 R
	30	4	HM4 R	22×30×4 HM4 R	47	72	6	HMA85 R	47×72×6 HMA85 R
	35	5	HM14 R	22×35×5 HM14 R	48	58	4	HM4 R	48×58×4 HM4 R
23	32	5,50	HM1 R	23×32×6 HM1 R	50	60	6	HMA10 R	50×60×6 HMA10 R
	35	6	HMA10 R	23×35×6 HMA10 R		62	5	HM4 R	50×62×5 HM4 R
24	32	4	HM4 R	24×32×4 HM4 R	62	78	7	HMA8 R	62×78×7 HMA8 R
					65	75	8	HM102 R	65×75×8 HM102 R

1) Without SKF Bore Tite Coating

d<sub>1</sub> 0.188–1.375 in



Please see pages 83 to 86 for housing bore requirements.

Dimensions					Design and lip material	Designation	Dimensions					Design and lip material	Designation					
Shaft	Bore	Nominal seal width	Clearance				Shaft	Bore	Nominal seal width	Clearance								
d <sub>1</sub>	D	b	B <sub>3</sub>		d <sub>1</sub>	D	b	B <sub>3</sub>										
in						in												
<b>0.188</b>	0.500	0.125			HM1 R					<b>1850</b>	<b>0.500</b>	0.999	0.188			HM14 R	<b>4950<sup>1)</sup></b>	
<b>0.250</b>	0.499	0.188			HM14 R					<b>2450</b>	0.999	0.250			HM14 R	<b>4990<sup>1)</sup></b>		
	0.499	0.188			HMA14 V					<b>2452</b>	1.124	0.250			HM14 R	<b>5085<sup>1)</sup></b>		
	0.562	0.188			HM14 R					<b>2470<sup>1)</sup></b>	<b>0.551</b>	1.124	0.203			HM21 R	<b>5399<sup>1)</sup></b>	
	0.626	0.250			HM14 R					<b>2490</b>		<b>0.563</b>	0.750	0.094			HM3 R	<b>5500</b>
	0.749	0.188			HM14 R					<b>2560</b>			0.875	0.188			HM14 R	<b>5522<sup>1)</sup></b>
<b>0.313</b>	0.500	0.125			HM4 R					<b>3044</b>		0.999	0.219			HM14 R	<b>5569<sup>1)</sup></b>	
	0.626	0.156			HM14 R					<b>3060<sup>1)</sup></b>		1.124	0.250			HM14 R	<b>5685</b>	
	0.626	0.156			HM14 V					<b>3061</b>	<b>0.594</b>	1.124	0.250			HM14 R	<b>5946<sup>1)</sup></b>	
	0.626	0.203			HM1 R					<b>3050<sup>1)</sup></b>		<b>0.624</b>	1.131	0.188			HM14 R	<b>6243<sup>1)</sup></b>
	0.633	0.141			HM14 R					<b>3080</b>			<b>0.625</b>	0.812	0.094			HM3 R
	0.749	0.250			HM14 R					<b>3140</b>		0.813		0.094			HM3 V	<b>6106</b>
	0.750	0.250			HM3 R					<b>3141</b>		0.933	0.933	0.188			HM14 R	<b>6125<sup>1)</sup></b>
	0.862	0.250			HM14 R					<b>3086</b>			0.933	0.188			HM14 V	<b>6126<sup>1)</sup></b>
<b>0.375</b>	0.562	0.093			HM3 V					<b>535835</b>		0.937	0.188			HM14 R	<b>6130<sup>1)</sup></b>	
	0.563	0.094			HM3 R					<b>3621</b>		1.000	0.125			HM14 P	<b>6152<sup>1)</sup></b>	
	0.628	0.197			HMA10 P					<b>3632</b>	1.000	0.125			HM14 R	<b>6153</b>		
	0.687	0.156			HM14 R					<b>3645<sup>1)</sup></b>	1.063	0.250			HM14 R	<b>6158<sup>1)</sup></b>		
	0.749	0.250			HM14 R					<b>3683</b>	1.124	0.250			HM14 R	<b>6225<sup>1)</sup></b>		
<b>0.404</b>	0.875	0.250			HM14 R					<b>3727</b>	1.250	0.250			HM14 R	<b>6323<sup>1)</sup></b>		
	0.620	0.188			HM14 R					<b>4010</b>	1.259	0.250			HM14 R	<b>6335<sup>1)</sup></b>		
<b>0.438</b>	0.836	0.188			HM14 R					<b>4231</b>		1.375	0.250			HM14 R	<b>6370<sup>1)</sup></b>	
	0.879	0.180			HM8 R					<b>4256</b>	<b>0.669</b>	1.250	0.250			HM14 R	<b>6806<sup>1)</sup></b>	
	0.999	0.250			HM14 R					<b>4340</b>		<b>0.688</b>	0.999	0.188			HM14 R	<b>6720<sup>1)</sup></b>
<b>0.469</b>	0.836	0.188			HM14 P					<b>4623</b>			1.124	0.250			HM14 R	<b>6759<sup>1)</sup></b>
	0.875	0.219			HM14 R					<b>4628</b>	1.187	0.125			HM14 R	<b>6762<sup>1)</sup></b>		
<b>0.500</b>	0.687	0.093			HM3 V					<b>538545</b>	1.375	0.125			HM14 R	<b>6915<sup>1)</sup></b>		
	0.688	0.094			HM3 R					<b>4911</b>	1.375	0.250			HM14 R	<b>6920<sup>1)</sup></b>		
	0.750	0.125			HM14 R					<b>4912<sup>1)</sup></b>	<b>0.750</b>	0.999	0.125			HM14 R	<b>7410</b>	
<b>0.500</b>	0.820	0.156			HM14 R					<b>4914<sup>1)</sup></b>		1.000	0.125			HM14 D	<b>7408<sup>1)</sup></b>	
	0.843	0.250			HM14 R					<b>4923<sup>1)</sup></b>		1.000	0.125			HM3 V	<b>535909</b>	
	0.875	0.125			HM14 R					<b>4925</b>		1.004	0.156			HM8 R	<b>7409</b>	
	0.875	0.250			HM14 R					<b>4938</b>		1.006	0.125			HM14 R	<b>7411<sup>1)</sup></b>	

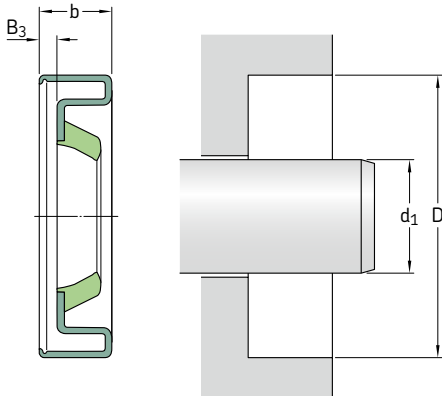
<sup>1)</sup> SKF Bore Tite Coating



Dimensions				Design and lip material	Designation	Dimensions				Design and lip material	Designation	
Shaft	Bore	Nominal seal width	Clearance			Shaft	Bore	Nominal seal width	Clearance			
d <sub>1</sub>	D	b	B <sub>3</sub>			b	B <sub>3</sub>					
in				-	-	in				-	-	
<b>0.750 cont.</b>	1.031	0.313		HMA6 R	<b>7412</b>	<b>1.125 cont.</b>	1.438	0.203		HM14 R	<b>11055<sup>1)</sup></b>	
	1.062	0.188		HM14 R	<b>7413</b>		1.499	0.188		HM14 R	<b>11060<sup>1)</sup></b>	
	1.124	0.156		HM14 R	<b>7415<sup>1)</sup></b>		1.562	0.188		HM8 R	<b>11065</b>	
	1.187	0.156		HM14 R	<b>7421</b>		1.562	0.250		HM14 R	<b>11081</b>	
							1.624	0.250		HM21 R	<b>11130<sup>1)</sup></b>	
	1.249	0.250		HM14 R	<b>530716<sup>2)</sup></b>		1.750	0.250		HM14 R	<b>11150<sup>1)</sup></b>	
	1.250	0.250		HM14 R	<b>7464<sup>1)</sup></b>		1.781	0.250		HM21 R	<b>11161<sup>1)</sup></b>	
	1.259	0.250		HM14 R	<b>7477<sup>1)</sup></b>		1.781	0.469	0.265	HM18 R	<b>11164</b>	
	1.375	0.250		HM14 R	<b>7536</b>		1.828	0.250		HM21 R	<b>11191</b>	
	1.375	0.250		HM14 P	<b>7537</b>		1.938	0.343	0.352	HM14 R	<b>11269</b>	
	1.437	0.250		HM14 R	<b>7550<sup>1)</sup></b>							
	1.499	0.250		HM14 R	<b>7571<sup>1)</sup></b>							
	<b>0.781</b>	1.375	0.197		HM14 R		<b>7831<sup>1)</sup></b>	2.000	0.250		HM21 R	<b>11334<sup>1)</sup></b>
								2.047	0.250		HM21 R	<b>11352<sup>1)</sup></b>
	<b>0.813</b>	1.063	0.125		HM3 R		<b>8009</b>	<b>1.188</b>	2.000	0.250		HM1 R
<b>0.875</b>	1.125	0.125		HM14 R	<b>8620</b>	<b>1.190</b>	1.996	0.250		HM1 R	<b>11846<sup>1)</sup></b>	
	1.125	0.125		HM14 V	<b>8619<sup>1)</sup></b>		1.500	0.125		HM14 R	<b>12330<sup>1)</sup></b>	
	1.246	0.188		HM14 R	<b>8625<sup>1)</sup></b>		1.624	0.250		HM14 R	<b>12325<sup>1)</sup></b>	
	1.251	0.188		HM14 R	<b>8627</b>							
	1.251	0.188		HM3 R	<b>8631<sup>2)</sup></b>		1.625	0.188		HM14 R	<b>11096</b>	
	1.255	0.188		HM14 R	<b>8632<sup>1)</sup></b>		1.686	0.188		HM14 R	<b>12334<sup>1)</sup></b>	
							1.752	0.188		HM21 R	<b>12361<sup>1)</sup></b>	
	1.308	0.250		HM14 R	<b>8637<sup>1)</sup></b>		1.752	0.250		HM21 R	<b>12369</b>	
	1.312	0.250		HM14 R	<b>8645<sup>1)</sup></b>		1.828	0.188		HM8 R	<b>12375</b>	
	1.375	0.188		HM14 R	<b>8677<sup>1)</sup></b>		1.874	0.250		HM21 R	<b>12379<sup>1)</sup></b>	
	1.437	0.250		HM14 R	<b>8690<sup>1)</sup></b>		1.968	0.438		HM14 R	<b>12398<sup>1)</sup></b>	
	1.499	0.250		HM21 R	<b>8741<sup>1)</sup></b>		1.968	0.469	0.254	HM18 R	<b>12399<sup>1)</sup></b>	
							1.979	0.250		HM21 R	<b>12407<sup>1)</sup></b>	
	1.562	0.250		HM14 R	<b>8761</b>		1.979	0.406	0.200	HM18 R	<b>12411</b>	
	1.575	0.250		HM14 R	<b>8772</b>		1.980	0.406		HMA22 R	<b>12506<sup>1)</sup></b>	
1.624	0.188		HM8 R	<b>8802</b>	1.983	0.250		HM21 R	<b>12437</b>			
<b>0.938</b>	1.375	0.250		HM14 R	<b>9243<sup>1)</sup></b>							
	1.499	0.250		HM14 R	<b>9298<sup>1)</sup></b>	2.000	0.250		HM21 R	<b>12481<sup>1)</sup></b>		
	1.734	0.250		HM14 R	<b>9354<sup>1)</sup></b>	2.062	0.250		HM21 R	<b>12508<sup>1)</sup></b>		
	1.250	0.125		HM14 R	<b>9815<sup>1)</sup></b>	2.125	0.250		HM21 R	<b>12565<sup>1)</sup></b>		
	1.312	0.125		HM14 R	<b>9818<sup>1)</sup></b>	2.250	0.250		HM14 R	<b>12582<sup>1)</sup></b>		
	1.375	0.188		HM14 R	<b>9820<sup>1)</sup></b>	2.328	0.500	0.286	HM18 R	<b>12611<sup>1)</sup></b>		
	1.437	0.250		HM14 R	<b>9835<sup>1)</sup></b>	<b>1.375</b>	1.750	0.197		HM14 R	<b>13529</b>	
	1.499	0.188		HM14 R	<b>9859<sup>1)</sup></b>		1.750	0.197		HM14 V	<b>13509<sup>1)</sup></b>	
	1.510	0.219		HM21 R	<b>9853<sup>1)</sup></b>		1.834	0.188		HM8 R	<b>13533<sup>1)</sup></b>	
	1.561	0.250		HM14 R	<b>9900<sup>1)</sup></b>		1.874	0.188		HM14 R	<b>13543</b>	
	1.575	0.250		HM14 R	<b>9903<sup>1)</sup></b>		1.874	0.250		HM14 R	<b>13548<sup>1)</sup></b>	
	1.624	0.250		HM14 R	<b>9932<sup>1)</sup></b>		1.874	0.250		HM14 P	<b>13545<sup>1)</sup></b>	
	<b>1.000</b>	1.752	0.250		HM21 R		<b>9995<sup>1)</sup></b>	1.938	0.250		HM14 R	<b>13556<sup>1)</sup></b>
		1.781	0.250		HM21 R		<b>530484</b>	2.000	0.250		HM21 R	<b>13573<sup>1)</sup></b>
1.781		0.469		HM14 R	<b>10034<sup>1)</sup></b>		2.106	0.250		HM21 R	<b>13612<sup>1)</sup></b>	
1.781		0.469	0.265	HM18 R	<b>10035<sup>1)</sup></b>		2.125	0.250		HM21 R	<b>13662<sup>1)</sup></b>	
1.851		0.250		HM14 R	<b>10074<sup>1)</sup></b>		2.250	0.250		HM14 R	<b>13689<sup>1)</sup></b>	
1.938		0.250		HM14 R	<b>10112<sup>1)</sup></b>		2.282	0.250		HM14 R	<b>13710<sup>1)</sup></b>	
2.000		0.250		HM21 R	<b>10152<sup>1)</sup></b>		2.328	0.406	0.188	HM18 R	<b>13711</b>	
2.250		0.250		HM14 R	<b>10185<sup>1)</sup></b>		2.374	0.250		HM21 R	<b>13758<sup>1)</sup></b>	
<b>1.125</b>		1.375	0.125		HM14 R		<b>11050</b>	2.437	0.250		HM21 R	<b>13796<sup>1)</sup></b>
		1.375	0.125		HM14 V	<b>11052<sup>1)</sup></b>	2.502	0.250		HM21 R	<b>13862<sup>1)</sup></b>	
							2.835	0.594		TL8 R	<b>13916<sup>1)</sup></b>	

<sup>1)</sup> SKF Bore Tite Coating  
<sup>2)</sup> Stainless steel case

d<sub>1</sub> 1.438–3.500 in



Please see pages 83 to 86 for housing bore requirements.

Dimensions		Nominal seal width b	Clearance B <sub>3</sub>	Design and lip material	Designation	
Shaft d <sub>1</sub>	Bore D					
in						
<b>1.438</b>	2.000	0.125		HM4 R	<b>14209</b>	
	2.250	0.250		HM14 R	<b>14257<sup>1)</sup></b>	
	2.437	0.250		HM21 R	<b>14359<sup>1)</sup></b>	
	2.437	0.250		HM21 V	<b>564365<sup>1)</sup></b>	
<b>1.457</b>	2.047	0.328		HMA11 R	<b>14600<sup>3)</sup></b>	
<b>1.473</b>	1.971	0.563		HMA10 R	<b>14631</b>	
<b>1.500</b>	1.874	0.188		HM14 R	<b>14804</b>	
	1.874	0.188		HM14 V	<b>14808<sup>1)</sup></b>	
	1.874	0.250		HM14 R	<b>14810<sup>1)</sup></b>	
	1.938	0.250		HM14 R	<b>14816<sup>1)</sup></b>	
	1.983	0.188		HM14 R	<b>14840</b>	
	1.989	0.250		HMA22 R	<b>14848<sup>1)</sup></b>	
	<b>1.500</b>	2.000	0.188		HM8 R	<b>14869</b>
2.000		0.250		HM14 R	<b>14857<sup>1)</sup></b>	
	2.250	0.250		HM21 R	<b>14960</b>	
	2.254	0.250		HM21 R	<b>14966<sup>1)</sup></b>	
	2.328	0.390	0.188	HM18 R	<b>14975</b>	
	2.328	0.500	0.286	HM18 R	<b>14974</b>	
	2.374	0.250		HM21 R	<b>15032<sup>1)</sup></b>	
	2.437	0.250		HM14 R	<b>15080<sup>1)</sup></b>	
	2.502	0.250		HM21 R	<b>15160<sup>1)</sup></b>	
	2.623	0.250		HM21 R	<b>15190</b>	
	2.716	0.250		HM21 R	<b>15209<sup>1)</sup></b>	
	<b>1.563</b>	2.250	0.250		HM14 R	<b>15532<sup>1)</sup></b>
		2.374	0.250		HM21 R	<b>15544<sup>1)</sup></b>
		2.502	0.250		HM21 R	<b>15649<sup>1)</sup></b>
	2.687	0.250		HM21 R	<b>15719<sup>1)</sup></b>	
<b>1.609</b>	1.906	0.250		HM3 R	<b>16430<sup>2)</sup></b>	
<b>1.625</b>	2.125	0.250		HM14 R	<b>16055<sup>1)</sup></b>	
	2.250	0.250		HM21 R	<b>16065<sup>1)</sup></b>	

Dimensions		Nominal seal width b	Clearance B <sub>3</sub>	Design and lip material	Designation
Shaft d <sub>1</sub>	Bore D				
in					
<b>1.625</b>	2.328	0.438	0.235	HM18 R	<b>16069<sup>1)</sup></b>
	<b>cont.</b>	2.328	0.438	TL7 R	<b>16064</b>
		2.374	0.250	HM21 R	<b>16092<sup>1)</sup></b>
		2.375	0.250	HM14 R	<b>16095</b>
	2.437	0.250		HM21 R	<b>16168<sup>1)</sup></b>
	2.502	0.250		HM21 R	<b>16270<sup>1)</sup></b>
	2.562	0.250		HM21 R	<b>16285<sup>1)</sup></b>
	2.562	0.438	0.210	HM18 R	<b>16289<sup>1)</sup></b>
	2.623	0.250		HM21 R	<b>16322<sup>1)</sup></b>
	2.750	0.250		HM21 R	<b>16362<sup>1)</sup></b>
	2.781	0.313		HM14 R	<b>16384<sup>1)</sup></b>
	<b>1.660</b>	2.440	0.594		HM11 R
<b>1.688</b>	2.328	0.500	0.286	HM18 R	<b>16667</b>
	2.502	0.281		HM21 R	<b>16743<sup>1)</sup></b>
	2.562	0.250		HM21 R	<b>16754<sup>1)</sup></b>
<b>1.750</b>	2.250	0.188		HM14 R	<b>17240<sup>1)</sup></b>
	2.374	0.250		HM21 R	<b>17277</b>
	2.437	0.250		HM21 R	<b>17310</b>
	2.441	0.250		HM21 R	<b>17340<sup>1)</sup></b>
	2.441	0.250		HM21 R	<b>17341<sup>1)2)</sup></b>
	2.441	0.469	0.254	HM18 R	<b>17359<sup>1)</sup></b>
	2.502	0.250		HM21 R	<b>17392<sup>1)</sup></b>
	2.561	0.250		HM21 R	<b>17415<sup>1)</sup></b>
	2.562	0.500	0.286	HM18 R	<b>17406<sup>1)</sup></b>
2.623	0.250		HM21 R	<b>17461</b>	
	2.716	0.250		HM21 R	<b>17488<sup>1)</sup></b>
	2.718	0.359	0.160	HM18 R	<b>17617<sup>1)</sup></b>
	2.718	0.359		TL7 R	<b>17618</b>
	2.750	0.250		HM21 R	<b>17544<sup>1)</sup></b>
	2.830	0.375		HM21 R	<b>17633<sup>1)</sup></b>
	2.875	0.250		HM21 R	<b>17671<sup>1)</sup></b>
	2.875	0.500		TL7 R	<b>17674</b>
<b>1.750</b>	3.000	0.250		HM21 R	<b>17702<sup>1)</sup></b>
	3.149	0.290		TL6 R	<b>17724</b>

<sup>1)</sup> SKF Bore Tite Coating

<sup>2)</sup> Stainless steel case

<sup>3)</sup> Press-fit width 0.288 in, axial auxiliary lip

Dimensions				Design and lip material	Designation	Dimensions				Design and lip material	Designation
Shaft	Bore	Nominal seal width	Clearance			Shaft	Bore	Nominal seal width	Clearance		
d <sub>1</sub>	D	b	B <sub>3</sub>								
in				–	–	in		–	–		
<b>1.781</b>	2.126	0.250		HM14 R	<b>17802</b> <sup>2)</sup>	<b>2.250</b>	2.625 2.875	0.188 0.250		HM14 R HM21 R	<b>22306</b> <sup>1)</sup> <b>22325</b>
<b>1.811</b>	2.697	0.295		HMA8 R	<b>17955</b>		3.000 3.061	0.250 0.250		HM21 R HM21 R	<b>22368</b> <sup>1)</sup> <b>22392</b>
<b>1.813</b>	2.562 2.719 2.965	0.438 0.270 0.250	0.224	HM18 R TL7 R HM1 R	<b>18050</b> <sup>1)</sup> <b>18127</b> <b>18258</b>		3.125 3.251 3.440	0.563 0.250 0.250	0.214	HM18 R HM21 R HM14 R	<b>22411</b> <b>22468</b> <b>22565</b> <sup>1)</sup>
<b>1.875</b>	2.502 2.623 2.750	0.250 0.250 0.250		HM21 R HM21 R HM21 R	<b>18558</b> <sup>1)</sup> <b>18591</b> <sup>1)</sup> <b>18659</b> <sup>1)</sup>	<b>2.297</b>	3.148	0.359	0.185	HM18 R	<b>22870</b>
	2.780 2.875 2.997	0.250 0.250 0.250		HM21 R HM21 R HM14 R	<b>18704</b> <sup>1)</sup> <b>18750</b> <sup>1)</sup> <b>18808</b> <sup>1)</sup>	<b>2.313</b>	3.000 3.065 3.500	0.250 0.281 0.250		HM14 R HM1 R HM21 R	<b>23035</b> <sup>1)</sup> <b>23098</b> <b>23240</b> <sup>1)</sup>
	3.000 3.150	0.250 0.250		HM21 R HM21 R	<b>18823</b> <sup>1)</sup> <b>18889</b> <sup>1)</sup>	<b>2.375</b>	2.997 3.000 3.350 3.543	0.250 0.250 0.250 0.250		HM21 R HM21 R HM21 R HM21 R	<b>23630</b> <sup>1)</sup> <b>23640</b> <b>23725</b> <sup>1)</sup> <b>23815</b> <sup>1)</sup>
<b>1.938</b>	2.502 2.875 2.686	0.281 0.250 0.594		HM14 R HM21 R TL8 R	<b>19219</b> <sup>1)</sup> <b>19306</b> <sup>1)</sup> <b>19251</b> <sup>1)</sup>	<b>2.500</b>	3.000 3.000	0.313 0.250		HM1 R HM14 R	<b>24865</b> <b>24863</b> <sup>1)</sup>
<b>1.945</b>	2.892	0.294		TL6 R	<b>19510</b> <sup>1)</sup>		3.125 3.150	0.250 0.250		HM21 R HM21 R	<b>24875</b> <sup>1)</sup> <b>24880</b> <sup>1)</sup>
<b>1.970</b>	2.362	0.158		HM14 D	<b>532627</b>		3.251 3.500	0.250 0.250		HM21 R HM21 R	<b>24904</b> <sup>1)</sup> <b>25007</b> <sup>1)</sup>
<b>2.000</b>	2.371 2.375	0.250 0.188		HM14 R HM14 R	<b>19737</b> <sup>1)</sup> <b>19733</b>	<b>2.625</b>	3.371 3.623 3.751 3.813	0.250 0.250 0.715 0.415		HM14 R HM21 R TL4 RR TL5 R	<b>26144</b> <sup>1)</sup> <b>26260</b> <sup>1)</sup> <b>26289</b> <sup>4)</sup> <b>26310</b> <sup>5)</sup>
	2.500 2.502	0.250 0.250		HM1 R HM14 R	<b>19748</b> <b>19754</b> <sup>1)</sup>	<b>2.750</b>	3.125 3.250	0.188 0.313		HM1 R HM1 R	<b>27210</b> <b>27225</b>
<b>2.000</b>	2.623 2.623 2.631 2.635 2.686	0.250 0.250 0.272 0.234 0.250		HM21 R HM21 V HMA94 R HM14 R HM21 R	<b>19763</b> <sup>1)</sup> <b>19746</b> <sup>1)</sup> <b>20016</b> <sup>3)</sup> <b>19770</b> <sup>1)</sup> <b>19783</b> <sup>1)</sup>		3.500 3.500 3.751	0.250 0.250 0.250		HM14 R HM14 V HM21 R	<b>27271</b> <sup>1)</sup> <b>54675</b> <sup>1)</sup> <b>27394</b> <sup>1)</sup>
	2.750 2.752	0.250 0.188		HM21 R HM14 R	<b>19834</b> <sup>1)</sup> <b>19820</b> <sup>1)</sup>	<b>2.875</b>	3.751 3.876 3.876 4.003	0.250 0.188 0.250 0.250		HM21 R HM1 R HM21 R HM21 R	<b>28700</b> <sup>1)</sup> <b>28725</b> <sup>1)</sup> <b>28751</b> <sup>1)</sup> <b>28800</b> <sup>1)</sup>
	2.875 2.965 2.965 2.997	0.250 0.313 0.500 0.250	0.275	HM21 R HM14 R HM14 R HM21 R	<b>19880</b> <sup>1)</sup> <b>19940</b> <sup>1)</sup> <b>19938</b> <sup>1)</sup> <b>19965</b>	<b>2.953</b>	4.724	0.320		TL1 R	<b>29852</b> <sup>1)</sup>
	3.000 3.061 3.148 3.623	0.250 0.250 0.250 0.250		HM21 R HM21 R HM14 R HM21 R	<b>20006</b> <sup>1)</sup> <b>20044</b> <sup>1)</sup> <b>20078</b> <b>20148</b>	<b>3.000</b>	3.500 3.623 3.751	0.313 0.250 0.250		HM1 R HM14 R HM21 R	<b>29840</b> <b>29850</b> <b>29863</b> <sup>1)</sup>
<b>2.063</b>	3.149 3.150	0.500 0.266		TL6 D TL7 R	<b>20672</b> <sup>1)</sup> <sup>4)</sup> <b>20674</b>		4.000 4.003 4.249	0.250 0.250 0.250		HM21 V HM21 R HM21 R	<b>539075</b> <b>29968</b> <b>30049</b> <sup>1)</sup>
<b>2.094</b>	2.718 2.750	0.359 0.250	0.160	HM18 R HM21 R	<b>20952</b> <sup>1)</sup> <b>20920</b> <sup>1)</sup>	<b>3.125</b>	3.751 4.125	0.250 0.250		HMA1 R HMA1 R	<b>31129</b> <sup>1)</sup> <b>31192</b>
<b>2.125</b>	2.750 2.875 2.891	0.250 0.250 0.250		HM21 R HM14 R HM14 R	<b>21059</b> <sup>1)</sup> <b>21101</b> <sup>1)</sup> <b>21121</b> <sup>1)</sup>	<b>3.250</b>	3.750 4.249 4.501	0.250 0.250 0.250		HMA1 R HM14 R HM21 R	<b>32325</b> <sup>1)</sup> <b>32412</b> <sup>1)</sup> <b>32510</b> <sup>1)</sup>
	3.000 3.061 3.189	0.250 0.250 0.250		HM21 R HM21 R HM21 R	<b>21159</b> <sup>1)</sup> <b>21208</b> <sup>1)</sup> <b>21265</b> <sup>1)</sup>	<b>3.500</b>	4.000 4.003	0.300 0.250		HM1 R HM14 R	<b>34835</b> <b>34840</b> <sup>1)</sup>
<b>2.240</b>	3.189	0.610		HM14 R	<b>22614</b> <sup>1)</sup>		4.125 4.125	0.250 0.250		HM14 R HM14 V	<b>34848</b> <b>546770</b> <sup>1)</sup>

1) SKF Bore Tite Coating

2) Stainless steel case

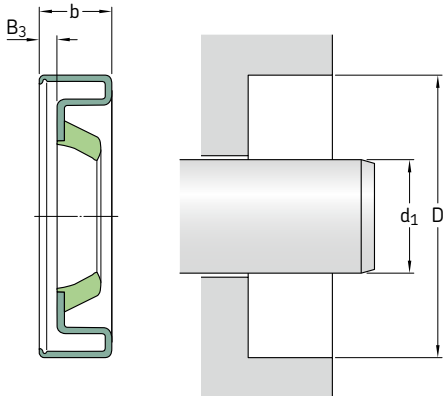
3) Press-fit width 0.257 in

4) Press-fit width 0.395 in

4) Press-fit width 0.640 in

5) Press-fit width 0.300 in

d<sub>1</sub> 3.500–9.500 in



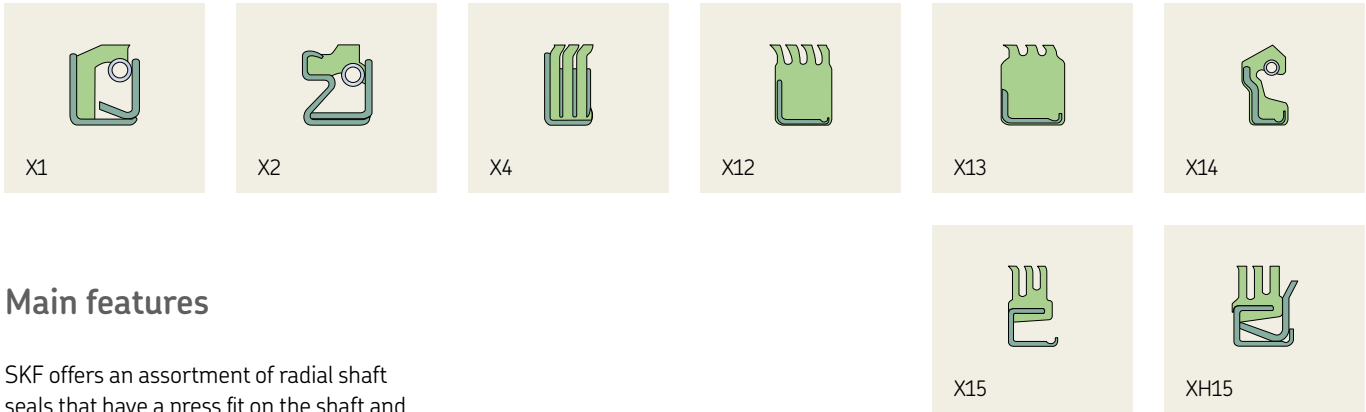
Please see **pages 83 to 86** for housing bore requirements.

Dimensions		Nominal seal width b	Clearance B <sub>3</sub>	Design and lip material	Designation
Shaft d <sub>1</sub>	Bore D				
in				–	–
<b>3.500</b>	4.450	0.531		HM12 R	<b>34885</b>
<b>cont.</b>	4.501	0.250		HM21 R	<b>34967</b>
	4.751	0.250		HM21 R	<b>35042<sup>1)</sup></b>
<b>3.750</b>	4.376	0.250		HM14 R	<b>37320<sup>1)</sup></b>
	4.376	0.250		HM14 V	<b>37325<sup>1)</sup></b>
<b>4.000</b>	4.501	0.250		HM14 R	<b>39835<sup>1)</sup></b>
	4.501	0.250		HM14 V	<b>546387<sup>1)</sup></b>
	4.876	0.250		HM21 R	<b>39860<sup>1)</sup></b>
	4.999	0.250		HM21 R	<b>39961<sup>1)</sup></b>
<b>4.250</b>	4.813	0.313		HM14 R	<b>42340</b>
	5.126	0.250		HM21 R	<b>42380<sup>1)</sup></b>
	5.251	0.250		HM21 R	<b>42470<sup>1)</sup></b>
<b>4.500</b>	5.501	0.250		HM14 R	<b>45025</b>
<b>4.750</b>	5.375	0.313		HM14 R	<b>47378<sup>1)</sup></b>
<b>4.875</b>	5.501	0.250		HM14 R	<b>48650</b>
<b>5.000</b>	6.250	0.250		HM21 R	<b>50070<sup>1)</sup></b>
<b>5.250</b>	6.250	0.250		HM4 R	<b>52475</b>
<b>5.750</b>	6.375	0.250		HMA1 R	<b>57502</b>
	7.003	0.250		HMA21 R	<b>57571</b>
<b>6.000</b>	7.500	0.250		HM4 R	<b>60075</b>
<b>6.374</b>	8.749	0.421		HMA96 R	<b>181948</b>
<b>7.938</b>	8.750	0.344		HM14 R	<b>79302</b>
<b>9.500</b>	10.750	0.313		HM21 R	<b>95052</b>

<sup>1)</sup> SKF Bore Tite Coating



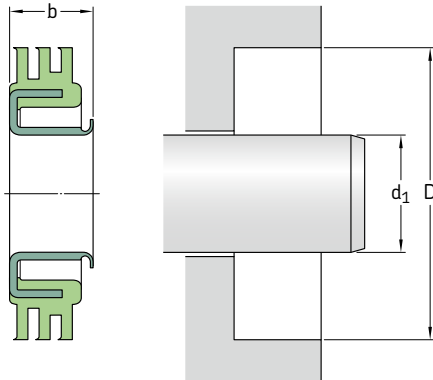
# X seals, sealing against housing bore



## Main features

SKF offers an assortment of radial shaft seals that have a press fit on the shaft and with sealing lip(s) that contact the housing bore. For a proper press fit, the requirements specified for housing bores on **pages 83 to 86** should be adhered to for the shaft. Shaft requirements specified on **pages 80 to 82** apply for the housing bore when using X seals. These seals are generally installed with the sealing lip(s) facing outward to provide optimum exclusion. Main applications are greased lubricated agriculture machinery. The selection to the right shows the most commonly used SKF designs. Contact SKF for more information on available designs.

See **matrix 1** on **pages 104 and 105** for general permissible operating conditions.

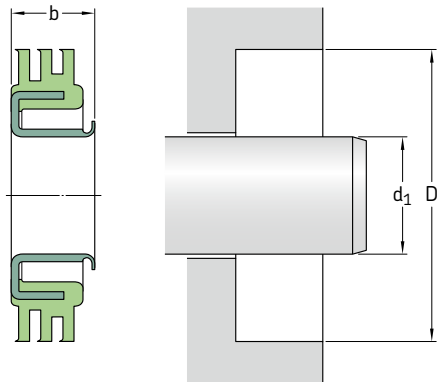


For proper press fit on shaft, refer to housing bore tolerances specified on pages 83 to 86.

Dimensions					Design and lip material					
Shaft	Bore	Nominal seal width	Design and lip material	Designation	Shaft	Bore	Nominal seal width	Design and lip material	Designation	
$d_1$	D	b			$d_1$	D	b			
mm					mm					
<b>25,40</b>	59,84	6,86	X15 R	<b>538266</b>	<b>80,00</b>	101,45	15,00	X15 R	<b>31514</b>	
<b>38,10</b>	55,55	12,70	X1 L	<b>14896</b>	<b>82,55</b>	113,49	8,00	X4 R	<b>32437</b>	
	58,06	6,86	X15 R	<b>14970</b>		114,30	7,95	X15 R	<b>32441</b>	
	58,06	10,67	XH15 R	<b>14971</b>	<b>86,36</b>	114,30	7,14	X14 V	<b>340001)</b>	
	62,53	7,37	X13 R	<b>15174</b>		<b>92,08</b>	114,30	7,47	X15 R	<b>36172</b>
<b>39,70</b>	56,82	7,37	X4 R	<b>15530</b>	<b>98,43</b>	136,91	9,53	X12 R	<b>38590</b>	
	64,29	7,24	X15 R	<b>15660</b>		<b>101,60</b>	147,65	12,70	X R	<b>40131</b>
	69,85	11,13	X R	<b>15702</b>			<b>111,13</b>	136,47	14,48	X1 P
<b>41,28</b>	62,53	6,35	X15 R	<b>16286</b>	<b>114,30</b>	152,78	13,97	X12 R	<b>44892</b>	
<b>42,88</b>	67,31	7,37	X4 R	<b>16818</b>		162,79	10,54	X12 D	<b>45161</b>	
<b>44,45</b>	69,04	7,47	X4 R	<b>17485</b>	<b>120,65</b>	152,45	7,62	X15 R	<b>47455</b>	
	70,76	7,47	X15 R	<b>17620</b>		<b>139,70</b>	172,21	9,65	X R	<b>55152</b>
<b>46,05</b>	61,16	7,62	X15 R	<b>18030</b>	<b>158,75</b>		196,85	8,89	X R	<b>62530</b>
<b>47,57</b>	68,99	7,14	X13 R	<b>18630</b>		<b>50,80</b>	71,17	6,35	X15 D	<b>19844</b>
	<b>50,57</b>	73,66	7,37	X4 R	<b>19720</b>		73,03	6,50	XHM R	<b>19882</b>
<b>53,98</b>		82,55	6,86	X15 R	<b>21298</b>	<b>57,15</b>	86,36	7,47	X15 R	<b>22563</b>
<b>57,15</b>	86,36	7,47	X15 R	<b>22563</b>	<b>63,40</b>		93,27	7,95	X15 R	<b>25078</b>
	<b>63,40</b>	93,27	7,95	X15 R		<b>25078</b>	<b>76,20</b>	101,60	12,70	X2 L
<b>76,20</b>		101,60	12,70	X2 L	<b>29900</b>	114,94		9,53	X12 R	<b>30108</b>
		114,94	9,53	X12 R	<b>30108</b>					

<sup>1)</sup> SKF Bore Tite Coating on inside diameter

Radial shaft seals | Seals for general industrial applications – X seals, sealing against housing bore – inch dimensions  
 $d_1$  1.000–6.250 mm



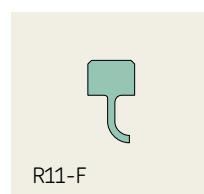
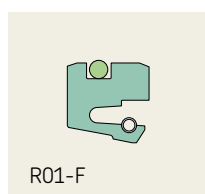
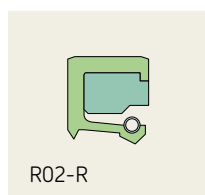
For proper press fit on shaft, refer to housing bore tolerances specified on pages 83 to 86.

Dimensions					Design and lip material				
Shaft	Bore	Nominal seal width		Designation	Shaft	Bore	Nominal seal width		Designation
$d_1$	D	b			$d_1$	D	b		
in			–	–	in			–	–
<b>1.000</b>	2.356	0.270	X15 R	<b>538266</b>	<b>3.000</b>	4.000	0.500	X2 L	<b>29900</b>
<b>1.500</b>	2.187	0.500	X1 L	<b>14896</b>		4.525	0.375	X12 R	<b>30108</b>
	2.286	0.270	X15 R	<b>14970</b>	<b>3.150</b>	3.994	0.591	X15 R	<b>31514</b>
	2.286	0.420	XH15 R	<b>14971</b>	<b>3.250</b>	4.468	0.315	X4 R	<b>32437</b>
	2.462	0.290	X13 R	<b>15174</b>		4.500	0.313	X15 R	<b>32441</b>
<b>1.563</b>	2.237	0.290	X4 R	<b>15530</b>	<b>3.400</b>	4.500	0.281	X14 V	<b>340001)</b>
	2.531	0.285	X15 R	<b>15660</b>	<b>3.625</b>	4.500	0.294	X15 R	<b>36172</b>
	2.684	0.438	X R	<b>15702</b>	<b>3.875</b>	5.390	0.375	X12 R	<b>38590</b>
<b>1.625</b>	2.462	0.250	X15 R	<b>16286</b>	<b>4.000</b>	5.813	0.500	X R	<b>40131</b>
<b>1.688</b>	2.650	0.290	X4 R	<b>16818</b>	<b>4.375</b>	5.373	0.570	X1 P	<b>44269</b>
<b>1.750</b>	2.718	0.294	X4 R	<b>17485</b>	<b>4.500</b>	6.015	0.550	X12 R	<b>44892</b>
	2.786	0.294	X15 R	<b>17620</b>		6.409	0.415	X12 D	<b>45161</b>
<b>1.813</b>	2.408	0.300	X15 R	<b>18030</b>	<b>4.750</b>	6.002	0.300	X15 R	<b>47455</b>
<b>1.873</b>	2.716	0.281	X13 R	<b>18630</b>	<b>5.500</b>	6.780	0.380	X R	<b>55152</b>
<b>1.991</b>	2.900	0.290	X4 R	<b>19720</b>	<b>6.250</b>	7.750	0.350	X R	<b>62530</b>
<b>2.000</b>	2.802	0.250	X15 D	<b>19844</b>					
	2.875	0.256	XHM R	<b>19882</b>					
<b>2.125</b>	3.250	0.270	X15 R	<b>21298</b>					
<b>2.250</b>	3.400	0.294	X15 R	<b>22563</b>					
<b>2.496</b>	3.672	0.313	X15 R	<b>25078</b>					

<sup>1)</sup> SKF Bore Tite Coating on inside diameter

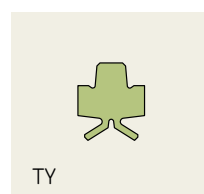


# Machined seals



The seals for industrial applications listed in this catalogue represent the preferred standard seals in common sizes. SKF supplies many additional sizes and designs developed for a great variety of customer applications. The machined seals profiles shown here are also tested and evaluated according to these application requirements. For additional information about these profiles, or if the application requires a solution outside of what is provided in this catalogue, contact SKF. SKF can provide customized sealing solutions for the toughest application conditions.

## SNL types



Sealproduction – SKF machine seals



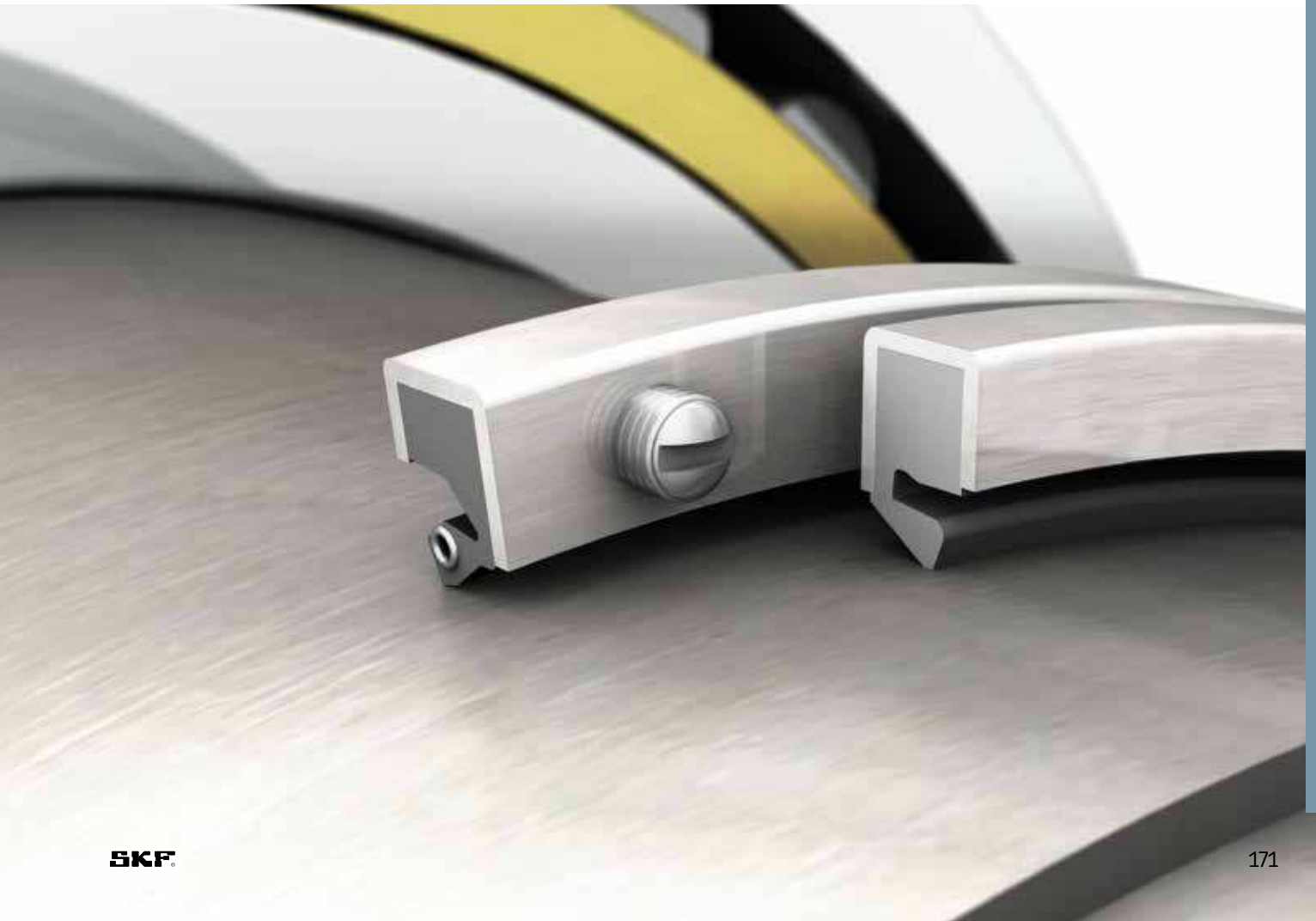


## Seals for heavy industrial applications



### Seals for heavy industrial applications

- › Flexible in sizes
- › Configured to the application
- › Express service available



# Seals for heavy industrial applications – general

Heavy duty industrial applications, such as construction equipment, metal, mining, paper, oil drilling or wind turbines can be very challenging for radial shaft seals. In operation, the seals are exposed to a wide range of temperatures, speeds and abrasive contaminants. Seals for these applications feature generally sturdy designs and often large size and come with some special features to help improve sealing performance, reliability and handling.

The Heavy Industrial Seals (HIS) range is specially developed by SKF to protect large size bearings under the tough operating conditions experienced in heavy industrial applications.

The heavy industrial seals offering includes metal cased seals (HDS), all-rubber seals (HS), reinforced all-rubber seals (HSS) and polyurethane seals (HRS). SKF's flexible manufacturing processes of the seals enables a wide range of dimensions to be manufactured, with no extra tooling or machine setup time and costs or delays to maintenance timelines. In addition, this SKF service has no minimum order quantity, so is ideal for both large and small industrial application requirements.

## Features

SKF Heavy Industrial seals are

- made to order in an unlimited range of customized sizes to suit existing machine dimensions,
- available in a wide range of design and material options to suit application requirements,
- produced quickly to suit any customer lead time – including standard, express or urgent delivery options and
- quick and easy to install, the seals reduce risk of failure and resultant downtime.

## Typical applications

- Steel and aluminium rolling
- Pulp and paper feeders and paper machine wet section
- Mining and cement machinery
- Traditional energy – coal grinding mills
- Wind turbines
- Tunnel boring machines
- Heavy duty gearboxes
- Special purpose machinery
- Construction machinery

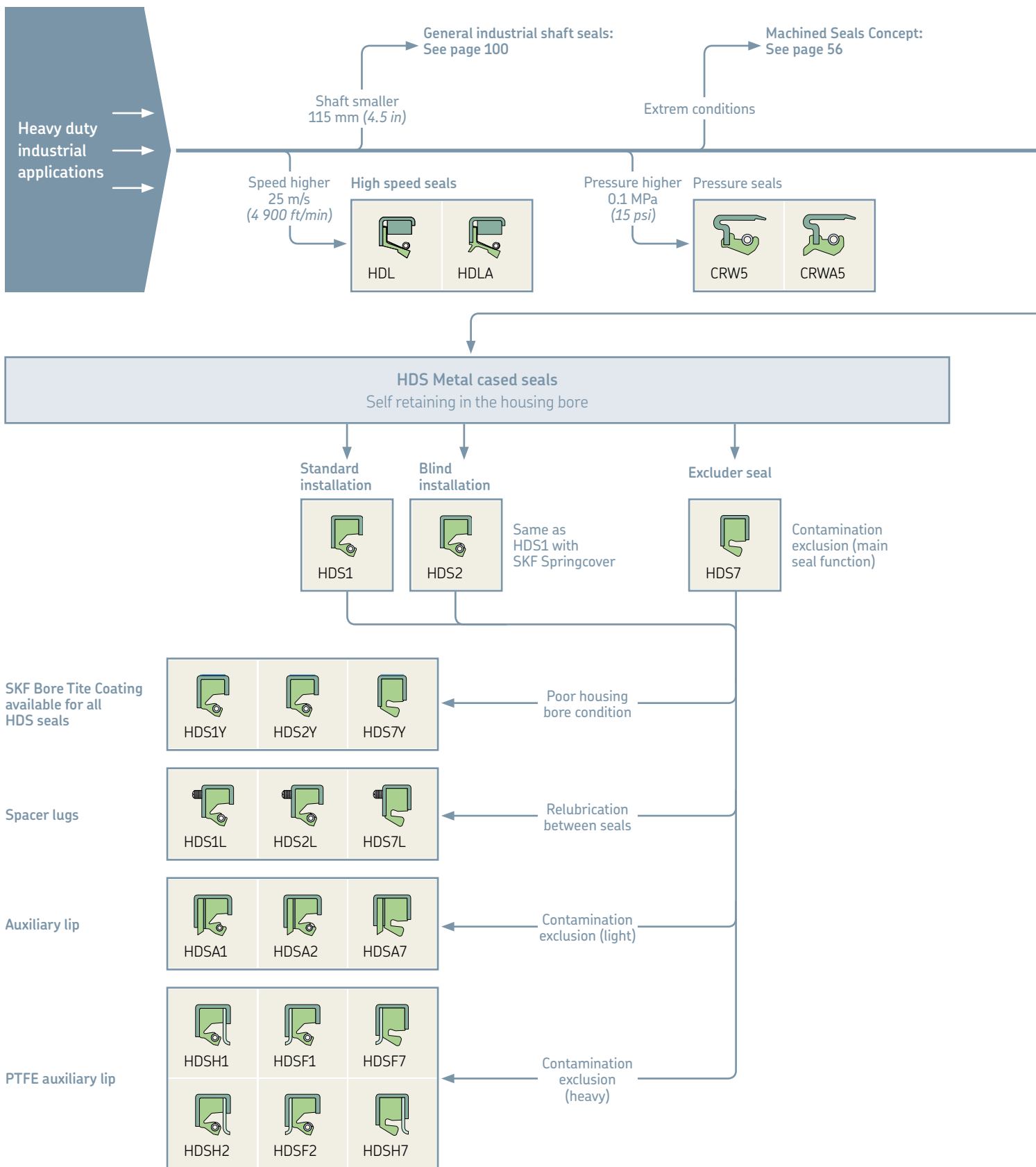
See also **matrix 2** on **pages 176 to 183**.

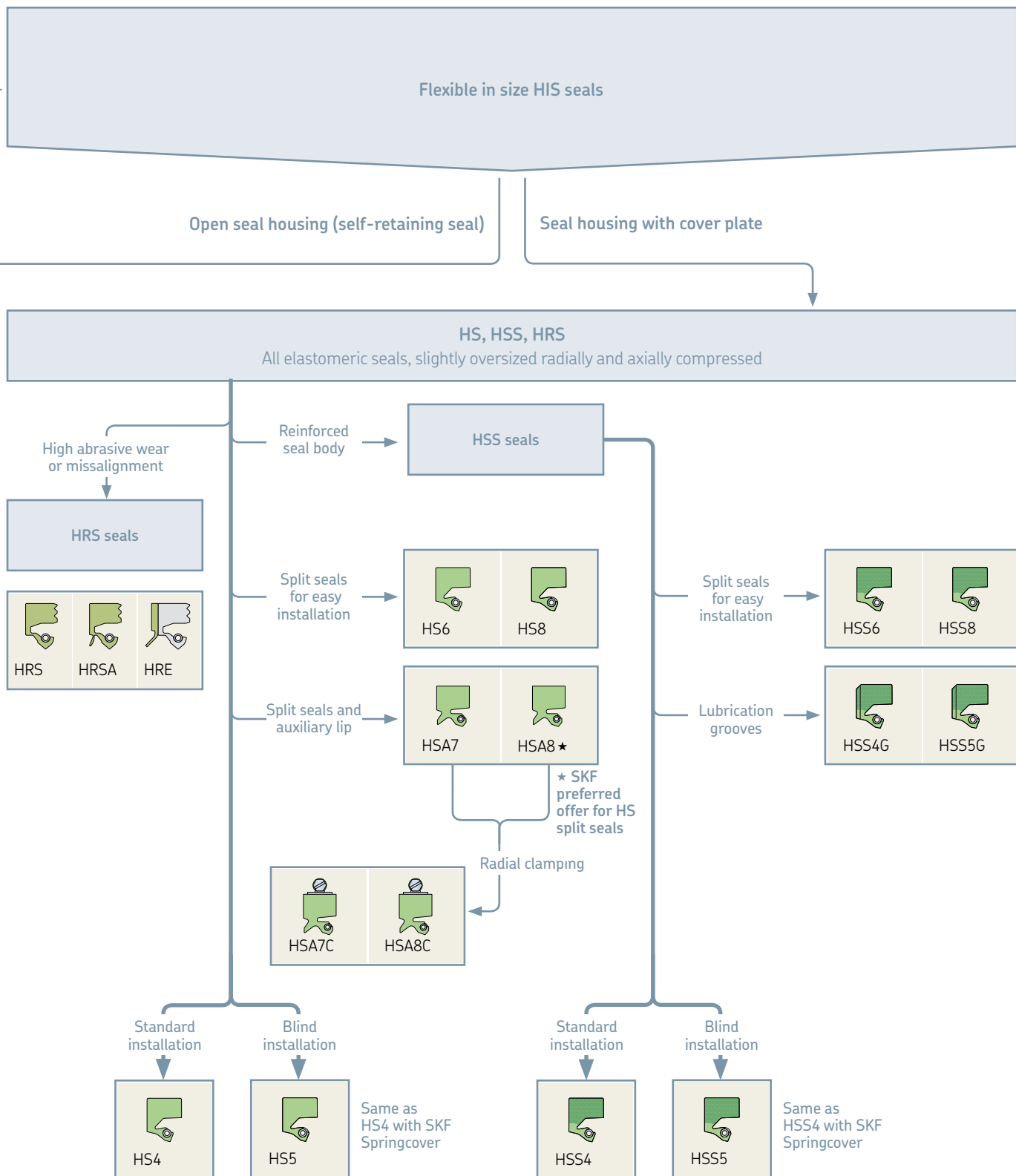
### **Express service with flexible manufacturing processes**

Catalogue shaft seals flexible in size are available in customized main dimensions with minimum order quantity of just one seal and optional express service.

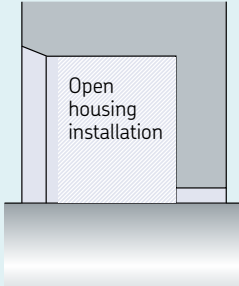














# Classification





Seals for heavy industrial applications, self retaining metal cased seals for open end or through housing bores, HDS range

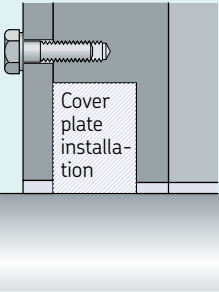

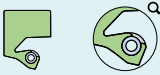



Installation	Seal design	Seal design description	Material code	Material description	Maximum shaft surface speed	
					m/s	ft/min
 <p>Open housing installation</p>	 HDS1	Spring activated sealing lip Metal clad self retaining seals	R	Nitrile rubber (NBR)	15	2 950
			D	SKF Duralip (XNBR)	15	2 950
			H	SKF Duratemp (HNBR)	20	3 900
			V	SKF Duralife (FKM)	25	4 900
	  HDS2	Spring activated sealing lip SKF Springcover spring retention Metal clad self retaining seal	R	Nitrile rubber (NBR)	15	2 950
			D	SKF Duralip (XNBR)	15	2 950
			H	SKF Duratemp (HNBR)	20	3 900
			V	SKF Duralife (FKM)	25	4 900
	 HDS7	Springless sealing lip Metal clad self retaining seal	R	Nitrile rubber (NBR)	15	2 950
			D	SKF Duralip (XNBR)	15	2 950
H			SKF Duratemp (HNBR)	20	3 900	
V			SKF Duralife (FKM)	25	4 900	
  HDSA1      HDSA2	HDS1 and HDS2 seals with auxiliary dust lip Metal clad self retaining seal	R	Nitrile rubber (NBR)	15	2 950	
		D	SKF Duralip (XNBR)	15	2 950	
		H	SKF Duratemp (HNBR)	20	3 900	
		V	SKF Duralife (FKM)	25	4 900	
  HDSF1      HDSF2	HDS1 and HDS2 seals with auxiliary excluder lip (TPU or PTFE) to exclude heavy contamination Metal clad self retaining seal	R	Nitrile rubber (NBR)	15	2 950	
		D	SKF Duralip (XNBR)	15	2 950	
		H	SKF Duratemp (HNBR)	20	3 900	
		V	SKF Duralife (FKM)	25	4 900	
  HDSH2      HDSH7	HDS2 or HDS7 seals with auxiliary excluder lip (TPU or PTFE) to exclude heavy contamination Metal clad self retaining seal	R	Nitrile rubber (NBR)	15	2 950	
		D	SKF Duralip (XNBR)	15	2 950	
		H	SKF Duratemp (HNBR)	20	3 900	
		V	SKF Duralife (FKM)	25	4 900	
 HDS2	2 HDS2 seals in back to back arrangement Metal clad self retaining seal	R	Nitrile rubber (NBR)	15	2 950	
		D	SKF Duralip (XNBR)	15	2 950	
		H	SKF Duratemp (HNBR)	20	3 900	
		V	SKF Duralife (FKM)	25	4 900	
 HDSE2	2 HDS2 seals in tandem arrangement Metal clad self retaining seal	R	Nitrile rubber (NBR)	15	2 950	
		D	SKF Duralip (XNBR)	15	2 950	
		H	SKF Duratemp (HNBR)	20	3 900	
		V	SKF Duralife (FKM)	25	4 900	

NOTE: Optional features for HDS seals: SKF Bore Tite outside diameter sealant and spacer lugs as separator between 2 seals in back to back or tandem arrangements. Maximum values of application parameters (e.g. speed, temperature, pressure, STBM and DRO) should not be applied continuously nor simultaneously.



Operating temperature range				Pressure differential		Shaft-to-bore misalignment (STBM) TIR		Dynamic runout (DRO) TIR		Seal function	Typical applications
from	to	from	to								
°C		°F		MPa	psi	mm	in	mm	in		
-40	+100	-40	+210	0,1	15	1,6	0.062	2,4	0.093	Excellent oil or grease retention Exclusion of contamination (in excluder position) Excellent shaft followability	Large size machinery, customized or heavy duty machinery, industrial gearboxes
-40	+100	-40	+210								
-40	+150	-40	+300								
-20	+200	-4	+390								
-40	+100	-40	+210	0,1	15	1,6	0.062	2,4	0.093	Designed for blind installation Excellent oil or grease retention Exclusion of contamination (in excluder position)	Large size machinery, metal rolling mills, mining crushers, paper mills etc. with blind seal installation
-40	+100	-40	+210								
-40	+150	-40	+300								
-20	+200	-4	+390								
-40	+100	-40	+210	-	-	1,6	0.062	2,4	0.093	Excluder seal Highly effective exclusion of water and solid contaminants and retention of grease	Large size machinery, dust exclusion, metal rolling water and scale exclusion, paper mills water and pulp exclusion
-40	+100	-40	+210								
-40	+150	-40	+300								
-20	+200	-4	+390								
-40	+100	-40	+210	0,1	-	1,6	0.062	2,4	0.093	Exclusion of light to moderate contaminants Excellent oil or grease retention	Large size machinery, industrial gearboxes operated in lightly contaminated environments
-40	+100	-40	+210								
-40	+150	-40	+300								
-20	+200	-4	+390								
-40	+100	-40	+210	0,1	-	1,6	0.062	2,4	0.093	Exclusion of heavy contamination Excellent oil and grease retention	Special purpose machinery and gearboxes operated in heavily contaminated environments (e.g. vertical grinding mill in the cement industry, feeder in pulp processing etc.)
-40	+100	-40	+210								
-40	+150	-40	+300								
-20	+200	-4	+390								
-40	+100	-40	+210	0,1	-	1,6	0.062	2,4	0.093	Exclusion of heavy contamination	Special purpose machinery and gearboxes operated in heavily contaminated environments (e.g. vertical grinding mill in the cement processing etc.)
-40	+100	-40	+210								
-40	+150	-40	+300								
-20	+200	-4	+390								
-40	+100	-40	+210	0,1	-	1,6	0.062	2,4	0.093	Excellent oil and grease retention Exclusion of heavy contamination	Metal rolling, mining equipment, pulp & paper process and other heavy duty machinery
-40	+100	-40	+210								
-40	+150	-40	+300								
-20	+200	-4	+390								
-40	+100	-40	+210	0,1	-	1,6	0.062	2,4	0.093	Excellent oil and grease retention Exclusion of heavy contamination	Metal rolling, mining equipment, pulp & paper process and other heavy duty machinery
-40	+100	-40	+210								
-40	+150	-40	+300								
-20	+200	-4	+390								

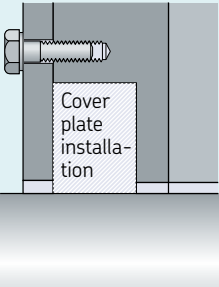








Seals for heavy industrial applications, all-rubber seals for housings with cover plate, HS range

Installation	Seal design	Seal design description	Material code	Material description	Maximum shaft surface speed	
					m/s	ft/min
 <p>Cover plate installation</p>	 HS4	Spring activated sealing lip All rubber seal, coverplate required!	R	Nitrile rubber (NBR)	15	2 950
			D	SKF Duralip (XNBR)	15	2 950
			H	SKF Duratemp (HNBR)	20	3 900
			V	SKF Duralife (FKM)	25	4 900
	 HS5	Spring activated sealing lip SKF Springcover spring retention All rubber seal, coverplate required!	R	Nitrile rubber (NBR)	15	2 950
			D	SKF Duralip (XNBR)	15	2 950
			H	SKF Duratemp (HNBR)	20	3 900
			V	SKF Duralife (FKM)	25	4 900
	 HS6	Split execution Spring activated sealing lip SKF Springlock All rubber seal, coverplate required!	R	Nitrile rubber (NBR)	10	2 000
			D	SKF Duralip (XNBR)	10	2 000
			H	SKF Duratemp (HNBR)	10	2 000
			V	SKF Duralife (FKM)	10	2 000
	 HS7	Split execution Control wire sealing lip SKF Springcover All rubber seal, coverplate required!	R	Nitrile rubber (NBR)	7,5	1 500
			D	SKF Duralip (XNBR)	7,5	1 500
			H	SKF Duratemp (HNBR)	7,5	1 500
			V	SKF Duralife (FKM)	7,5	1 500
	 HS8	★ SKF preferred offer for HS split seals Split execution Spring activated sealing lip SKF Springlock SKF Springcover spring retention All rubber seal, coverplate required!	R	Nitrile rubber (NBR)	10	2 000
			D	SKF Duralip (XNBR)	10	2 000
			H	SKF Duratemp (HNBR)	10	2 000
			V	SKF Duralife (FKM)	10	2 000

NOTE: HS seals are axially and radially oversized to ensure interference fit with cover plate and housing bore.  
 Maximum values of application parameters (e.g. speed, temperature, pressure, STBM and DRO) should not be applied continuously nor simultaneously.

Operating temperature range				Pressure differential		Shaft-to-bore misalignment (STBM) TIR		Dynamic runout (DRO) TIR		Seal function	Typical applications
from	to	from	to								
°C		°F		MPa	psi	mm	in	mm	in		
-40	+100	-40	+210	0,07	11	1,6	0.062	2,4	0.093	Excellent oil and grease retention Exclusion of contamination (in excluder position)	Large size machinery, customized or heavy duty machinery, industrial gearboxes
-40	+100	-40	+210								
-40	+150	-40	+300								
-20	+200	-4	+390								
-40	+100	-40	+210	0,07	11	1,6	0.062	2,4	0.093	Designed for blind installation Excellent oil and grease retention Exclusion of contamination (in excluder position)	Large size machinery, wind turbines, metal rolling mills, mining crushers, paper mills etc. with blind seal installation
-40	+100	-40	+210								
-40	+150	-40	+300								
-20	+200	-4	+390								
-40	+100	-40	+210	-	-	1,6	0.062	2,4	0.093	Grease (and limited oil) retention Exclusion of contamination (in excluder position)	Large size machinery, End of shaft not accessible, split seal is a requirement Large size, customized or heavy duty machinery
-40	+100	-40	+210								
-40	+150	-40	+300								
-20	+200	-4	+390								
-40	+100	-40	+210	-	-	1,6	0.062	2,4	0.093	Grease retention Exclusion of contamination (in excluder position)	Large size machinery, industrial gearboxes, metal rolling mills, mining crushers, paper mills etc. End of shaft not accessible, split seal is a requirement. Only in case of narrow installation space where closing the spring lock is not an option
-40	+100	-40	+210								
-40	+150	-40	+300								
-20	+200	-4	+390								
-40	+100	-40	+210	-	-	1,6	0.062	2,4	0.093	Grease (and limited oil) retention Exclusion of contamination (in excluder position)	Large size machinery, industrial gearboxes, wind turbines, metal rolling mills, mining crushers, paper mills etc. End of shaft not accessible, split seal is a requirement SKF Springcover spring retention facilitates the split seal installation Blind installation into large size, customized or heavy duty machinery
-40	+100	-40	+210								
-40	+150	-40	+300								
-20	+200	-4	+390								

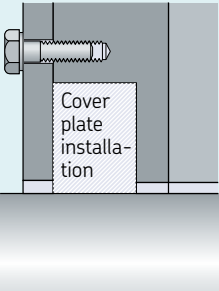






Seals for heavy industrial applications, all-rubber reinforced seals for housings with cover plate, HSS range

Installation	Seal design	Seal design description	Material code	Material description	Maximum shaft surface speed	
					m/s	ft/min
 <p>Cover plate installation</p>	 HSS4	Spring activated sealing lip Reinforced all rubber seal, coverplate required!	R	Nitrile rubber (NBR)	15	2 950
			H	SKF Duratemp (HNBR)	20	3 900
			V	SKF Duralife (FKM)	25	4 900
	  <sup>a</sup> HSS5	Spring activated sealing lip SKF Springcover spring retention Reinforced all rubber seal, coverplate required!	R	Nitrile rubber (NBR)	15	2 950
			H	SKF Duratemp (HNBR)	20	3 900
			V	SKF Duralife (FKM)	25	4 900
	  HSS6	Split execution Spring activated sealing lip SKF Springlock Reinforced all rubber seal, coverplate required!	R	Nitrile rubber (NBR)	10	2 000
			H	SKF Duratemp (HNBR)		
			V	SKF Duralife (FKM)		
	   <sup>a</sup> HSS8	★ <b>SKF preferred offer for HSS split seals</b> Split execution Spring activated sealing lip SKF Springlock SKF Springcover spring retention Reinforced all rubber seal, coverplate required!	R	Nitrile rubber (NBR)	10	2 000
			H	SKF Duratemp (HNBR)		
			V	SKF Duralife (FKM)		

NOTE: HSS seals are axially and radially oversized to ensure interference fit with cover plate and housing bore.  
 Optional feature for HSS seals: Lubrication grooves for re-lubrication between 2 seals.  
 Maximum values of application parameters (e.g. speed, temperature, pressure, STBM and DRO) should not be applied continuously nor simultaneously.

Operating temperature range				Pressure differential		Shaft-to-bore misalignment (STBM) TIR		Dynamic runout (DRO) TIR		Seal function	Typical applications
from	to	from	to								
°C		°F		MPa	psi	mm	in	mm	in		
-40	+100	-40	+210	0,07	11	1,6	0.062	2,4	0.093	Excellent oil and grease retention Exclusion of contamination (in excluder position)	Large size machinery, customized or heavy duty machinery, industrial gearboxes
-40	+150	-40	+300								
-20	+200	-4	+390								
-40	+100	-40	+210	0,07	11	1,6	0.062	2,4	0.093	Designed for blind installation Excellent oil and grease retention Exclusion of contamination (in excluder position)	Large size machinery, metal rolling mills, mining crushers, paper mills etc. with blind seal installation
-40	+150	-40	+300								
-20	+200	-4	+390								
-40	+100	-40	+210	-	-	1,6	0.062	2,4	0.093	Grease (and limited oil) retention Exclusion of contamination (in excluder position)	Large size machinery, industrial gearboxes, metal rolling mills, mining crushers, paper mills etc. End of shaft not accessible, split seal is a requirement Large size, customized or heavy duty machinery
-40	+150	-40	+300								
-20	+200	-4	+390								
-40	+100	-40	+210	-	-	1,6	0.062	2,4	0.093	Grease (and limited oil) retention Exclusion of contamination (in excluder position)	Large size machinery, industrial gearboxes, wind turbines, metal rolling mills, mining crushers, paper mills etc. End of shaft not accessible, split seal is a requirement SKF Springcover spring retention facilitates the split seal installation Blind installation into large size, customized or heavy duty machinery
-40	+150	-40	+300								
-20	+200	-4	+390								

Seals for heavy industrial applications, selected main designs, Polyurethane seal HRS

Installation	Seal design	Seal design description	Material code	Material description	Maximum shaft surface speed	
					m/s	ft/min
 <p>Cover plate installation</p>	 HRS11	High performance polyurethane radial shaft seal with spring activated sealing lip Cover plate required	HP GP	H-ECOPUR (D < 600 mm) G-ECOPUR (D > 600 mm)	2,5	490
	 HRS A1	High performance polyurethane radial shaft seal with spring activated sealing lip and auxiliary lip Cover plate required	HP GP	H-ECOPUR (D < 600 mm) G-ECOPUR (D > 600 mm)	2,5	490
	 HRE11	High performance polyurethane radial excluder seal Cover plate required	HP GP	H-ECOPUR (D < 600 mm) G-ECOPUR (D > 600 mm)	2,5	490
	 HRS12	High performance polyurethane radial shaft seal split execution, SKF Springlock spring activated sealing lip Cover plate required	HP GP	H-ECOPUR (D < 600 mm) G-ECOPUR (D > 600 mm)	2,5	490
	 HRS A12	High performance polyurethane radial shaft seal split execution, SKF Springlock spring activated sealing lip Cover plate required	HP GP	H-ECOPUR (D < 600 mm) G-ECOPUR (D > 600 mm)	2,5	490
	 HRE12	High performance polyurethane radial excluder seal Cover plate required	HP GP	H-ECOPUR (D < 600 mm) G-ECOPUR (D > 600 mm)	2,5	490

Operating temperature range				Pressure differential		Shaft-to-bore misalignment (STBM) TIR		Dynamic runout (DRO) TIR		Seal function	Typical applications
from	to	from	to								
°C		°F		MPa	psi	mm	in	mm	in		
-30	+110	-22	+230	0,05	7	1,5	0.059	3	0.118	Lubricant retention for grease with NLGI > 1	Wind turbine main shaft, heavy industrial applications that require high wear resistance and where there is access to the end of the shaft
-30	+110	-22	+230	0,05	7	1,5	0.059	3	0.118	Lubricant retention for grease with NLGI > 1 with light contamination protection	Wind turbine main shaft, heavy industrial applications that require high wear resistance with light contamination protection where there is access to the end of the shaft
-30	+110	-22	+230	0,05	7	1,5	0.059	3	0.118	Contamination exclusion	Wind turbine main shaft, heavy industrial applications that require high wear resistance and high contamination protection where there is access to the end of the shaft
-30	+110	-22	+230	0,05	7	1,5	0.059	3	0.118	Lubricant retention for grease with NLGI > 1	Wind turbine main shaft, heavy industrial applications that require high wear resistance and where there is <b>no</b> access to the end of the shaft
-30	+110	-22	+230	0,05	7	1,5	0.059	3	0.118	Lubricant retention for grease with NLGI > 1 with light contamination protection	Wind turbine main shaft, heavy industrial applications that require high wear resistance with light contamination protection where there is <b>no</b> access to the end of the shaft
-30	+110	-22	+230	0,05	7	1,5	0.059	3	0.118	Contamination exclusion	Wind turbine main shaft, heavy industrial applications that require high wear resistance with light contamination protection where there is <b>no</b> access to the end of the shaft

# How to read a designation

Matrix 3

Dimension / Designation examples	Dimension		Seal design		Material				
	Shaft (d1)	Decimal Code <sup>1)</sup>	Bore (D)	Decimal Code <sup>1)</sup>	Bore Depth (B)	Decimal Code <sup>1)</sup>	Seal design	Main Lip	Auxiliary lip
<b>1200 - 1316 - 48 HDS2Y R</b>	12.00 in	1200	13.25 in	1316	0.75 in	48	HDS2Y	NBR	-
<b>616 - 700 - 32 HSS5G V</b>	6.25 in	616	7.00 in	700	0.50 in	32	HSS5G	FKM	-
<b>1816 - 2016 - 100 HDSF2L08 DU</b>	18.25 in	1816	20.25 in	2016	1.00 in	100	HDSF2L08 <sup>2)</sup>	XNBR	H-ECOPUR
<b>675 X 725.2 X 28 HDSA2 DD</b>	675 mm	-	725.2 mm	-	28 mm	-	HDSA2	XNBR	XNBR

Separators (- inch, X metric)

<sup>1)</sup> Inch size decimal code in **table 1** (decimals multiplied by 64)  
<sup>2)</sup> "L08" indicates a 0.125 inch lug length from the **table 2**

Matrix 4

## Dimensions

<b>dXDXB</b>	Metric seals real dimensions in mm	<b>d</b>	Shaft diameter
<b>d-D-B</b>	Inch size decimal code in <b>table 1</b> (inch decimals multiplied by 64)	<b>D</b>	Seal housing bore diameter
		<b>B</b>	Housing bore depth / HDS seal width

Table 1

Inch size Decimal code					
Key	Inch	Key	Inch	Key	Inch
00	0	25	0.391	40	0.625
01	0.016	26	0.406	41	0.641
02	0.031	27	0.422	42	0.656
03	0.047	28	0.438	43	0.672
04	0.063	29	0.453	44	0.688
05	0.078	30	0.469	45	0.703
06	0.094	31	0.484	46	0.719
07	0.109	32	0.500	47	0.734
08	0.125	22	0.344	48	0.750
09	0.141	23	0.359	49	0.766
10	0.156	24	0.375	50	0.781
11	0.172	25	0.391	51	0.797
12	0.188	26	0.406	52	0.813
13	0.203	27	0.422	53	0.828
14	0.219	28	0.438	54	0.844
15	0.234	29	0.453	55	0.859
16	0.250	30	0.469	56	0.875
17	0.266	31	0.484	57	0.891
18	0.281	33	0.516	58	0.906
19	0.297	34	0.531	59	0.922
20	0.313	35	0.547	60	0.938
21	0.328	36	0.563	61	0.953
22	0.344	37	0.578	62	0.969
23	0.359	38	0.594	63	0.984
24	0.375	39	0.609	64	1.000

Table 2

## Lugs specifications (metric) HDS1L / HDS2L / HDS7L

Metric Code	Length (mm)
L3	3
L4	4
L5	5
L6	6
L7	7
L8	8
L9	9
L10	10
L11	11
L12	12

## Lugs specifications (inch) HDS1L / HDS2L / HDS7L

Inch Code	Length (in)
L08	0.125
L10	0.156
L12	0.188
L16	0.250
L20	0.313
L24	0.375
L28	0.438
L32	0.500



Matrix 5

Seal design / Material designation example

	Group 1 ▼	Group 2 ▼	Group 3 ▼	Group 4 ▼	Group 5 ▼	Group 6 ▼	Group 7 ▼
HDS design		A	1	Y	L6	R	D
HS / HSS design		-	5	-	G	H	-
HRS design		A	1	-	-	GP	-

Matrix 6

Seal design and material

	HDS designs	HS / HSS designs	HRS designs
<b>Group 1</b> ▶			
<b>Group 2</b> ▶	<p><b>Auxiliary lip (dust lip)</b></p> <p><b>A</b> → Elastomeric auxiliary lip</p> <p><b>F</b> → Polyurethane or PTFE auxiliary lip on the back of the seal</p> <p><b>H</b> → Polyurethane or PTFE auxiliary lip on the face of the seal</p>	<p><b>Polyurethane or PTFE</b></p> <p><b>A</b> → Elastomeric auxiliary lip</p>	<p><b>Auxiliary lip</b></p> <p><b>A</b> → Polyurethane auxiliary lip</p>
<b>Group 3</b> ▶	<p><b>Main sealing lip features</b></p> <p><b>1</b> → Seal with spring</p> <p><b>2</b> → Seal with spring and SKF Springcover</p> <p><b>7</b> → Seal without spring</p>	<p><b>Main sealing lip features</b></p> <p><b>4</b> → Solid seal with spring</p> <p><b>5</b> → Solid seal with spring and SKF Springcover</p> <p><b>6</b> → Split seal with spring</p> <p><b>7</b> → Split seal with control wire and SKF Springcover</p> <p><b>8</b> → Split seal with spring and SKF Springcover</p>	<p><b>Main sealing lip features</b></p> <p><b>1</b> → Solid seal with spring</p> <p><b>2</b> → Split seal with spring</p>
<b>Group 4</b> ▶	<p><b>Outside features</b></p> <p><b>9</b> → Stainless steel case</p> <p><b>Y</b> → SKF Bore Tite coating</p>		
<b>Group 5</b> ▶	<p><b>Relubrication features</b></p> <p><b>L</b> → Spacer lugs: spacer lug length according to <b>table 2</b></p>	<p><b>Relubrication features</b></p> <p><b>G</b> → Relubrication grooves on the back of the seal</p>	
<b>Group 6</b> ▶	<p><b>Main sealing lip material</b></p> <p><b>R</b> → NBR - nitrile rubber</p> <p><b>H</b> → HNBR - hydrogenated nitrile rubber</p> <p><b>D</b> → SKF Duralip (XNBR)</p> <p><b>V</b> → SKF Duralife (FKM)</p>	<p><b>Main sealing lip material</b></p> <p><b>R</b> → NBR – nitrile rubber</p> <p><b>H</b> → HNBR – hydrogenated nitrile rubber</p> <p><b>D</b> → SKF Duralip (XNBR)</p> <p><b>V</b> → SKF Duralife (FKM)</p>	<p><b>Sealing lip material</b></p> <p><b>HP</b> H-ECOPUR (D &lt; 600 mm)</p> <p><b>GP</b> G-ECOPUR (D &gt; 600 mm)</p>
<b>Group 7</b> ▶	<p><b>Auxiliary lip material</b></p> <p><b>D</b> → XNBR with HDSA</p> <p><b>T</b> → PTFE</p> <p><b>U</b> → H-ECOPUR (D &lt; 600 mm) G-ECOPUR (D &gt; 600 mm)</p>		

# Metal-cased seals

## General

SKF metal-cased seals are specially designed to withstand the extreme conditions encountered in heavy-duty applications. The seals include the highly engineered and commonly used HDS1, HDS2 and HDS7, as well as designs with additional excluder lips, such as the HDSA, HDSF, HDSH. HDS2 and HDS7 seals can be ordered as a unit in back to back (e.g. HDSD2) or in tandem (e.g. HDSE2) arrangements. These seals perform exceptionally well in the very contaminated environment of metal rolling mills, the pulp and wet section of paper mills, mining and construction machinery and more universal industrial drive applications.

## Size flexibility

SKF metal-cased seals are available in a wide range of sizes. Seals in customized dimensions are created as required without any new tooling, resulting in short lead times. In addition, the minimum order quantity is just one seal, enabling a flexible solution for any heavy duty application, no matter how big or small the job.

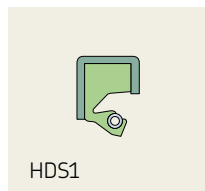
The HDS seals are available for all shaft diameters within the ranges listed in **table 5** on **page 200**. The size tables starting on **page 203** list a selection of sizes. Contact your SKF sales representative for additional information.

## Ease of installation

SKF's heavy duty application self-retaining HDS seals are ideal for use in open housing bore installations. For housings with cover plates and axial clamping of the seal into the housing bore, please refer to the all rubber SKF seals marked HS and HSS on **page 90**.



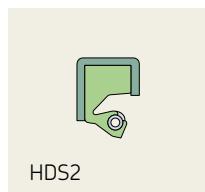
Fig. 1



HDS1



Fig. 2



HDS2

## HDS1 and HDS2

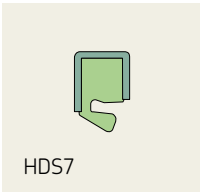
The most commonly used metal-cased seals are the HDS1 and HDS2 seals, designed for general-purpose applications. They are equipped with a heavy-duty metal case and a stainless steel garter spring.

The HDS1 seal (→ **fig. 1**) has a spring installed in the SKF Springlock groove (→ **fig. 11** on **page 191**). For blind installations, where spring displacement may go undetected, HDS2 seals (→ **fig. 2**) have an SKF Springcover (→ **fig. 12** on **page 191**) that retains the spring in the groove. The HDS1 and HDS2 seals are available with adjustable or fixed-width spacer lugs (→ **page 190**).

The HDS1 and HDS2 seals can be designed with a PTFE or ECOPUR auxiliary lip, positioned and directed in either of the two ways shown in **figs. 6** and **7** on **page 188** and with optional SKF Bore Tite outer diameter sealant coating (→ **fig. 13** on **page 191**).

Nitrile rubber (NBR) is standard for these seal designs, but both of them are also available in SKF Duralip (XNBR), SKF Duratemp (HNBR) and SKF Duralife (FKM).

Fig. 3



## HDS7

The ingress of water and solid contaminants is a common cause of bearing failures. To solve this, SKF developed in its flexible in size heavy duty HDS radial shaft seals family the HDS7 seal with enhanced exclusion capabilities (→ **fig. 3**). It was originally designed for grease lubricated bearings in rolling mill stands, where water and scale are a constant threat to bearing service life. The HDS7 is also recommended for use in large gear-boxes, coal pulverizers and cement grinders and all other applications where excluding contamination and protecting the drive train challenges the sealing system. Customers have reported that the HDS7 seal is easier to install and provides longer service life than common seal designs.

The HDS7 seal features an optimized non-spring-loaded lip profile, designed to retain grease and aggressively pump contaminants away from the lip. The lip concept of HDS7 seals also reduces radial loads, which otherwise can lead to elevated underlip temperatures and increased seal wear. HDS7 seals are installed with the sealing lip facing the air side. The HDS7 can also be used in oil lubricated applications in back-to-back arrangements with a spring-loaded seal design, e.g. an HDS1 or HDS2 (→ **figs. 1 and 2**), in the includer position.

HDS7 seals can also be equipped with a PTFE or ECOPUR auxiliary lip positioned and directed as shown in **fig. 7** on **page 188**.

The HDS7 seal is available with a nitrile sealing lip (NBR) for general use, SKF Duralip (XNBR) for increased wear resistance in abrasive environments and SKF Duratemp (HNBR) that combines improved wear resistance with increased temperature capability. For certain applications, SKF Duralife (FKM) can also be specified. See page 31 for additional information about different sealing lip materials.

SKF Bore Tite outer diameter sealant coating (see **page 191**) and spacer lugs (see **page 190**) are available as options.

Fig. 4



## HDSA seals

HDSA seals are designed with an elastomeric auxiliary lip in addition to the sealing lip (→ figs. 4 to 7). They are generally used where additional protection from light contaminants is needed.

HDSA2 is designed with an SKF Spring-cover for spring retention in blind installations e. g. in metal rolling mill chocks, while HDSA1 is designed without an SKF Spring-cover for industrial drive and gearbox applications (→ fig. 12 on page 191).

HDSA is also available with SKF Bore Tite coating ( see page 191).

HDSA seals are available with sealing lips made of nitrile rubber (NBR), SKF Duralip (XNBR), SKF Duratemp (HNBR) or SKF Duralife (FKM). For shaft diameters up to 1 200 mm (47 in), the standard auxiliary lip is made of SKF Duralip.

Fig. 6



HDSA1



HDSF2

Fig. 5



Fig. 7



HDSA2



HDSH2

## HDSF and HDSH seals

HDS1, HDS2 and HDS7 seals can be designed with an auxiliary PTFE or ECOPUR lip to further protect the bearing and sealing lip(s) from dust particles in heavily contaminated environments, for example mining and cement industries. The lip is then positioned and directed as shown in **fig. 6**.

The auxiliary lip is providing strong protection against solid contamination (**fig. 7**).

The auxiliary lip is clamped between the metal case and the rubber seal body without significantly increasing the total seal width. It has very good wear resistance, can withstand dry running and contributes to improved sealing performance while only generating a minimal friction torque. The PTFE auxiliary lip has outstanding chemical and temperature resistance. The combination of a PTFE auxiliary lip and a main lip made of the fluoro rubber compound SKF Duralife creates a particularly effective sealing solution for applications with elevated temperatures and required seal resistance against process or cleaning fluids.

Special care must be taken to prevent damaging the PTFE lip during installation. Refer to instructions in paragraph PTFE seals on **pages 96 and 97**.

The letters F and H in the product name indicate a PTFE or ECOPUR auxiliary lip design including the lip's position and direction; see for example the HDSF2 (**→ fig. 6**) and HDSH2 (**→ fig. 7**).

### SKF Bore Tite Coating

SKF Bore Tite Coating is optional available as a water-based acrylic sealant for all SKF metal-cased HDS seals. The sealant is used as a coating on the outside diameter of the seal. For more details see **page 191**.

**!** ECOPUR is a thermoplastic polyurethane (TPU) and has outstanding mechanical properties like abrasion resistance against contaminants. G-ECOPUR and H-ECOPUR are hydrolysis-resistant polyurethanes with similar properties. The size of the seal will dictate whether G-ECOPUR or H-ECOPUR is used.



Fig. 8

### HDSD and HDSE seals

HDSD seals (**→ fig. 8**) are designed with two sealing lips facing opposite directions (back to back arrangement). These seals are typically used in applications where two fluids must be kept separated e.g. the bearing lubricant and a process fluid. When using an HDSD seal, it is very important to provide the means to lubricate the sealing lips. To do this, the cavity between the sealing lips must be filled completely with grease prior to installation.

HDSE seals (**→ fig. 9**) feature two sealing lips facing the same direction (tandem arrangement). They are typically used when a back-up seal would otherwise be needed for retention or exclusion purposes. Like for HDSD seals, for HDSE seals the cavity between the sealing lips must be filled with grease prior to installation so that the seal functions properly.

HDSD and HDSE seals are equipped with an SKF Springcover (HDS2, HDSE2) (**→ fig. 12 on page 191**). All of them are available in nitrile rubber (NBR), SKF Duralip (XNBR), SKF Duratemp (HNBR) or SKF Duralife (FKM).

HDSD and HDSE seals are available optional with SKF Bore Tite outer diameter sealant coating (**see page 191**).



Fig. 9



# Additional design features for HDS seals

## Spacer lugs

Spacer lugs are available for all metal-cased HDS designs to separate seals in tandem or back-to-back arrangements to provide space for sealing lip lubrication (→ **fig. 10**).

Traditional fixed-width lugs for metal-cased HDS seals are 9,5 mm (0.375 in) in diameter and are available in widths from 3,2 mm (0.125 in) to 12,7 mm (0.5 in) in increments of 1,6 mm (0.063 in). The fixed-width lug is an available option for all metal-cased seals.

All standard adjustable lugs are 9,5 mm (0.375 in) in diameter and 9,5 mm (0.375 in) in width. They can be adjusted to smaller widths in 1,6 mm (0.063 in) increments by removing the steel washers. The lugs may also be removed entirely. Longer, adjustable lugs, with a width of 12,7 mm (0.5 in), are available on request, however, it can be more difficult to reduce their width.

Certain small seal cross sections may require special small diameter lugs, 5,3 mm (0.210 in), with a width range of 1,6 to 3,2 mm (0.063 to 0.125 in).

The lugs are placed around the heel of the seal in four, six or eight equally spaced locations, depending on the seal outside diameter (→ **table 3**).

Fig. 10



HDS1 with spacer lug

Table 3

### Number of spacer lugs needed

Spacer lugs	Housing bore diameter			
	from	incl.	from	incl.
–	mm		in	
4		762		30
6	762	1143	30	45
8	1143		45	

Table 4

### Lugs specifications (metric) HDS1L / HDS2L / HDS7L

Metric Code	Length (mm)
L3	3
L4	4
L5	5
L6	6
L7	7
L8	8
L9	9
L10	10
L11	11
L12	12

### Lugs specifications (inch) HDS1L / HDS2L / HDS7L

Inch Code	Length (in)
L08	0.125
L10	0.156
L12	0.188
L16	0.250
L20	0.313
L24	0.375
L28	0.438
L32	0.500

## SKF Springlock

The SKF Springlock is a sealing lip feature that surrounds 270° of the garter spring diameter (→ **fig. 11**). It helps hold the spring in position during installation and is standard on all HS, HSS seals and spring-loaded, metal-cased HDS seals.

## SKF Springcover

For blind installations, where spring displacement may go undetected, the SKF Springcover (→ **fig. 12**) can be specified. It also protects the spring from dirt, water and other contaminants. SKF Springcover is flexible and covers the exposed portion of the stainless steel garter spring without adversely affecting the spring's capability.

## SKF Bore Tite Coating

The static sealing ability between a metal outside diameter and the housing bore is somewhat limited. This is particularly the case with low-viscosity and wetting fluids. With this in mind, HDS seals can be ordered with the optional SKF Bore Tite Coating (→ **fig. 13**), a water-based acrylic sealant. SKF Bore Tite Coating is green in colour, does not harden and serves to fill small imperfections in the housing bore.

- The coating thickness is 0,03 to 0,07 mm (0.0012 to 0.0028 in)
- The coating compensates for small imperfections in the housing bore surface. It is recommended for bore surface texture greater 2,5 µm (100 µin)  $R_a$
- The temperatures resistance is up to 200 °C (390 °F)

Media compatibility is very good for oils, greases, aqueous acids and alkalis, alcohols, glycols. With aromatics, ketones and esters the coating is not compatible.

Fig. 11



Fig. 12



Fig. 13



# All-rubber seals

## General

SKF offers a wide range of all-rubber seals in customized dimensions for housings with cover plates and axial clamping of the seal into the housing bore.

SKF all-rubber seals are specially designed to withstand the extreme conditions encountered in heavy-duty applications. The assortment includes the HS and HSS seals. The HSS seals feature a reinforced seal body for improved stability. Both designs are available as split seals to enable easy installation without shaft dismounting in large machinery. These seals perform exceptionally well in the very demanding environment of wind turbines, metal rolling mills, mining and construction machinery and more universal industrial drive applications.

## Size flexibility

SKF all-rubber seals are available in a wide range of sizes. Seals in customized dimensions are created as required without any new tooling resulting in short lead times. In addition, the minimum order quantity is just one seal, enabling a flexible solution for any heavy duty application, no matter how big or small the job.

For all shaft diameters within the ranges listed in **table 6** on **page 201**. Also, see the product tables starting on **page 203** for a selection of sizes. Contact your SKF sales representative for additional information.

## Ease of installation

SKF's heavy duty application axial clamped all-rubber seals are ideal for use in housing bore installations with cover plates. For open housings without cover plates please refer to the metal cased seals HDS on **page 90**.



Fig. 14

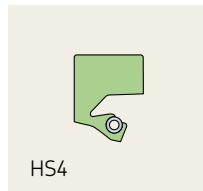
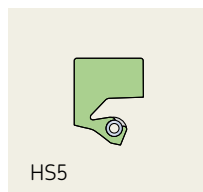


Fig. 15



## HS all-rubber seals

HS seals, available in solid and split executions, are all-rubber seals, designed without any reinforcement. They are manufactured oversized relative to the housing bore diameter and depth to enable proper compression and stability. A cover plate (→ **figs. 26** and **27** on **pages 94** and **95**) is required to compress the seal axially, helping to stabilize the seal in the housing bore.

A stainless steel garter spring located in the SKF Springlock groove (→ **fig. 23** on **page 195**) provides the appropriate radial load against the shaft.

For certain applications, HS seals are also available with an auxiliary lip and / or band clamp (HSA and HSAC designs). Contact SKF for more information.

HS seals are available in nitrile rubber (NBR), SKF Duralip (XNBR), SKF Duratemp (HNBR) or SKF Duralife (FKM).

## Solid execution

Standard solid HS seals can accommodate shaft diameters starting at 165 mm (6.5 in) but basically do not have an upper size limit.

HS4 seals (→ **fig. 14**) have a solid, all-rubber design and incorporate a spring-loaded sealing lip. They feature an SKF Springlock groove (→ **fig. 23** on **page 195**). For a proper fit in the housing bore, a cover plate is required (→ **figs. 26** and **27** on **pages 94** and **95**).

HS5 seals (→ **fig. 15**) have the same basic design as HS4 seals with the addition of an SKF Springcover (→ **fig. 24** on **page 195**) to hold the spring in place during installation and protect it from contaminants.

Both designs have a threaded spring connection (→ **fig. 22a** on **page 195**).





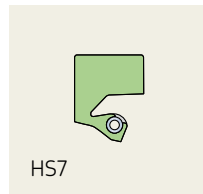
Fig. 17



HS6



Fig. 18



HS7



HS8

housing bore, a cover plate is required (→ figs. 26 and 27 on page 95).

HS7 seals (→ fig. 18), designed for **grease lubricated applications only**, have a wire controlled sealing lip and are designed with both an SKF Springlock and SKF Springcover (→ figs. 23 and 24 on page 195). All HS7 seals feature a control-wire spring connection (→ fig. 22c on page 195). The spring is completely enclosed and the connection is made by running the control wire into the centre of the spring coil across the split (butt joint). A built-in spring tension holds the sealing lip on the shaft. For a proper fit, a cover plate is required (→ figs. 27 and 28 on pages 95). Due to the unique design that enables easier installation, a gap and minor leakage may occur at the joint even after the cover plate is installed. It is necessary to place the split at the 12 o'clock position during installation (→ fig. 25 on page 94). HS7 seals do not have the high sealing characteristics of other HS seals, but are the easiest to install.

HS8 seals (→ fig. 18) are designed with a spring-loaded sealing lip, SKF Springlock, SKF Springcover (→ figs. 23 and 24 on page 195) and a hook-and-eye spring connection (→ fig. 22b on page 195) for shaft diameters above 455 mm (18 in). Smaller sizes of HS8 seals come with a threaded spring connection. The spring is entirely enclosed except for a small portion on either side of the split. HS8 seals provide the most effective sealing performance of all split HS seals and are the preferred design for retaining low-viscosity lubricants and for water exclusion. HS8 seals perform best on horizontal shafts, but can also be used on vertical shafts provided they are not flooded with lubricant.

More information on spring connections for split seals can be found on page 195.

## Split execution

In applications where shaft removal is impractical, HS all-rubber split seals are an excellent choice. They are simply placed around the shaft and pushed evenly into the housing bore with the split at the 12 o'clock position. A cover plate (→ figs. 27 and 28 on pages 95) must be used to compress the seal axially to stabilize it in the housing bore.

HS split seals perform best with grease or high-viscosity lubricants. However, low-viscosity lubricants are also suitable if the level of lubricant is kept below the shaft centre line, which is particularly important at considerable surface speeds. Split seals are preferably used on horizontal shafts, but can also be used on vertical shafts in grease lubricated applications.

HS6 seals (→ fig. 17) are designed with a spring-loaded sealing lip and an SKF Springlock (→ fig. 23 on page 195). They feature a separate loose spring and a hook-and-eye spring connection for shaft diameters above 455 mm (18 in) unless otherwise specified (→ fig. 22b on page 195). Smaller sizes of HS6 seals come with a threaded spring connection. For a proper fit in the

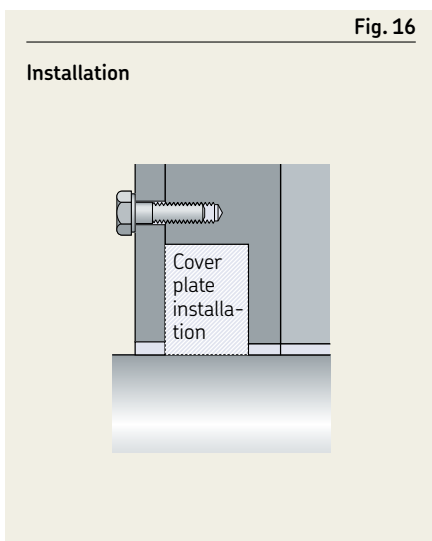


Fig. 16

Installation

Fig. 19



Fig. 20



## HSS reinforced all-rubber seals

HSS seals constitute a range of seals with a variety of design following the same design standard and designation system as the HS assortment. Additional features are the reinforced seal body and optional lubrication grooves **fig. 20** at the back of the seal to allow re-greasing between the sealing lips in back-to-back or tandem installations of two HSS seals.

HSS4 and HSS5 are solid, HSS6 and HSS8 are split seal executions. HSS5 and HSS8 are featured with the SKF Springcover (→ **fig. 24** on **page 195**). For seals with lubrication grooves the designation includes the suffix G (e.g. HSS5G).

HSS seals are available in nitrile rubber (NBR), SKF Duratemp (HNBR) or SKF Duralife (FKM) for all shaft diameters within the ranges listed in **matrix 2** on **page 180**. Also see the product **tables** starting on **page 203**. for a selection of sizes. Additional please refer to the unsurpassed size flexibility of HSS seals, customized dimensions without any new tooling and minimum order quantity of one seal only. Contact your SKF sales representative for additional information.



HSS4 / HSS6



HSS5 / HSS8

Fig. 21



HSA7 / HSA8



HSA7C / HSA8C

## HSA7, HSA8, HSA7C, HSA8C

HSA7 and HSA8 are specifically designed for the harsh conditions in the very slow rotating horizontal grinding mills in cement and mining industries. The seals feature a stronger shaft interference than HS7 and HS8 seals for an improved lubricant retention at very low speeds and an additional auxiliary dust lip to keep the heavy dust contamination in the application out of the bearing.

HSA7C and HSA8C seals are equipped with an outer diameter retention ring to simulate the outer diameter interference in radially open housing bores (→ **fig 21**)

HSA7 seals (→ **fig. 21**) is designed for grease lubricated applications only, have a wire controlled sealing lip and are designed with both an SKF Springlock and SKF Springcover (→ **figs. 23** and **24** on **page 195**).

For a proper fit, a cover plate is required (**figs. 26** and **27** on **page 95**). Due to the unique design that enables easier installation, a gap and minor leakage may occur at the joint even after the cover plate is installed. It is necessary to place the split at the 12 o'clock position during installation (→ **fig. 24** on **page 92**).

HSA7 seals do not have the advanced sealing characteristics of other HS seals, but are the easiest to install.

HSA8 seals are designed with a spring-loaded sealing lip, SKF Springlock, SKF Springcover (→ **figs. 23** and **24** on **page 195**) and a hook-and-eye spring connection (→ **fig. 22b** on **page 195**). The spring is entirely enclosed except for a small portion on either side of the split.

HSA8 seals provide the most effective sealing performance and are the preferred design for retaining low-viscosity lubricants.

# Additional design features for HS and HSS seals

## Spring connections for split seals

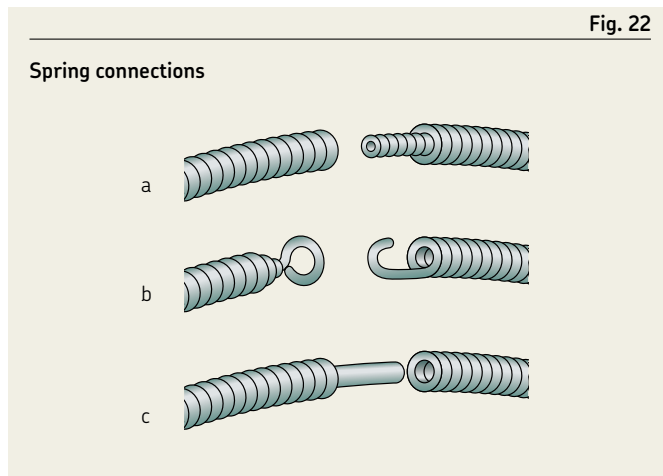
There are different ways to connect the stainless steel garter springs of HS and HSS split seals. A threaded spring connection (→ **fig. 22a**) is used for all solid HS and HSS seals as well as the split HS6 / HSS6 and HS8 / HSS8 seals for shaft diameters  $\leq 455$  mm (18 in). A hook-and-eye spring connection (→ **fig.22b**) is used for HS6 / HSS6 and HS8 / HSS8 seals for shaft diameters  $> 455$  mm (18 in). HS7 seals feature the special control-wire connection (→ **fig.22c**), are only to be used for grease applications when the other spring connections cannot be installed.

## SKF Springlock

The SKF Springlock is a sealing lip feature that surrounds 270° of the garter spring diameter (→ **fig. 23**). It helps holding the spring in position during installation and is standard on all HS and HSS seals.

## SKF Springcover

For blind installations, where spring displacement may go undetected, the SKF Springcover (→ **fig. 24**) can be specified. It also protects the spring from dirt, water and other contaminants. SKF Springcover is flexible and covers the exposed portion of the stainless steel garter spring without adversely affecting the spring's capability.



# HRS seals

## General

HRS seals from SKF were specially designed to cope with the harsh conditions that wind turbine main shafts face. They offer lubricant retention and contamination exclusion to reduce the risks of lubrication or contaminant-related bearings failures and their consequences, such as production downtime and repair costs. These high performance radial shaft seals can deliver significantly extended service life and help operators to reduce maintenance costs and ultimately increase reliability. These seals can also be used for other heavy duty applications.

## Benefits and features

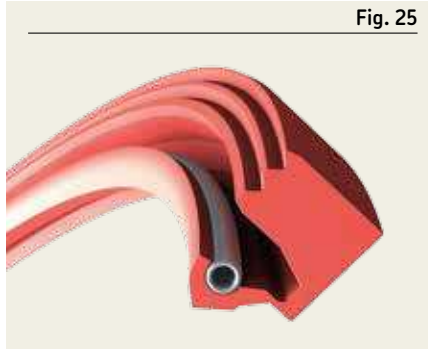
- Extended service life due to high abrasion resistance
- Reduced bearing failures related to contamination
- Resistance against hydrolysis, UV radiation and ozone due to H-ECOPUR and G-ECOPUR material
- Increased reliability
- Facilitated up-tower retrofits
- Reduced OPEX during machine life
- Easy installation
- Customization of seal size thanks to flexible manufacturing process



### Easy up-tower usage

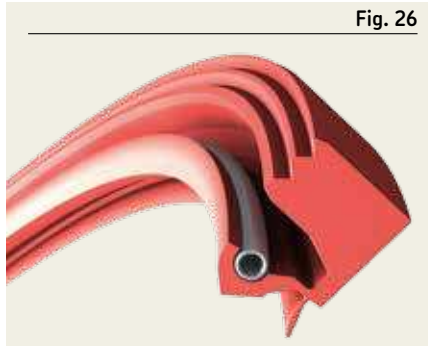
The split seals are single packed and designed to fulfill the needs in the wind aftermarket. Each package contains a seal with the garter spring and an installation guide. To allow for easy handling and transportation for large diameter seals, these seals are folded. For more information on installing a split seal, please see **page 91**.

Fig. 25



HRS1

Fig. 26



HRSA

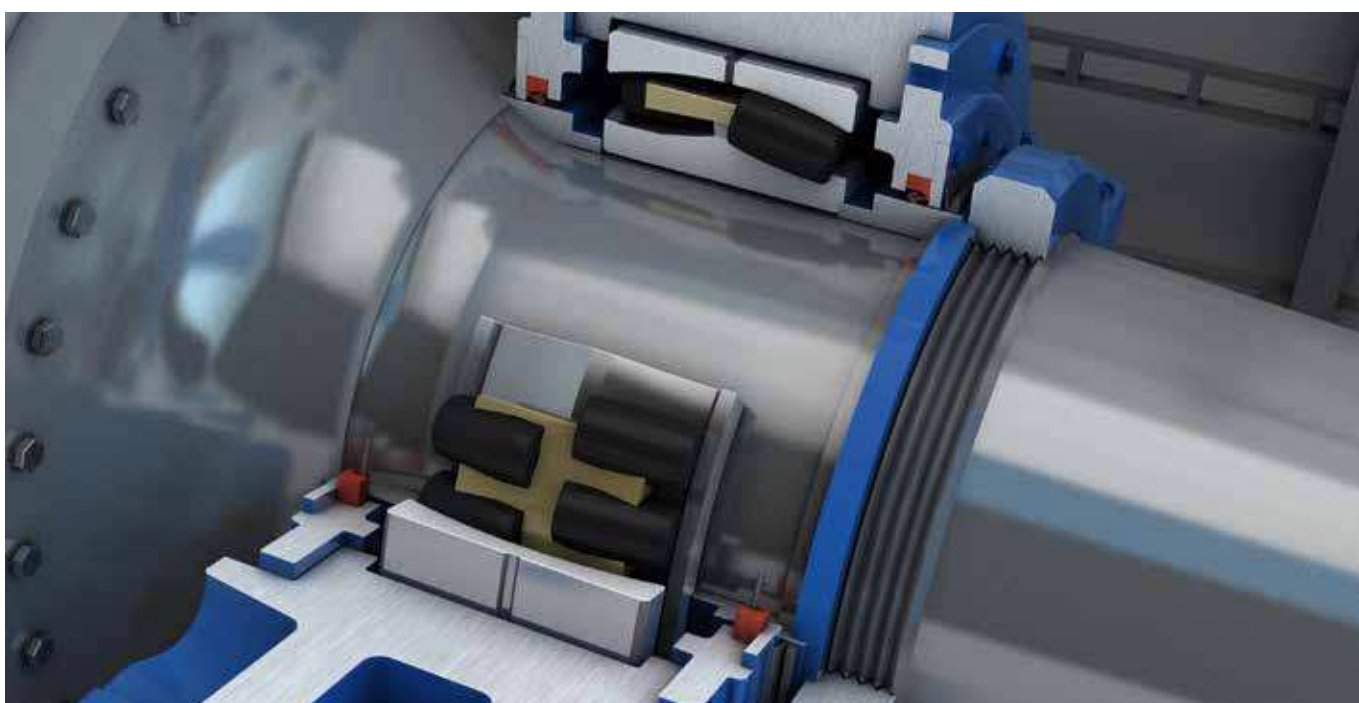
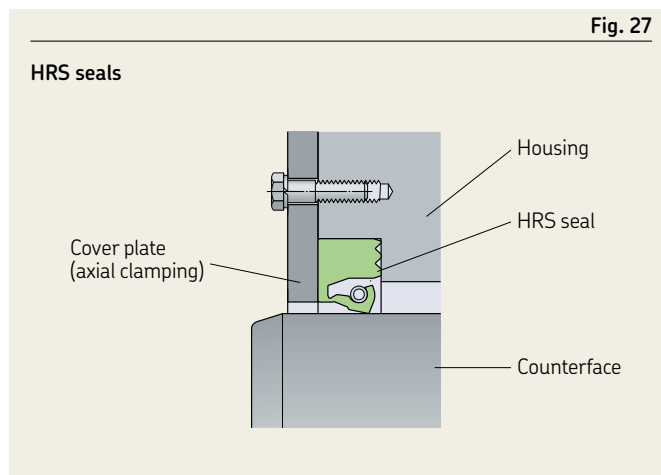
### HRS and HRSA radial shaft seals

These large diameter radial shaft seals (→ **figs. 25 and 26**), are designed to protect large size bearings in grease lubrication and low pressure differentials. A flexible manufacturing process allows a degree of customization to the seal dimensions to help meet unusual requirements.

HRSA seals (→ **fig. 26**) feature an additional auxiliary lip to protect the seal and the application against contamination from the environment.

HRS and HRSA seals feature a garter spring that stabilizes the sealing lip, increases the lip followability (DRO and STBM) and maintains the sealing function even in alternating operating temperatures. The seals are designed to secure the garter spring inside the spring groove once the seals are installed.

Solid seals feature an endless garter spring, while split seals feature an open connection that is closed during seal installation.

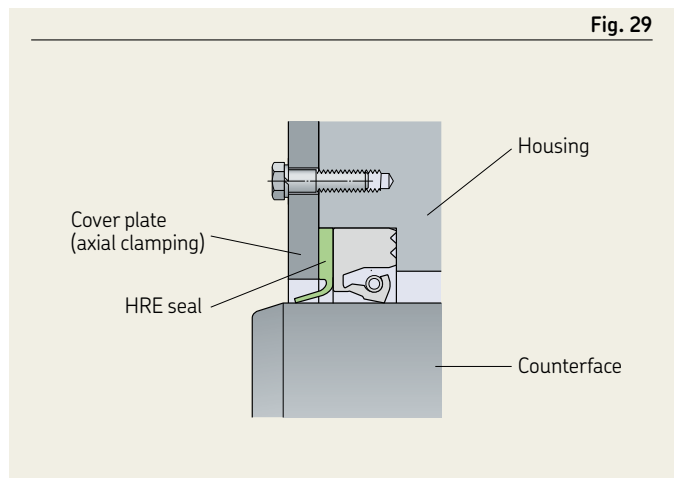
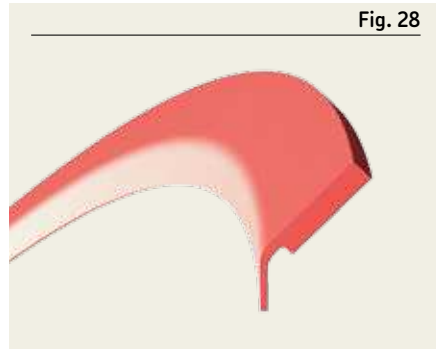


### HRE radial excluder seal

HRE is a radial contacting excluder seal (→ **fig. 28**), designed to be used in combination with HS, HSS or HRS radial shaft seals as additional protection against contamination. A flexible manufacturing process allows a degree of customization to the seal dimensions to help meet unusual requirements.

HRE seals are additional auxiliary lips for contamination protection to be used in combination with HS, HSS and HRS seals. They are generally used where additional protection from contaminants is needed.

To avoid sealing lip with housing interference please see the dimensional housing requirements on **page 91**.



## Material and manufacturing

ECOPUR is a thermoplastic polyurethane (TPU) and has outstanding mechanical properties like abrasion resistance against contaminants.

G-ECOPUR and H-ECOPUR are hydrolysis-resistant polyurethanes with similar properties.

The size of the seal will dictate whether G-ECOPUR or H-ECOPUR is used.

### G-ECOPUR

Standard seals are made of G-ECOPUR, which is a casted polyurethane elastomer.

This material has outstanding wear resistance and increased stiffness compared to rubber materials (→ **diagram 1**).

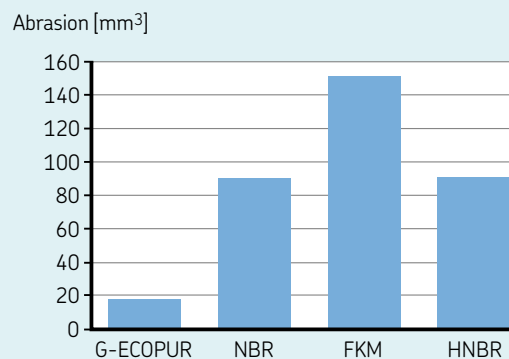
Increased stiffness allows for easier handling and minimizes the risk of installation failures like bending the sealing lip or losing the garter spring.

### CNC manufacturing process

Featuring proprietary software and high-precision cutting tools, the SKF SEAL JET manufacturing system uses Computer Numerical Control (CNC) technology to machine polymeric seals quickly (→ **page 56**). The system machines a seal from a semi-finished tube of the selected material.

Diagram 1

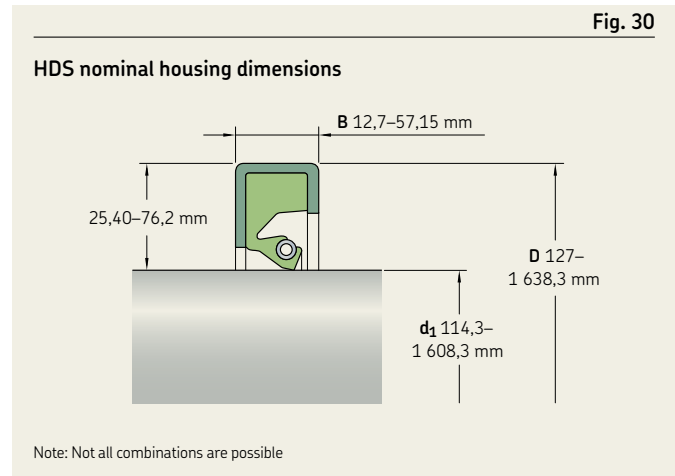
Abrasion wear of various sealing materials



G-ECOPUR is 5 times more abrasion-resistant than the next best performing elastomer material.

# Size options of heavy industrial seals

All SKF metal-cased HDS seals, HS seals, HSS and HRS seals are made upon order in any inch or metric size within the ranges listed in **tables 5, 6 and 7**. New seal sizes are manufactured without additional tooling and can be supplied without extended lead times. The product tables starting on **page 203**, list a selection of sizes. For any size that is not listed in the product tables, contact your SKF distributor or SKF sales representative.



**Table 5**

**Standard sizes for metal-cased HDS seal designs**

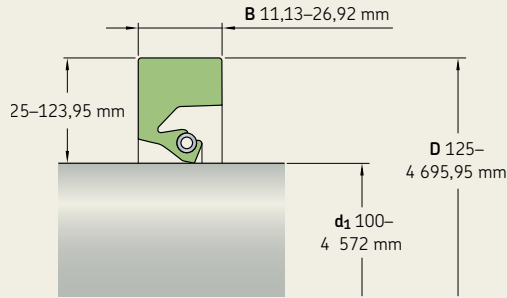
Designs with metal outside diameter	Shaft diameter $d_1$		Bore diameter D		Nominal seal width B		Difference between bore and shaft diameter	
	from	to	from	to	from	to	from	to
	mm/in		mm/in		mm/in		mm/in	
<b>HDS7</b>	114,30 4.500	1 608,30 63.319	139,70 5.500	1 638,30 64.500	12,70 0.500	31,75 1.250	25,40 1.000	76,20 3.000
<b>HDSH7</b>	114,30 6.500	1 608,30 63.250	139,70 7.750	1 638,30 64.500	15,00 0.787	31,75 1.250	25,40 1.250	50,80 2.500
<b>HDS1-2, HDSF1-2</b>	114,30 4.500	1 608,30 63.319	127,00 7.750	1 638,30 64.500	12,70 0.625	31,75 1.250	25,40 1.250	76,20 3.000
<b>HDSH1-2</b>	114,30 4.500	1 608,30 63.319	127,00 5.000	1 638,30 64.500	17,07 0.627	31,75 1.250	25,40 1.000	76,20 3.000
<b>HDSA1-2</b>	114,30 4.500	1 189,20 46.819	139,70 5.500	1 219,20 48.000	17,48 0.688	38,10 1.500	25,40 1.000	76,20 3.000
<b>HDS2, HDSE2</b>	114,30 4.500	1 602,97 63.109	143,51 5.650	1 638,30 64.500	28,58 1.125	57,15 2.250	29,21 1.150	76,20 3.000
<b>HDSEH1-2</b>	165,10 6.500	1 603,50 63.130	202,18 7.960	1 638,30 64.500	39,98 1.574	50,80 2.000	37,08 1.460	76,20 3.000

Not all cross sections and widths are possible with every shaft diameter. Contact SKF for information on dimensions at the extreme limits or for sizes outside the standard range.



Fig. 31

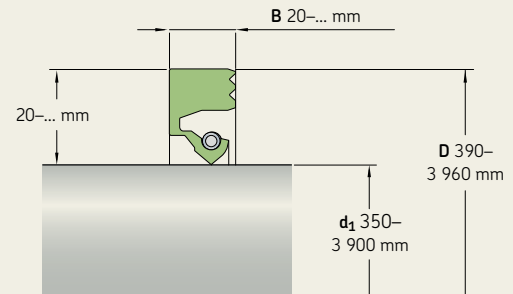
HS and HSS nominal housing dimensions



Note: Not all combinations are possible

Fig. 32

HRS nominal housing dimensions



Note: Not all combinations are possible

Table 6

Standard size for all rubber and polyurethane seals

Designs with metal outside diameter	Shaft diameter d <sub>1</sub>		Bore diameter D		Nominal seal width B		Difference between bore and shaft diameter	
	from	to	from	to	from	to	from	to
–	mm/in		mm/in		mm/in		mm/in	
HS	100	4 572	125	4 636	11,13	25,4	25	64
	3,937	180	4,921	182,52	0,438	1	0,984	2,52
HSS	203,2	4 572	233,2	4 636	12,7	25,4	30	64
	8	180	9,181	182,52	0,5	1	1,181	2,52
HSA7 / HSA8	711,2	4 572	753,11	4 695,95	22,86	26,92	41,91	123,95
	28	180	29,65	184,88	0,9	1,06	1,65	4,88
HRS	350	3 900	390	3 960	20	–	20	–
	13,78	153,543	15,354	155,906	0,787	–	0,787	–
HRE	350	3 900	390	3 960	5	–	20	–
	13,78	153,543	15,354	155,906	0,197	–	0,787	–

Not all cross sections and widths are possible with every shaft diameter. Contact SKF for information on dimensions at the extreme limits or for sizes outside the standard range.

**Table 7**

**Standard size options for HRS seals**

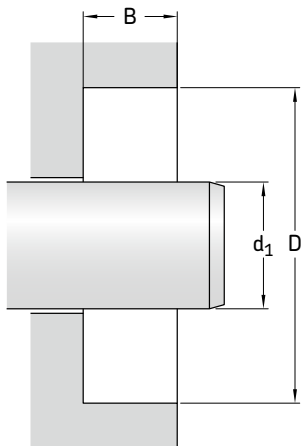
Shaft diameter $d_1$		Bore diameter D		Bore depth B		Difference between bore and shaft diameter	
from	to	from	to	HRS, HRSA	HRS, HRE	min.	min. recommended
mm/in		mm/in		mm/in		mm/in	
350	3 900	390	3 960	$\geq 20$	$\geq 25$	$\geq 20$	$\geq 25$
13.780	153.543	15.354	155.906	0.787	0.984	0.787	0.984

<sup>1)</sup> Tolerance h11

<sup>2)</sup> Tolerance H8

<sup>3)</sup> Tolerance  $\pm 0.13$  mm (0.005 in)

Not all cross sections and widths are possible with every shaft diameter. Contact SKF for information on dimensions at the extreme limits or on sizes outside the standard range.



In all listed sizes seals can be configured to application requirements. Not all combinations of sizes and designs are possible, please refer to tables for seal design selection **pages 176 to 183** and size capabilities **page 201 to 202** or contact your SKF representative.



Principal dimensions

d <sub>1</sub>	D	B	d <sub>1</sub>	D	B	d <sub>1</sub>	D	B	d <sub>1</sub>	D	B
100	130	12,5	125	155	14	145	185	16	170	195	13
105	130	12	125	157	12,5	145	185	18	170	200	12
105	130	13	125	160	12	146	178	16	170	200	15
105	135	12	125	160	15	149	178	13	170	200	16
105	135	13	125	165	15	149	180	13	170	205	16
105	140	12	125	165	15,8	150	180	12	170	210	16
105	143	16	125	165	16	150	180	13	170	210	20
105	145	16	125	170	13	150	180	14	170	211	16
107	147	16	126	160	15	150	180	15	170	220	15
110	135	12,5	127	165	16	150	180	16	175	200	15
110	140	12	130	155	12,5	150	182	16	175	205	15
110	140	13	130	155	15,5	150	185	18	175	213	19
110	140	15	130	160	12	150	186	20	175	215	15
110	140	16	130	160	15	150	190	15	175	215	16
110	142	12	130	160	18	150	190	16	178	210	14
110	143	18	130	165	13	150	195	16	179	219	16
110	145	19	130	165	18	151	183	13	180	205	12
110	150	16	130	170	12	152	181	12,5	180	205	13
110	150,1	16	130	170	16	152	191	13	180	210	12
110	152	15	133	165	12,5	152,5	183	15	180	210	14
113	140	13	135	160	12	155	180	12,5	180	210	15
114	139	15	135	161	13	155	180	13	180	210	16
114	140	13,3	135	165	12	155	190	13	180	210	20
115	140	12	135	167	15	155	190	15	180	215	15
115	140	13	135	170	12	155	195	16	180	215	16
115	145	15	135	170	15	155	195	18	180	215	18
115	150	12	135	170	16,5	156	185	13	180	215	19
115	150	15	135	175	16	156	200	16	180	220	15
115	155	16	140	165	12	160	185	12,5	180	220	16
118	150	15	140	168	21	160	188	21	180	220	20
120	140	12	140	170	12	160	190	14,3	180	222	16
120	145	15,5	140	170	14	160	190	15	181	219	15
120	150	12	140	170	15	160	190	16	182	215	16
120	150	13	140	170	16	160	190	16,5	185	215	15
120	150	14	140	175	15	160	190	20	185	220	12,7
120	150	15	140	178	16	160	196	20	185	225	16
120	150	16	140	180	15	160	200	15	185	225	16,5
120	152	16	140	180	16	160	200	15,9	186	226	16
120	155	18	140	180	17	160	200	16	188	215	16
120	160	12	145	170	13	160	200	17	189	215	16
120	160	15	145	174	14	160	211	16	190	215	16
120	160	16	145	175	14	162	190	12	190	220	13
120	160	18	145	175	15	162	202	16	190	220	15
120	170	16	145	180	12	165	190	13	190	220	16
125	150	12	145	180	13	165	190	15	190	225	15
125	150	13	145	180	14	165	195	15	190	225	16
125	151	17	145	180	15	165	200	15	190	225	18
125	155	12	145	180	18	165	205	16	190	230	15
125	155	12,5	145	180	20	166	206	16	190	230	16

Please use size tables in section *Size options of heavy industrial seals* on **page 200** to determine your required seal type and size.

Radial shaft seals | Seals for heavy industrial applications – metric dimensions

d<sub>1</sub> 190–285 mm

Principal dimensions			Principal dimensions			Principal dimensions			Principal dimensions		
d <sub>1</sub>	D	B	d <sub>1</sub>	D	B	d <sub>1</sub>	D	B	d <sub>1</sub>	D	B
190	230	17	220	250	22	240	280	16	265	305	18
190	230,1	16	220	255	16	240	280	18	265	309	20
190	234	20	220	255	18	240	280	19	265	310	16
190	235	16	220	255	18,3	240	280	20	265	310	22
190	240	20	220	260	14,3	240	280	22	266	310	20
195	220	12,7	220	260	15	240	280	23	267	308	19
195	220,4	17,7	220	260	16	240	290	16	267	308	20
195	235	16	220	260	16,5	240	290	20	267	308	22
195	250	22	220	260	18	240	290	25	267	315	15
197	236	16	220	260	19	240	300	25	270	260	15
200	225	15	220	260	20	241	279	19	270	300	15
200	230	14	220	260	22	244	284	16	270	310	15
200	230	15	220	275	23	245	275	16	270	310	16
200	230	16	224	260	16	245	285	16	270	310	18
200	230,1	15	224	274	20	245	288	16	270	310	20
200	235	15	225	250	15	245	290	15	270	310	20,5
200	235	16	225	250	16	248	298	19	270	310,3	16
200	235	18	225	255	15	250	280	15	270	314	19
200	235	19	225	257	16	250	280	16	270	314	20
200	235	20	225	260	20	250	280	20	270	314	26
200	238	19	225	260	22	250	280	22	270	320	16
200	238,1	18	225	265	16	250	285	15	270	330	18
200	238,1	19,1	225	265	20	250	285	16	270	330	25
200	240	15	225	290	16	250	285	17	270	335	18
200	240	16	226	258	16	250	285	18	272	304	15,8
200	240	17,5	226	270	16	250	290	15	272	304	16
200	240	18	226	276	22,3	250	290	16	273	311	15
200	240	20	228	268	16	250	290	16,5	273	317	19
200	250	15	228	268	20	250	290	18	275	307	13
200	250	18	229	267	19	250	290	20	275	310	15
200	255	22	229	270	17	250	294	20	275	310	16
203	241	16	230	260	15	250	295	24	275	315	18
205	230	15	230	260	15,7	250	300	20	275	315	20
205	245	16	230	260	16	250	310	25	275	319	18
205	245	20	230	260	18	254	290	15	275	319	20
205	250	16	230	260	20	254	305	21	275	320	15
208	233	12,5	230	262	15	255	290	16	275	320	16
210	235	13	230	264	16	255	290,1	16	278	312	16
210	235	15,8	230	265	16	255	295	16	279	310	16
210	240	12	230	265	18	255	299	20	279	323	20
210	240	14	230	265	20	255	315	25	280	310	14
210	240	15	230	269	22	256	300	20	280	310	15
210	240	16	230	270	16	258	290	16	280	310	16
210	240	18	230	270	18	260	285	12,7	280	310	20
210	240	20	230	270	20	260	285	13	280	315	15
210	245	16	230	280	16	260	285,4	12,7	280	318	15
210	245	16,5	230	280	20	260	290	16	280	318,7	27
210	245	18	230	285	23	260	290	19	280	320	16
210	245	18,2	230	320	18	260	290	20	280	320	17
210	250	15	235	265	15	260	295	17	280	320	18
210	250	16	235	265	15,3	260	298	17	280	320	19
210	250	18	235	267	15	260	300	14	280	320	19,1
210	250	20	235	270	15	260	300	14,4	280	320	19,6
210	260	15	235	270	16	260	300	15	280	320	20
210	265	23	235	273	19	260	300	16	280	320	22
210	270	15	235	275	16	260	300	18	280	322	20
210	270	16	235	275	20	260	300	20	280	324	20
215	240	12	236	276	16	260	300	22	280	325	20
215	240	20	238	270	16	260	304	20	280	325	22
215	245	16	238	290	25	260	305	16	280	325	24
215	248	15	240	265	13	260	305	22	280	330	20
215	250	16	240	270	12,7	260	310	16	280	330	20,6
215	255	16	240	270	13,5	260	315	24	280	330	24
215	265	21,5	240	270	15	260	320	25	280	340	15
215	270	23	240	270	16	261	311	16	280	340	20
216	254	16	240	270	17	264	310	13	280	340	25
218,4	250	15	240	270	18	264	310	17	280	350	16
219	250	12	240	275	15	264,8	300	20	285	310	13
220	250	12	240	275	16	264,8	304	20	285	310	16
220	250	15	240	275	18	265	295	15	285	320	16
220	250	16	240	275,1	18	265	300	15	285	320	20
220	250	16,5	240	279	22	265	300	16	285	324	20
220	250	18	240	279,9	16	265	303	15	285	325	16
220	250	20	240	280	14	265	303	16	285	325	18

Please use size tables in section *Size options of heavy industrial seals* on page 200 to determine your required seal type and size.

Principal dimensions											
d1	D	B	d <sub>1</sub>	D	B	d <sub>1</sub>	D	B	d <sub>1</sub>	D	B
285	325	20	310	355,6	20	330	384	18	356	432	28
285	329	20	310	360	22	330	390	18	360	390	15,9
286	336,6	15	310	370	25	330	390	20	360	390	18
289	327	19	311	345	18	330	390	25	360	392	15,9
290	320	15	311	345	18,3	331	371	14	360	392	20
290	320	16	314	355	20	331	371	15	360	398	19
290	320	18	315	345	14	331	371	16	360	398	20
290	329,7	16	315	345	20	335	365	16	360	400	5
290	330	16	315	347	13	335	373	19	360	400	17
290	330	18	315	355	16	335	375	15	360	400	18
290	330	20	315	355	18	335	375	18	360	400	20
290	330	20,3	315	355	20	335	379	20	360	400	22
290	334	20	315	359	22	335	380	20	360	400	23
290	334	20,3	315	360	20	335	395	16	360	400	25
290	334	20,5	315	364	20	336	380	20	360	404	5
290	335	24	315	365	20	340	370	16	360	404	16
290	340	20	316	360	20	340	370	18	360	404	17,5
290	350	15	317	352	16	340	372	16	360	404	20
290	350	25	317	352	23	340	372	18	360	405	25
292	336	20	317	361	20	340	372	20	360	410	5
292	350	16	318	348	19	340	380	15	360	410	20
295	325	15	318	360	20	340	380	16	360	410,8	22,3
295	330	16	320	350	15	340	380	18	360	411	22,3
295	330	17,5	320	350	15,4	340	380	20	360	420	15
295	330	18	320	350	16	340	380	22	360	420	25
295	335	16	320	350	18	340	384	20	362	400	16
295	335	18	320	350	20	340	385	20	362	400	20
295	339	20	320	355	16	340	390	25	362	402	18
295	344	20	320	358	19	340	400	25	362	406	5
296	340	20	320	358	20	342	380	16	362	406	19,5
298	338	16	320	360	12	343	381	21	362	406	19,8
298	340	17	320	360	15	345	384	20	362	406	20
300	325,4	12,7	320	360	16	345	389	20	362	406	22
300	330	14	320	360	18	345	390	25	362	412	25
300	330	15	320	360	20	345	395	20	363	418	5
300	332	16	320	360	22	346	375	15	363	418	20
300	335	15	320	360	22,2	348	380	16	364	406	17
300	335	18	320	360	25	349	395	18	364	420	25
300	340	16	320	364	20	350	380	15	364,5	400	20
300	340	16,5	320	368,1	19	350	380	16	365	400	17
300	340	18	320	370	25	350	380	17,7	365	405	5
300	340	20	320	380	25	350	380	20	365	405	18
300	340	22	323	363	16	350	380	20,5	365	405	20
300	340	22,2	324	362	17,5	350	382	20	365	409	5
300	344	16	324	365	22	350	390	5	365	409	20
300	344	20	325	360	20	350	390	16	366	410	5
300	344	22	325	363	16	350	390	18	367	405	18
300	345	22	325	365	16	350	390	20	370	410	5
300	345	25	325	365	18	350	391	16	370	410	15
300	350	24	325	365	20	350	394	5	370	410	16
300	350	25	325	368	20	350	394	20	370	410	18
300	360	20	325	369	19,3	350	394	20,1	370	410	20
300	360	25	325	369	20	350	394	21	370	414	5
300	390	20	325	370	20	350	394	22	370	414	13
300	390	25	325	375	22,8	350	400	5	370	414	16
302	342	16	325	375	25	350	400	17	370	414	19
304	348	20	328	372	20,2	350	400	25	370	414	20
305	345	20	330	360	14	350,6	395	5	370	420	5
305	349	20	330	360	18	351	390	20	370	420	15
305	355	22,5	330	365	14	351	391	16	370	420	20
308	352	20	330	370	14	351	407	24	370	420	25
310	310	16	330	370	15	355	393	18	375	419	5
310	340	15	330	370	16	355	393	20	375	419	20
310	340	20	330	370	18	355	394	20	375	420	16
310	345	18	330	370	20	355	395	5	375	420	18
310	350	16	330	370	21	355	395	20	375	435	25
310	350	18	330	370	25	355	399	5	376	427	5
310	350	20	330	374	17	355	399	20	380	412	16
310	353	20	330	374	18	355	405	5	380	418	19
310	354	19,3	330	374	19	355	405	20	380	419	24
310	354	20	330	374	20	356	400	5	380	419	25
310	354	20,5	330	380	19	356	400	16	380	420	5
310	355	20	330	380	20	356	400	20	380	420	15
310	355	24	330	380	22	356	432	5	380	420	16

Please use size tables in section *Size options of heavy industrial seals* on page 200 to determine your required seal type and size.

Radial shaft seals | Seals for heavy industrial applications – metric dimensions

d<sub>1</sub> 380–490 mm

Principal dimensions

d <sub>1</sub>	D	B	d <sub>1</sub>	D	B	d <sub>1</sub>	D	B	d <sub>1</sub>	D	B
380	420	18	400	450	17,5	430	480	27,5	460	500	23
380	420	19	400	450	18	430	480	30	460	504	20
380	420	20	400	450	18,1	430	490	25	460	510	5
380	420	22	400	450	20	431	488	19	460	510	20
380	420	22,2	400	450	22	432	463	17	460	510	20,6
380	420	25	400	450	22,5	432	470	21,5	460	510	21
380	423,9	5	400	450	25	432	470	22	460	510	21,5
380	424	5	400	451	5	435	475	20	460	510	22
380	424	20	400	451	22,2	435	485	5	460	510	25
380	425	20	400	460	5	435	485	18	460	520	20
380	429	5	400	460	25	435	485	22	460	520	25
380	429	24	405	449	5	435	485	22,6	461	495	20
380	430	19	405	449	20	435	485	23	461,5	540	5
380	430	20	405	455	5	438	476	24	461,5	540	31
380	430,8	5	405	455	22	440	470	20	463	528	20
380	435	5	405	455,6	5	440	472	16	465	495	20
380	435	25	410	350	18	440	472	20	465	510	20
380	440	5	410	440	16	440	480	5	465	510	22
380	440	16	410	450	5	440	480	20	465	520	22
380	440	23	410	450	17,5	440	480	21	467	510	5
380	440	25	410	450	18	440	480	22,2	467	510	20
384	414	15	410	450	20	440	480	26	467	510	25
385	421	16	410	454	5	440	484	20	467,1	510	5
385	425	18	410	454	19	440	484,3	19	468	530	20
385	425	18,3	410	454	20	440	490	5	470	508	19
385	429	5	410	460	5	440	490	20	470	510	5
385	429	20	410	460	22	440	490	20,5	470	510	18
385	432	15	410	460	25	440	490	22	470	510	20
385	435	5	410	470	16	440	490	25	470	510	22
385	435	22	410	470	25	440	490	28	470	520	5
385	435	25	413	463	5	442	472	20	470	520	20
387	431	5	413	463	22	445	485	18	470	520	20,7
387	431	22	415	465	5	445	485	20	470	520	22
387	431	22,5	415	465	20	445	495	5	470	520	24
387	438	5	415	465	22	445	495	22	470	520	25
387,4	431	5	415	465	25	446	486	16	470	530	5
388	418	15	416	466	5	446	486	16,5	470	530	20
390	420	14	416	466	21,5	446	496	22	470	530	25
390	420	16	418	455	16	448	480	16	470	530	30
390	420	20	419	451	19	449	500	5	474	514	5
390	424,8	13,5	420	460	5	449	500	23	474	514	20
390	430	5	420	460	15	450	480	17,5	475	505	17
390	430	16	420	460	17	450	480	20	475	525	5
390	430	18	420	460	18	450	490	18	475	525	22
390	430	19	420	460	20	450	490	20	475	525	25
390	430	20	420	460	22,2	450	490	22	475	525,8	5
390	434	5	420	464	5	450	494	5	475	530	18
390	434	18	420	464	20	450	494	20	475,8	520	5
390	434	20	420	470	5	450	500	5	475,8	520	22
390	434	22	420	470	20	450	500	18	480	450	20
390	435	25	420	470	22	450	500	20	480	514	15
390	450	25	420	470	23	450	500	22	480	520	5
392	432	18	420	470	25	450	500	22,4	480	520	18
395	430	16	420	480	5	450	500	23	480	520	20
395	430	18	420	480	24	450	500	24	480	520	22
395	430	20	420	480	25	450	500	25	480	524	5
395	439	5	425	465	20	450	510	25	480	524	20
395	439	19	425	475	5	452	496	15	480	530	5
395	439	20	425	475	25	452	503	20,7	480	530	18
395	439	20,5	425	480	22	454	500	18	480	530	20
399	431	19	425	483	5	454	504	5	480	530	22
400	430	20	425	483	23	454	504	21	480	530	25
400	440	5	430	460	15	455	505	5	480	540	20
400	440	14	430	468	22	455	505	21,8	480	540	25
400	440	18	430	470	20	455	505	22	480	550	5
400	440	20	430	474	5	455	505	25	480	550	25
400	440	22	430	474	20	457	508	5	485	530	20
400	444	5	430	480	5	458	494	18	485	535	5
400	444	13,5	430	480	16	458	505	20,6	485	535	19
400	444	20	430	480	18	460	500	5	485	535	20
400	444	22	430	480	20	460	500	16	485	535	22
400	444,5	22	430	480	21,5	460	500	18	490	530	5
400	447	20	430	480	22	460	500	20	490	530	20
400	450	5	430	480	25	460	500	22	490	530	20,5

Please use size tables in section *Size options of heavy industrial seals* on page 200 to determine your required seal type and size.

Principal dimensions											
d1	D	B	d <sub>1</sub>	D	B	d <sub>1</sub>	D	B	d <sub>1</sub>	D	B
490	540	5	520	560	18	550	600	20	590	640	5
490	540	22	520	560	20	550	600	22	590	640	20
490	540	25	520	564	5	550	600	22,3	590	640	22
490	541	21	520	564	20	550	600	23,5	590	640	22,8
493	543	5	520	570	5	550	600	25	590	640	25
493	543	26	520	570	18	550	610	5	600	640	5
495	545	5	520	570	22	550	610	25	600	640	18
495	545	22	520	570	22,6	550	620	25	600	640	20
495	560	25	520	570	24	550	660	23,5	600	640	25
495,5	546	5	520	570	25	555	605	5	600	649,2	5
495,5	546	22	520	580	20	555	605	22	600	650	5
497	540	5	520	580	25	556	610	25	600	650	18
497	540	20	524	574	25	559	597	19	600	650	22
500	540	5	525	555	18	560	590	20	600	650	25
500	540	16	525	569	5	560	600	5	600	660	5
500	540	20	525	569	20	560	600	18	600	660	18
500	540	22	525	575	5	560	600	20	600	660	25
500	544	5	525	575	20	560	603	5	600	660	30
500	544	20	525	575	22	560	603	20	600	664	5
500	544	22	525	575	25	560	604	5	600	664	25
500	544,5	5	528	578	5	560	604	16	604	640	22
500	545	5	528	578	22	560	604	20	605	640	20
500	545	20	530	570	20	560	610	5	605	645	18
500	545	20,5	530	570	22	560	610	20	605	655	5
500	550	5	530	574	20	560	610	22	605	655	20
500	550	18	530	575	20	560	610	22,3	605	655	22
500	550	19	530	576	21	560	610	25	610	620	20
500	550	20	530	580	5	560	610	26	610	650	20
500	550	22	530	580	20	560	620	25	610	650	22,5
500	550	24,5	530	580	20,6	565	601	20	610	650	25
500	550	25	530	580	22	565	615	5	610	654	20
500	550,8	5	530	580	22,3	565	615	22	610	660	5
500	558,8	5	530	580	24,2	565,2	616	5	610	660	20
500	558,8	22	530	580	24,5	569,9	619,1	5	610	660	22
500	560	5	530	580	25	570	604	15	610	660	25
500	560	18	530	580,8	5	570	610	18	610	674	5
500	560	25	530	580,8	21	570	610	20	610	674	22
500	564	5	530	590	5	570	616	19	610	674	25
500	564	25	530	590	38	570	620	5	614	658	5
502	542	5	530	620	5	570	620	20	614	658	20
502	542	20	530	620	22	570	620	22	615	645	20
503	552	5	534	584	5	570	620	25	615	665	5
503	552	20	534	584	22	574	610	16	615	665	20,5
503	553	5	535	580	20	575	619	5	615	665	24
503	553	22	535	585	5	575	619	20	615	665	24,5
505	535	15	535	585	22	575	625	5	616	666,8	5
505	555	20,6	535	585	27	575	625	22	616	666,8	22
508	558,8	5	538	570	20	580	550	20	616	679,8	5
508	559	19	538	590	20	580	610	20	616	679,8	25
508	560	25	540	570	20	580	615	20	616	680	5
508	565	22,5	540	580	20	580	616	16	616	680	25
510	520	20	540	584	5	580	616	17	620	660	20
510	548	24	540	584	20	580	620	5	620	670	5
510	548	25	540	585	18	580	620	20	620	670	20
510	550	5	540	590	5	580	620	25	620	670	22
510	550	17,5	540	590	18	580	630	5	620	680	20
510	550	20	540	590	20	580	630	18	620	684	5
510	554	5	540	590	22	580	630	22	620	684	25
510	554	19,5	540	590	22,6	580	630	25	625	655	20
510	554	20	540	590	25	580	640	16	625	665	25
510	560	5	540	590	27,5	580	640	25	625	670	5
510	560	22	540	590	30	580	650	25	625	670	20
510	560	22,5	540	600	20	585	620	20	625	675	25
510	560	25	542	578	16	585	635	5	625	675,8	19
511	561	22	542	578	18	585	635	22	625	676	19
513	543	16	545	595	5	586	646	5	625	689	5
515	555	5	545	595	22	586	646	22	625	689	25
515	555	20	548	610	25	586	650	25	630	660	15
515	565	5	549	600,8	5	587	637	5	630	660	25
515	565	22	549,3	600,1	5	587	637	22	630	670	20
515	565	25	550	590	5	588	638	5	630	674	20
519	560	21	550	590	20	588	638	23	630	680	5
519	560	25	550	600	5	590	630	20	630	680	22
520	560	5	550	600	19	590	630	22	630	680	25

Please use size tables in section *Size options of heavy industrial seals* on page 200 to determine your required seal type and size.

Radial shaft seals | Seals for heavy industrial applications – metric dimensions

d<sub>1</sub> 630–800 mm

Principal dimensions											
d <sub>1</sub>	D	B	d <sub>1</sub>	D	B	d <sub>1</sub>	D	B	d <sub>1</sub>	D	B
630	690	5	668	706	25	710	774	25	760	804	5
630	690	20	670	704	15	710	774	30	760	804	20
630	690	25	670	710	5	711	775	5	760	810	20,6
630	690	30	670	710	18	711	775	25	760	810	25
630	694	5	670	710	20	712	757	20,5	760	813	22
630	694	25	670	714	5	715	779	25	760	820	5
635	685	5	670	714	20	716	780	5	760	820	18
635	685	22	670	714	22	716	780	25	760	820	25
635	699	5	670	720	24	720	760	18	760	820	30
635	699	25	670	720	25	720	770	25	760	824	22
635	705	5	670	730	25	720	771,1	21	760	824	25
635	705	30	670	734	5	720	780	5	760	830	5
636	692	5	670	734	22	720	780	25	760	830	30
636	692	30,5	670	734	25	720	784	5	762	791	13
638	678	20	672	737	5	720	784	23	762	812,8	5
640	680	5	672	737	25	720	784	25	762	825,5	5
640	680	20	676	740	5	724	775	5	770	810	20
640	680	25	676	740	22	724	775	22	770	834	5
640	684	5	676	740	25	725	775	25	770	834	20
640	684	20	676	740	28	725	789,2	25	770	834	25
640	688	5	679,5	743	5	730	770	5	775	825	5
640	688	20	679,5	743	25	730	770	20	775	825	25
640	690	5	680	700	20	730	780	5	775	839	5
640	690	22	680	720	5	730	780	20	775	839	25
640	690	25	680	720	20	730	780	22	775	839	31
640	700	25	680	730	5	730	780	25	776	820	5
640	704	5	680	730	20	730	790	25	776	820	20
640	704	25	680	730	22	730	794	5	778	818	20,5
641	707	5	680	730	25	730	794	25	780	820	18
641	707	25	680	744	5	735	795	25	780	820	19
645	695	5	680	744	25	735	799	5	780	820	20
645	695	22	680	780	5	735	799	25	780	830	5
645	700	22	680	780	20	736	800	5	780	830	22
647	700	25	685	720	20	736	800	25	780	830	25
648	690	20	685	735	5	737	790	16	780	830	27,5
650	680	15	685	735	22	740	780	5	780	844	5
650	686	20	685	737	5	740	780	16,5	780	844	20
650	690	5	685	737	22	740	780	18	780	844	25
650	690	18	685	749	5	740	780	25	786	836	5
650	690	20	685	749	25	740	782	18	786	836	25
650	690	22	686	740	5	740	785	18	790	830	5
650	690	25	686	740	25	740	790	16	790	830	23
650	700	5	690	730	20	740	790	20	790	834	5
650	700	20	690	734	20	740	790	25	790	834	25
650	700	22	690	740	5	740	804	5	790	840	5
650	700	25	690	740	22	740	804	25	790	840	20
650	710	25	690	740	25	744	808	5	790	840	22
650	714	5	690	754	5	744	808	25	790	840	25
650	714	25	690	754	25	744	808	30	790	845	5
655	690	20	692	732	15	748	812	5	790	845	25
658	703	25	700	740	20	748	812	25	790	850	5
658	716	25	700	750	5	750	780	18	790	850	25
660	650	20	700	750	20	750	790	5	790	850	30
660	690	18	700	750	25	750	790	20	790	854	5
660	700	5	700	760	5	750	790	23	790	854	25
660	700	15	700	760	25	750	800	5	799	860	5
660	700	18	700	760	30	750	800	22	799	860	26
660	700	20	700	764	5	750	800	25	800	840	5
660	700	25	700	764	20	750	800	27,5	800	840	16
660	704	5	700	764	25	750	800	28	800	840	18
660	704	18	700	765	25	750	810	5	800	840	20
660	704	20	710	750	20	750	810	22	800	840	25
660	710	5	710	750	23	750	810	25	800	850	20
660	710	22	710	760	5	750	810	30	800	850	25
660	710	25	710	760	20	750	810	36	800	860	5
660	716	25	710	760	22	750	814	5	800	860	16
660	720	22	710	760	22,2	750	814	25	800	860	25
660	724	5	710	760	24,9	750	814	28	800	860	30
660	724	25	710	760	25	750	840	5	800	864	5
664	715	25	710	770	5	750	840	25	800	864	23
665	715	5	710	770	25	750,1	810	5	800	864	25
665	715	22	710	770	30	760	800	5	800	865	5
665	729	5	710	774	5	760	800	20	800	865	25
665	729	25	710	774	22	760	800	20,6	800	870	5

Please use size tables in section Size options of heavy industrial seals on page 200 to determine your required seal type and size.



## Principal dimensions

d1	D	B	d <sub>1</sub>	D	B	d <sub>1</sub>	D	B	d <sub>1</sub>	D	B
800	870	25	850	924	25	920	984	25	1 000	1 035	20
800	870	30	850	925	25	925	975	22	1 000	1 050	20
800	874	5	853	917	20	927	978	22	1 000	1 050	23
800	874	25	853	917	22,1	930	980	5	1 000	1 050	25
805	869	5	853	917	25	930	980	20	1 000	1 060	5
805	869	25	860	900	20	930	980	22,2	1 000	1 060	20
810	850	17	860	920	5	930	980	25	1 000	1 060	25
810	850	20	860	920	22	930	990	5	1 000	1 060	30
810	854	5	860	920	25	930	990	25	1 000	1 064	5
810	854	20	860	924	5	930	994	5	1 000	1 064	25
810	860	5	860	924	16	930	994	25	1 020	1 070	20
810	860	21	860	924	25	930	1 000	5	1 020	1 070	25
810	860	25	860	950	5	930	1 000	30	1 020	1 080	5
810	870	5	860	950	32	934	984	5	1 020	1 080	20,5
810	870	25	864	928	5	934	984	22	1 020	1 080	25
810	874	5	864	928	25	934	984	25	1 020	1 084	5
810	874	22	865	911	18	939	971	22,2	1 020	1 084	25
810	874	23	867	920	16	940	995	5	1 026	1 066	20
810	874	25	870	910	20	940	995	25	1 026	1 076	25
815	865	5	870	920	5	940	1 000	25	1 040	1 100	5
815	865	25	870	920	16	940	1 004	5	1 040	1 100	20
816	866,8	5	870	920	20	940	1 004	25	1 040	1 100	25
820	860	16	870	920	25	950	980	18	1 040	1 104	5
820	860	18	870	930	25	950	990	18	1 040	1 104	25
820	860	20	870	934	5	950	990	20	1 050	1 090	20
820	870	5	870	934	24	950	1 000	5	1 050	1 114	5
820	870	22	870	934	25	950	1 000	25	1 050	1 114	25
820	870	25	870	935	23	950	1 006	20	1 054	1 105	20
820	884	5	880	940	5	950	1 010	5	1 055	1 100	25
820	884	25	880	940	25	950	1 010	25	1 055	1 119	5
820	884	28	880	940	30	950	1 010	30	1 055	1 119	25
825	860	20	880	944	5	950	1 014	5	1 056	1 120	5
825	875	5	880	944	22	950	1 014	25	1 056	1 120	25
825	875	22	880	944	25	953	1 003	5	1 060	1 100	20
825	875	25	880	944	25,6	953	1 003	22	1 060	1 110	5
825,5	877	20	885	919	15	953	1 003	25	1 060	1 110	20
826	876	5	890	930	18	954	1 004	5	1 060	1 110	25
826	876	30	890	930	20	954	1 004	22	1 060	1 120	5
830	874	20	890	930	23	954	1 004	25	1 060	1 120	30
830	890	5	890	940	5	955	1 019	5	1 060	1 124	5
830	890	23	890	940	25	955	1 019	25	1 060	1 124	25
830	894	5	890	954	5	960	1 000	20	1 070	1 120	20
830	894	22	890	954	22	960	1 000	25	1 070	1 125	25
830	894	25	890	954	25	960	1 020	25	1 070	1 140	25
835	899	5	893	925	20	960	1 024	5	1 073	1 104	15
835	899	25	900	940	5	960	1 024	25	1 080	1 130	20
836	896	5	900	940	20	960	1 040	23	1 080	1 140	5
836	896	30	900	950	25	965	1 015	5	1 080	1 140	25
837	889	22,2	900	960	5	965	1 015	22	1 080	1 145	25
838	880	5	900	960	25	965	1 015	25	1 090	1 150	5
838	880	20	900	960	27	970	1 020	5	1 090	1 150	30
840	880	18	900	960	30	970	1 020	22	1 100	1 140	20
840	880	23	900	964	5	970	1 020	25	1 105	1 154	25
840	890	25	900	964	25	970	1 030	5	1 105	1 155	5
840	892	18	900	964	32	970	1 030	21,5	1 105	1 155	22
840	900	25	900	980	5	970	1 030	22	1 105	1 155	25
840	904	5	900	980	23	970	1 030	25	1 105	1 160	5
840	904	25	910	950	25	970	1 034	5	1 105	1 160	22
840	910	25	910	960	5	970	1 034	25	1 105	1 160	25
850	890	5	910	960	25	975	1 034	25	1 105	1 169	25
850	890	20	910	966	17,9	978	1 018	18	1 110	1 160	5
850	900	5	910	966	18	980	1 030	5	1 110	1 160	22
850	900	19	910	967	17,9	980	1 030	30	1 110	1 160	25
850	900	20	910	974	5	985	1 045	5	1 110	1 174	5
850	900	22	910	974	22	985	1 045	25	1 110	1 174	25
850	904	5	910	974	25	990	1 030	20	1 120	1 160	20
850	904	25	920	958	19	990	1 040	5	1 120	1 184	5
850	910	5	920	970	5	990	1 040	22	1 120	1 184	25
850	910	22	920	970	20	990	1 040	25	1 130	1 194	5
850	910	25	920	970	25	990	1 045	25	1 130	1 194	25
850	910	30	920	980	5	990	1 054	5	1 135	1 198	25
850	914	5	920	980	25	990	1 054	25	1 140	1 180	20
850	914	25	920	980	30	992	1 037	25	1 140	1 190	5
850	924	5	920	984	5	995	1 025	15	1 140	1 190	25

Please use size tables in section *Size options of heavy industrial seals* on page 200 to determine your required seal type and size.

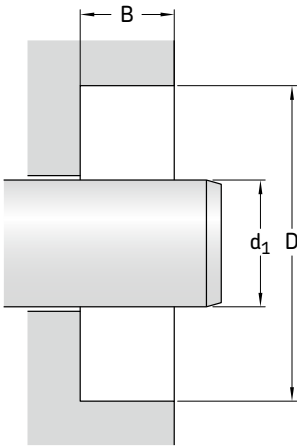
Radial shaft seals | Seals for heavy industrial applications

d<sub>1</sub> 1 140–5 220 mm

Principal dimensions

d <sub>1</sub>	D	B	d <sub>1</sub>	D	B	d <sub>1</sub>	D	B
1 140	1 210	25	1 415	1 479	5	2 160	2 220	25
1 150	1 200	18	1 415	1 479	25	2 197	2 257	24
1 160	1 200	18	1 435	1 499	5	2 204	2 264	24
1 160	1 200	20	1 435	1 499	25	2 247	2 300	5
1 166	1 230	5	1 437	1 505	5	2 247	2 300	25
1 166	1 230	25	1 437	1 505	25	2 247,8	2 300	5
1 175	1 239	5	1 475	1 598	25	2 248	2 300	25
1 175	1 239	25	1 480	1 544	5	2 320	2 384	25
1 178	1 242	5	1 480	1 544	25	2 340	2 404	25
1 178	1 242	25	1 530	1 580	20	2 350	2 414	5
1 178	1 245	25	1 540	1 580	20	2 350	2 414	25
1 180	1 230	20	1 540	1 590	5	2 422	2 486	5
1 180	1 244	25	1 540	1 590	22	2 422	2 486	25
1 184	1 248	25	1 540	1 590	25	2 470	2 534	25
1 200	1 250	5	1 550	1 610	25	2 480	2 544	5
1 200	1 250	22	1 550	1 614	5	2 480	2 544	35
1 200	1 250	25	1 550	1 614	25	2 680	2 740	5
1 200	1 264	5	1 556	1 620	5	2 680	2 740	30
1 200	1 264	22,2	1 556	1 620	25	2 680	2 744	5
1 200	1 264	25	1 560	1 624	5	2 680	2 744	25
1 220	1 255	20	1 560	1 624	25	2 850	2 900	20,6
1 220	1 284	5	1 566	1 616	17,5	2 900	2 959	17,3
1 220	1 284	25	1 580	1 644	25	2 917	2 985	5
1 238	1 338	25	1 587,5	1 625,8	22,2	2 917	2 985	25
1 248	1 298	21	1 600	1 664	5	2 920	2 955	25
1 250	1 300	5	1 600	1 664	25,3	2 920	2 985	5
1 250	1 300	20	1 610	1 660	5	2 920	2 985	25
1 250	1 300	25	1 610	1 660	20	2 925	2 985	5
1 250	1 314	5	1 610	1 660	25	2 925	2 985	25
1 250	1 314	21,5	1 610	1 670	5	3 000	3 050	20,6
1 250	1 314	25	1 610	1 670	20	3 060	3 110	20
1 260	1 300	18	1 610	1 670	25	3 170	3 234	5
1 270	1 320	25	1 620	1 684	5	3 170	3 234	25
1 280	1 340	25	1 620	1 684	25	3 170	3 234	35
1 280	1 344	5	1 625	1 675	5	3 560	3 680	25
1 280	1 344	25	1 625	1 675	25	3 572	3 636	25
1 285	1 350	5	1 650	1 700	5	3 820	3 890	5
1 285	1 350	25	1 650	1 700	20	3 820	3 890	35
1 305	1 355	5	1 650	1 700	25	4 760	4 883	25
1 305	1 355	25	1 656	1 720	5	4 800	4 860	25
1 310	1 374	5	1 656	1 720	25	4 800	4 920	25
1 310	1 374	25	1 660	1 708	17,5	5 220	5 340	25
1 320	1 370	5	1 675	1 725	20			
1 320	1 370	20	1 675	1 725	20,6			
1 320	1 370	25	1 710	1 770	5			
1 320	1 384	5	1 710	1 770	25			
1 320	1 384	25	1 750	1 810	25			
1 330	1 380	5	1 760	1 824	25			
1 330	1 380	25	1 810	1 860	20			
1 330	1 394	5	1 810	1 860	20,6			
1 330	1 394	25	1 835	1 891	5			
1 336	1 400	5	1 835	1 891	25			
1 336	1 400	25	1 835	1 899	25			
1 350	1 415	25	1 890	1 950	5			
1 356	1 420	5	1 890	1 950	25			
1 356	1 420	25	1 908	1 958	21			
1 360	1 400	18	1 910	1 974	25			
1 370	1 420	19	1 958	2 016	5			
1 370	1 420	19,8	1 958	2 016	30			
1 370	1 420	20	2 000	2 050	20			
1 375	1 425	19,8	2 000	2 056	5			
1 380	1 420	18	2 000	2 056	25			
1 380	1 440	25	2 016	2 080	5			
1 380	1 445	25	2 016	2 080	25			
1 380	1 458	5	2 047	2 105	5			
1 380	1 458	32	2 047	2 105	30			
1 385	1 435	5	2 080	2 144	5			
1 385	1 435	25	2 080	2 144	25			
1 400	1 464	5	2 130	2 194	25			
1 400	1 464	20	2 130,5	2 194	5			
1 400	1 464	25	2 130,5	2 194	25			
1 400	1 464	35	2 140	2 204	5			
1 410	1 470	5	2 140	2 204	25			
1 410	1 470	30	2 160	2 220	5			

Please use size tables in section *Size options of heavy industrial seals* on page 200 to determine your required seal type and size.



In all listed sizes seals can be configured to application requirements. Not all combinations of sizes and designs are possible, please refer to tables for seal design selection **pages 176 to 183** and size capabilities **page 201 to 202** or contact your SKF representative.



Principal dimensions

d <sub>1</sub>	D	B	d <sub>1</sub>	D	B	d <sub>1</sub>	D	B	d <sub>1</sub>	D	B
4	5	0.438	4.063	5.5	0.5	4.188	5.875	0.625	4.313	5.75	0.5
4	5	0.469	4.063	5.5	0.563	4.188	6	0.5	4.313	5.75	0.563
4	5	0.5	4.063	5.875	0.5	4.188	6	0.906	4.313	5.75	0.625
4	5	0.625	4.063	6	0.906	4.188	6.125	0.5	4.313	6	0.5
4	5	0.719	4.125	5.125	0.5	4.219	5.281	0.5	4.313	6.25	0.5
4	5	0.75	4.125	5.125	0.625	4.25	5.25	0.5	4.328	5.5	0.438
4	5	0.906	4.125	5.125	0.719	4.25	5.25	0.563	4.375	5.375	0.5
4	5.016	0.5	4.125	5.125	0.75	4.25	5.25	0.625	4.375	5.375	0.625
4	5.031	0.5	4.125	5.125	0.906	4.25	5.25	0.75	4.375	5.375	0.688
4	5.125	0.438	4.125	5.188	0.5	4.25	5.25	0.781	4.375	5.375	0.719
4	5.125	0.5	4.125	5.25	0.5	4.25	5.25	0.906	4.375	5.375	0.75
4	5.125	0.563	4.125	5.25	0.563	4.25	5.375	0.5	4.375	5.375	0.906
4	5.125	0.625	4.125	5.25	0.625	4.25	5.375	0.563	4.375	5.5	0.5
4	5.125	0.906	4.125	5.25	0.75	4.25	5.375	0.625	4.375	5.5	0.563
4	5.125	0.969	4.125	5.25	0.906	4.25	5.375	0.75	4.375	5.5	0.625
4	5.25	0.438	4.125	5.281	0.5	4.25	5.375	0.906	4.375	5.5	0.75
4	5.25	0.469	4.125	5.375	0.5	4.25	5.438	0.375	4.375	5.5	0.969
4	5.25	0.5	4.125	5.375	0.625	4.25	5.438	0.5	4.375	5.563	0.5
4	5.25	0.563	4.125	5.375	0.75	4.25	5.5	0.5	4.375	5.625	0.5
4	5.25	0.625	4.125	5.375	0.906	4.25	5.5	0.563	4.375	5.75	0.5
4	5.25	0.75	4.125	5.5	0.438	4.25	5.5	0.625	4.375	5.813	0.5
4	5.25	0.906	4.125	5.5	0.5	4.25	5.5	0.75	4.375	5.828	0.484
4	5.266	0.5	4.125	5.5	0.563	4.25	5.625	0.5	4.375	5.875	0.5
4	5.375	0.5	4.125	5.5	0.969	4.25	5.625	0.625	4.375	6	0.5
4	5.375	0.625	4.125	5.625	0.5	4.25	5.688	0.5	4.375	6	0.563
4	5.375	0.75	4.125	5.625	0.625	4.25	5.703	0.484	4.375	6	0.75
4	5.5	0.438	4.125	5.75	0.625	4.25	5.75	0.5	4.375	6.125	0.5
4	5.5	0.5	4.125	5.875	0.5	4.25	5.75	0.563	4.375	6.25	0.5
4	5.5	0.563	4.125	6	0.5	4.25	5.75	0.625	4.375	6.25	0.563
4	5.5	0.625	4.156	5.406	0.5	4.25	5.75	0.906	4.406	5.5	0.5
4	5.5	0.719	4.188	5.188	0.5	4.25	5.875	0.625	4.438	5.438	0.5
4	5.5	0.75	4.188	5.188	0.625	4.25	6	0.5	4.438	5.438	0.75
4	5.625	0.5	4.188	5.188	0.75	4.25	6.125	0.5	4.438	5.5	0.5
4	5.626	0.5	4.188	5.25	0.469	4.25	6.25	0.5	4.438	5.5	0.563
4	5.75	0.5	4.188	5.25	0.5	4.25	6.25	0.563	4.438	5.5	0.625
4	5.75	0.563	4.188	5.25	0.625	4.313	5.313	0.438	4.438	5.5	0.75
4	5.75	0.781	4.188	5.25	0.75	4.313	5.313	0.5	4.438	5.5	0.906
4	5.875	0.5	4.188	5.25	0.969	4.313	5.313	0.625	4.438	5.563	0.5
4	6	0.5	4.188	5.313	0.5	4.313	5.313	0.75	4.438	5.563	0.75
4	6	0.906	4.188	5.313	0.563	4.313	5.375	0.5	4.438	5.625	0.5
4.016	5.234	0.625	4.188	5.375	0.5	4.313	5.438	0.5	4.438	5.625	0.625
4.016	5.438	0.5	4.188	5.375	0.625	4.313	5.5	0.438	4.438	5.688	0.5
4.063	5.063	0.5	4.188	5.438	0.5	4.313	5.5	0.5	4.438	5.688	0.625
4.063	5.063	0.75	4.188	5.5	0.5	4.313	5.5	0.625	4.438	5.75	0.5
4.063	5.125	0.469	4.188	5.5	0.563	4.313	5.5	0.75	4.438	5.75	0.563
4.063	5.125	0.5	4.188	5.5	0.625	4.313	5.5	0.969	4.438	5.75	0.625
4.063	5.125	0.75	4.188	5.625	0.5	4.313	5.563	0.5	4.438	5.75	0.719
4.063	5.25	0.5	4.188	5.75	0.5	4.313	5.625	0.5	4.438	5.813	0.5
4.063	5.313	0.5	4.188	5.875	0.5	4.313	5.688	0.75	4.438	5.875	0.5

Please use size tables in section *Size options of heavy industrial seals* on **page 200** to determine your required seal type and size.



















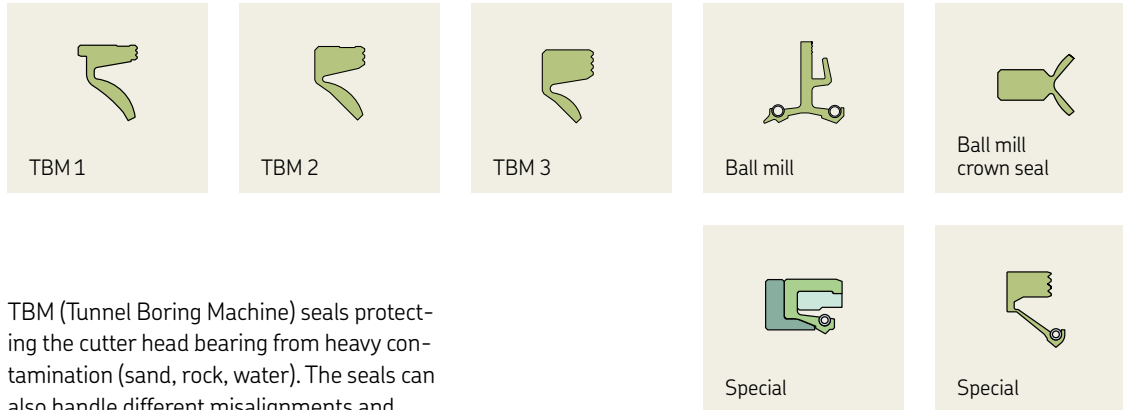








# Machined seals



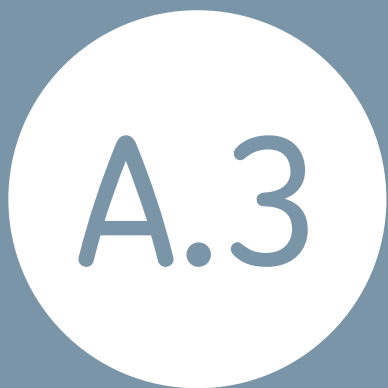
TBM (Tunnel Boring Machine) seals protecting the cutter head bearing from heavy contamination (sand, rock, water). The seals can also handle different misalignments and pressure steps. One benefit of the SKF seals are the split version – during the maintenance they can be welded on site and without the need to remove the shaft, therefore the downtime can be reduced significantly.

SKF can manufacture a wide variety of seal profiles with different materials and sizes with its industry-leading SKF SEALJET production system (see details on **page 56**). For additional information about customized machined profiles, refer to publication *Customized machined seals – Product range* or contact SKF.









## Cassette seals

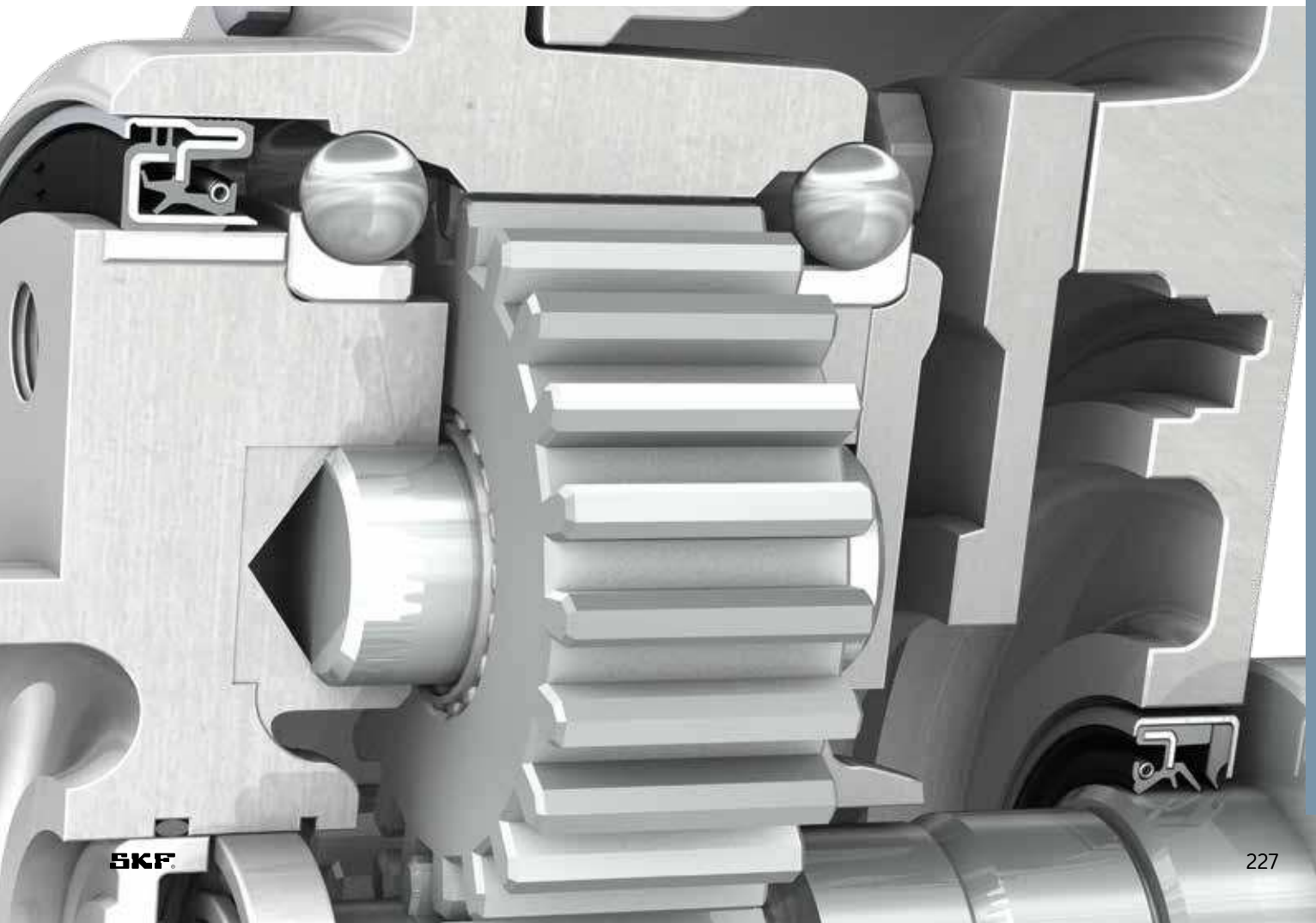


**20%**  
LESS FRICTION



### SKF Cassette seals

- > Maximum protection against liquid or solid contamination
- > Extended wheel-end service life
- > Reduced friction

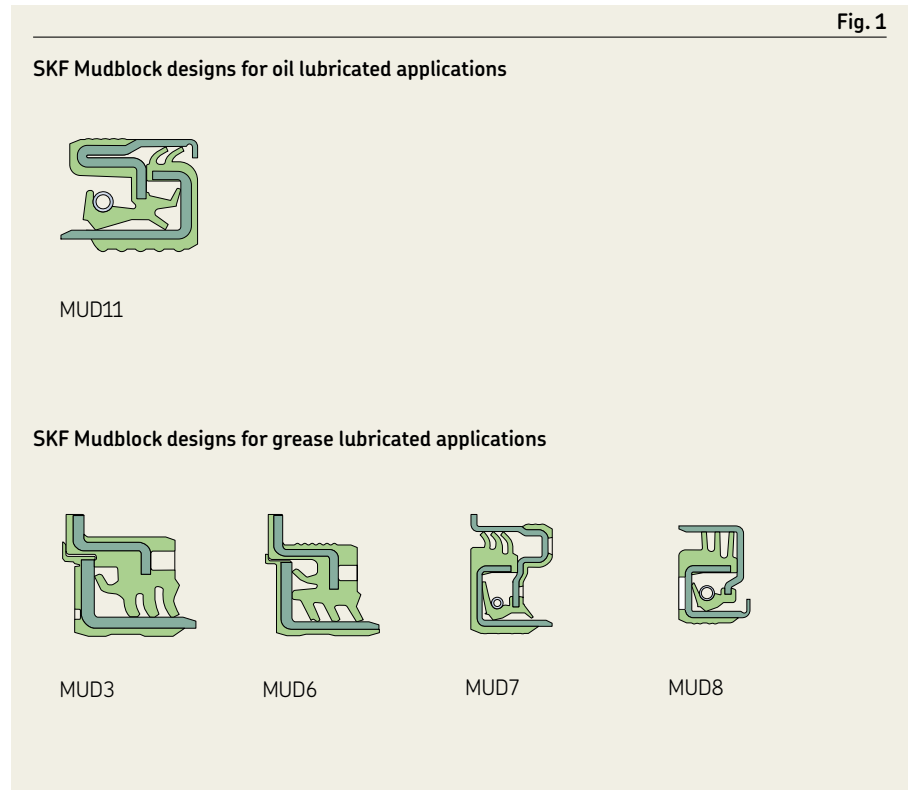


# Cassette seals – general

Featuring a utilized, multilip seal design, coupled with a high performance elastomer, SKF Mudblock seals are the latest generation radial shaft sealing units. These seals have their own integrated lip running surface delivering a very high performance in contaminated environment. The design of SKF Mudblock cassette seals has been optimized to provide excellent retention of either grease or oil and maximum protection against liquid or solid contaminants (→ **fig. 1**). The seal designs are selected based on specific application criteria.

SKF Mudblock seals are widely used in low speed wheel-end applications such as the front and rear axles of, for example:

- Tractors
- Agricultural machinery
- Construction equipment
- Forestry equipment
- Off-highway trucks



## Design features

All SKF Mudblock seals are designed with an integrated wear sleeve and a rubber inside diameter, but can have any one of a number of sealing lip and auxiliary lip configurations. The sealing lip material normally is nitrile rubber, but the seals are also available in other compounds including fluoro rubber, hydrogenated nitrile rubber or polyacrylate to meet the demands of different operating conditions. For more information, please refer to paragraph *Sealing materials*, starting on **page 31**.

## Interchangeable and easy to handle and install

Fully interchangeable with alternative seal designs available in the market, the SKF Mudblock seals offer OEMs a range of extensively tested, pre-validated sealing retrofit options. The seals feature an integrated sleeve as the main lip counterface, which eliminates the need for costly shaft machining operations like grinding and hardening. The seal and sleeve are also unitized with a curled design feature that helps prevent damage during transportation, handling and installation. Additionally, SKF Mudblock seals do not require specific assembly tools.

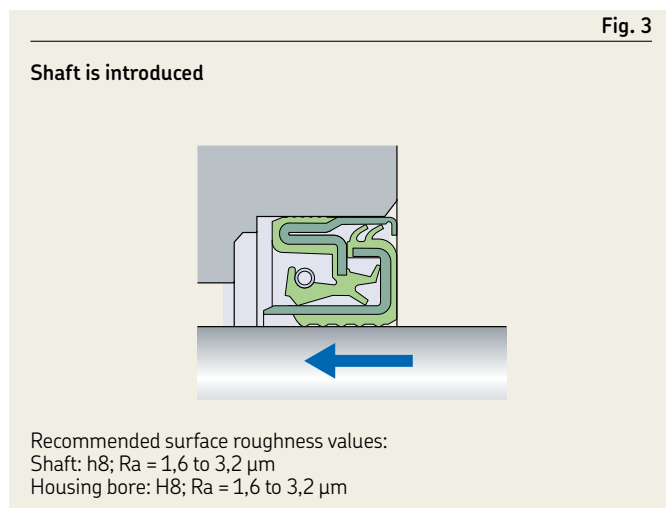
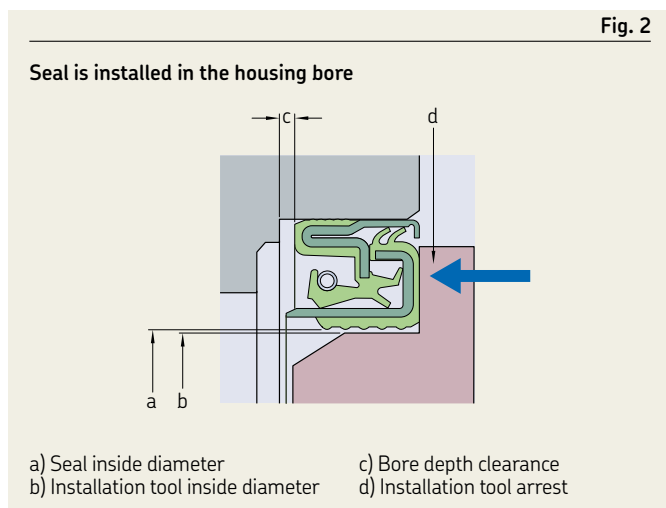
## Testing

SKF conducts mud shary tests of the SKF Mudblock seals at global testing facilities in USA, Europe and Asia. The tests include both our own tests and tests according to customer specifications (→ **diagram 1, 2 and 3** on **page 230 and 231**). SKF Mudblock seals are engineered using Finite Element Analysis (FEA) to obtain optimum design solutions.

FEA evaluates to optimise the design:

- Stress / strain behavior of the sealing lip in deformed condition
- Lip contact forces
- Lip opening pressure
- Displacement of the lips
- Assembly simulation of seal and sleeve

To see how the new generation SKF Mudblock seals for oil-lubricated applications compare to conventional cassette seal designs, SKF conducted a punishing series of performance tests. The results speak for themselves: SKF Mudblock new generation seals lasted up to 50% longer and operated with up to 20% less friction than the competitor's seal. Yet SKF Mudblock seals also offered superior oil retention and contamination exclusion in the harshest, most contaminated conditions.



# SKF Mudblock seal designs MUD11 and MUD7

SKF Mudblock seal design MUD11 is a new generation of radial shaft sealing units, specifically developed for heavy-duty applications in harsh environments and tough operating conditions.

SKF MUD11 seals (→ fig. 4) are designed for oil lubricated applications and provide features including:

- **Half-metal / half-rubber outside diameter:** Improves static sealing, heat dissipation and retention in housing.
- **Bumper:** The bumper positions the sleeve relative to the seal to balance the right interference for the axial lips. It also acts as a line of defence against contaminants.
- **SKF developed nitrile rubber:** Represented by all of the light-green areas in the illustration, this standard SKF Mudblock sealing lip material is a unique nitrile rubber compound. Specially formulated by SKF to help reduce wear and ageing, this advanced material is compatible with most synthetic oils.
- **Curl:** Curled feature closes the unitized design, promotes easier installation and dismounting and also prevents seal disassembly during transport and handling.
- **Main lip:** The spring-loaded main sealing lip keep the sealing lips lubricated and promote sealing ability regardless of rotation direction. This results in less friction and wear for extended service life.
- **Integrated counterface:** Wear sleeve and seal form a single, unitized seal unit that eliminates shaft machining requirements.
- **Multiple sealing lips:** Pre-greased auxiliary radial and axial lips support the main lip for maximum protection against liquid or solid contaminant ingress.
- **Full rubber inside diameter:** Contributes to effective static sealing and helps reduce the assembly force required for installation.

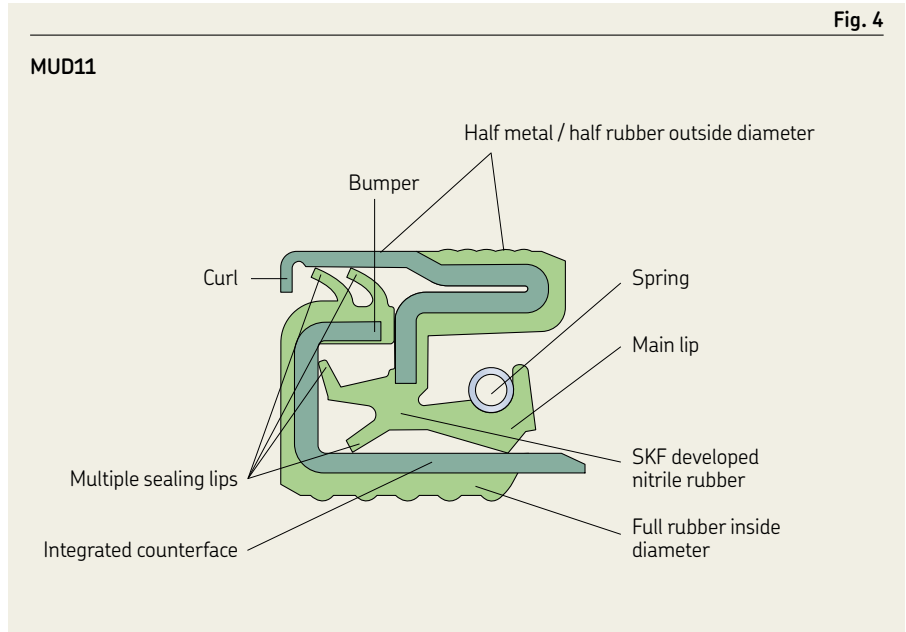
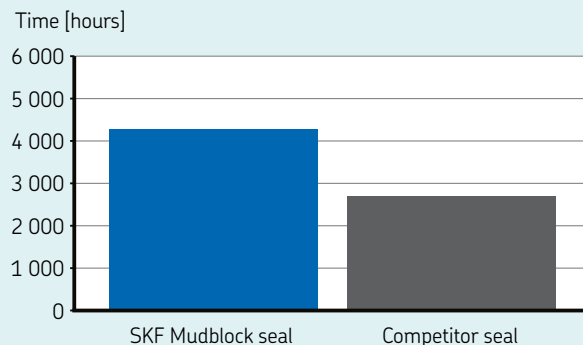


Diagram 1

### MUD11 – Mud slurry test results to seal failure

Mud slurry tests simulate many thousands of hours of exposure to the most punishing liquid and solid contaminants. As this graph indicates, SKF Mudblock seals can outlast the competitor's seals by up to 1 700 hours.



SKF Mudblock seals MUD7 (→ fig. 5) are designed for use in grease lubricated applications and provide features including:

- **Half metal / half rubber outside diameter:** for reliable seal retention in the bore as well as improved sealing performance
- **Rubber covered inside diameter:** for improved sealing performance and easy installation
- **Integrated wear sleeve**
- **SKF patented lip design:** for extended bearing service life
- **Bumper:** maintaining the relative position between the seal and the sleeve as well as acting as a barrier against contaminants
- **Auxiliary radial lips:** for contaminant exclusion

The SKF patented lip design has a special geometry combining both a spring-loaded radial lip and an axial lip. This design enables excess pressure inside the bearing chamber to pass the lip. Thus, the bearing can run cooler, resulting in extended service life.

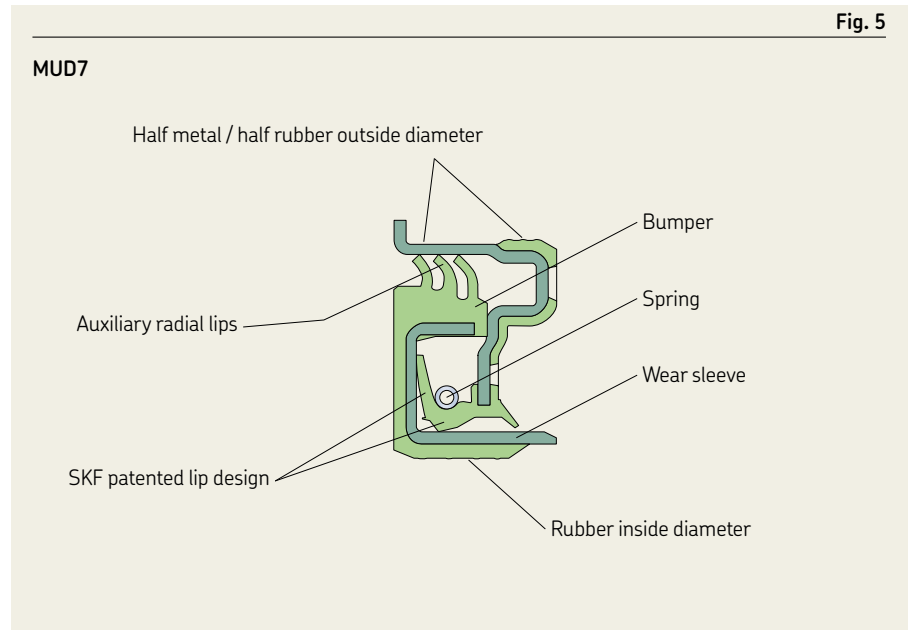


Diagram 2

#### MUD11 – Hot oil durability test results to seal failure

Deteriorating oil condition indicates the effectiveness of a seal's main oil retention lip. Featuring the seal profile, SKF Mudblock seals help extend oil durability, thereby reducing wear and contributing to significantly longer service life vs. the competitor's seals.

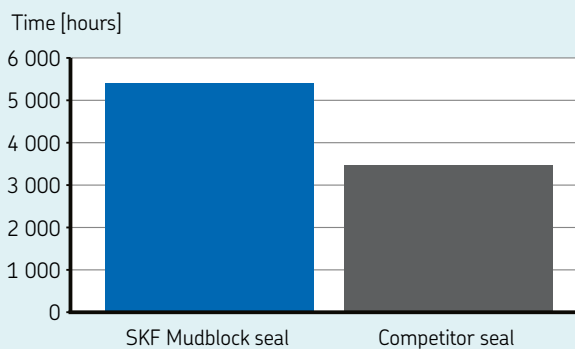
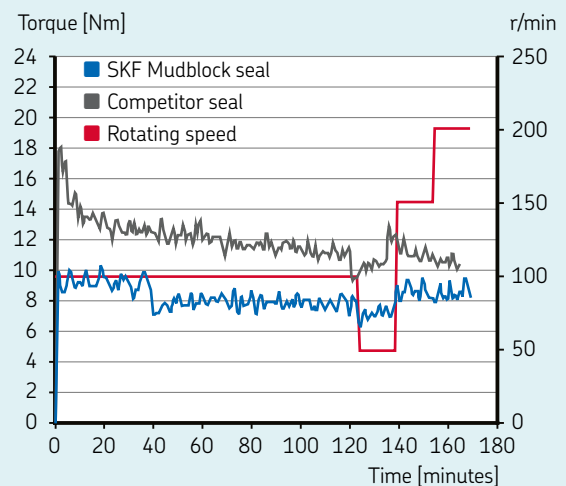


Diagram 3

#### MUD11 – Friction torque tests

Seal friction depends on several factors, including design geometry, rubber material composition and speed. Thanks to their optimized geometry and high-performance nitrile rubber material, SKF Mudblock seals operate with up to 20% less friction than the competitor's seals.



A close-up photograph of a metal shaft and a sleeve. The shaft is on the left, and the sleeve is on the right. The sleeve has a textured surface, possibly a coating or a specific material. The background is dark and out of focus.

**B**

Wear sleeves



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# Wear sleeves – general

To seal efficiently, radial shaft seals must run against a smooth, round counterface. If the counterface becomes worn, the seals will no longer be able to fulfil their function, which is to retain lubricant and exclude contaminants.

Typically, the counterface becomes scored when a contaminant particle is caught under the sealing lip and abrades a track as the shaft rotates. As this continues, the seal will enable more particles to pass or get stuck, and seal efficiency deteriorates, eventually leading to malfunction of the component that the seal is meant to protect. To rectify the situation, it is necessary to repair the shaft surface since a seal replacement will not be sufficient. To repair the shaft, it is usually necessary to disassemble the machine in order to either replace the shaft or grind down the counterface until it is again within specification.

To overcome the problem of preparing the seal counterface to specification, without costly shaft treatments (machining, hardening and plunge grinding) and disassembly in case of worn shaft repair jobs, SKF has developed two kinds of sleeve: the SKF Speedi-Sleeve and LDSLV wear sleeves for heavy industrial applications.

The SKF Speedi-Sleeve is available for shaft diameters up to 203,33 mm (8 in) and when combined with an SKF radial shaft seal, will deliver a more consistent and durable sealing system.

For shaft diameters ranging from 211,15 to 1 143 mm (8.313 to 45 in), SKF's LDSLV4 design is recommended. They are made of SAE 1008 chromium-plated carbon steel to enhance wear and corrosion resistance (see **page 262** for more information).

Fig. 1

SKF Speedi-Sleeve

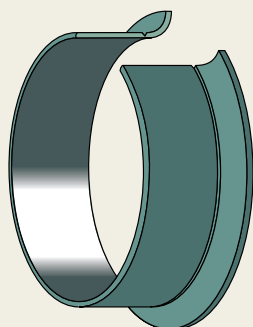
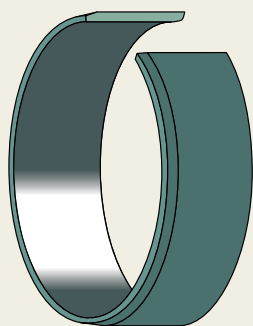


Fig. 2

LDLVL4 wear sleeve





# SKF Speedi-Sleeve



**30%**  
LESS WEAR TO  
THE PREVIOUS  
GENERATION



**SKF Speedi-Sleeve**

- > Minimal downtime
- > Optimized surface



# SKF Speedi-Sleeve – general

This thin-walled sleeve (0,28 mm [0.011 in]), developed by SKF, is simply pushed in position over the shaft, providing a counterface surface that is optimized for radial shaft seals.

There is no shaft disassembly or machining involved and costly downtime is minimized. Since the same sized seal as the original can be used, there is no need to search for other seals, or keep a stock of different sizes.

No special equipment is required since the installation tool is supplied with the sleeve. A mallet and a pair of pliers are all that is needed for the installation.

## Features

The new generation SKF Speedi-Sleeve uses a proprietary stainless steel material and manufacturing process, resulting in an optimized seal counterface surface that minimizes wear on both sleeve and sealing lip. The proprietary material provides increased strength and excellent ductility properties of the sleeve. Imperceptible lubricant pockets

enable the lubricant to reside on the sleeve and thereby prevent dry running of the sealing lip that otherwise can create excessive wear. The contact surface is wear resistant and machined to minimize directionality ( $0^\circ \pm 0,05$ ) with a finish of  $R_a$  0,25 to 0,5  $\mu\text{m}$  (10 to 20  $\mu\text{in}$ ). This is, in fact, a better counterface surface than can often be achieved on a shaft.

SKF Speedi-Sleeve has a removable flange to simplify installation ( $\rightarrow$  fig. 1). The flange can most often be left intact, but in applications where the flange will interfere with other system components, it should be removed to not cause friction heat and wear debris. The flange should also be removed in applications where it may reduce the supply of lubricant to the seal. This would reduce the cooling effect of the lubricant, resulting in elevated underlip temperatures and premature ageing of the sealing material.

If the flange is to be removed, it should be cut from the outside diameter into the radius in one location prior to installation. The flange can then be twisted and raised up after installation and grasped with a pair of long-nosed pliers and twisted into a coil.

## Size range

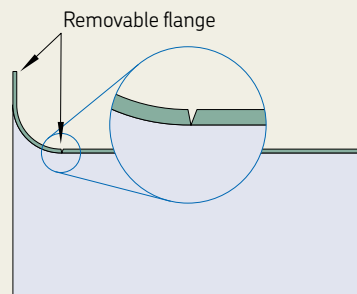
The standard size range covers sleeves for shaft diameters from 11,99 to 203,33 mm (0.472 to 8 in). Depending on production quantities, non-standard sizes can be manufactured. Each sleeve is designed to fit a specific shaft diameter range, usually above and below the nominal shaft diameter. This permits some flexibility to accommodate variations in the actual shaft diameter.

## SKF Speedi-Sleeve Gold

The new generation of SKF Speedi-Sleeve is also available in the Gold version, designed for highly abrasive applications. A thin, metallic coating applied to the base stainless steel imparts a gold colour and significantly increases durability. The original seal size can still be used. SKF Speedi-Sleeve Gold is particularly effective in environments with abrasive contaminants, especially when combined with a seal manufactured from the SKF fluoro rubber material, SKF Duralife.

Fig. 1

### SKF Speedi-Sleeve removable flange



SKF Speedi-Sleeve – the fast and easy solution for worn shafts

## Test results

The previous and new generation of SKF Speedi-Sleeve products were tested for abrasion resistance under both coarse and fine dust conditions. A 500 hour contamination test (→ **diagram 1**) showed that when compared to the previous generation sleeve, the new generation SKF Speedi-Sleeve reduced abrasion by a factor of 1,5 and was still operating efficiently.

To test sealing system effectiveness, a 2 000 hour life test was performed (→ **diagram 2**) using SKF Speedi-Sleeve new and previous generation products and SKF Wave seals made of the SKF fluoro rubber material SKF Duralife. The test results showed that SKF Speedi-Sleeve new generation reduced the sealing lip wear and the variation in the wear rate by approximately 30% compared to the previous generation sleeve and outperformed a chromium-plated surface by a factor of 2.

Both tests were carried out under the same operating conditions:

- Temperatures up to 110 °C (225 °F)
- Linear shaft speeds of up to 8,6 m/s (1 700 ft/min)

In other tests, it was found that continuous salt spray at 35 °C (95 °F) produced no trace of corrosion even after 600 hours. This optimized performance is made possible through the use of the new generation of SKF Speedi-Sleeve.

Diagram 1

**SKF Speedi-Sleeve wear test**  
Abrasive media, test stopped at 500 hours

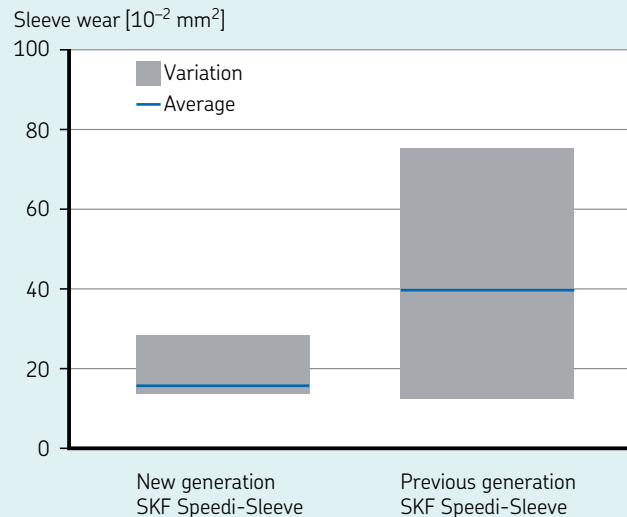
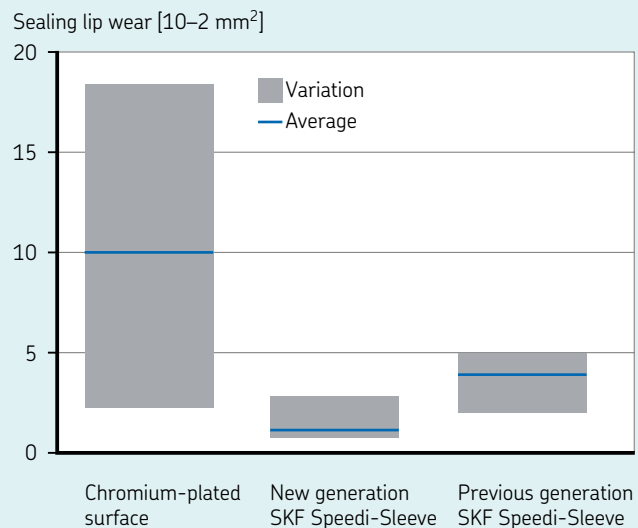


Diagram 2

**Sealing lip wear test**  
Seals made from fluoro rubber, test stopped at 2 000 hours



## Selecting the right size

To determine the appropriate sleeve size, it is first necessary to clean the shaft carefully. The diameter of an undamaged section of the seal counterface should then be measured on at least three different planes. The arithmetical mean of these measurements determines the size of SKF Speedi-Sleeve. If the value lies within the permissible range listed in the product table for the shaft diameter  $d_1$ , SKF Speedi-Sleeve will have an adequate tight fit on the shaft and will not require an adhesive.

If no suitable size is listed in the product table, it will be necessary to rework the shaft to an appropriate dimension. This also means that a new seal size will be required. If production quantities are sufficient enough, SKF can provide specially dimensioned SKF Speedi-Sleeve or other wear sleeve solution.

## Installing SKF Speedi-Sleeve

All SKF Speedi-Sleeve designs are installed the same way. Although installation is simple, it should be done carefully to achieve the best results. As the thin-walled sleeve has an interference fit, any disturbances on the shaft surface may create a similar pattern on the sleeve surface and cause the seal to leak. Therefore, the seal counterface surface of the shaft should be carefully cleaned and any burrs or rough spots filed down prior to installation. Deep wear grooves, scratches or very rough surfaces should be treated with a suitable powdered metal epoxy-type filler. The sleeve must be positioned on the shaft before the filler has hardened.

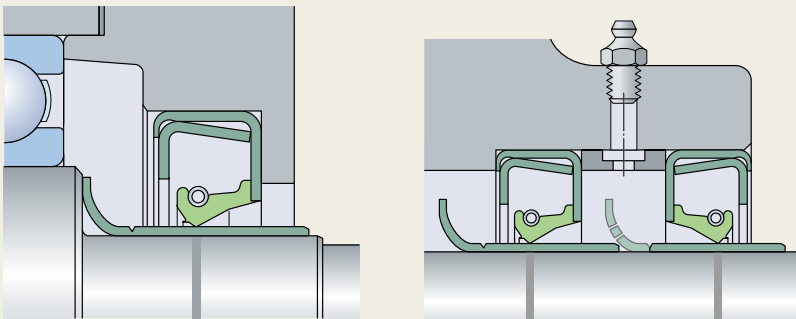
SKF Speedi-Sleeve must not be installed over keyways, cross holes, splines or threads since this will result in deformation of the sleeve, making it difficult for the seal to follow its new counterface surface as it rotates.

SKF Speedi-Sleeve should never be heated prior to installation. Using heat will cause the sleeve to expand, but when it cools, it may not contract back to its original size, resulting in a loose fit on the shaft.

See **fig. 2** for different SKF Speedi-Sleeve installations.

Fig. 2

### SKF Speedi-Sleeve installations





## Installation procedure

- 1 Clean the seal counterface surface on the shaft. File down any burrs or rough spots and make sure that the sleeve will not be installed over keyways, cross holes, splines or similar.
- 2 Measure the diameter on an unworn portion of the shaft where the sleeve will be positioned (→ fig. 3). Measure in three positions and average the readings to make sure the shaft is within recommended specifications. If the average diameter is within the range for a given sleeve size, there is sufficient press fit built into the sleeve to prevent it from sliding or spinning without using an adhesive.
- 3 Determine where the sleeve must be positioned to cover the worn area. Measure to the exact point, or mark directly on the surface. The sleeve must be placed over the worn area, not just bottomed or left flush with the end of the shaft.
- 4 Shallow wear grooves do not require filling. Optionally, a light layer of a non-hardening sealant can be applied to the inside diameter surface of the sleeve. Clean away sealant that migrates to the shaft or sleeve outside diameter surface.
- 5 If the shaft is deeply scored, fill the groove with a powdered metal epoxy-type filler. Install the sleeve before the filler hardens, enabling the sleeve to wipe off any excess filler. Clean away any remaining filler from the sleeve outside diameter surface.
- 6 It should be repeated that heat should never be used to install SKF Speedi-Sleeve.
- 7 If the flange should be removed after installation, cut it from the outside diameter into the radius in one location. The flange end of the sleeve goes on the shaft first. Then, place the installation tool over the sleeve (→ fig. 4).
- 8 Gently tap the centre of the installation tool until the sleeve covers the worn shaft surface (→ fig. 5). If the installation

tool is too short, a length of pipe or tubing with a squared-off, burr-free end can be used. Be sure that the inside diameter of the pipe is the same as that of the installation tool. Use care not to scratch the precision ground sleeve's outside diameter.

- 9 SKF Speedi-Sleeve should always be installed so that the outside edge of the sleeve is seated on the full shaft diameter. It must not rest in or outside the chamfer area since the sharp edge will likely cut the sealing lip during seal installation.
- 10 If the flange was cut for removal, use a pair of long-nosed pliers to grasp the flange away from the sleeve and twist it into a coil, being careful not to lift the end of the sleeve off the shaft or it will leave a jagged edge. Flange removal must be done with care to avoid damage to the outside diameter of the sleeve.
- 11 After the sleeve is installed, check again for burrs that could damage the seal.
- 12 Lubricate the sleeve with the system medium before installing the seal.
- 13 Proceed with seal installation.

## Removing SKF Speedi-Sleeve

SKF Speedi-Sleeve can be removed by applying heat to the sleeve with an electric heat blower, which will expand it enough to let it slide off the shaft without causing any damage to the shaft.

Alternatively, the sleeve can be removed in any of the following ways, always using care not to damage the shaft surface:

- By Relieving The Press-Fit Tension Using A Small Hammer To Peen Across The Full Width Of The Sleeve
- By Using A Cold Chisel To Cut Through The Sleeve
- By Using A Pair Of Wire Cutters Starting At Or Near The flange and applying a twisting motion

Please note that SKF Speedi-Sleeve cannot be reused.

Fig. 3

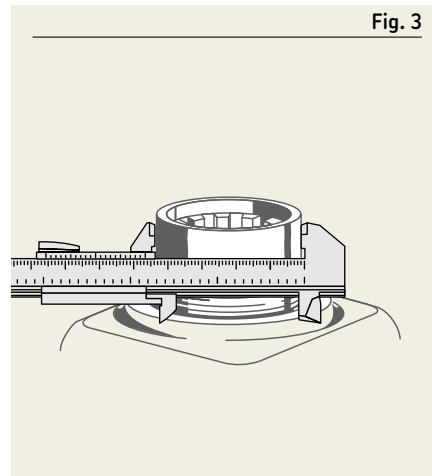


Fig. 4

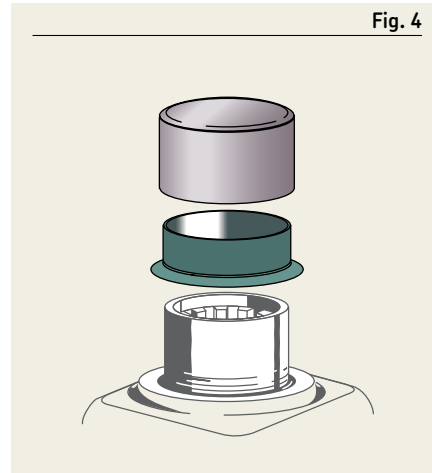
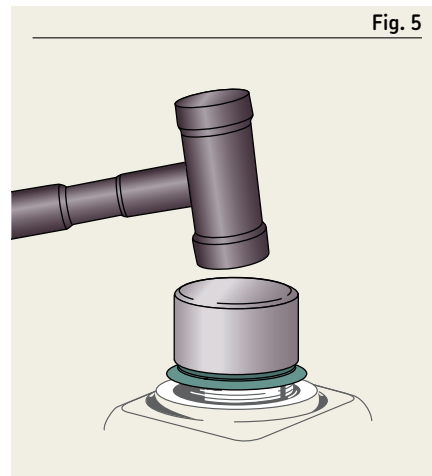
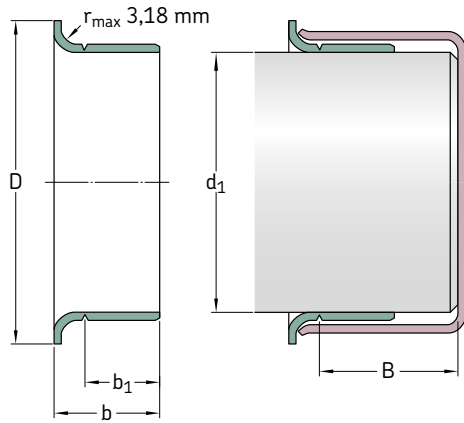


Fig. 5



Wear sleeves | SKF Speedi-Sleeve – metric dimensions (converted from inch dimensions)  
 $d_1$  11,99–38,18 mm



All sleeves listed in the product table can be manufactured as both standard and Gold version.

Shaft diameter range		Nominal dimensions					Designation
$d_1$ min.	max.	$d_1$	D $\pm 1,6$	$b_1$ $\pm 0,8$	b $\pm 0,8$	B <sup>1)</sup>	
mm		mm					–
11,99	12,07	11,99	15,49	5,99	8,41	47,63	99049
12,65	12,75	12,70	15,49	6,35	8,74	50,80	99050
13,89	14,00	14,00	19,05	6,35	9,93	46,51	99055
14,22	14,38	14,30	19,05	6,35	9,93	46,51	99056
14,96	15,06	15,01	19,05	5,00	8,99	47,29	99059
15,82	15,93	15,88 15,88	19,05 19,05	7,95 7,95	10,31 10,31	50,80 50,80	99810 <sup>2)</sup> 99062
15,90	16,00	16,00	18,24	7,95	11,13	50,80	99058
16,94	17,04	16,99	22,23	8,00	11,00	50,80	99068
17,32	17,42	17,37	22,86	7,95	11,13	50,80	99060
17,88	18,01	18,01	24,43	8,00	11,00	46,00	99082
19,00	19,10	19,05 19,05	24,00 24,00	7,95 7,95	11,13 11,13	50,80 50,80	99811 <sup>2)</sup> 99076
19,28	19,33	19,30	23,83	7,95	11,13	50,80	99081
19,81	19,91	19,84	23,75	7,95	11,13	50,80	99080
19,94	20,04	19,99	23,62	8,00	11,00	50,80	99078
20,62	20,70	20,65	30,18	9,53	14,30	76,20	99083
21,77	21,87	21,82	29,34	6,35	9,53	50,80	99086
21,87	22,00	22,00 22,00	30,18 30,18	6,58 8,00	9,12 11,99	47,14 46,02	99084 99085
22,17	22,28	22,23 22,23	27,79 27,79	7,95 7,95	11,13 11,13	50,80 50,80	99812 <sup>2)</sup> 99087
23,06	23,16	23,11 23,11	30,94 30,94	7,95 7,95	11,13 11,13	46,91 46,91	99860 <sup>2)</sup> 99091
23,88	24,00	24,00	28,70	7,95	11,13	50,80	99092

<sup>1)</sup> Possible max. distance of the rear groove from the shaft end when the installation tool supplied with the sleeve is used

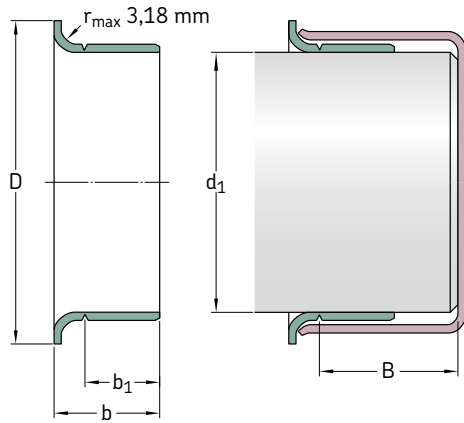
<sup>2)</sup> SKF Speedi-Sleeve Gold

Shaft diameter range		Nominal dimensions					Designation
d <sub>1</sub> min.	max.	d <sub>1</sub>	D ±1,6	b <sub>1</sub> ±0,8	b ±0,8	B <sup>1)</sup>	
mm		mm					–
24,54	24,64	24,61	28,70	7,95	11,13	50,80	99094
		24,61	28,70	15,88	18,26	50,80	99096
24,94	25,04	24,99	33,02	7,95	11,00	50,80	99813 <sup>2)</sup>
		24,99	33,02	7,95	11,00	50,80	99098
25,35	25,45	25,40	30,96	7,95	11,13	50,80	99814 <sup>2)</sup>
		25,40	30,96	7,95	11,13	50,80	99868
25,88	26,01	26,01	33,35	8,00	11,99	46,05	99103
26,92	27,03	27,00	33,53	7,95	11,13	46,81	99815 <sup>2)</sup>
		27,00	33,53	7,95	11,13	46,81	99106
27,61	27,71	27,66	35,71	7,95	11,13	15,88	99108
27,94	28,04	27,99	34,93	9,53	12,70	46,81	99866 <sup>3)</sup>
		27,99	34,93	9,53	12,70	46,81	99111
28,52	28,63	28,58	38,10	7,95	11,13	17,48	99816 <sup>2)</sup>
		28,58	38,10	7,95	11,13	17,48	99112
		28,58	38,10	9,53	12,70	17,48	99116
29,31	29,41	29,36	34,29	9,53	12,70	17,48	99865 <sup>3)</sup>
		29,36	34,29	9,53	12,70	17,48	99120
29,79	29,92	29,85	35,56	7,95	11,13	17,48	99122
29,95	30,07	30,00	35,56	8,00	11,00	17,48	99114
30,10	30,23	30,18	35,56	7,95	11,13	17,48	99118
30,89	31,04	30,96	39,70	7,95	11,00	15,88	99123
31,42	31,57	31,50	39,12	8,00	11,13	17,48	99141
31,67	31,83	31,75	38,10	7,95	11,13	17,48	99817 <sup>2)</sup>
		31,75	38,10	7,95	11,13	17,48	99125
31,93	32,08	32,00	38,10	8,00	11,13	17,48	99128
32,94	33,05	32,99	40,49	15,01	18,01	25,40	99121
33,22	33,38	33,35	40,64	6,35	9,53	20,65	99129
33,27	33,43	33,35	40,49	12,70	15,88	20,65	99818 <sup>2)</sup>
		33,35	40,49	12,70	15,88	20,65	99131
33,86	34,01	34,01	41,28	12,70	15,88	20,65	99134
34,82	34,98	34,93	41,61	7,95	11,13	20,65	99133
		34,93	41,61	12,70	15,88	20,65	99819 <sup>2)</sup>
		34,93	41,61	12,70	15,88	20,65	99138
34,93	35,08	34,93	41,61	13,00	16,00	20,65	99820 <sup>2)</sup>
		34,93	41,61	13,00	16,00	20,65	99139
35,84	35,99	35,99	45,24	13,00	16,99	24,99	99146
36,37	36,53	36,53	45,24	14,30	17,48	25,81	99821 <sup>2)</sup>
		36,53	45,24	14,30	17,48	25,81	99143
36,45	36,60	36,53	45,24	9,53	12,70	25,81	99144
37,85	38,00	38,00	45,24	13,00	16,99	24,99	99147
38,02	38,18	38,10	45,24	9,53	12,70	25,81	99823 <sup>2)</sup>
		38,10	45,24	9,53	12,70	25,81	99150
		38,10	45,24	14,30	17,48	25,81	99822 <sup>2)</sup>
		38,10	45,24	14,30	17,48	25,81	99149

1) Possible max. distance of the rear groove from the shaft end when the installation tool supplied with the sleeve is used

2) SKF Speedi-Sleeve Gold

Wear sleeves | SKF Speedi-Sleeve – metric dimensions (converted from inch dimensions)  
 d<sub>1</sub> 38,61–59,26 mm



All sleeves listed in the product table can be manufactured as both standard and Gold version.

Shaft diameter range		Nominal dimensions					Designation
d <sub>1</sub> min.	max.	d <sub>1</sub>	D ±1,6	b <sub>1</sub> ±0,8	b ±0,8	B <sup>1)</sup>	
mm		mm					–
38,61	38,76	38,68	47,22	11,13	14,30	25,81	99152
39,34	39,50	39,42	47,22	11,13	14,30	25,81	99155
39,60	39,75	39,67	47,22	14,30	17,48	25,81	99824 <sup>2)</sup>
		39,67	47,22	14,30	17,48	25,81	99156
39,78	39,93	39,85	47,22	15,88	19,05	25,81	99159
39,85	40,01	40,01	46,99	9,91	12,93	25,40	99153
39,93	40,08	40,08	46,99	13,00	16,00	25,98	99825 <sup>2)</sup>
		40,08	46,99	13,00	16,00	25,98	99157
40,69	40,84	40,77	49,23	12,70	16,28	25,40	99160
40,84	41,00	41,00	49,23	12,70	15,88	25,81	99163
41,20	41,35	41,28	47,63	7,95	11,13	25,81	99161
		41,28	47,63	14,30	17,48	20,65	99826 <sup>2)</sup>
		41,28	47,63	14,30	17,48	20,65	99162
41,83	42,01	41,91	53,01	11,30	14,50	21,49	99166
		41,91	53,01	14,30	17,50	21,01	99169
		42,01	53,01	14,30	17,50	21,01	99873 <sup>2)</sup>
41,99	42,14	42,06	53,01	13,97	17,50	21,01	99165
42,77	42,93	42,88	48,41	14,30	17,48	22,23	99168
42,80	42,95	42,88	48,41	7,95	11,13	22,23	99167
42,85	43,00	43,00	48,41	12,70	15,88	21,44	99182
43,56	43,71	43,66	51,59	14,30	17,48	20,65	99171
44,09	44,25	44,17	52,40	9,53	12,70	20,65	99170
44,37	44,53	44,45	52,20	9,53	12,70	20,65	99172
		44,45	52,40	13,49	15,88	22,30	99180
		44,45	52,40	14,30	17,48	20,65	99827 <sup>2)</sup>
		44,45	52,40	14,30	17,48	20,65	99174
		44,45	52,40	19,05	22,23	20,65	99828 <sup>2)</sup>
		44,45	52,40	19,05	22,23	20,65	99175

<sup>1)</sup> Possible max. distance of the rear groove from the shaft end when the installation tool supplied with the sleeve is used

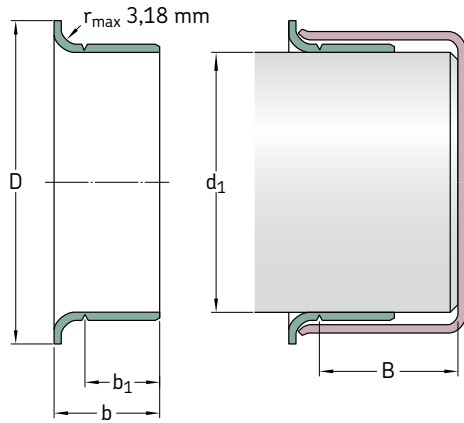
<sup>2)</sup> SKF Speedi-Sleeve Gold

Shaft diameter range		Nominal dimensions					Designation
d <sub>1</sub> min.	max.	d <sub>1</sub>	D ±1,6	b <sub>1</sub> ±0,8	b ±0,8	B <sup>1)</sup>	
mm		mm					–
44,73	44,88	44,86	52,40	14,30	17,48	20,65	99829 <sup>2)</sup>
		44,86	52,40	14,30	17,48	20,65	99176
44,93	45,09	45,01	53,01	14,00	16,99	20,62	99830 <sup>2)</sup>
		45,01	53,01	14,00	16,99	20,62	99177
45,16	45,31	45,24	53,98	16,94	20,32	26,97	99179
45,95	46,10	46,05	53,09	14,30	17,48	25,40	99831 <sup>2)</sup>
		46,05	53,09	14,30	17,48	25,40	99181
47,17	47,32	47,22	54,76	14,30	17,48	25,40	99185
47,40	47,55	47,45	55,58	22,58	26,04	25,40	99186
47,55	47,70	47,63	55,96	4,45	7,49	18,90	99190
		47,63	55,96	7,49	10,54	18,90	99188
		47,63	55,96	9,53	13,11	26,67	99184
		47,63	55,96	14,30	17,48	25,40	99832 <sup>2)</sup>
		47,63	55,96	14,30	17,48	25,40	99187
47,93	48,08	48,03	56,01	14,00	16,97	24,99	99189
48,49	48,64	48,56	56,36	9,53	12,70	25,40	99192
49,12	49,28	49,23	56,36	14,30	17,48	25,40	99833 <sup>2)</sup>
		49,23	56,36	14,30	17,48	25,40	99193
49,91	50,06	50,01	56,49	14,00	16,97	34,29	99052
		50,01	57,00	14,00	16,97	24,99	99196
50,22	50,37	50,29	58,75	14,30	17,88	26,67	99198
50,72	50,88	50,80	61,11	14,30	17,48	25,55	99834 <sup>2)</sup>
		50,80	61,11	14,30	17,48	25,40	99199
		50,80	61,11	22,23	25,40	25,40	99835 <sup>2)</sup>
		50,80	61,11	22,23	25,40	25,40	99200
51,82	51,99	51,99	62,71	12,70	15,88	34,52	99878
52,25	52,40	52,40	62,71	19,84	23,83	34,93	99205
53,92	54,05	53,98	61,52	12,70	19,05	32,54	99210
53,95	54,10	53,98	61,52	19,84	23,83	34,93	99836 <sup>2)</sup>
		53,98	61,52	19,84	23,83	34,93	99212
54,91	55,07	54,99	62,00	19,99	22,99	31,75	99863 <sup>2)</sup>
		54,99	62,00	19,99	22,99	31,75	99215
55,52	55,68	55,58	63,50	19,84	23,83	33,35	99218
55,83	56,01	56,01	64,29	12,70	15,88	33,35	99220
		56,01	64,29	19,79	23,77	80,01	99224
56,57	56,72	56,64	64,29	12,70	15,88	33,35	99861 <sup>2)</sup>
		56,64	64,29	12,70	15,88	33,35	99229
		56,64	64,29	19,84	23,01	31,75	99230
56,82	56,97	56,90	65,10	19,41	22,86	31,75	99226
57,12	57,28	57,15	64,29	7,95	11,13	33,35	99838 <sup>2)</sup>
		57,15	64,29	7,95	11,13	33,35	99227
		57,15	64,29	19,84	23,83	33,35	99837 <sup>2)</sup>
		57,15	64,29	19,84	23,83	33,35	99225
57,91	58,06	57,99	65,99	19,99	23,83	34,93	99219
58,65	58,80	58,75	68,28	19,84	23,83	34,93	99231
59,11	59,26	59,13	69,85	19,05	22,23	38,10	99233

<sup>1)</sup> Possible max. distance of the rear groove from the shaft end when the installation tool supplied with the sleeve is used

<sup>2)</sup> SKF Speedi-Sleeve Gold

Wear sleeves | SKF Speedi-Sleeve – metric dimensions (converted from inch dimensions)  
 d<sub>1</sub> 59,92–82,63 mm



All sleeves listed in the product table can be manufactured as both standard and Gold version.

Shaft diameter range		Nominal dimensions					Designation	
d <sub>1</sub> min.	max.	d <sub>1</sub>	D ±1,6	b <sub>1</sub> ±0,8	b ±0,8	B <sup>1)</sup>		
mm		mm						–
59,92	60,07	59,99	70,74	9,40	11,43	37,36	99241	
		59,99	70,74	19,99	22,99	34,93	99869 <sup>2)</sup>	
		59,99	70,74	19,99	22,99	34,93	99235	
60,25	60,40	60,33	69,85	15,09	19,05	34,93	99238	
60,30	60,45	60,33	69,85	13,36	17,35	34,93	99240	
		60,33	69,85	19,84	23,83	34,93	99839 <sup>2)</sup>	
		60,33	69,85	19,84	23,83	34,93	99237	
61,82	62,00	61,93	71,83	19,84	23,83	35,38	99243	
		62,00	71,83	12,70	15,88	36,20	99244	
61,85	62,00	61,93	71,83	12,70	15,88	36,20	99242	
63,22	63,37	63,30	73,03	19,84	23,83	35,38	99249	
63,42	63,58	63,50	71,63	14,10	16,51	22,61	99253	
63,50	63,65	63,50	71,83	12,70	16,66	35,38	99248	
		63,50	71,63	19,84	23,83	34,93	99840 <sup>2)</sup>	
		63,50	71,63	19,84	23,83	34,93	99250	
63,75	63,91	63,91	71,83	19,84	23,01	36,53	99251	
64,92	65,07	65,00	72,39	19,99	22,99	34,93	99841 <sup>2)</sup>	
		65,00	72,39	19,99	22,99	34,93	99254	
65,02	65,18	65,10	73,43	19,84	23,83	34,93	99256	
65,91	66,07	65,99	75,95	19,84	23,83	31,75	99259	
66,50	66,65	66,57	77,39	19,84	23,83	34,93	99261	
66,57	66,73	66,68	77,39	19,84	23,01	34,93	99264	
66,60	66,75	66,68	77,39	12,70	15,88	34,93	99260	
66,68	66,83	66,68	77,39	19,84	23,83	34,93	99842 <sup>2)</sup>	
		66,68	77,39	19,84	23,83	34,93	99262	
67,82	68,00	68,00	79,38	19,05	22,23	42,88	99266	
69,27	69,42	69,34	79,38	19,84	23,01	33,35	99268	

<sup>1)</sup> Possible max. distance of the rear groove from the shaft end when the installation tool supplied with the sleeve is used

<sup>2)</sup> SKF Speedi-Sleeve Gold

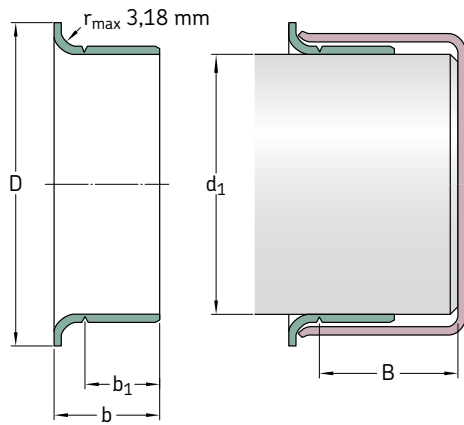
Shaft diameter range		Nominal dimensions					Designation
d <sub>1</sub> min.	max.	d <sub>1</sub>	D ±1,6	b <sub>1</sub> ±0,8	b ±0,8	B <sup>1)</sup>	
mm		mm					–
69,60	69,75	69,67	77,85	19,84	23,83	31,75	99273
69,72	69,88	69,85 69,85	79,38 79,38	19,84 19,84	23,83 23,83	31,75 31,75	99843 <sup>2)</sup> 99274
69,77	69,93	69,85	78,11	36,53	41,28	41,28	99267
69,85	70,00	69,85 69,85 69,85 69,85	79,38 79,38 79,38 79,38	10,31 19,84 19,84 28,58	14,30 23,83 23,83 31,75	31,75 31,75 31,75 33,32	99272 99844 <sup>2)</sup> 99275 99269
69,93	70,08	70,00	79,38	19,99	24,00	31,75	99276
71,35	71,50	71,45	80,98	15,09	17,48	31,75	99281
71,83	72,01	72,01 72,01	81,92 81,92	19,05 19,05	22,23 22,23	34,11 34,11	99870 <sup>2)</sup> 99284
72,09	72,24	72,09 72,09	81,92 81,92	12,70 12,70	16,66 16,66	31,75 31,75	99845 <sup>2)</sup> 99282
72,80	72,95	72,87	80,98	19,84	23,83	31,75	99286
72,97	73,13	73,03 73,03	81,76 81,76	19,84 19,84	23,83 23,83	31,75 31,75	99846 <sup>2)</sup> 99287
74,60	74,75	74,63 74,63 74,68	84,94 84,94 84,94	12,70 19,84 19,84	16,28 23,83 23,83	33,81 33,35 33,35	99290 99847 <sup>2)</sup> 99293
74,93	75,08	75,01 75,01 75,01	83,13 83,95 83,95	15,09 22,00 22,00	17,53 26,01 26,01	27,51 33,35 33,35	99289 99875 <sup>2)</sup> 99294
75,49	75,59	75,54	82,17	20,65	25,40	31,75	99292
75,95	76,10	76,02 76,02 76,02	85,32 85,32 85,09	12,29 14,30 20,65	15,88 17,48 25,40	33,81 34,93 32,54	99291 99298 99299
76,12	76,28	76,20	82,30	20,65	23,83	34,93	99296
76,20	76,35	76,20 76,20 76,20	84,96 82,17 82,17	15,88 20,65 20,65	20,65 25,40 25,40	32,51 32,54 32,54	99048 99848 <sup>2)</sup> 99300
76,40	76,56	76,48	85,22	12,70	15,88	50,80	99301
77,83	78,00	78,00	88,09	19,05	22,23	52,22	99306
79,25	79,40	79,38 79,38 79,38	89,69 89,69 89,69	17,48 20,65 20,65	20,65 25,40 25,40	50,80 50,80 50,80	99311 99849 <sup>2)</sup> 99312
79,35	79,55	79,38	89,54	14,00	18,01	51,59	99053
79,81	80,01	80,01	89,92	19,05	22,50	34,93	99313
79,91	80,09	80,01 80,01	89,99 89,99	11,00 21,01	15,01 24,00	34,93 34,93	99317 99315
81,92	82,07	81,99	91,06	16,76	21,54	44,45	99328
82,47	82,63	82,55	91,29	20,65	25,40	34,93	99322

<sup>1)</sup> Possible max. distance of the rear groove from the shaft end when the installation tool supplied with the sleeve is used

<sup>2)</sup> SKF Speedi-Sleeve Gold

Wear sleeves | SKF Speedi-Sleeve – metric dimensions (converted from inch dimensions)

d<sub>1</sub> 82,55–123,11 mm



All sleeves listed in the product table can be manufactured as both standard and Gold version.

Shaft diameter range		Nominal dimensions					Designation	
d <sub>1</sub> min.	max.	d <sub>1</sub>	D ±1,6	b <sub>1</sub> ±0,8	b ±0,8	B <sup>1)</sup>		
mm		mm					–	
82,55	82,70	82,55	90,81	15,11	18,26	34,93	99850 <sup>2)</sup>	
		82,55	90,81	15,11	18,26	34,93	99324	
		82,55	91,06	17,48	22,23	31,75	99326	
		82,55	91,06	20,65	25,40	34,93	99851 <sup>2)</sup>	
		82,55	91,06	20,65	25,40	34,93	99325	
84,00	84,15	84,07	93,68	20,65	25,40	34,93	99331	
84,76	85,01	84,89	93,98	16,99	21,01	35,00	99332	
		84,89	93,98	21,01	24,99	35,00	99872 <sup>2)</sup>	
		84,89	93,98	21,01	24,99	35,00	99333	
84,79	85,01	85,01	90,93	10,13	12,67	36,35	99334	
85,67	85,83	85,73	93,68	9,53	12,70	35,81	99338	
		85,73	93,85	20,65	25,40	34,93	99337	
87,25	87,40	87,33	97,64	19,84	23,01	35,71	99339	
87,80	88,00	88,00	95,28	29,21	34,27	42,50	99481	
88,32	88,47	88,39	97,41	19,84	23,01	35,71	99340	
88,82	88,98	88,90	97,64	15,88	20,65	34,21	99346	
88,90	89,05	88,90	97,16	7,95	12,70	34,21	99347	
		88,90	97,64	20,65	25,40	34,21	99852 <sup>2)</sup>	
		88,90	97,64	20,65	25,40	34,21	99350	
88,93	89,08	89,00	97,64	15,88	20,65	34,24	99349	
89,92	90,07	89,99	101,60	11,13	13,67	46,05	99352	
		89,99	101,60	13,36	16,94	44,45	99353	
		89,99	101,60	18,03	23,01	46,05	99351	
		89,99	101,60	23,01	27,99	44,45	99354	
90,42	90,58	90,50	99,06	20,65	25,40	44,45	99356	
91,90	92,05	91,97	102,39	20,65	25,40	44,45	99360	
92,02	92,18	92,08	102,24	12,70	15,88	44,45	99363	
		92,08	102,39	20,65	25,40	44,45	99362	
93,57	93,73	93,68	102,39	7,95	11,13	22,23	99368	

<sup>1)</sup> Possible max. distance of the rear groove from the shaft end when the installation tool supplied with the sleeve is used

<sup>2)</sup> SKF Speedi-Sleeve Gold

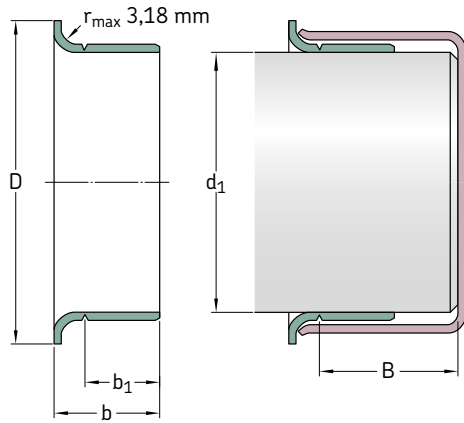


Shaft diameter range		Nominal dimensions					Designation
d <sub>1</sub> min.	max.	d <sub>1</sub>	D ±1,6	b <sub>1</sub> ±0,8	b ±0,8	B <sup>1)</sup>	
mm		mm					–
93,60	93,75	93,68	102,24	20,65	23,83	45,72	99365
94,67	94,82	94,74 94,74	102,01 102,24	11,91 19,84	15,09 23,01	45,72 45,72	99359 99366
94,92	95,07	95,00	102,24	21,01	24,00	45,72	99369
95,00	95,15	95,07 95,07	102,39 102,49	8,74 11,91	12,70 15,09	45,72 45,72	99374 99364
95,15	95,30	95,22	102,24	14,30	17,48	45,72	99376
95,25	95,40	95,25 95,33 95,33	102,11 102,24 102,11	17,48 8,74 17,48	22,23 12,70 22,23	45,72 45,72 45,72	99853 <sup>2)</sup> 99367 99372
98,25	98,40	98,32	106,30	20,65	25,40	47,63	99386
98,37	98,53	98,43	107,16	20,65	25,40	47,63	99387
99,95	100,10	100,03 100,03	109,55 109,55	20,65 20,65	25,40 25,40	52,07 52,07	99854 <sup>2)</sup> 99393
101,55	101,75	101,60 101,60 101,60 101,60 101,60	111,13 111,13 111,13 111,13 111,13	12,70 15,24 16,51 20,65 20,65	15,88 18,42 19,69 25,40 25,40	52,48 52,07 34,93 52,07 52,07	99401 99395 99400 99855 <sup>2)</sup> 99399
103,89	104,09	103,99	112,73	19,99	24,00	35,99	99409
104,70	104,90	104,78	113,54	20,65	25,40	34,93	99412
104,90	105,11	105,00	113,54	19,99	23,19	35,00	99413
106,25	106,45	106,38	114,30	20,65	25,40	34,93	99418
107,34	107,54	107,54	117,09	19,84	23,01	36,53	99423
107,90	108,10	107,95	117,09	20,65	25,40	36,53	99424
109,78	110,01	110,01	124,99	11,38	14,96	32,94	99434
109,91	110,11	109,93	124,99	12,93	16,51	31,75	99435
111,00	111,20	111,13	120,65	20,65	25,40	41,91	99437
111,79	111,99	111,99	120,65	19,05	22,50	33,02	99438
112,62	112,83	112,73	122,25	25,40	29,01	33,35	99439
114,20	114,40	114,30 114,30	123,19 124,46	20,65 20,65	25,40 25,40	31,75 31,75	99856 <sup>2)</sup> 99450
114,88	115,09	115,01	127,00	20,65	23,83	31,75	99452
117,37	117,58	117,48 117,48	127,00 128,60	11,13 25,40	15,88 31,75	34,93 34,93	99465 99463
119,00	119,20	119,08	128,60	20,65	25,40	34,93	99468
119,89	120,09	119,99 119,99	129,79 129,79	8,00 19,99	11,00 24,99	33,60 32,00	99471 99473
120,55	120,75	120,65	127,00	12,70	19,05	38,10	99475
121,89	122,10	122,00	131,50	19,99	24,00	32,00	99472
122,91	123,11	123,01	132,82	19,99	24,99	31,60	99484

<sup>1)</sup> Possible max. distance of the rear groove from the shaft end when the installation tool supplied with the sleeve is used

<sup>2)</sup> SKF Speedi-Sleeve Gold

Wear sleeves | SKF Speedi-Sleeve – metric dimensions (converted from inch dimensions)  
 d<sub>1</sub> 123,72–203,33 mm



All sleeves listed in the product table can be manufactured as both standard and Gold version.

Shaft diameter range		Nominal dimensions					Designation	
d <sub>1</sub> min.	max.	d <sub>1</sub>	D ±1,6	b <sub>1</sub> ±0,8	b ±0,8	B <sup>1)</sup>		
mm		mm					–	
123,72	123,93	123,83	133,35	15,88	19,05	36,53	99487	
124,89	125,10	124,99	137,16	10,01	14,00	36,53	99490	
		124,99	137,16	26,01	32,00	36,53	99492	
126,95	127,15	127,00	137,16	13,72	17,30	36,53	99501	
		127,00	137,16	17,48	22,23	36,53	99857 <sup>2)</sup>	
		127,00	137,16	17,48	22,23	36,53	99498	
		127,00	136,91	20,65	25,40	36,53	99858 <sup>2)</sup>	
		127,00	136,91	20,65	25,40	36,53	99499	
127,80	128,00	128,00	135,26	29,21	34,27	40,30	99482	
129,79	130,00	129,90	139,52	19,05	23,83	30,00	99494	
129,97	130,18	130,00	139,52	22,00	25,30	32,51	99874 <sup>2)</sup>	
		130,18	139,52	22,00	25,30	32,51	99491	
130,05	130,25	130,18	139,70	20,65	25,40	31,75	99513	
133,25	133,45	133,35	141,22	20,65	25,40	31,75	99525	
134,80	135,00	134,90	145,67	20,50	25,40	31,75	99533	
136,42	136,63	136,53	149,23	20,65	25,40	31,75	99537	
138,02	138,23	138,13	146,05	38,10	42,88	47,63	99548	
138,99	139,19	139,09	149,86	14,30	19,05	31,34	99547	
139,65	139,85	139,70	150,83	13,16	17,91	31,75	99550	
		139,70	150,83	20,65	25,40	31,75	99859 <sup>2)</sup>	
		139,70	150,83	20,65	25,40	31,75	99549	
139,90	140,11	140,00	151,00	20,50	25,40	31,75	99552	
142,77	142,98	142,88	157,18	22,23	25,40	46,02	99560	
144,75	145,01	145,01	154,94	19,05	22,23	46,02	99571	
145,44	145,64	145,64	154,94	14,30	19,05	49,23	99562	
145,95	146,15	146,05	156,97	20,65	25,40	44,45	99575	

<sup>1)</sup> Possible max. distance of the rear groove from the shaft end when the installation tool supplied with the sleeve is used

<sup>2)</sup> SKF Speedi-Sleeve Gold

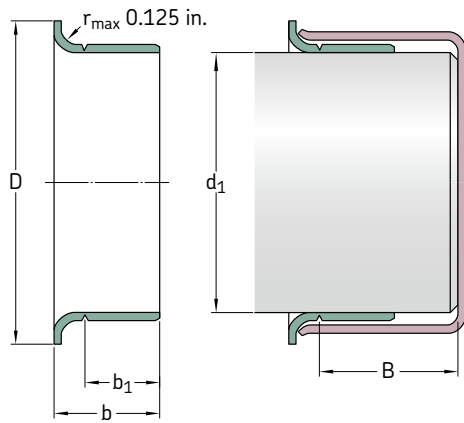
Shaft diameter range		Nominal dimensions					Designation
$d_1$ min.	max.	$d_1$	D $\pm 1,6$	$b_1$ $\pm 0,8$	b $\pm 0,8$	B <sup>1)</sup>	
mm		mm					–
<b>149,12</b>	<b>149,33</b>	149,23 149,23	157,18 157,18	25,40 25,40	31,75 31,75	33,35 33,35	<b>99862<sup>2)</sup></b> <b>99587</b>
<b>149,76</b>	<b>150,01</b>	149,99	159,00	26,01	30,00	32,51	<b>99595</b>
<b>150,72</b>	<b>150,93</b>	150,83	161,93	25,40	28,58	47,63	<b>99596</b>
<b>152,27</b>	<b>152,48</b>	152,40 152,40	161,54 161,93	12,70 25,40	19,05 31,75	44,45 44,45	<b>99601</b> <b>99599</b>
<b>153,87</b>	<b>154,13</b>	154,00	161,93	26,01	30,00	32,99	<b>99605</b>
<b>154,74</b>	<b>154,99</b>	154,86	167,01	26,01	30,00	32,99	<b>99606</b>
<b>157,43</b>	<b>157,68</b>	157,56	168,28	20,65	27,00	44,45	<b>99620</b>
<b>158,62</b>	<b>158,88</b>	158,75	168,28	26,19	31,75	44,45	<b>99625</b>
<b>159,74</b>	<b>159,99</b>	159,99	171,45	25,40	31,75	34,93	<b>99630</b>
<b>164,97</b>	<b>165,23</b>	165,10	177,80	25,40	31,75	34,93	<b>99650</b>
<b>169,75</b>	<b>170,00</b>	169,88	182,58	31,75	38,00	44,45	<b>99640</b>
<b>171,32</b>	<b>171,58</b>	171,45	180,98	20,65	27,00	44,45	<b>99675</b>
<b>174,75</b>	<b>175,01</b>	175,01	186,99	27,99	32,00	35,00	<b>99687</b>
<b>177,67</b>	<b>177,93</b>	177,80 177,80	189,87 189,87	25,40 25,40	31,75 31,75	42,88 42,88	<b>99864<sup>2)</sup></b> <b>99700</b>
<b>179,76</b>	<b>180,01</b>	180,01	190,50	32,99	38,00	44,50	<b>99721</b>
<b>184,00</b>	<b>184,25</b>	184,15	197,10	31,75	38,10	55,25	<b>99725</b>
<b>184,73</b>	<b>184,99</b>	184,86	197,10	32,00	38,00	54,99	<b>99726</b>
<b>189,08</b>	<b>189,33</b>	189,31	199,64	20,65	25,40	31,75	<b>99745</b>
<b>190,37</b>	<b>190,63</b>	190,50	200,03	20,65	25,40	31,75	<b>99750</b>
<b>196,72</b>	<b>196,98</b>	196,85	210,06	25,40	33,35	47,63	<b>99775</b>
<b>199,87</b>	<b>200,13</b>	200,03	212,73	34,52	38,10	44,45	<b>99787</b>
<b>201,50</b>	<b>201,75</b>	201,63	212,73	25,40	31,75	44,45	<b>99799</b>
<b>203,07</b>	<b>203,33</b>	203,20	212,73	25,40	31,75	44,45	<b>99800</b>

<sup>1)</sup> Possible max. distance of the rear groove from the shaft end when the installation tool supplied with the sleeve is used

<sup>2)</sup> SKF Speedi-Sleeve Gold

Wear sleeves | SKF Speedi-Sleeve – inch dimensions

$d_1$  0.472–1.496



All sleeves listed in the product table can be manufactured as both standard and Gold version.

Shaft diameter range		Nominal dimensions					Designation
$d_1$ min.	max.	$d_1$	D $\pm 0.063$	$b_1$ $\pm 0.031$	b $\pm 0.031$	B <sup>1)</sup>	
in		in					
0.472	0.475	0.472	0.610	0.236	0.331	1.875	99049
0.498	0.502	0.500	0.610	0.250	0.344	2.000	99050
0.547	0.551	0.551	0.750	0.250	0.391	1.831	99055
0.560	0.566	0.563	0.750	0.250	0.391	1.831	99056
0.589	0.593	0.591	0.750	0.197	0.354	1.862	99059
0.623	0.627	0.625 0.625	0.750 0.750	0.313 0.313	0.406 0.406	2.000 2.000	99810 <sup>2)</sup> 99062
0.626	0.630	0.630	0.718	0.313	0.438	2.000	99058
0.667	0.671	0.669	0.875	0.315	0.433	2.000	99068
0.682	0.686	0.684	0.900	0.313	0.438	2.000	99060
0.704	0.709	0.709	0.962	0.315	0.433	1.811	99082
0.748	0.752	0.750 0.750	0.945 0.945	0.313 0.313	0.438 0.438	2.000 2.000	99811 <sup>2)</sup> 99076
0.759	0.761	0.760	0.938	0.313	0.438	2.000	99081
0.780	0.784	0.781	0.935	0.313	0.438	2.000	99080
0.785	0.789	0.787	0.930	0.315	0.433	2.000	99078
0.812	0.815	0.813	1.188	0.375	0.563	3.000	99083
0.857	0.861	0.859	1.155	0.250	0.375	2.000	99086
0.861	0.866	0.866 0.866	1.188 1.188	0.259 0.315	0.359 0.472	1.856 1.812	99084 99085
0.873	0.877	0.875 0.875	1.094 1.094	0.313 0.313	0.438 0.438	2.000 2.000	99812 <sup>2)</sup> 99087
0.908	0.912	0.910 0.910	1.218 1.218	0.313 0.313	0.438 0.438	1.847 1.847	99860 <sup>2)</sup> 99091

<sup>1)</sup> Possible max. distance of the rear groove from the shaft end when the installation tool supplied with the sleeve is used

<sup>2)</sup> SKF Speedi-Sleeve Gold

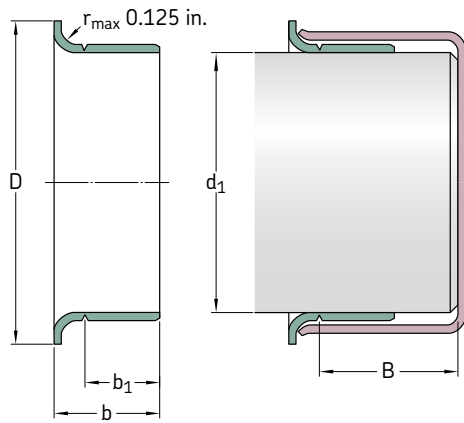
Shaft diameter range		Nominal dimensions					Designation
d <sub>1</sub> min.	max.	d <sub>1</sub>	D ±0.063	b <sub>1</sub> ±0.031	b ±0.031	B <sup>1)</sup>	
in		in					–
0.940	0.945	0.945	1.130	0.313	0.438	2.000	99092
0.966	0.970	0.969 0.969	1.130 1.130	0.313 0.625	0.438 0.719	2.000 2.000	99094 99096
0.982	0.986	0.984 0.984	1.300 1.300	0.313 0.313	0.433 0.433	2.000 2.000	99813 <sup>2)</sup> 99098
0.998	1.002	1.000 1.000	1.219 1.219	0.313 0.313	0.438 0.438	2.000 2.000	99814 <sup>2)</sup> 99868
1.019	1.024	1.024	1.313	0.315	0.472	1.813	99103
1.060	1.064	1.063 1.063	1.320 1.320	0.313 0.313	0.438 0.438	1.843 1.843	99815 <sup>2)</sup> 99106
1.087	1.091	1.089	1.406	0.313	0.438	0.625	99108
1.100	1.104	1.102 1.102	1.375 1.375	0.375 0.375	0.500 0.500	1.843 1.843	99866 <sup>2)</sup> 99111
1.123	1.127	1.125 1.125 1.125	1.500 1.500 1.500	0.313 0.313 0.375	0.438 0.438 0.500	0.688 0.688 0.688	99816 <sup>2)</sup> 99112 99116
1.154	1.158	1.156 1.156	1.350 1.350	0.375 0.375	0.500 0.500	0.688 0.688	99865 <sup>2)</sup> 99120
1.173	1.178	1.175	1.400	0.313	0.438	0.688	99122
1.179	1.184	1.181	1.400	0.315	0.433	0.688	99114
1.185	1.190	1.188	1.400	0.313	0.438	0.688	99118
1.216	1.222	1.219	1.563	0.313	0.433	0.625	99123
1.237	1.243	1.240	1.540	0.315	0.438	0.688	99141
1.247	1.253	1.250 1.250	1.500 1.500	0.313 0.313	0.438 0.438	0.688 0.688	99817 <sup>2)</sup> 99125
1.257	1.263	1.260	1.500	0.315	0.438	0.688	99128
1.297	1.301	1.299	1.594	0.591	0.709	1.000	99121
1.308	1.314	1.313	1.600	0.250	0.375	0.813	99129
1.310	1.316	1.313 1.313	1.594 1.594	0.500 0.500	0.625 0.625	0.813 0.813	99818 <sup>2)</sup> 99131
1.333	1.339	1.339	1.625	0.500	0.625	0.813	99134
1.371	1.377	1.375 1.375 1.375	1.638 1.638 1.638	0.313 0.500 0.500	0.438 0.625 0.625	0.813 0.813 0.813	99133 99819 <sup>2)</sup> 99138
1.375	1.381	1.375 1.375	1.638 1.638	0.512 0.512	0.630 0.630	0.813 0.813	99820 <sup>2)</sup> 99139
1.411	1.417	1.417	1.781	0.512	0.669	0.984	99146
1.432	1.438	1.438 1.438	1.781 1.781	0.563 0.563	0.688 0.688	1.016 1.016	99821 <sup>2)</sup> 99143
1.435	1.441	1.438	1.781	0.375	0.500	1.016	99144
1.490	1.496	1.496	1.781	0.512	0.669	0.984	99147

<sup>1)</sup> Possible max. distance of the rear groove from the shaft end when the installation tool supplied with the sleeve is used

<sup>2)</sup> SKF Speedi-Sleeve Gold

Wear sleeves | SKF Speedi-Sleeve – inch dimensions

d<sub>1</sub> 1.497–2.243



All sleeves listed in the product table can be manufactured as both standard and Gold version.

Shaft diameter range		Nominal dimensions					Designation	
d <sub>1</sub> min.	max.	d <sub>1</sub>	D ±0.063	b <sub>1</sub> ±0.031	b ±0.031	B <sup>1)</sup>		
in		in						–
1.497	1.503	1.500	1.781	0.375	0.500	1.016	99823 <sup>2)</sup>	
		1.500	1.781	0.375	0.500	1.016	99150	
		1.500	1.781	0.563	0.688	1.016	99822 <sup>2)</sup>	
		1.500	1.781	0.563	0.688	1.016	99149	
1.520	1.526	1.523	1.859	0.438	0.563	1.016	99152	
1.549	1.555	1.552	1.859	0.438	0.563	1.016	99155	
1.559	1.565	1.562	1.859	0.563	0.688	1.016	99824 <sup>2)</sup>	
		1.562	1.859	0.563	0.688	1.016	99156	
1.566	1.572	1.569	1.859	0.625	0.750	1.016	99159	
1.569	1.575	1.575	1.850	0.390	0.509	1.000	99153	
1.572	1.578	1.578	1.850	0.512	0.630	1.023	99825 <sup>2)</sup>	
		1.578	1.850	0.512	0.630	1.023	99157	
1.602	1.608	1.605	1.938	0.500	0.641	1.000	99160	
1.608	1.614	1.614	1.938	0.500	0.625	1.016	99163	
1.622	1.628	1.625	1.875	0.313	0.438	1.016	99161	
		1.625	1.875	0.563	0.688	0.813	99826 <sup>2)</sup>	
		1.625	1.875	0.563	0.688	0.813	99162	
1.647	1.654	1.650	2.087	0.445	0.571	0.846	99166	
		1.650	2.087	0.563	0.689	0.827	99169	
		1.654	2.087	0.563	0.689	0.827	99873 <sup>2)</sup>	
1.653	1.659	1.656	2.087	0.550	0.689	0.827	99165	
1.684	1.690	1.688	1.906	0.563	0.688	0.875	99168	
1.685	1.691	1.688	1.906	0.313	0.438	0.875	99167	
1.687	1.693	1.693	1.906	0.500	0.625	0.844	99182	
1.715	1.721	1.719	2.031	0.563	0.688	0.813	99171	
1.736	1.742	1.739	2.063	0.375	0.500	0.813	99170	
1.747	1.753	1.750	2.055	0.375	0.500	0.813	99172	

<sup>1)</sup> Possible max. distance of the rear groove from the shaft end when the installation tool supplied with the sleeve is used

<sup>2)</sup> SKF Speedi-Sleeve Gold

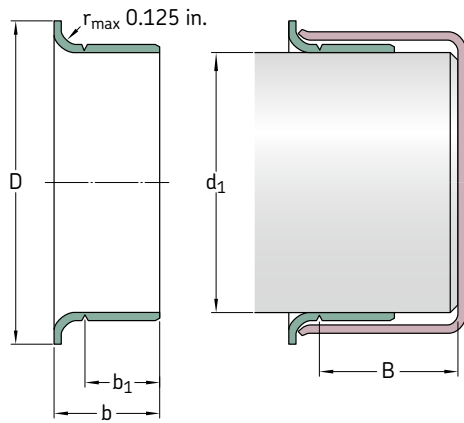
Shaft diameter range		Nominal dimensions					Designation
d <sub>1</sub> min.	max.	d <sub>1</sub>	D ±0.063	b <sub>1</sub> ±0.031	b ±0.031	B <sup>1)</sup>	
in		in					–
		1.750	2.063	0.531	0.625	0.878	<b>99180</b>
		1.750	2.063	0.563	0.688	0.813	<b>99827<sup>2)</sup></b>
		1.750	2.063	0.563	0.688	0.813	<b>99174</b>
		1.750	2.063	0.750	0.875	0.813	<b>99828<sup>2)</sup></b>
		1.750	2.063	0.750	0.875	0.813	<b>99175</b>
<b>1.761</b>	<b>1.767</b>	1.766	2.063	0.563	0.688	0.813	<b>99829<sup>2)</sup></b>
		1.766	2.063	0.563	0.688	0.813	<b>99176</b>
<b>1.769</b>	<b>1.775</b>	1.772	2.087	0.551	0.669	0.812	<b>99830<sup>2)</sup></b>
		1.772	2.087	0.551	0.669	0.812	<b>99177</b>
<b>1.778</b>	<b>1.784</b>	1.781	2.125	0.667	0.800	1.062	<b>99179</b>
<b>1.809</b>	<b>1.815</b>	1.813	2.090	0.563	0.688	1.000	<b>99831<sup>2)</sup></b>
		1.813	2.090	0.563	0.688	1.000	<b>99181</b>
<b>1.857</b>	<b>1.863</b>	1.859	2.156	0.563	0.688	1.000	<b>99185</b>
<b>1.866</b>	<b>1.872</b>	1.868	2.188	0.889	1.025	1.000	<b>99186</b>
<b>1.872</b>	<b>1.878</b>	1.875	2.203	0.175	0.295	0.744	<b>99190</b>
		1.875	2.203	0.295	0.415	0.744	<b>99188</b>
		1.875	2.203	0.375	0.516	1.050	<b>99184</b>
		1.875	2.203	0.563	0.688	1.000	<b>99832<sup>2)</sup></b>
		1.875	2.203	0.563	0.688	1.000	<b>99187</b>
<b>1.887</b>	<b>1.893</b>	1.891	2.205	0.551	0.668	0.984	<b>99189</b>
<b>1.909</b>	<b>1.915</b>	1.912	2.219	0.375	0.500	1.000	<b>99192</b>
<b>1.934</b>	<b>1.940</b>	1.938	2.219	0.563	0.688	1.000	<b>99833<sup>2)</sup></b>
		1.938	2.219	0.563	0.688	1.000	<b>99193</b>
<b>1.965</b>	<b>1.971</b>	1.969	2.244	0.551	0.668	1.350	<b>99052</b>
		1.969	2.244	0.551	0.668	0.984	<b>99196</b>
<b>1.977</b>	<b>1.983</b>	1.980	2.313	0.563	0.704	1.050	<b>99198</b>
<b>1.997</b>	<b>2.003</b>	2.000	2.406	0.563	0.688	1.006	<b>99834<sup>2)</sup></b>
		2.000	2.406	0.563	0.688	1.000	<b>99199</b>
		2.000	2.406	0.875	1.000	1.000	<b>99835<sup>2)</sup></b>
		2.000	2.406	0.875	1.000	1.000	<b>99200</b>
<b>2.040</b>	<b>2.047</b>	2.047	2.469	0.500	0.625	1.359	<b>99878</b>
<b>2.057</b>	<b>2.063</b>	2.063	2.469	0.781	0.938	1.375	<b>99205</b>
<b>2.123</b>	<b>2.128</b>	2.125	2.422	0.500	0.750	1.281	<b>99210</b>
<b>2.124</b>	<b>2.130</b>	2.125	2.422	0.781	0.938	1.375	<b>99836<sup>2)</sup></b>
		2.125	2.422	0.781	0.938	1.375	<b>99212</b>
<b>2.162</b>	<b>2.168</b>	2.165	2.441	0.787	0.905	1.250	<b>99863<sup>2)</sup></b>
		2.165	2.441	0.787	0.905	1.250	<b>99215</b>
<b>2.186</b>	<b>2.192</b>	2.188	2.500	0.781	0.938	1.313	<b>99218</b>
<b>2.198</b>	<b>2.205</b>	2.205	2.531	0.500	0.625	1.313	<b>99220</b>
		2.205	2.531	0.779	0.936	3.150	<b>99224</b>
<b>2.227</b>	<b>2.233</b>	2.230	2.531	0.500	0.625	1.313	<b>99861<sup>2)</sup></b>
		2.230	2.531	0.500	0.625	1.313	<b>99229</b>
		2.230	2.531	0.781	0.906	1.250	<b>99230</b>
<b>2.237</b>	<b>2.243</b>	2.240	2.563	0.764	0.900	1.250	<b>99226</b>

<sup>1)</sup> Possible max. distance of the rear groove from the shaft end when the installation tool supplied with the sleeve is used

<sup>2)</sup> SKF Speedi-Sleeve Gold

Wear sleeves | SKF Speedi-Sleeve – inch dimensions

d<sub>1</sub> 2.249–3.150



All sleeves listed in the product table can be manufactured as both standard and Gold version.

Shaft diameter range		Nominal dimensions					Designation	
d <sub>1</sub> min.	max.	d <sub>1</sub>	D ±0.063	b <sub>1</sub> ±0.031	b ±0.031	B <sup>1)</sup>		
in		in					–	
2.249	2.255	2.250	2.531	0.313	0.438	1.313	99838 <sup>2)</sup>	
		2.250	2.531	0.313	0.438	1.313	99227	
		2.250	2.531	0.781	0.938	1.313	99837 <sup>2)</sup>	
		2.250	2.531	0.781	0.938	1.313	99225	
2.280	2.286	2.283	2.598	0.787	0.938	1.375	99219	
2.309	2.315	2.313	2.688	0.781	0.938	1.375	99231	
2.327	2.333	2.328	2.750	0.750	0.875	1.500	99233	
2.359	2.365	2.362	2.785	0.370	0.450	1.471	99241	
		2.362	2.785	0.787	0.905	1.375	99869 <sup>2)</sup>	
		2.362	2.785	0.787	0.905	1.375	99235	
2.372	2.378	2.375	2.750	0.594	0.750	1.375	99238	
2.374	2.380	2.375	2.750	0.526	0.683	1.375	99240	
		2.375	2.750	0.781	0.938	1.375	99839 <sup>2)</sup>	
		2.375	2.750	0.781	0.938	1.375	99237	
2.434	2.441	2.438	2.828	0.781	0.938	1.393	99243	
		2.441	2.828	0.500	0.625	1.425	99244	
2.435	2.441	2.438	2.828	0.500	0.625	1.425	99242	
2.489	2.495	2.492	2.875	0.781	0.938	1.393	99249	
2.497	2.503	2.500	2.820	0.555	0.650	0.890	99253	
2.500	2.506	2.500	2.828	0.500	0.656	1.393	99248	
		2.500	2.820	0.781	0.938	1.375	99840 <sup>2)</sup>	
		2.500	2.820	0.781	0.938	1.375	99250	
2.510	2.516	2.516	2.828	0.781	0.906	1.438	99251	
2.556	2.562	2.559	2.850	0.787	0.905	1.375	99841 <sup>2)</sup>	
		2.559	2.850	0.787	0.905	1.375	99254	
2.560	2.566	2.563	2.891	0.781	0.938	1.375	99256	
2.595	2.601	2.598	2.990	0.781	0.938	1.250	99259	
2.618	2.624	2.621	3.047	0.781	0.938	1.375	99261	

<sup>1)</sup> Possible max. distance of the rear groove from the shaft end when the installation tool supplied with the sleeve is used

<sup>2)</sup> SKF Speedi-Sleeve Gold



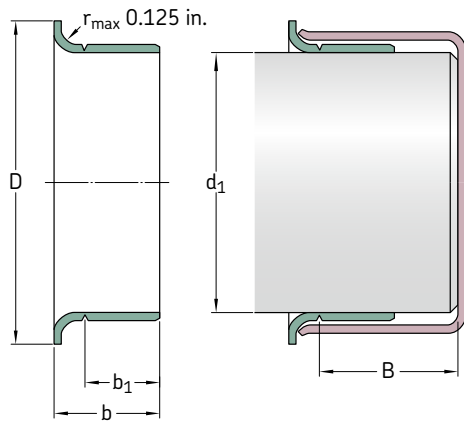
Shaft diameter range		Nominal dimensions					Designation
d <sub>1</sub> min.	max.	d <sub>1</sub>	D ±0.063	b <sub>1</sub> ±0.031	b ±0.031	B <sup>1)</sup>	
in		in					–
2.621	2.627	2.625	3.047	0.781	0.906	1.375	99264
2.622	2.628	2.625	3.047	0.500	0.625	1.375	99260
2.625	2.631	2.625	3.047	0.781	0.938	1.375	99842 <sup>2)</sup>
		2.625	3.047	0.781	0.938	1.375	99262
2.670	2.677	2.677	3.125	0.750	0.875	1.688	99266
2.727	2.733	2.730	3.125	0.781	0.906	1.313	99268
2.740	2.746	2.743	3.065	0.781	0.938	1.250	99273
2.745	2.751	2.750	3.125	0.781	0.938	1.250	99843 <sup>2)</sup>
		2.750	3.125	0.781	0.938	1.250	99274
2.747	2.753	2.750	3.075	1.438	1.625	1.625	99267
2.750	2.756	2.750	3.125	0.406	0.563	1.250	99272
		2.750	3.125	0.781	0.938	1.250	99844 <sup>2)</sup>
		2.750	3.125	0.781	0.938	1.250	99275
		2.750	3.125	1.125	1.250	1.312	99269
2.753	2.759	2.756	3.125	0.787	0.945	1.250	99276
2.809	2.815	2.813	3.188	0.594	0.688	1.250	99281
2.828	2.835	2.835	3.225	0.750	0.875	1.343	99870 <sup>2)</sup>
		2.835	3.225	0.750	0.875	1.343	99284
2.838	2.844	2.838	3.225	0.500	0.656	1.250	99845 <sup>2)</sup>
		2.838	3.225	0.500	0.656	1.250	99282
2.866	2.872	2.869	3.188	0.781	0.938	1.250	99286
2.873	2.879	2.875	3.219	0.781	0.938	1.250	99846 <sup>2)</sup>
		2.875	3.219	0.781	0.938	1.250	99287
2.937	2.943	2.938	3.344	0.500	0.641	1.331	99290
		2.938	3.344	0.781	0.938	1.313	99847 <sup>2)</sup>
		2.940	3.344	0.781	0.938	1.313	99293
2.950	2.956	2.953	3.273	0.594	0.690	1.083	99289
		2.953	3.305	0.866	1.024	1.313	99875 <sup>2)</sup>
		2.953	3.305	0.866	1.024	1.313	99294
2.972	2.976	2.974	3.235	0.813	1.000	1.250	99292
2.990	2.996	2.993	3.359	0.484	0.625	1.331	99291
		2.993	3.359	0.563	0.688	1.375	99298
		2.993	3.350	0.813	1.000	1.281	99299
2.997	3.003	3.000	3.240	0.813	0.938	1.375	99296
3.000	3.006	3.000	3.345	0.625	0.813	1.280	99048
		3.000	3.235	0.813	1.000	1.281	99848 <sup>2)</sup>
		3.000	3.235	0.813	1.000	1.281	99300
3.008	3.014	3.011	3.355	0.500	0.625	2.000	99301
3.064	3.071	3.071	3.468	0.750	0.875	2.056	99306
3.120	3.126	3.125	3.531	0.688	0.813	2.000	99311
		3.125	3.531	0.813	1.000	2.000	99849 <sup>2)</sup>
		3.125	3.531	0.813	1.000	2.000	99312
3.124	3.132	3.125	3.525	0.551	0.709	2.031	99053
3.142	3.150	3.150	3.540	0.750	0.886	1.375	99313

1) Possible max. distance of the rear groove from the shaft end when the installation tool supplied with the sleeve is used

2) SKF Speedi-Sleeve Gold

Wear sleeves | SKF Speedi-Sleeve – inch dimensions

d<sub>1</sub> 3.146–4.693



All sleeves listed in the product table can be manufactured as both standard and Gold version.

Shaft diameter range		Nominal dimensions					Designation	
d <sub>1</sub> min.	max.	d <sub>1</sub>	D ±0.063	b <sub>1</sub> ±0.031	b ±0.031	B <sup>1)</sup>		
in		in						–
3.146	3.153	3.150	3.543	0.433	0.591	1.375	99317	
		3.150	3.543	0.827	0.945	1.375	99315	
3.225	3.231	3.228	3.585	0.660	0.848	1.750	99328	
3.247	3.253	3.250	3.594	0.813	1.000	1.375	99322	
3.250	3.256	3.250	3.575	0.595	0.719	1.375	99850 <sup>2)</sup>	
		3.250	3.575	0.595	0.719	1.375	99324	
		3.250	3.585	0.688	0.875	1.250	99326	
		3.250	3.585	0.813	1.000	1.375	99851 <sup>2)</sup>	
		3.250	3.585	0.813	1.000	1.375	99325	
3.307	3.313	3.310	3.688	0.813	1.000	1.375	99331	
3.337	3.347	3.342	3.700	0.669	0.827	1.378	99332	
		3.342	3.700	0.827	0.984	1.378	99872 <sup>2)</sup>	
		3.342	3.700	0.827	0.984	1.378	99333	
3.338	3.347	3.347	3.580	0.399	0.499	1.431	99334	
3.373	3.379	3.375	3.688	0.375	0.500	1.410	99338	
		3.375	3.695	0.813	1.000	1.375	99337	
3.435	3.441	3.438	3.844	0.781	0.906	1.406	99339	
3.457	3.465	3.465	3.751	1.150	1.349	1.673	99481	
3.477	3.483	3.480	3.835	0.781	0.906	1.406	99340	
3.497	3.503	3.500	3.844	0.625	0.813	1.347	99346	
3.500	3.506	3.500	3.825	0.313	0.500	1.347	99347	
		3.500	3.844	0.813	1.000	1.347	99852 <sup>2)</sup>	
		3.500	3.844	0.813	1.000	1.347	99350	
3.501	3.507	3.504	3.844	0.625	0.813	1.348	99349	
3.540	3.546	3.543	4.000	0.438	0.538	1.813	99352	
		3.543	4.000	0.526	0.667	1.750	99353	
		3.543	4.000	0.710	0.906	1.813	99351	
		3.543	4.000	0.906	1.102	1.750	99354	
3.560	3.566	3.563	3.900	0.813	1.000	1.750	99356	

<sup>1)</sup> Possible max. distance of the rear groove from the shaft end when the installation tool supplied with the sleeve is used

<sup>2)</sup> SKF Speedi-Sleeve Gold

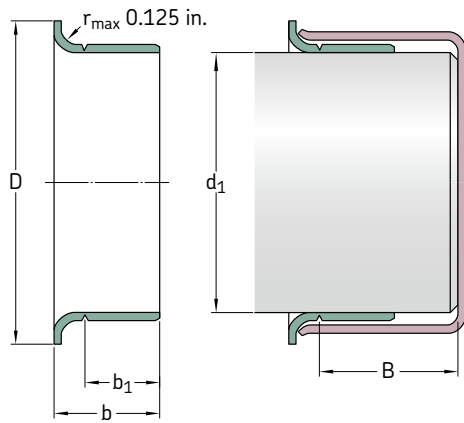
Shaft diameter range		Nominal dimensions					Designation
d <sub>1</sub> min.	max.	d <sub>1</sub>	D ±0.063	b <sub>1</sub> ±0.031	b ±0.031	B <sup>1)</sup>	
in		in					–
3.618	3.624	3.621	4.031	0.813	1.000	1.750	99360
3.623	3.629	3.625 3.625	4.025 4.031	0.500 0.813	0.625 1.000	1.750 1.750	99363 99362
3.684	3.690	3.688	4.031	0.313	0.438	0.875	99368
3.685	3.691	3.688	4.025	0.813	0.938	1.800	99365
3.727	3.733	3.730 3.730	4.016 4.025	0.469 0.781	0.594 0.906	1.800 1.800	99359 99366
3.737	3.743	3.740	4.025	0.827	0.945	1.800	99369
3.740	3.746	3.743 3.743	4.031 4.035	0.344 0.469	0.500 0.594	1.800 1.800	99374 99364
3.746	3.752	3.749	4.025	0.563	0.688	1.800	99376
3.750	3.756	3.750 3.753 3.753	4.020 4.025 4.020	0.688 0.344 0.688	0.875 0.500 0.875	1.800 1.800 1.800	99853 <sup>2)</sup> 99367 99372
3.868	3.874	3.871	4.185	0.813	1.000	1.875	99386
3.873	3.879	3.875	4.219	0.813	1.000	1.875	99387
3.935	3.941	3.938 3.938	4.313 4.313	0.813 0.813	1.000 1.000	2.050 2.050	99854 <sup>2)</sup> 99393
3.998	4.006	4.000 4.000 4.000 4.000 4.000	4.375 4.375 4.375 4.375 4.375	0.500 0.600 0.650 0.813 0.813	0.625 0.725 0.775 1.000 1.000	2.066 2.050 1.375 2.050 2.050	99401 99395 99400 99855 <sup>2)</sup> 99399
4.090	4.098	4.094	4.438	0.787	0.945	1.417	99409
4.122	4.130	4.125	4.470	0.813	1.000	1.375	99412
4.130	4.138	4.134	4.470	0.787	0.913	1.378	99413
4.183	4.191	4.188	4.500	0.813	1.000	1.375	99418
4.226	4.234	4.234	4.610	0.781	0.906	1.438	99423
4.248	4.256	4.250	4.610	0.813	1.000	1.438	99424
4.322	4.331	4.331	4.921	0.448	0.589	1.297	99434
4.327	4.335	4.328	4.921	0.509	0.650	1.250	99435
4.370	4.378	4.375	4.750	0.813	1.000	1.650	99437
4.401	4.409	4.409	4.750	0.750	0.886	1.300	99438
4.434	4.442	4.438	4.813	1.000	1.142	1.313	99439
4.496	4.504	4.500 4.500	4.850 4.900	0.813 0.813	1.000 1.000	1.250 1.250	99856 <sup>2)</sup> 99450
4.523	4.531	4.528	5.000	0.813	0.938	1.250	99452
4.621	4.629	4.625 4.625	5.000 5.063	0.438 1.000	0.625 1.250	1.375 1.375	99465 99463
4.685	4.693	4.688	5.063	0.813	1.000	1.375	99468

1) Possible max. distance of the rear groove from the shaft end when the installation tool supplied with the sleeve is used

2) SKF Speedi-Sleeve Gold

Wear sleeves | SKF Speedi-Sleeve – inch dimensions

d<sub>1</sub> 4.720–8.005



All sleeves listed in the product table can be manufactured as both standard and Gold version.

Shaft diameter range		Nominal dimensions					Designation	
d <sub>1</sub> min.	max.	d <sub>1</sub>	D ±0.063	b <sub>1</sub> ±0.031	b ±0.031	B <sup>1)</sup>		
in		in						–
4.720	4.728	4.724	5.110	0.315	0.433	1.323	99471	
		4.724	5.110	0.787	0.984	1.260	99473	
4.746	4.754	4.750	5.000	0.500	0.750	1.500	99475	
4.799	4.807	4.803	5.177	0.787	0.945	1.260	99472	
4.839	4.847	4.843	5.229	0.787	0.984	1.244	99484	
4.871	4.879	4.875	5.250	0.625	0.750	1.438	99487	
4.917	4.925	4.921	5.400	0.394	0.551	1.438	99490	
		4.921	5.400	1.024	1.260	1.438	99492	
4.998	5.006	5.000	5.400	0.540	0.681	1.438	99501	
		5.000	5.400	0.688	0.875	1.438	99857 <sup>2)</sup>	
		5.000	5.400	0.688	0.875	1.438	99498	
		5.000	5.390	0.813	1.000	1.438	99858 <sup>2)</sup>	
		5.000	5.390	0.813	1.000	1.438	99499	
5.032	5.039	5.039	5.325	1.150	1.349	1.587	99482	
5.110	5.118	5.114	5.493	0.750	0.938	1.181	99494	
5.117	5.125	5.118	5.493	0.866	0.996	1.280	99874 <sup>2)</sup>	
		5.125	5.493	0.866	0.996	1.280	99491	
5.120	5.128	5.125	5.500	0.813	1.000	1.250	99513	
5.246	5.254	5.250	5.560	0.813	1.000	1.250	99525	
5.307	5.315	5.311	5.735	0.807	1.000	1.250	99533	
5.371	5.379	5.375	5.875	0.813	1.000	1.250	99537	
5.434	5.442	5.438	5.750	1.500	1.688	1.875	99548	
5.472	5.480	5.476	5.900	0.563	0.750	1.234	99547	
5.498	5.506	5.500	5.938	0.518	0.705	1.250	99550	
		5.500	5.938	0.813	1.000	1.250	99859 <sup>2)</sup>	
		5.500	5.938	0.813	1.000	1.250	99549	

<sup>1)</sup> Possible max. distance of the rear groove from the shaft end when the installation tool supplied with the sleeve is used

<sup>2)</sup> SKF Speedi-Sleeve Gold

Shaft diameter range		Nominal dimensions					Designation
d <sub>1</sub> min.	max.	d <sub>1</sub>	D ±0.063	b <sub>1</sub> ±0.031	b ±0.031	B <sup>1)</sup>	
in		in					–
5.508	5.516	5.512	5.945	0.807	1.000	1.250	99552
5.621	5.629	5.625	6.188	0.875	1.000	1.812	99560
5.699	5.709	5.709	6.100	0.750	0.875	1.812	99571
5.726	5.734	5.734	6.100	0.563	0.750	1.938	99562
5.746	5.754	5.750	6.180	0.813	1.000	1.750	99575
5.871	5.879	5.875 5.875	6.188 6.188	1.000 1.000	1.250 1.250	1.313 1.313	99862 <sup>2)</sup> 99587
5.896	5.906	5.905	6.260	1.024	1.181	1.280	99595
5.934	5.942	5.938	6.375	1.000	1.125	1.875	99596
5.995	6.003	6.000 6.000	6.360 6.375	0.500 1.000	0.750 1.250	1.750 1.750	99601 99599
6.058	6.068	6.063	6.375	1.024	1.181	1.299	99605
6.092	6.102	6.097	6.575	1.024	1.181	1.299	99606
6.198	6.208	6.203	6.625	0.813	1.063	1.750	99620
6.245	6.255	6.250	6.625	1.031	1.250	1.750	99625
6.289	6.299	6.299	6.750	1.000	1.250	1.375	99630
6.495	6.505	6.500	7.000	1.000	1.250	1.375	99650
6.683	6.693	6.688	7.188	1.250	1.496	1.750	99640
6.745	6.755	6.750	7.125	0.813	1.063	1.750	99675
6.880	6.890	6.890	7.362	1.102	1.260	1.378	99687
6.995	7.005	7.000 7.000	7.475 7.475	1.000 1.000	1.250 1.250	1.688 1.688	99864 <sup>2)</sup> 99700
7.077	7.087	7.087	7.500	1.299	1.496	1.752	99721
7.244	7.254	7.250	7.760	1.250	1.500	2.175	99725
7.273	7.283	7.278	7.760	1.260	1.496	2.165	99726
7.444	7.454	7.453	7.860	0.813	1.000	1.250	99745
7.495	7.505	7.500	7.875	0.813	1.000	1.250	99750
7.745	7.755	7.750	8.270	1.000	1.313	1.875	99775
7.869	7.879	7.875	8.375	1.359	1.500	1.750	99787
7.933	7.943	7.938	8.375	1.000	1.250	1.750	99799
7.995	8.005	8.000	8.375	1.000	1.250	1.750	99800

<sup>1)</sup> Possible max. distance of the rear groove from the shaft end when the installation tool supplied with the sleeve is used

<sup>2)</sup> SKF Speedi-Sleeve Gold



## Wear sleeves for heavy industrial applications (LDSL)



**1**  
SINGLE  
PIECE ORDER  
POSSIBLE!



**Wear sleeves for heavy industrial applications (LDSLVS)**

- > Minimal downtime
- > Flexible in dimensions

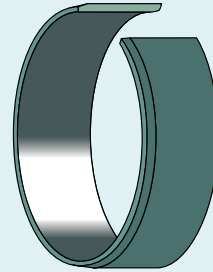


# Wear sleeves for heavy industrial applications (LDSL4) – general

SKF wear sleeves for heavy applications are available in a range of sizes. Within this range, LDSLV4 in customized dimensions are created as required without any new tooling. In addition, the minimum order quantity is just one sleeve, enabling a flexible solution for any heavy duty application, no matter how big or small the job. Contact your SKF sales representative for additional information.

Table 1

LDSL4 is flexible in size within the range



Shaft range over		incl.		Width <sup>1)</sup> min.		max.	
mm	in	mm	in	mm	in	mm	in
<b>211,15</b>	8.313	736,60	29.000	12,70	0.500	63,50	2.500
<b>736,60</b>	29.000	1 143,00	45.000	19,05	0.750	63,50	2.500

<sup>1)</sup> Total width (b), 38,10 to 50,80 mm (1.5 to 2 in) at 1 143,00 mm (45 in) shaft diameter

Contact SKF for LDSLV4 designs outside the primary size range.



## Designs and features

SKF wear sleeves for heavy industrial applications are available in the LDSLV4 design (→ **fig. 1**) made of SAE 1008 chromium-plated carbon steel to enhance wear and corrosion resistance. Other sleeve materials can be provided to meet the application's specific demands. The sleeve outside diameter is specially ground to provide a precision counterface surface for the seal. The wall thickness of the standard sleeves is 2,39 mm (0.094 in).

SKF wear sleeves for heavy applications are available in a range of sizes. Within this range, LDSLV4 in customized dimensions are created as required without any new tooling. In addition, the minimum order quantity is just one sleeve, enabling a flexible solution for any heavy duty application, no matter how big or small the job. Contact your SKF sales representative for additional information.

## Using LDSLV designs

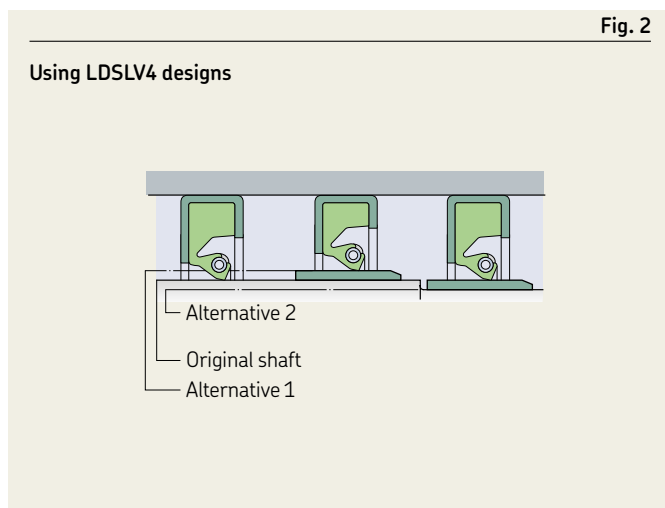
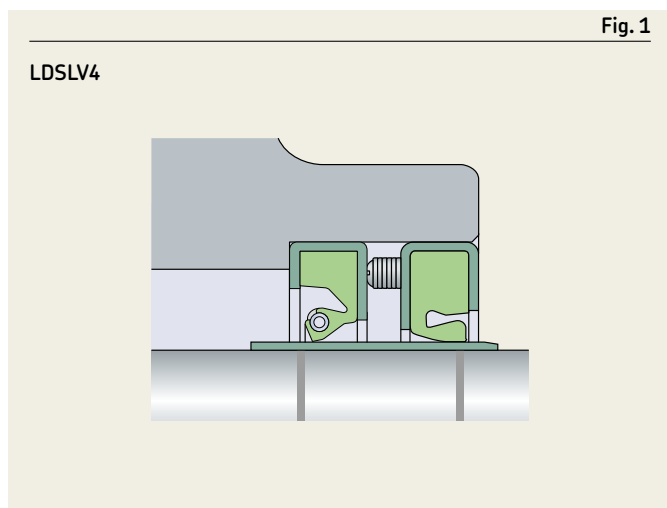
There are two alternative ways of using SKF wear sleeves for heavy industrial applications (→ **fig. 2 and table 2 on page 266**):

- 1 The sleeve is positioned on the shaft until it covers the damaged part and a new seal, designed for a 4,78 mm (0.188 in) larger shaft diameter, is used.
- 2 The shaft is machined down by 4,78 mm (0.188 in) in diameter, the sleeve is installed and the original seal size is used.

The reworked shaft surface for the sleeve should have a surface roughness between  $R_a$  2,5 and 3,2  $\mu\text{m}$  (100 to 125  $\mu\text{in}$ )

### NOTE

The shaft tolerances for LDSLV designs, due to their heated slip-fit installation, are different from those for radial shaft seals. Contact SKF for assistance if the sleeves are to be used in systems with sustained temperatures higher than 75 °C (165 °F) and surface speeds in excess of 20 m/s (3 900 ft/min).



## Installation

SKF wear sleeves for heavy industrial applications are designed for a heated slip-fit installation and must therefore be **uniformly heated** prior to installation. The sleeve temperature should be approximately 180 °C (355 °F). Under no circumstances should the sleeve be heated to above 200 °C (390 °F). Any heating techniques normally used for bearings are suitable, such as induction heaters or heating cabinets.

The sleeves should be installed immediately after heating since they cool rapidly and could seize on the shaft before the correct position is achieved. If repositioning is necessary, use a soft faced hammer and a wooden block. After the sleeve is in the desired position, check the lead-in chamfer for any damage during installation.

## Removal

The wear sleeves can be removed either by heating them or expanding them by light hammer blows.

Table 2

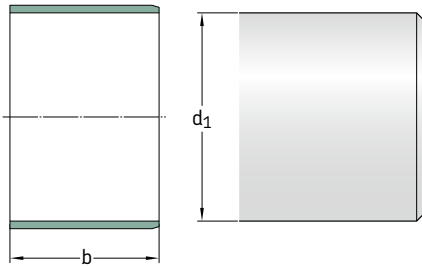
### Installation

**Option I:** No shaft machining is required. However, a seal designed for a nominal shaft size (4.8 mm (0.188 in) larger than the original needs to be used. SKF's broad size coverage and wide range of shaft / bore combinations for large diameter seals makes this the most popular installation method.

**Option II:** Before installation, the shaft needs to be machined to 4,8 mm (0.188 in) below its original diameter and finished to 10–125 micro-inches  $R_a$  (arithmetic average), to allow use of the same sized original seal. This method enables to keep the same seal size and designation and does not increase the need for additional seal inventories.

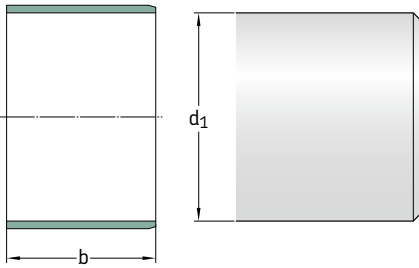
Shaft Diameter	Tolerance	Sleeve (metal I.D.)	
		Nominal press fit	I.D. tolerance
up to 50,8 mm (up to 2.000 in)	±0,025 mm (±0.001 in)	0,127 mm (0.005 in)	0,051 mm (0.002 in)
50,8 to 76,2 mm (2.001 to 3.000 in)	±0,025 mm (±0.001 in)	0,127 mm (0.005 in)	+0,051 mm –0,076 mm (+0.002 in –0.003 in)
76,2 to 127 mm (3.001 to 5.000 in)	±0,038 mm (±0.0015 in)	0,127 mm (0.005 in)	+0,051 mm –0,102 mm (+0.002 in –0.004 in)
127 to 177,8 mm (5.001 to 7.000 in)	±0,038 mm (±0.0015 in)	0,152 mm (0.006 in)	+0,051 mm –0,102 mm (+0.002 in –0.004 in)
177,8 to 304,8 mm (7.001 to 12.000 in)	±0,051 mm (±0.002 in)	0,178 mm (0.007 in)	+0,051 mm –0,127 mm (+0.002 in –0.005 in)
304,8 to 508 mm (12.001 to 20.000 in)	+0,102 mm –0,051 mm (+0.004 in –0.002 in)	0,203 mm (0.008 in)	+0,051 mm –0,203 mm (+0.007 in –0.008 in)
508 to 1 016 mm (20.001 to 40.000 in)	+0,203 mm –0,051 mm (+0.008 in –0.002 in)	0,203 mm (0.008 in)	+0,051 mm –0,203 mm (+0.007 in –0.008 in)
1 016 to 1 524 mm (40.001 to 60.000 in)	+0,254 mm –0,051 mm (+0.010 in –0.002 in)	0,203 mm (0.008 in)	+0,081 mm –0,254 mm (+0.002 in –0.010 in)

Note: Please contact SKF for recommendations concerning large diameter wear sleeves that will operate in systems with sustained oil sump temperatures higher than 76,7 °C (170 °F) and surface speed exceeding 20 m/s (3 950 ft/min).



Shaft diameter	Sleeve width	Reference sleeve installed outside diameter	Design	Designation	Shaft diameter	Sleeve width	Reference sleeve installed outside diameter	Design	Designation
d <sub>1</sub>	b				d <sub>1</sub>	b			
mm	mm	mm	–	–	mm	mm	mm	–	–
235,23	18	240	LDSL4	90952	503,25	24	508	LDSL4	90149
240,21	44	245	LDSL4	87911	530,00	20	535	LDSL4	87783
275,00	22	280	LDSL4	90546	535,23	63	540	LDSL4	90802
280,00	45	285	LDSL4	90437	555,20	63,50	560	LDSL4	90075
285,22	63,50	290	LDSL4	90238	575,23	63,50	580	LDSL4	90951
315,19	63,50	320	LDSL4	90155	585,22	55	590	LDSL4	90292
320,00	63,50	325	LDSL4	90198	595,20	63,50	600	LDSL4	89997
325,22	63,50	330	LDSL4	90239	645,20	64	650	LDSL4	90004
335,22	39	340	LDSL4	90777	665,20	45	670	LDSL4	90799
	50	340	LDSL4	90792	685,22	63,50	690	LDSL4	90953
340,00	18	340	LDSL4	87901	714,81	50	720	LDSL4	87820
	50	340	LDSL4	90801	735,23	63	740	LDSL4	89949
355,20	25,40	360	LDSL4	90778	865,23	63,50	870	LDSL4	90221
	50	360	LDSL4	90785	875,18	63,50	880	LDSL4	90103
360,00	44	365	LDSL4	87500	1015,20	25	1020	LDSL4	90786
360,22	45	365	LDSL4	90788	1049,33	60	1054	LDSL4	89947
365,20	20	370	LDSL4	87531	1100,23	63	1105	LDSL4	89946
395,22	63,50	400	LDSL4	87461					
405,23	50	410	LDSL4	90042					
435,20	63,50	440	LDSL4	87916					
455,00	30	460	LDSL4	90347					
455,20	50	460	LDSL4	87504					
475,18	20	480	LDSL4	87921					
494,44	24	500	LDSL4	90259					
495,20	30	500	LDSL4	87503					

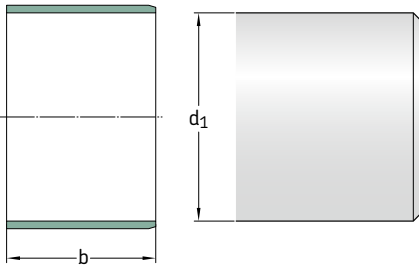
Wear sleeves | Wear sleeves for heavy industrial applications (LDSL4) – LDSLV4 – inch dimensions  
d<sub>1</sub> 8.313–16.812



Shaft diameter	Sleeve width	Reference sleeve installed outside diameter	Design	Designation	Shaft diameter	Sleeve width	Reference sleeve installed outside diameter	Design	Designation
d <sub>1</sub>	b				d <sub>1</sub>	b			
in/mm	in/mm	in/mm	–	–	in/mm	in/mm	in/mm	–	–
<b>8.313</b> 211,15	1.250 31,75	8.501 215,93	LDSL4	<b>85885</b>	<b>9.563</b> 242,90	1.000 25,40	9.751 247,68	LDSL4	<b>85073</b>
<b>8.353</b> 212,17	1.500 38,10	8.541 216,94	LDSL4	<b>86907</b>		2.000 50,80	9.751 247,68	LDSL4	<b>85397</b>
<b>8.661</b> 220,00	1.000 25,40	8.849 224,76	LDSL4	<b>87319</b>	<b>9.750</b> 247,65	1.438 36,53	9.938 252,43	LDSL4	<b>84965</b>
<b>8.812</b> 223,82	2.000 50,80	9.000 228,60	LDSL4	<b>86551</b>		2.250 57,15	9.938 252,43	LDSL4	<b>85045</b>
<b>8.866</b> 225,20	2.500 63,50	9.054 229,97	LDSL4	<b>87166</b>	<b>9.813</b> 249,25	1.125 28,58	10.001 254,03	LDSL4	<b>86413</b>
<b>8.867</b> 225,22	1.000 25,40	9.055 230,00	LDSL4	<b>87462</b>	<b>9.835</b> 249,81	1.575 40,01	10.023 254,58	LDSL4	<b>90773</b>
<b>8.875</b> 225,43	1.250 31,75	9.063 230,20	LDSL4	<b>87526</b>	<b>10.063</b> 255,60	2.250 57,15	10.251 260,38	LDSL4	<b>86000</b>
<b>8.938</b> 227,03	2.500 63,50	9.126 231,80	LDSL4	<b>86546</b>	<b>10.188</b> 258,78	1.125 28,58	10.376 263,55	LDSL4	<b>84962</b>
<b>9.063</b> 230,20	1.500 38,10	9.251 234,98	LDSL4	<b>85931</b>	<b>10.313</b> 261,95	2.000 50,80	10.501 266,73	LDSL4	<b>85629</b>
<b>9.125</b> 231,78	1.000 25,40	9.313 236,55	LDSL4	<b>86547</b>	<b>10.441</b> 265,20	2.165 54,99	10.629 269,98	LDSL4	<b>86798</b>
	1.500 38,10	9.313 236,55	LDSL4	<b>90130</b>	<b>10.500</b> 266,70	2.750 69,85	10.688 271,48	LDSL4	<b>86013</b>
<b>9.250</b> 234,95	0.875 22,23	9.438 239,73	LDSL4	<b>84643</b>	<b>10.557</b> 268,15	2.250 57,15	10.745 272,92	LDSL4	<b>85491</b>
<b>9.260</b> 235,20	1.102 27,99	9.448 239,98	LDSL4	<b>87789</b>	<b>10.562</b> 268,27	0.984 24,99	10.750 273,05	LDSL4	<b>90800</b>
<b>9.449</b> 240,00	1.181 30,00	9.637 244,78	LDSL4	<b>87144</b>		1.750 44,45	10.750 273,05	LDSL4	<b>86468</b>
<b>9.500</b> 241,30	2.500 63,50	9.688 246,08	LDSL4	<b>86562</b>		1.813 46,05	10.750 273,05	LDSL4	<b>86544</b>
					<b>10.563</b> 268,30	1.500 38,10	10.751 273,08	LDSL4	<b>87768</b>
					<b>10.750</b> 273,05	2.500 63,50	10.938 277,83	LDSL4	<b>86435</b>

Shaft diameter	Sleeve width	Reference sleeve installed outside diameter	Design	Designation	Shaft diameter	Sleeve width	Reference sleeve installed outside diameter	Design	Designation
$d_1$	b				$d_1$	b			
in/mm	in/mm	in/mm	–	–	in/mm	in/mm	in/mm	–	–
<b>10.813</b> 274,65	2.000 50,80	11.001 279,43	LDSL4	<b>85033</b>	<b>12.750</b> 323,85	0.688 17,48	12.938 328,63	LDSL4	<b>87513</b>
<b>10.846</b> 275,49	0.709 18,01	11.034 280,26	LDSL4	<b>86601</b>	<b>12.813</b> 325,45	1.000 25,40	13.001 330,23	LDSL4	<b>86258</b>
<b>10.875</b> 276,23	2.000 50,80	11.063 281,00	LDSL4	<b>84510</b>		1.375 34,93	13.001 330,23	LDSL4	<b>84263</b>
<b>11.000</b> 279,40	1.500 38,10	11.188 284,18	LDSL4	<b>86486</b>		2.500 63,50	13.001 330,23	LDSL4	<b>86722</b>
	2.500 63,50	11.188 284,18	LDSL4	<b>86454</b>	<b>13.000</b> 330,20	1.750 44,45	13.188 334,98	LDSL4	<b>85535</b>
<b>11.024</b> 280,00	1.181 30,00	11.212 284,78	LDSL4	<b>87142</b>	<b>13.063</b> 331,80	1.125 28,58	13.251 336,53	LDSL4	<b>84963</b>
<b>11.031</b> 280,19	1.260 32,00	11.219 284,96	LDSL4	<b>87525</b>	<b>13.313</b> 338,15	0.813 20,65	13.501 342,93	LDSL4	<b>86688</b>
<b>11.062</b> 280,97	1.750 44,45	11.250 285,75	LDSL4	<b>85469</b>		1.500 38,10	13.501 342,93	LDSL4	<b>87463</b>
<b>11.187</b> 284,15	1.250 31,75	11.375 288,93	LDSL4	<b>86269</b>	<b>13.813</b> 350,85	2.000 50,80	14.001 355,63	LDSL4	<b>85179</b>
<b>11.188</b> 284,18	2.250 57,15	11.376 288,95	LDSL4	<b>85212</b>	<b>14.173</b> 359,99	1.000 25,40	14.361 364,77	LDSL4	<b>87445</b>
<b>11.190</b> 284,23	2.250 57,15	11.378 289,00	LDSL4	<b>87566</b>	<b>14.313</b> 363,55	1.500 38,10	14.501 368,33	LDSL4	<b>86429</b>
<b>11.313</b> 287,35	1.500 38,10	11.501 292,13	LDSL4	<b>84094</b>	<b>14.500</b> 368,30	1.000 25,40	14.688 373,08	LDSL4	<b>85914</b>
<b>11.375</b> 288,93	2.250 57,15	11.563 293,70	LDSL4	<b>86145</b>	<b>14.813</b> 376,25	1.500 38,10	15.001 381,03	LDSL4	<b>87723</b>
<b>11.417</b> 290,00	1.750 44,45	11.605 294,77	LDSL4	<b>86441</b>	<b>15.000</b> 381,00	1.000 25,40	15.188 385,78	LDSL4	<b>87247</b>
<b>11.500</b> 292,10	0.750 19,05	11.688 296,88	LDSL4	<b>90761</b>	<b>15.062</b> 382,57	0.750 19,05	15.250 387,35	LDSL4	<b>90272</b>
<b>11.562</b> 293,67	1.000 25,40	11.750 298,45	LDSL4	<b>90333</b>	<b>15.188</b> 385,78	2.500 63,50	15.376 390,55	LDSL4	<b>87569</b>
<b>11.812</b> 300,02	1.125 28,58	12.000 304,80	LDSL4	<b>86687</b>	<b>15.560</b> 395,22	0.906 23,01	15.748 400,00	LDSL4	<b>85582</b>
<b>11.813</b> 300,05	1.500 38,10	12.001 304,83	LDSL4	<b>85979</b>	<b>15.813</b> 401,65	2.000 50,80	16.001 406,43	LDSL4	<b>85181</b>
	2.750 69,85	12.001 304,83	LDSL4	<b>85844</b>		2.500 63,50	16.001 406,43	LDSL4	<b>86407</b>
<b>11.969</b> 304,00	0.709 18,00	12.157 308,79	LDSL4	<b>86600</b>	<b>16.063</b> 408,00	0.500 12,70	16.251 412,78	LDSL4	<b>87613</b>
<b>12.000</b> 304,80	2.250 57,15	12.188 309,58	LDSL4	<b>85577</b>		1.250 31,75	16.251 412,78	LDSL4	<b>86175</b>
<b>12.063</b> 306,40	0.625 15,88	12.251 311,18	LDSL4	<b>85418</b>		1.300 33,02	16.251 412,78	LDSL4	<b>86426</b>
<b>12.312</b> 312,72	1.500 38,10	12.500 317,50	LDSL4	<b>90174</b>		2.000 50,80	16.251 412,78	LDSL4	<b>86575</b>
<b>12.313</b> 312,75	0.750 19,05	12.501 317,53	LDSL4	<b>83760</b>	<b>16.313</b> 414,35	2.000 50,80	16.501 419,13	LDSL4	<b>84697</b>
					<b>16.750</b> 425,45	1.500 38,10	16.938 430,23	LDSL4	<b>87585</b>
					<b>16.812</b> 427,02	1.000 25,40	17.000 431,80	LDSL4	<b>86737</b>

Wear sleeves | Wear sleeves for heavy industrial applications (LDSL4) – LDSLV4 – inch dimensions  
d<sub>1</sub> 16.813–42.500



Shaft diameter	Sleeve width	Reference sleeve installed outside diameter	Design	Designation	Shaft diameter	Sleeve width	Reference sleeve installed outside diameter	Design	Designation
d <sub>1</sub>	b				d <sub>1</sub>	b			
in/mm	in/mm	in/mm	–	–	in/mm	in/mm	in/mm	–	–
<b>16.813</b> 427,05	2.250 57,15	17.001 431,83	LDSL4	<b>84616</b>	<b>19.500</b> 495,30	1.250 31,75	19.688 500,08	LDSL4	<b>90769</b>
<b>17.250</b> 438,15	1.000 25,40	17.438 442,93	LDSL4	<b>90779</b>	<b>19.563</b> 496,90	2.750 69,85	19.751 501,68	LDSL4	<b>85654</b>
	2.000 50,80	17.438 442,93	LDSL4	<b>84576</b>	<b>19.813</b> 503,25	1.250 31,75	20.001 508,03	LDSL4	<b>84781</b>
<b>17.313</b> 439,75	1.500 38,10	17.501 444,53	LDSL4	<b>86430</b>	<b>20.312</b> 515,92	1.000 25,40	20.500 520,70	LDSL4	<b>86739</b>
<b>17.449</b> 443,20	2.000 50,80	17.637 447,98	LDSL4	<b>85762</b>	<b>20.813</b> 528,65	2.125 53,98	21.001 533,43	LDSL4	<b>85367</b>
<b>17.500</b> 444,50	1.250 31,75	17.688 449,28	LDSL4	<b>90770</b>		2.500 63,50	21.001 533,43	LDSL4	<b>87298</b>
<b>17.543</b> 445,59	2.362 59,99	17.731 450,37	LDSL4	<b>86799</b>	<b>20.865</b> 529,97	2.250 57,15	21.053 534,75	LDSL4	<b>90805</b>
<b>17.750</b> 450,85	1.250 31,75	17.938 455,63	LDSL4	<b>90774</b>	<b>21.000</b> 533,40	2.250 57,15	21.188 538,18	LDSL4	<b>87090</b>
<b>17.812</b> 452,42	2.125 53,98	18.000 457,20	LDSL4	<b>87271</b>	<b>21.803</b> 553,80	2.362 59,99	21.991 558,57	LDSL4	<b>87069</b>
<b>18.163</b> 461,34	2.000 50,80	18.351 466,12	LDSL4	<b>86343</b>	<b>21.813</b> 554,05	2.250 57,15	22.001 558,83	LDSL4	<b>84590</b>
<b>18.312</b> 465,12	1.191 30,25	18.500 469,90	LDSL4	<b>90790</b>	<b>22.303</b> 566,50	2.362 59,99	22.491 571,27	LDSL4	<b>87070</b>
<b>18.813</b> 477,85	1.750 44,45	19.001 482,63	LDSL4	<b>86563</b>	<b>22.313</b> 566,75	1.250 31,75	22.501 571,53	LDSL4	<b>85907</b>
	2.250 57,15	19.001 482,63	LDSL4	<b>87015</b>	<b>22.812</b> 579,42	2.000 50,80	23.000 584,20	LDSL4	<b>90163</b>
	2.500 63,50	19.001 482,63	LDSL4	<b>86716</b>	<b>23.000</b> 584,20	2.000 50,80	23.188 588,98	LDSL4	<b>90146</b>
<b>19.496</b> 495,20	2.362 59,99	19.684 499,97	LDSL4	<b>87631</b>	<b>23.434</b> 595,22	0.984 24,99	23.622 600,00	LDSL4	<b>87777</b>
<b>19.497</b> 495,22	1.575 40,01	19.685 500,00	LDSL4	<b>87785</b>	<b>23.687</b> 601,65	1.950 49,53	23.875 606,43	LDSL4	<b>87907</b>

Shaft diameter	Sleeve width	Reference sleeve installed outside diameter	Design	Designation	Shaft diameter	Sleeve width	Reference sleeve installed outside diameter	Design	Designation
$d_1$	b				$d_1$	b			
in/mm	in/mm	in/mm	–	–	in/mm	in/mm	in/mm	–	–
<b>23.812</b> 604,82	0.750 19,05	24.000 609,60	LDSL4	<b>87922</b>	<b>36.375</b> 923,93	2.500 63,50	36.563 928,70	LDSL4	<b>86111</b>
	2.500 63,50	24.000 609,60	LDSL4	<b>87960</b>	<b>36.813</b> 935,05	2.500 63,50	37.001 939,83	LDSL4	<b>86458</b>
<b>25.000</b> 635,00	2.500 63,50	25.188 639,78	LDSL4	<b>86567</b>	<b>37.813</b> 960,45	1.500 38,10	38.001 965,23	LDSL4	<b>86973</b>
<b>25.312</b> 642,92	2.000 50,80	25.500 647,70	LDSL4	<b>86091</b>	<b>38.000</b> 965,20	1.500 38,10	38.188 969,98	LDSL4	<b>86840</b>
<b>25.313</b> 642,95	2.500 63,50	25.501 647,73	LDSL4	<b>87802</b>	<b>38.500</b> 977,90	1.500 38,10	38.688 982,68	LDSL4	<b>81753</b>
<b>26.312</b> 668,32	1.375 34,93	26.500 673,10	LDSL4	<b>90809</b>	<b>38.813</b> 985,85	2.125 53,98	39.001 990,63	LDSL4	<b>85123</b>
<b>26.813</b> 681,05	1.250 31,75	27.001 685,83	LDSL4	<b>85384</b>	<b>39.813</b> 1011,25	2.125 53,98	40.001 1016,03	LDSL4	<b>81826</b>
	2.250 57,15	27.001 685,83	LDSL4	<b>85531</b>	<b>41.312</b> 1049,32	1.968 49,99	41.500 1054,10	LDSL4	<b>89948</b>
<b>27.000</b> 685,80	2.000 50,80	27.188 690,58	LDSL4	<b>86841</b>	<b>42.063</b> 1068,40	2.125 53,98	42.251 1073,18	LDSL4	<b>85038</b>
<b>27.063</b> 687,40	2.250 57,15	27.251 692,18	LDSL4	<b>84764</b>	<b>42.125</b> 1069,98	2.125 53,98	42.313 1074,75	LDSL4	<b>87054</b>
<b>27.313</b> 693,75	2.250 57,15	27.501 698,53	LDSL4	<b>91331</b>	<b>42.312</b> 1074,72	1.250 31,75	42.500 1079,50	LDSL4	<b>87379</b>
<b>27.500</b> 698,50	2.250 57,15	27.688 703,28	LDSL4	<b>84711</b>	<b>42.500</b> 1079,50	1.250 31,75	42.688 1084,28	LDSL4	<b>87392</b>
<b>27.812</b> 706,42	2.500 63,50	28.000 711,20	LDSL4	<b>87421</b>					
<b>28.813</b> 731,85	2.250 57,15	29.001 736,63	LDSL4	<b>84641</b>					
<b>29.813</b> 757,25	2.250 57,15	30.001 762,03	LDSL4	<b>84642</b>					
<b>30.309</b> 769,85	1.375 34,93	30.497 774,62	LDSL4	<b>87530</b>					
<b>30.813</b> 782,65	2.000 50,80	31.001 787,43	LDSL4	<b>85039</b>					
<b>31.812</b> 808,02	2.500 63,50	32.000 812,80	LDSL4	<b>90810</b>					
<b>32.313</b> 820,75	2.000 50,80	32.501 825,53	LDSL4	<b>86090</b>					
<b>32.812</b> 833,42	2.220 56,39	33.000 838,20	LDSL4	<b>87850</b>					
<b>33.313</b> 846,15	2.625 66,68	33.501 850,93	LDSL4	<b>84730</b>					
<b>34.312</b> 871,52	1.750 44,45	34.500 876,30	LDSL4	<b>87529</b>					
<b>35.313</b> 896,95	2.500 63,50	35.501 901,73	LDSL4	<b>85814</b>					
<b>35.812</b> 909,62	1.500 38,10	36.000 914,40	LDSL4	<b>90332</b>					



# Axial shaft seals



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# Axial shaft seals

## General

Common for all axial shaft seals is that they seal axially against a counterface that is perpendicular to the shaft (or pin). Many axial shaft seals, like V-ring seals, are relatively simple sealing elements that are typically used as secondary seals in applications where the primary seals are subjected to large quantities of contaminants. With the exception of axial clamp seals, axial shaft seals rotate with the shaft and act as flingers. They tolerate small misalignments of the shaft with respect to the counter face and also provide reliable sealing if the shaft is out of round or rotates eccentrically

## Features and benefits

Axial shaft seals are available from SKF as

- V-ring seals
- Axial clamp seals
- Metal clamp seals
- Track pin seals





## Track pin seals

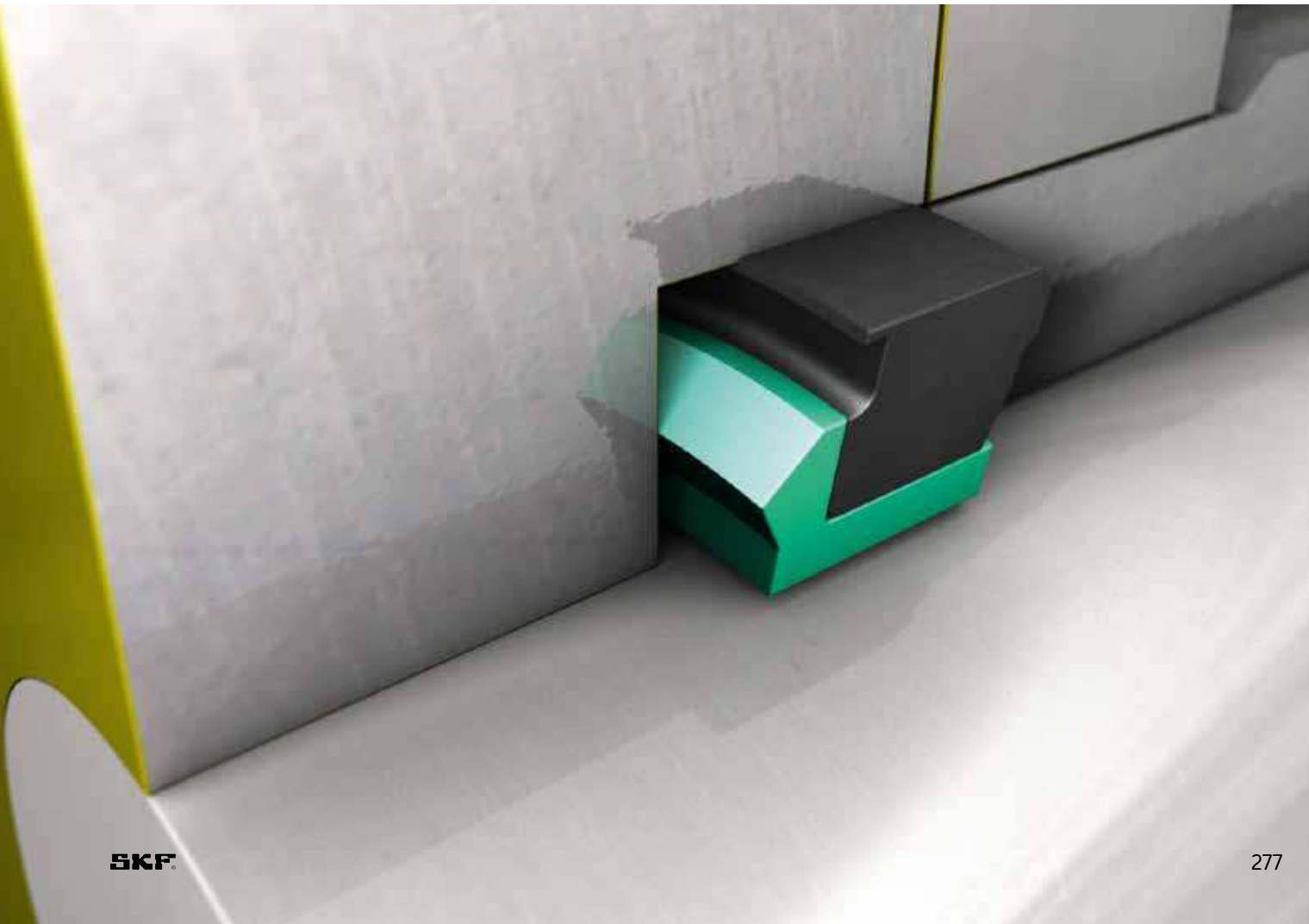


EXTENDED  
SERVICE LIFE  
OF THE  
UNDERCARRIAGE



### Track pin seals

- > For oil lubricated track chains
- > Easy installation



# Track pin seals

## General

The SKF track pin seals, SKF Trackstar, are specifically designed for oil lubricated track chains in off-highway applications. The seals are installed on the pin that connects a pair of links in the chain (→ **fig. 1**).

## Features and benefits

The basic SKF Trackstar seal TP design features a polyurethane sealing ring and a nitrile rubber energizer (→ **fig. 2**). The sealing ring retains the oil between the pin and the bushing and excludes contaminants. The energizer provides the static sealing ability. Ribs on the seal inside diameter enable oil to pass providing the necessary lubrication.

For heavy-duty applications the SKF Trackstar TPM design is available. This version with a metal ring as reinforcement provides additional rigidity for severe operating conditions (→ **fig. 3**).

The perfect combination of these 3 parts results in a longer seal life resulting in a longer track life and consequently reduced maintenance cost. The sealing element is a special fibre reinforced and high wear resistance polyurethane material. The rubber energizer compound is developed by SKF to give optimal load to the polyurethane sealing ring enabling the static sealing function as well as protecting the system from external contamination via the passive sealing surface.

Furthermore, the seal design ensures that the seals do not rotate during operation, thus prolonging life time.

Both SKF Trackstar designs are installed on a spacer ring provided by the undercarriage manufacturer. The function of the spacer ring is to ensure that the required space for the seal exists when squeezed between the link and the bushing. The spacer is designed with oil galleys that enable oil to pass for optimal lubrication of the main sealing lip. Another feature to mention is the easy and safe mounting, since we have engineered an integrated mounting lip feature in the rubber, which also make it suitable for robotized mounting.

SKF Trackstar seals provide several important benefits including:

- Extended service life of the undercarriage
- Reduced internal bushing and pin wear
- Easy installation
- Interchangeability with the most commonly used sealed and lubricated track pin seals

Fig. 1

SKF Trackstar seal installation

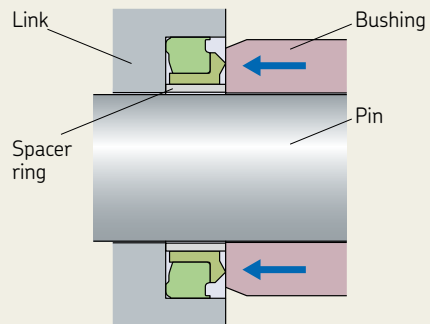


Fig. 2

SKF Trackstar seal design TP

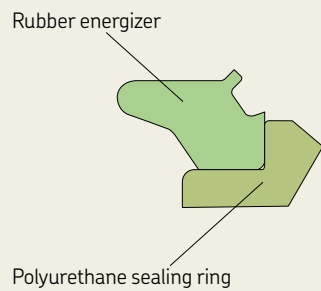
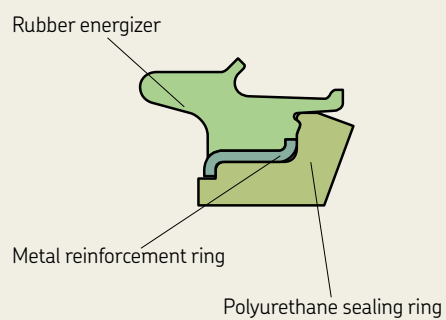


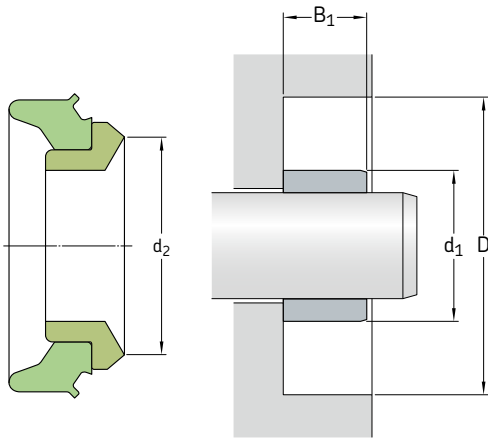
Fig. 3

SKF Trackstar seal design TPM



Axial shaft seals | Track pin seals | TP and TPM – metric dimensions

d<sub>1</sub> 33,22–80,72 mm



Dimensions		Operating width		Lip diameter		Designation
Spacer ring outside diameter	Bore diameter, nominal D	B <sub>1</sub>	d <sub>2</sub> max.			
d <sub>1</sub> max.	D	B <sub>1</sub>	d <sub>2</sub> max.			
mm/in						–
<b>33,22</b> 1.308	47,88 1.885	±0,25 ±0.010	8,38 0.330	±0,25 ±0.010	40,01 1.575	<b>33.2×47.3×11.8 TP</b>
<b>36,47</b> 1.436	51,99 2.047	±0,25 ±0.010	8,31 0.327	±0,25 ±0.010	44,45 1.750	<b>36.5×51.4×11.7 TP</b>
<b>38,05</b> 1.498	55,04 2.167	±0,25 ±0.010	9,60 0.378	±0,25 ±0.010	46,99 1.850	<b>38.1×54.4×12.8 TP</b>
<b>41,86</b> 1.648	59,77 2.353	±0,25 ±0.010	9,25 0.364	±0,25 ±0.010	50,04 1.970	<b>42.0×59.1×12.8 TP</b>
<b>42,52</b> 1.674	59,79 2.354	±0,03 ±0.001	10,69 0.421	±0,25 ±0.010	51,05 2.010	<b>43.1×59.4×14.3 TPM</b>
<b>44,60</b> 1.756	63,04 2.482	±0,25 ±0.010	10,69 0.421	±0,25 ±0.010	53,70 2.114	<b>44.7×62.7×14.2 TP</b>
<b>46,20</b> 1.819	64,64 2.545	±0,15 ±0.006	10,80 0.425	±0,25 ±0.010	56,41 2.221	<b>46.1×64.1×14.1 TP</b>
<b>45,69</b> 1.799	62,99 2.480	±0,03 ±0.001	10,69 0.421	±0,25 ±0.010	54,71 2.154	<b>46.3×62.3×14.3 TPM</b>
<b>50,29</b> 1.980	67,59 2.661	±0,25 ±0.010	10,80 0.425	±0,25 ±0.010	58,42 2.300	<b>50.3×67.0×14.7 TP</b>
<b>52,60</b> 2.071	70,79 2.787	±0,25 ±0.010	10,80 0.425	±0,25 ±0.010	61,34 2.415	<b>52.7×70.5×14.2 TP</b>
<b>52,43</b> 2.064	70,10 2.760	±0,03 ±0.001	10,80 0.425	±0,25 ±0.010	61,11 2.406	<b>53.0×69.3×14.2 TPM</b>
<b>54,99</b> 2.165	72,75 2.864	±0,25 ±0.010	10,80 0.425	±0,25 ±0.010	64,19 2.527	<b>54.9×72.4×14.8 TP</b>
<b>58,19</b> 2.291	75,54 2.974	±0,25 ±0.010	10,67 0.420	±0,25 ±0.010	67,03 2.639	<b>58.1×75.0×14.7 TP</b>
<b>58,90</b> 2.319	77,65 3.057	±0,25 ±0.010	11,10 0.437	±0,25 ±0.010	67,59 2.661	<b>58.8×77.1×15.2 TP</b>



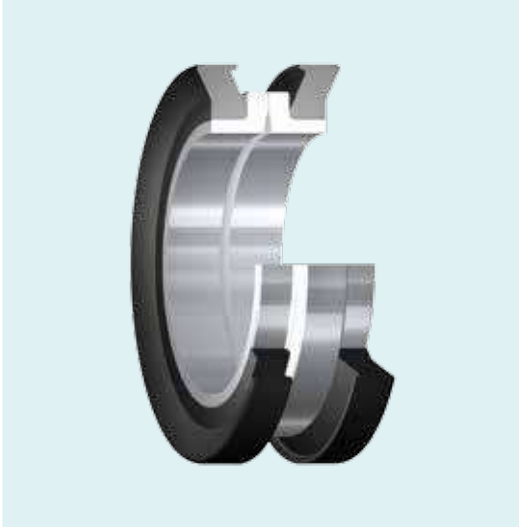
Dimensions						Designation
Spacer ring outside diameter	Bore diameter, nominal D		Operating width	Lip diameter		
$d_1$ max.			$B_1$	$d_2$ max.		
mm/in						–
<b>61,09</b> 2.405	82,55 3.250	$\pm 0,13$ $\pm 0.005$	11,10 0.437	$\pm 0,25$ $\pm 0.010$	70,00 2.756	<b>61.1×82.0×16.0 TP</b>
<b>63,14</b> 2.486	83,74 3.297	$\pm 0,25$ $\pm 0.010$	15,49 0.610	$\pm 0,25$ $\pm 0.010$	73,66 2.900	<b>63.2×83.1×19.3 TP</b>
<b>63,60</b> 2.504	83,49 3.287	$\pm 0,25$ $\pm 0.010$	11,13 0.438	$\pm 0,25$ $\pm 0.010$	74,22 2.922	<b>63.6×82.5×15.0 TP</b>
<b>67,21</b> 2.646	87,25 3.435	$\pm 0,25$ $\pm 0.010$	11,13 0.438	$\pm 0,25$ $\pm 0.010$	77,14 3.037	<b>67.1×86.7×15.4 TP</b>
<b>76,71</b> 3.020	99,80 3.929	$\pm 0,13$ $\pm 0.005$	11,10 0.437	$\pm 0,25$ $\pm 0.010$	89,08 3.507	<b>76.7×99.3×15.1 TP</b>
<b>80,72</b> 3.178	106,20 4.181	$\pm 0,13$ $\pm 0.005$	11,10 0.437	$\pm 0,25$ $\pm 0.010$	92,53 3.643	<b>80.8×105.8×15.9 TP</b>



## Metal face seals

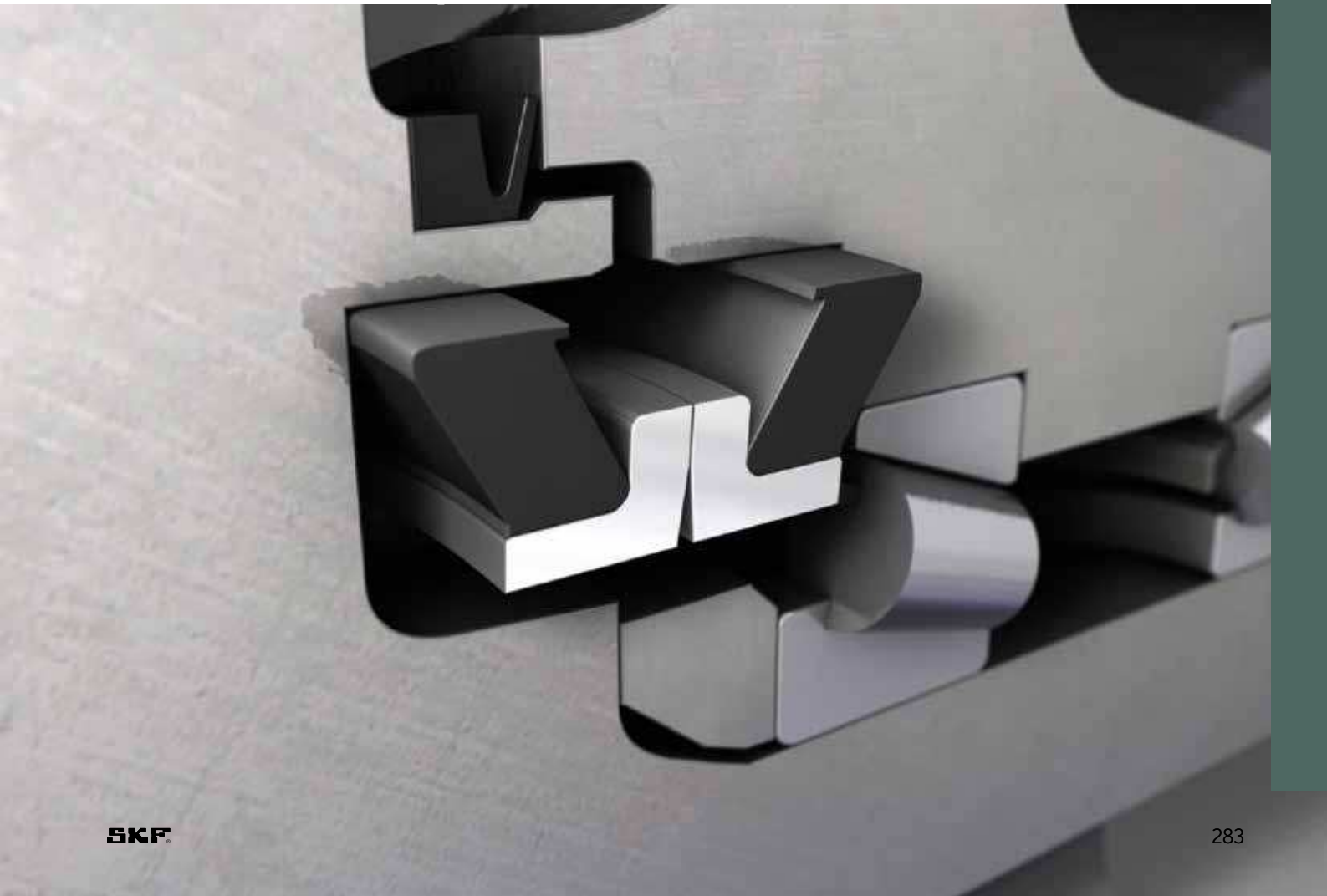


PROOFED SOLUTION  
FOR OFF-ROAD AND  
TRACKED VEHICLES



### Metal face seals

- > High resistance to wear, corrosion and chemicals



# Metal face seals

## General

SKF metal face seals type HDDF (→ **fig. 1**) are designed for use under severe service conditions at relatively low circumferential speeds. They offer reliable protection against solid and liquid contaminants as well as leak-proof retention of lubricants. The seals were originally developed for off-road and tracked vehicles, but have been found to be equally suitable for a range of other applications where effective protection is required against sand, soil, mud, water etc. (→ **fig. 2**). These applications include:

- All types of mixers
- Sand treatment equipment
- Conveyors and other construction equipment
- Agricultural machinery
- Washing equipment
- Grinding mills and other pulverizing equipment
- Ore dressing equipment
- Mining equipment

## Design features

HDDF seals consist of two identical metal sealing rings and two similar Belleville washers (cup springs) made of nitrile or fluoro rubber compounds, specifically developed for these seals (→ **fig. 3** on **page 287**). The sealing rings are made of wear- and corrosion-resistant cast alloy and have finely finished sliding and sealing surfaces.

The Belleville washers of nitrile or fluoro rubber provide the necessary uniform face loading and effective sealing at the bore and outside diameters. The outside diameter of the washers adapts to the form of the bore in which they are installed. It is crucial that the bore diameter and bore depth are in accordance with the dimensions listed in the product table on **pages 288** to **291**. Adequate tolerances between the seal assembly and its mating component are crucial to ensure a proper sealing performance.

## Lubricant requirements

A lubricant should be applied on the dynamic sealing surfaces of a metal face seal to prevent scoring and cover at least 30% of the sealing surface to properly lubricate and cool the sealing rings. The lubricant can be either a detergent like SAE 10W-40 or a mineral based oil ranging from 10 WT to 90 WT, depending on the ambient temperature. It should be noted that some oils contain additives that make them incompatible with elastomers, which can cause degradation of the Belleville washers, especially when exposed to elevated temperatures.

Although mineral oils are always the recommended lubricant, a grease lubricant can also be used in some slowly rotating or oscillating applications, where the seal face surface speed does not exceed 0,5 m/s (100 ft/min). At higher speeds, an oil lubricant is required, not only to provide lubrication to the sealing faces, but also to cool the sealing rings.

Fig. 1

HDDF seal

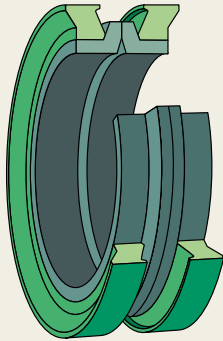
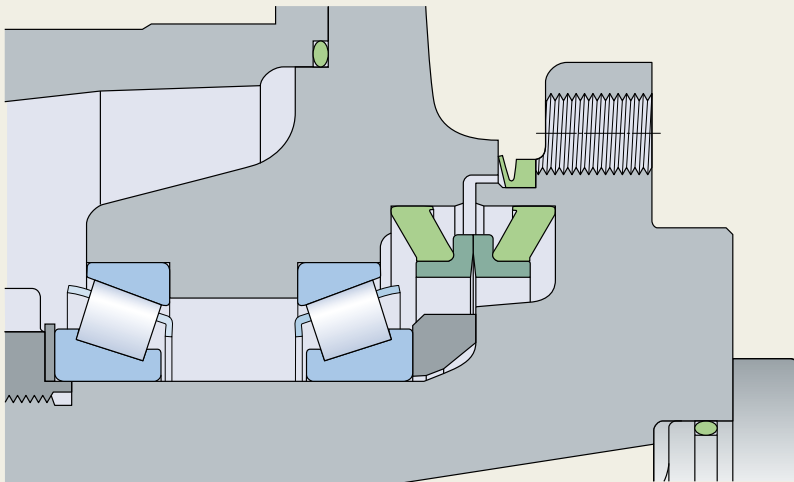


Fig. 2

HDDF application



## Permissible operating conditions

Depending on their design, metal face seals can withstand different amounts of internal pressure. It should, however, generally be maintained below 0,25 MPa (35 psi). Other recommendations regarding operating conditions for the metal face seals, like temperature and speed, are provided in **table 1**. The chemical resistance of the nitrile and fluoro rubber in general is dealt with in the section *Chemical resistance* on **page 37**.

## Contaminants

Metal face seals are often used in heavily contaminated environments, where mud packing in the cavity between the housing, sealing rings and Belleville washers can occur. Eventually, the mud packing can cause the Belleville washers to be pushed out of position, resulting in improper face loads or mud being pumped past the Belleville washers.

Contaminants can also cause abrasion to the Belleville washers, which in turn causes deterioration of the elastomer. To minimize the risk of seal failure due to this deterioration, it is critical to select a proper Belleville washer material for the application in question.

## Installing HDDF seals

### General

Careful handling and installation of a metal face seal is crucial to avoid cutting or tearing of the elastomeric Belleville washers or breaking the metal sealing rings, both which can cause premature seal failure and immediate leakage. It is also vital to keep the sealing faces free of contaminants like dirt or lint. Always carefully observe installation instructions provided on **page 287**.

### Housing and seal preparation

All housing components contacting the Belleville washers must be free of contaminants (oil, grease, dust, lint particles etc.) when installing the seal. SKF recommends using a non-petroleum based solvent and a clean, lint-free wipe to clean these components prior to installation.

All seal parts must be handled with care to avoid damage or scoring.

**Table 1**

### Permissible operating conditions

Operating condition	Recommended value	
<b>Temperature, max.</b>		
Continuous operation		
Nitrile rubber (NBR)	-25 to +100 °C	(-15 to +210 °F)
Fluoro rubber (FKM)	-10 to +190 °C	(15 to 375 °F)
<b>Circumferential speed, max.</b>		
Continuous operation	1,8 m/s	(350 ft/min)
Brief periods	3,8 m/s	(750 ft/min)
<b>Pressure, max.</b>		
Continuous operation	0,25 MPa	(35 psi)
Brief periods	0,35 MPa	(50 psi)

### Installation procedure

- 1 Install the Belleville washers seated against the inside shoulder of the metal sealing rings (→ fig. 4a).
- 2 Carefully push each seal half (Belleville washer and metal sealing ring) into the housing until it is fully seated. Check that the seal is not cocked and that the washers are seated evenly at the bottom of the housing bore. Improper seal installation can result in uneven face loads around the circumference of the seal faces, causing scoring or the sealing rings to separate and allow oil to leak.
- 3 Clean both metal sealing ring faces with a lint-free wipe and apply a thin film of oil. Ensure that no oil is applied to any surface but the sealing ring faces (→ fig. 4b).
- 4 Check that both housings are concentric and in correct alignment. The Belleville washers must not unseat from the bottom of the housing.
- 5 Carefully bring the two housings together, avoiding high impact that can scratch or break the seal components.
- 6 Finally, hold one half of the assembly stationary while rotating the other half at least ten complete revolutions.

#### NOTE

This procedure enables the installer to check that the housing and the Belleville washers are aligned. If the seal assembly wobbles, it is necessary to disassemble it and make sure that the Belleville washers are properly seated in the housing.

Fig. 3

#### Design features

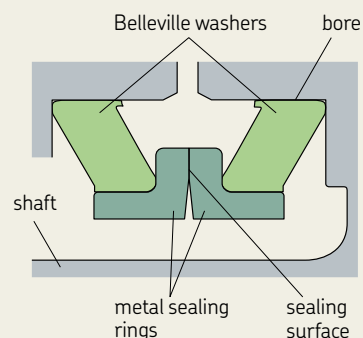
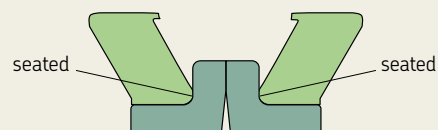


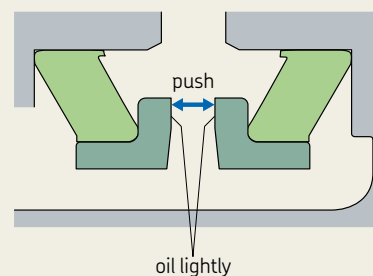
Fig. 4

#### Installation procedure

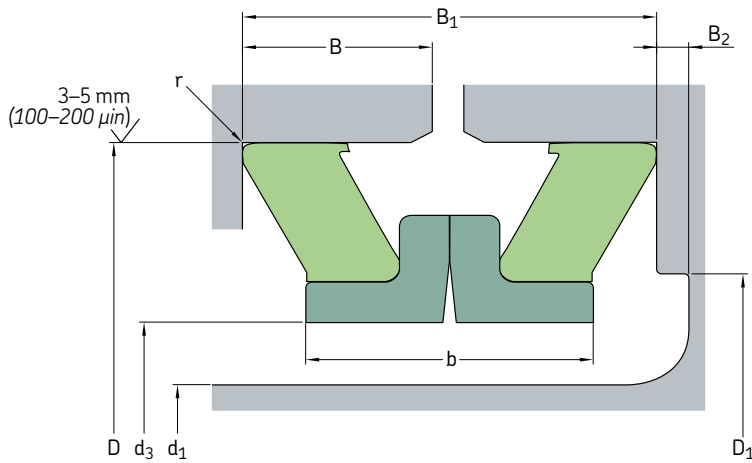
a



b



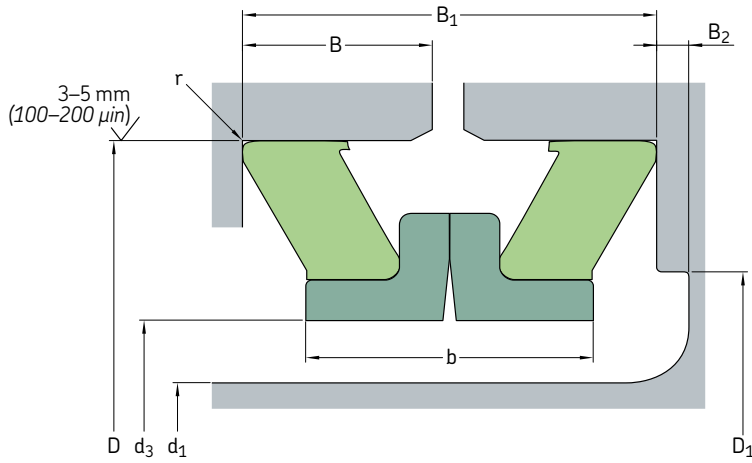
d<sub>1</sub> 1.688–8.688 in



Designation d <sub>1</sub> max.	Lip mat- erial	Inch dimensions		Operating width B <sub>1</sub>	Seal inside diameter d <sub>3</sub> min.	Bore depth B	Recommended shoulder diameter		Under- cut B <sub>2</sub> min.	Sealing ring width b max.	Radius r max.
		Shaft diameter d <sub>1</sub>	Bore diameter D				D <sub>1</sub> max.	min.			
–	–	in		–	–	–	–	–	–	–	–
<b>16904</b>	R	<b>1.688</b>	2.760 ±0.002	0.974 ±0.038	1.760	0.453	2.282	–	–	0.846	0.037
<b>18259</b>	R	<b>1.812</b>	3.003 ±0.002	0.892 ±0.031	1.910	0.416	2.475	–	–	0.790	0.042
<b>21215</b>	R	<b>2.125</b>	3.250 ±0.002	0.900 ±0.033	2.215	0.418	2.759	–	–	0.812	0.045
<b>25096</b>	R	<b>2.500</b>	3.762 ±0.002	0.907 ±0.033	2.580	0.422	3.188	–	–	0.840	0.042
<b>27536</b>	R	<b>2.750</b>	4.030 ±0.002	0.918 ±0.035	2.830	0.426	3.480	–	–	0.810	0.042
<b>30651</b>	R	<b>3.063</b>	4.500 ±0.002	1.016 ±0.035	3.170	0.475	3.833	–	–	0.912	0.042
<b>35076</b>	R	<b>3.500</b>	4.953 ±0.002	1.096 ±0.043	3.620	0.511	4.296	–	–	0.962	0.035
<b>38740</b>	R	<b>3.875</b>	5.312 ±0.003	1.102 ±0.024	4.040	0.524	4.750	–	–	1.002	0.042
<b>38751</b>	R	<b>3.875</b>	5.562 ±0.003	1.267 ±0.050	4.040	0.594	4.791	–	–	1.110	0.051
<b>43135</b>	R	<b>4.312</b>	5.823 ±0.003	1.102 ±0.024	4.420	0.524	5.125	–	–	1.002	0.042
<b>43150</b>	R	<b>4.312</b>	6.000 ±0.003	1.320 ±0.040	4.420	0.625	5.173	–	–	1.090	0.051
<b>46975</b>	R	<b>4.688</b>	6.400 ±0.003	1.525 ±0.050	4.795	0.722	5.583	–	–	1.254	0.047
<b>50655</b>	R	<b>5.062</b>	6.750 ±0.003	1.280 ±0.040	5.170	0.605	5.975	–	–	1.150	0.057
<b>54000</b>	R	<b>5.400</b>	6.990 ±0.003	1.310 ±0.030	5.625	0.625	6.625	–	–	1.182	0.057
<b>56170</b>	R	<b>5.625</b>	7.250 ±0.003	1.366 ±0.031	5.825	0.650	6.486	6.174	0.032	1.300	0.057
<b>58775</b>	R	<b>5.875</b>	7.641 ±0.003	1.510 ±0.031	6.000	0.724	6.868	6.548	0.056	1.490	0.073
<b>63796</b>	R	<b>6.375</b>	8.120 ±0.003	1.265 ±0.040	6.570	0.598	7.555	7.505	0.125	1.350	0.042
<b>67560</b>	R	<b>6.750</b>	8.620 ±0.004	1.375 ±0.030	6.920	0.656	7.750	–	–	1.260	0.042
<b>74310</b>	R	<b>7.438</b>	9.400 ±0.004	1.656 ±0.040	7.540	0.793	8.431	–	–	1.344	0.073
<b>78020</b>	R	<b>7.800</b>	10.000 ±0.004	1.750 ±0.050	7.940	0.835	8.910	–	–	1.500	0.058
<b>82540</b>	R	<b>8.250</b>	10.062 ±0.004	1.560 ±0.040	8.358	0.745	9.280	9.220	0.071	1.562	0.058
<b>86850</b>	R	<b>8.688</b>	10.911 ±0.005	1.924 ±0.030	8.790	0.932	9.754	–	–	1.642	0.058



Designation d <sub>1</sub> max.	Lip mat- erial	Inch dimensions		Operating width B <sub>1</sub>	Seal inside diameter d <sub>3</sub> min.	Bore depth B	Recommended shoulder diameter		Under- cut B <sub>2</sub> min.	Sealing ring width b max.	Radius r max.
		Shaft diameter d <sub>1</sub>	Bore diameter D				D <sub>1</sub> max.	min.			
–	–	mm									
16904	R	42,88	70,10 ±0,06	24,74 ±0,97	44,70	11,51	57,96	-	-	21,49	0,94
18259	R	46,03	76,28 ±0,06	22,66 ±0,79	48,51	10,57	62,87	-	-	20,07	1,07
21215	R	53,98	82,55 ±0,06	22,86 ±0,84	56,26	10,62	70,08	-	-	20,62	1,14
25096	R	63,50	95,56 ±0,06	23,04 ±0,84	65,53	10,72	80,98	-	-	21,34	1,07
27536	R	69,85	102,36 ±0,06	23,32 ±0,89	71,88	10,82	88,39	-	-	20,57	1,07
30651	R	77,80	114,30 ±0,06	25,81 ±0,89	80,52	12,07	97,36	-	-	23,16	1,07
35076	R	88,90	125,81 ±0,06	27,84 ±1,09	91,95	12,98	109,12	-	-	24,43	0,89
38740	R	98,43	134,92 ±0,08	27,99 ±0,61	102,62	13,31	120,65	-	-	25,45	1,07
38751	R	98,43	141,27 ±0,08	32,18 ±1,27	102,62	15,09	121,69	-	-	28,19	1,30
43135	R	109,52	147,90 ±0,08	27,99 ±0,61	112,27	13,31	130,18	-	-	25,45	1,07
43150	R	109,52	152,40 ±0,08	33,53 ±1,02	112,27	15,88	131,39	-	-	27,69	1,30
46975	R	119,08	162,56 ±0,08	38,74 ±1,27	121,79	18,34	141,81	-	-	31,85	1,19
50655	R	128,57	171,45 ±0,08	32,51 ±1,02	131,32	15,37	151,77	-	-	29,21	1,45
54000	R	137,16	177,55 ±0,08	33,27 ±0,76	142,88	15,88	168,28	-	-	30,02	1,45
56170	R	142,88	184,15 ±0,08	34,70 ±0,79	147,96	16,51	164,74	156,82	0,81	33,02	1,45
58775	R	149,23	194,08 ±0,08	38,35 ±0,79	152,40	18,39	174,45	166,32	1,42	37,85	1,85
63796	R	161,93	206,25 ±0,08	32,13 ±1,02	166,88	15,19	191,90	190,63	3,18	34,29	1,07
67560	R	171,45	218,95 ±0,10	34,93 ±0,76	175,77	16,66	196,85	-	-	32,00	1,07
74310	R	188,93	238,76 ±0,10	42,06 ±1,02	191,52	20,14	214,15	-	-	34,14	1,85
78020	R	198,12	254,00 ±0,10	44,45 ±1,27	201,68	21,21	226,31	-	-	38,10	1,47
82540	R	209,55	255,57 ±0,10	39,62 ±1,02	212,29	18,92	235,71	234,19	1,80	39,67	1,47
86850	R	220,68	277,14 ±0,13	48,87 ±0,76	223,27	23,67	247,75	-	-	41,71	1,47

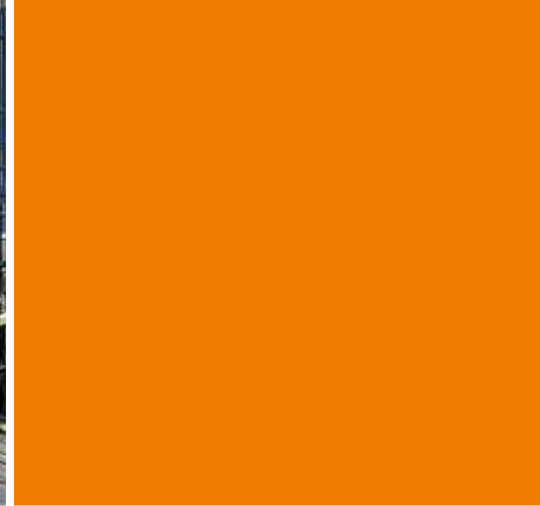


Designation d <sub>1</sub> max.	Lip mat- erial	Inch dimensions		Operating width B <sub>1</sub>	Seal inside diameter d <sub>3</sub> min.	Bore depth B	Recommended shoulder diameter		Under- cut B <sub>2</sub> min.	Sealing ring width b max.	Radius r max.
		Shaft diameter d <sub>1</sub>	Bore diameter D				D <sub>1</sub> max.	min.			
–	–	in									
<b>93115</b>	R	<b>9.312</b>	11.000 ±0.005	1.437 ±0.032	9.410	0.687	10.360	10.260	0.090	1.510	0.050
<b>93125</b>	R	<b>9.312</b>	11.625 ±0.005	1.754 ±0.050	9.410	0.837	10.750	–	–	1.510	0.089
<b>95620</b>	R	<b>9.562</b>	11.859 ±0.005	1.949 ±0.069	9.660	0.925	10.703	–	–	1.700	0.074
<b>108710</b>	R	<b>10.875</b>	12.969 ±0.005	1.540 ±0.050	11.060	0.730	12.100	12.000	0.143	1.670	0.043
<b>116500</b>	R	<b>11.625</b>	13.250 ±0.005	1.290 ±0.030	11.780	0.615	12.780	–	–	1.210	0.045
<b>124020</b>	R	<b>12.400</b>	14.375 ±0.005	1.656 ±0.050	12.500	0.788	13.530	13.470	0.060	1.610	0.057
<b>137570</b>	R	<b>13.750</b>	15.817 ±0.005	1.875 ±0.032	13.910	0.906	14.985	–	–	1.670	0.089
<b>806715</b>	R	<b>14.750</b>	16.695 ±0.005	1.875 ±0.032	14.950	0.906	15.863	–	–	1.670	0.062
<b>807115</b>	V	<b>14.750</b>	16.695 ±0.005	1.875 ±0.032	14.950	0.906	15.863	–	–	1.670	0.062
<b>171025</b>	R	<b>17.125</b>	19.240 ±0.006	1.531 ±0.053	17.280	0.724	18.400	18.300	0.140	1.659	0.043
<b>191022</b>	R	<b>19.125</b>	21.500 ±0.006	1.640 ±0.042	19.250	0.784	20.950	20.850	0.175	1.832	0.057
<b>238020</b>	R	<b>23.875</b>	26.875 ±0.006	2.125 ±0.040	24.280	1.018	25.550	–	–	1.851	0.089
<b>807199</b>	V	<b>23.875</b>	26.875 ±0.006	2.125 ±0.040	24.280	1.018	25.550	–	–	1.851	0.089
<b>807149</b>	V	<b>29.000</b>	32.000 ±0.006	2.125 ±0.040	29.512	1.028	30.672	–	–	1.851	0.089

Designation $d_1$ max.	Lip mat- erial	Inch dimensions		Operating width $B_1$	Seal inside diameter $d_3$ min.	Bore depth B	Recommended shoulder diameter		Under- cut $B_2$ min.	Sealing ring width b max.	Radius r max.
		Shaft diameter $d_1$	Bore diameter D				$D_1$ max.	min.			
–	–	mm									
<b>93115</b>	R	<b>232,52</b>	279,40 ±0,13	36,50 ±0,81	239,01	17,45	263,14	260,60	2,29	38,35	1,27
<b>93125</b>	R	<b>236,52</b>	295,28 ±0,13	44,55 ±1,27	239,01	21,26	273,05	-	-	38,35	2,26
<b>95620</b>	R	<b>242,87</b>	301,22 ±0,13	49,50 ±1,75	245,36	23,50	271,86	-	-	43,18	1,88
<b>108710</b>	R	<b>276,23</b>	329,41 ±0,13	39,12 ±1,27	280,92	18,54	307,34	304,80	3,63	42,42	1,09
<b>116500</b>	R	<b>295,28</b>	336,55 ±0,13	32,77 ±0,76	299,21	15,62	324,61	-	-	30,73	1,14
<b>124020</b>	R	<b>314,96</b>	365,13 ±0,13	42,06 ±1,27	317,50	20,02	343,66	342,14	1,52	40,89	1,45
<b>137570</b>	R	<b>349,25</b>	401,75 ±0,13	47,63 ±0,81	353,31	23,01	380,62	-	-	42,42	2,26
<b>806715</b>	R	<b>374,65</b>	424,05 ±0,13	47,63 ±0,81	379,73	23,01	402,92	-	-	42,42	1,58
<b>807115</b>	V	<b>374,65</b>	424,05 ±0,13	47,63 ±0,81	379,73	23,01	402,92	-	-	42,42	1,57
<b>171025</b>	R	<b>434,98</b>	488,70 ±0,15	38,89 ±1,35	438,91	18,39	467,36	464,82	3,56	42,14	1,09
<b>191022</b>	R	<b>485,78</b>	546,10 ±0,15	41,66 ±1,07	488,95	19,91	532,13	529,59	4,45	46,53	1,45
<b>238020</b>	R	<b>606,43</b>	682,63 ±0,15	53,98 ±1,02	616,71	25,86	648,97	-	-	47,02	2,26
<b>807199</b>	V	<b>606,43</b>	682,63 ±0,15	53,98 ±1,02	616,71	25,86	648,97	-	-	47,02	2,26
<b>807149</b>	V	<b>736,60</b>	812,80 ±0,15	53,98 ±1,02	749,60	26,11	779,07	-	-	47,02	2,26



# V-ring seals



- V-ring seals**
- > Cost-effective
  - > Versatile



# V-ring seals

## General

V-ring seals (or V-rings) are unique all-rubber seals for rotating shafts and are used in an extremely wide range of applications. The V-ring can be used alone to protect a wide assortment of bearing types from contaminants. They are also often used as secondary seals to protect primary seals in highly contaminated environments.

V-rings are installed on shafts and their thin, tapered lip seals against a counterface perpendicular to the shaft (→ **fig. 1a**). V-rings have an interference fit on the shaft, rotate with it and act as flingers (→ **fig. 1b**). Angular misalignment of the shaft relative to the counterface can be tolerated (→ **fig. 1c**). V-rings provide reliable sealing even if the shaft is out-of-round or rotates eccentrically (→ **fig. 1d**). The amount by which the shaft can be displaced axially is governed by the permissible displacement of the V-ring relative to its counterface.

V-rings are made entirely of elastomers without fabric or metal reinforcement and are therefore easy to install. They can be stretched and, depending on size, pushed over other components like flanges, pulleys or even housings. This is a very valuable feature, especially when replacing a seal.

## Features

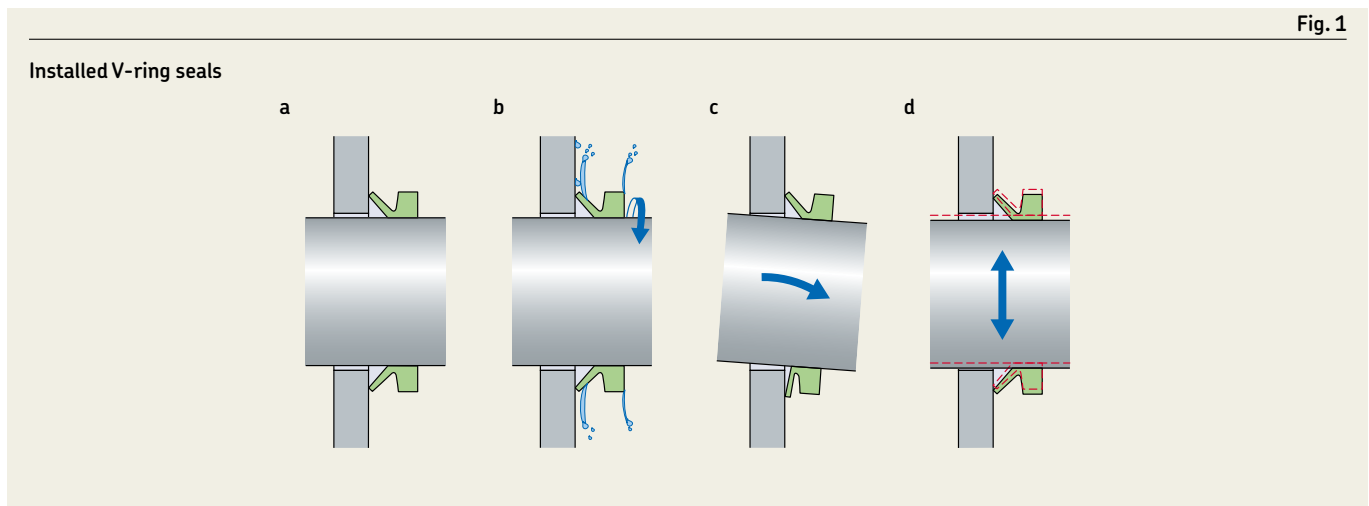
A V-ring consists of a seal body, a flexible, conical-shaped sealing lip and an integral, resilient “hinge” (→ **fig. 2**). It is stretched and installed directly on the shaft, where it is held in place by the inherent tension of the seal body. It rotates with the shaft and seals axially against a stationary counterface.

The counterface can be the end face of a bearing, a washer, stamping, bearing housing, or even the metal case of a radial shaft seal.

The flexible sealing lip applies contact pressure against the counterface that is relatively low but sufficient enough to maintain the sealing function. The light contact pressure even enables the seal to run dry in some low-speed applications resulting in insignificant torque drag or heat build-up. The contact pressure varies with the fitted width.

The flexible lip and hinge provide adequate sealing even in applications with considerable end play and shaft misalignment.

As a result of centrifugal force, the contact pressure of the lip decreases with increasing shaft speed. This means that friction losses and heat are kept to a minimum, resulting in improved wear resistance and extended service life.



## Materials

V-rings are normally made of nitrile rubber that features good chemical resistance, resistance to wear and can be used in applications with temperatures ranging from  $-40$  to  $+100$  °C ( $-40$  to  $+210$  °F). For applications with higher temperatures or where aggressive media are present, V-rings made of fluoro rubber can be supplied. The permissible operating conditions for V-rings made of nitrile or fluoro rubber are listed in **table 2** on **page 299**. In the product table under the heading Lip code, the letters R and V are used to identify nitrile rubber and fluoro rubber respectively.

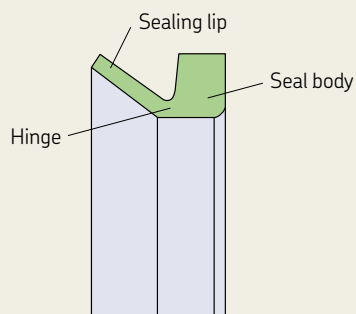
### ⚠ WARNING

At temperatures above  $300$  °C ( $570$  °F), all fluoro rubber compounds give off dangerous fumes.

For additional information, refer to **page 32**.

Fig. 2

### V-ring design



## Standard designs

SKF offers five standard V-ring designs:

- VA/VR1, the most common type of V-ring, has a standard cross section and straight back sideface. VA/VR1 is typically used to protect bearing arrangements in gear-boxes, electric motors and drives.
- VS/VR2, that has a standard low cross section, tapered back face and wide body, providing a firm hold on the shaft. VS/VR2 is commonly used in agricultural and automotive applications.
- VL/VR3, designed with a very compact axial cross section. VL/VR3 is commonly used in confined spaces to enhance labyrinth seals.
- VE/VR4, designed as secondary seals for heavy-duty applications where the primary seal has to be protected against water and / or solid contaminants. The design has the largest cross section of any V-ring designs and also permits the largest axial displacements. VE/VR4 is available in the diameter range 300 to 2 010 mm (11.811 to 79.134 in).

- VRME/VR6, a heavy-duty, large diameter V-ring for applications with large axial displacements. VRME/VR6 can be located axially and radially on the shaft using a standard band clamp. VRME/VR6 is primarily designed to protect high-speed bearing arrangements in rolling mills, paper-making and other large machine applications. VRME/VR6 is available on a made-to-order basis.

V-rings from SKF are available for the shaft diameter ranges listed in **table 1**. If the shaft diameter lies in the appropriate range for two V-rings, the larger V-ring, referring to the Seal fitted with, should always be chosen (→ **fig. 9** on **page 302**). In addition, special sizes and designs, including split versions, can be made to order. Contact your SKF sales representative for sizes outside the standard range.

## Main V-ring functions

V-rings are suitable for both grease and oil lubricated applications. For sealing grease lubricated bearing arrangements and protecting against contaminants, the V-ring should be arranged outside the housing cover or housing wall. Dust, water spray and other contaminants can be excluded in this position (→ **fig. 3**). The V-ring can also act as a grease valve, where used grease or excess new grease can escape between the counterface and the sealing lip (→ **fig. 4**). The installation of two opposing V-rings can be used in applications where lubricant retention and contaminant exclusion are of equal importance (→ **fig. 5**).

If V-rings are used to retain oil, they should always be located axially on the shaft on the lubricant side (→ **fig. 6**).

V-rings should not be submerged in the application medium.

**Table 1**

### Standard V-ring designs and size ranges

Design, globally outside North America Design, North America	VA VR1		VS VR2		VL VR3		VE VR4		VRME VR6	
	mm	in	mm	in	mm	in	mm	in	mm	in
min.	2,7	0.106	4,5	0.177	105	4.134	300	11.811	300	11.811
max.	2 020	79.257	210	8.268	2 025	79.724	2 010	79.134	1 995	78.543



Fig. 3

V-ring used as an excluder

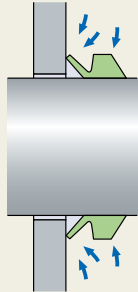


Fig. 4

V-ring used as a grease valve

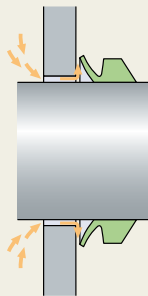


Fig. 5

Two opposing V-rings

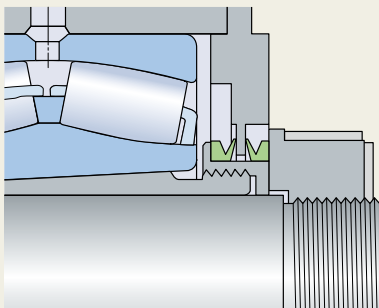
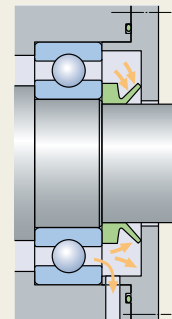


Fig. 6

V-ring located axially



## Other V-ring functions

V-rings can also be used as secondary seals (→ **fig. 7**), for example where it is necessary to protect the sealing lip and counterface of the primary seal against contaminants or corrosion. V-rings can also be used to enhance the efficiency of labyrinth seals (→ **fig. 8**).

Fig. 7

V-ring used as a secondary seal

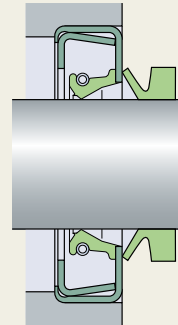
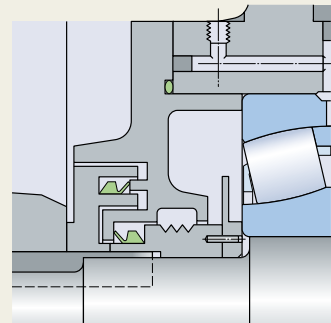


Fig. 8

V-rings in a labyrinth seal

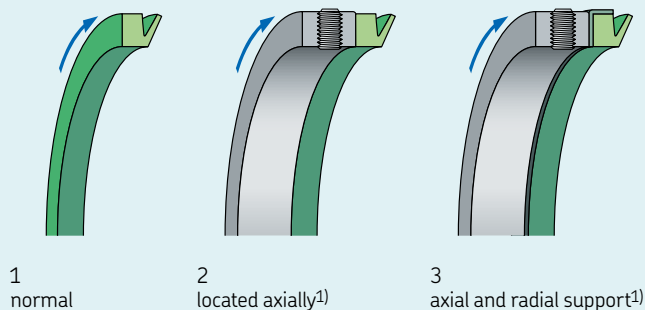


## Sliding velocities

V-rings can operate under the conditions listed in table 2. In the speed range 15 to 20 m/s (2 900 to 3 900 ft/min), the sealing lip lifts from the counterface and the V-ring only acts as a gap-type seal.

Table 2

### Permissible operating conditions



Operating conditions	Guideline values for V-rings of			
	nitrile rubber		fluoro rubber	
<b>Temperature</b>	-40 to +100 °C	(-40 to +210 °F)	-20 to +150 °C	(-4 to +300 °F)
<b>Circumferential speed</b>				
normal (1)	up to 8 m/s	(1 575 ft/min)	up to 6,5 m/s	(1 280 ft/min)
located axially (2)	8 to 12 m/s	(1 575 to 2 360 ft/min)	6,5 to 10 m/s	(1 280 to 1 970 ft/min)
axial and radial support (3)	> 12 m/s	(2 360 ft/min)	> 10 m/s	(1 970 ft/min)
<b>Pressure acting on seal</b>				
static sealing or very low speed operation	up to 0,03 MPa	(4.35 psi)	up to 0,03 MPa	(4.35 psi)

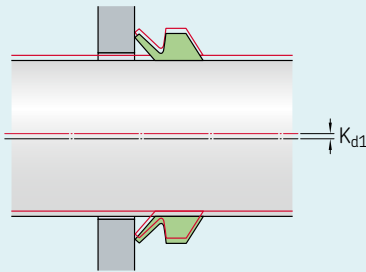
<sup>1)</sup> Support ring by customer

## Coaxiality and runout

The total tolerance for the deviation from coaxiality and runout should not exceed the guideline values provided in **table 3**.

**Table 3**

### Coaxiality and runout tolerances



Shaft diameter nominal				Total tolerance for coaxiality deviation and runout	
d <sub>1</sub> over	incl.	over	incl.	K <sub>d1</sub> max.	
mm		inc.		mm	in
<b>V-rings, VA / VR1 and VS / VR2 designs</b>					
<b>9,5</b>	<b>9,5</b>		<i>0.374</i>	0,4	<i>0.016</i>
<b>19,5</b>	<b>19,5</b>	<i>0.374</i>	<i>0.768</i>	0,6	<i>0.024</i>
<b>19,5</b>	<b>38</b>	<i>0.768</i>	<i>1.496</i>	0,9	<i>0.034</i>
<b>38</b>	<b>68</b>	<i>1.496</i>	<i>2.677</i>	1,1	<i>0.043</i>
<b>68</b>	<b>105</b>	<i>2.677</i>	<i>4.134</i>	1,4	<i>0.055</i>
<b>105</b>	<b>155</b>	<i>4.134</i>	<i>6.102</i>	1,6	<i>0.063</i>
<b>155</b>	<b>210</b>	<i>6.102</i>	<i>8.628</i>	1,9	<i>0.075</i>
<b>210</b>	<b>2 020</b>	<i>8.628</i>	<i>79.527</i>	3,6	<i>0.142</i>
<b>V-rings, VL / VR3 designs</b>					
<b>135</b>	<b>630</b>	<i>5.315</i>	<i>24.803</i>	1,5	<i>0.059</i>
<b>V-rings, VE / VR4 designs</b>					
<b>450</b>	<b>2 010</b>	<i>17.716</i>	<i>79.134</i>	6	<i>0.236</i>

## Misalignment

V-rings can tolerate misalignment between the shaft and housing, i.e. deviations from the perpendicularity between the shaft and counterface of the housing. Guideline values for the maximum permissible angular misalignment are provided in **diagram 1**. These values apply to the V-ring designs VA/VR1 and VS/VR2, provided they are supported axially on the shaft.

The permissible misalignment values for the very compact VL/VR3 design are appreciably lower than those for the VA/VR1 and VS/VR2 designs.

In applications where V-rings are not supported axially on the shaft, the maximum value in the diagram should be reduced.

## Counterface

A fine-turned counterface is adequate for V-rings. The appropriate surface roughness values vary depending on the circumferential speed ( $\rightarrow$  **table 4** on **page 302**). SKF recommends buffing all turned surfaces with an emery cloth to remove any sharp peaks arising from the turning operation. The surface finish should be measured at approximately 90 degrees to the path of the groove to obtain a true reading of the surface.

### Counterface treatment

In the presence of grease, oil or dry lubricants, no special counterface treatment is required. Mild steel counterfaces that are exposed to water or other corrosives should be protected, for example by zinc- or chromium-plating or treated with an anti-corrosive spray.

### Additional counterface information

Aluminium surfaces should be free of scratch marks. Surface hardness should be  $> 100$  HB in abrasive applications. Die cast aluminium can be used in the as-cast condition.

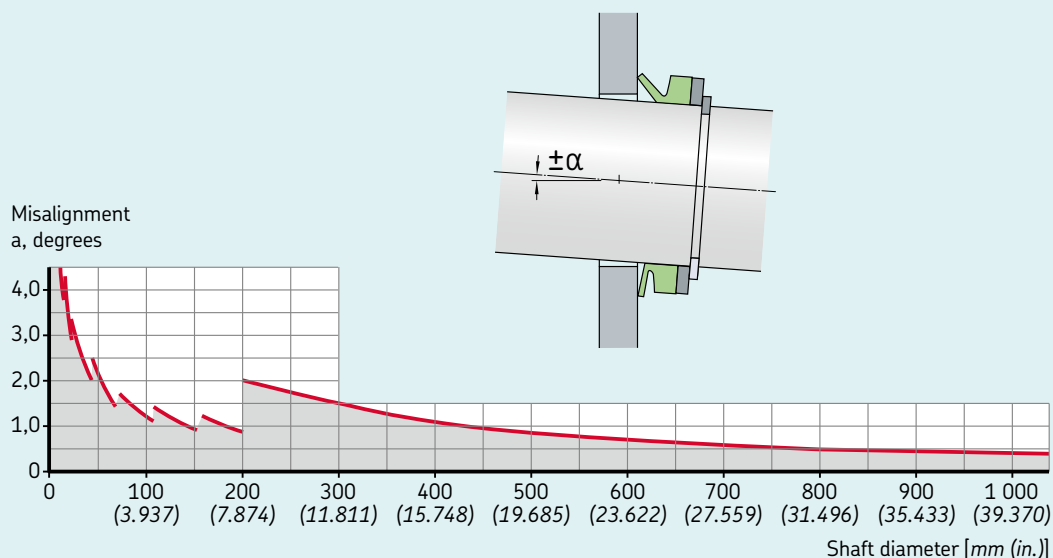
Steel and cast iron surfaces should be free of lead and sharp tool marks. Cold rolled steel stampings can be used without machining.

Plastic counterface materials are generally not acceptable due to poor heat dissipation.

Stainless steel should not be used in dry-running applications unless the speed is below 1 m/s (200 ft/min).

Diagram 1

Maximum permissible misalignment for V-rings of the VA / VR1 and VS / VR2 designs



### Product table sorting order

When searching for a suitable V-ring for a given shaft diameter, e.g. 930 mm, first identify the possible shaft diameter ranges ( $d_1$ ). In this case, there are three possible ranges (→ **fig. 9a**). Then look for the appropriate dimensions  $D_1$ ,  $D$  and  $B_1$  that are listed in ascending order (→ **fig. 9b**). Please note that this sorting order concept results in that the shaft diameter ranges do not always come in ascending order, e.g. here 925–975 mm is listed before 920–965 mm.

Table 4

#### Recommended counterface surface finish

Circumferential speed		Surface finish	
m/s	ft/min	$R_a \mu\text{m}$	$R_a \mu\text{in}$
> 10	> 1 969	0,4–0,8	16–32
5–10	984–1 969	0,8–1,6	32–64
1–5	199–984	1,6–2,0	64–80
< 1	< 199	2,0–2,5	80–100

The surface finish must not be lower than  $R_a 0,05 \mu\text{m}$  ( $2 \mu\text{in}$ ).

Fig. 9

V-ring seals – metric dimensions, globally valid outside North American market

Dimensions		Shaft diameter range $d_1$	Seal inside diameter, free state $d$	Seal seat width $b_1$	Nominal seal width $b$	Nominal seal height $c$	Clearance $D_1$ max.	Counterface $D$ min.	Seal fitted width $B_1$	Lip code	Designation
over	incl.										
310	315	304	304	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	310 VE R
		304		32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	310 VRME R
315	320	309	309	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	315 VE R
		309		32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	315 VRME R
320	325	314	314	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	320 VE R
		314		32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	320 VRME R
325	330	319	319	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	325 VE R
		319		32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	325 VRME R
330	335	323	323	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	330 VE R
		323		32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	330 VRME R
335	365	315	315	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	R	335 VL R
		315	315	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	V	335 VL V
		315	315	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	R	335 VA R
		315	315	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	V	335 VA V
335	340	328	328	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	335 VE R
		328		32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	335 VRME R

## Shaft requirements

Sharp edges, nicks and burrs on the shaft must be avoided to prevent damage to the V-ring during installation.

V-rings rotate with the shaft and only require a moderate surface roughness value. As a general guideline, the value should not exceed  $R_a$  6,3  $\mu\text{m}$  (252  $\mu\text{in}$ ). When sealing fluids or exposed to fine, solid contaminants, the V-ring requires a surface roughness value of maximum  $R_a$  3,2  $\mu\text{m}$  (128  $\mu\text{in}$ ).

A V-ring is stretched when installed and fits all shaft diameters within the ranges listed in the product tables.

## Installing V-rings

V-rings are elastic and can be stretched and pushed over other components, which facilitates the installation ( $\rightarrow$  **fig. 10**). When several V-rings are to be installed, a simple tool ( $\rightarrow$  **fig. 11**) can be used to push the seals to their position at a predetermined distance from the counterface. V-rings can also be cut and rejoined in the field.

The general installation guidelines include the following:

- Clean the V-ring, counterface and shaft.
- Make sure that the shaft is dry and free from grease or oil, particularly when installing a V-ring without axial support.
- Lubricate the lip of the V-ring with a thin film of grease or silicone oil.
- In applications where friction must be reduced to a minimum, the counterface should be coated with a low-friction agent. Do not apply grease to the lip.
- Check that the V-ring is installed with a uniform stretch around the shaft.

Fig. 10

Installing a V-ring

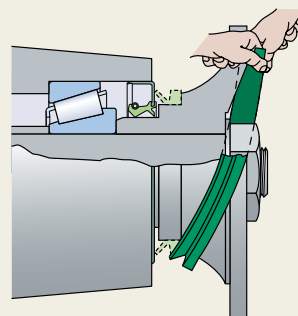
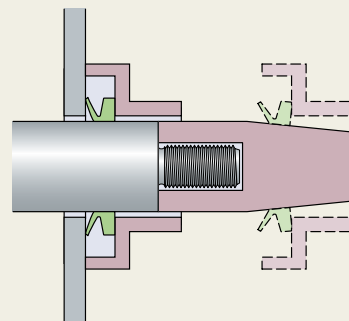
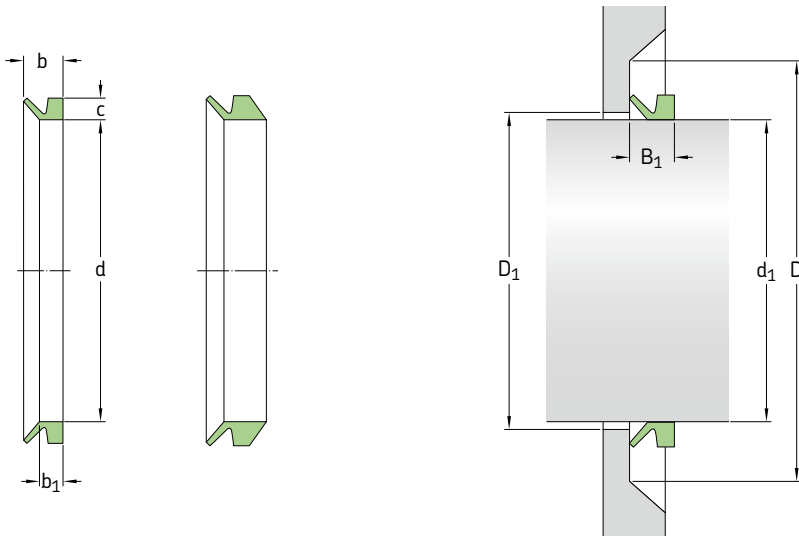


Fig. 11

Installation tool



Axial shaft seals | V-ring seals – metric dimensions, globally valid outside North American market  
 $d_1$  2,7–58 mm



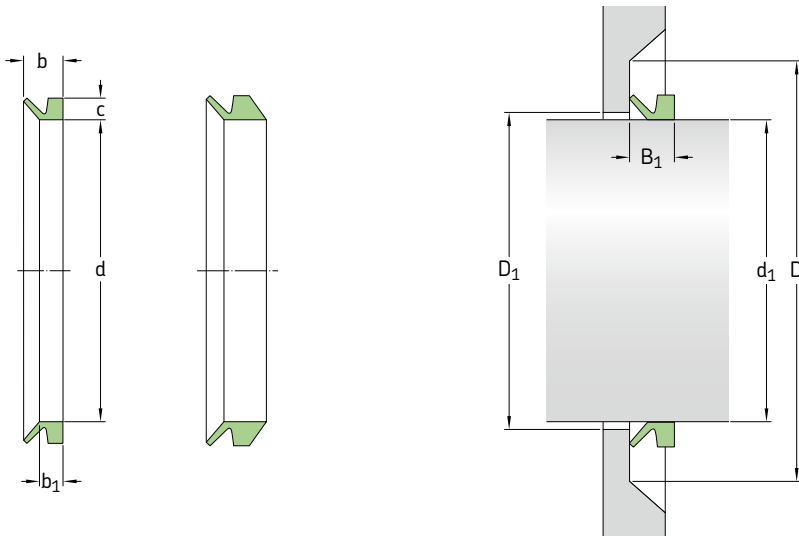
Dimensions		Seal inside diameter, free state $d$	Seal seat width $b_1$	Nominal seal width $b$	Nominal seal height $c$	Clearance $D_1$ max.	Counterface $D$ min.	Seal fitted width $B_1$	Lip code	Designation
Shaft diameter range $d_1$ over	incl.									
mm										
2,7	3,5	2,5	2,1	3	1,5	$d_1+1$	$d_1+4$	$2,5 \pm 0,3$	R	3 VA R
		2,5	2,1	3	1,5	$d_1+1$	$d_1+4$	$2,5 \pm 0,3$	V	3 VA V
3,5	4,5	3,2	2,4	3,7	2	$d_1+1$	$d_1+6$	$3 \pm 0,4$	R	4 VA R
		3,2	2,4	3,7	2	$d_1+1$	$d_1+6$	$3 \pm 0,4$	V	4 VA V
4,5	5,5	4	2,4	3,7	2	$d_1+1$	$d_1+6$	$3 \pm 0,4$	R	5 VA R
		4	2,4	3,7	2	$d_1+1$	$d_1+6$	$3 \pm 0,4$	V	5 VA V
		4	3,9	5,2	2	$d_1+1$	$d_1+6$	$4,5 \pm 0,4$	R	5 VS R
		4	3,9	5,2	2	$d_1+1$	$d_1+6$	$4,5 \pm 0,4$	V	5 VS V
5,5	6,5	5	2,4	3,7	2	$d_1+1$	$d_1+6$	$3 \pm 0,4$	R	6 VA R
		5	2,4	3,7	2	$d_1+1$	$d_1+6$	$3 \pm 0,4$	V	6 VA V
		5	3,9	5,2	2	$d_1+1$	$d_1+6$	$4,5 \pm 0,4$	R	6 VS R
		5	3,9	5,2	2	$d_1+1$	$d_1+6$	$4,5 \pm 0,4$	V	6 VS V
6,5	8	6	2,4	3,7	2	$d_1+1$	$d_1+6$	$3 \pm 0,4$	R	7 VA R
		6	2,4	3,7	2	$d_1+1$	$d_1+6$	$3 \pm 0,4$	V	7 VA V
		6	3,9	5,2	2	$d_1+1$	$d_1+6$	$4,5 \pm 0,4$	R	7 VS R
		6	3,9	5,2	2	$d_1+1$	$d_1+6$	$4,5 \pm 0,4$	V	7 VS V
8	9,5	7	2,4	3,7	2	$d_1+1$	$d_1+6$	$3 \pm 0,4$	R	8 VA R
		7	2,4	3,7	2	$d_1+1$	$d_1+6$	$3 \pm 0,4$	V	8 VA V
		7	3,9	5,2	2	$d_1+1$	$d_1+6$	$4,5 \pm 0,4$	R	8 VS R
		7	3,9	5,2	2	$d_1+1$	$d_1+6$	$4,5 \pm 0,4$	V	8 VS V
9,5	11,5	9	3,4	5,5	3	$d_1+1$	$d_1+9$	$4,5 \pm 0,6$	R	10 VA R
		9	3,4	5,5	3	$d_1+1$	$d_1+9$	$4,5 \pm 0,6$	V	10 VA V
		9	5,6	7,7	3	$d_1+1$	$d_1+9$	$6,7 \pm 0,6$	R	10 VS R
		9	5,6	7,7	3	$d_1+1$	$d_1+9$	$6,7 \pm 0,6$	V	10 VS V
11,5	12,5	10,5	3,4	5,5	3	$d_1+1$	$d_1+9$	$4,5 \pm 0,6$	R	12 VA R
		10,5	3,4	5,5	3	$d_1+1$	$d_1+9$	$4,5 \pm 0,6$	V	12 VA V
11,5	13,5	10,5	5,6	7,7	3	$d_1+1$	$d_1+9$	$6,7 \pm 0,6$	R	12 VS R
		10,5	5,6	7,7	3	$d_1+1$	$d_1+9$	$6,7 \pm 0,6$	V	12 VS V
		11,7	3,4	5,5	3	$d_1+1$	$d_1+9$	$4,5 \pm 0,6$	R	13 VA R
		11,7	3,4	5,5	3	$d_1+1$	$d_1+9$	$4,5 \pm 0,6$	V	13 VA V
13,5	15,5	12,5	3,4	5,5	3	$d_1+1$	$d_1+9$	$4,5 \pm 0,6$	R	14 VA R
		12,5	3,4	5,5	3	$d_1+1$	$d_1+9$	$4,5 \pm 0,6$	V	14 VA V
13,5	15,5	12,5	5,6	7,7	3	$d_1+1$	$d_1+9$	$6,7 \pm 0,6$	R	14 VS R
		12,5	5,6	7,7	3	$d_1+1$	$d_1+9$	$6,7 \pm 0,6$	V	14 VS V



Dimensions		Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
mm		-								
15,5	17	14	3,4	5,5	3	d <sub>1</sub> +1	d <sub>1</sub> +9	4,5 ± 0,6	R	16 VA R
		14	3,4	5,5	3	d <sub>1</sub> +1	d <sub>1</sub> +9	4,5 ± 0,6	V	16 VAV
15,5	17,5	14	5,6	7,7	3	d <sub>1</sub> +1	d <sub>1</sub> +9	6,7 ± 0,6	R	16 VS R
		14	5,6	7,7	3	d <sub>1</sub> +1	d <sub>1</sub> +9	6,7 ± 0,6	V	16 VS V
17,5	19	16	3,4	5,5	3	d <sub>1</sub> +1	d <sub>1</sub> +9	4,5 ± 0,6	R	18 VA R
		16	3,4	5,5	3	d <sub>1</sub> +1	d <sub>1</sub> +9	4,5 ± 0,6	V	18 VAV
		16	5,6	7,7	3	d <sub>1</sub> +1	d <sub>1</sub> +9	6,7 ± 0,6	R	18 VS R
		16	5,6	7,7	3	d <sub>1</sub> +1	d <sub>1</sub> +9	6,7 ± 0,6	V	18 VS V
19	21	18	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	R	20 VA R
		18	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	V	20 VAV
		18	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	R	20 VS R
		18	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	V	20 VS V
21	24	20	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	R	22 VA R
		20	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	V	22 VAV
		20	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	R	22 VS R
		20	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	V	22 VS V
24	27	22	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	R	25 VA R
		22	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	V	25 VAV
		22	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	R	25 VS R
		22	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	V	25 VS V
27	29	25	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	R	28 VA R
		25	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	V	28 VAV
		25	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	R	28 VS R
		25	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	V	28 VS V
29	31	27	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	R	30 VA R
		27	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	V	30 VAV
		27	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	R	30 VS R
		27	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	V	30 VS V
31	33	29	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	R	32 VA R
		29	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	V	32 VAV
		29	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	R	32 VS R
		29	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	V	32 VS V
33	36	31	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	R	35 VA R
		31	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	V	35 VAV
		31	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	R	35 VS R
		31	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	V	35 VS V
36	38	34	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	R	38 VA R
		34	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	V	38 VAV
		34	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	R	38 VS R
		34	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	V	38 VS V
38	43	36	5,5	9	5	d <sub>1</sub> +2	d <sub>1</sub> +15	7 ± 1	R	40 VA R
		36	5,5	9	5	d <sub>1</sub> +2	d <sub>1</sub> +15	7 ± 1	V	40 VAV
		36	9,5	13	5	d <sub>1</sub> +2	d <sub>1</sub> +15	11 ± 1	R	40 VS R
		36	9,5	13	5	d <sub>1</sub> +2	d <sub>1</sub> +15	11 ± 1	V	40 VS V
43	48	40	5,5	9	5	d <sub>1</sub> +2	d <sub>1</sub> +15	7 ± 1	R	45 VA R
		40	5,5	9	5	d <sub>1</sub> +2	d <sub>1</sub> +15	7 ± 1	V	45 VAV
		40	9,5	13	5	d <sub>1</sub> +2	d <sub>1</sub> +15	11 ± 1	R	45 VS R
		40	9,5	13	5	d <sub>1</sub> +2	d <sub>1</sub> +15	11 ± 1	V	45 VS V
48	53	45	5,5	9	5	d <sub>1</sub> +2	d <sub>1</sub> +15	7 ± 1	R	50 VA R
		45	5,5	9	5	d <sub>1</sub> +2	d <sub>1</sub> +15	7 ± 1	V	50 VAV
		45	9,5	13	5	d <sub>1</sub> +2	d <sub>1</sub> +15	11 ± 1	R	50 VS R
		45	9,5	13	5	d <sub>1</sub> +2	d <sub>1</sub> +15	11 ± 1	V	50 VS V
53	58	49	5,5	9	5	d <sub>1</sub> +2	d <sub>1</sub> +15	7 ± 1	R	55 VA R
		49	5,5	9	5	d <sub>1</sub> +2	d <sub>1</sub> +15	7 ± 1	V	55 VAV

Axial shaft seals | V-ring seals – metric dimensions, globally valid outside North American market

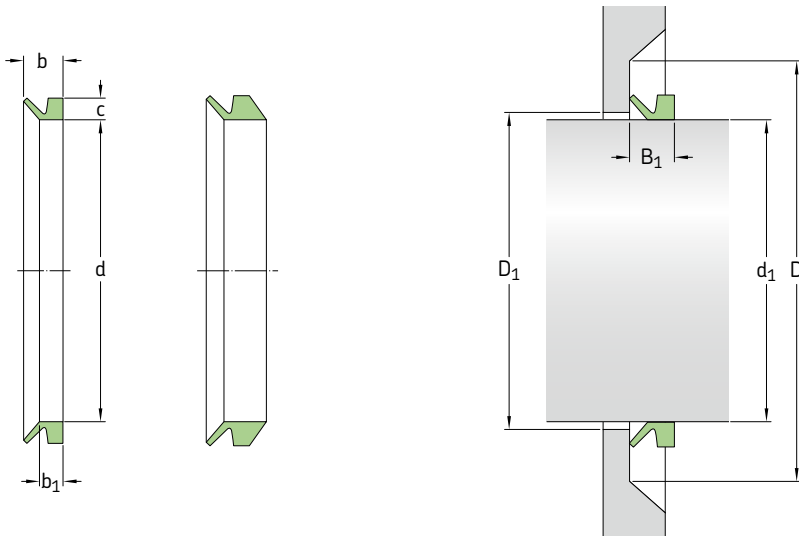
d<sub>1</sub> 53–195 mm



Dimensions		Shaft diameter range d <sub>1</sub> over	incl.	Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
mm												
58	63	49		49	9,5	13	5	d <sub>1</sub> +2	d <sub>1</sub> +15	11 ± 1	R	55 VS R
		49		49	9,5	13	5	d <sub>1</sub> +2	d <sub>1</sub> +15	11 ± 1	V	55 VS V
		54		54	5,5	9	5	d <sub>1</sub> +2	d <sub>1</sub> +15	7 ± 1	R	60 VA R
		54		54	5,5	9	5	d <sub>1</sub> +2	d <sub>1</sub> +15	7 ± 1	V	60 VA V
63	68	54		54	9,5	13	5	d <sub>1</sub> +2	d <sub>1</sub> +15	11 ± 1	R	60 VS R
		54		54	9,5	13	5	d <sub>1</sub> +2	d <sub>1</sub> +15	11 ± 1	V	60 VS V
		58		58	5,5	9	5	d <sub>1</sub> +2	d <sub>1</sub> +15	7 ± 1	R	65 VA R
		58		58	5,5	9	5	d <sub>1</sub> +2	d <sub>1</sub> +15	7 ± 1	V	65 VA V
68	73	58		58	9,5	13	5	d <sub>1</sub> +2	d <sub>1</sub> +15	11 ± 1	R	65 VS R
		58		58	9,5	13	5	d <sub>1</sub> +2	d <sub>1</sub> +15	11 ± 1	V	65 VS V
		63		63	6,8	11	6	d <sub>1</sub> +3	d <sub>1</sub> +18	9 ± 1,2	R	70 VA R
		63		63	6,8	11	6	d <sub>1</sub> +3	d <sub>1</sub> +18	9 ± 1,2	V	70 VA V
73	78	63		63	11,3	15,5	6	d <sub>1</sub> +3	d <sub>1</sub> +18	13,5 ± 1,2	R	70 VS R
		63		63	11,3	15,5	6	d <sub>1</sub> +3	d <sub>1</sub> +18	13,5 ± 1,2	V	70 VS V
		67		67	6,8	11	6	d <sub>1</sub> +3	d <sub>1</sub> +18	9 ± 1,2	R	75 VA R
		67		67	6,8	11	6	d <sub>1</sub> +3	d <sub>1</sub> +18	13,5 ± 1,2	R	75 VS R
78	83	67		67	11,3	15,5	6	d <sub>1</sub> +3	d <sub>1</sub> +18	13,5 ± 1,2	V	75 VS V
		72		72	6,8	11	6	d <sub>1</sub> +3	d <sub>1</sub> +18	9 ± 1,2	R	80 VA R
		72		72	6,8	11	6	d <sub>1</sub> +3	d <sub>1</sub> +18	9 ± 1,2	V	80 VA V
		72		72	11,3	15,5	6	d <sub>1</sub> +3	d <sub>1</sub> +18	13,5 ± 1,2	R	80 VS R
83	88	72		72	11,3	15,5	6	d <sub>1</sub> +3	d <sub>1</sub> +18	13,5 ± 1,2	V	80 VS V
		76		76	6,8	11	6	d <sub>1</sub> +3	d <sub>1</sub> +18	9 ± 1,2	R	85 VA R
		76		76	6,8	11	6	d <sub>1</sub> +3	d <sub>1</sub> +18	9 ± 1,2	V	85 VA V
		76		76	11,3	15,5	6	d <sub>1</sub> +3	d <sub>1</sub> +18	13,5 ± 1,2	R	85 VS R
88	93	76		76	11,3	15,5	6	d <sub>1</sub> +3	d <sub>1</sub> +18	13,5 ± 1,2	V	85 VS V
		81		81	6,8	11	6	d <sub>1</sub> +3	d <sub>1</sub> +18	9 ± 1,2	R	90 VA R
		81		81	6,8	11	6	d <sub>1</sub> +3	d <sub>1</sub> +18	9 ± 1,2	V	90 VA V
		81		81	11,3	15,5	6	d <sub>1</sub> +3	d <sub>1</sub> +18	13,5 ± 1,2	R	90 VS R
93	98	81		81	11,3	15,5	6	d <sub>1</sub> +3	d <sub>1</sub> +18	13,5 ± 1,2	V	90 VS V
		85		85	6,8	11	6	d <sub>1</sub> +3	d <sub>1</sub> +18	9 ± 1,2	R	95 VA R
		85		85	6,8	11	6	d <sub>1</sub> +3	d <sub>1</sub> +18	9 ± 1,2	V	95 VA V
		85		85	11,3	15,5	6	d <sub>1</sub> +3	d <sub>1</sub> +18	13,5 ± 1,2	R	95 VS R
93	98	85		85	11,3	15,5	6	d <sub>1</sub> +3	d <sub>1</sub> +18	13,5 ± 1,2	V	95 VS V

Dimensions		Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
mm		-								
98	105	90	6,8	11	6	d <sub>1</sub> +3	d <sub>1</sub> +18	9 ± 1,2	R	100 VA R
		90	6,8	11	6	d <sub>1</sub> +3	d <sub>1</sub> +18	9 ± 1,2	V	100 VA V
		90	11,3	15,5	6	d <sub>1</sub> +3	d <sub>1</sub> +18	13,5 ± 1,2	R	100 VS R
		90	11,3	15,5	6	d <sub>1</sub> +3	d <sub>1</sub> +18	13,5 ± 1,2	V	100 VS V
105	115	99	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	R	110 VL R
		99	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	V	110 VL V
		99	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	R	110 VA R
		99	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	V	110 VA V
		99	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	R	110 VS R
		99	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	V	110 VS V
115	125	108	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	R	120 VL R
		108	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	V	120 VL V
		108	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	R	120 VA R
		108	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	V	120 VA V
		108	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	R	120 VS R
		108	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	V	120 VS V
125	135	117	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	R	130 VL R
		117	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	V	130 VL V
		117	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	R	130 VA R
		117	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	V	130 VA V
		117	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	R	130 VS R
		117	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	V	130 VS V
135	145	126	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	R	140 VL R
		126	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	V	140 VL V
		126	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	R	140 VA R
		126	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	V	140 VA V
		126	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	R	140 VS R
		126	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	V	140 VS V
145	155	135	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	R	150 VL R
		135	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	V	150 VL V
		135	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	R	150 VA R
		135	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	V	150 VA V
		135	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	R	150 VS R
		135	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	V	150 VS V
155	165	144	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	R	160 VL R
		144	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	V	160 VL V
		144	9	14,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	12 ± 1,8	R	160 VA R
		144	9	14,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	12 ± 1,8	V	160 VA V
		144	15	20,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	18 ± 1,8	R	160 VS R
		144	15	20,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	18 ± 1,8	V	160 VS V
165	175	153	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	R	170 VL R
		153	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	V	170 VL V
		153	9	14,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	12 ± 1,8	R	170 VA R
		153	9	14,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	12 ± 1,8	V	170 VA V
		153	15	20,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	18 ± 1,8	R	170 VS R
		153	15	20,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	18 ± 1,8	V	170 VS V
175	185	162	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	R	180 VL R
		162	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	V	180 VL V
		162	9	14,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	12 ± 1,8	R	180 VA R
		162	9	14,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	12 ± 1,8	V	180 VA V
		162	15	20,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	18 ± 1,8	R	180 VS R
		162	15	20,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	18 ± 1,8	V	180 VS V
185	195	171	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	R	190 VL R
		171	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	V	190 VL V
		171	9	14,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	12 ± 1,8	R	190 VA R
		171	9	14,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	12 ± 1,8	V	190 VA V
		171	15	20,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	18 ± 1,8	R	190 VS R
		171	15	20,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	18 ± 1,8	V	190 VS V

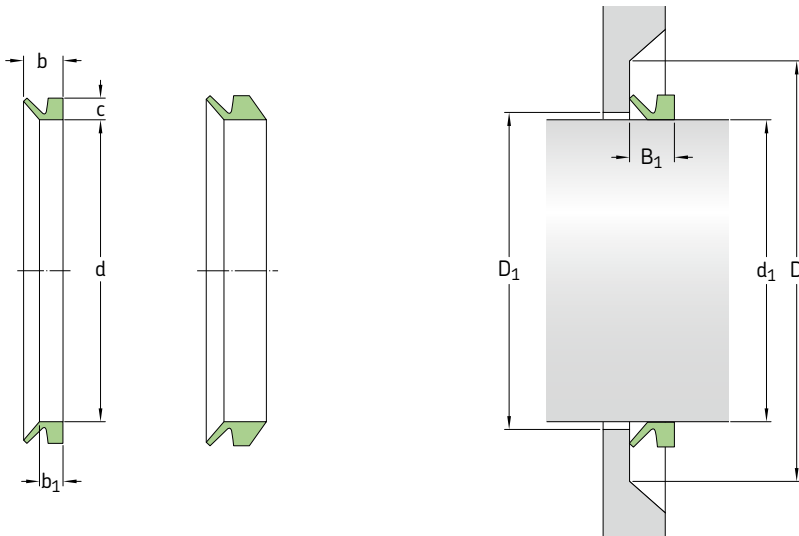
Axial shaft seals | V-ring seals – metric dimensions, globally valid outside North American market  
 d<sub>1</sub> 195–400 mm



Dimensions		Shaft diameter range d <sub>1</sub> over	Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
d <sub>1</sub> incl.											
mm											
195	210	182	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	200 VL R	
		182	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	200 VL V	
		180	9	14,5	8	d <sub>1</sub> + 4	d <sub>1</sub> + 24	12 ± 1,8	R	199 VA R	
		180	9	14,5	8	d <sub>1</sub> + 4	d <sub>1</sub> + 24	12 ± 1,8	V	199 VA V	
		180	15	20,5	8	d <sub>1</sub> + 4	d <sub>1</sub> + 24	18 ± 1,8	R	199 VS R	
180	15	20,5	8	d <sub>1</sub> + 4	d <sub>1</sub> + 24	18 ± 1,8	V	199 VS V			
190	210	180	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	200 VA R	
		180	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	V	200 VA V	
210	233	198	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	220 VL R	
		198	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	220 VL V	
		198	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	220 VA R	
		198	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	V	220 VA V	
233	260	225	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	250 VL R	
		225	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	250 VL V	
235	265	225	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	250 VA R	
		225	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	V	250 VA V	
260	285	247	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	275 VL R	
		247	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	275 VL V	
265	290	247	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	275 VA R	
		247	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	V	275 VA V	
285	310	270	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	300 VL R	
		270	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	300 VL V	
290	310	270	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	300 VA R	
		270	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	V	300 VA V	
300	305	294	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	300 VE R	
		294	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	300 VRME R	
305	310	299	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	305 VE R	
		299	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	305 VRME R	
310	335	292	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	325 VL R	
		292	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	325 VL V	
310	335	292	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	325 VA R	
		292	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	V	325 VA V	

Dimensions		Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
mm		-								
310	315	304	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	310 VE R
		304	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	310 VRME R
315	320	309	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	315 VE R
		309	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	315 VRME R
320	325	314	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	320 VE R
		314	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	320 VRME R
325	330	319	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	325 VE R
		319	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	325 VRME R
330	335	323	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	330 VE R
		323	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	330 VRME R
335	365	315	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	R	350 VL R
		315	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	V	350 VL V
		315	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	R	350 VA R
		315	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	V	350 VA V
335	340	328	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	335 VE R
		328	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	335 VRME R
340	345	333	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	340 VE R
		328	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	340 VRME R
345	350	338	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	345 VE R
		338	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	345 VRME R
350	355	343	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	350 VE R
		343	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	350 VRME R
355	360	347	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	355 VE R
		347	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	355 VRME R
360	365	352	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	360 VE R
		357	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	360 VRME R
365	385	337	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	R	375 VL R
		337	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	V	375 VL V
365	390	337	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	R	375 VA R
		337	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	V	375 VA V
365	370	357	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	365 VE R
370	375	362	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	370 VE R
		362	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	370 VRME R
375	380	367	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	375 VE R
		367	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	375 VRME R
380	385	371	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	380 VE R
		371	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	380 VRME R
385	410	360	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	R	400 VL R
		360	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	V	400 VL V
390	430	360	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	R	400 VA R
		360	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	V	400 VA V
385	390	376	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	385 VE R
		376	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	385 VRME R
390	395	381	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	390 VE R
		381	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	390 VRME R
395	400	386	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	395 VE R
		386	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	395 VRME R

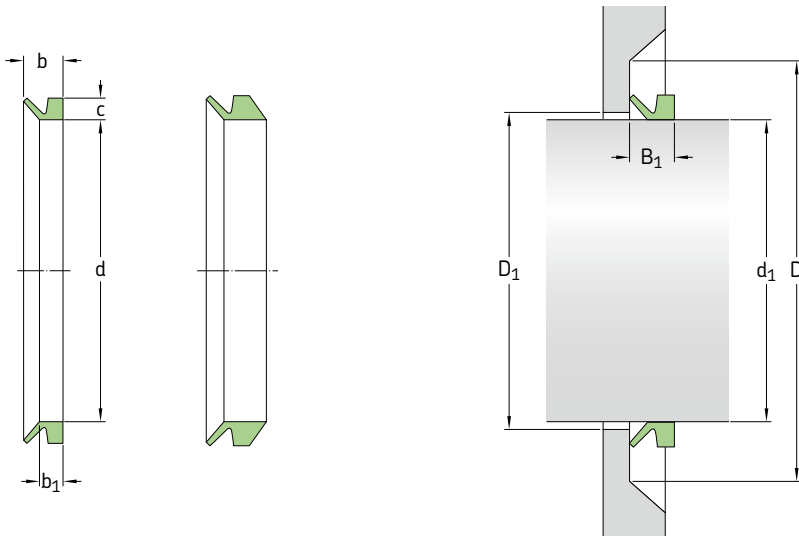
Axial shaft seals | V-ring seals – metric dimensions, globally valid outside North American market  
 d<sub>1</sub> 400–550 mm



Dimensions		Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
mm										
400	405	391	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	400 VE R
		391	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	400 VRME R
405	410	396	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	405 VE R
		396	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	405 VRME R
410	415	401	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	410 VE R
		401	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	410 VRME R
415	420	405	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	415 VE R
		405	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	415 VRME R
420	425	410	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	420 VE R
		410	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	420 VRME R
425	430	415	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	425 VE R
		415	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	425 VRME R
410	440	382	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	425 VL R
		382	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	425 VLV
440	475	405	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	450 VL R
		405	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	450 VLV
430	480	405	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	450 VA R
		405	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	V	450 VAV
430	435	420	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	430 VE R
		420	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	430 VRME R
435	440	425	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	435 VE R
		425	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	435 VRME R
440	445	429	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	440 VE R
		429	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	440 VRME R
445	450	434	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	445 VE R
		434	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	445 VRME R
450	455	439	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	450 VE R
		439	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	450 VRME R
455	460	444	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	455 VE R
		444	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	455 VRME R

Dimensions		Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
mm		–								
460	465	448	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	460 VE R
		448	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	460 VRME R
465	470	453	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	465 VE R
		453	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	465 VRME R
470	475	458	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	470 VE R
		458	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	470 VRME R
475	480	463	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	475 VE R
		463	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	475 VRME R
475	510	450	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	R	500 VL R
		450	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	V	500 VL V
510	540	472	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	R	525 VL R
		472	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	V	525 VL V
480	530	450	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	R	500 VA R
		450	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	V	500 VAV
480	485	468	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	480 VE R
		468	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	480 VRME R
485	490	473	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	485 VE R
		473	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	485 VRME R
490	495	478	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	490 VE R
		478	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	490 VRME R
495	500	483	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	495 VE R
		483	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	495 VRME R
500	505	488	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	500 VE R
		488	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	500 VRME R
505	510	493	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	505 VE R
		493	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	505 VRME R
510	515	497	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	510 VE R
		497	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	510 VRME R
515	520	502	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	515 VE R
		502	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	515 VRME R
520	525	507	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	520 VE R
		507	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	520 VRME R
525	530	512	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	525 VE R
		512	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	525 VRME R
540	575	495	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	R	550 VL R
		495	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	V	550 VL V
530	580	495	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	R	550 VA R
		495	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	V	550 VAV
530	535	517	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	530 VE R
		517	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	530 VRME R
535	540	521	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	535 VE R
		521	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	535 VRME R
540	545	526	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	540 VE R
		526	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	540 VRME R
545	550	531	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	545 VE R
		531	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	545 VRME R

Axial shaft seals | V-ring seals – metric dimensions, globally valid outside North American market  
 d<sub>1</sub> 550–792 mm

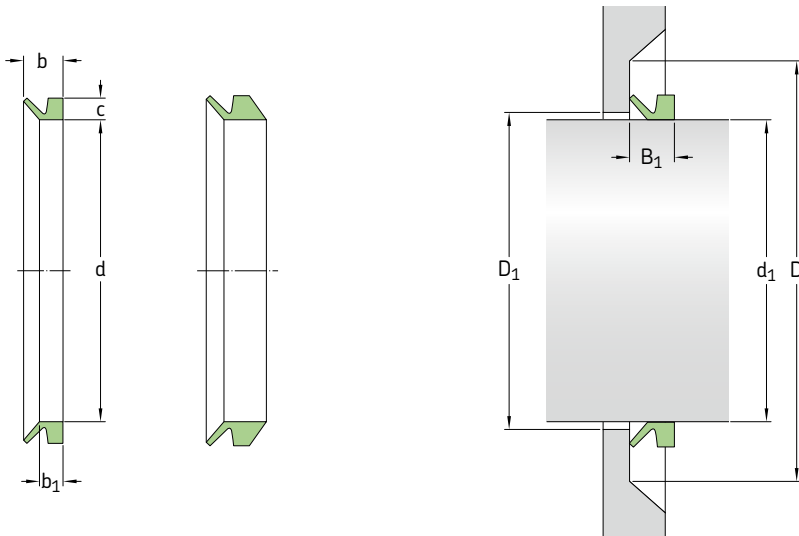


Dimensions		Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
mm										
550	555	536	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	550 VE R
		536	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	550 VRME R
555	560	541	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	555 VE R
		541	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	555 VRME R
560	565	546	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	560 VE R
		546	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	560 VRME R
565	570	550	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	565 VE R
		550	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	565 VRME R
570	575	555	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	570 VE R
		555	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	570 VRME R
575	580	560	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	575 VE R
		560	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	575 VRME R
575	625	540	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	600 VL R
		540	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	600 VL V
580	630	540	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	600 VA R
		540	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	V	600 VA V
580	585	565	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	580 VE R
		565	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	580 VRME R
585	590	570	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	585 VE R
		570	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	585 VRME R
590	600	575	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	590 VE R
		575	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	590 VRME R
600	610	582	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	600 VE R
		582	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	600 VRME R
610	620	592	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	610 VE R
		592	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	610 VRME R
620	630	602	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	620 VE R
		602	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	620 VRME R
615	675	600	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	650 VL R
		600	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	650 VL V



Dimensions		Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
mm		–								
630	665	600	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	R	650 VA R
		600	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	V	650 VAV
630	640	612	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	630 VE R
		612	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	630 VRME R
640	650	621	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	640 VE R
		621	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	640 VRME R
650	660	631	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	650 VE R
		631	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	650 VRME R
660	670	640	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	660 VE R
		640	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	660 VRME R
675	710	630	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	R	700 VL R
		630	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	V	700 VL V
665	705	630	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	R	700 VA R
		630	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	V	700 VAV
670	680	650	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	670 VE R
		650	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	670 VRME R
680	690	660	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	680 VE R
		660	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	680 VRME R
690	700	670	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	690 VE R
		670	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	690 VRME R
700	710	680	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	700 VE R
		680	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	700 VRME R
710	740	670	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	R	725 VL R
		670	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	V	725 VL V
705	745	670	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	R	725 VA R
		670	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	V	725 VAV
710	720	689	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	710 VE R
		689	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	710 VRME R
720	730	699	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	720 VE R
		699	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	720 VRME R
730	740	709	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	730 VE R
		709	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	730 VRME R
740	750	718	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	740 VE R
		718	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	740 VRME R
740	775	705	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	R	750 VL R
		705	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	V	750 VL V
745	785	705	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	R	750 VA R
		705	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	V	750 VAV
750	758	728	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	750 VE R
		728	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	750 VRME R
758	766	735	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	760 VE R
		735	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	760 VRME R
766	774	743	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	770 VE R
		743	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	770 VRME R
774	783	751	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	780 VE R
		751	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	780 VRME R
783	792	759	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	790 VE R
		759	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	790 VRME R

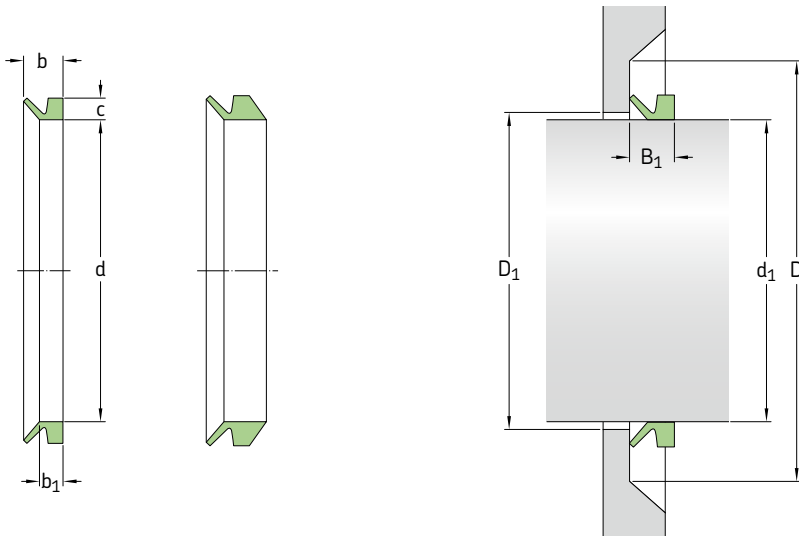
Axial shaft seals | V-ring seals – metric dimensions, globally valid outside North American market  
 d<sub>1</sub> 775–1 105 mm



Dimensions		Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
mm										
775	825	745	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	800 VL R
		745	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	800 VL V
785	830	745	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	800 VA R
		745	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	V	800 VA V
792	801	768	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	800 VE R
		768	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	800 VRME R
801	810	777	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	810 VE R
		777	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	810 VRME R
810	821	786	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	820 VE R
		786	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	820 VRME R
821	831	796	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	830 VE R
		796	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	830 VRME R
825	875	785	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	850 VL R
		785	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	850 VL V
830	875	785	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	850 VA R
		785	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	V	850 VA V
831	841	805	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	840 VE R
		805	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	840 VRME R
841	851	814	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	850 VE R
		814	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	850 VRME R
851	861	824	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	860 VE R
		824	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	860 VRME R
861	871	833	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	870 VE R
		833	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	870 VRME R
871	882	843	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	880 VE R
		843	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	880 VRME R
875	925	825	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	900 VL R
		825	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	900 VL V
875	920	825	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	900 VA R
		825	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	V	900 VA V

Dimensions		Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
mm		–								
882	892	853	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	890 VE R 890 VRME R
		853	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	
892	912	871	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	900 VE R 900 VRME R
		871	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	
912	922	880	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	920 VE R 920 VRME R
		880	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	
925	975	865	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	R	950 VL R 950 VL V
		865	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	V	
920	965	865	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	R	950 VA R 950 VAV
		865	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	V	
922	933	890	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	930 VE R 930 VRME R
		890	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	
933	944	900	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	940 VE R 940 VRME R
		900	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	
944	955	911	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	950 VE R 950 VRME R
		911	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	
955	966	921	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	960 VE R 960 VRME R
		921	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	
975	1 025	910	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	R	1000 VL R 1000 VL V
		910	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	V	
965	1 015	910	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	R	1000 VA R 1000 VAV
		910	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	V	
966	977	932	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	970 VE R 970 VRME R
		932	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	
977	988	942	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	980 VE R 980 VRME R
		942	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	
988	999	953	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	990 VE R 990 VRME R
		953	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	
999	1 010	963	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	1000 VE R 1000 VRME R
		963	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	
1 010	1 025	973	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	1020 VE R 1020 VRME R
		973	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	
1 025	1 075	955	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	R	1050 VL R 1050 VL V
		955	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	V	
1 015	1 065	955	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	R	1050 VA R
1 025	1 045	990	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	1040 VE R 1040 VRME R
		990	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	
1 045	1 065	1 008	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	1060 VE R 1060 VRME R
		1 008	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	
1 075	1 125	1 000	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	R	1100 VL R 1100 VL V
		1 000	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	V	
1 065	1 115	1 000	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	R	1100 VA R
1 065	1 085	1 027	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	1080 VE R 1080 VRME R
		1 027	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	
1 085	1 105	1 045	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	1100 VE R 1100 VRME R
		1 045	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	R	

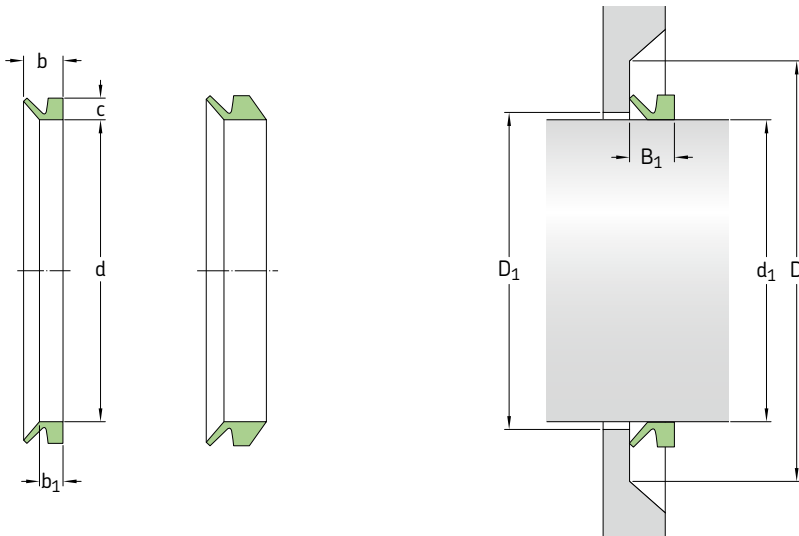
Axial shaft seals | V-ring seals – metric dimensions, globally valid outside North American market  
 d<sub>1</sub> 1105–1640 mm



Dimensions		Shaft diameter range d <sub>1</sub> over	Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
d <sub>1</sub> incl.											
mm											
1105	1125	1065	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1120 VE R 1120 VRME R	
		1065	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R		
1125	1175	1045	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	1150 VL R 1150 VL V	
		1045	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V		
1115	1165	1045	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	1150 VA R	
1125	1145	1084	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1140 VE R 1140 VRME R	
		1084	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R		
1145	1165	1103	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1160 VE R 1160 VRME R	
		1103	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R		
1175	1225	1090	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	1200 VL R 1200 VL V	
		1090	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V		
1165	1215	1090	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	1200 VA R	
1165	1185	1121	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1180 VE R 1180 VRME R	
		1121	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R		
1185	1205	1139	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1200 VE R 1200 VRME R	
		1139	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R		
1205	1225	1157	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1220 VE R 1220 VRME R	
		1157	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R		
1225	1275	1135	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	1250 VL R 1250 VL V	
		1135	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V		
1215	1270	1135	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	1250 VA R	
1225	1245	1176	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1240 VE R 1240 VRME R	
		1176	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R		
1245	1270	1195	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1260 VE R 1260 VRME R	
		1195	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R		
1270	1295	1218	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1280 VE R 1280 VRME R	
		1218	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R		
1275	1325	1180	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	1300 VL R 1300 VL V	
		1180	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V		

Dimensions		Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
mm										
1 270	1 320	1 180	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	R	1300 VA R
1 295	1 315	1 240 1 240	32,5 32,5	65 65	30 21	d <sub>1</sub> +24 d <sub>1</sub> +24	d <sub>1</sub> +115 d <sub>1</sub> +115	50 ± 12 50 ± 12	R R	1300 VE R 1300 VRME R
1 315	1 340	1 259 1 259	32,5 32,5	65 65	30 21	d <sub>1</sub> +24 d <sub>1</sub> +24	d <sub>1</sub> +115 d <sub>1</sub> +115	50 ± 12 50 ± 12	R R	1325 VE R 1325 VRME R
1 325	1 375	1 225 1 225	6 6	10,5 10,5	6,5 6,5	d <sub>1</sub> +5 d <sub>1</sub> +5	d <sub>1</sub> +20 d <sub>1</sub> +20	8 ± 1,5 8 ± 1,5	R V	1350 VL R 1350 VL V
1 320	1 370	1 225	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	R	1350 VA R
1 340	1 365	1 281 1 281	32,5 32,5	65 65	30 21	d <sub>1</sub> +24 d <sub>1</sub> +24	d <sub>1</sub> +115 d <sub>1</sub> +115	50 ± 12 50 ± 12	R R	1350 VE R 1350 VRME R
1 365	1 390	1 305 1 305	32,5 32,5	65 65	30 21	d <sub>1</sub> +24 d <sub>1</sub> +24	d <sub>1</sub> +115 d <sub>1</sub> +115	50 ± 12 50 ± 12	R R	1375 VE R 1375 VRME R
1 375	1 425	1 270 1 270	6 6	10,5 10,5	6,5 6,5	d <sub>1</sub> +5 d <sub>1</sub> +5	d <sub>1</sub> +20 d <sub>1</sub> +20	8 ± 1,5 8 ± 1,5	R V	1400 VL R 1400 VL V
1 370	1 420	1 270	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	R	1400 VA R
1 390	1 415	1 328 1 328	32,5 32,5	65 65	30 21	d <sub>1</sub> +24 d <sub>1</sub> +24	d <sub>1</sub> +115 d <sub>1</sub> +115	50 ± 12 50 ± 12	R R	1400 VE R 1400 VRME R
1 415	1 440	1 350 1 350	32,5 32,5	65 65	30 21	d <sub>1</sub> +24 d <sub>1</sub> +24	d <sub>1</sub> +115 d <sub>1</sub> +115	50 ± 12 50 ± 12	R R	1425 VE R 1425 VRME R
1 425	1 475	1 315 1 315	6 6	10,5 10,5	6,5 6,5	d <sub>1</sub> +5 d <sub>1</sub> +5	d <sub>1</sub> +20 d <sub>1</sub> +20	8 ± 1,5 8 ± 1,5	R V	1450 VL R 1450 VL V
1 420	1 470	1 315	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	R	1450 VA R
1 440	1 465	1 374 1 374	32,5 32,5	65 65	30 21	d <sub>1</sub> +24 d <sub>1</sub> +24	d <sub>1</sub> +115 d <sub>1</sub> +115	50 ± 12 50 ± 12	R R	1450 VE R 1450 VRME R
1 465	1 490	1 397 1 397	32,5 32,5	65 65	30 21	d <sub>1</sub> +24 d <sub>1</sub> +24	d <sub>1</sub> +115 d <sub>1</sub> +115	50 ± 12 50 ± 12	R R	1475 VE R 1475 VRME R
1 475	1 525	1 360 1 360	6 6	10,5 10,5	6,5 6,5	d <sub>1</sub> +5 d <sub>1</sub> +5	d <sub>1</sub> +20 d <sub>1</sub> +20	8 ± 1,5 8 ± 1,5	R V	1500 VL R 1500 VL V
1 470	1 520	1 360	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	R	1500 VA R
1 490	1 515	1 419 1 419	32,5 32,5	65 65	30 21	d <sub>1</sub> +24 d <sub>1</sub> +24	d <sub>1</sub> +115 d <sub>1</sub> +115	50 ± 12 50 ± 12	R R	1500 VE R 1500 VRME R
1 515	1 540	1 443 1 443	32,5 32,5	65 65	30 21	d <sub>1</sub> +24 d <sub>1</sub> +24	d <sub>1</sub> +115 d <sub>1</sub> +115	50 ± 12 50 ± 12	R R	1525 VE R 1525 VRME R
1 525	1 575	1 405 1 405	6 6	10,5 10,5	6,5 6,5	d <sub>1</sub> +5 d <sub>1</sub> +5	d <sub>1</sub> +20 d <sub>1</sub> +20	8 ± 1,5 8 ± 1,5	R V	1550 VL R 1550 VL V
1 520	1 570	1 405	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	R	1550 VA R
1 540	1 570	1 467 1 467	32,5 32,5	65 65	30 21	d <sub>1</sub> +24 d <sub>1</sub> +24	d <sub>1</sub> +115 d <sub>1</sub> +115	50 ± 12 50 ± 12	R R	1550 VE R 1550 VRME R
1 570	1 600	1 495 1 495	32,5 32,5	65 65	30 21	d <sub>1</sub> +24 d <sub>1</sub> +24	d <sub>1</sub> +115 d <sub>1</sub> +115	50 ± 12 50 ± 12	R R	1575 VE R 1575 VRME R
1 575	1 625	1 450 1 450	6 6	10,5 10,5	6,5 6,5	d <sub>1</sub> +5 d <sub>1</sub> +5	d <sub>1</sub> +20 d <sub>1</sub> +20	8 ± 1,5 8 ± 1,5	R V	1600 VL R 1600 VL V
1 570	1 620	1 450	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	R	1600 VA R
1 600	1 640	1 524 1 524	32,5 32,5	65 65	30 21	d <sub>1</sub> +24 d <sub>1</sub> +24	d <sub>1</sub> +115 d <sub>1</sub> +115	50 ± 12 50 ± 12	R R	1600 VE R 1600 VRME R

Axial shaft seals | V-ring seals – metric dimensions, globally valid outside North American market  
 d<sub>1</sub> 1 625–2020 mm

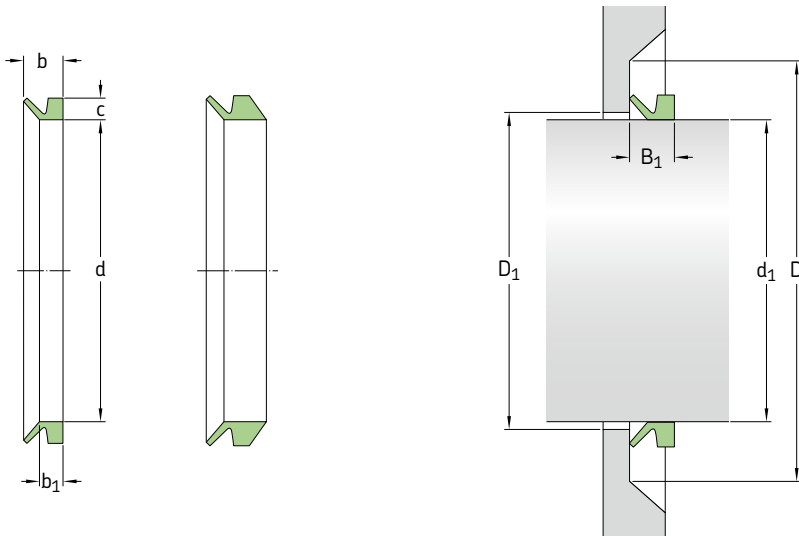


Dimensions		Shaft diameter range d <sub>1</sub> over	Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
d <sub>1</sub> incl.	mm										
1 625	1 675	1 495	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	1650 VL R	
		1 495	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	1650 VL V	
1 620	1 670	1 495	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	1650 VA R	
1 640	1 680	1 559	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1650 VE R	
		1 559	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1650 VRME R	
1 675	1 725	1 540	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	1700 VL R	
		1 540	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	1700 VL V	
1 670	1 720	1 540	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	1700 VA R	
1 720	1 720	1 596	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1700 VE R	
		1 596	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1700 VRME R	
1 725	1 775	1 585	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	1750 VL R	
		1 585	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	1750 VL V	
1 720	1 770	1 585	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	1750 VA R	
1 720	1 765	1 632	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1750 VE R	
		1 632	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1750 VRME R	
1 765	1 810	1 671	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1800 VE R	
		1 671	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1800 VRME R	
1 775	1 825	1 630	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	1800 VL R	
		1 630	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	1800 VL V	
1 770	1 820	1 630	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	1800 VA R	
1 810	1 855	1 714	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1850 VE R	
		1 714	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1850 VRME R	
1 825	1 875	1 675	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	1850 VL R	
		1 675	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	1850 VL V	
1 820	1 870	1 675	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	1850 VA R	
1 855	1 905	1 753	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1900 VE R	
		1 753	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1900 VRME R	
1 875	1 925	1 720	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	1900 VL R	
		1 720	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	1900 VL V	

Dimensions		Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation	
Shaft diameter range d <sub>1</sub> over	incl.										
mm										–	–
<b>1 870</b>	<b>1 920</b>	1 720	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	R	<b>1900 VA R</b>	
<b>1 905</b>	<b>1 955</b>	1 794 1 794	32,5 32,5	65 65	30 21	d <sub>1</sub> +24 d <sub>1</sub> +24	d <sub>1</sub> +115 d <sub>1</sub> +115	50 ± 12 50 ± 12	R R	<b>1950 VE R</b> <b>1950 VRME R</b>	
<b>1 925</b>	<b>1 975</b>	1 765 1 765	6 6	10,5 10,5	6,5 6,5	d <sub>1</sub> +5 d <sub>1</sub> +5	d <sub>1</sub> +20 d <sub>1</sub> +20	8 ± 1,5 8 ± 1,5	R V	<b>1950 VL R</b> <b>1950 VL V</b>	
<b>1 920</b>	<b>1 970</b>	1 765	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	R	<b>1950 VA R</b>	
<b>1 955</b>	<b>2 010</b>	1 844 1 844	32,5 32,5	65 65	30 21	d <sub>1</sub> +24 d <sub>1</sub> +24	d <sub>1</sub> +115 d <sub>1</sub> +115	50 ± 12 50 ± 12	R R	<b>2000 VE R</b> <b>2000 VRME R</b>	
<b>1 975</b>	<b>2 025</b>	1 810 1 810	6 6	10,5 10,5	6,5 6,5	d <sub>1</sub> +5 d <sub>1</sub> +5	d <sub>1</sub> +20 d <sub>1</sub> +20	8 ± 1,5 8 ± 1,5	R V	<b>2000 VL R</b> <b>2000 VL V</b>	
<b>1 970</b>	<b>2 020</b>	1 810	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	R	<b>2000 VA R</b>	

Axial shaft seals | V-ring seals – inch dimensions, globally valid outside North American market

d<sub>1</sub> 0.11–2.28 in

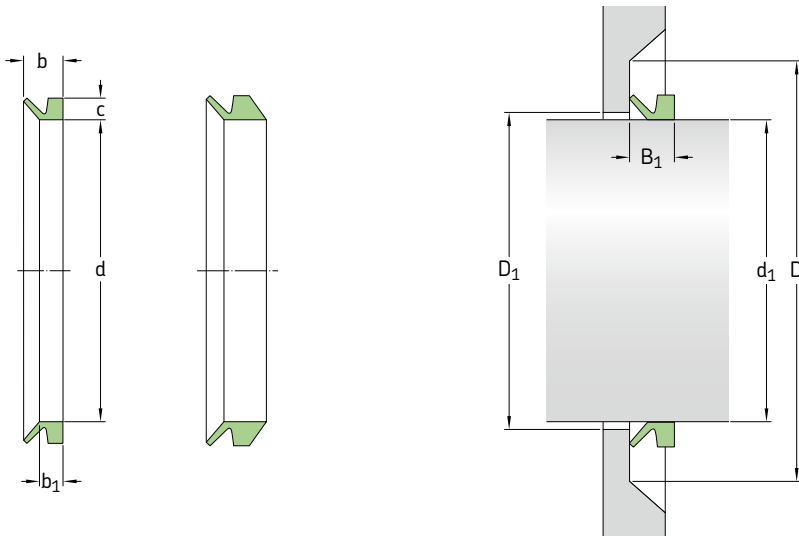


Dimensions		Shaft diameter range d <sub>1</sub> over	incl.	Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
in												
<b>0.11</b>	<b>0.14</b>	0.10	0.10	0.06	0.06	0.08	0.08	0.04	0.16	0.10 ± 0.012	R	<b>3 VA R</b>
		0.10	0.10	0.06	0.06	0.08	0.08	0.04	0.16	0.10 ± 0.012	V	<b>3 VA V</b>
<b>0.14</b>	<b>0.18</b>	0.13	0.13	0.08	0.08	0.09	0.09	0.04	0.24	0.12 ± 0.016	R	<b>4 VA R</b>
		0.13	0.13	0.08	0.08	0.09	0.09	0.04	0.24	0.12 ± 0.016	V	<b>4 VA V</b>
<b>0.18</b>	<b>0.22</b>	0.16	0.16	0.08	0.08	0.09	0.09	0.04	0.24	0.12 ± 0.016	R	<b>5 VA R</b>
		0.16	0.16	0.08	0.08	0.09	0.09	0.04	0.24	0.12 ± 0.016	V	<b>5 VA V</b>
		0.16	0.16	0.08	0.08	0.15	0.15	0.04	0.24	0.18 ± 0.016	R	<b>5 VS R</b>
		0.16	0.16	0.08	0.08	0.15	0.15	0.04	0.24	0.18 ± 0.016	V	<b>5 VS V</b>
<b>0.22</b>	<b>0.26</b>	0.20	0.20	0.08	0.08	0.09	0.09	0.04	0.24	0.12 ± 0.016	R	<b>6 VA R</b>
		0.20	0.20	0.08	0.08	0.09	0.09	0.04	0.24	0.12 ± 0.016	V	<b>6 VA V</b>
		0.20	0.20	0.08	0.08	0.15	0.15	0.04	0.24	0.18 ± 0.016	R	<b>6 VS R</b>
		0.20	0.20	0.08	0.08	0.15	0.15	0.04	0.24	0.18 ± 0.016	V	<b>6 VS V</b>
<b>0.26</b>	<b>0.31</b>	0.24	0.24	0.08	0.08	0.09	0.09	0.04	0.24	0.12 ± 0.016	R	<b>7 VA R</b>
		0.24	0.24	0.08	0.08	0.09	0.09	0.04	0.24	0.12 ± 0.016	V	<b>7 VA V</b>
		0.24	0.24	0.08	0.08	0.15	0.15	0.04	0.24	0.18 ± 0.016	R	<b>7 VS R</b>
		0.24	0.24	0.08	0.08	0.15	0.15	0.04	0.24	0.18 ± 0.016	V	<b>7 VS V</b>
<b>0.31</b>	<b>0.37</b>	0.28	0.28	0.08	0.08	0.09	0.09	0.04	0.24	0.12 ± 0.016	R	<b>8 VA R</b>
		0.28	0.28	0.08	0.08	0.09	0.09	0.04	0.24	0.12 ± 0.016	V	<b>8 VA V</b>
		0.28	0.28	0.08	0.08	0.15	0.15	0.04	0.24	0.18 ± 0.016	R	<b>8 VS R</b>
		0.28	0.28	0.08	0.08	0.15	0.15	0.04	0.24	0.18 ± 0.016	V	<b>8 VS V</b>
<b>0.37</b>	<b>0.45</b>	0.35	0.35	0.12	0.12	0.13	0.13	0.04	0.35	0.18 ± 0.02	R	<b>10 VA R</b>
		0.35	0.35	0.12	0.12	0.13	0.13	0.04	0.35	0.18 ± 0.02	V	<b>10 VA V</b>
		0.35	0.35	0.12	0.12	0.22	0.22	0.04	0.35	0.26 ± 0.02	R	<b>10 VS R</b>
		0.35	0.35	0.12	0.12	0.22	0.22	0.04	0.35	0.26 ± 0.02	V	<b>10 VS V</b>
<b>0.45</b>	<b>0.49</b>	0.41	0.41	0.12	0.12	0.13	0.13	0.04	0.35	0.18 ± 0.02	R	<b>12 VA R</b>
		0.41	0.41	0.12	0.12	0.13	0.13	0.04	0.35	0.18 ± 0.02	V	<b>12 VA V</b>
<b>0.45</b>	<b>0.53</b>	0.41	0.41	0.12	0.12	0.22	0.22	0.04	0.35	0.26 ± 0.02	R	<b>12 VS R</b>
		0.41	0.41	0.12	0.12	0.22	0.22	0.04	0.35	0.26 ± 0.02	V	<b>12 VS V</b>
<b>0.49</b>	<b>0.53</b>	0.46	0.46	0.12	0.12	0.13	0.13	0.04	0.35	0.18 ± 0.02	R	<b>13 VA R</b>
		0.46	0.46	0.12	0.12	0.13	0.13	0.04	0.35	0.18 ± 0.02	V	<b>13 VA V</b>
<b>0.53</b>	<b>0.61</b>	0.49	0.49	0.12	0.12	0.13	0.13	0.04	0.35	0.18 ± 0.02	R	<b>14 VA R</b>
		0.49	0.49	0.12	0.12	0.13	0.13	0.04	0.35	0.18 ± 0.02	V	<b>14 VA V</b>
<b>0.53</b>	<b>0.61</b>	0.49	0.49	0.12	0.12	0.22	0.22	0.04	0.35	0.26 ± 0.02	R	<b>14 VS R</b>
		0.49	0.49	0.12	0.12	0.22	0.22	0.04	0.35	0.26 ± 0.02	V	<b>14 VS V</b>



Dimensions		Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
in									-	-
<b>0.61</b>	<b>0.67</b>	0.55	0.12	0.13	0.22	0.04	0.35	0.18 ± 0.02	R	<b>16 VA R</b>
		0.55	0.12	0.13	0.22	0.04	0.35	0.18 ± 0.02	V	<b>16 VA V</b>
<b>0.61</b>	<b>0.69</b>	0.55	0.12	0.22	0.30	0.04	0.35	0.26 ± 0.02	R	<b>16 VS R</b>
		0.55	0.12	0.22	0.30	0.04	0.35	0.26 ± 0.02	V	<b>16 VS V</b>
<b>0.69</b>	<b>0.75</b>	0.63	0.12	0.13	0.22	0.04	0.35	0.18 ± 0.02	R	<b>18 VA R</b>
		0.63	0.12	0.13	0.22	0.04	0.35	0.18 ± 0.02	V	<b>18 VA V</b>
		0.63	0.12	0.22	0.30	0.04	0.35	0.26 ± 0.02	R	<b>18 VS R</b>
		0.63	0.12	0.22	0.30	0.04	0.35	0.26 ± 0.02	V	<b>18 VS V</b>
<b>0.75</b>	<b>0.83</b>	0.71	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	R	<b>20 VA R</b>
		0.71	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	V	<b>20 VA V</b>
		0.71	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	R	<b>20 VS R</b>
		0.71	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	V	<b>20 VS V</b>
<b>0.83</b>	<b>0.94</b>	0.79	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	R	<b>22 VA R</b>
		0.79	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	V	<b>22 VA V</b>
		0.79	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	R	<b>22 VS R</b>
		0.79	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	V	<b>22 VS V</b>
<b>0.94</b>	<b>1.06</b>	0.87	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	R	<b>25 VA R</b>
		0.87	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	V	<b>25 VA V</b>
		0.87	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	R	<b>25 VS R</b>
		0.87	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	V	<b>25 VS V</b>
<b>1.06</b>	<b>1.14</b>	0.98	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	R	<b>28 VA R</b>
		0.98	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	V	<b>28 VA V</b>
		0.98	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	R	<b>28 VS R</b>
		0.98	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	V	<b>28 VS V</b>
<b>1.14</b>	<b>1.22</b>	1.06	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	R	<b>30 VA R</b>
		1.06	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	V	<b>30 VA V</b>
		1.06	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	R	<b>30 VS R</b>
		1.06	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	V	<b>30 VS V</b>
<b>1.22</b>	<b>1.30</b>	1.14	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	R	<b>32 VA R</b>
		1.14	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	V	<b>32 VA V</b>
		1.14	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	R	<b>32 VS R</b>
		1.14	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	V	<b>32 VS V</b>
<b>1.30</b>	<b>1.42</b>	1.22	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	R	<b>35 VA R</b>
		1.22	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	V	<b>35 VA V</b>
		1.22	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	R	<b>35 VS R</b>
		1.22	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	V	<b>35 VS V</b>
<b>1.42</b>	<b>1.50</b>	1.34	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	R	<b>38 VA R</b>
		1.34	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	V	<b>38 VA V</b>
		1.34	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	R	<b>38 VS R</b>
		1.34	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	V	<b>38 VS V</b>
<b>1.50</b>	<b>1.69</b>	1.42	0.20	0.22	0.35	0.08	0.59	0.28 ± 0.04	R	<b>40 VA R</b>
		1.42	0.20	0.22	0.35	0.08	0.59	0.28 ± 0.04	V	<b>40 VA V</b>
		1.42	0.20	0.37	0.51	0.08	0.59	0.43 ± 0.04	R	<b>40 VS R</b>
		1.42	0.20	0.37	0.51	0.08	0.59	0.43 ± 0.04	V	<b>40 VS V</b>
<b>1.69</b>	<b>1.89</b>	1.57	0.20	0.22	0.35	0.08	0.59	0.28 ± 0.04	R	<b>45 VA R</b>
		1.57	0.20	0.22	0.35	0.08	0.59	0.28 ± 0.04	V	<b>45 VA V</b>
		1.57	0.20	0.37	0.51	0.08	0.59	0.43 ± 0.04	R	<b>45 VS R</b>
		1.57	0.20	0.37	0.51	0.08	0.59	0.43 ± 0.04	V	<b>45 VS V</b>
<b>1.89</b>	<b>2.09</b>	1.77	0.20	0.22	0.35	0.08	0.59	0.28 ± 0.04	R	<b>50 VA R</b>
		1.77	0.20	0.22	0.35	0.08	0.59	0.28 ± 0.04	V	<b>50 VA V</b>
		1.77	0.20	0.37	0.51	0.08	0.59	0.43 ± 0.04	R	<b>50 VS R</b>
		1.77	0.20	0.37	0.51	0.08	0.59	0.43 ± 0.04	V	<b>50 VS V</b>
<b>2.09</b>	<b>2.28</b>	1.93	0.20	0.22	0.35	0.08	0.59	0.28 ± 0.04	R	<b>55 VA R</b>
		1.93	0.20	0.22	0.35	0.08	0.59	0.28 ± 0.04	V	<b>55 VA V</b>
		1.93	0.20	0.37	0.51	0.08	0.59	0.43 ± 0.04	R	<b>55 VS R</b>
		1.93	0.20	0.37	0.51	0.08	0.59	0.43 ± 0.04	V	<b>55 VS V</b>

d<sub>1</sub> 2.28–8.27 in

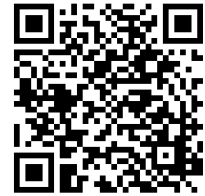
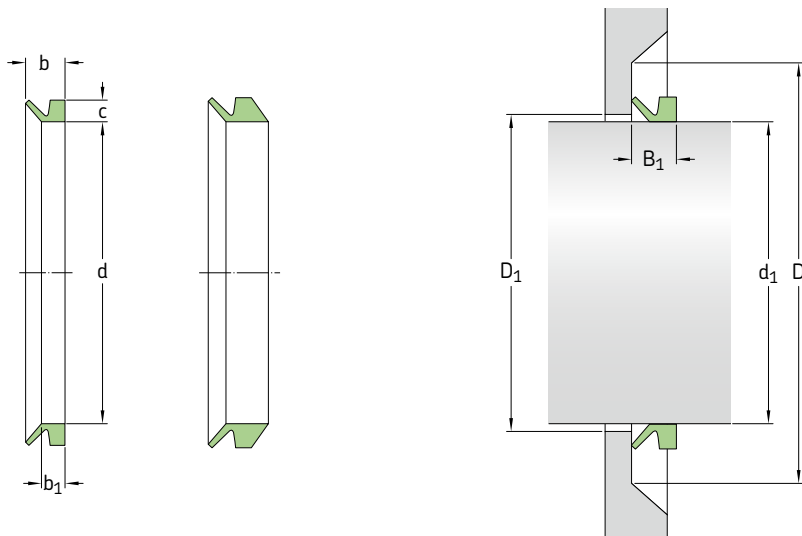


Dimensions		Shaft diameter range d <sub>1</sub> over	incl.	Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
in												
2.28	2.48	2.13	0.20	0.22	0.35	0.08	0.59	0.28 ± 0.04	R	60 VA R		
		2.13	0.20	0.22	0.35	0.08	0.59	0.28 ± 0.04	V	60 VA V		
		2.13	0.20	0.37	0.51	0.08	0.59	0.43 ± 0.04	R	60 VS R		
		2.13	0.20	0.37	0.51	0.08	0.59	0.43 ± 0.04	V	60 VS V		
2.48	2.68	2.28	0.20	0.22	0.35	0.08	0.59	0.28 ± 0.04	R	65 VA R		
		2.28	0.20	0.22	0.35	0.08	0.59	0.28 ± 0.04	V	65 VA V		
		2.28	0.20	0.37	0.51	0.08	0.59	0.43 ± 0.04	R	65 VS R		
		2.28	0.20	0.37	0.51	0.08	0.59	0.43 ± 0.04	V	65 VS V		
2.68	2.87	2.48	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	R	70 VA R		
		2.48	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	V	70 VA V		
		2.48	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	R	70 VS R		
		2.48	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	V	70 VS V		
2.87	3.07	2.64	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	R	75 VA R		
		2.64	0.24	0.27	0.43	0.12	0.71	0.53 ± 0.05	R	75 VS R		
		2.64	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	V	75 VS V		
3.07	3.27	2.83	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	R	80 VA R		
		2.83	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	V	80 VA V		
		2.83	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	R	80 VS R		
		2.83	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	V	80 VS V		
3.27	3.46	2.99	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	R	85 VA R		
		2.99	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	V	85 VA V		
		2.99	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	R	85 VS R		
		2.99	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	V	85 VS V		
3.46	3.66	3.19	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	R	90 VA R		
		3.19	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	V	90 VA V		
		3.19	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	R	90 VS R		
		3.19	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	V	90 VS V		
3.66	3.86	3.35	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	R	95 VA R		
		3.35	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	V	95 VA V		
		3.35	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	R	95 VS R		
		3.35	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	V	95 VS V		
3.86	4.13	3.54	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	R	100 VA R		
		3.54	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	V	100 VA V		
		3.54	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	R	100 VS R		
		3.54	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	V	100 VS V		

Dimensions		Shaft diameter range d <sub>1</sub> over	incl.	Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
in												
<b>4.13</b>	<b>4.53</b>	3.90		0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	<b>110 VL R</b>	
		3.90		0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	<b>110 VL V</b>	
		3.90		0.28	0.31	0.50	0.16	0.83	0.41 ± 0.06	R	<b>110 VA R</b>	
		3.90		0.28	0.31	0.50	0.16	0.83	0.41 ± 0.06	V	<b>110 VA V</b>	
		3.90		0.28	0.52	0.71	0.16	0.83	0.61 ± 0.06	R	<b>110 VS R</b>	
		3.90		0.28	0.52	0.71	0.16	0.83	0.61 ± 0.06	V	<b>110 VS V</b>	
<b>4.53</b>	<b>4.92</b>	4.25		0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	<b>120 VL R</b>	
		4.25		0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	<b>120 VL V</b>	
		4.25		0.28	0.31	0.50	0.16	0.83	0.41 ± 0.06	R	<b>120 VA R</b>	
		4.25		0.28	0.31	0.50	0.16	0.83	0.41 ± 0.06	V	<b>120 VA V</b>	
		4.25		0.28	0.52	0.71	0.16	0.83	0.61 ± 0.06	R	<b>120 VS R</b>	
		4.25		0.28	0.52	0.71	0.16	0.83	0.61 ± 0.06	V	<b>120 VS V</b>	
<b>4.92</b>	<b>5.31</b>	4.61		0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	<b>130 VL R</b>	
		4.61		0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	<b>130 VL V</b>	
		4.61		0.28	0.31	0.50	0.16	0.83	0.41 ± 0.06	R	<b>130 VA R</b>	
		4.61		0.28	0.31	0.50	0.16	0.83	0.41 ± 0.06	V	<b>130 VA V</b>	
		4.61		0.28	0.52	0.71	0.16	0.83	0.61 ± 0.06	R	<b>130 VS R</b>	
		4.61		0.28	0.52	0.71	0.16	0.83	0.61 ± 0.06	V	<b>130 VS V</b>	
<b>5.31</b>	<b>5.71</b>	4.96		0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	<b>140 VL R</b>	
		4.96		0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	<b>140 VL V</b>	
		4.96		0.28	0.31	0.50	0.16	0.83	0.41 ± 0.06	R	<b>140 VA R</b>	
		4.96		0.28	0.31	0.50	0.16	0.83	0.41 ± 0.06	V	<b>140 VA V</b>	
		4.96		0.28	0.52	0.71	0.16	0.83	0.61 ± 0.06	R	<b>140 VS R</b>	
		4.96		0.28	0.52	0.71	0.16	0.83	0.61 ± 0.06	V	<b>140 VS V</b>	
<b>5.71</b>	<b>6.10</b>	5.31		0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	<b>150 VL R</b>	
		5.31		0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	<b>150 VL V</b>	
		5.31		0.28	0.31	0.50	0.16	0.83	0.41 ± 0.06	R	<b>150 VA R</b>	
		5.31		0.28	0.31	0.50	0.16	0.83	0.41 ± 0.06	V	<b>150 VA V</b>	
		5.31		0.28	0.52	0.71	0.16	0.83	0.61 ± 0.06	R	<b>150 VS R</b>	
		5.31		0.28	0.52	0.71	0.16	0.83	0.61 ± 0.06	V	<b>150 VS V</b>	
<b>6.10</b>	<b>6.50</b>	5.67		0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	<b>160 VL R</b>	
		5.67		0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	<b>160 VL V</b>	
		5.67		0.31	0.35	0.57	0.16	0.94	0.47 ± 0.07	R	<b>160 VA R</b>	
		5.67		0.31	0.35	0.57	0.16	0.94	0.47 ± 0.07	V	<b>160 VA V</b>	
		5.67		0.31	0.59	0.81	0.16	0.94	0.71 ± 0.07	R	<b>160 VS R</b>	
		5.67		0.31	0.59	0.81	0.16	0.94	0.71 ± 0.07	V	<b>160 VS V</b>	
<b>6.50</b>	<b>6.89</b>	6.02		0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	<b>170 VL R</b>	
		6.02		0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	<b>170 VL V</b>	
		6.02		0.31	0.35	0.57	0.16	0.94	0.47 ± 0.07	R	<b>170 VA R</b>	
		6.02		0.31	0.35	0.57	0.16	0.94	0.47 ± 0.07	V	<b>170 VA V</b>	
		6.02		0.31	0.59	0.81	0.16	0.94	0.71 ± 0.07	R	<b>170 VS R</b>	
		6.02		0.31	0.59	0.81	0.16	0.94	0.71 ± 0.07	V	<b>170 VS V</b>	
<b>6.89</b>	<b>7.28</b>	6.38		0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	<b>180 VL R</b>	
		6.38		0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	<b>180 VL V</b>	
		6.38		0.31	0.35	0.57	0.16	0.94	0.47 ± 0.07	R	<b>180 VA R</b>	
		6.38		0.31	0.35	0.57	0.16	0.94	0.47 ± 0.07	V	<b>180 VA V</b>	
		6.38		0.31	0.59	0.81	0.16	0.94	0.71 ± 0.07	R	<b>180 VS R</b>	
		6.38		0.31	0.59	0.81	0.16	0.94	0.71 ± 0.07	V	<b>180 VS V</b>	
<b>7.28</b>	<b>7.68</b>	6.73		0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	<b>190 VL R</b>	
		6.73		0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	<b>190 VL V</b>	
		6.73		0.31	0.35	0.57	0.16	0.94	0.47 ± 0.07	R	<b>190 VA R</b>	
		6.73		0.31	0.35	0.57	0.16	0.94	0.47 ± 0.07	V	<b>190 VA V</b>	
		6.73		0.31	0.59	0.81	0.16	0.94	0.71 ± 0.07	R	<b>190 VS R</b>	
		6.73		0.31	0.59	0.81	0.16	0.94	0.71 ± 0.07	V	<b>190 VS V</b>	
<b>7.68</b>	<b>8.27</b>	7.17		0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	<b>200 VL R</b>	
		7.17		0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	<b>200 VL V</b>	
		7.09		0.31	0.35	0.57	0.16	0.94	0.47 ± 0.07	R	<b>199 VA R</b>	
		7.09		0.31	0.35	0.57	0.16	0.94	0.47 ± 0.07	V	<b>199 VA V</b>	
		7.09		0.31	0.59	0.81	0.16	0.94	0.71 ± 0.07	R	<b>199 VS R</b>	
		7.09		0.31	0.59	0.81	0.16	0.94	0.71 ± 0.07	V	<b>199 VS V</b>	

Axial shaft seals | V-ring seals – inch dimensions, globally valid outside North American market

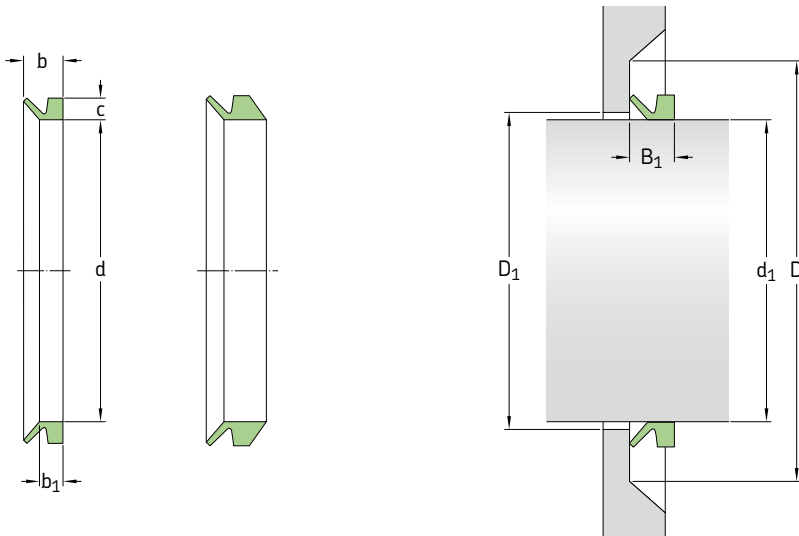
d<sub>1</sub> 7.48–16.34 in



Dimensions		Shaft diameter range d <sub>1</sub> over	Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
d <sub>1</sub> incl.											
7.48	8.27		7.09	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	200 VA R
			7.09	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	V	200 VAV
8.27	9.17		7.80	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	220 VL R
			7.80	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	220 VLV
			7.80	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	220 VA R
			7.80	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	V	220 VAV
9.17	10.24		8.86	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	250 VL R
			8.86	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	250 VLV
9.25	10.43		8.86	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	250 VA R
			8.86	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	V	250 VAV
10.24	11.22		9.72	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	275 VL R
			9.72	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	275 VLV
10.43	11.42		9.72	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	275 VA R
			9.72	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	V	275 VAV
11.22	12.20		10.63	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	300 VL R
			10.63	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	300 VLV
11.42	12.20		10.63	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	300 VA R
			10.63	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	V	300 VAV
11.81	12.01		11.57	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	300 VE R
			11.57	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	300 VRME R
12.01	12.20		11.77	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	305 VE R
			11.77	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	305 VRME R
12.20	13.19		11.50	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	325 VL R
			11.50	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	325 VLV
			11.50	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	325 VA R
12.20	13.19		11.50	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	V	325 VAV
			11.97	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	310 VE R
			11.97	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	310 VRME R
12.40	12.60		12.17	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	315 VE R
			12.17	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	315 VRME R
12.60	12.80		12.36	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	320 VE R
			12.36	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	320 VRME R

Dimensions		Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
in									–	–
<b>12.80</b>	<b>12.99</b>	12.56 12.56	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>325 VE R</b> <b>325 VRME R</b>
<b>12.99</b>	<b>13.19</b>	12.72 12.72	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>330 VE R</b> <b>330 VRME R</b>
<b>13.19</b>	<b>14.37</b>	12.40 12.40 12.40 12.40	0.26 0.26 0.59 0.59	0.24 0.24 0.56 0.56	0.41 0.41 0.98 0.98	0.20 0.20 0.39 0.39	0.79 0.79 1.77 1.77	0.31 ± 0.06 0.31 ± 0.06 0.79 ± 0.16 0.79 ± 0.16	R V R V	<b>350 VL R</b> <b>350 VL V</b> <b>350 VA R</b> <b>350 VAV</b>
<b>13.19</b>	<b>13.39</b>	12.91 12.91	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>335 VE R</b> <b>335 VRME R</b>
<b>13.39</b>	<b>13.58</b>	13.11 12.91	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>340 VE R</b> <b>340 VRME R</b>
<b>13.58</b>	<b>13.78</b>	13.31 13.31	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>345 VE R</b> <b>345 VRME R</b>
<b>13.78</b>	<b>13.98</b>	13.50 13.50	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>350 VE R</b> <b>350 VRME R</b>
<b>13.98</b>	<b>14.17</b>	13.66 13.66	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>355 VE R</b> <b>355 VRME R</b>
<b>14.17</b>	<b>14.37</b>	13.86 14.06	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>360 VE R</b> <b>360 VRME R</b>
<b>14.37</b>	<b>15.16</b>	13.27 13.27	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	<b>375 VL R</b> <b>375 VL V</b>
<b>14.37</b>	<b>15.35</b>	13.27 13.27	0.59 0.59	0.56 0.56	0.98 0.98	0.39 0.39	1.77 1.77	0.79 ± 0.16 0.79 ± 0.16	R V	<b>375 VA R</b> <b>375 VAV</b>
<b>14.37</b>	<b>14.57</b>	14.06	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>365 VE R</b>
<b>14.57</b>	<b>14.76</b>	14.25 14.25	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>370 VE R</b> <b>370 VRME R</b>
<b>14.76</b>	<b>14.96</b>	14.45 14.45	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>375 VE R</b> <b>375 VRME R</b>
<b>14.96</b>	<b>15.16</b>	14.61 14.61	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>380 VE R</b> <b>380 VRME R</b>
<b>15.16</b>	<b>16.14</b>	14.17 14.17	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	<b>400 VL R</b> <b>400 VL V</b>
<b>15.35</b>	<b>16.93</b>	14.17 14.17	0.59 0.59	0.56 0.56	0.98 0.98	0.39 0.39	1.77 1.77	0.79 ± 0.16 0.79 ± 0.16	R V	<b>400 VA R</b> <b>400 VAV</b>
<b>15.16</b>	<b>15.35</b>	14.80 14.80	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>385 VE R</b> <b>385 VRME R</b>
<b>15.35</b>	<b>15.55</b>	15.00 15.00	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>390 VE R</b> <b>390 VRME R</b>
<b>15.55</b>	<b>15.75</b>	15.20 15.20	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>395 VE R</b> <b>395 VRME R</b>
<b>15.75</b>	<b>15.94</b>	15.39 15.39	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>400 VE R</b> <b>400 VRME R</b>
<b>15.94</b>	<b>16.14</b>	15.59 15.59	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>405 VE R</b> <b>405 VRME R</b>
<b>16.14</b>	<b>16.34</b>	15.79 15.79	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>410 VE R</b> <b>410 VRME R</b>

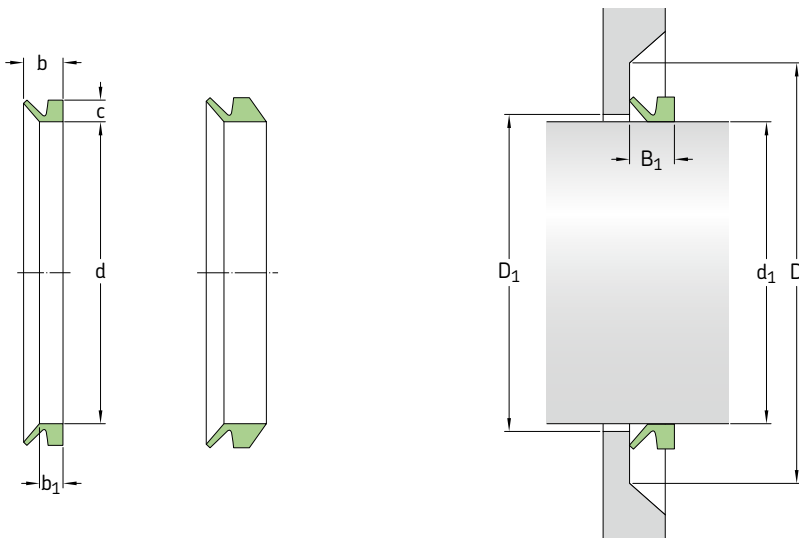
d<sub>1</sub> 16.34–22.24 in



Dimensions		Shaft diameter range d <sub>1</sub> over	Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
d <sub>1</sub> incl.											
in											
16.34	16.54	15.94 15.94	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	415 VE R 415 VRME R	
16.54	16.73	16.14 16.14	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	420 VE R 420 VRME R	
16.73	16.93	16.34 16.34	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	425 VE R 425 VRME R	
16.14	17.32	15.04 15.04	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	425 VL R 425 VL V	
17.32	18.70	15.94 15.94	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	450 VL R 450 VL V	
16.93	18.90	15.94 15.94	0.59 0.59	0.56 0.56	0.98 0.98	0.39 0.39	1.77 1.77	0.79 ± 0.16 0.79 ± 0.16	R V	450 VA R 450 VA V	
16.93	17.13	16.54 16.54	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	430 VE R 430 VRME R	
17.13	17.32	16.73 16.73	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	435 VE R 435 VRME R	
17.32	17.52	16.89 16.89	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	440 VE R 440 VRME R	
17.52	17.72	17.09 17.09	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	445 VE R 445 VRME R	
17.72	17.91	17.28 17.28	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	450 VE R 450 VRME R	
17.91	18.11	17.48 17.48	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	455 VE R 455 VRME R	
18.11	18.31	17.64 17.64	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	460 VE R 460 VRME R	
18.31	18.50	17.83 17.83	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	465 VE R 465 VRME R	
18.50	18.70	18.03 18.03	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	470 VE R 470 VRME R	

Dimensions		Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
in		–								
<b>18.70</b>	<b>18.90</b>	18.23 18.23	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>475 VE R</b> <b>475 VRME R</b>
<b>18.70</b>	<b>20.08</b>	17.72 17.72	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	<b>500 VL R</b> <b>500 VL V</b>
<b>20.08</b>	<b>21.26</b>	18.58 18.58	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	<b>525 VL R</b> <b>525 VL V</b>
<b>18.90</b>	<b>20.87</b>	17.72 17.72	0.59 0.59	0.56 0.56	0.98 0.98	0.39 0.39	1.77 1.77	0.79 ± 0.16 0.79 ± 0.16	R V	<b>500 VA R</b> <b>500 VAV</b>
<b>18.90</b>	<b>19.09</b>	18.43 18.43	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>480 VE R</b> <b>480 VRME R</b>
<b>19.09</b>	<b>19.29</b>	18.62 18.62	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>485 VE R</b> <b>485 VRME R</b>
<b>19.29</b>	<b>19.49</b>	18.82 18.82	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>490 VE R</b> <b>490 VRME R</b>
<b>19.49</b>	<b>19.69</b>	19.02 19.02	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>495 VE R</b> <b>495 VRME R</b>
<b>19.69</b>	<b>19.88</b>	19.21 19.21	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>500 VE R</b> <b>500 VRME R</b>
<b>19.88</b>	<b>20.08</b>	19.41 19.41	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>505 VE R</b> <b>505 VRME R</b>
<b>20.08</b>	<b>20.28</b>	19.57 19.57	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>510 VE R</b> <b>510 VRME R</b>
<b>20.28</b>	<b>20.47</b>	19.76 19.76	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>515 VE R</b> <b>515 VRME R</b>
<b>20.47</b>	<b>20.67</b>	19.96 19.96	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>520 VE R</b> <b>520 VRME R</b>
<b>20.67</b>	<b>20.87</b>	20.16 20.16	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>525 VE R</b> <b>525 VRME R</b>
<b>21.26</b>	<b>22.64</b>	19.49 19.49	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	<b>550 VL R</b> <b>550 VL V</b>
<b>20.87</b>	<b>22.83</b>	19.49 19.49	0.59 0.59	0.56 0.56	0.98 0.98	0.39 0.39	1.77 1.77	0.79 ± 0.16 0.79 ± 0.16	R V	<b>550 VA R</b> <b>550 VAV</b>
<b>20.87</b>	<b>21.06</b>	20.35 20.35	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>530 VE R</b> <b>530 VRME R</b>
<b>21.06</b>	<b>21.26</b>	20.51 20.51	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>535 VE R</b> <b>535 VRME R</b>
<b>21.26</b>	<b>21.46</b>	20.71 20.71	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>540 VE R</b> <b>540 VRME R</b>
<b>21.46</b>	<b>21.65</b>	20.91 20.91	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>545 VE R</b> <b>545 VRME R</b>
<b>21.65</b>	<b>21.85</b>	21.10 21.10	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>550 VE R</b> <b>550 VRME R</b>
<b>21.85</b>	<b>22.05</b>	21.30 21.30	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>555 VE R</b> <b>555 VRME R</b>
<b>22.05</b>	<b>22.24</b>	21.50 21.50	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>560 VE R</b> <b>560 VRME R</b>

d<sub>1</sub> 22.24–32.68 in

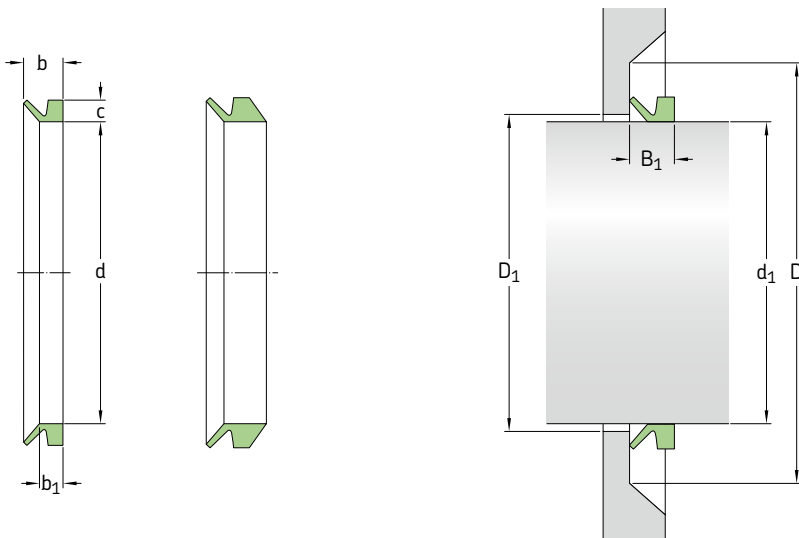


Dimensions		Shaft diameter range d <sub>1</sub> over	Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
d <sub>1</sub> incl.											
22.24	22.44	21.65 21.65	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	565 VE R 565 VRME R	
22.44	22.64	21.85 21.85	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	570 VE R 570 VRME R	
22.64	22.83	22.05 22.05	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	575 VE R 575 VRME R	
22.64	24.61	21.26 21.26	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	600 VL R 600 VL V	
22.83	24.80	21.26 21.26	0.59 0.59	0.56 0.56	0.98 0.98	0.39 0.39	1.77 1.77	0.79 ± 0.16 0.79 ± 0.16	R V	600 VA R 600 VAV	
22.83	23.03	22.24 22.24	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	580 VE R 580 VRME R	
23.03	23.23	22.44 22.44	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	585 VE R 585 VRME R	
23.23	23.62	22.64 22.64	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	590 VE R 590 VRME R	
23.62	24.02	22.91 22.91	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	600 VE R 600 VRME R	
24.02	24.41	23.31 23.31	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	610 VE R 610 VRME R	
24.41	24.80	23.70 23.70	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	620 VE R 620 VRME R	
24.21	26.57	23.62 23.62	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	650 VL R 650 VL V	
24.80	26.18	23.62 23.62	0.59 0.59	0.56 0.56	0.98 0.98	0.39 0.39	1.77 1.77	0.79 ± 0.16 0.79 ± 0.16	R V	650 VA R 650 VAV	
24.80	25.20	24.09 24.09	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	630 VE R 630 VRME R	
25.20	25.59	24.45 24.45	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	640 VE R 640 VRME R	



Dimensions		Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
in		-								
<b>25.59</b>	<b>25.98</b>	24.84 24.84	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>650 VE R</b> <b>650 VRME R</b>
<b>25.98</b>	<b>26.38</b>	25.20 25.20	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>660 VE R</b> <b>660 VRME R</b>
<b>26.57</b>	<b>27.95</b>	24.80 24.80	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	<b>700 VL R</b> <b>700 VL V</b>
<b>26.18</b>	<b>27.76</b>	24.80 24.80	0.59 0.59	0.56 0.56	0.98 0.98	0.39 0.39	1.77 1.77	0.79 ± 0.16 0.79 ± 0.16	R V	<b>700 VA R</b> <b>700 VAV</b>
<b>26.38</b>	<b>26.77</b>	25.59 25.59	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>670 VE R</b> <b>670 VRME R</b>
<b>26.77</b>	<b>27.17</b>	25.98 25.98	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>680 VE R</b> <b>680 VRME R</b>
<b>27.17</b>	<b>27.56</b>	26.38 26.38	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>690 VE R</b> <b>690 VRME R</b>
<b>27.56</b>	<b>27.95</b>	26.77 26.77	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>700 VE R</b> <b>700 VRME R</b>
<b>27.95</b>	<b>29.13</b>	26.38 26.38	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	<b>725 VL R</b> <b>725 VL V</b>
<b>27.76</b>	<b>29.33</b>	26.38 26.38	0.59 0.59	0.56 0.56	0.98 0.98	0.39 0.39	1.77 1.77	0.79 ± 0.16 0.79 ± 0.16	R V	<b>725 VA R</b> <b>725 VAV</b>
<b>27.95</b>	<b>28.35</b>	27.13 27.13	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>710 VE R</b> <b>710 VRME R</b>
<b>28.35</b>	<b>28.74</b>	27.52 27.52	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>720 VE R</b> <b>720 VRME R</b>
<b>28.74</b>	<b>29.13</b>	27.91 27.91	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>730 VE R</b> <b>730 VRME R</b>
<b>29.13</b>	<b>29.53</b>	28.27 28.27	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>740 VE R</b> <b>740 VRME R</b>
<b>29.13</b>	<b>30.51</b>	27.76 27.76	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	<b>750 VL R</b> <b>750 VL V</b>
<b>29.33</b>	<b>30.91</b>	27.76 27.76	0.59 0.59	0.56 0.56	0.98 0.98	0.39 0.39	1.77 1.77	0.79 ± 0.16 0.79 ± 0.16	R V	<b>750 VA R</b> <b>750 VAV</b>
<b>29.53</b>	<b>29.84</b>	28.66 28.66	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>750 VE R</b> <b>750 VRME R</b>
<b>29.84</b>	<b>30.16</b>	28.94 28.94	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>760 VE R</b> <b>760 VRME R</b>
<b>30.16</b>	<b>30.47</b>	29.25 29.25	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>770 VE R</b> <b>770 VRME R</b>
<b>30.47</b>	<b>30.83</b>	29.57 29.57	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>780 VE R</b> <b>780 VRME R</b>
<b>30.83</b>	<b>31.18</b>	29.88 29.88	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>790 VE R</b> <b>790 VRME R</b>
<b>30.51</b>	<b>32.48</b>	29.33 29.33	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	<b>800 VL R</b> <b>800 VL V</b>
<b>30.91</b>	<b>32.68</b>	29.33 29.33	0.59 0.59	0.56 0.56	0.98 0.98	0.39 0.39	1.77 1.77	0.79 ± 0.16 0.79 ± 0.16	R V	<b>800 VA R</b> <b>800 VAV</b>

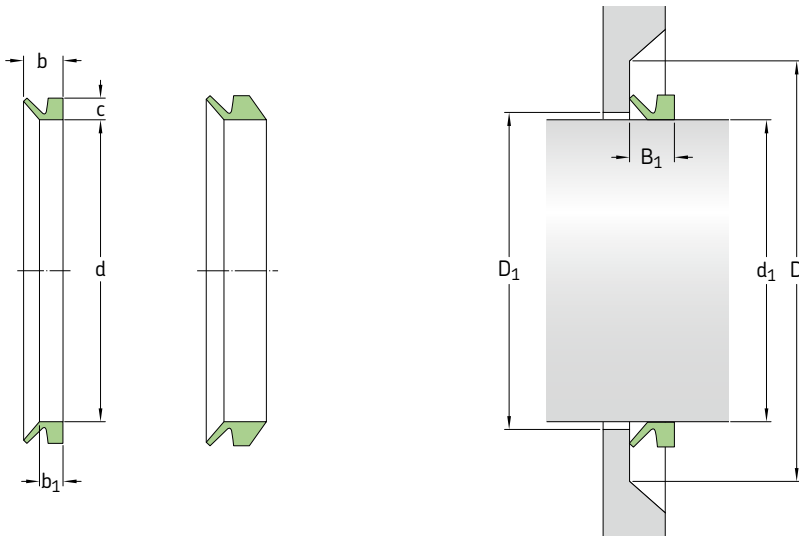
d<sub>1</sub> 31.18–46.26 in



Dimensions		Shaft diameter range d <sub>1</sub> over	Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
d <sub>1</sub> incl.											
in											
31.18	31.54	30.24 30.24	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	800 VE R 800 VRME R	
31.54	31.89	30.59 30.59	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	810 VE R 810 VRME R	
31.89	32.32	30.94 30.94	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	820 VE R 820 VRME R	
32.32	32.72	31.34 31.34	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	830 VE R 830 VRME R	
32.48	34.45	30.91 30.91	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	850 VL R 850 VL V	
32.68	34.45	30.91 30.91	0.59 0.59	0.56 0.56	0.98 0.98	0.39 0.39	1.77 1.77	0.79 ± 0.16 0.79 ± 0.16	R V	850 VA R 850 VA V	
32.72	33.11	31.69 31.69	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	840 VE R 840 VRME R	
33.11	33.50	32.05 32.05	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	850 VE R 850 VRME R	
33.50	33.90	32.44 32.44	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	860 VE R 860 VRME R	
33.90	34.29	32.80 32.80	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	870 VE R 870 VRME R	
34.29	34.72	33.19 33.19	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	880 VE R 880 VRME R	
34.45	36.42	32.48 32.48	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	900 VL R 900 VL V	
34.45	36.22	32.48 32.48	0.59 0.59	0.56 0.56	0.98 0.98	0.39 0.39	1.77 1.77	0.79 ± 0.16 0.79 ± 0.16	R V	900 VA R 900 VA V	
34.72	35.12	33.58 33.58	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	890 VE R 890 VRME R	
35.12	35.91	34.29 34.29	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	900 VE R 900 VRME R	

Dimensions		Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
in		–								
<b>35.91</b>	<b>36.30</b>	34.65 34.65	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>920 VE R</b> <b>920 VRME R</b>
<b>36.42</b>	<b>38.39</b>	34.06 34.06	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	<b>950 VL R</b> <b>950 VL V</b>
<b>36.22</b>	<b>37.99</b>	34.06 34.06	0.59 0.59	0.56 0.56	0.98 0.98	0.39 0.39	1.77 1.77	0.79 ± 0.16 0.79 ± 0.16	R V	<b>950 VA R</b> <b>950 VAV</b>
<b>36.30</b>	<b>36.73</b>	35.04 35.04	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>930 VE R</b> <b>930 VRME R</b>
<b>36.73</b>	<b>37.17</b>	35.43 35.43	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>940 VE R</b> <b>940 VRME R</b>
<b>37.17</b>	<b>37.60</b>	35.87 35.87	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>950 VE R</b> <b>950 VRME R</b>
<b>37.60</b>	<b>38.03</b>	36.26 36.26	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>960 VE R</b> <b>960 VRME R</b>
<b>38.39</b>	<b>40.35</b>	35.83 35.83	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	<b>1000 VL R</b> <b>1000 VL V</b>
<b>37.99</b>	<b>39.96</b>	35.83 35.83	0.59 0.59	0.56 0.56	0.98 0.98	0.39 0.39	1.77 1.77	0.79 ± 0.16 0.79 ± 0.16	R V	<b>1000 VA R</b> <b>1000 VAV</b>
<b>38.03</b>	<b>38.46</b>	36.69 36.69	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>970 VE R</b> <b>970 VRME R</b>
<b>38.46</b>	<b>38.90</b>	37.09 37.09	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>980 VE R</b> <b>980 VRME R</b>
<b>38.90</b>	<b>39.33</b>	37.52 37.52	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>990 VE R</b> <b>990 VRME R</b>
<b>39.33</b>	<b>39.76</b>	37.91 37.91	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>1000 VE R</b> <b>1000 VRME R</b>
<b>39.76</b>	<b>40.35</b>	38.31 38.31	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>1020 VE R</b> <b>1020 VRME R</b>
<b>40.35</b>	<b>42.32</b>	37.60 37.60	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	<b>1050 VL R</b> <b>1050 VL V</b>
<b>39.96</b>	<b>41.93</b>	37.60	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	<b>1050 VA R</b>
<b>40.35</b>	<b>41.14</b>	38.98 38.98	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>1040 VE R</b> <b>1040 VRME R</b>
<b>41.14</b>	<b>41.93</b>	39.69 39.69	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>1060 VE R</b> <b>1060 VRME R</b>
<b>42.32</b>	<b>44.29</b>	39.37 39.37	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	<b>1100 VL R</b> <b>1100 VL V</b>
<b>41.93</b>	<b>43.90</b>	39.37 40.43	0.59 1.18	0.56 1.28	0.98 2.56	0.39 0.94	1.77 4.53	0.79 ± 0.16 1.97 ± 0.47	R R	<b>1100 VA R</b> <b>1080 VE R</b>
<b>41.93</b>	<b>42.72</b>	40.43	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>1080 VRME R</b>
<b>42.72</b>	<b>43.50</b>	41.14 41.14	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>1100 VE R</b> <b>1100 VRME R</b>
<b>43.50</b>	<b>44.29</b>	41.93 41.93	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>1120 VE R</b> <b>1120 VRME R</b>
<b>44.29</b>	<b>46.26</b>	41.14 41.14	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	<b>1150 VL R</b> <b>1150 VL V</b>

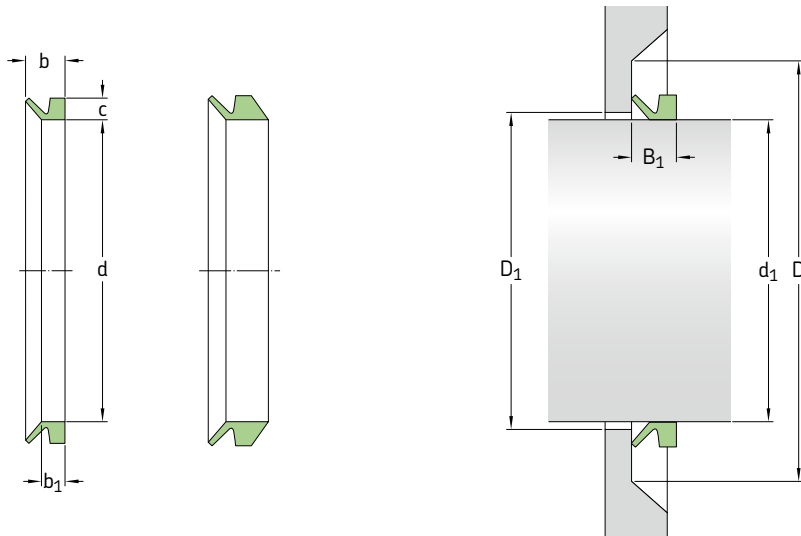
d<sub>1</sub> 43.90–65.94 in



Dimensions		Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
in									–	–
43.90	45.87	41.14	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	1150 VA R
44.29	45.08	42.68	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1140 VE R
		42.68	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1140 VRME R
45.08	45.87	43.43	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1160 VE R
		43.43	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1160 VRME R
46.26	48.23	42.91	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	1200 VL R
		42.91	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	1200 VL V
45.87	47.83	42.91	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	1200 VA R
45.87	46.65	44.13	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1180 VE R
		44.13	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1180 VRME R
46.65	47.44	44.84	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1200 VE R
		44.84	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1200 VRME R
47.44	48.23	45.55	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1220 VE R
		45.55	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1220 VRME R
48.23	50.20	44.69	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	1250 VL R
		44.69	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	1250 VL V
47.83	50.00	44.69	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	1250 VA R
48.23	49.02	46.30	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1240 VE R
		46.30	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1240 VRME R
49.02	50.00	47.05	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1260 VE R
		47.05	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1260 VRME R
50.00	50.98	47.95	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1280 VE R
		47.95	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1280 VRME R
50.20	52.17	46.46	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	1300 VL R
		46.46	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	1300 VL V
50.00	51.97	46.46	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	1300 VA R
50.98	51.77	48.82	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1300 VE R
		48.82	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1300 VRME R

Dimensions		Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
in		–								
<b>51.77</b>	<b>52.76</b>	49.57 49.57	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>1325 VE R</b> <b>1325 VRME R</b>
<b>52.17</b>	<b>54.13</b>	48.23 48.23	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	<b>1350 VL R</b> <b>1350 VL V</b>
<b>51.97</b>	<b>53.94</b>	48.23	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	<b>1350 VA R</b>
<b>52.76</b>	<b>53.74</b>	50.43 50.43	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>1350 VE R</b> <b>1350 VRME R</b>
<b>53.74</b>	<b>54.72</b>	51.38 51.38	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>1375 VE R</b> <b>1375 VRME R</b>
<b>54.13</b>	<b>56.10</b>	50.00 50.00	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	<b>1400 VL R</b> <b>1400 VL V</b>
<b>53.94</b>	<b>55.91</b>	50.00	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	<b>1400 VA R</b>
<b>54.72</b>	<b>55.71</b>	52.28 52.28	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>1400 VE R</b> <b>1400 VRME R</b>
<b>55.71</b>	<b>56.69</b>	53.15 53.15	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>1425 VE R</b> <b>1425 VRME R</b>
<b>56.10</b>	<b>58.07</b>	51.77 51.77	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	<b>1450 VL R</b> <b>1450 VL V</b>
<b>55.91</b>	<b>57.87</b>	51.77	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	<b>1450 VA R</b>
<b>56.69</b>	<b>57.68</b>	54.09 54.09	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>1450 VE R</b> <b>1450 VRME R</b>
<b>57.68</b>	<b>58.66</b>	55.00 55.00	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>1475 VE R</b> <b>1475 VRME R</b>
<b>58.07</b>	<b>60.04</b>	53.54 53.54	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	<b>1500 VL R</b> <b>1500 VL V</b>
<b>57.87</b>	<b>59.84</b>	53.54	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	<b>1500 VA R</b>
<b>58.66</b>	<b>59.65</b>	55.87 55.87	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>1500 VE R</b> <b>1500 VRME R</b>
<b>59.65</b>	<b>60.63</b>	56.81 56.81	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>1525 VE R</b> <b>1525 VRME R</b>
<b>60.04</b>	<b>62.01</b>	55.31 55.31	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	<b>1550 VL R</b> <b>1550 VL V</b>
<b>59.84</b>	<b>61.81</b>	55.31	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	<b>1550 VA R</b>
<b>60.63</b>	<b>61.81</b>	57.76 57.76	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>1550 VE R</b> <b>1550 VRME R</b>
<b>61.81</b>	<b>62.99</b>	58.86 58.86	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>1575 VE R</b> <b>1575 VRME R</b>
<b>62.01</b>	<b>63.98</b>	57.09 57.09	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	<b>1600 VL R</b> <b>1600 VL V</b>
<b>61.81</b>	<b>63.78</b>	57.09	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	<b>1600 VA R</b>
<b>62.99</b>	<b>64.57</b>	60.00 60.00	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	<b>1600 VE R</b> <b>1600 VRME R</b>
<b>63.98</b>	<b>65.94</b>	58.86 58.86	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	<b>1650 VL R</b> <b>1650 VL V</b>

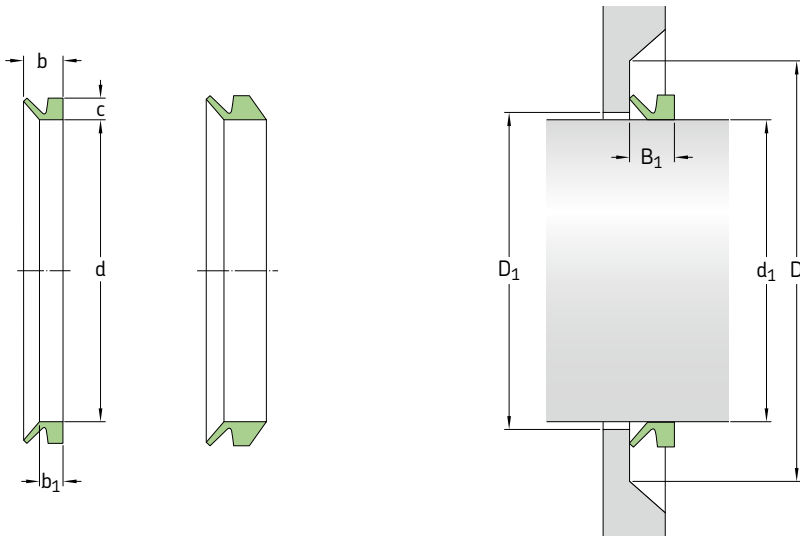
d<sub>1</sub> 63.78–79.53 in



Dimensions		Shaft diameter range d <sub>1</sub> over	Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
d <sub>1</sub> incl.											
63.78	65.75		58.86	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	1650 VA R
64.57	66.14		61.38 61.38	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	1650 VE R 1650 VRME R
65.94	67.91		60.63 60.63	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	1700 VL R 1700 VL V
65.75	67.72		60.63	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	1700 VA R
66.14	67.72		62.83 62.83	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	1700 VE R 1700 VRME R
67.91	69.88		62.40 62.40	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	1750 VL R 1750 VL V
67.72	69.69		62.40	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	1750 VA R
67.72	69.49		64.25 64.25	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	1750 VE R 1750 VRME R
69.49	71.26		65.79 65.79	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	1800 VE R 1800 VRME R
69.88	71.85		64.17 64.17	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	1800 VL R 1800 VL V
69.69	71.65		64.17	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	1800 VA R
71.26	73.03		67.48 67.48	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	1850 VE R 1850 VRME R
71.85	73.82		65.94 65.94	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	1850 VL R 1850 VL V
71.65	73.62		65.94	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	1850 VA R
73.03	75.00		69.02 69.02	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	R R	1900 VE R 1900 VRME R
73.82	75.79		67.72 67.72	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	R V	1900 VL R 1900 VL V
73.62	75.59		67.72	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	1900 VA R

Dimensions		Shaft diameter range d <sub>1</sub> over	incl.	Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Lip code	Designation
in	in											
<b>75.00</b>	<b>76.97</b>	70.63		1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>1950 VE R</b>	
		70.63		0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>1950 VRME R</b>	
<b>75.79</b>	<b>77.76</b>	69.49		0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	<b>1950 VL R</b>	
<b>75.79</b>	<b>77.76</b>	69.49		0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	<b>1950 VL V</b>	
		69.49		0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	<b>1950 VA R</b>	
<b>76.97</b>	<b>79.13</b>	72.60		1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>2000 VE R</b>	
		72.60		0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>2000 VRME R</b>	
<b>77.76</b>	<b>79.72</b>	71.26		0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	<b>2000 VL R</b>	
		71.26		0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	<b>2000 VL V</b>	
<b>77.56</b>	<b>79.53</b>	71.26		0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	<b>2000 VA R</b>	

Axial shaft seals | V-ring seals – metric dimensions, for North American market  
 $d_1$  2,7–58 mm

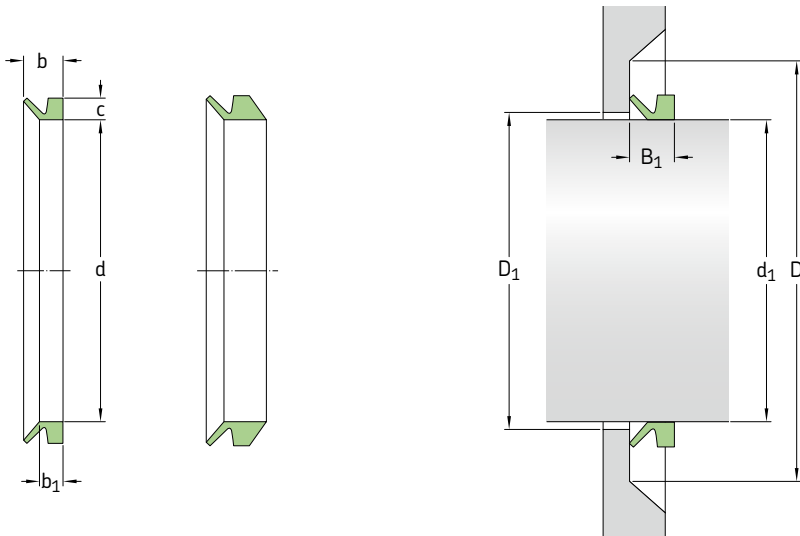


Dimensions		Seal inside diameter, free state $d$	Seal seat width $b_1$	Nominal seal width $b$	Nominal seal height $c$	Clearance $D_1$ max.	Counterface $D$ min.	Seal fitted width $B_1$	Design	Lip code	Designation
Shaft diameter range $d_1$ over	incl.										
mm											
2,7	3,5	2,5	2,1	3	1,5	$d_1+1$	$d_1+4$	$2,5 \pm 0,3$	VR1	R	400030
		2,5	2,1	3	1,5	$d_1+1$	$d_1+4$	$2,5 \pm 0,3$	VR1	V	400034
3,5	4,5	3,2	2,4	3,7	2	$d_1+1$	$d_1+6$	$3 \pm 0,4$	VR1	R	400040
		3,2	2,4	3,7	2	$d_1+1$	$d_1+6$	$3 \pm 0,4$	VR1	V	400044
4,5	5,5	4	2,4	3,7	2	$d_1+1$	$d_1+6$	$3 \pm 0,4$	VR1	R	400050
		4	2,4	3,7	2	$d_1+1$	$d_1+6$	$3 \pm 0,4$	VR1	V	400054
		4	3,9	5,2	2	$d_1+1$	$d_1+6$	$4,5 \pm 0,4$	VR2	R	400051
		4	3,9	5,2	2	$d_1+1$	$d_1+6$	$4,5 \pm 0,4$	VR2	V	400055
5,5	6,5	5	2,4	3,7	2	$d_1+1$	$d_1+6$	$3 \pm 0,4$	VR1	R	400060
		5	2,4	3,7	2	$d_1+1$	$d_1+6$	$3 \pm 0,4$	VR1	V	400064
		5	3,9	5,2	2	$d_1+1$	$d_1+6$	$4,5 \pm 0,4$	VR2	R	400061
		5	3,9	5,2	2	$d_1+1$	$d_1+6$	$4,5 \pm 0,4$	VR2	V	400065
6,5	8	6	2,4	3,7	2	$d_1+1$	$d_1+6$	$3 \pm 0,4$	VR1	R	400070
		6	2,4	3,7	2	$d_1+1$	$d_1+6$	$3 \pm 0,4$	VR1	V	400074
		6	3,9	5,2	2	$d_1+1$	$d_1+6$	$4,5 \pm 0,4$	VR2	R	400071
		6	3,9	5,2	2	$d_1+1$	$d_1+6$	$4,5 \pm 0,4$	VR2	V	400075
8	9,5	7	2,4	3,7	2	$d_1+1$	$d_1+6$	$3 \pm 0,4$	VR1	R	400080
		7	2,4	3,7	2	$d_1+1$	$d_1+6$	$3 \pm 0,4$	VR1	V	400084
		7	3,9	5,2	2	$d_1+1$	$d_1+6$	$4,5 \pm 0,4$	VR2	R	400081
		7	3,9	5,2	2	$d_1+1$	$d_1+6$	$4,5 \pm 0,4$	VR2	V	400085
9,5	11,5	9	3,4	5,5	3	$d_1+1$	$d_1+9$	$4,5 \pm 0,6$	VR1	R	400100
		9	3,4	5,5	3	$d_1+1$	$d_1+9$	$4,5 \pm 0,6$	VR1	V	400104
		9	5,6	7,7	3	$d_1+1$	$d_1+9$	$6,7 \pm 0,6$	VR2	R	400101
		9	5,6	7,7	3	$d_1+1$	$d_1+9$	$6,7 \pm 0,6$	VR2	V	400105
11,5	12,5	10,5	3,4	5,5	3	$d_1+1$	$d_1+9$	$4,5 \pm 0,6$	VR1	R	400120
		10,5	3,4	5,5	3	$d_1+1$	$d_1+9$	$4,5 \pm 0,6$	VR1	V	400124
		10,5	5,6	7,7	3	$d_1+1$	$d_1+9$	$6,7 \pm 0,6$	VR2	R	400121
		10,5	5,6	7,7	3	$d_1+1$	$d_1+9$	$6,7 \pm 0,6$	VR2	V	400125
12,5	13,5	11,7	3,4	5,5	3	$d_1+1$	$d_1+9$	$4,5 \pm 0,6$	VR1	R	400130
		11,7	3,4	5,5	3	$d_1+1$	$d_1+9$	$4,5 \pm 0,6$	VR1	V	400134
13,5	15,5	12,5	3,4	5,5	3	$d_1+1$	$d_1+9$	$4,5 \pm 0,6$	VR1	R	400140
		12,5	3,4	5,5	3	$d_1+1$	$d_1+9$	$4,5 \pm 0,6$	VR1	V	400144
13,5	15,5	12,5	5,6	7,7	3	$d_1+1$	$d_1+9$	$6,7 \pm 0,6$	VR2	R	400141
		12,5	5,6	7,7	3	$d_1+1$	$d_1+9$	$6,7 \pm 0,6$	VR2	V	400145



Dimensions		Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
mm		–									
15,5	17	14	3,4	5,5	3	d <sub>1</sub> +1	d <sub>1</sub> +9	4,5 ± 0,6	VR1	R	400160
		14	3,4	5,5	3	d <sub>1</sub> +1	d <sub>1</sub> +9	4,5 ± 0,6	VR1	V	400164
15,5	17,5	14	5,6	7,7	3	d <sub>1</sub> +1	d <sub>1</sub> +9	6,7 ± 0,6	VR2	R	400161
		14	5,6	7,7	3	d <sub>1</sub> +1	d <sub>1</sub> +9	6,7 ± 0,6	VR2	V	400165
17,5	19	16	3,4	5,5	3	d <sub>1</sub> +1	d <sub>1</sub> +9	4,5 ± 0,6	VR1	R	400180
		16	3,4	5,5	3	d <sub>1</sub> +1	d <sub>1</sub> +9	4,5 ± 0,6	VR1	V	400184
		16	5,6	7,7	3	d <sub>1</sub> +1	d <sub>1</sub> +9	6,7 ± 0,6	VR2	R	400181
		16	5,6	7,7	3	d <sub>1</sub> +1	d <sub>1</sub> +9	6,7 ± 0,6	VR2	V	400185
19	21	18	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	R	400200
		18	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	V	400204
		18	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	R	400201
		18	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	V	400205
21	24	20	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	R	400220
		20	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	V	400224
		20	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	R	400221
		20	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	V	400225
24	27	22	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	R	400250
		22	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	V	400254
		22	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	R	400251
		22	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	V	400255
27	29	25	4,7	7,5	4	d <sub>1</sub> +2	12	6 ± 0,8	VR1	R	400280
		25	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	V	400284
		25	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	R	400281
		25	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	V	400285
29	31	27	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	R	400300
		27	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	V	400304
		27	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	R	400301
		27	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	V	400305
31	33	29	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	R	400320
		29	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	V	400324
		29	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	R	400321
		29	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	V	400325
33	36	31	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	R	400350
		31	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	V	400354
		31	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	R	400351
		31	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	V	400355
36	38	34	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	R	400380
		34	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	V	400384
		34	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	R	400381
		34	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	V	400385
38	43	36	5,5	9	5	d <sub>1</sub> +2	d <sub>1</sub> +15	7 ± 1	VR1	R	400400
		36	5,5	9	5	d <sub>1</sub> +2	d <sub>1</sub> +15	7 ± 1	VR1	V	400409
		36	9,5	13	5	d <sub>1</sub> +2	d <sub>1</sub> +15	11 ± 1	VR2	R	400401
		36	9,5	13	5	d <sub>1</sub> +2	d <sub>1</sub> +15	11 ± 1	VR2	V	400405
43	48	40	5,5	9	5	d <sub>1</sub> +2	d <sub>1</sub> +15	7 ± 1	VR1	R	400450
		40	5,5	9	5	d <sub>1</sub> +2	d <sub>1</sub> +15	7 ± 1	VR1	V	400454
		40	9,5	13	5	d <sub>1</sub> +2	d <sub>1</sub> +15	11 ± 1	VR2	R	400451
		40	9,5	13	5	d <sub>1</sub> +2	d <sub>1</sub> +15	11 ± 1	VR2	V	400455
48	53	45	5,5	9	5	d <sub>1</sub> +2	d <sub>1</sub> +15	7 ± 1	VR1	R	400500
		45	5,5	9	5	d <sub>1</sub> +2	d <sub>1</sub> +15	7 ± 1	VR1	V	400504
		45	9,5	13	5	d <sub>1</sub> +2	d <sub>1</sub> +15	11 ± 1	VR2	R	400501
		45	9,5	13	5	d <sub>1</sub> +2	d <sub>1</sub> +15	11 ± 1	VR2	V	400505
53	58	49	5,5	9	5	d <sub>1</sub> +2	d <sub>1</sub> +15	7 ± 1	VR1	R	400550
		49	5,5	9	5	d <sub>1</sub> +2	d <sub>1</sub> +15	7 ± 1	VR1	V	400554
		49	9,5	13	5	d <sub>1</sub> +2	d <sub>1</sub> +15	11 ± 1	VR2	R	400551
		49	9,5	13	5	d <sub>1</sub> +2	d <sub>1</sub> +15	11 ± 1	VR2	V	400555

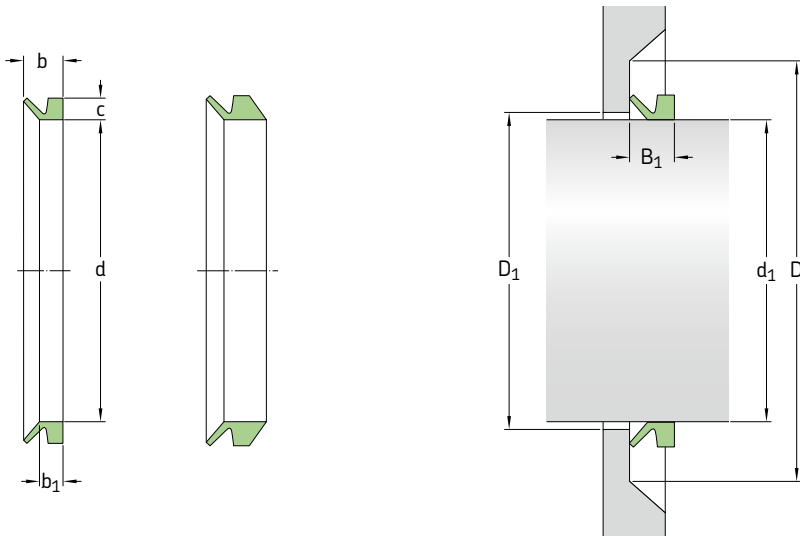
Axial shaft seals | V-ring seals – metric dimensions, for North American market  
 $d_1$  58–210 mm



Dimensions		Seal inside diameter, free state $d$	Seal seat width $b_1$	Nominal seal width $b$	Nominal seal height $c$	Clearance $D_1$ max.	Counterface $D$ min.	Seal fitted width $B_1$	Design	Lip code	Designation
Shaft diameter range $d_1$ over	incl.										
mm											
58	63	54	5,5	9	5	$d_1 + 2$	$d_1 + 15$	$7 \pm 1$	VR1	R	400600
		54	5,5	9	5	$d_1 + 2$	$d_1 + 15$	$7 \pm 1$	VR1	V	400604
		54	9,5	13	5	$d_1 + 2$	$d_1 + 15$	$11 \pm 1$	VR2	R	400601
		54	9,5	13	5	$d_1 + 2$	$d_1 + 15$	$11 \pm 1$	VR2	V	400605
63	68	58	5,5	9	5	$d_1 + 2$	$d_1 + 15$	$7 \pm 1$	VR1	R	400650
		58	5,5	9	5	$d_1 + 2$	$d_1 + 15$	$7 \pm 1$	VR1	V	400654
		58	9,5	13	5	$d_1 + 2$	$d_1 + 15$	$11 \pm 1$	VR2	R	400651
		58	9,5	13	5	$d_1 + 2$	$d_1 + 15$	$11 \pm 1$	VR2	V	400655
68	73	63	6,8	11	6	$d_1 + 3$	$d_1 + 18$	$9 \pm 1,2$	VR1	R	400700
		63	6,8	11	6	$d_1 + 3$	$d_1 + 18$	$9 \pm 1,2$	VR1	V	400704
		63	11,3	15,5	6	$d_1 + 3$	$d_1 + 18$	$13,5 \pm 1,2$	VR2	R	400701
		63	11,3	15,5	6	$d_1 + 3$	$d_1 + 18$	$13,5 \pm 1,2$	VR2	V	400705
73	78	67	6,8	11	6	$d_1 + 3$	$d_1 + 18$	$9 \pm 1,2$	VR1	R	400750
		67	6,8	11	6	$d_1 + 3$	$d_1 + 18$	$13,5 \pm 1,2$	VR2	R	400751
		67	11,3	15,5	6	$d_1 + 3$	$d_1 + 18$	$13,5 \pm 1,2$	VR2	V	400755
78	83	72	6,8	11	6	$d_1 + 3$	$d_1 + 18$	$9 \pm 1,2$	VR1	R	400800
		72	6,8	11	6	$d_1 + 3$	$d_1 + 18$	$9 \pm 1,2$	VR1	V	400804
		72	11,3	15,5	6	$d_1 + 3$	$d_1 + 18$	$13,5 \pm 1,2$	VR2	R	400801
		72	11,3	15,5	6	$d_1 + 3$	$d_1 + 18$	$13,5 \pm 1,2$	VR2	V	400805
83	88	76	6,8	11	6	$d_1 + 3$	$d_1 + 18$	$9 \pm 1,2$	VR1	R	400850
		76	6,8	11	6	$d_1 + 3$	$d_1 + 18$	$9 \pm 1,2$	VR1	V	400854
		76	11,3	15,5	6	$d_1 + 3$	$d_1 + 18$	$13,5 \pm 1,2$	VR2	R	400851
		76	11,3	15,5	6	$d_1 + 3$	$d_1 + 18$	$13,5 \pm 1,2$	VR2	V	400855
88	93	81	6,8	11	6	$d_1 + 3$	$d_1 + 18$	$9 \pm 1,2$	VR1	R	400900
		81	6,8	11	6	$d_1 + 3$	$d_1 + 18$	$9 \pm 1,2$	VR1	V	400904
		81	11,3	15,5	6	$d_1 + 3$	$d_1 + 18$	$13,5 \pm 1,2$	VR2	R	400901
		81	11,3	15,5	6	$d_1 + 3$	$d_1 + 18$	$13,5 \pm 1,2$	VR2	V	400905
93	98	85	6,8	11	6	$d_1 + 3$	$d_1 + 18$	$9 \pm 1,2$	VR1	R	400950
		85	6,8	11	6	$d_1 + 3$	$d_1 + 18$	$9 \pm 1,2$	VR1	V	400954
		85	11,3	15,5	6	$d_1 + 3$	$d_1 + 18$	$13,5 \pm 1,2$	VR2	R	400951
		85	11,3	15,5	6	$d_1 + 3$	$d_1 + 18$	$13,5 \pm 1,2$	VR2	V	400955
98	105	90	6,8	11	6	$d_1 + 3$	$d_1 + 18$	$9 \pm 1,2$	VR1	R	401000
		90	6,8	11	6	$d_1 + 3$	$d_1 + 18$	$9 \pm 1,2$	VR1	V	401004
		90	11,3	15,5	6	$d_1 + 3$	$d_1 + 18$	$13,5 \pm 1,2$	VR2	R	401001
		90	11,3	15,5	6	$d_1 + 3$	$d_1 + 18$	$13,5 \pm 1,2$	VR2	V	401005

Dimensions		Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
mm											
<b>105</b>	<b>115</b>	99	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	<b>401102</b>
		99	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	<b>401106</b>
		99	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	VR1	R	<b>401100</b>
		99	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	VR1	V	<b>401104</b>
		99	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	VR2	R	<b>401101</b>
		99	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	VR2	V	<b>401105</b>
<b>115</b>	<b>125</b>	108	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	<b>401202</b>
		108	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	<b>401206</b>
		108	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	VR1	R	<b>401200</b>
		108	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	VR1	V	<b>401204</b>
		108	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	VR2	R	<b>401201</b>
		108	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	VR2	V	<b>401205</b>
<b>125</b>	<b>135</b>	117	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	<b>401302</b>
		117	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	<b>401306</b>
		117	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	VR1	R	<b>401300</b>
		117	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	VR1	V	<b>401304</b>
		117	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	VR2	R	<b>401301</b>
		117	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	VR2	V	<b>401305</b>
<b>135</b>	<b>145</b>	126	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	<b>401402</b>
		126	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	<b>401406</b>
		126	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	VR1	R	<b>401400</b>
		126	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	VR1	V	<b>401404</b>
		126	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	VR2	R	<b>401401</b>
		126	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	VR2	V	<b>401405</b>
<b>145</b>	<b>155</b>	135	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	<b>401502</b>
		135	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	<b>401506</b>
		135	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	VR1	R	<b>401500</b>
		135	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	VR1	V	<b>401504</b>
		135	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	VR2	R	<b>401501</b>
		135	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	VR2	V	<b>401505</b>
<b>155</b>	<b>165</b>	144	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	<b>401602</b>
		144	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	<b>401606</b>
		144	9	14,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	12 ± 1,8	VR1	R	<b>401600</b>
		144	9	14,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	12 ± 1,8	VR1	V	<b>401604</b>
		144	15	20,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	18 ± 1,8	VR2	R	<b>401601</b>
		144	15	20,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	18 ± 1,8	VR2	V	<b>401605</b>
<b>165</b>	<b>175</b>	153	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	<b>401702</b>
		153	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	<b>401706</b>
		153	9	14,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	12 ± 1,8	VR1	R	<b>401700</b>
		153	9	14,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	12 ± 1,8	VR1	V	<b>401704</b>
		153	15	20,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	18 ± 1,8	VR2	R	<b>401701</b>
		153	15	20,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	18 ± 1,8	VR2	V	<b>401705</b>
<b>175</b>	<b>185</b>	162	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	<b>401802</b>
		162	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	<b>401806</b>
		162	9	14,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	12 ± 1,8	VR1	R	<b>401800</b>
		162	9	14,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	12 ± 1,8	VR1	V	<b>401804</b>
		162	15	20,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	18 ± 1,8	VR2	R	<b>401801</b>
		162	15	20,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	18 ± 1,8	VR2	V	<b>401805</b>
<b>185</b>	<b>195</b>	171	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	<b>401902</b>
		171	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	<b>401906</b>
		171	9	14,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	12 ± 1,8	VR1	R	<b>401900</b>
		171	9	14,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	12 ± 1,8	VR1	V	<b>401904</b>
		171	15	20,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	18 ± 1,8	VR2	R	<b>401901</b>
		171	15	20,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	18 ± 1,8	VR2	V	<b>401905</b>
<b>195</b>	<b>210</b>	182	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	<b>4020022</b>
		182	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	<b>402006</b>
		180	9	14,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	12 ± 1,8	VR1	R	<b>401990</b>
		180	9	14,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	12 ± 1,8	VR1	V	<b>401994</b>
		180	15	20,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	18 ± 1,8	VR2	R	<b>401991</b>
		180	15	20,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	18 ± 1,8	VR2	V	<b>401995</b>

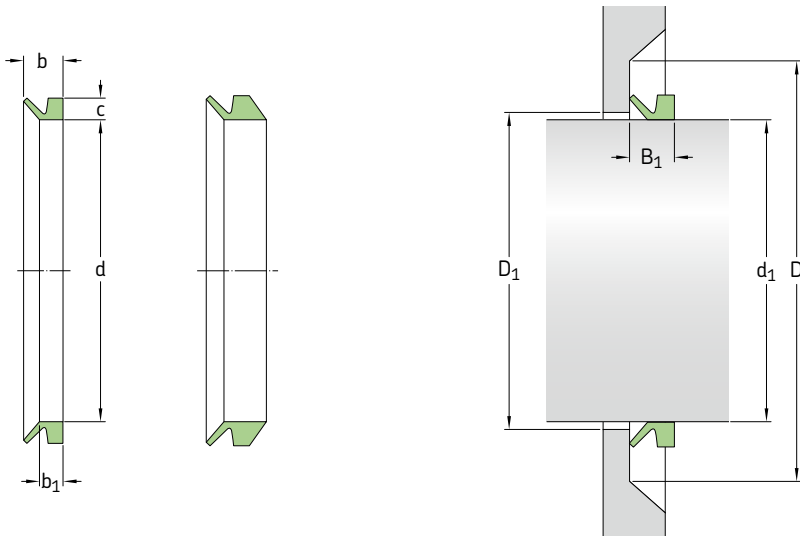
Axial shaft seals | V-ring seals – metric dimensions, for North American market  
 d<sub>1</sub> 190–410 mm



Dimensions		Shaft diameter range d <sub>1</sub> over	Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
d <sub>1</sub> incl.	mm											
190	210	180	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	402000	
		180	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	V	402004	
210	233	198	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	402202	
		198	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	402206	
		198	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	402200	
		198	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	V	402204	
233	260	225	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	402502	
		225	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	402506	
235	265	225	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	402500	
		225	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	V	402504	
260	285	247	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	402752	
		247	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	402756	
265	290	247	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	402750	
		247	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	V	402754	
285	310	270	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	403002	
		270	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	403006	
290	310	270	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	403000	
		270	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	V	403004	
300	305	294	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	403003	
		294	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470301	
305	310	299	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	403053	
		299	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470306	
310	335	292	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	403252	
		292	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	403256	
310	335	292	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	403250	
		292	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	V	403254	
310	315	304	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	403103	
		304	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470311	
315	320	309	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	403153	
		309	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470316	

Dimensions		Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
mm											
320	325	314	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	403203
		314	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470321
325	330	319	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	403253
		319	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470326
330	335	323	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	403303
		323	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470331
335	365	315	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	403502
		315	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	403506
		315	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	403500
		315	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	V	403504
335	340	328	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	403353
		328	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470336
340	345	333	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	403403
		328	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470341
345	350	338	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	403453
		338	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470346
350	355	343	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	403503
		343	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470351
355	360	347	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	403553
		347	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470356
360	365	352	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	403603
		357	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470361
365	385	337	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	403752
		337	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	403756
365	390	337	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	403750
		337	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	V	403754
		357	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	403653
370	375	362	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	403703
		362	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470371
375	380	367	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	403753
		367	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470376
380	385	371	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	403803
		371	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470381
385	410	360	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	404002
		360	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	4040066
390	430	360	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	404000
		360	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	V	4040044
385	390	376	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	403853
		376	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470386
390	395	381	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	403903
		381	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470391
395	400	386	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	403953
		386	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470396
400	405	391	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	4040033
		391	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470401
405	410	396	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	404053
		396	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470406

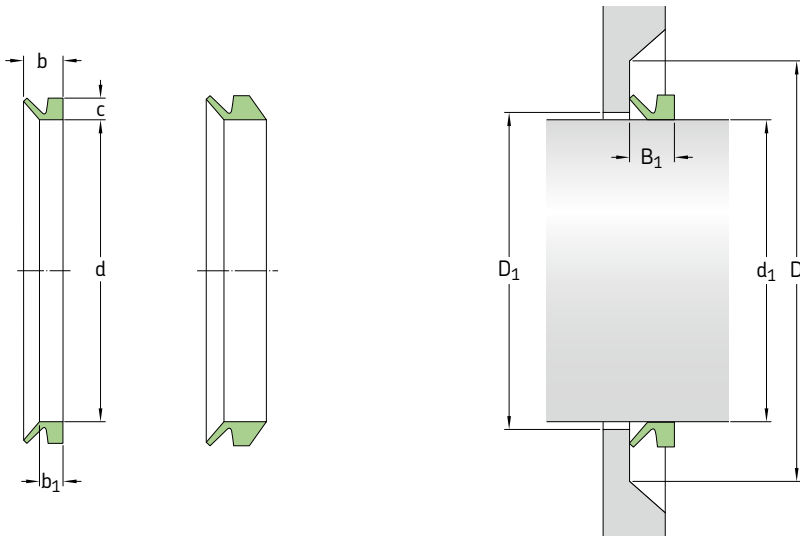
Axial shaft seals | V-ring seals – metric dimensions, for North American market  
 d<sub>1</sub> 410–560 mm



Dimensions		Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
mm											
410	415	401	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	404103
		401	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR6	R	470411
415	420	405	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	404153
		405	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR6	R	470416
420	425	410	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	404203
		410	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR6	R	470421
425	430	415	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	404253
		415	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR6	R	470426
410	440	382	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	VR3	R	404252
		382	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	VR3	V	404256
440	475	405	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	VR3	R	404502
		405	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	VR3	V	404506
430	480	405	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	VR1	R	404500
		405	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	VR1	V	404504
430	435	420	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	404303
		420	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR6	R	470431
435	440	425	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	404353
		425	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR6	R	470436
440	445	429	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	4044033
		429	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR6	R	470441
445	450	434	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	404453
		434	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR6	R	470446
450	455	439	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	404503
		439	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR6	R	470451
455	460	444	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	404553
		444	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR6	R	470456
460	465	448	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	4046033
		448	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR6	R	470461
465	470	453	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	404653
		453	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR6	R	470466

Dimensions		Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
mm		–									
470	475	458	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	404703
		458	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470471
475	480	463	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	404753
		463	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470476
475	510	450	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	405002
		450	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	405009
510	540	472	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	405252
		472	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	405256
480	530	450	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	405000
		450	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	V	405004
480	485	468	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	404803
		468	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470481
485	490	473	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	404853
		473	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470486
490	495	478	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	404903
		478	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470491
495	500	483	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	404953
		483	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470496
500	505	488	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	405003
		488	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470501
505	510	493	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	405053
		493	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470506
510	515	497	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	405103
		497	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470511
515	520	502	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	405153
		502	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470516
520	525	507	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	405203
		507	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470521
525	530	512	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	405253
		512	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470526
540	575	495	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	405502
		495	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	405506
530	580	495	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	405500
		495	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	V	405504
530	535	517	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	405303
		517	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470531
535	540	521	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	405353
		521	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470536
540	545	526	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	405403
		526	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470541
545	550	531	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	405453
		531	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470546
550	555	536	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	405503
		536	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470551
555	560	541	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	405553
		541	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470556

Axial shaft seals | V-ring seals – metric dimensions, for North American market  
 d<sub>1</sub> 560–825 mm

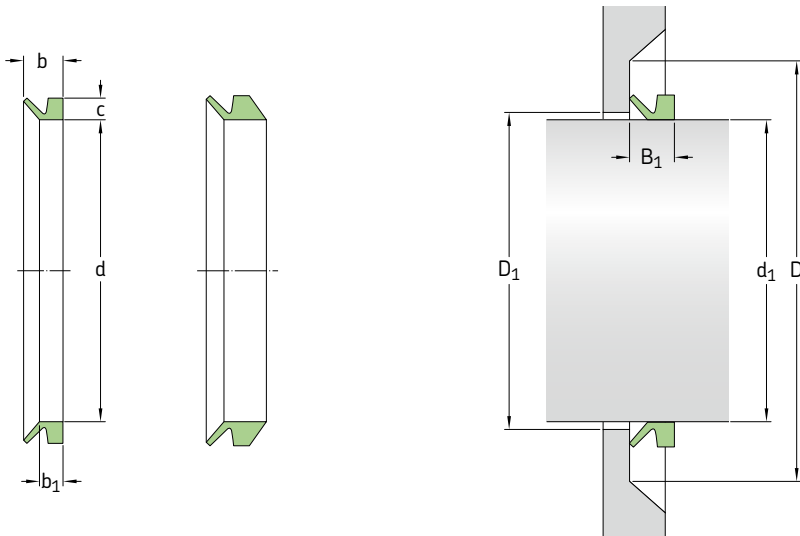


Dimensions		Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
mm											
560	565	546	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	405603
		546	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR6	R	470561
565	570	550	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	405653
		550	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR6	R	470566
570	575	555	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	405703
		555	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR6	R	470571
575	580	560	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	405753
		560	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR6	R	470576
575	625	540	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	VR3	R	4060022
		540	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	VR3	V	406006
580	630	540	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	VR1	R	406000
		540	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	VR1	V	4060044
580	585	565	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	405803
		565	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR6	R	470581
585	590	570	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	405853
		570	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR6	R	470586
590	600	575	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	405903
		575	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR6	R	470591
600	610	582	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	406003
		582	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR6	R	470601
610	620	592	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	4061033
		592	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR6	R	470611
620	630	602	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	4062033
		602	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR6	R	470621
615	675	600	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	VR3	R	406502
		600	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	VR3	V	406506
630	665	600	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	VR1	R	406500
		600	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	VR1	V	406504
630	640	612	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	4063033
		612	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR6	R	470631



Dimensions		Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
mm		–									
640	650	621	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	4064033
		621	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470641
650	660	631	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	406503
		631	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470651
660	670	640	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	4066033
		640	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470661
675	710	630	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	407002
		630	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	407006
665	705	630	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	407000
		630	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	V	407004
670	680	650	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	406703
		650	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470671
680	690	660	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	406803
		660	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470681
690	700	670	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	406903
		670	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470691
700	710	680	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	407003
		680	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470701
710	740	670	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	407252
		670	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	407256
705	745	670	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	407250
		670	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	V	407254
710	720	689	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	407103
		689	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470711
720	730	699	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	407203
		699	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470721
730	740	709	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	407309
		709	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470731
740	750	718	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	407403
		718	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470741
740	775	705	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	407502
		705	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	407506
745	785	705	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	407500
		705	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	V	407504
750	758	728	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	407503
		728	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470751
758	766	735	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	407603
		735	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470761
766	774	743	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	407703
		743	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470771
774	783	751	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	407803
		751	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470781
783	792	759	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	407903
		759	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470791
775	825	745	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	408002
		745	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	408006

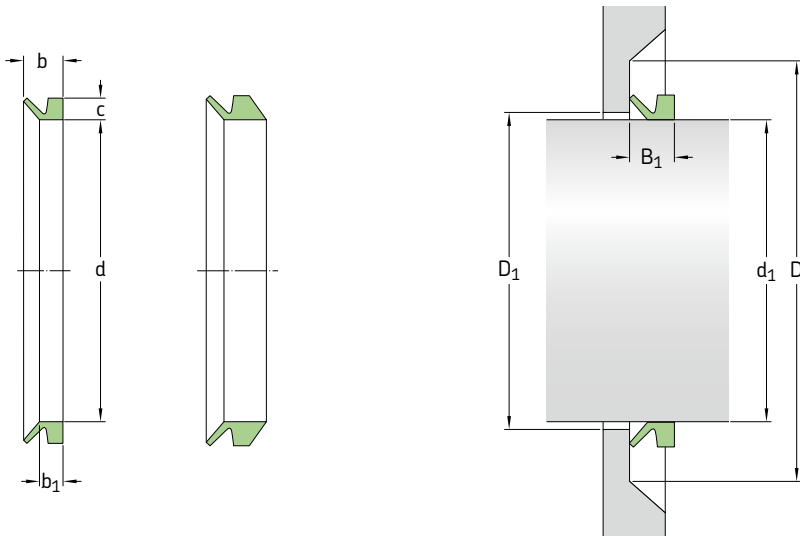
Axial shaft seals | V-ring seals – metric dimensions, for North American market  
 d<sub>1</sub> 785–1125 mm



Dimensions		Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
mm											
785	830	745	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	408000
		745	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	V	408004
792	801	768	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	408003
		768	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470801
801	810	777	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	408103
		777	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470811
810	821	786	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	408203
		786	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470821
821	831	796	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	408303
		796	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470831
825	875	785	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	408502
		785	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	408506
830	875	785	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	408500
		785	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	V	408504
831	841	805	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	408403
		805	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470841
841	851	814	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	408503
		814	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470851
851	861	824	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	408603
		824	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470861
861	871	833	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	408703
		833	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470871
871	882	843	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	408803
		843	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470881
875	925	825	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	409002
		825	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	409006
875	920	825	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	409000
		825	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	V	409004
882	892	853	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	408903
		853	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470891

Dimensions		Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
mm		–									
892	912	871	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	409003
		871	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470901
912	922	880	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	409203
		880	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470921
925	975	865	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	409502
		865	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	409506
920	965	865	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	409500
		865	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	V	409504
922	933	890	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	409303
		890	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470931
933	944	900	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	409403
		900	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470941
944	955	911	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	409503
		911	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470951
955	966	921	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	409603
		921	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470961
975	1 025	910	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	410002
		910	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	410006
965	1 015	910	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	410000
		910	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	V	410004
966	977	932	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	409703
		932	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470971
977	988	942	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	409803
		942	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470981
988	999	953	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	409903
		953	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	470991
999	1 010	963	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	410003
		963	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	471001
1 010	1 025	973	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	410203
		973	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	471021
1 025	1 075	955	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	410502
		955	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	410506
1 015	1 065	955	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	410500
1 025	1 045	990	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	410403
		990	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	471041
1 045	1 065	1 008	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	410603
		1 008	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	471061
1 075	1 125	1 000	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	411002
		1 000	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	411006
1 065	1 115	1 000	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	411000
		1 027	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	410803
		1 027	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	471081
1 085	1 105	1 045	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	411003
		1 045	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	471101
1 105	1 125	1 065	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	411203
		1 065	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	471121

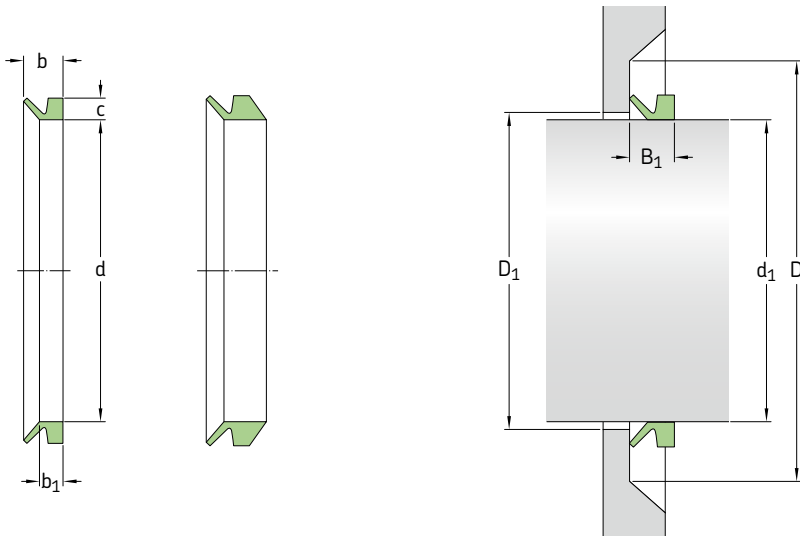
Axial shaft seals | V-ring seals – metric dimensions, for North American market  
 d<sub>1</sub> 1 125–1640 mm



Dimensions		Shaft diameter range d <sub>1</sub> over	Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
d <sub>1</sub> incl.	mm											
1125	1175	1 045 1 045	6	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	VR3	R	411502
												411506
1115	1165	1 045	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	VR1	R	411500	
1125	1145	1 084 1 084	32,5	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	411403
												471141
1145	1165	1 103 1 103	32,5	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	411603
												471161
1175	1225	1 090 1 090	6	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	VR3	R	412002
												412006
1165	1215	1 090	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	VR1	R	412000	
1165	1185	1 121 1 121	32,5	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	411803
												471181
1185	1205	1 139 1 139	32,5	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	412003
												471201
1205	1225	1 157 1 157	32,5	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	412203
												471221
1225	1275	1 135 1 135	6	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	VR3	R	412502
												412506
1215	1270	1 135	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	VR1	R	412500	
1225	1245	1 176 1 176	32,5	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	471240
												471241
1245	1270	1 195 1 195	32,5	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	412603
												471261
1270	1295	1 218 1 218	32,5	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	412803
												471281
1275	1325	1 180 1 180	6	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	VR3	R	413002
												413006
1270	1320	1 180	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	VR1	R	413000	

Dimensions		Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
mm											
<b>1 295</b>	<b>1 315</b>	1 240	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>413003</b>
		1 240	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>471301</b>
<b>1 315</b>	<b>1 340</b>	1 259	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>413253</b>
		1 259	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>471326</b>
<b>1 325</b>	<b>1 375</b>	1 225	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	<b>413502</b>
		1 225	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	<b>413506</b>
<b>1 320</b>	<b>1 370</b>	1 225	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	<b>413500</b>
<b>1 340</b>	<b>1 365</b>	1 281	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>413503</b>
		1 281	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>471351</b>
<b>1 365</b>	<b>1 390</b>	1 305	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>413753</b>
		1 305	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>471376</b>
<b>1 375</b>	<b>1 425</b>	1 270	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	<b>414002</b>
		1 270	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	<b>414006</b>
<b>1 370</b>	<b>1 420</b>	1 270	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	<b>414000</b>
<b>1 390</b>	<b>1 415</b>	1 328	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>414003</b>
		1 328	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>471401</b>
<b>1 415</b>	<b>1 440</b>	1 350	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>414253</b>
		1 350	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>471426</b>
<b>1 425</b>	<b>1 475</b>	1 315	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	<b>414502</b>
		1 315	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	<b>414506</b>
<b>1 420</b>	<b>1 470</b>	1 315	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	<b>414500</b>
<b>1 440</b>	<b>1 465</b>	1 374	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>414503</b>
		1 374	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>471451</b>
<b>1 465</b>	<b>1 490</b>	1 397	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>414753</b>
		1 397	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>471476</b>
<b>1 475</b>	<b>1 525</b>	1 360	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	<b>415002</b>
		1 360	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	<b>415006</b>
<b>1 470</b>	<b>1 520</b>	1 360	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	<b>415000</b>
<b>1 490</b>	<b>1 515</b>	1 419	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>415003</b>
		1 419	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>471501</b>
<b>1 515</b>	<b>1 540</b>	1 443	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>415253</b>
		1 443	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>471526</b>
<b>1 525</b>	<b>1 575</b>	1 405	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	<b>415502</b>
		1 405	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	<b>415506</b>
<b>1 520</b>	<b>1 570</b>	1 405	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	<b>415500</b>
<b>1 540</b>	<b>1 570</b>	1 467	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>415503</b>
		1 467	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>471551</b>
<b>1 570</b>	<b>1 600</b>	1 495	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>415753</b>
		1 495	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>471576</b>
<b>1 575</b>	<b>1 625</b>	1 450	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	<b>416002</b>
		1 450	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	<b>416006</b>
<b>1 570</b>	<b>1 620</b>	1 450	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	<b>416000</b>
<b>1 600</b>	<b>1 640</b>	1 524	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>416003</b>
		1 524	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>471601</b>

Axial shaft seals | V-ring seals – metric dimensions, for North American market  
 d<sub>1</sub> 1 625–2020 mm

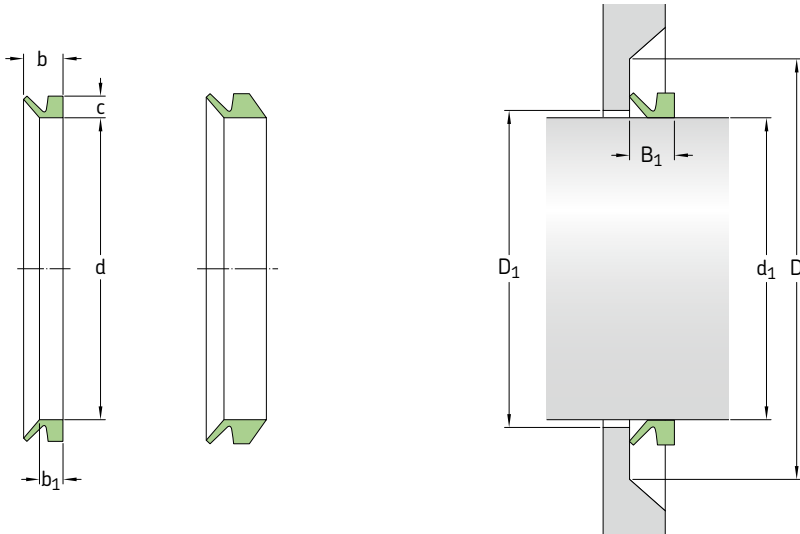


Dimensions		Shaft diameter range d <sub>1</sub> over	Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
d <sub>1</sub> incl.	mm											
<b>1 625</b>	<b>1 675</b>	1 495 1 495	6 6	10,5 10,5	6,5 6,5	d <sub>1</sub> + 5 d <sub>1</sub> + 5	d <sub>1</sub> + 20 d <sub>1</sub> + 20	8 ± 1,5 8 ± 1,5	VR3 VR3	R V	<b>416502</b> <b>416506</b>	
<b>1 620</b>	<b>1 670</b>	1 495	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	VR1	R	<b>416500</b>	
<b>1 640</b>	<b>1 680</b>	1 559 1 559	32,5 32,5	65 65	30 21	d <sub>1</sub> + 24 d <sub>1</sub> + 24	d <sub>1</sub> + 115 d <sub>1</sub> + 115	50 ± 12 50 ± 12	VR4 VR6	R R	<b>416503</b> <b>471651</b>	
<b>1 675</b>	<b>1 725</b>	1 540 1 540	6 6	10,5 10,5	6,5 6,5	d <sub>1</sub> + 5 d <sub>1</sub> + 5	d <sub>1</sub> + 20 d <sub>1</sub> + 20	8 ± 1,5 8 ± 1,5	VR3 VR3	R V	<b>417002</b> <b>417006</b>	
<b>1 670</b>	<b>1 720</b>	1 540	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	VR1	R	<b>417000</b>	
<b>1 680</b>	<b>1 720</b>	1 596 1 596	32,5 32,5	65 65	30 21	d <sub>1</sub> + 24 d <sub>1</sub> + 24	d <sub>1</sub> + 115 d <sub>1</sub> + 115	50 ± 12 50 ± 12	VR4 VR6	R R	<b>417003</b> <b>471701</b>	
<b>1 725</b>	<b>1 775</b>	1 585 1 585	6 6	10,5 10,5	6,5 6,5	d <sub>1</sub> + 5 d <sub>1</sub> + 5	d <sub>1</sub> + 20 d <sub>1</sub> + 20	8 ± 1,5 8 ± 1,5	VR3 VR3	R V	<b>417502</b> <b>417506</b>	
<b>1 720</b>	<b>1 770</b>	1 585	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	VR1	R	<b>417500</b>	
<b>1 720</b>	<b>1 765</b>	1 632 1 632	32,5 32,5	65 65	30 21	d <sub>1</sub> + 24 d <sub>1</sub> + 24	d <sub>1</sub> + 115 d <sub>1</sub> + 115	50 ± 12 50 ± 12	VR4 VR6	R R	<b>417503</b> <b>471751</b>	
<b>1 765</b>	<b>1 810</b>	1 671 1 671	32,5 32,5	65 65	30 21	d <sub>1</sub> + 24 d <sub>1</sub> + 24	d <sub>1</sub> + 115 d <sub>1</sub> + 115	50 ± 12 50 ± 12	VR4 VR6	R R	<b>418003</b> <b>471801</b>	
<b>1 775</b>	<b>1 825</b>	1 630 1 630	6 6	10,5 10,5	6,5 6,5	d <sub>1</sub> + 5 d <sub>1</sub> + 5	d <sub>1</sub> + 20 d <sub>1</sub> + 20	8 ± 1,5 8 ± 1,5	VR3 VR3	R V	<b>418002</b> <b>418006</b>	
<b>1 770</b>	<b>1 820</b>	1 630	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	VR1	R	<b>418000</b>	
<b>1 810</b>	<b>1 855</b>	1 714 1 714	32,5 32,5	65 65	30 21	d <sub>1</sub> + 24 d <sub>1</sub> + 24	d <sub>1</sub> + 115 d <sub>1</sub> + 115	50 ± 12 50 ± 12	VR4 VR6	R R	<b>418503</b> <b>471851</b>	
<b>1 825</b>	<b>1 875</b>	1 675 1 675	6 6	10,5 10,5	6,5 6,5	d <sub>1</sub> + 5 d <sub>1</sub> + 5	d <sub>1</sub> + 20 d <sub>1</sub> + 20	8 ± 1,5 8 ± 1,5	VR3 VR3	R V	<b>418502</b> <b>418506</b>	
<b>1 820</b>	<b>1 870</b>	1 675	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	VR1	R	<b>418500</b>	
<b>1 855</b>	<b>1 905</b>	1 753 1 753	32,5 32,5	65 65	30 21	d <sub>1</sub> + 24 d <sub>1</sub> + 24	d <sub>1</sub> + 115 d <sub>1</sub> + 115	50 ± 12 50 ± 12	VR4 VR6	R R	<b>419003</b> <b>471901</b>	

Dimensions		Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max.	Counterface D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
mm											
<b>1 875</b>	<b>1 925</b>	1 720	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	VR3	R	<b>419002</b>
		1 720	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	VR3	V	<b>419006</b>
<b>1 870</b>	<b>1 920</b>	1 720	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	VR1	R	<b>419000</b>
<b>1 905</b>	<b>1 955</b>	1 794	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	<b>419503</b>
		1 794	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR6	R	<b>471951</b>
<b>1 925</b>	<b>1 975</b>	1 765	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	VR3	R	<b>419502</b>
		1 765	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	VR3	V	<b>419506</b>
<b>1 920</b>	<b>1 970</b>	1 765	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	VR1	R	<b>419500</b>
<b>1 955</b>	<b>2 010</b>	1 844	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	<b>420003</b>
		1 844	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR6	R	<b>472001</b>
<b>1 975</b>	<b>2 025</b>	1 810	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	VR3	R	<b>420002</b>
		1 810	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	VR3	V	<b>420006</b>
<b>1 970</b>	<b>2 020</b>	1 810	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	VR1	R	<b>420000</b>

Axial shaft seals | V-ring seals – inch dimensions, for North American market

d<sub>1</sub> 0.11–2.28 in



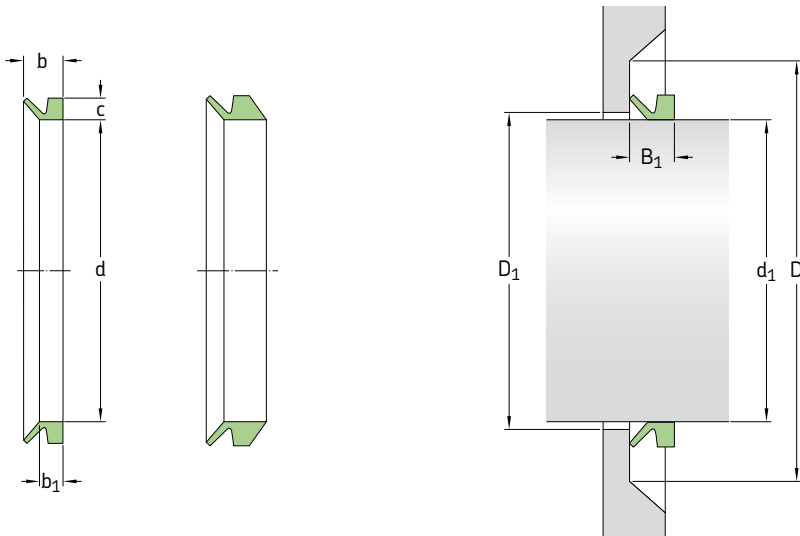
Dimensions		Shaft diameter range d <sub>1</sub> over	Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> (= d <sub>1</sub> +) D <sub>1</sub> max.	Counterface D (= d <sub>1</sub> +) D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
d <sub>1</sub> over	incl.											
in	in											
<b>0.11</b>	<b>0.14</b>	0.10	0.06	0.08	0.12	0.04	0.16	0.10 ± 0.012	VR1	R	<b>400030</b>	
		0.10	0.06	0.08	0.12	0.04	0.16	0.10 ± 0.012	VR1	V	<b>400034</b>	
<b>0.14</b>	<b>0.18</b>	0.13	0.08	0.09	0.15	0.04	0.24	0.12 ± 0.016	VR1	R	<b>400040</b>	
		0.13	0.08	0.09	0.15	0.04	0.24	0.12 ± 0.016	VR1	V	<b>400044</b>	
<b>0.18</b>	<b>0.22</b>	0.16	0.08	0.09	0.15	0.04	0.24	0.12 ± 0.016	VR1	R	<b>400050</b>	
		0.16	0.08	0.09	0.15	0.04	0.24	0.12 ± 0.016	VR1	V	<b>400054</b>	
		0.16	0.08	0.15	0.20	0.04	0.24	0.18 ± 0.016	VR2	R	<b>400051</b>	
		0.16	0.08	0.15	0.20	0.04	0.24	0.18 ± 0.016	VR2	V	<b>400055</b>	
<b>0.22</b>	<b>0.26</b>	0.20	0.08	0.09	0.15	0.04	0.24	0.12 ± 0.016	VR1	R	<b>400060</b>	
		0.20	0.08	0.09	0.15	0.04	0.24	0.12 ± 0.016	VR1	V	<b>400064</b>	
		0.20	0.08	0.15	0.20	0.04	0.24	0.18 ± 0.016	VR2	R	<b>400061</b>	
		0.20	0.08	0.15	0.20	0.04	0.24	0.18 ± 0.016	VR2	V	<b>400065</b>	
<b>0.26</b>	<b>0.31</b>	0.24	0.08	0.09	0.15	0.04	0.24	0.12 ± 0.016	VR1	R	<b>400070</b>	
		0.24	0.08	0.09	0.15	0.04	0.24	0.12 ± 0.016	VR1	V	<b>400074</b>	
		0.24	0.08	0.15	0.20	0.04	0.24	0.18 ± 0.016	VR2	R	<b>400071</b>	
		0.24	0.08	0.15	0.20	0.04	0.24	0.18 ± 0.016	VR2	V	<b>400075</b>	
<b>0.31</b>	<b>0.37</b>	0.28	0.08	0.09	0.15	0.04	0.24	0.12 ± 0.016	VR1	R	<b>400080</b>	
		0.28	0.08	0.09	0.15	0.04	0.24	0.12 ± 0.016	VR1	V	<b>400084</b>	
		0.28	0.08	0.15	0.20	0.04	0.24	0.18 ± 0.016	VR2	R	<b>400081</b>	
		0.28	0.08	0.15	0.20	0.04	0.24	0.18 ± 0.016	VR2	V	<b>400085</b>	
<b>0.37</b>	<b>0.45</b>	0.35	0.12	0.13	0.22	0.04	0.35	0.18 ± 0.02	VR1	R	<b>400100</b>	
		0.35	0.12	0.13	0.22	0.04	0.35	0.18 ± 0.02	VR1	V	<b>400104</b>	
		0.35	0.12	0.22	0.30	0.04	0.35	0.26 ± 0.02	VR2	R	<b>400101</b>	
		0.35	0.12	0.22	0.30	0.04	0.35	0.26 ± 0.02	VR2	V	<b>400105</b>	
<b>0.45</b>	<b>0.49</b>	0.41	0.12	0.13	0.22	0.04	0.35	0.18 ± 0.02	VR1	R	<b>400120</b>	
		0.41	0.12	0.13	0.22	0.04	0.35	0.18 ± 0.02	VR1	V	<b>400124</b>	
		0.41	0.12	0.22	0.30	0.04	0.35	0.26 ± 0.02	VR2	R	<b>400121</b>	
		0.41	0.12	0.22	0.30	0.04	0.35	0.26 ± 0.02	VR2	V	<b>400125</b>	
<b>0.49</b>	<b>0.53</b>	0.46	0.12	0.13	0.22	0.04	0.35	0.18 ± 0.02	VR1	R	<b>400130</b>	
		0.46	0.12	0.13	0.22	0.04	0.35	0.18 ± 0.02	VR1	V	<b>400134</b>	
<b>0.53</b>	<b>0.61</b>	0.49	0.12	0.13	0.22	0.04	0.35	0.18 ± 0.02	VR1	R	<b>400140</b>	
		0.49	0.12	0.13	0.22	0.04	0.35	0.18 ± 0.02	VR1	V	<b>400144</b>	
<b>0.53</b>	<b>0.61</b>	0.49	0.12	0.22	0.30	0.04	0.35	0.26 ± 0.02	VR2	R	<b>400141</b>	
		0.49	0.12	0.22	0.30	0.04	0.35	0.26 ± 0.02	VR2	V	<b>400145</b>	



Dimensions		Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> (= d <sub>1</sub> +) D <sub>1</sub> max.	Counterface D (= d <sub>1</sub> +) D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
in	in	in									
<b>0.61</b>	<b>0.67</b>	0.55	0.12	0.13	0.22	0.04	0.35	0.18 ± 0.02	VR1	R	<b>400160</b>
		0.55	0.12	0.13	0.22	0.04	0.35	0.18 ± 0.02	VR1	V	<b>400164</b>
<b>0.61</b>	<b>0.69</b>	0.55	0.12	0.22	0.30	0.04	0.35	0.26 ± 0.02	VR2	R	<b>400161</b>
		0.55	0.12	0.22	0.30	0.04	0.35	0.26 ± 0.02	VR2	V	<b>400165</b>
<b>0.69</b>	<b>0.75</b>	0.63	0.12	0.13	0.22	0.04	0.35	0.18 ± 0.02	VR1	R	<b>400180</b>
		0.63	0.12	0.13	0.22	0.04	0.35	0.18 ± 0.02	VR1	V	<b>400184</b>
		0.63	0.12	0.22	0.30	0.04	0.35	0.26 ± 0.02	VR2	R	<b>400181</b>
		0.63	0.12	0.22	0.30	0.04	0.35	0.26 ± 0.02	VR2	V	<b>400185</b>
<b>0.75</b>	<b>0.83</b>	0.71	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	VR1	R	<b>400200</b>
		0.71	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	VR1	V	<b>400204</b>
		0.71	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	VR2	R	<b>400201</b>
		0.71	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	VR2	V	<b>400205</b>
<b>0.83</b>	<b>0.94</b>	0.79	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	VR1	R	<b>400220</b>
		0.79	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	VR1	V	<b>400224</b>
		0.79	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	VR2	R	<b>400221</b>
		0.79	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	VR2	V	<b>400225</b>
<b>0.94</b>	<b>1.06</b>	0.87	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	VR1	R	<b>400250</b>
		0.87	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	VR1	V	<b>400254</b>
		0.87	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	VR2	R	<b>400251</b>
		0.87	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	VR2	V	<b>400255</b>
<b>1.06</b>	<b>1.14</b>	0.98	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	VR1	R	<b>400280</b>
		0.98	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	VR1	V	<b>400284</b>
		0.98	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	VR2	R	<b>400281</b>
		0.98	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	VR2	V	<b>400285</b>
<b>1.14</b>	<b>1.22</b>	1.06	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	VR1	R	<b>400300</b>
		1.06	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	VR1	V	<b>400304</b>
		1.06	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	VR2	R	<b>400301</b>
		1.06	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	VR2	V	<b>400305</b>
<b>1.22</b>	<b>1.30</b>	1.14	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	VR1	R	<b>400320</b>
		1.14	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	VR1	V	<b>400324</b>
		1.14	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	VR2	R	<b>400321</b>
		1.14	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	VR2	V	<b>400325</b>
<b>1.30</b>	<b>1.42</b>	1.22	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	VR1	R	<b>400350</b>
		1.22	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	VR1	V	<b>400354</b>
		1.22	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	VR2	R	<b>400351</b>
		1.22	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	VR2	V	<b>400355</b>
<b>1.42</b>	<b>1.50</b>	1.34	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	VR1	R	<b>400380</b>
		1.34	0.16	0.19	0.30	0.08	0.47	0.24 ± 0.03	VR1	V	<b>400384</b>
		1.34	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	VR2	R	<b>400381</b>
		1.34	0.16	0.31	0.41	0.08	0.47	0.35 ± 0.03	VR2	V	<b>400385</b>
<b>1.50</b>	<b>1.69</b>	1.42	0.20	0.22	0.35	0.08	0.59	0.28 ± 0.04	VR1	R	<b>400400</b>
		1.42	0.20	0.22	0.35	0.08	0.59	0.28 ± 0.04	VR1	V	<b>400409</b>
		1.42	0.20	0.37	0.51	0.08	0.59	0.43 ± 0.04	VR2	R	<b>400401</b>
		1.42	0.20	0.37	0.51	0.08	0.59	0.43 ± 0.04	VR2	V	<b>400405</b>
<b>1.69</b>	<b>1.89</b>	1.57	0.20	0.22	0.35	0.08	0.59	0.28 ± 0.04	VR1	R	<b>400450</b>
		1.57	0.20	0.22	0.35	0.08	0.59	0.28 ± 0.04	VR1	V	<b>400454</b>
		1.57	0.20	0.37	0.51	0.08	0.59	0.43 ± 0.04	VR2	R	<b>400451</b>
		1.57	0.20	0.37	0.51	0.08	0.59	0.43 ± 0.04	VR2	V	<b>400455</b>
<b>1.89</b>	<b>2.09</b>	1.77	0.20	0.22	0.35	0.08	0.59	0.28 ± 0.04	VR1	R	<b>400500</b>
		1.77	0.20	0.22	0.35	0.08	0.59	0.28 ± 0.04	VR1	V	<b>400504</b>
		1.77	0.20	0.37	0.51	0.08	0.59	0.43 ± 0.04	VR2	R	<b>400501</b>
		1.77	0.20	0.37	0.51	0.08	0.59	0.43 ± 0.04	VR2	V	<b>400505</b>
<b>2.09</b>	<b>2.28</b>	1.93	0.20	0.22	0.35	0.08	0.59	0.28 ± 0.04	VR1	R	<b>400550</b>
		1.93	0.20	0.22	0.35	0.08	0.59	0.28 ± 0.04	VR1	V	<b>400554</b>
		1.93	0.20	0.37	0.51	0.08	0.59	0.43 ± 0.04	VR2	R	<b>400551</b>
		1.93	0.20	0.37	0.51	0.08	0.59	0.43 ± 0.04	VR2	V	<b>400555</b>

Axial shaft seals | V-ring seals – inch dimensions, for North American market

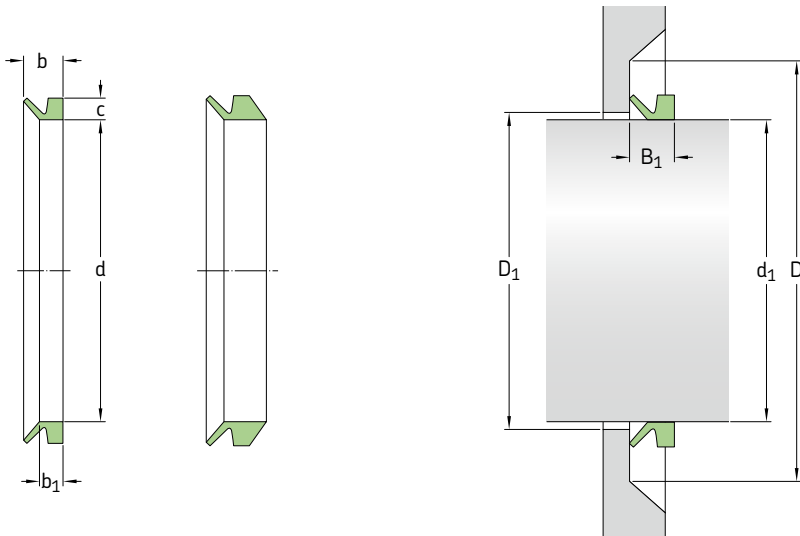
d<sub>1</sub> 2.28–8.27 in



Dimensions		Shaft diameter range d <sub>1</sub> over	Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> (= d <sub>1</sub> +) D <sub>1</sub> max.	Counterface D (= d <sub>1</sub> +) D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
d <sub>1</sub> over	incl.											
in	in											
<b>2.28</b>	<b>2.48</b>	2.13	0.20	0.22	0.35	0.08	0.59	0.28 ± 0.04	VR1	R	<b>400600</b>	
		2.13	0.20	0.22	0.35	0.08	0.59	0.28 ± 0.04	VR1	V	<b>400604</b>	
		2.13	0.20	0.37	0.51	0.08	0.59	0.43 ± 0.04	VR2	R	<b>400601</b>	
		2.13	0.20	0.37	0.51	0.08	0.59	0.43 ± 0.04	VR2	V	<b>400605</b>	
<b>2.48</b>	<b>2.68</b>	2.28	0.20	0.22	0.35	0.08	0.59	0.28 ± 0.04	VR1	R	<b>400650</b>	
		2.28	0.20	0.22	0.35	0.08	0.59	0.28 ± 0.04	VR1	V	<b>400654</b>	
		2.28	0.20	0.37	0.51	0.08	0.59	0.43 ± 0.04	VR2	R	<b>400651</b>	
		2.28	0.20	0.37	0.51	0.08	0.59	0.43 ± 0.04	VR2	V	<b>400655</b>	
<b>2.68</b>	<b>2.87</b>	2.48	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	VR1	R	<b>400700</b>	
		2.48	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	VR1	V	<b>400704</b>	
		2.48	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	VR2	R	<b>400701</b>	
		2.48	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	VR2	V	<b>400705</b>	
<b>2.87</b>	<b>3.07</b>	2.64	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	VR1	R	<b>400750</b>	
		2.64	0.24	0.27	0.43	0.12	0.71	0.53 ± 0.05	VR2	R	<b>400751</b>	
		2.64	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	VR2	V	<b>400755</b>	
<b>3.07</b>	<b>3.27</b>	2.83	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	VR1	R	<b>400800</b>	
		2.83	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	VR1	V	<b>400804</b>	
		2.83	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	VR2	R	<b>400801</b>	
		2.83	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	VR2	V	<b>400805</b>	
<b>3.27</b>	<b>3.46</b>	2.99	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	VR1	R	<b>400850</b>	
		2.99	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	VR1	V	<b>400854</b>	
		2.99	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	VR2	R	<b>400851</b>	
		2.99	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	VR2	V	<b>400855</b>	
<b>3.46</b>	<b>3.66</b>	3.19	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	VR1	R	<b>400900</b>	
		3.19	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	VR1	V	<b>400904</b>	
		3.19	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	VR2	R	<b>400901</b>	
		3.19	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	VR2	V	<b>400905</b>	
<b>3.66</b>	<b>3.86</b>	3.35	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	VR1	R	<b>400950</b>	
		3.35	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	VR1	V	<b>400954</b>	
		3.35	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	VR2	R	<b>400951</b>	
		3.35	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	VR2	V	<b>400955</b>	
<b>3.86</b>	<b>4.13</b>	3.54	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	VR1	R	<b>401000</b>	
		3.54	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	VR1	V	<b>401004</b>	
		3.54	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	VR2	R	<b>401001</b>	
		3.54	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	VR2	V	<b>401005</b>	

Dimensions		Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> (= d <sub>1</sub> +) D <sub>1</sub> max.	Counterface D (= d <sub>1</sub> +) D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
in		in									
4.13	4.53	3.90	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	401102
		3.90	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	401106
		3.90	0.28	0.31	0.50	0.16	0.83	0.41 ± 0.06	VR1	R	401100
		3.90	0.28	0.31	0.50	0.16	0.83	0.41 ± 0.06	VR1	V	401104
		3.90	0.28	0.52	0.71	0.16	0.83	0.61 ± 0.06	VR2	R	401101
		3.90	0.28	0.52	0.71	0.16	0.83	0.61 ± 0.06	VR2	V	401105
4.53	4.92	4.25	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	401202
		4.25	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	401206
		4.25	0.28	0.31	0.50	0.16	0.83	0.41 ± 0.06	VR1	R	401200
		4.25	0.28	0.31	0.50	0.16	0.83	0.41 ± 0.06	VR1	V	401204
		4.25	0.28	0.52	0.71	0.16	0.83	0.61 ± 0.06	VR2	R	401201
		4.25	0.28	0.52	0.71	0.16	0.83	0.61 ± 0.06	VR2	V	401205
4.92	5.31	4.61	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	401302
		4.61	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	401306
		4.61	0.28	0.31	0.50	0.16	0.83	0.41 ± 0.06	VR1	R	401300
		4.61	0.28	0.31	0.50	0.16	0.83	0.41 ± 0.06	VR1	V	401304
		4.61	0.28	0.52	0.71	0.16	0.83	0.61 ± 0.06	VR2	R	401301
		4.61	0.28	0.52	0.71	0.16	0.83	0.61 ± 0.06	VR2	V	401305
5.31	5.71	4.96	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	401402
		4.96	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	401406
		4.96	0.28	0.31	0.50	0.16	0.83	0.41 ± 0.06	VR1	R	401400
		4.96	0.28	0.31	0.50	0.16	0.83	0.41 ± 0.06	VR1	V	401404
		4.96	0.28	0.52	0.71	0.16	0.83	0.61 ± 0.06	VR2	R	401401
		4.96	0.28	0.52	0.71	0.16	0.83	0.61 ± 0.06	VR2	V	401405
5.71	6.10	5.31	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	401502
		5.31	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	401506
		5.31	0.28	0.31	0.50	0.16	0.83	0.41 ± 0.06	VR1	R	401500
		5.31	0.28	0.31	0.50	0.16	0.83	0.41 ± 0.06	VR1	V	401504
		5.31	0.28	0.52	0.71	0.16	0.83	0.61 ± 0.06	VR2	R	401501
		5.31	0.28	0.52	0.71	0.16	0.83	0.61 ± 0.06	VR2	V	401505
6.10	6.50	5.67	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	401602
		5.67	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	401606
		5.67	0.31	0.35	0.57	0.16	0.94	0.47 ± 0.07	VR1	R	401600
		5.67	0.31	0.35	0.57	0.16	0.94	0.47 ± 0.07	VR1	V	401604
		5.67	0.31	0.59	0.81	0.16	0.94	0.71 ± 0.07	VR2	R	401601
		5.67	0.31	0.59	0.81	0.16	0.94	0.71 ± 0.07	VR2	V	401605
6.50	6.89	6.02	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	401702
		6.02	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	401706
		6.02	0.31	0.35	0.57	0.16	0.94	0.47 ± 0.07	VR1	R	401700
		6.02	0.31	0.35	0.57	0.16	0.94	0.47 ± 0.07	VR1	V	401704
		6.02	0.31	0.59	0.81	0.16	0.94	0.71 ± 0.07	VR2	R	401701
		6.02	0.31	0.59	0.81	0.16	0.94	0.71 ± 0.07	VR2	V	401705
6.89	7.28	6.38	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	401802
		6.38	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	401806
		6.38	0.31	0.35	0.57	0.16	0.94	0.47 ± 0.07	VR1	R	401800
		6.38	0.31	0.35	0.57	0.16	0.94	0.47 ± 0.07	VR1	V	401804
		6.38	0.31	0.59	0.81	0.16	0.94	0.71 ± 0.07	VR2	R	401801
		6.38	0.31	0.59	0.81	0.16	0.94	0.71 ± 0.07	VR2	V	401805
7.28	7.68	6.73	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	401902
		6.73	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	401906
		6.73	0.31	0.35	0.57	0.16	0.94	0.47 ± 0.07	VR1	R	401900
		6.73	0.31	0.35	0.57	0.16	0.94	0.47 ± 0.07	VR1	V	401904
		6.73	0.31	0.59	0.81	0.16	0.94	0.71 ± 0.07	VR2	R	401901
		6.73	0.31	0.59	0.81	0.16	0.94	0.71 ± 0.07	VR2	V	401905
7.68	8.27	7.17	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	4020022
		7.17	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	402006
		7.09	0.31	0.35	0.57	0.16	0.94	0.47 ± 0.07	VR1	R	401990
		7.09	0.31	0.35	0.57	0.16	0.94	0.47 ± 0.07	VR1	V	401994
		7.09	0.31	0.59	0.81	0.16	0.94	0.71 ± 0.07	VR2	R	401991
		7.09	0.31	0.59	0.81	0.16	0.94	0.71 ± 0.07	VR2	V	401995

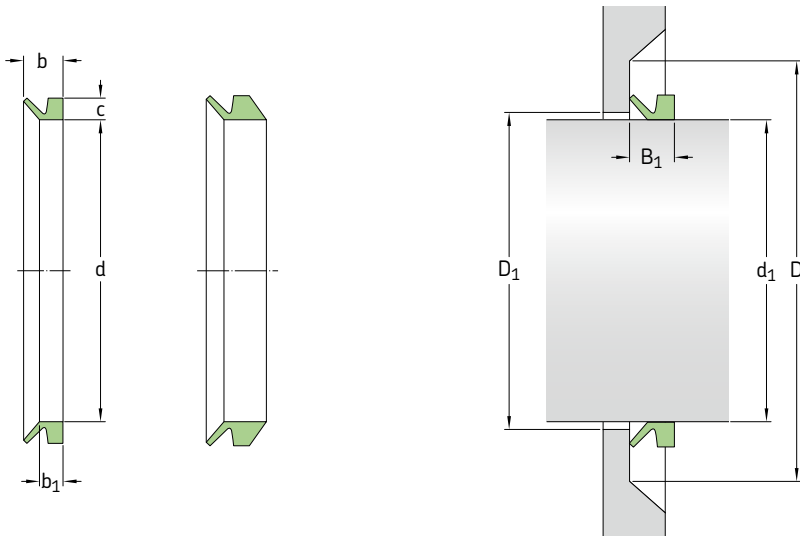
Axial shaft seals | V-ring seals – inch dimensions, for North American market  
 d<sub>1</sub> 7.48–16.14 in



Dimensions		Shaft diameter range d <sub>1</sub> over	Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> (= d <sub>1</sub> +) D <sub>1</sub> max.	Counterface D (= d <sub>1</sub> +) D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
d <sub>1</sub> over	incl.											
in	in											
7.48	8.27	7.09	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	402000	
		7.09	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	V	402004	
8.27	9.17	7.80	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	402202	
		7.80	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	402206	
		7.80	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	402200	
		7.80	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	V	402204	
9.17	10.24	8.86	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	402502	
		8.86	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	402506	
9.25	10.43	8.86	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	402500	
		8.86	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	V	402504	
10.24	11.22	9.72	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	402752	
		9.72	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	402756	
10.43	11.42	9.72	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	402750	
		9.72	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	V	402754	
11.22	12.20	10.63	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	403002	
		10.63	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	403006	
11.42	12.20	10.63	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	403000	
		10.63	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	V	403004	
11.81	12.01	11.57	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	403003	
		11.57	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470301	
12.01	12.20	11.77	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	403053	
		11.77	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470306	
12.20	13.19	11.50	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	403252	
		11.50	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	403256	
		11.50	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	403250	
		11.50	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	V	403254	
12.20	12.40	11.97	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	403103	
		11.97	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470311	
12.40	12.60	12.17	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	403153	
		12.17	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470316	

Dimensions		Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> (= d <sub>1</sub> +) D <sub>1</sub> max.	Counterface D (= d <sub>1</sub> +) D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
in		in							–	–	–
12.60	12.80	12.36	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	403203
		12.36	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470321
12.80	12.99	12.56	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	403253
		12.56	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470326
12.99	13.19	12.72	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	403303
		12.72	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470331
13.19	14.37	12.40	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	403502
		12.40	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	403506
		12.40	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	403500
		12.40	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	V	403504
13.19	13.39	12.91	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	403353
		12.91	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470336
13.39	13.58	13.11	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	403403
		12.91	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470341
13.58	13.78	13.31	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	403453
		13.31	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470346
13.78	13.98	13.50	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	403503
		13.50	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470351
13.98	14.17	13.66	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	403553
		13.66	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470356
14.17	14.37	13.86	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	403603
		14.06	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470361
14.37	15.16	13.27	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	403752
		13.27	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	403756
14.37	15.35	13.27	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	403750
		13.27	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	V	403754
14.37	14.57	14.06	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	403653
14.57	14.76	14.25	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	403703
		14.25	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470371
14.76	14.96	14.45	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	403753
		14.45	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470376
14.96	15.16	14.61	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	403803
		14.61	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470381
15.16	16.14	14.17	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	404002
		14.17	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	4040066
15.35	16.93	14.17	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	404000
		14.17	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	V	4040044
15.16	15.35	14.80	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	403853
		14.80	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470386
15.35	15.55	15.00	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	403903
		15.00	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470391
15.55	15.75	15.20	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	403953
		15.20	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470396
15.75	15.94	15.39	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	4040033
		15.39	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470401
15.94	16.14	15.59	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	404053
		15.59	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470406

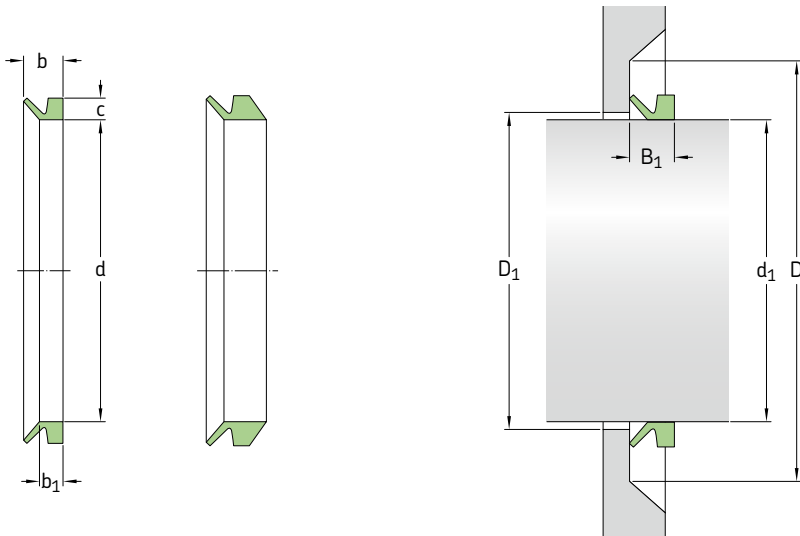
Axial shaft seals | V-ring seals – inch dimensions, for North American market  
 d<sub>1</sub> 16.14–22.05 in



Dimensions		Shaft diameter range d <sub>1</sub> over	Seal inside diameter, free state d	Nominal seal height c	Seal seal width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> (= d <sub>1</sub> +) D <sub>1</sub> max.	Counterface D (= d <sub>1</sub> +) D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
in	incl.											
16.14	16.34	15.79	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	404103	
		15.79	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470411	
16.34	16.54	15.94	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	404153	
		15.94	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470416	
16.54	16.73	16.14	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	404203	
		16.14	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470421	
16.73	16.93	16.34	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	404253	
		16.34	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470426	
16.14	17.32	15.04	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	404252	
		15.04	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	404256	
17.32	18.70	15.94	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	404502	
		15.94	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	404506	
16.93	18.90	15.94	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	404500	
		15.94	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	V	404504	
16.93	17.13	16.54	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	404303	
		16.54	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470431	
17.13	17.32	16.73	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	404353	
		16.73	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470436	
17.32	17.52	16.89	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	4044033	
		16.89	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470441	
17.52	17.72	17.09	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	404453	
		17.09	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470446	
17.72	17.91	17.28	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	404503	
		17.28	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470451	
17.91	18.11	17.48	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	404553	
		17.48	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470456	
18.11	18.31	17.64	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	4046033	
		17.64	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470461	
18.31	18.50	17.83	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	404653	
		17.83	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470466	

Dimensions		Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> (= d <sub>1</sub> +) D <sub>1</sub> max.	Counterface D (= d <sub>1</sub> +) D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
in		in									
18.50	18.70	18.03	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	404703
		18.03	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470471
18.70	18.90	18.23	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	404753
		18.23	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470476
18.70	20.08	17.72	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	405002
		17.72	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	405009
20.08	21.26	18.58	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	405252
		18.58	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	405256
18.90	20.87	17.72	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	405000
		17.72	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	V	405004
18.90	19.09	18.43	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	404803
		18.43	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470481
19.09	19.29	18.62	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	404853
		18.62	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470486
19.29	19.49	18.82	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	404903
		18.82	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470491
19.49	19.69	19.02	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	404953
		19.02	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470496
19.69	19.88	19.21	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	405003
		19.21	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470501
19.88	20.08	19.41	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	405053
		19.41	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470506
20.08	20.28	19.57	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	405103
		19.57	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470511
20.28	20.47	19.76	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	405153
		19.76	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470516
20.47	20.67	19.96	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	405203
		19.96	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470521
20.67	20.87	20.16	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	405253
		20.16	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470526
21.26	22.64	19.49	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	405502
		19.49	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	405506
20.87	22.83	19.49	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	405500
		19.49	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	V	405504
20.87	21.06	20.35	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	405303
		20.35	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470531
21.06	21.26	20.51	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	405353
		20.51	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470536
21.26	21.46	20.71	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	405403
		20.71	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470541
21.46	21.65	20.91	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	405453
		20.91	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470546
21.65	21.85	21.10	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	405503
		21.10	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470551
21.85	22.05	21.30	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	405553
		21.30	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470556

Axial shaft seals | V-ring seals – inch dimensions, for North American market  
 d<sub>1</sub> 22.05–32.48 in



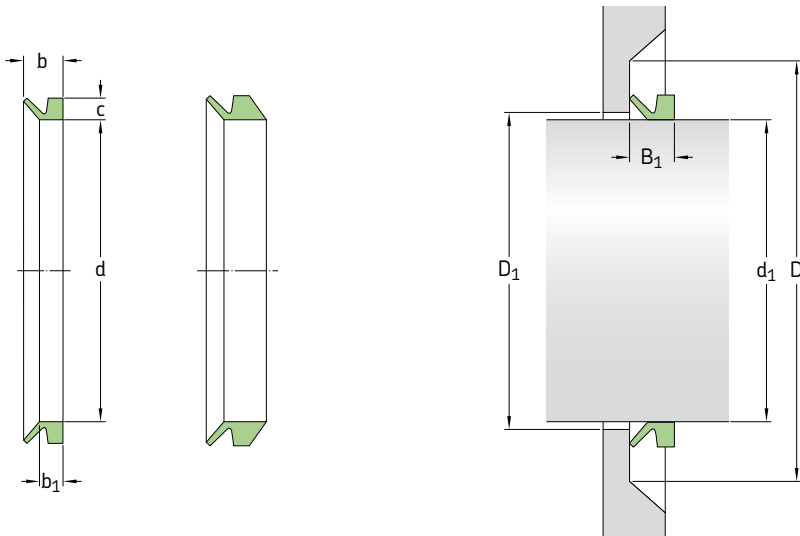
Dimensions		Shaft diameter range d <sub>1</sub> over	Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> (= d <sub>1</sub> +) D <sub>1</sub> max.	Counterface D (= d <sub>1</sub> +) D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
in	incl.											
22.05	22.24	21.50 21.50	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	VR4	R	405603	
									VR6	R	470561	
22.24	22.44	21.65 21.65	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	VR4	R	405653	
									VR6	R	470566	
22.44	22.64	21.85 21.85	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	VR4	R	405703	
									VR6	R	470571	
22.64	22.83	22.05 22.05	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	VR4	R	405753	
									VR6	R	470576	
22.64	24.61	21.26 21.26	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	VR3	R	4060022	
									VR3	V	406006	
22.83	24.80	21.26 21.26	0.59 0.59	0.56 0.56	0.98 0.98	0.39 0.39	1.77 1.77	0.79 ± 0.16 0.79 ± 0.16	VR1	R	406000	
									VR1	V	4060044	
22.83	23.03	22.24 22.24	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	VR4	R	405803	
									VR6	R	470581	
23.03	23.23	22.44 22.44	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	VR4	R	405853	
									VR6	R	470586	
23.23	23.62	22.64 22.64	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	VR4	R	405903	
									VR6	R	470591	
23.62	24.02	22.91 22.91	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	VR4	R	406003	
									VR6	R	470601	
24.02	24.41	23.31 23.31	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	VR4	R	4061033	
									VR6	R	470611	
24.41	24.80	23.70 23.70	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	VR4	R	4062033	
									VR6	R	470621	
24.21	26.57	23.62 23.62	0.26 0.26	0.24 0.24	0.41 0.41	0.20 0.20	0.79 0.79	0.31 ± 0.06 0.31 ± 0.06	VR3	R	406502	
									VR3	V	406506	
24.80	26.18	23.62 23.62	0.59 0.59	0.56 0.56	0.98 0.98	0.39 0.39	1.77 1.77	0.79 ± 0.16 0.79 ± 0.16	VR1	R	406500	
									VR1	V	406504	
24.80	25.20	24.09 24.09	1.18 0.83	1.28 1.28	2.56 2.56	0.94 0.94	4.53 4.53	1.97 ± 0.47 1.97 ± 0.47	VR4	R	4063033	
									VR6	R	470631	



Dimensions		Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> (= d <sub>1</sub> +) D <sub>1</sub> max.	Counterface D (= d <sub>1</sub> +) D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
in		in							–	–	–
25.20	25.59	24.45	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	4064033
		24.45	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470641
25.59	25.98	24.84	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	406503
		24.84	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470651
25.98	26.38	25.20	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	4066033
		25.20	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470661
26.57	27.95	24.80	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	407002
		24.80	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	407006
26.18	27.76	24.80	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	407000
		24.80	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	V	407004
26.38	26.77	25.59	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	406703
		25.59	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470671
26.77	27.17	25.98	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	406803
		25.98	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470681
27.17	27.56	26.38	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	406903
		26.38	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470691
27.56	27.95	26.77	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	407003
		26.77	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470701
27.95	29.13	26.38	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	407252
		26.38	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	407256
27.76	29.33	26.38	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	407250
		26.38	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	V	407254
27.95	28.35	27.13	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	407103
		27.13	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470711
28.35	28.74	27.52	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	407203
		27.52	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470721
28.74	29.13	27.91	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	407309
		27.91	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470731
29.13	29.53	28.27	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	407403
		28.27	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470741
29.13	30.51	27.76	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	407502
		27.76	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	407506
29.33	30.91	27.76	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	407500
		27.76	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	V	407504
29.53	29.84	28.66	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	407503
		28.66	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470751
29.84	30.16	28.94	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	407603
		28.94	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470761
30.16	30.47	29.25	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	407703
		29.25	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470771
30.47	30.83	29.57	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	407803
		29.57	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470781
30.83	31.18	29.88	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	407903
		29.88	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470791
30.51	32.48	29.33	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	408002
		29.33	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	408006

Axial shaft seals | V-ring seals – inch dimensions, for North American market

d<sub>1</sub> 30.91–44.29 in

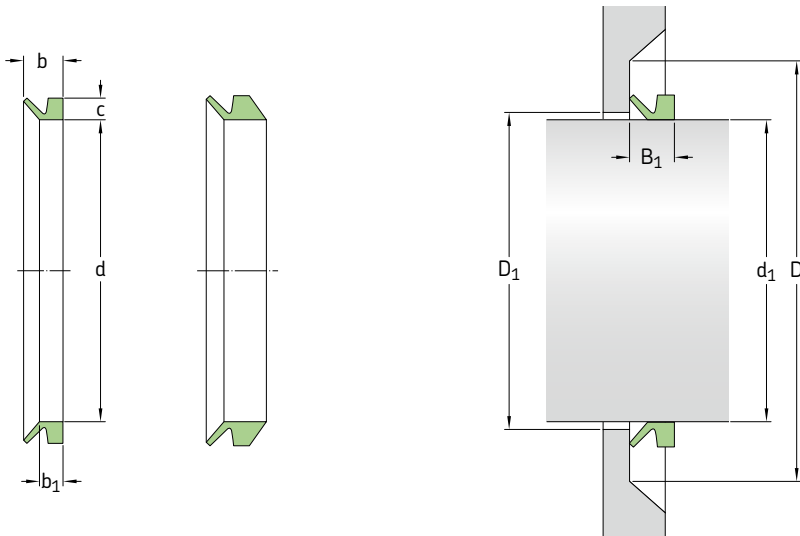


Dimensions		Shaft diameter range d <sub>1</sub> over	Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> (= d <sub>1</sub> +) D <sub>1</sub> max.	Counterface D (= d <sub>1</sub> +) D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
d <sub>1</sub> over	incl.											
in	in									–	–	–
30.91	32.68	29.33	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	408000	
		29.33	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	V	408004	
31.18	31.54	30.24	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	408003	
		30.24	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470801	
31.54	31.89	30.59	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	408103	
		30.59	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470811	
31.89	32.32	30.94	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	408203	
		30.94	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470821	
32.32	32.72	31.34	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	408303	
		31.34	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470831	
32.48	34.45	30.91	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	408502	
		30.91	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	408506	
32.68	34.45	30.91	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	408500	
		30.91	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	V	408504	
32.72	33.11	31.69	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	408403	
		31.69	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470841	
33.11	33.50	32.05	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	408503	
		32.05	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470851	
33.50	33.90	32.44	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	408603	
		32.44	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470861	
33.90	34.29	32.80	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	408703	
		32.80	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470871	
34.29	34.72	33.19	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	408803	
		33.19	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470881	
34.45	36.42	32.48	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	409002	
		32.48	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	409006	
34.45	36.22	32.48	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	409000	
		32.48	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	V	409004	
34.72	35.12	33.58	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	408903	
		33.58	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470891	

Dimensions		Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> (= d <sub>1</sub> +) D <sub>1</sub> max.	Counterface D (= d <sub>1</sub> +) D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
in		in							–	–	–
35.12	35.91	34.29	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	409003
		34.29	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470901
35.91	36.30	34.65	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	409203
		34.65	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470921
36.42	38.39	34.06	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	409502
		34.06	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	409506
36.22	37.99	34.06	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	409500
		34.06	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	V	409504
36.30	36.73	35.04	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	409303
		35.04	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470931
36.73	37.17	35.43	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	409403
		35.43	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470941
37.17	37.60	35.87	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	409503
		35.87	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470951
37.60	38.03	36.26	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	409603
		36.26	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470961
38.39	40.35	35.83	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	410002
		35.83	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	410006
37.99	39.96	35.83	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	410000
		35.83	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	V	410004
38.03	38.46	36.69	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	409703
		36.69	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470971
38.46	38.90	37.09	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	409803
		37.09	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470981
38.90	39.33	37.52	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	409903
		37.52	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	470991
39.33	39.76	37.91	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	410003
		37.91	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471001
39.76	40.35	38.31	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	410203
		38.31	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471021
40.35	42.32	37.60	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	410502
		37.60	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	410506
39.96	41.93	37.60	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	410500
40.35	41.14	38.98	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	410403
		38.98	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471041
41.14	41.93	39.69	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	410603
		39.69	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471061
42.32	44.29	39.37	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	411002
		39.37	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	411006
41.93	43.90	39.37	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	411000
41.93	42.72	40.43	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	410803
		40.43	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471081
42.72	43.50	41.14	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	411003
		41.14	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471101
43.50	44.29	41.93	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	411203
		41.93	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471121

Axial shaft seals | V-ring seals – inch dimensions, for North American market

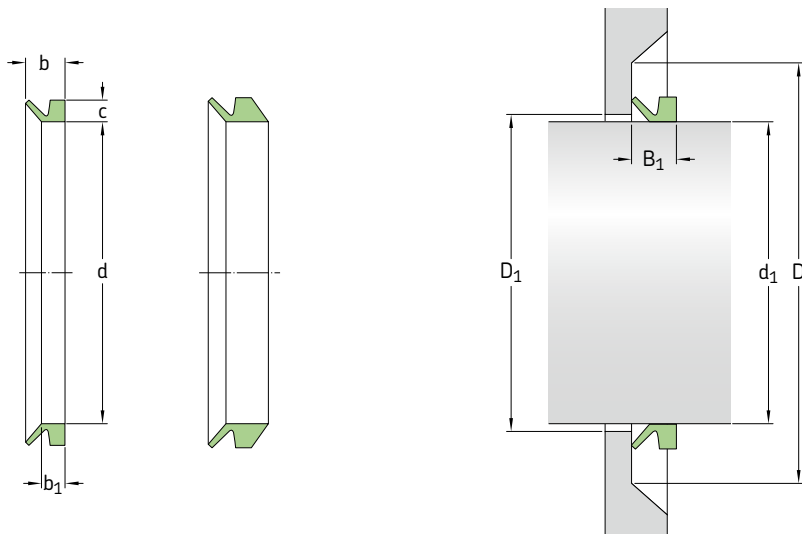
d<sub>1</sub> 44.29–65.94 in



Dimensions		Shaft diameter range d <sub>1</sub> over	Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> (= d <sub>1</sub> +) D <sub>1</sub> max.	Counterface D (= d <sub>1</sub> +) D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
d <sub>1</sub> over	incl.											
in	in											
44.29	46.26	41.14	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	411502	
		41.14	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	411506	
43.90	45.87	41.14	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	411500	
44.29	45.08	42.68	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	411403	
		42.68	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471141	
45.08	45.87	43.43	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	411603	
		43.43	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471161	
46.26	48.23	42.91	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	412002	
		42.91	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	412006	
45.87	47.83	42.91	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	412000	
45.87	46.65	44.13	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	411803	
		44.13	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471181	
46.65	47.44	44.84	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	412003	
		44.84	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471201	
47.44	48.23	45.55	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	412203	
		45.55	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471221	
48.23	50.20	44.69	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	412502	
		44.69	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	412506	
47.83	50.00	44.69	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	412500	
48.23	49.02	46.30	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	471240	
		46.30	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471241	
49.02	50.00	47.05	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	412603	
		47.05	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471261	
50.00	50.98	47.95	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	412803	
		47.95	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471281	
50.20	52.17	46.46	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	413002	
		46.46	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	413006	
50.00	51.97	46.46	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	413000	

Dimensions		Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> (= d <sub>1</sub> +) D <sub>1</sub> max.	Counterface D (= d <sub>1</sub> +) D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
in		in							–	–	–
50.98	51.77	48.82	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	413003
		48.82	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471301
51.77	52.76	49.57	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	413253
		49.57	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471326
52.17	54.13	48.23	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	413502
		48.23	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	413506
51.97	53.94	48.23	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	413500
52.76	53.74	50.43	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	413503
		50.43	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471351
53.74	54.72	51.38	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	413753
		51.38	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471376
54.13	56.10	50.00	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	414002
		50.00	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	414006
53.94	55.91	50.00	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	414000
54.72	55.71	52.28	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	414003
		52.28	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471401
55.71	56.69	53.15	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	414253
56.10	58.07	51.77	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	414502
		51.77	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	414506
55.91	57.87	51.77	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	414500
56.69	57.68	54.09	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	414503
		54.09	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471451
57.68	58.66	55.00	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	414753
		55.00	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471476
58.07	60.04	53.54	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	415002
		53.54	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	415006
57.87	59.84	53.54	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	415000
58.66	59.65	55.87	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	415003
		55.87	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471501
59.65	60.63	56.81	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	415253
		56.81	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471526
60.04	62.01	55.31	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	415502
		55.31	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	415506
59.84	61.81	55.31	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	415500
60.63	61.81	57.76	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	415503
		57.76	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471551
61.81	62.99	58.86	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	415753
		58.86	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471576
62.01	63.98	57.09	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	416002
		57.09	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	416006
61.81	63.78	57.09	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	416000
62.99	64.57	60.00	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	416003
		60.00	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471601
63.98	65.94	58.86	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	416502
		58.86	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	416506

Axial shaft seals | V-ring seals – inch dimensions, for North American market  
 d<sub>1</sub> 63.78–79.53 in



Dimensions		Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> (= d <sub>1</sub> +) D <sub>1</sub> max.	Counterface D (= d <sub>1</sub> +) D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
in	in										
63.78	65.75	58.86	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	416500
64.57	66.14	61.38	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	416503
		61.38	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471651
65.94	67.91	60.63	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	417002
		60.63	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	417006
65.75	67.72	60.63	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	417000
66.14	67.72	62.83	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	417003
		62.83	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471701
67.91	69.88	62.40	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	417502
		62.40	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	417506
67.72	69.69	62.40	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	417500
67.72	69.49	64.25	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	417503
		64.25	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471751
69.49	71.26	65.79	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	418003
		65.79	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471801
69.88	71.85	64.17	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	418002
		64.17	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	418006
69.69	71.65	64.17	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	418000
71.26	73.03	67.48	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	418503
		67.48	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471851
71.85	73.82	65.94	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	418502
		65.94	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	418506
71.65	73.62	65.94	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	418500
73.03	75.00	69.02	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	419003
		69.02	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	471901
73.82	75.79	67.72	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	419002
		67.72	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	419006
73.62	75.59	67.72	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	419000

Dimensions		Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> (= d <sub>1</sub> +) D <sub>1</sub> max.	Counterface D (= d <sub>1</sub> +) D min.	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
in		in									
<b>75.00</b>	<b>76.97</b>	70.63	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	<b>419503</b>
		70.63	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	<b>471951</b>
<b>75.79</b>	<b>77.76</b>	69.49	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	<b>419502</b>
		69.49	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	<b>419506</b>
<b>75.59</b>	<b>77.56</b>	69.49	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	<b>419500</b>
<b>76.97</b>	<b>79.13</b>	72.60	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	<b>420003</b>
		72.60	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	<b>472001</b>
<b>77.76</b>	<b>79.72</b>	71.26	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	<b>420002</b>
		71.26	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	<b>420006</b>
<b>77.56</b>	<b>79.53</b>	71.26	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	<b>420000</b>

# Machined seals



R06-P



R06-R

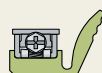


R07-P



R07-R

SKF can manufacture a wide variety of seal profiles with different materials and sizes with its industry-leading SKF SEAL JET production system (see details on **page 56**). For additional information about customized machined profiles, refer to publication *Customized machined seals – Product range* or contact SKF.



Wind turbines  
HRC-PW



Special V-ring

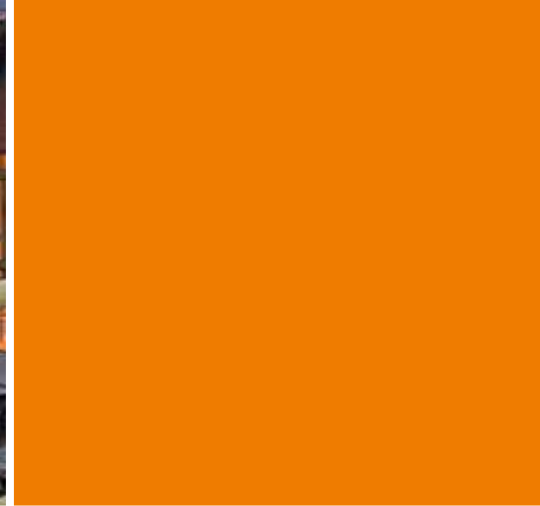








## Axial clamp seals

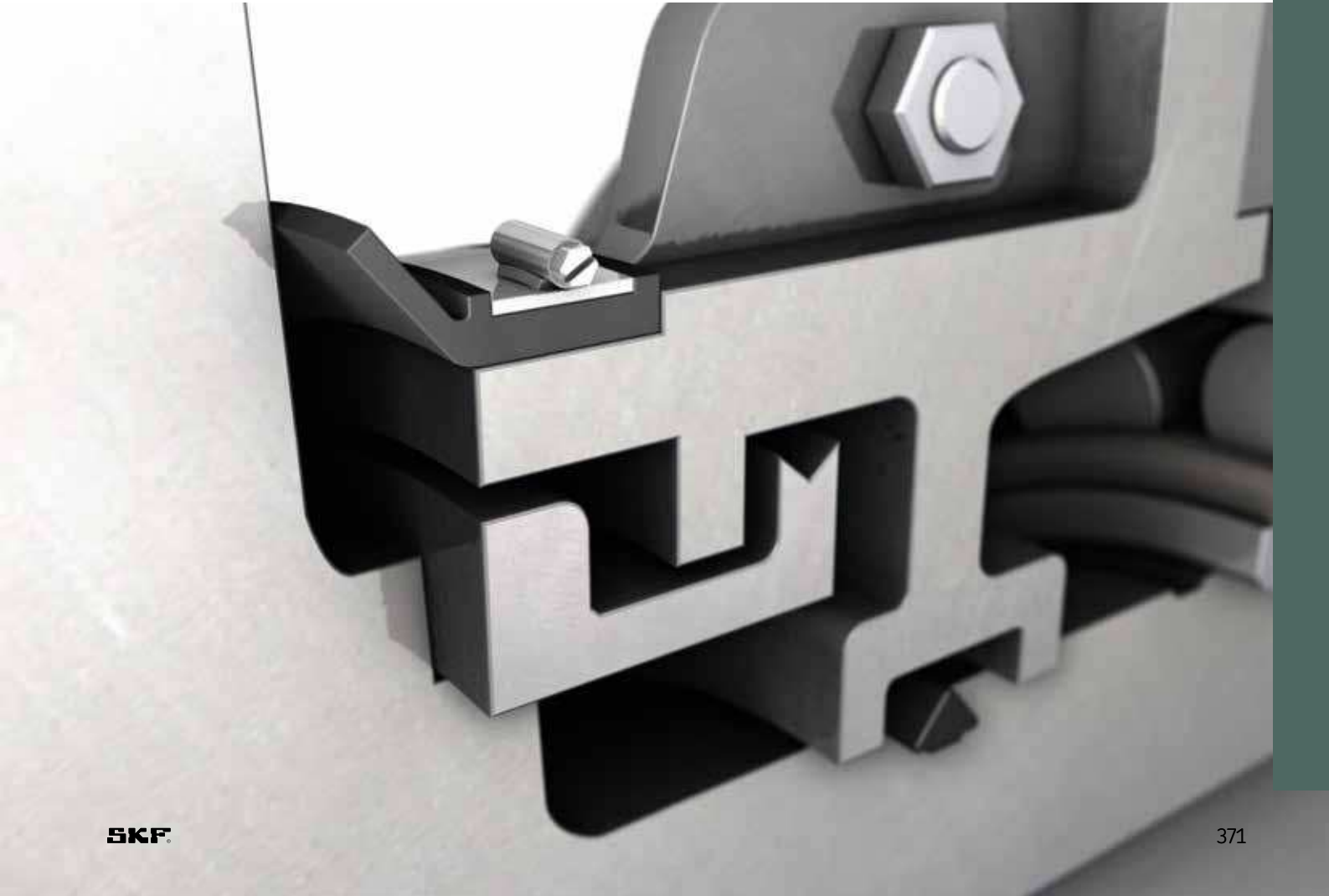


FOR LARGE AND  
VERY LARGE SHAFT  
DIAMETERS



### Axial clamp seals

- > Cost-Effective
- > Versatile



# Axial clamp seals

## General

SKF axial clamp seals are designed for large and very large shaft diameters. They are suitable for use as primary seals or as secondary seals in applications where the primary seals are subjected to excessive solid or fluid contaminants. Axial clamp seals do not rotate but seal axially against a rotating counterface.

SKF axial clamp seals are made of profiled strips of non-reinforced nitrile rubber and are held firmly in position by stainless steel band clamps. They are available for shaft diameters ranging from 150 to 4 600 mm (5.9 to 181 in).

The standard range of SKF axial clamp seals is intended for inch-size shaft diameters. Because axial clamp seals are typically installed with an approximate 25 mm (0.984 in) gap between the ends, they may also be used for metric shaft diameters.

## Designs

SKF axial clamp seals are manufactured in two different designs:

- CT1 seals (→ **fig. 1**) have the basic design and are held in position by a band clamp. The maximum permissible axial displacement relative to the counterface is +2,4 mm (0.094 in).
- CT4 seals (→ **fig. 1**) are extra wide and are designed with two band clamps. The maximum axial displacement relative to the counterface is +4,8 mm (0.189 in).

## Design of the sealing arrangement

To obtain reliable sealing performance, the seal seat diameter ( $d_1$ ), seal seat width ( $b_1$ ) and the seal fitted width ( $B_1$ ) should meet the requirements listed in **table 1**. SKF also recommends that the seal should abut a shoulder to simplify alignment.

Finely turned counterfaces are adequate for axial clamp seals. The appropriate surface roughness values are  $R_a$  2,5  $\mu\text{m}$  (115  $\mu\text{in}$ ) and  $R_t$  12  $\mu\text{m}$  (480  $\mu\text{in}$ ).

Typically, after installation, CT axial clamp seals have an approximate 25 mm (1 in) gap between the ends. This should be arranged at the 6 o'clock position (→ **fig. 2** on **page 373**) to facilitate installation and drainage of contaminants.

Butt-joint seals are also available for certain applications.

## Installation instructions

Axial clamp seals are supplied as rolled-up coils. They are placed in position on their seat in the housing and bolted lightly together. They are then pushed forward toward the counterface and the gap (or joint) between the two ends is arranged at the 6 o'clock position (→ **fig. 2**). The clamps are finally tightened. The torque applied to the clamp screws should not exceed 7 Nm.

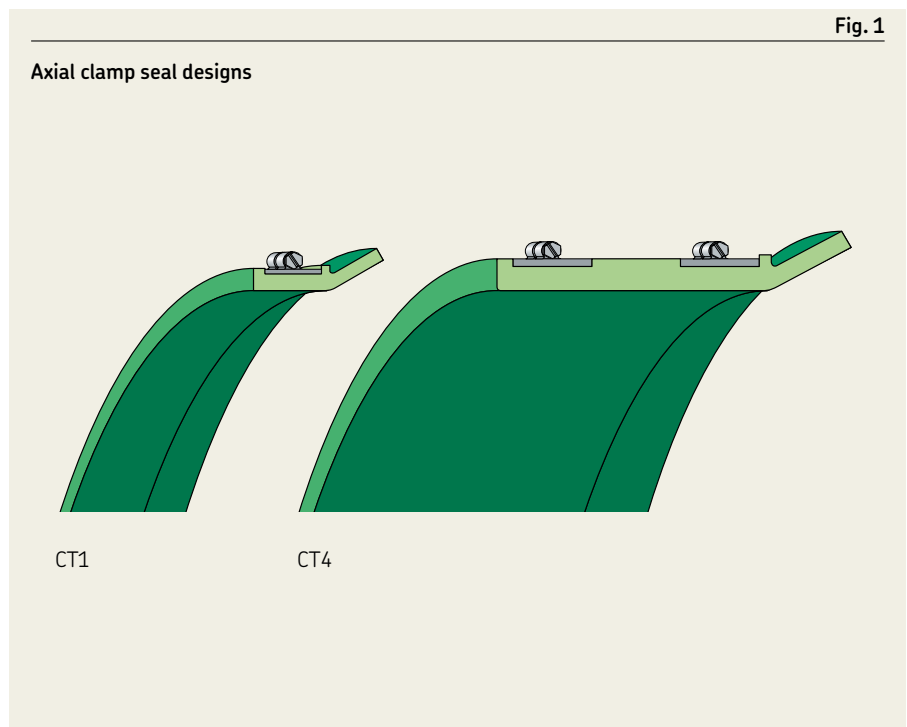
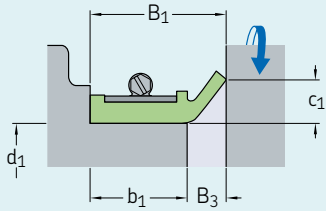


Table 1

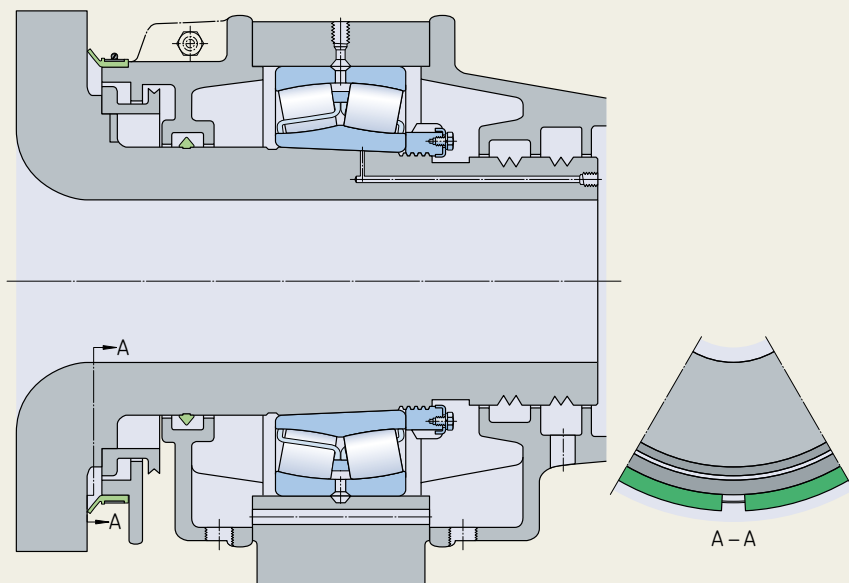
Application tolerances



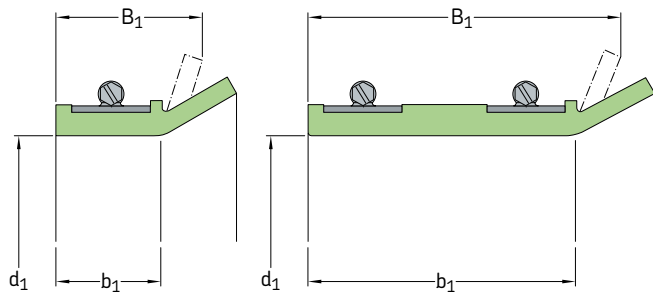
Dimension	Tolerance		Axial clamp seals CT1		CT4	
	mm	in	mm	in	mm	in
Seal seat diameter, $d_1$	$\pm 1,6$	$\pm 0.063$	152,40–4 572	6.000–180.000	304,80–1 143	12.000–45.000
Seal fitted width, $B_1$	$\pm 0,8$	$\pm 0.031$	28,60–38,10	1.125–1.500	38,10–92,20	1.500–3.750
Seal seat width, $b_1$	$\pm 3,2$	$\pm 0.125$	17,50–27	0.688–1.063	27–84	1.063–3.313
Lip height, $c_1$	$\pm 0,8$	$\pm 0.031$	12,70	0.500	12,70	0.500
Gap width, $B_3$ (max.)			11,10	0.437	11,10	0.437

Fig. 2

Sealing arrangement and installation



Axial shaft seals | Axial clamp seals | CT1 and CT4 – metric dimensions (converted from inch dimensions)  
 d<sub>1</sub> 168–1 105 mm



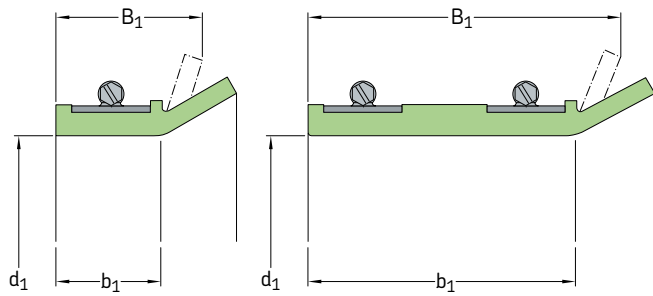
See **table 1, page 373** for application tolerances.

Dimensions			Design	Designation	Dimensions			Design	Designation
Seal seat diameter d <sub>1</sub>	Seal fitted width B <sub>1</sub>	Seal seat width b <sub>1</sub>			Seal seat diameter d <sub>1</sub>	Seal fitted width B <sub>1</sub>	Seal seat width b <sub>1</sub>		
mm			–	–	mm		–	–	
168	28,60	17,50	CT1	594334	387	28,60	17,50	CT1	594954
168,30	28,60	17,50	CT1	529489	410	23,80	12,70	CT1	595110
178	38,10	27	CT1	523586	413	88,90	77,80	CT4	592934
185	30	18,90	CT1	593637	425	31,80 33,40	20,70 22,30	CT1 CT1	523826 524815
209,60	28,60	17,50	CT1	527820	432	38,10	27	CT1	528535
219	28,60	17,50	CT1	529490	444,50	34,90	23,80	CT1	525737
227	28,60	17,50	CT1	531635	445	31,80 34,90	20,70 23,80	CT1 CT1	522679 523547
228,60	28,60 28,60	17,50 17,50	CT1 CT1	524204 527819	449,30	95,30	84,20	CT4	528070
229	29	17,90	CT1	528631	470	28,60 31,80	17,50 20,70	CT1 CT1	525708 526192
254	28,60 28,60	17,50 17,50	CT1 CT1	524205 527806	495	28,60	17,50	CT1	594181
273	28,60	17,50	CT1	594369	508	31,80	20,70	CT1	524587
280	28,60 31,80	17,50 20,70	CT1 CT1	524206 524928	533	32	20,90	CT1	594241
298,40	28,60	17,50	CT1	593629	546	31,80 95,30	20,70 84,20	CT1 CT4	524599 526741
305	31,80 38,10	20,70 27	CT1 CT1	524208 525582	554	31,80	20,70	CT1	524210
330	28,60 38,10	17,50 27	CT1 CT1	524209 523587	557	28,60	17,50	CT1	524211
350,80	38,10	27	CT1	594110	559	31,80	20,70	CT1	524347
355,60	38,10 34,90	27 23,80	CT1 CT1	530733 593037	571,50	31,80	20,70	CT1	524212
380	38,10	27	CT1	593171	578	34,90	23,80	CT1	524657
381	28,60	17,50	CT1	594025	594	34,90	23,80	CT1	525627
					595	28,60	17,50	CT1	525031

CT1 and CT4 – metric dimensions (converted from inch dimensions)

Dimensions			Design	Designation	Dimensions			Design	Designation
Seal seat diameter $d_1$	Seal fitted width $B_1$	Seal seat width $b_1$			Seal seat diameter $d_1$	Seal fitted width $B_1$	Seal seat width $b_1$		
mm			–	–	mm			–	–
597	34,90	23,80	CT1	524364	902	38,10	27	CT1	524222
600	30	18,90	CT1	594431	914	28,60	17,50	CT1	528416
603	31,80	20,70	CT1	524365	914,40	30,20	19,10	CT1	524223
	34,90	23,80	CT1	523184		38,10	27	CT1	524224
	46	34,90	CT4	528651		28,60	17,50	CT1	593606
603,30	34,90	23,80	CT1	525637	914,40	31,80	20,70	CT1	530466
	46	34,90	CT4	528267		28,60	17,50	CT1	593285
616	47,60	36,50	CT4	529276	929	75,20	64,10	CT4	594202
629	31,80	20,70	CT1	524213	937	34,90	23,80	CT1	523154
638	34,90	23,80	CT1	524214	940	38,10	27	CT1	525320
655	40	28,90	CT4	594784	943	31,80	20,70	CT1	524768
660	34,90	23,80	CT1	524591	946	31,80	20,70	CT1	524368
684	28,60	17,50	CT1	524215	949	31,80	20,70	CT1	526246
	73	61,90	CT4	593604	952	31,80	20,70	CT1	526582
692	34,90	23,80	CT1	524592	962	31,80	20,70	CT1	524225
705	34,90	23,80	CT1	524216	965	31,80	20,70	CT1	524226
	60,30	49,20	CT4	528268	1 003	28,60	17,50	CT1	529452
711	31,80	20,70	CT1	527232	1 003	31,80	20,70	CT1	526806
732	28,60	17,50	CT1	525032	1 013	34,90	23,80	CT1	523584
737	38,10	27	CT1	524940	1 013	36,50	25,40	CT1	529379
	44,50	33,40	CT4	528269	1 016	36,50	25,40	CT1	525035
746	38,10	27	CT1	524853	1 016	38,10	27	CT1	527903
	39,70	28,60	CT4	528270	1 018	54,80	43,70	CT4	530396
755	34,90	23,80	CT1	524217	1 022	31,80	20,70	CT1	525426
	38,10	27	CT1	524218	1 029	38,10	27	CT1	528532
755,70	38,10	27	CT1	524973	1 038	38,10	27	CT1	525633
764	28,60	17,50	CT1	525033	1 041	38,10	27	CT1	524227
787	31,80	20,70	CT1	525212	1 045	38,10	27	CT1	525036
800	31,80	20,70	CT1	528210	1 051	33,40	22,30	CT1	530448
806	31,80	20,70	CT1	526715	1 054	31,80	20,70	CT1	527474
818	31,80	20,70	CT1	525034	1 054	38,10	27	CT1	524228
819,20	31,80	20,70	CT1	524294	1 064	41,30	30,20	CT4	528272
822,30	31,80	20,70	CT1	593949	1 066	63,50	52,40	CT4	528271
825	28,60	17,50	CT1	594785	1 066,90	38,10	27	CT4	594494
	31,80	20,70	CT1	524367	1 080	28,60	17,50	CT1	523133
840	31,80	20,70	CT1	526867	1 101,70	31,80	20,70	CT1	524909
856	31,80	20,70	CT1	524219	1 105	38,10	27	CT1	524369
876	38,10	27	CT1	523063					
889	31,80	20,70	CT1	524220					
900	31,80	20,70	CT1	524221					

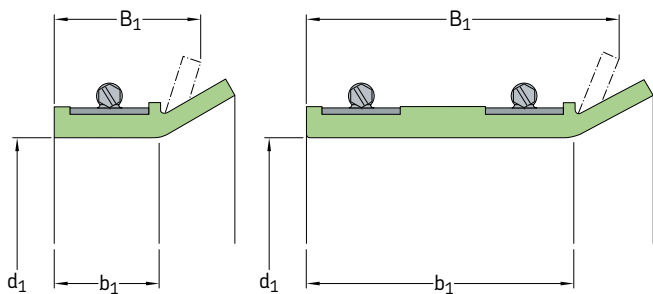
Axial shaft seals | Axial clamp seals | CT1 and CT4 – metric dimensions (converted from inch dimensions)  
 d<sub>1</sub> 1 118–4 142 mm



See **table 1, page 376** for application tolerances.

Dimensions			Design	Designation	Dimensions			Design	Designation
Seal seat diameter d <sub>1</sub>	Seal fitted width B <sub>1</sub>	Seal seat width b <sub>1</sub>			Seal seat diameter d <sub>1</sub>	Seal fitted width B <sub>1</sub>	Seal seat width b <sub>1</sub>		
mm			–	–	mm			–	–
<b>1 118</b>	31,80	20,70	CT1	<b>524370</b>	<b>1 497,60</b>	41,30	30,20	CT4	<b>594163</b>
	34,90	23,80	CT1	<b>528415</b>					
	38,10	27	CT1	<b>524229</b>	<b>1 613</b>	31,80	20,70	CT1	<b>526808</b>
	38,10	27	CT1	<b>593180</b>	<b>1 721</b>	31,80	20,70	CT1	<b>528975</b>
	44,50	33,40	CT4	<b>528002</b>	<b>1 778</b>	31,80	20,70	CT1	<b>526809</b>
	44,50	33,40	CT4	<b>528273</b>	<b>1 803</b>	31,80	20,70	CT1	<b>524373</b>
<b>1 140</b>	38,10	27	CT1	<b>522676</b>	<b>1 854</b>	38,10	27	CT1	<b>531456</b>
<b>1 181</b>	31,80	20,70	CT1	<b>529086</b>	<b>1 924</b>	31,80	20,70	CT1	<b>525092</b>
<b>1 193,80</b>	38,10	27	CT1	<b>527211</b>	<b>1 968</b>	31,80	20,70	CT1	<b>529517</b>
<b>1 206</b>	31,80	27	CT1	<b>525091</b>	<b>2 540</b>	38,10	27	CT1	<b>522856</b>
	34,90	23,80	CT1	<b>526021</b>	<b>2 616</b>	31,80	20,70	CT1	<b>594083</b>
	38,10	27	CT1	<b>524230</b>	<b>4 142</b>	31,80	20,70	CT1	<b>594682</b>
<b>1 206,50</b>	30,20	19,10	CT1	<b>530606</b>					
<b>1 210</b>	38,10	27	CT1	<b>522677</b>					
<b>1 225</b>	38,10	27	CT1	<b>524231</b>					
<b>1 241</b>	38,10	27	CT1	<b>524371</b>					
<b>1 245</b>	31,80	20,70	CT1	<b>522828</b>					
<b>1 270</b>	34,90	23,80	CT1	<b>529129</b>					
<b>1 286</b>	31,80	20,70	CT1	<b>525953</b>					
<b>1 302</b>	34,90	23,80	CT1	<b>529130</b>					
<b>1 308</b>	31,80	20,70	CT1	<b>524372</b>					
	34,90	23,80	CT1	<b>530661</b>					
	38,10	27	CT1	<b>524232</b>					
<b>1 321</b>	38,10	27	CT1	<b>528927</b>					
<b>1 346</b>	31,80	20,70	CT1	<b>528526</b>					
<b>1 397</b>	31,80	20,70	CT1	<b>526807</b>					
<b>1 448</b>	31,80	20,70	CT1	<b>528525</b>					

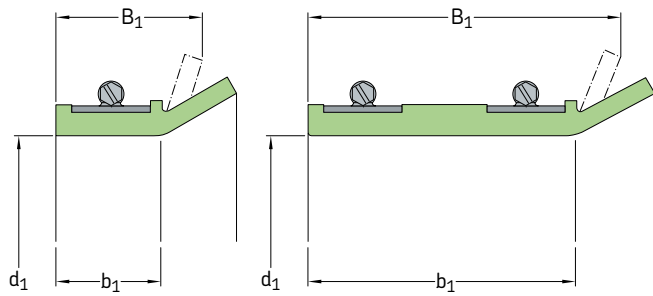




See **table 1, page 377** for application tolerances.

Dimensions			Design	Designation	Dimensions			Design	Designation
Seal seat diameter $d_1$	Seal fitted width $B_1$	Seal seat width $b_1$			Seal seat diameter $d_1$	Seal fitted width $B_1$	Seal seat width $b_1$		
in			–	–	in			–	–
6.614	1.126	0.689	CT1	594334	18.504	1.126	0.689	CT1	525708
6.626	1.126	0.689	CT1	529489	18.504	1.252	0.815	CT1	526192
7.008	1.500	1.063	CT1	523586	19.488	1.126	0.689	CT1	594181
7.284	1.181	0.744	CT1	593637	20.000	1.252	0.815	CT1	524587
8.252	1.126	0.689	CT1	527820	20.984	1.260	0.823	CT1	594241
8.622	1.126	0.689	CT1	529490	21.496	1.252	0.815	CT1	524599
8.937	1.126	0.689	CT1	531635	21.496	3.752	3.315	CT4	526741
9.000	1.126	0.689	CT1	524204	21.811	1.252	0.815	CT1	524210
9.000	1.126	0.689	CT1	527819	21.929	1.126	0.689	CT1	524211
9.016	1.142	0.705	CT1	528631	22.008	1.252	0.815	CT1	524347
10.000	1.126	0.689	CT1	524205	22.500	1.252	0.815	CT1	524212
10.000	1.126	0.689	CT1	527806	22.756	1.374	0.937	CT1	524657
10.748	1.126	0.689	CT1	594369	23.386	1.374	0.937	CT1	525627
11.024	1.126	0.689	CT1	524206	23.426	1.126	0.689	CT1	525031
11.024	1.252	0.815	CT1	524928	23.504	1.374	0.937	CT1	524364
11.748	1.126	0.689	CT1	593629	23.622	1.181	0.744	CT1	594431
12.008	1.252	0.815	CT1	524208	23.740	1.252	0.815	CT1	524365
12.008	1.500	1.063	CT1	525582	23.740	1.374	0.937	CT1	523184
12.992	1.126	0.689	CT1	524209	23.740	1.811	1.374	CT4	528651
12.992	1.500	1.063	CT1	523587	23.752	1.374	0.937	CT1	525637
13.811	1.500	1.063	CT1	594110	23.752	1.811	1.374	CT4	528267
14.000	1.500	1.063	CT1	530733	24.252	1.874	1.437	CT4	529276
14.000	1.374	0.937	CT1	593037	24.764	1.252	0.815	CT1	524213
14.961	1.500	1.063	CT1	593171	25.118	1.374	0.937	CT1	524214
15.000	1.126	0.689	CT1	594025	25.787	1.575	1.138	CT4	594784
15.236	1.126	0.689	CT1	594954	25.984	1.374	0.937	CT1	524591
16.142	0.937	0.500	CT1	595110	26.929	1.126	0.689	CT1	524215
16.260	3.500	3.063	CT4	592934	26.929	2.874	2.437	CT4	593604
16.732	1.252	0.815	CT1	523826	27.244	1.374	0.937	CT1	524592
16.732	1.315	0.878	CT1	524815	27.756	1.374	0.937	CT1	524216
17.008	1.500	1.063	CT1	528535	27.756	2.374	1.937	CT4	528268
17.500	1.374	0.937	CT1	525737	27.992	1.252	0.815	CT1	527232
17.520	1.252	0.815	CT1	522679	28.819	1.126	0.689	CT1	525032
17.520	1.374	0.937	CT1	523547	29.016	1.500	1.063	CT1	524940
17.689	3.752	3.315	CT4	528070	29.016	1.752	1.315	CT4	528269

Axial shaft seals | Axial clamp seals | CT1 and CT4 – inch dimensions  
 d<sub>1</sub> 29.370–163.071 in



See **table 1, page 373** for application tolerances.

Dimensions			Design	Designation	Dimensions			Design	Designation
Seal seat diameter $d_1$	Seal fitted width $B_1$	Seal seat width $b_1$			Seal seat diameter $d_1$	Seal fitted width $B_1$	Seal seat width $b_1$		
in			–	–	in		–	–	
29.370	1.500	1.063	CT1	524853	39.488	1.126	0.689	CT1	529452
29.370	1.563	1.126	CT4	528270	39.488	1.252	0.815	CT1	526806
29.724	1.374	0.937	CT1	524217	39.882	1.374	0.937	CT1	523584
29.724	1.500	1.063	CT1	524218	39.882	1.437	1.000	CT1	529379
29.752	1.500	1.063	CT1	524973	40.000	1.437	1.000	CT1	525035
30.079	1.126	0.689	CT1	525033	40.000	1.500	1.063	CT1	527903
30.984	1.252	0.815	CT1	525212	40.079	2.156	1.721	CT4	530396
31.496	1.252	0.815	CT1	528210	40.236	1.252	0.815	CT1	525426
31.732	1.252	0.815	CT1	526715	40.512	1.500	1.063	CT1	528532
32.205	1.252	0.815	CT1	525034	40.866	1.500	1.063	CT1	525633
32.252	1.252	0.815	CT1	524294	40.984	1.500	1.063	CT1	524227
32.374	1.252	0.815	CT1	593949	41.142	1.500	1.063	CT1	525036
32.480	1.126	0.689	CT1	594785	41.378	1.315	0.878	CT1	530448
32.480	1.252	0.815	CT1	524367	41.496	1.252	0.815	CT1	527474
33.071	1.252	0.815	CT1	526867	41.496	1.500	1.063	CT1	524228
33.701	1.252	0.815	CT1	524219	41.890	1.626	1.189	CT4	528272
34.488	1.500	1.063	CT1	523063	41.968	2.500	2.063	CT4	528271
35.000	1.252	0.815	CT1	524220	42.004	1.500	1.063	CT4	594494
35.433	1.252	0.815	CT1	524221	42.520	1.126	0.689	CT1	523133
35.512	1.500	1.063	CT1	524222	43.374	1.252	0.815	CT1	524909
35.984	1.126	0.689	CT1	528416	43.504	1.500	1.063	CT1	524369
35.984	1.189	0.752	CT1	524223	44.016	1.252	0.815	CT1	524370
35.984	1.500	1.063	CT1	524224	44.016	1.374	0.937	CT1	528415
36.000	1.126	0.689	CT1	593606	44.016	1.500	1.063	CT1	524229
36.000	1.252	0.815	CT1	530466	44.016	1.500	1.063	CT1	593180
36.575	1.126	0.689	CT1	593285	44.016	1.752	1.315	CT4	528002
36.575	2.961	2.524	CT4	594202	44.016	1.752	1.315	CT4	528273
36.890	1.374	0.937	CT1	523154	44.882	1.500	1.063	CT1	522676
37.008	1.252	0.815	CT1	526246	46.496	1.252	0.815	CT1	529086
37.008	1.500	1.063	CT1	525320	47.000	1.500	1.063	CT1	527211
37.126	1.252	0.815	CT1	524768	47.480	1.252	1.063	CT1	525091
37.244	1.252	0.815	CT1	524368	47.480	1.374	0.937	CT1	526021
37.480	1.252	0.815	CT1	526582	47.480	1.500	1.063	CT1	524230
37.874	1.252	0.815	CT1	524225	47.500	1.189	0.752	CT1	530606
37.992	1.252	0.815	CT1	524226	47.638	1.500	1.063	CT1	522677

Dimensions			Design	Designation
Seal seat diameter $d_1$	Seal fitted width $B_1$	Seal seat width $b_1$		
in			–	–
<b>48.228</b>	1.500	1.063	CT1	<b>524231</b>
<b>48.858</b>	1.500	1.063	CT1	<b>524371</b>
<b>49.016</b>	1.252	0.815	CT1	<b>522828</b>
<b>50.000</b>	1.374	0.937	CT1	<b>529129</b>
<b>50.630</b>	1.252	0.815	CT1	<b>525953</b>
<b>51.260</b>	1.374	0.937	CT1	<b>529130</b>
<b>51.496</b>	1.252	0.815	CT1	<b>524372</b>
<b>51.496</b>	1.374	0.937	CT1	<b>530661</b>
<b>51.496</b>	1.500	1.063	CT1	<b>524232</b>
<b>52.008</b>	1.500	1.063	CT1	<b>528927</b>
<b>52.992</b>	1.252	0.815	CT1	<b>528526</b>
<b>55.000</b>	1.252	0.815	CT1	<b>526807</b>
<b>57.008</b>	1.252	0.815	CT1	<b>528525</b>
<b>58.606</b>	1.626	1.189	CT4	<b>594163</b>
<b>63.504</b>	1.252	0.815	CT1	<b>526808</b>
<b>67.756</b>	1.252	0.815	CT1	<b>528975</b>
<b>70.000</b>	1.252	0.815	CT1	<b>526809</b>
<b>70.984</b>	1.252	0.815	CT1	<b>524373</b>
<b>72.992</b>	1.500	1.063	CT1	<b>531456</b>
<b>75.748</b>	1.252	0.815	CT1	<b>525092</b>
<b>77.480</b>	1.252	0.815	CT1	<b>529517</b>
<b>100.00</b>	1.500	1.063	CT1	<b>522856</b>
<b>102.992</b>	1.252	0.815	CT1	<b>594083</b>
<b>163.071</b>	1.252	0.815	CT1	<b>594082</b>



# US Designation index











Numerical designation	Design	Material	Inner diameter	Outer diameter	Width	Metric or inch value	Numerical designation	Design	Material	Inner diameter	Outer diameter	Width	Metric or inch value
13588	CRWA1	ACM	1.375	2.062	0.313	Inch	14780	CRSA1	NBR	1.491	2.191	0.250	Inch
13598	CRW1	NBR	1.365	2.081	0.313	Inch	14789	CRW1	NBR	1.494	2.060	0.270	Inch
13602	CRWA1	NBR	1.375	2.106	0.313	Inch	14804	HM14	NBR	1.500	1.874	0.188	Inch
13612	HM21	NBR	1.375	2.106	0.250	Inch	14807	CRW1	NBR	1.500	1.874	0.250	Inch
13614	CRW1	ACM	1.375	2.106	0.313	Inch	14808	HM14	FKM	1.500	1.874	0.188	Inch
13649	CRW1	NBR	1.375	2.125	0.313	Inch	14809	CRW1	FKM	1.500	1.918	0.250	Inch
13651	CRWA1	NBR	1.375	2.125	0.313	Inch	14810	HM14	NBR	1.500	1.874	0.250	Inch
13661	CRWA1	FKM	1.375	2.125	0.313	Inch	14816	HM14	NBR	1.500	1.938	0.250	Inch
13662	HM21	NBR	1.375	2.125	0.250	Inch	14821	CRW1	FKM	1.500	1.983	0.250	Inch
13663	CRW1	FKM	1.375	2.125	0.313	Inch	14824	CRWA1	NBR	1.500	1.983	0.250	Inch
13671	CRW1	NBR	1.375	2.250	0.313	Inch	14832	CRW1	NBR	1.500	1.983	0.313	Inch
13676	CRWA1	NBR	1.375	2.250	0.313	Inch	14840	HM14	NBR	1.500	1.983	0.188	Inch
13688	CRW1	FKM	1.375	2.250	0.313	Inch	14844	CRWA5	FKM	1.500	1.997	0.250	Inch
13689	HM14	NBR	1.375	2.250	0.250	Inch	14846	CRWA1	NBR	1.500	2.000	0.313	Inch
13691	CRWA1	FKM	1.375	2.250	0.313	Inch	14848	HMA22	NBR	1.500	1.989	0.250	Inch
13698	CRWA1	NBR	1.375	2.250	0.250	Inch	14855	CRW1	NBR	1.500	2.000	0.313	Inch
13700	CRW1	NBR	1.365	2.261	0.313	Inch	14857	HM14	NBR	1.500	2.000	0.250	Inch
13710	HM14	NBR	1.375	2.282	0.250	Inch	14858	CRWA1	NBR	1.500	2.048	0.313	Inch
13711	HM18	NBR	2.328	0.406	0.188	Inch	14861	CRW1	FKM	1.500	2.000	0.313	Inch
13734	CRW1	FKM	1.375	2.374	0.313	Inch	14864	CRW1	NBR	1.500	2.062	0.313	Inch
13738	CRW1	NBR	1.375	2.374	0.313	Inch	14867	CRW1	FKM	1.500	2.062	0.313	Inch
13739	CRWA1	NBR	1.375	2.374	0.313	Inch	14868	CRWA5	FKM	1.500	2.064	0.375	Inch
13758	HM21	NBR	2.328	2.374	0.250	Inch	14869	HM8	NBR	1.500	2.000	0.188	Inch
13796	HM21	NBR	2.328	2.437	0.250	Inch	14875	CRW1	NBR	1.500	2.125	0.313	Inch
13797	CRW1	NBR	1.375	2.437	0.250	Inch	14876	CRWA1	NBR	1.500	2.125	0.313	Inch
13810	CRW1	NBR	1.375	2.441	0.313	Inch	14886	CRW1	FKM	1.500	2.125	0.313	Inch
13812	CRWA1	NBR	1.375	2.441	0.313	Inch	14887	CRWA1	FKM	1.500	2.125	0.313	Inch
13862	HM21	NBR	2.328	2.502	0.250	Inch	14896	X1	Leather	1.500	2.187	0.500	Inch
13865	CRW1	NBR	1.375	2.502	0.313	Inch	14903	CRW1	NBR	1.500	2.222	0.313	Inch
13867	CRW1	FKM	1.375	2.502	0.313	Inch	14907	CRW1	NBR	1.484	2.254	0.313	Inch
13869	CRW1	ACM	1.375	2.250	0.313	Inch	14935	CRW1	MVQ	1.500	2.250	0.313	Inch
13875	CRW1	NBR	1.375	2.562	0.375	Inch	14938	CRW1	NBR	1.500	2.250	0.313	Inch
13876	CRWA1	NBR	1.375	2.562	0.375	Inch	14939	CRWA1	NBR	1.500	2.250	0.313	Inch
13878	CRWA1	FKM	1.375	2.562	0.375	Inch	14940	CRW1	FKM	1.500	2.250	0.313	Inch
13882	CRWA1	FKM	1.375	2.623	0.313	Inch	14942	CRWA1	FKM	1.500	2.250	0.313	Inch
13892	CRW1	NBR	1.375	2.686	0.500	Inch	14960	HM21	NBR	1.500	2.250	0.250	Inch
13900	CRW1	NBR	1.375	2.716	0.313	Inch	14966	HM21	NBR	1.500	2.254	0.250	Inch
13906	CRSH1	NBR	1.375	2.750	0.500	Inch	14968	CRW1	NBR	1.500	2.260	0.406	Inch
13912	CRWHA1	NBR	1.375	2.812	0.375	Inch	14970	X15	NBR	1.500	2.286	0.270	Inch
13916	TL8	NBR	2.328	2.835	0.594	Inch	14971	XH15	NBR	1.500	2.286	0.420	Inch
13918	CRWA1	NBR	1.375	2.835	0.313	Inch	14974	HM18	NBR	2.328	0.500	0.286	Inch
13920	CRW1	NBR	1.375	2.835	0.313	Inch	14975	HM18	NBR	2.328	0.390	0.188	Inch
13925	CRWA1	ACM	1.375	2.835	0.313	Inch	14977	CRWA5	NBR	1.500	2.328	0.500	Inch
13926	CRWA1	FKM	1.378	2.835	0.313	Inch	14979	CRWA5	FKM	1.500	2.311	0.500	Inch
13929	CRWA1	ACM	1.375	2.875	0.313	Inch	14992	CRW1	FKM	1.500	2.374	0.313	Inch
13934	CRSH1	NBR	1.375	3.350	0.469	Inch	14994	CRWA1	FKM	1.500	2.374	0.313	Inch
13936	CRSH1	NBR	1.375	3.125	0.500	Inch	15004	CRW1	NBR	1.500	2.374	0.313	Inch
13937	CRSHA1	NBR	1.375	3.000	0.500	Inch	15005	CRWA1	NBR	1.500	2.374	0.313	Inch
13985	CRW1	NBR	1.365	1.956	0.438	Inch	15032	HM21	NBR	2.328	2.374	0.250	Inch
13990	CRSA1	NBR	1.399	2.292	0.500	Inch	15039	CRWH1	NBR	1.500	2.374	0.500	Inch
13992	CRSA1	NBR	1.399	2.292	0.469	Inch	15041	CRWA1	NBR	1.500	2.377	0.453	Inch
14035	CRSHA1	NBR	1.414	2.250	0.250	Inch	15076	CRW1	NBR	1.500	2.437	0.313	Inch
14092	CRW1	NBR	1.417	2.616	0.313	Inch	15080	HM14	NBR	2.328	2.437	0.250	Inch
14209	HM4	NBR	1.438	2.000	0.125	Inch	15092	CRW1	NBR	1.500	2.441	0.313	Inch
14212	CRW1	FKM	1.438	2.062	0.313	Inch	15093	CRWA1	NBR	1.500	2.441	0.313	Inch
14214	CRWA1	NBR	1.438	2.062	0.313	Inch	15097	CRW1	FKM	1.500	2.441	0.313	Inch
14223	CRW1	NBR	1.438	2.125	0.313	Inch	15138	CRW1	FKM	1.500	2.502	0.313	Inch
14225	CRWA1	FKM	1.438	2.125	0.313	Inch	15141	CRW1	NBR	1.500	2.502	0.313	Inch
14247	CRWA1	NBR	1.438	2.250	0.313	Inch	15142	CRWA1	NBR	1.500	2.502	0.313	Inch
14257	HM14	NBR	1.438	2.250	0.250	Inch	15160	HM21	NBR	2.328	2.502	0.250	Inch
14259	CRWA1	FKM	1.438	2.250	0.313	Inch	15174	X13	NBR	1.500	2.462	0.290	Inch
14260	CRW1	FKM	1.438	2.250	0.313	Inch	15176	CRW1	NBR	1.500	2.561	0.313	Inch
14262	CRW1	NBR	1.438	2.250	0.313	Inch	15190	HM21	NBR	2.328	2.623	0.250	Inch
14282	CRW1	NBR	1.438	2.374	0.313	Inch	15194	CRW1	NBR	1.500	2.623	0.313	Inch
14285	CRWA1	NBR	1.438	2.374	0.313	Inch	15204	CRW1	NBR	1.500	2.716	0.438	Inch
14359	HM21	NBR	1.438	2.437	0.250	Inch	15207	CRW1	NBR	1.500	2.686	0.500	Inch
14363	CRW1	NBR	1.438	2.437	0.313	Inch	15209	HM21	NBR	2.328	2.716	0.250	Inch
14383	CRW1	NBR	1.438	2.502	0.313	Inch	15214	CRW1	NBR	1.500	2.750	0.313	Inch
14404	CRW1	NBR	1.438	2.623	0.313	Inch	15230	CRW1	NBR	1.500	2.758	0.313	Inch
14423	CRW1	NBR	1.438	2.686	0.313	Inch	15234	CRW1	NBR	1.500	2.835	0.313	Inch
14458	CRW1	NBR	1.438	2.750	0.313	Inch	15235	CRW1	NBR	1.500	2.875	0.313	Inch
14600	HMA11	NBR	1.457	2.047	0.328	Inch	15240	CRSH1	NBR	1.500	2.996	0.500	Inch
14641	CRSA1	NBR	1.469	2.374	0.375	Inch	15241	CRSA1	NBR	1.500	3.000	0.375	Inch

**US Designation index**  
from 15343 to 17292

Numerical designation	Design	Material	Inner diameter	Outer diameter	Width	Metric or inch value	Numerical designation	Design	Material	Inner diameter	Outer diameter	Width	Metric or inch value
15343	CRSH1	NBR	1.524	2.374	0.500	Inch	16245	CRW1	NBR	1.625	2.502	0.313	Inch
15450	CRWA1	NBR	1.552	2.502	0.500	Inch	16246	CRWA1	NBR	1.625	2.502	0.313	Inch
15460	CRW1	NBR	1.552	2.686	0.500	Inch	16247	CRWA1	ACM	1.625	2.502	0.313	Inch
15462	CRWHA1	ACM	1.552	2.750	0.500	Inch	16254	CRWHA1	NBR	1.625	2.502	0.375	Inch
15506	CRW1	FKM	1.563	2.062	0.250	Inch	16257	CRWHA1	FKM	1.625	2.502	0.374	Inch
15508	CRW1	NBR	1.563	2.062	0.250	Inch	16270	HM21	NBR	2.328	2.502	0.250	Inch
15510	CRW1	NBR	1.578	2.082	0.250	Inch	16285	HM21	NBR	2.328	2.562	0.250	Inch
15517	CRW1	NBR	1.563	2.125	0.313	Inch	16286	X15	NBR	1.625	2.462	0.250	Inch
15518	CRWA1	ACM	1.563	2.125	0.313	Inch	16289	HM18	NBR	2.562	0.438	0.210	Inch
15522	CRW1	NBR	1.563	2.250	0.313	Inch	16290	CRWA1	FKM	1.625	2.562	0.313	Inch
15530	X4	NBR	1.563	2.237	0.290	Inch	16314	CRW1	NBR	1.625	2.623	0.313	Inch
15532	HM14	NBR	1.563	2.250	0.250	Inch	16315	CRWA1	NBR	1.625	2.623	0.313	Inch
15540	CRW1	ACM	1.563	2.374	0.313	Inch	16316	CRW1	FKM	1.625	2.623	0.313	Inch
15542	CRW1	NBR	1.563	2.374	0.313	Inch	16322	HM21	NBR	2.562	2.623	0.250	Inch
15543	CRWA1	NBR	1.563	2.374	0.313	Inch	16337	CRW1	NBR	1.625	2.686	0.313	Inch
15544	HM21	NBR	1.563	2.374	0.250	Inch	16338	CRW1	FKM	1.625	2.686	0.313	Inch
15549	CRWA1	FKM	1.563	2.374	0.313	Inch	16362	HM21	NBR	2.562	2.750	0.250	Inch
15557	CRWHA1	NBR	1.578	2.408	0.313	Inch	16364	CRW1	NBR	1.625	2.750	0.250	Inch
15592	CRW1	NBR	1.563	2.437	0.313	Inch	16368	CRWH1	NBR	1.625	2.750	0.313	Inch
15620	CRWA1	NBR	1.563	2.441	0.500	Inch	16384	HM14	NBR	2.562	2.781	0.313	Inch
15624	CRWA1	ACM	1.563	2.465	0.374	Inch	16386	CRSH1	NBR	1.625	2.835	0.469	Inch
15635	CRWA1	NBR	1.563	2.502	0.313	Inch	16404	CRSA1	NBR	1.618	2.575	0.500	Inch
15649	HM21	NBR	1.563	2.502	0.250	Inch	16406	CRW1	NBR	1.625	2.875	0.313	Inch
15655	CRW1	NBR	1.563	2.502	0.313	Inch	16422	CRWH1	NBR	1.625	3.000	0.313	Inch
15656	CRW1	FKM	1.563	2.502	0.313	Inch	16430	HM3	NBR	1.609	1.906	0.250	Inch
15660	X15	NBR	1.563	2.531	0.285	Inch	16431	CRSH1	NBR	1.625	3.062	0.500	Inch
15677	CRW1	NBR	1.563	2.561	0.313	Inch	16440	CRSH1	NBR	1.625	3.251	0.500	Inch
15699	CRW1	NBR	1.563	2.623	0.313	Inch	16449	CRWA1	NBR	1.618	2.531	0.438	Inch
15702	X	NBR	1.563	2.684	0.438	Inch	16500	CRWA1	ACM	1.645	2.656	0.313	Inch
15707	CRW1	NBR	1.563	2.686	0.313	Inch	16520	HM11	NBR	1.660	2.440	0.594	Inch
15719	HM21	NBR	1.563	2.687	0.250	Inch	16532	CRSH1	NBR	1.656	2.502	0.500	Inch
15748	CRSH1	NBR	1.563	2.716	0.469	Inch	16545	CRWA1	ACM	1.656	2.623	0.375	Inch
15761	CRWH1	NBR	1.563	2.750	0.500	Inch	16650	CRWH1	NBR	1.688	2.279	0.500	Inch
15773	CRW1	NBR	1.563	2.875	0.313	Inch	16657	CRWA1	NBR	1.688	2.328	0.313	Inch
15779	CRWA1	ACM	1.563	2.875	0.313	Inch	16667	HM18	NBR	1.688	2.328	0.500	Inch
15915	CRW1	ACM	1.594	2.125	0.313	Inch	16669	CRSA1	NBR	1.688	2.374	0.313	Inch
15940	CRW1	ACM	1.594	2.437	0.313	Inch	16679	CRW1	NBR	1.688	2.437	0.313	Inch
15955	CRW1	NBR	1.594	2.437	0.313	Inch	16680	CRWA1	NBR	1.688	2.437	0.313	Inch
15960	CRW1	NBR	1.594	2.502	0.313	Inch	16692	CRW1	MVQ	1.688	2.437	0.250	Inch
15968	CRW1	NBR	1.594	2.623	0.313	Inch	16696	CRW1	MVQ	1.688	2.437	0.469	Inch
15975	CRW1	NBR	1.594	2.758	0.313	Inch	16719	CRW1	NBR	1.688	2.502	0.313	Inch
16039	CRW1	FKM	1.625	2.000	0.250	Inch	16743	HM21	NBR	1.688	2.502	0.281	Inch
16046	CRW1	NBR	1.625	2.000	0.250	Inch	16754	HM21	NBR	1.688	2.562	0.250	Inch
16047	CRWA1	NBR	1.625	2.116	0.313	Inch	16814	CRWA1	NBR	1.688	2.623	0.313	Inch
16048	CRW1	FKM	1.625	2.125	0.250	Inch	16816	CRW1	NBR	1.688	2.623	0.500	Inch
16049	CRW1	ACM	1.625	2.250	0.375	Inch	16817	CRWA1	FKM	1.688	2.623	0.500	Inch
16054	CRW1	NBR	1.625	2.125	0.250	Inch	16818	X4	NBR	1.688	2.650	0.290	Inch
16055	HM14	NBR	1.625	2.125	0.250	Inch	16842	CRW1	NBR	1.688	2.686	0.313	Inch
16061	CRW1	NBR	1.625	2.250	0.313	Inch	16854	CRW1	NBR	1.688	2.716	0.313	Inch
16062	CRWA1	NBR	1.625	2.248	0.313	Inch	16900	CRW1	NBR	1.688	2.750	0.313	Inch
16064	TL7	NBR	2.328	2.328	0.438	Inch	16903	CRWA1	NBR	1.688	2.750	0.375	Inch
16065	HM21	NBR	1.625	2.250	0.250	Inch	16904	HDDF	Steel	42.88	70.10		Metric
16069	HM18	NBR	2.328	0.438	0.235	Inch	16960	CRSA1	NBR	1.688	2.835	0.469	Inch
16072	CRWH1	NBR	1.625	2.374	0.313	Inch	16999	CRW1	NBR	1.688	2.875	0.313	Inch
16077	CRW1	FKM	1.625	2.374	0.313	Inch	17035	CRW1	NBR	1.688	3.061	0.375	Inch
16078	CRW1	FKM	1.625	2.250	0.313	Inch	17038	CRWA1	NBR	1.688	3.125	0.375	Inch
16079	CRWH1	NBR	1.625	2.374	0.500	Inch	17053	CRS1	NBR	1.705	3.084	0.500	Inch
16083	CRW1	NBR	1.625	2.282	0.313	Inch	17100	CRWA1	NBR	1.704	3.034	0.500	Inch
16084	CRW1	NBR	1.625	2.374	0.313	Inch	17136	CRSH1	NBR	1.719	2.623	0.500	Inch
16085	CRWA1	NBR	1.625	2.374	0.313	Inch	17144	CRWA1	NBR	1.719	2.561	0.315	Inch
16091	CRWA1	ACM	1.625	2.374	0.313	Inch	17231	CRW1	NBR	1.750	2.250	0.313	Inch
16092	HM21	NBR	2.328	2.374	0.250	Inch	17234	CRW1	FKM	1.750	2.250	0.313	Inch
16094	CRW1	NBR	1.625	2.374	0.250	Inch	17240	HM14	NBR	1.750	2.250	0.188	Inch
16095	HM14	NBR	2.328	2.375	0.250	Inch	17257	CRS1	NBR	1.750	2.328	0.438	Inch
16113	CRW1	NBR	1.625	2.437	0.313	Inch	17261	CRWA1	FKM	1.750	2.374	0.313	Inch
16119	CRW1	FKM	1.625	2.437	0.313	Inch	17270	CRW1	NBR	1.750	2.374	0.313	Inch
16120	CRWA1	FKM	1.625	2.437	0.313	Inch	17271	CRWA1	NBR	1.750	2.374	0.313	Inch
16121	CRSHA1	NBR	1.625	2.437	0.469	Inch	17277	HM21	NBR	1.750	2.374	0.250	Inch
16128	CRWA1	NBR	1.625	2.437	0.313	Inch	17280	CRW1	ACM	1.750	2.411	0.375	Inch
16168	HM21	NBR	2.328	2.437	0.250	Inch	17283	CRW1	NBR	1.750	2.437	0.313	Inch
16180	CRW1	NBR	1.625	2.441	0.313	Inch	17284	CRW1	NBR	1.750	2.437	0.313	Inch
16201	CRWA1	NBR	1.625	2.441	0.313	Inch	17285	CRWA1	NBR	1.750	2.437	0.313	Inch
16243	CRWA1	FKM	1.625	2.502	0.313	Inch	17292	CRW1	FKM	1.750	2.437	0.313	Inch

Numerical designation	Design	Material	Inner diameter	Outer diameter	Width	Metric or inch value	Numerical designation	Design	Material	Inner diameter	Outer diameter	Width	Metric or inch value
17293	CRWA1	FKM	1.750	2.437	0.313	Inch	18049	CRWA1	FKM	1.813	2.562	0.313	Inch
17310	HM21	NBR	1.750	2.437	0.250	Inch	18050	HM18	NBR	1.813	2.562	0.438	Inch
17315	CRW1	NBR	1.750	2.441	0.313	Inch	18104	CRW1	NBR	1.813	2.623	0.313	Inch
17320	CRWA1	FKM	1.750	2.441	0.375	Inch	18114	CRWA1	ACM	1.813	2.686	0.313	Inch
17340	HM21	NBR	1.750	2.441	0.250	Inch	18127	TL7	NBR	1.813	2.719	0.270	Inch
17341	HM21	NBR	1.750	2.441	0.250	Inch	18159	CRW1	NBR	1.813	2.750	0.313	Inch
17359	HM18	NBR	2.441	0.469	0.254	Inch	18242	CRW1	NBR	1.813	2.875	0.313	Inch
17374	CRWA5	NBR	1.750	2.502	0.500	Inch	18258	HM1	NBR	1.813	2.965	0.250	Inch
17379	CRW1	FKM	1.750	2.502	0.313	Inch	18259	HDDF	Steel	46.03	76.28		Metric
17381	CRWA1	FKM	1.750	2.502	0.313	Inch	18264	CRWA1	ACM	1.813	3.000	0.375	Inch
17386	CRW1	NBR	1.750	2.502	0.313	Inch	18412	CRSA1	NBR	1.844	2.502	0.375	Inch
17387	CRWA1	NBR	1.750	2.502	0.313	Inch	18425	CRW1	NBR	1.844	2.623	0.313	Inch
17392	HM21	NBR	2.441	2.502	0.250	Inch	18444	CRW1	ACM	1.844	2.750	0.313	Inch
17395	CRWHA1	FKM	1.750	2.502	0.375	Inch	18446	CRSA1	NBR	1.844	2.750	0.375	Inch
17404	CRW1	NBR	1.750	2.561	0.313	Inch	18492	CRWA1	ACM	1.868	2.518	0.315	Inch
17406	HM18	NBR	2.562	0.500	0.286	Inch	18545	CRWA1	NBR	1.875	2.471	0.313	Inch
17413	CRWA1	NBR	1.750	2.565	0.313	Inch	18546	CRWA1	FKM	1.875	2.562	0.313	Inch
17415	HM21	NBR	2.441	2.561	0.250	Inch	18549	CRW1	NBR	1.875	2.398	0.250	Inch
17442	CRW1	NBR	1.750	2.623	0.313	Inch	18555	CRW1	ACM	1.875	2.500	0.313	Inch
17443	CRWA1	NBR	1.750	2.623	0.313	Inch	18558	HM21	NBR	1.875	2.502	0.250	Inch
17444	CRW1	MVQ	1.750	2.623	0.313	Inch	18562	CRW1	ACM	1.875	2.562	0.313	Inch
17448	CRWA1	FKM	1.750	2.623	0.313	Inch	18565	CRW1	NBR	1.875	2.502	0.313	Inch
17456	CRWH1	NBR	1.750	2.623	0.375	Inch	18580	CRW1	NBR	1.875	2.623	0.313	Inch
17461	HM21	NBR	2.562	2.623	0.250	Inch	18581	CRWA1	NBR	1.875	2.623	0.313	Inch
17484	CRW1	NBR	1.750	2.686	0.313	Inch	18582	CRW1	FKM	1.875	2.623	0.313	Inch
17485	X4	NBR	1.750	2.718	0.294	Inch	18584	CRWA1	FKM	1.875	2.623	0.313	Inch
17488	HM21	NBR	2.562	2.716	0.250	Inch	18591	HM21	NBR	1.875	2.623	0.250	Inch
17523	CRWA1	NBR	1.750	2.750	0.313	Inch	18592	CRW1	MVQ	1.875	2.623	0.374	Inch
17544	HM21	NBR	2.718	2.750	0.250	Inch	18626	CRW1	NBR	1.875	2.686	0.313	Inch
17557	CRW1	NBR	1.750	2.750	0.313	Inch	18630	X13	NBR	1.873	2.716	0.281	Inch
17558	CRW1	FKM	1.750	2.750	0.313	Inch	18652	CRW1	FKM	1.875	2.750	0.313	Inch
17605	CRW1	NBR	1.750	2.758	0.313	Inch	18657	CRW1	NBR	1.875	2.750	0.313	Inch
17607	CRWA1	NBR	1.750	2.717	0.438	Inch	18658	CRWA1	NBR	1.875	2.750	0.313	Inch
17617	HM18	NBR	2.718	0.359	0.160	Inch	18659	HM21	NBR	1.875	2.750	0.250	Inch
17618	TL7	NBR	2.718	2.718	0.359	Inch	18666	CRW1	ACM	1.875	2.750	0.313	Inch
17620	X15	NBR	1.750	2.786	0.294	Inch	18671	CRW1	ACM	1.875	2.758	0.313	Inch
17624	CRWA1	NBR	1.750	2.810	0.313	Inch	18693	CRWH1	NBR	1.875	2.782	0.438	Inch
17627	CRWA1	FKM	1.750	2.810	0.313	Inch	18695	CRWHA1	NBR	1.875	2.782	0.438	Inch
17633	HM21	NBR	2.718	2.830	0.375	Inch	18704	HM21	NBR	1.875	2.780	0.250	Inch
17645	CRWHA1	NBR	1.750	2.875	0.375	Inch	18732	CRW1	FKM	1.875	2.875	0.313	Inch
17653	CRW1	NBR	1.750	2.875	0.313	Inch	18733	CRW1	NBR	1.875	2.875	0.313	Inch
17657	CRW1	FKM	1.750	2.875	0.313	Inch	18734	CRWA1	NBR	1.875	2.875	0.313	Inch
17671	HM21	NBR	2.718	2.875	0.250	Inch	18737	CRWA1	FKM	1.875	2.875	0.313	Inch
17674	TL7	NBR	2.718	2.875	0.500	Inch	18750	HM21	NBR	1.875	2.875	0.250	Inch
17675	CRWHA1	NBR	1.750	2.981	0.438	Inch	18785	CRW1	NBR	1.875	2.997	0.313	Inch
17678	CRWHA1	NBR	1.750	2.997	0.313	Inch	18808	HM14	NBR	1.875	2.997	0.250	Inch
17695	CRW1	NBR	1.750	2.997	0.313	Inch	18817	CRW1	NBR	1.875	3.000	0.313	Inch
17699	CRWA1	NBR	1.750	3.000	0.313	Inch	18818	CRW1	FKM	1.875	3.000	0.313	Inch
17702	HM21	NBR	1.750	3.000	0.250	Inch	18823	HM21	NBR	1.875	3.000	0.250	Inch
17707	CRW1	NBR	1.750	3.000	0.313	Inch	18872	CRWA1	NBR	1.875	3.061	0.313	Inch
17709	CRW1	FKM	1.750	3.000	0.313	Inch	18879	CRSA1	NBR	1.875	3.125	0.313	Inch
17716	CRW1	NBR	1.750	3.061	0.313	Inch	18880	CRWA1	NBR	1.875	3.105	0.500	Inch
17718	CRWA1	NBR	1.750	3.061	0.375	Inch	18889	HM21	NBR	1.875	3.150	0.250	Inch
17724	TL6	NBR	1.750	3.149	0.290	Inch	18899	CRWH1	NBR	1.875	3.189	0.469	Inch
17726	CRS1	NBR	1.750	3.154	0.313	Inch	18916	CRWH1	NBR	1.875	3.371	0.438	Inch
17746	CRW1	NBR	1.750	3.189	0.313	Inch	18922	CRWA1	NBR	1.875	3.249	0.484	Inch
17756	CRW1	NBR	1.750	3.543	0.438	Inch	18924	CRWA1	NBR	1.875	3.496	0.438	Inch
17761	CRW1	NBR	1.750	3.625	0.438	Inch	18926	CRW1	NBR	1.875	3.500	0.438	Inch
17771	CRSA1	NBR	1.750	3.937	0.313	Inch	18979	CRSA1	ACM	1.890	2.874	0.276	Inch
17780	CRWHA1	FKM	1.768	2.363	0.313	Inch	19000	CRW1	NBR	1.893	2.434	0.250	Inch
17802	HM14	NBR	1.781	2.126	0.250	Inch	19010	CRW1	NBR	1.915	2.533	0.250	Inch
17806	CRWA1	NBR	1.781	2.252	0.313	Inch	19017	CRWA1	ACM	1.906	2.752	0.375	Inch
17810	CRWH1	NBR	1.781	2.502	0.313	Inch	19062	CRSA1	ACM	1.906	3.189	0.313	Inch
17811	CRWH1	FKM	1.781	2.502	0.313	Inch	19210	CRW1	NBR	1.938	2.437	0.250	Inch
17821	CRW1	NBR	1.781	2.623	0.313	Inch	19211	CRW1	NBR	1.938	2.563	0.313	Inch
17832	CRW1	NBR	1.781	2.686	0.313	Inch	19212	CRW1	NBR	1.938	2.437	0.250	Inch
17847	CRSH1	NBR	1.781	2.750	0.500	Inch	19213	CRWA5	NBR	1.938	2.675	0.250	Inch
17851	CRSH1	NBR	1.781	2.758	0.500	Inch	19215	CRW1	NBR	1.938	2.412	0.313	Inch
17949	CRWA1	FKM	1.812	2.623	0.374	Inch	19219	HM14	NBR	1.938	2.502	0.281	Inch
17955	HMA8	NBR	1.811	2.697	0.295	Inch	19220	CRWA1	NBR	1.938	2.502	0.375	Inch
18025	CRW1	NBR	1.813	2.279	0.313	Inch	19226	CRW1	NBR	1.938	2.623	0.313	Inch
18030	X15	NBR	1.813	2.408	0.300	Inch	19227	CRWA1	FKM	1.938	2.623	0.313	Inch
18039	CRW1	NBR	1.813	2.437	0.313	Inch	19229	CRWA1	NBR	1.938	2.623	0.313	Inch

**US Designation index**  
from 19234 to 21215

Numerical designation	Design	Material	Inner diameter	Outer diameter	Width	Metric or inch value	Numerical designation	Design	Material	Inner diameter	Outer diameter	Width	Metric or inch value
19234	CRWA1	ACM	1.938	2.686	0.313	Inch	19940	HM14	NBR	2.000	2.965	0.313	Inch
19236	CRW1	NBR	1.938	2.686	0.313	Inch	19965	HM21	NBR	2.965	2.997	0.250	Inch
19237	CRWA1	NBR	1.938	2.686	0.313	Inch	19969	CRWH1	NBR	2.000	2.997	0.375	Inch
19240	CRW1	MVQ	1.938	2.686	0.375	Inch	19970	CRWHA1	NBR	2.000	2.997	0.375	Inch
19243	CRWA1	FKM	1.938	2.686	0.313	Inch	19979	CRWH1	FKM	2.000	2.997	0.375	Inch
19244	CRW1	ACM	1.938	2.686	0.300	Inch	19992	CRW1	NBR	2.000	3.000	0.313	Inch
19251	TL8	NBR	1.938	2.686	0.594	Inch	19993	CRWA1	NBR	2.000	3.000	0.313	Inch
19264	CRW1	NBR	1.938	2.750	0.313	Inch	19995	CRWA1	FKM	2.000	3.000	0.313	Inch
19267	CRW1	FKM	1.938	2.750	0.313	Inch	20002	CRWH1	FKM	2.000	3.000	0.375	Inch
19273	CRSA1	NBR	1.938	2.762	0.500	Inch	20004	CRWH1	NBR	2.000	3.000	0.375	Inch
19274	CRSH1	ACM	1.938	2.825	0.500	Inch	20005	CRWHA1	NBR	2.000	3.000	0.375	Inch
19278	CRWA5	NBR	1.938	2.835	0.250	Inch	20006	HM21	NBR	2.965	3.000	0.250	Inch
19300	CRW1	NBR	1.938	2.875	0.313	Inch	20012	CRSA1	ACM	2.008	2.953	0.354	Inch
19301	CRWA1	NBR	1.938	2.875	0.313	Inch	20016	HMA94	NBR	2.000	2.631	0.272	Inch
19304	CRWH1	FKM	1.938	2.875	0.313	Inch	20044	HM21	NBR	2.965	3.061	0.250	Inch
19306	HM21	NBR	1.938	2.875	0.250	Inch	20045	CRW1	NBR	2.000	3.061	0.375	Inch
19310	CRWA1	ACM	1.938	2.884	0.313	Inch	20055	CRWH1	NBR	2.000	3.061	0.500	Inch
19350	CRW1	NBR	1.938	2.997	0.313	Inch	20059	CRWHA1	NBR	2.000	3.061	0.500	Inch
19359	CRW1	NBR	1.938	3.000	0.313	Inch	20070	CRW1	NBR	2.000	3.125	0.375	Inch
19360	CRWA1	NBR	1.938	3.000	0.313	Inch	20078	HM14	NBR	2.965	3.148	0.250	Inch
19368	CRWA1	FKM	1.938	3.000	0.313	Inch	20079	CRW1	NBR	2.000	3.150	0.375	Inch
19380	CRW1	NBR	1.938	3.061	0.313	Inch	20098	CRWH1	NBR	2.000	3.189	0.469	Inch
19400	CRW1	NBR	1.938	3.125	0.500	Inch	20100	CRWHA1	NBR	2.000	3.189	0.469	Inch
19407	CRW1	NBR	1.938	3.189	0.313	Inch	20109	CRWH1	NBR	2.000	3.251	0.438	Inch
19433	CRWA1	FKM	1.938	3.251	0.313	Inch	20122	CRW1	FKM	2.000	3.371	0.438	Inch
19434	CRW1	NBR	1.938	3.251	0.313	Inch	20124	CRWH1	NBR	2.000	3.371	0.438	Inch
19438	CRW1	MVQ	1.938	3.062	0.500	Inch	20125	CRWHA1	NBR	2.000	3.371	0.438	Inch
19445	CRWHA1	NBR	1.938	3.350	0.469	Inch	20127	CRWH1	FKM	2.000	3.371	0.438	Inch
19449	CRW1	NBR	1.938	3.543	0.313	Inch	20140	CRWH1	NBR	2.000	3.543	0.438	Inch
19466	CRSH1	NBR	1.938	3.751	0.500	Inch	20144	CRWH1	NBR	2.000	3.623	0.438	Inch
19510	TL6	NBR	1.945	2.892	0.294	Inch	20148	HM21	NBR	2.965	3.623	0.250	Inch
19607	CRWA1	NBR	1.969	2.623	0.313	Inch	20158	CRWH1	NBR	2.000	4.003	0.438	Inch
19615	CRSH1	NBR	1.969	2.686	0.500	Inch	20420	CRW1	NBR	2.047	2.561	0.315	Inch
19620	CRSH1	ACM	1.969	2.742	0.500	Inch	20520	CRW1	FKM	2.063	2.561	0.313	Inch
19628	CRSA1	NBR	1.969	2.638	0.354	Inch	20530	CRWH1	NBR	2.063	2.750	0.313	Inch
19643	CRSH1	NBR	1.969	2.875	0.469	Inch	20538	CRWH1	NBR	2.063	2.842	0.438	Inch
19720	X4	NBR	1.991	2.900	0.290	Inch	20554	CRWH1	NBR	2.063	2.875	0.438	Inch
19733	HM14	NBR	2.000	2.375	0.188	Inch	20586	CRWH1	NBR	2.063	2.997	0.438	Inch
19737	HM14	NBR	2.000	2.371	0.250	Inch	20594	CRW1	NBR	2.063	3.000	0.375	Inch
19745	CRW1	ACM	2.000	2.502	0.313	Inch	20596	CRWA1	FKM	2.063	3.000	0.375	Inch
19746	HM21	FKM	2.000	2.623	0.250	Inch	20643	CRWH1	NBR	2.063	3.061	0.313	Inch
19748	HM1	NBR	2.000	2.500	0.250	Inch	20659	CRW1	NBR	2.063	3.125	0.375	Inch
19754	HM14	NBR	2.000	2.502	0.250	Inch	20674	TL7	NBR	2.063	3.150	0.266	Inch
19760	CRW1	NBR	2.000	2.623	0.313	Inch	20702	CRW1	NBR	2.063	3.189	0.375	Inch
19762	CRWA1	NBR	2.000	2.623	0.313	Inch	20747	CRWHA1	NBR	2.063	3.251	0.438	Inch
19763	HM21	NBR	2.000	2.623	0.250	Inch	20749	CRWH1	NBR	2.063	3.251	0.438	Inch
19770	HM14	NBR	2.000	2.635	0.234	Inch	20920	HM21	NBR	2.094	2.750	0.250	Inch
19777	CRWA1	FKM	2.000	2.623	0.313	Inch	20952	HM18	NBR	2.094	2.718	0.359	Inch
19778	CRW1	NBR	2.000	2.686	0.375	Inch	21059	HM21	NBR	2.125	2.750	0.250	Inch
19782	CRWA1	FKM	2.000	2.623	0.313	Inch	21061	CRWA1	NBR	2.125	2.750	0.500	Inch
19783	HM21	NBR	2.000	2.686	0.250	Inch	21063	CRW1	FKM	2.125	2.750	0.375	Inch
19785	CRW1	NBR	2.000	2.716	0.375	Inch	21069	CRW1	NBR	2.125	2.763	0.250	Inch
19786	CRWA1	NBR	2.000	2.716	0.375	Inch	21091	CRW1	FKM	2.125	2.875	0.438	Inch
19807	CRW1	MVQ	2.000	2.746	0.375	Inch	21098	CRW1	NBR	2.125	2.875	0.438	Inch
19820	HM14	NBR	2.000	2.752	0.188	Inch	21100	CRWA1	NBR	2.125	2.875	0.438	Inch
19823	CRW1	FKM	2.000	2.750	0.313	Inch	21101	HM14	NBR	2.125	2.875	0.250	Inch
19831	CRW1	NBR	2.000	2.750	0.313	Inch	21103	CRW1	MVQ	2.125	2.875	0.375	Inch
19832	CRWA1	NBR	2.000	2.750	0.313	Inch	21108	CRWHA1	NBR	2.125	2.875	0.438	Inch
19834	HM21	NBR	2.000	2.750	0.250	Inch	21121	HM14	NBR	2.125	2.891	0.250	Inch
19839	CRWA1	FKM	2.000	2.750	0.313	Inch	21134	CRWH1	NBR	2.125	2.997	0.438	Inch
19840	CRW1	FKM	2.000	2.750	0.313	Inch	21136	CRWHA1	NBR	2.125	2.997	0.438	Inch
19844	X15	XNBR	2.000	2.802	0.250	Inch	21159	HM21	NBR	2.125	3.000	0.250	Inch
19848	CRWH1	NBR	2.000	2.835	0.469	Inch	21163	CRW1	NBR	2.125	3.000	0.375	Inch
19880	HM21	NBR	2.000	2.875	0.250	Inch	21164	CRWA1	NBR	2.125	3.000	0.375	Inch
19882	XHM	NBR	2.000	2.875	0.256	Inch	21167	CRWHA1	FKM	2.125	3.000	0.313	Inch
19884	CRW1	FKM	2.000	2.875	0.313	Inch	21171	CRWH1	FKM	2.125	3.000	0.438	Inch
19886	CRW1	NBR	2.000	2.875	0.313	Inch	21172	CRWH1	NBR	2.125	3.000	0.438	Inch
19887	CRWA1	NBR	2.000	2.875	0.313	Inch	21173	CRWHA1	NBR	2.125	3.000	0.438	Inch
19896	CRWHA1	NBR	2.000	2.875	0.375	Inch	21208	HM21	NBR	2.125	3.061	0.250	Inch
19900	CRWH1	NBR	2.000	2.875	0.500	Inch	21210	CRW1	NBR	2.125	3.061	0.500	Inch
19922	CRWA1	NBR	2.000	2.880	0.375	Inch	21211	CRWA1	NBR	2.125	3.061	0.500	Inch
19923	CRWA1	ACM	2.000	2.880	0.375	Inch	21213	CRWHA1	NBR	2.125	3.061	0.500	Inch
19938	HM14	NBR	2.965	0.500	0.275	Inch	21215	HDDF	Steel	53,98	82,55		Metric

Numerical designation	Design	Material	Inner diameter	Outer diameter	Width	Metric or inch value	Numerical designation	Design	Material	Inner diameter	Outer diameter	Width	Metric or inch value
21215	CRWH1	FKM	2.125	3.061	0.438	Inch	22644	CRWH1	NBR	2.250	3.876	0.438	Inch
21234	CRWH1	NBR	2.125	3.125	0.438	Inch	22647	CRWH1	NBR	2.250	4.003	0.438	Inch
21245	CRWHA1	ACM	2.125	3.125	0.438	Inch	22870	HM18	NBR	2.297	3.148	0.359	Inch
21265	HM21	NBR	2.125	3.189	0.250	Inch	23030	CRW1	NBR	2.313	2.997	0.375	Inch
21267	CRWA1	NBR	2.125	3.189	0.375	Inch	23035	HM14	NBR	2.313	3.000	0.250	Inch
21269	CRWA1	FKM	2.125	3.189	0.375	Inch	23040	CRWH1	FKM	2.313	3.000	0.438	Inch
21270	CRWHA1	MVQ	2.125	3.189	0.469	Inch	23046	CRW1	NBR	2.313	3.061	0.313	Inch
21298	X15	NBR	2.125	3.250	0.270	Inch	23061	CRW1	NBR	2.313	3.125	0.375	Inch
21302	CRWH1	NBR	2.125	3.251	0.438	Inch	23063	CRWA1	FKM	2.313	3.125	0.375	Inch
21336	CRWH1	NBR	2.125	3.350	0.438	Inch	23093	CRWH1	NBR	2.313	3.251	0.438	Inch
21352	CRWA1	NBR	2.125	3.371	0.375	Inch	23098	HM1	NBR	2.313	3.065	0.281	Inch
21353	CRWH1	NBR	2.125	3.371	0.438	Inch	23099	CRWHA1	FKM	2.313	3.251	0.438	Inch
21358	CRWH1	NBR	2.125	3.543	0.438	Inch	23152	CRWH1	NBR	2.313	3.350	0.438	Inch
21379	CRSA1	ACM	2.125	3.623	0.469	Inch	23167	CRW1	NBR	2.313	3.371	0.438	Inch
21538	CRSH1	NBR	2.145	3.188	0.469	Inch	23169	CRWHA1	NBR	2.313	3.374	0.438	Inch
21736	CRWH1	NBR	2.188	2.875	0.438	Inch	23184	CRW1	NBR	2.313	3.500	0.313	Inch
21749	CRWH1	NBR	2.188	2.997	0.438	Inch	23240	HM21	NBR	2.313	3.500	0.250	Inch
21759	CRWA1	NBR	2.188	3.000	0.375	Inch	23277	CRW1	NBR	2.313	3.751	0.500	Inch
21763	CRWA1	FKM	2.188	3.000	0.375	Inch	23300	CRW1	ACM	2.328	3.000	0.395	Inch
21764	CRWH1	NBR	2.188	3.000	0.500	Inch	23630	HM21	NBR	2.375	2.997	0.250	Inch
21787	CRWH1	NBR	2.188	3.061	0.500	Inch	23632	CRWH1	NBR	2.375	2.997	0.438	Inch
21840	CRWH1	NBR	2.188	3.251	0.438	Inch	23640	HM21	NBR	2.375	3.000	0.250	Inch
21890	CRWH1	NBR	2.188	3.350	0.438	Inch	23641	CRW1	FKM	2.375	3.000	0.375	Inch
21910	CRWH1	NBR	2.188	3.371	0.438	Inch	23644	CRWH1	NBR	2.375	3.061	0.438	Inch
21950	CRSHA1	NBR	2.188	3.623	0.500	Inch	23645	CRWH1	ACM	2.375	3.061	0.438	Inch
22306	HM14	NBR	2.250	2.625	0.188	Inch	23646	CRW1	NBR	2.375	3.125	0.375	Inch
22325	HM21	NBR	2.250	2.875	0.250	Inch	23652	CRWH1	NBR	2.375	3.125	0.438	Inch
22328	CRWA1	NBR	2.250	2.875	0.313	Inch	23654	CRWHA1	NBR	2.375	3.125	0.438	Inch
22336	CRWH1	NBR	2.250	2.997	0.438	Inch	23655	CRWH1	FKM	2.375	3.061	0.438	Inch
22340	CRWHA1	NBR	2.250	2.997	0.438	Inch	23656	CRWHA1	FKM	2.375	3.125	0.438	Inch
22347	CRWA1	NBR	2.250	2.891	0.563	Inch	23666	CRWH1	NBR	2.375	3.189	0.438	Inch
22353	CRW1	NBR	2.250	3.000	0.375	Inch	23678	CRWHA1	FKM	2.375	3.251	0.438	Inch
22354	CRWA1	NBR	2.250	3.000	0.375	Inch	23685	CRW1	ACM	2.375	3.251	0.453	Inch
22358	CRWH1	NBR	2.250	3.000	0.438	Inch	23701	CRW1	NBR	2.375	3.350	0.375	Inch
22359	CRWHA1	NBR	2.250	3.000	0.438	Inch	23702	CRWA1	NBR	2.375	3.350	0.375	Inch
22361	CRWA1	FKM	2.250	3.000	0.375	Inch	23703	CRW1	ACM	2.375	3.350	0.375	Inch
22363	CRW1	FKM	2.250	3.000	0.375	Inch	23706	CRW1	MVQ	2.375	3.350	0.375	Inch
22367	CRWH1	FKM	2.250	3.000	0.438	Inch	23708	CRWH1	NBR	2.375	3.350	0.438	Inch
22368	HM21	NBR	2.250	3.000	0.250	Inch	23710	CRWHA1	NBR	2.375	3.350	0.438	Inch
22382	CRW1	NBR	2.250	3.061	0.375	Inch	23725	HM21	NBR	2.375	3.350	0.250	Inch
22390	CRWH1	NBR	2.250	3.061	0.438	Inch	23742	CRWH1	NBR	2.375	3.371	0.438	Inch
22391	CRWHA1	NBR	2.250	3.061	0.438	Inch	23746	CRWH1	FKM	2.375	3.371	0.438	Inch
22392	HM21	NBR	2.250	3.061	0.250	Inch	23755	CRWH1	NBR	2.375	3.481	0.438	Inch
22394	CRWHA1	MVQ	2.250	3.061	0.438	Inch	23756	CRWHA1	NBR	2.375	3.481	0.438	Inch
22400	CRWA1	NBR	2.250	3.125	0.375	Inch	23770	CRWA1	ACM	2.375	3.500	0.375	Inch
22405	CRWA1	FKM	2.250	3.125	0.375	Inch	23771	CRWH1	FKM	2.375	3.500	0.375	Inch
22407	CRWH1	NBR	2.250	3.125	0.500	Inch	23779	CRWH1	NBR	2.375	3.500	0.375	Inch
22411	HM18	NBR	3.125	0.563	0.214	Inch	23782	CRWHA1	NBR	2.375	3.500	0.438	Inch
22424	CRW1	NBR	2.250	3.189	0.438	Inch	23808	CRWH1	NBR	2.375	3.543	0.438	Inch
22425	CRWA1	ACM	2.250	3.189	0.438	Inch	23809	CRWHA1	FKM	2.375	3.543	0.438	Inch
22440	CRW1	NBR	2.250	3.251	0.375	Inch	23815	HM21	NBR	2.375	3.543	0.250	Inch
22441	CRWA1	NBR	2.250	3.251	0.375	Inch	23820	CRW1	NBR	2.375	3.601	0.438	Inch
22446	CRWH1	NBR	2.250	3.251	0.438	Inch	23839	CRWH1	NBR	2.375	3.623	0.438	Inch
22448	CRWHA1	NBR	2.250	3.251	0.438	Inch	23841	CRWHA1	ACM	2.375	3.623	0.438	Inch
22449	CRWH1	FKM	2.250	3.251	0.438	Inch	23843	CRWHA1	FKM	2.375	3.623	0.438	Inch
22468	HM21	NBR	3.125	3.251	0.250	Inch	23844	CRWH1	NBR	2.375	3.876	0.438	Inch
22484	CRW1	ACM	2.250	3.350	0.375	Inch	24110	CRSA1	ACM	2.432	3.070	0.227	Inch
22492	CRWH1	NBR	2.250	3.350	0.438	Inch	24255	CRWH1	NBR	2.438	3.125	0.500	Inch
22493	CRWHA1	NBR	2.250	3.350	0.438	Inch	24263	CRWH1	NBR	2.438	3.251	0.438	Inch
22495	CRWH1	FKM	2.250	3.350	0.438	Inch	24286	CRW1	NBR	2.438	3.350	0.375	Inch
22532	CRWHA1	NBR	2.250	3.371	0.438	Inch	24287	CRWA1	NBR	2.438	3.350	0.375	Inch
22558	CRWH1	NBR	2.250	3.371	0.438	Inch	24320	CRWH1	NBR	2.438	3.371	0.438	Inch
22561	CRWH1	FKM	2.250	3.371	0.438	Inch	24340	CRWH1	NBR	2.438	3.481	0.438	Inch
22563	X15	NBR	2.250	3.400	0.294	Inch	24370	CRWH1	NBR	2.438	3.500	0.438	Inch
22565	HM14	NBR	3.125	3.440	0.250	Inch	24372	CRWH1	FKM	2.438	3.500	0.438	Inch
22582	CRWHA1	NBR	2.250	3.500	0.438	Inch	24445	CRWH1	NBR	2.438	3.543	0.438	Inch
22583	CRWH1	NBR	2.250	3.500	0.438	Inch	24863	HM14	NBR	2.500	3.000	0.250	Inch
22590	CRWHA1	FKM	2.250	3.500	0.438	Inch	24865	HM1	NBR	2.500	3.000	0.313	Inch
22610	CRWA1	NBR	2.250	3.565	0.438	Inch	24875	HM21	NBR	2.500	3.125	0.250	Inch
22614	HM14	NBR	2.240	3.189	0.610	Inch	24880	HM21	NBR	2.500	3.150	0.250	Inch
22618	CRWH1	NBR	2.250	3.623	0.438	Inch	24881	CRWH1	NBR	2.500	3.189	0.438	Inch
22619	CRWHA1	NBR	2.250	3.623	0.438	Inch	24883	CRWH1	FKM	2.500	3.189	0.438	Inch
22626	CRWH1	NBR	2.250	3.751	0.438	Inch	24889	CRWH1	NBR	2.500	3.245	0.438	Inch

**US Designation index**  
from 24892 to 28687

Numerical Designation	Design	Material	Inner diameter	Outer diameter	Width	Metric or inch value	Numerical Designation	Design	Material	Inner diameter	Outer diameter	Width	Metric or inch value
24892	CRWA5	NBR	2.500	3.251	0.350	Inch	26237	CRW1	NBR	2.625	3.623	0.375	Inch
24897	CRW1	NBR	2.500	3.251	0.375	Inch	26238	CRWA1	NBR	2.625	3.623	0.375	Inch
24898	CRWA1	NBR	2.500	3.251	0.375	Inch	26260	HM21	NBR	2.625	3.623	0.250	Inch
24899	CRWA1	FKM	2.500	3.251	0.375	Inch	26284	CRWA1	NBR	2.625	3.751	0.375	Inch
24904	HM21	NBR	2.500	3.251	0.250	Inch	26289	TL4	NBR	2.625	3.751	0.715	Inch
24910	CRWH1	NBR	2.500	3.251	0.438	Inch	26297	CRWH1	NBR	2.625	3.751	0.438	Inch
24911	CRWHA1	NBR	2.500	3.251	0.438	Inch	26298	CRWHA1	NBR	2.625	3.751	0.438	Inch
24913	CRW1	FKM	2.500	3.251	0.500	Inch	26299	CRWHA1	FKM	2.625	3.751	0.438	Inch
24914	CRWH1	FKM	2.500	3.251	0.438	Inch	26310	TL5	NBR	2.625	3.813	0.415	Inch
24916	CRWHA1	FKM	2.500	3.251	0.438	Inch	26328	CRWH1	NBR	2.625	3.876	0.438	Inch
24931	CRWH1	NBR	2.500	3.350	0.438	Inch	26346	CRWH1	NBR	2.625	3.936	0.438	Inch
24932	CRWHA1	NBR	2.500	3.350	0.438	Inch	26354	CRWA1	NBR	2.625	4.003	0.375	Inch
24934	CRWHA1	NBR	2.500	3.371	0.375	Inch	26356	CRWH1	NBR	2.625	4.003	0.438	Inch
24936	CRWHA1	FKM	2.500	3.371	0.438	Inch	26359	CRWHA1	NBR	2.625	4.370	0.438	Inch
24949	CRWA1	ACM	2.500	3.428	0.375	Inch	26368	CRWH1	NBR	2.625	4.438	0.438	Inch
24951	CRWA1	NBR	2.500	3.428	0.375	Inch	26761	CRWH1	NBR	2.688	3.751	0.438	Inch
24954	CRWH1	NBR	2.500	3.371	0.438	Inch	26877	CRS1	NBR	2.648	3.812	0.500	Inch
24971	CRWA1	FKM	2.500	3.500	0.375	Inch	26921	CRWH1	NBR	2.688	3.876	0.438	Inch
24980	CRW1	NBR	2.500	3.500	0.438	Inch	26975	CRWH1	NBR	2.688	4.003	0.469	Inch
24982	CRWA1	NBR	2.500	3.500	0.438	Inch	27210	HM1	NBR	2.750	3.125	0.188	Inch
24984	CRWH1	FKM	2.500	3.500	0.438	Inch	27225	HM1	NBR	2.750	3.250	0.313	Inch
24986	CRWH1	NBR	2.500	3.500	0.438	Inch	27251	CRW1	NBR	2.750	3.481	0.438	Inch
24988	CRWHA1	NBR	2.500	3.500	0.438	Inch	27268	CRW1	NBR	2.750	3.500	0.375	Inch
24989	CRWH1	ACM	2.500	3.500	0.438	Inch	27269	CRWA1	NBR	2.750	3.500	0.375	Inch
24990	CRWHA1	FKM	2.500	3.500	0.438	Inch	27271	HM14	NBR	2.750	3.500	0.250	Inch
25007	HM21	NBR	2.500	3.500	0.250	Inch	27272	CRWA1	FKM	2.750	3.500	0.375	Inch
25037	CRWA1	FKM	2.500	3.544	0.433	Inch	27280	CRWH1	NBR	2.750	3.500	0.438	Inch
25043	CRWH1	NBR	2.500	3.543	0.438	Inch	27284	CRWH1	NBR	2.750	3.538	0.438	Inch
25065	CRWHA1	ACM	2.500	3.543	0.438	Inch	27292	CRWH1	ACM	2.750	3.543	0.438	Inch
25071	CRWH1	NBR	2.500	3.623	0.438	Inch	27293	CRWH1	FKM	2.750	3.543	0.438	Inch
25074	CRW1	NBR	2.500	3.623	0.375	Inch	27295	CRWHA1	ACM	2.750	3.543	0.438	Inch
25075	CRWA1	NBR	2.500	3.623	0.375	Inch	27324	CRWH1	FKM	2.750	3.623	0.438	Inch
25076	CRWA1	FKM	2.500	3.623	0.375	Inch	27334	CRWH1	NBR	2.750	3.623	0.438	Inch
25078	X15	NBR	2.496	3.672	0.313	Inch	27361	CRW1	NBR	2.750	3.751	0.438	Inch
25082	CRW1	MVQ	2.500	3.502	0.406	Inch	27362	CRWA1	NBR	2.750	3.751	0.438	Inch
25091	CRWH1	NBR	2.500	3.751	0.438	Inch	27365	CRWH1	FKM	2.750	3.751	0.438	Inch
25096	HDDF	Steel	63,50	95,56		Metric	27368	CRWH1	NBR	2.750	3.751	0.438	Inch
25100	CRWH1	NBR	2.500	3.876	0.438	Inch	27370	CRWHA1	NBR	2.750	3.751	0.438	Inch
25102	CRWHA1	ACM	2.500	3.876	0.469	Inch	27377	CRWA1	ACM	2.750	3.751	0.438	Inch
25108	CRWA1	NBR	2.500	4.003	0.375	Inch	27394	HM21	NBR	2.750	3.751	0.250	Inch
25110	CRWA1	FKM	2.500	4.003	0.375	Inch	27426	CRWH1	NBR	2.750	3.765	0.438	Inch
25561	CRWHA1	NBR	2.563	3.481	0.500	Inch	27452	CRWHA1	ACM	2.750	3.876	0.433	Inch
25587	CRSHA1	ACM	2.563	3.500	0.500	Inch	27467	CRWA1	NBR	2.750	3.876	0.438	Inch
25597	CRWH1	NBR	2.563	3.500	0.438	Inch	27470	CRWH1	NBR	2.750	3.876	0.438	Inch
25641	CRWH1	NBR	2.563	3.623	0.438	Inch	27471	CRWHA1	NBR	2.750	3.876	0.438	Inch
25661	CRWA1	ACM	2.563	3.623	0.469	Inch	27525	CRWH1	NBR	2.750	3.936	0.438	Inch
25713	CRWH1	NBR	2.563	3.751	0.438	Inch	27526	CRWA1	ACM	2.750	3.937	0.438	Inch
25714	CRWHA1	NBR	2.563	3.751	0.438	Inch	27536	HDDF	Steel	69,85	102,36		Metric
25725	CRWH1	FKM	2.563	3.751	0.438	Inch	27539	CRWA1	FKM	2.750	4.003	0.375	Inch
25745	CRWHA1	NBR	2.563	3.873	0.438	Inch	27541	CRWH1	NBR	2.750	4.003	0.438	Inch
25748	CRWH1	NBR	2.563	3.876	0.438	Inch	27565	CRWHA1	ACM	2.750	4.003	0.438	Inch
25950	CRWH1	ACM	2.607	3.350	0.375	Inch	27576	CRS1	ACM	2.750	4.125	0.438	Inch
25970	CRWHA1	ACM	2.598	3.481	0.438	Inch	27577	CRSA1	NBR	2.750	4.125	0.563	Inch
26110	CRWH1	NBR	2.625	3.251	0.438	Inch	27600	CRWH1	NBR	2.750	4.249	0.438	Inch
26122	CRW1	FKM	2.625	3.350	0.375	Inch	27601	CRWHA1	ACM	2.750	4.249	0.438	Inch
26123	CRW1	NBR	2.625	3.350	0.375	Inch	27625	CRWHA1	NBR	2.750	4.331	0.500	Inch
26124	CRWA1	NBR	2.625	3.350	0.375	Inch	28035	CRWH1	NBR	2.813	3.751	0.438	Inch
26128	CRW1	NBR	2.625	3.350	0.438	Inch	28116	CRWH1	NBR	2.813	3.876	0.438	Inch
26141	CRWHA1	NBR	2.625	3.374	0.438	Inch	28175	CRWH1	NBR	2.813	4.003	0.438	Inch
26144	HM14	NBR	2.625	3.371	0.250	Inch	28270	CRW1	NBR	2.813	4.249	0.313	Inch
26153	CRWHA1	NBR	2.625	3.371	0.438	Inch	28275	CRWH1	NBR	2.813	4.249	0.438	Inch
26163	CRWH1	NBR	2.625	3.481	0.438	Inch	28276	CRWH1	ACM	2.813	4.250	0.438	Inch
26177	CRW1	FKM	2.625	3.500	0.375	Inch	28425	CRWA1	NBR	2.844	3.939	0.500	Inch
26186	CRWA1	NBR	2.625	3.500	0.375	Inch	28426	CRWHA1	NBR	2.844	3.939	0.550	Inch
26189	CRWH1	NBR	2.625	3.500	0.438	Inch	28464	CRWH1	NBR	2.844	4.003	0.438	Inch
26190	CRWHA1	NBR	2.625	3.500	0.438	Inch	28474	CRWH1	FKM	2.844	4.003	0.500	Inch
26191	CRWA1	ACM	2.625	3.500	0.438	Inch	28646	CRSA1	NBR	2.875	3.434	0.294	Inch
26194	CRWH1	NBR	2.625	3.543	0.438	Inch	28654	CRWH1	NBR	2.875	3.623	0.438	Inch
26204	CRW1	FKM	2.625	3.623	0.375	Inch	28655	CRWHA1	NBR	2.875	3.623	0.438	Inch
26208	CRWH1	FKM	2.625	3.623	0.438	Inch	28669	CRWA1	NBR	2.875	3.751	0.375	Inch
26209	CRWH1	NBR	2.625	3.623	0.438	Inch	28670	CRWA1	FKM	2.875	3.751	0.375	Inch
26211	CRWHA1	NBR	2.625	3.623	0.438	Inch	28686	CRWH1	NBR	2.875	3.751	0.438	Inch
26220	CRWA1	ACM	2.625	3.623	0.375	Inch	28687	CRWHA1	NBR	2.875	3.751	0.438	Inch

Numerical designation	Design	Material	Inner diameter	Outer diameter	Width	Metric or inch value	Numerical designation	Design	Material	Inner diameter	Outer diameter	Width	Metric or inch value
28697	CRWH1	ACM	2.875	3.751	0.438	Inch	31139	CRWA1	NBR	3.125	4.003	0.375	Inch
28698	CRWH1	FKM	2.875	3.751	0.438	Inch	31144	CRSA1	FKM	3.125	3.936	0.512	Inch
28699	CRWHA1	FKM	2.875	3.751	0.438	Inch	31147	CRWH1	NBR	3.125	4.003	0.438	Inch
28700	HM21	NBR	2.875	3.751	0.250	Inch	31148	CRWHA1	NBR	3.125	4.003	0.438	Inch
28725	HM1	NBR	2.875	3.876	0.188	Inch	31152	CRWHA1	FKM	3.125	4.003	0.375	Inch
28745	CRWH1	NBR	2.875	3.876	0.438	Inch	31173	CRWHA1	ACM	3.125	4.125	0.438	Inch
28746	CRWHA1	NBR	2.875	3.876	0.438	Inch	31177	CRW1	NBR	3.125	4.125	0.375	Inch
28748	CRWHA1	FKM	2.875	3.876	0.438	Inch	31179	CRWA1	FKM	3.125	4.125	0.375	Inch
28751	HM21	NBR	2.875	3.876	0.250	Inch	31185	CRWHA1	MVQ	3.125	4.125	0.438	Inch
28760	CRWH1	NBR	2.875	4.003	0.438	Inch	31189	CRWH1	NBR	3.125	4.125	0.438	Inch
28761	CRWHA1	NBR	2.875	4.003	0.438	Inch	31192	HMA1	NBR	3.125	4.125	0.250	Inch
28778	CRWA1	NBR	2.875	4.003	0.375	Inch	31227	CRWH1	NBR	3.125	4.249	0.438	Inch
28779	CRWA1	FKM	2.875	4.003	0.375	Inch	31228	CRWHA1	NBR	3.125	4.249	0.438	Inch
28800	HM21	NBR	2.875	4.003	0.250	Inch	31237	CRWHA1	FKM	3.125	4.249	0.438	Inch
28817	CRWH1	NBR	2.875	4.125	0.375	Inch	31250	CRWH1	NBR	3.125	4.376	0.438	Inch
28841	CRWA1	ACM	2.875	4.331	0.438	Inch	31261	CRWHA1	ACM	3.125	4.376	0.438	Inch
28848	CRWH1	NBR	2.750	4.500	0.469	Inch	31269	CRWH1	NBR	3.125	4.501	0.438	Inch
29105	CRS1	ACM	2.913	3.543	0.394	Inch	31299	CRWH1	NBR	3.125	4.626	0.438	Inch
29184	CRWH1	NBR	2.938	4.125	0.375	Inch	31327	CRWH1	NBR	3.125	4.751	0.438	Inch
29218	CRW1	NBR	2.938	3.623	0.375	Inch	31333	CRWH1	NBR	3.125	4.999	0.438	Inch
29223	CRW1	NBR	2.938	3.751	0.375	Inch	31353	CRWH1	NBR	3.125	5.251	0.438	Inch
29224	CRWA1	NBR	2.938	3.751	0.375	Inch	31511	CRW1	FKM	3.150	3.946	0.394	Inch
29226	CRWA1	FKM	2.938	3.751	0.375	Inch	31514	X15	NBR	3.150	3.994	0.591	Inch
29262	CRWHA1	FKM	2.938	3.876	0.375	Inch	31758	CRWH1	NBR	3.188	4.249	0.438	Inch
29263	CRWHA1	NBR	2.938	3.876	0.375	Inch	31825	CRWH1	NBR	3.188	4.376	0.438	Inch
29273	CRWA1	ACM	2.938	3.937	0.438	Inch	31855	CRWH1	NBR	3.188	4.501	0.438	Inch
29316	CRWH1	NBR	2.938	4.003	0.438	Inch	31870	CRWH1	NBR	3.188	4.626	0.438	Inch
29350	CRWA1	ACM	2.938	4.003	0.438	Inch	31955	CRWH1	NBR	3.188	4.999	0.438	Inch
29383	CRWHA1	FKM	2.938	4.004	0.433	Inch	32325	HMA1	NBR	3.250	3.750	0.250	Inch
29385	CRWHA1	NBR	2.938	4.125	0.375	Inch	32330	CRW1	ACM	3.250	3.876	0.375	Inch
29393	CRWHA1	NBR	2.938	4.003	0.438	Inch	32332	CRSA1	FKM	3.250	3.876	0.375	Inch
29465	CRWH1	NBR	2.938	4.501	0.438	Inch	32344	CRW1	NBR	3.250	4.003	0.375	Inch
29840	HM1	NBR	3.000	3.500	0.313	Inch	32347	CRWA1	ACM	3.250	4.003	0.375	Inch
29841	CRW1	FKM	3.000	3.500	0.375	Inch	32362	CRSH1	NBR	3.250	4.125	0.563	Inch
29850	HM14	NBR	3.000	3.623	0.250	Inch	32380	CRWH1	ACM	3.250	4.249	0.438	Inch
29852	TL1	NBR	2.953	4.724	0.320	Inch	32385	CRWHA1	ACM	3.250	4.249	0.438	Inch
29863	HM21	NBR	3.000	3.751	0.250	Inch	32392	CRWA1	FKM	3.250	4.249	0.375	Inch
29865	CRW1	NBR	3.000	3.751	0.375	Inch	32393	CRW1	NBR	3.250	4.249	0.375	Inch
29866	CRWA1	NBR	3.000	3.751	0.375	Inch	32395	CRWA1	NBR	3.250	4.249	0.375	Inch
29867	CRWA1	ACM	3.000	3.751	0.375	Inch	32396	CRWH1	NBR	3.250	4.249	0.438	Inch
29868	CRW1	FKM	3.000	3.751	0.375	Inch	32397	CRWHA1	NBR	3.250	4.249	0.438	Inch
29870	CRWA1	FKM	3.000	3.751	0.375	Inch	32403	CRWH1	FKM	3.250	4.249	0.438	Inch
29871	CRWH1	NBR	3.000	3.751	0.438	Inch	32412	HM14	NBR	3.250	4.249	0.250	Inch
29872	CRWHA1	NBR	3.000	3.751	0.438	Inch	32424	CRWH1	NBR	3.250	4.376	0.438	Inch
29877	CRW1	FKM	3.000	3.876	0.313	Inch	32437	X4	NBR	3.250	4.468	0.315	Inch
29887	CRWH1	NBR	3.000	3.876	0.438	Inch	32441	X15	NBR	3.250	4.500	0.313	Inch
29891	CRWH1	FKM	3.000	3.876	0.469	Inch	32448	CRWA1	ACM	3.250	4.500	0.438	Inch
29900	X2	Leather	3.000	4.000	0.500	Inch	32477	CRW1	NBR	3.250	4.501	0.375	Inch
29906	CRW1	NBR	3.000	4.003	0.375	Inch	32501	CRWH1	NBR	3.250	4.501	0.438	Inch
29907	CRWA1	NBR	3.000	4.003	0.375	Inch	32502	CRWHA1	NBR	3.250	4.501	0.438	Inch
29912	CRWA1	FKM	3.000	4.003	0.375	Inch	32510	HM21	NBR	3.250	4.501	0.250	Inch
29925	CRWHA1	ACM	3.000	4.003	0.438	Inch	32514	CRWHA1	NBR	3.250	4.626	0.433	Inch
29950	CRWH1	ACM	3.000	4.003	0.375	Inch	32540	CRWH1	NBR	3.250	4.626	0.438	Inch
29951	CRWH1	NBR	3.000	4.003	0.438	Inch	32555	CRWH1	NBR	3.250	4.718	0.438	Inch
29952	CRWHA1	NBR	3.000	4.003	0.438	Inch	32560	CRWH1	NBR	3.250	4.751	0.438	Inch
29958	CRWH1	FKM	3.000	4.003	0.438	Inch	32582	CRWH1	NBR	3.250	4.999	0.438	Inch
29968	HM21	NBR	3.000	4.003	0.250	Inch	32583	CRWHA1	NBR	3.250	4.999	0.438	Inch
30000	CRWH1	NBR	3.000	4.125	0.438	Inch	32815	CRSA1	NBR	3.298	4.125	0.563	Inch
30003	CRWH1	FKM	3.000	4.125	0.438	Inch	33033	CRWH1	NBR	3.313	4.125	0.438	Inch
30033	CRWH1	NBR	3.000	4.249	0.438	Inch	33073	CRWH1	NBR	3.313	4.249	0.438	Inch
30049	HM21	NBR	3.000	4.249	0.250	Inch	33136	CRWH1	NBR	3.313	4.500	0.438	Inch
30056	CRWHA1	ACM	3.000	4.249	0.438	Inch	33306	CRWH1	NBR	3.313	4.999	0.438	Inch
30060	CRWH1	NBR	3.000	4.331	0.438	Inch	33645	CRW1	NBR	3.375	4.125	0.375	Inch
30070	CRWH1	NBR	3.000	4.376	0.438	Inch	33654	CRWA1	MVQ	3.375	4.280	0.406	Inch
30087	CRWH1	NBR	3.000	4.500	0.438	Inch	33665	CRWHA1	NBR	3.375	4.249	0.438	Inch
30095	CRWHA1	NBR	3.000	4.500	0.438	Inch	33699	CRWA1	FKM	3.375	4.376	0.375	Inch
30098	CRWH1	FKM	3.000	4.501	0.438	Inch	33700	CRW1	NBR	3.375	4.376	0.375	Inch
30108	X12	NBR	3.000	4.525	0.375	Inch	33701	CRWA1	NBR	3.375	4.376	0.375	Inch
30125	CRWH1	NBR	3.000	4.999	0.438	Inch	33711	CRWH1	NBR	3.375	4.376	0.438	Inch
30651	HDDF	Steel	77,80	114,30		Metric	33712	CRWHA1	NBR	3.375	4.376	0.438	Inch
31129	HMA1	NBR	3.125	3.751	0.250	Inch	33733	CRWA1	FKM	3.375	4.501	0.438	Inch
31132	CRW1	FKM	3.125	3.811	0.355	Inch	33735	CRWH1	NBR	3.375	4.501	0.438	Inch
31135	CRW1	NBR	3.125	3.811	0.355	Inch	33772	CRWH1	NBR	3.375	4.626	0.438	Inch

**US Designation index**  
from 33773 to 39922

Numerical designation	Design	Material	Inner diameter	Outer diameter	Width	Metric or inch value	Numerical designation	Design	Material	Inner diameter	Outer diameter	Width	Metric or inch value
33773	CRWHA1	NBR	3.375	4.626	0.438	Inch	36361	CRWA1	NBR	3.625	4.999	0.375	Inch
33775	CRWHA1	FKM	3.375	4.626	0.438	Inch	36363	CRWH1	NBR	3.625	4.999	0.438	Inch
33807	CRWH1	NBR	3.375	4.686	0.438	Inch	36364	CRWHA1	NBR	3.625	4.999	0.438	Inch
33837	CRWH1	NBR	3.375	4.999	0.438	Inch	36382	CRWA1	NBR	3.625	5.251	0.375	Inch
33866	CRWHA1	NBR	3.375	5.251	0.438	Inch	36391	CRWHA1	NBR	3.625	5.375	0.438	Inch
34000	X14	FKM	3.400	4.500	0.281	Inch	36740	CRWHA1	NBR	3.688	4.501	0.438	Inch
34256	CRW1	NBR	3.438	4.249	0.375	Inch	36770	CRWH1	NBR	3.688	4.751	0.438	Inch
34279	CRWA1	NBR	3.438	4.501	0.375	Inch	36880	CRWH1	NBR	3.688	4.999	0.438	Inch
34282	CRWH1	NBR	3.438	4.501	0.438	Inch	36895	CRWA1	NBR	3.688	5.126	0.438	Inch
34283	CRWHA1	NBR	3.438	4.501	0.438	Inch	36910	CRWA1	NBR	3.688	5.626	0.438	Inch
34336	CRWH1	NBR	3.438	4.626	0.438	Inch	37320	HM14	NBR	3.750	4.376	0.250	Inch
34338	CRWHA1	NBR	3.438	4.626	0.438	Inch	37325	HM14	FKM	3.750	4.376	0.250	Inch
34379	CRWA1	NBR	3.438	4.751	0.438	Inch	37327	CRW1	NBR	3.750	4.501	0.375	Inch
34383	CRWH1	NBR	3.438	4.756	0.438	Inch	37328	CRW1	FKM	3.750	4.501	0.375	Inch
34398	CRWH1	NBR	3.438	4.876	0.438	Inch	37330	CRWHA1	ACM	3.750	4.501	0.469	Inch
34407	CRWH1	NBR	3.438	4.999	0.438	Inch	37332	CRWHA1	FKM	3.750	4.502	0.469	Inch
34408	CRWHA1	NBR	3.438	4.999	0.438	Inch	37387	CRW1	ACM	3.750	4.751	0.375	Inch
34647	CRWA1	FKM	3.375	4.125	0.375	Inch	37388	CRW1	NBR	3.750	4.751	0.375	Inch
34700	CRSA1	NBR	3.469	4.626	0.625	Inch	37389	CRWA1	NBR	3.750	4.751	0.375	Inch
34835	HM1	NBR	3.500	4.000	0.300	Inch	37390	CRWA1	ACM	3.750	4.751	0.438	Inch
34840	HM14	NBR	3.500	4.003	0.250	Inch	37395	CRWHA1	MVQ	3.750	4.751	0.438	Inch
34848	HM14	NBR	3.500	4.125	0.250	Inch	37396	CRWH1	NBR	3.750	4.751	0.438	Inch
34857	CRWHA1	FKM	3.500	4.249	0.438	Inch	37403	CRWHA1	ACM	3.750	4.750	0.438	Inch
34860	CRW1	NBR	3.500	4.376	0.375	Inch	37405	CRWH1	FKM	3.750	4.751	0.438	Inch
34861	CRWA1	NBR	3.500	4.376	0.375	Inch	37433	CRWH1	NBR	3.750	4.876	0.438	Inch
34866	CRWA1	FKM	3.500	4.376	0.375	Inch	37524	CRW1	FKM	3.750	4.999	0.375	Inch
34867	CRWH1	NBR	3.500	4.376	0.438	Inch	37525	CRW1	NBR	3.750	4.999	0.375	Inch
34868	CRWHA1	NBR	3.500	4.376	0.438	Inch	37526	CRWA1	NBR	3.750	4.999	0.375	Inch
34869	CRWHA1	FKM	3.500	4.376	0.433	Inch	37532	CRWH1	NBR	3.750	4.999	0.438	Inch
34883	CRWA1	FKM	3.500	4.501	0.375	Inch	37533	CRWHA1	NBR	3.750	4.999	0.438	Inch
34885	HM12	NBR	3.500	4.450	0.531	Inch	37574	CRWH1	NBR	3.750	5.251	0.438	Inch
34886	CRW1	NBR	3.500	4.501	0.375	Inch	37577	CRWH1	FKM	3.750	5.251	0.438	Inch
34887	CRWA1	NBR	3.500	4.501	0.375	Inch	38160	CRSH1	NBR	3.813	4.999	0.469	Inch
34888	CRWH1	NBR	3.500	4.501	0.438	Inch	38220	CRSH1	NBR	3.813	5.251	0.469	Inch
34889	CRWHA1	NBR	3.500	4.501	0.438	Inch	38590	X12	NBR	3.875	5.390	0.375	Inch
34891	CRWHA1	ACM	3.500	4.501	0.438	Inch	38646	CRW1	NBR	3.875	4.751	0.375	Inch
34892	CRWH1	FKM	3.500	4.501	0.438	Inch	38647	CRWA1	NBR	3.875	4.751	0.375	Inch
34967	HM21	NBR	3.500	4.501	0.250	Inch	38649	CRWA1	FKM	3.875	4.751	0.375	Inch
34985	CRWH1	NBR	3.500	4.626	0.438	Inch	38653	CRWH1	NBR	3.875	4.751	0.438	Inch
35012	CRWH1	NBR	3.500	4.751	0.438	Inch	38669	CRWH1	NBR	3.875	4.876	0.500	Inch
35020	CRWHA1	NBR	3.500	4.751	0.438	Inch	38673	CRWHA1	NBR	3.875	4.876	0.438	Inch
35029	CRWH1	NBR	3.500	4.751	0.625	Inch	38678	CRWHA1	FKM	3.875	4.876	0.500	Inch
35039	CRWA1	FKM	3.500	4.751	0.375	Inch	38691	CRW1	NBR	3.875	4.999	0.375	Inch
35040	CRWA1	ACM	3.500	4.751	0.375	Inch	38692	CRWA1	NBR	3.875	4.999	0.375	Inch
35042	HM21	NBR	3.500	4.751	0.250	Inch	38694	CRWA1	FKM	3.875	4.999	0.375	Inch
35076	HDDF	Steel	88,90	125,81		Metric	38702	CRWHA1	FKM	3.875	5.126	0.438	Inch
35080	CRWA1	FKM	3.500	4.999	0.438	Inch	38703	CRWH1	NBR	3.875	5.126	0.438	Inch
35082	CRWH1	NBR	3.500	4.999	0.438	Inch	38713	CRWHA1	NBR	3.875	5.126	0.438	Inch
35083	CRWHA1	ACM	3.500	4.999	0.438	Inch	38730	CRWH1	NBR	3.875	5.251	0.438	Inch
35086	CRWH1	NBR	3.500	5.126	0.438	Inch	38731	CRWHA1	NBR	3.875	5.251	0.438	Inch
35095	CRWHA1	NBR	3.500	5.126	0.438	Inch	38739	CRWHA1	ACM	3.875	5.251	0.438	Inch
35096	CRWH1	NBR	3.500	5.251	0.438	Inch	38740	HDDF	Steel	98,43	134,92		Metric
35111	CRSH1	NBR	3.500	5.751	0.563	Inch	38745	CRWH1	NBR	3.875	5.376	0.438	Inch
35120	CRSA1	FKM	3.504	4.173	0.354	Inch	38749	CRSHA1	NBR	3.875	5.501	0.500	Inch
35556	CRWH1	NBR	3.563	4.501	0.438	Inch	38751	HDDF	Steel	98,43	141,27		Metric
35593	CRWH1	NBR	3.563	4.626	0.438	Inch	38758	CRWHA1	NBR	3.875	5.626	0.433	Inch
35649	CRWH1	NBR	3.563	4.751	0.438	Inch	38770	CRSA1	FKM	3.898	4.680	0.370	Inch
35676	CRWH1	NBR	3.563	4.876	0.438	Inch	38774	CRWH1	NBR	3.875	5.690	0.500	Inch
35716	CRWH1	NBR	3.563	4.999	0.438	Inch	38810	CRSH1	NBR	3.875	5.751	0.563	Inch
36153	CRWA1	FKM	3.625	4.376	0.375	Inch	39245	CRWH1	NBR	3.938	4.876	0.438	Inch
36155	CRWA1	NBR	3.625	4.376	0.375	Inch	39275	CRWH1	NBR	3.938	4.999	0.438	Inch
36157	CRWH1	NBR	3.625	4.376	0.375	Inch	39276	CRWH1	FKM	3.938	4.999	0.438	Inch
36158	CRWH1	ACM	3.625	4.376	0.375	Inch	39277	CRWH1	NBR	3.938	4.999	0.438	Inch
36166	CRW1	NBR	3.625	4.501	0.375	Inch	39304	CRWHA1	FKM	3.938	5.126	0.472	Inch
36172	X15	NBR	3.625	4.500	0.294	Inch	39320	CRWH1	NBR	3.938	5.251	0.438	Inch
36177	CRW1	NBR	3.625	4.626	0.375	Inch	39350	CRWH1	NBR	3.938	5.375	0.438	Inch
36179	CRWA1	FKM	3.625	4.626	0.375	Inch	39423	CRWH1	NBR	3.938	5.501	0.438	Inch
36185	CRWH1	NBR	3.625	4.626	0.438	Inch	39835	HM14	NBR	4.000	4.501	0.250	Inch
36186	CRWHA1	NBR	3.625	4.626	0.438	Inch	39851	CRW1	NBR	4.000	4.876	0.438	Inch
36220	CRWH1	NBR	3.625	4.751	0.438	Inch	39860	HM21	NBR	4.000	4.876	0.250	Inch
36234	CRWA1	MVQ	3.625	4.751	0.500	Inch	39895	CRW1	ACM	4.000	4.999	0.375	Inch
36314	CRWH1	NBR	3.625	4.876	0.438	Inch	39921	CRWA1	FKM	4.000	4.999	0.375	Inch
36359	CRWA1	FKM	3.625	4.999	0.375	Inch	39922	CRW1	NBR	4.000	4.999	0.375	Inch









**US Designation index**  
**from 99111 to 99244**

Numerical designation	Design	Material	Inner diameter	Outer diameter	Width	Metric or inch value	Numerical designation	Design	Material	Inner diameter	Outer diameter	Width	Metric or inch value
99111	SKF Speedi-sleeve	Stainless steel	27,99	34,93	12,70	Metric	99175	SKF Speedi-sleeve	Stainless steel	44,45	52,40	22,23	Metric
99112	SKF Speedi-sleeve	Stainless steel	28,58	38,10	11,13	Metric	99176	SKF Speedi-sleeve	Stainless steel	44,86	52,40	17,48	Metric
99114	SKF Speedi-sleeve	Stainless steel	30,00	35,56	11,00	Metric	99177	SKF Speedi-sleeve	Stainless steel	45,01	53,01	16,99	Metric
99116	SKF Speedi-sleeve	Stainless steel	28,58	38,10	12,70	Metric	99179	SKF Speedi-sleeve	Stainless steel	45,24	53,98	20,32	Metric
99118	SKF Speedi-sleeve	Stainless steel	30,18	35,56	11,13	Metric	99180	SKF Speedi-sleeve	Stainless steel	44,45	52,40	15,88	Metric
99120	SKF Speedi-sleeve	Stainless steel	29,36	34,29	12,70	Metric	99181	SKF Speedi-sleeve	Stainless steel	46,05	53,09	17,48	Metric
99121	SKF Speedi-sleeve	Stainless steel	32,99	40,49	18,01	Metric	99182	SKF Speedi-sleeve	Stainless steel	43,00	48,41	15,88	Metric
99122	SKF Speedi-sleeve	Stainless steel	29,85	35,56	11,13	Metric	99184	SKF Speedi-sleeve	Stainless steel	47,63	55,96	13,11	Metric
99123	SKF Speedi-sleeve	Stainless steel	30,96	39,70	11,00	Metric	99185	SKF Speedi-sleeve	Stainless steel	47,22	54,76	17,48	Metric
99125	SKF Speedi-sleeve	Stainless steel	31,75	38,10	11,13	Metric	99186	SKF Speedi-sleeve	Stainless steel	47,45	55,58	26,04	Metric
99128	SKF Speedi-sleeve	Stainless steel	32,00	38,10	11,13	Metric	99187	SKF Speedi-sleeve	Stainless steel	47,63	55,96	17,48	Metric
99129	SKF Speedi-sleeve	Stainless steel	33,35	40,64	9,53	Metric	99188	SKF Speedi-sleeve	Stainless steel	47,63	55,96	10,54	Metric
99131	SKF Speedi-sleeve	Stainless steel	33,35	40,49	15,88	Metric	99189	SKF Speedi-sleeve	Stainless steel	48,03	56,01	16,97	Metric
99133	SKF Speedi-sleeve	Stainless steel	34,93	41,61	11,13	Metric	99190	SKF Speedi-sleeve	Stainless steel	47,63	55,96	7,49	Metric
99134	SKF Speedi-sleeve	Stainless steel	34,01	41,28	15,88	Metric	99192	SKF Speedi-sleeve	Stainless steel	48,56	56,36	12,70	Metric
99138	SKF Speedi-sleeve	Stainless steel	34,93	41,61	15,88	Metric	99193	SKF Speedi-sleeve	Stainless steel	49,23	56,36	17,48	Metric
99139	SKF Speedi-sleeve	Stainless steel	34,93	41,61	16,00	Metric	99196	SKF Speedi-sleeve	Stainless steel	50,01	57,00	16,97	Metric
99141	SKF Speedi-sleeve	Stainless steel	31,50	39,12	11,13	Metric	99198	SKF Speedi-sleeve	Stainless steel	50,29	58,75	17,88	Metric
99143	SKF Speedi-sleeve	Stainless steel	36,53	45,24	17,48	Metric	99199	SKF Speedi-sleeve	Stainless steel	50,80	61,11	17,48	Metric
99144	SKF Speedi-sleeve	Stainless steel	36,53	45,24	12,70	Metric	99200	SKF Speedi-sleeve	Stainless steel	50,80	61,11	25,40	Metric
99146	SKF Speedi-sleeve	Stainless steel	35,99	45,24	16,99	Metric	99205	SKF Speedi-sleeve	Stainless steel	52,40	62,71	23,83	Metric
99147	SKF Speedi-sleeve	Stainless steel	38,00	45,24	16,99	Metric	99210	SKF Speedi-sleeve	Stainless steel	53,98	61,52	19,05	Metric
99149	SKF Speedi-sleeve	Stainless steel	38,10	45,24	17,48	Metric	99212	SKF Speedi-sleeve	Stainless steel	53,98	61,52	23,83	Metric
99150	SKF Speedi-sleeve	Stainless steel	38,10	45,24	12,70	Metric	99215	SKF Speedi-sleeve	Stainless steel	54,99	62,00	22,99	Metric
99152	SKF Speedi-sleeve	Stainless steel	38,68	47,22	14,30	Metric	99218	SKF Speedi-sleeve	Stainless steel	55,58	63,50	23,83	Metric
99153	SKF Speedi-sleeve	Stainless steel	40,01	46,99	12,93	Metric	99219	SKF Speedi-sleeve	Stainless steel	57,99	65,99	23,83	Metric
99155	SKF Speedi-sleeve	Stainless steel	39,42	47,22	14,30	Metric	99220	SKF Speedi-sleeve	Stainless steel	56,01	64,29	15,88	Metric
99156	SKF Speedi-sleeve	Stainless steel	39,67	47,22	17,48	Metric	99224	SKF Speedi-sleeve	Stainless steel	56,01	64,29	23,77	Metric
99157	SKF Speedi-sleeve	Stainless steel	40,08	46,99	16,00	Metric	99225	SKF Speedi-sleeve	Stainless steel	57,15	64,29	23,83	Metric
99159	SKF Speedi-sleeve	Stainless steel	39,85	47,22	19,05	Metric	99226	SKF Speedi-sleeve	Stainless steel	56,90	65,10	22,86	Metric
99160	SKF Speedi-sleeve	Stainless steel	40,77	49,23	16,28	Metric	99227	SKF Speedi-sleeve	Stainless steel	57,15	64,29	11,13	Metric
99161	SKF Speedi-sleeve	Stainless steel	41,28	47,63	11,13	Metric	99229	SKF Speedi-sleeve	Stainless steel	56,64	64,29	15,88	Metric
99162	SKF Speedi-sleeve	Stainless steel	41,28	47,63	17,48	Metric	99230	SKF Speedi-sleeve	Stainless steel	56,64	64,29	23,01	Metric
99163	SKF Speedi-sleeve	Stainless steel	41,00	49,23	15,88	Metric	99231	SKF Speedi-sleeve	Stainless steel	58,75	68,28	23,83	Metric
99165	SKF Speedi-sleeve	Stainless steel	42,06	53,01	17,50	Metric	99233	SKF Speedi-sleeve	Stainless steel	59,13	69,85	22,23	Metric
99166	SKF Speedi-sleeve	Stainless steel	41,91	53,01	14,50	Metric	99235	SKF Speedi-sleeve	Stainless steel	59,99	70,74	22,99	Metric
99167	SKF Speedi-sleeve	Stainless steel	42,88	48,41	11,13	Metric	99237	SKF Speedi-sleeve	Stainless steel	60,33	69,85	23,83	Metric
99168	SKF Speedi-sleeve	Stainless steel	42,88	48,41	17,48	Metric	99238	SKF Speedi-sleeve	Stainless steel	60,33	69,85	19,05	Metric
99169	SKF Speedi-sleeve	Stainless steel	41,91	53,01	17,50	Metric	99240	SKF Speedi-sleeve	Stainless steel	60,33	69,85	17,35	Metric
99170	SKF Speedi-sleeve	Stainless steel	44,17	52,40	12,70	Metric	99241	SKF Speedi-sleeve	Stainless steel	59,99	70,74	11,43	Metric
99171	SKF Speedi-sleeve	Stainless steel	43,66	51,59	17,48	Metric	99242	SKF Speedi-sleeve	Stainless steel	61,93	71,83	15,88	Metric
99172	SKF Speedi-sleeve	Stainless steel	44,45	52,20	12,70	Metric	99243	SKF Speedi-sleeve	Stainless steel	61,93	71,83	23,83	Metric
99174	SKF Speedi-sleeve	Stainless steel	44,45	52,40	17,48	Metric	99244	SKF Speedi-sleeve	Stainless steel	62,00	71,83	15,88	Metric

Numerical designation	Design	Material	Inner diameter	Outer diameter	Width	Metric or inch value	Numerical designation	Design	Material	Inner diameter	Outer diameter	Width	Metric or inch value
99248	SKF Speedi-sleeve	Stainless steel	63,50	71,83	16,66	Metric	99322	SKF Speedi-sleeve	Stainless steel	82,55	91,29	25,40	Metric
99249	SKF Speedi-sleeve	Stainless steel	63,30	73,03	23,83	Metric	99324	SKF Speedi-sleeve	Stainless steel	82,55	90,81	18,26	Metric
99250	SKF Speedi-sleeve	Stainless steel	63,50	71,63	23,83	Metric	99325	SKF Speedi-sleeve	Stainless steel	82,55	91,06	25,40	Metric
99251	SKF Speedi-sleeve	Stainless steel	63,91	71,83	23,01	Metric	99326	SKF Speedi-sleeve	Stainless steel	82,55	91,06	22,23	Metric
99253	SKF Speedi-sleeve	Stainless steel	63,50	71,63	16,51	Metric	99328	SKF Speedi-sleeve	Stainless steel	81,99	91,06	21,54	Metric
99254	SKF Speedi-sleeve	Stainless steel	65,00	72,39	22,99	Metric	99331	SKF Speedi-sleeve	Stainless steel	84,07	93,68	25,40	Metric
99256	SKF Speedi-sleeve	Stainless steel	65,10	73,43	23,83	Metric	99332	SKF Speedi-sleeve	Stainless steel	84,89	93,98	21,01	Metric
99259	SKF Speedi-sleeve	Stainless steel	65,99	75,95	23,83	Metric	99333	SKF Speedi-sleeve	Stainless steel	84,89	93,98	24,99	Metric
99260	SKF Speedi-sleeve	Stainless steel	66,68	77,39	15,88	Metric	99334	SKF Speedi-sleeve	Stainless steel	85,01	90,93	12,67	Metric
99261	SKF Speedi-sleeve	Stainless steel	66,57	77,39	23,83	Metric	99337	SKF Speedi-sleeve	Stainless steel	85,73	93,85	25,40	Metric
99262	SKF Speedi-sleeve	Stainless steel	66,68	77,39	23,83	Metric	99338	SKF Speedi-sleeve	Stainless steel	85,73	93,68	12,70	Metric
99264	SKF Speedi-sleeve	Stainless steel	66,68	77,39	23,01	Metric	99339	SKF Speedi-sleeve	Stainless steel	87,33	97,64	23,01	Metric
99266	SKF Speedi-sleeve	Stainless steel	68,00	79,38	22,23	Metric	99340	SKF Speedi-sleeve	Stainless steel	88,39	97,41	23,01	Metric
99267	SKF Speedi-sleeve	Stainless steel	69,85	78,11	41,28	Metric	99346	SKF Speedi-sleeve	Stainless steel	88,90	97,64	20,65	Metric
99268	SKF Speedi-sleeve	Stainless steel	69,34	79,38	23,01	Metric	99347	SKF Speedi-sleeve	Stainless steel	88,90	97,16	12,70	Metric
99269	SKF Speedi-sleeve	Stainless steel	69,85	79,38	31,75	Metric	99349	SKF Speedi-sleeve	Stainless steel	89,00	97,64	20,65	Metric
99272	SKF Speedi-sleeve	Stainless steel	69,85	79,38	14,30	Metric	99350	SKF Speedi-sleeve	Stainless steel	88,90	97,64	25,40	Metric
99273	SKF Speedi-sleeve	Stainless steel	69,67	77,85	23,83	Metric	99351	SKF Speedi-sleeve	Stainless steel	89,99	101,60	23,01	Metric
99274	SKF Speedi-sleeve	Stainless steel	69,85	79,38	23,83	Metric	99352	SKF Speedi-sleeve	Stainless steel	89,99	101,60	13,67	Metric
99275	SKF Speedi-sleeve	Stainless steel	69,85	79,38	23,83	Metric	99353	SKF Speedi-sleeve	Stainless steel	89,99	101,60	16,94	Metric
99276	SKF Speedi-sleeve	Stainless steel	70,00	79,38	24,00	Metric	99354	SKF Speedi-sleeve	Stainless steel	89,99	101,60	27,99	Metric
99281	SKF Speedi-sleeve	Stainless steel	71,45	80,98	17,48	Metric	99356	SKF Speedi-sleeve	Stainless steel	90,50	99,06	25,40	Metric
99282	SKF Speedi-sleeve	Stainless steel	72,09	81,92	16,66	Metric	99359	SKF Speedi-sleeve	Stainless steel	94,74	102,01	15,09	Metric
99284	SKF Speedi-sleeve	Stainless steel	72,01	81,92	22,23	Metric	99360	SKF Speedi-sleeve	Stainless steel	91,97	102,39	25,40	Metric
99286	SKF Speedi-sleeve	Stainless steel	72,87	80,98	23,83	Metric	99362	SKF Speedi-sleeve	Stainless steel	92,08	102,39	25,40	Metric
99287	SKF Speedi-sleeve	Stainless steel	73,03	81,76	23,83	Metric	99363	SKF Speedi-sleeve	Stainless steel	92,08	102,24	15,88	Metric
99289	SKF Speedi-sleeve	Stainless steel	75,01	83,13	17,53	Metric	99364	SKF Speedi-sleeve	Stainless steel	95,07	102,49	15,09	Metric
99290	SKF Speedi-sleeve	Stainless steel	74,63	84,94	16,28	Metric	99365	SKF Speedi-sleeve	Stainless steel	93,68	102,24	23,83	Metric
99291	SKF Speedi-sleeve	Stainless steel	76,02	85,32	15,88	Metric	99366	SKF Speedi-sleeve	Stainless steel	94,74	102,24	23,01	Metric
99292	SKF Speedi-sleeve	Stainless steel	75,54	82,17	25,40	Metric	99367	SKF Speedi-sleeve	Stainless steel	95,33	102,24	12,70	Metric
99293	SKF Speedi-sleeve	Stainless steel	74,68	84,94	23,83	Metric	99368	SKF Speedi-sleeve	Stainless steel	93,68	102,39	11,13	Metric
99294	SKF Speedi-sleeve	Stainless steel	75,01	83,95	26,01	Metric	99369	SKF Speedi-sleeve	Stainless steel	95,00	102,24	24,00	Metric
99296	SKF Speedi-sleeve	Stainless steel	76,20	82,30	23,83	Metric	99372	SKF Speedi-sleeve	Stainless steel	95,33	102,11	22,23	Metric
99298	SKF Speedi-sleeve	Stainless steel	76,02	85,32	17,48	Metric	99374	SKF Speedi-sleeve	Stainless steel	95,07	102,39	12,70	Metric
99299	SKF Speedi-sleeve	Stainless steel	76,02	85,09	25,40	Metric	99376	SKF Speedi-sleeve	Stainless steel	95,22	102,24	17,48	Metric
99300	SKF Speedi-sleeve	Stainless steel	76,20	82,17	25,40	Metric	99386	SKF Speedi-sleeve	Stainless steel	98,32	106,30	25,40	Metric
99301	SKF Speedi-sleeve	Stainless steel	76,48	85,22	15,88	Metric	99387	SKF Speedi-sleeve	Stainless steel	98,43	107,16	25,40	Metric
99306	SKF Speedi-sleeve	Stainless steel	78,00	88,09	22,23	Metric	99393	SKF Speedi-sleeve	Stainless steel	100,03	109,55	25,40	Metric
99311	SKF Speedi-sleeve	Stainless steel	79,38	89,69	20,65	Metric	99395	SKF Speedi-sleeve	Stainless steel	101,60	111,13	18,42	Metric
99312	SKF Speedi-sleeve	Stainless steel	79,38	89,69	25,40	Metric	99399	SKF Speedi-sleeve	Stainless steel	101,60	111,13	25,40	Metric
99313	SKF Speedi-sleeve	Stainless steel	80,01	89,92	22,50	Metric	99400	SKF Speedi-sleeve	Stainless steel	101,60	111,13	19,69	Metric
99315	SKF Speedi-sleeve	Stainless steel	80,01	89,99	24,00	Metric	99401	SKF Speedi-sleeve	Stainless steel	101,60	111,13	15,88	Metric
99317	SKF Speedi-sleeve	Stainless steel	80,01	89,99	15,01	Metric	99409	SKF Speedi-sleeve	Stainless steel	103,99	112,73	24,00	Metric

**US Designation index**  
from 99412 to 99829

Numerical designation	Design	Material	Inner diameter	Outer diameter	Width	Metric or inch value	Numerical designation	Design	Material	Inner diameter	Outer diameter	Width	Metric or inch value
99412	SKF Speedi-sleeve	Stainless steel	104,78	113,54	25,40	Metric	99595	SKF Speedi-sleeve	Stainless steel	149,99	159,00	30,00	Metric
99413	SKF Speedi-sleeve	Stainless steel	105,00	113,54	23,19	Metric	99596	SKF Speedi-sleeve	Stainless steel	150,83	161,93	28,58	Metric
99418	SKF Speedi-sleeve	Stainless steel	106,38	114,30	25,40	Metric	99599	SKF Speedi-sleeve	Stainless steel	152,40	161,93	31,75	Metric
99423	SKF Speedi-sleeve	Stainless steel	107,54	117,09	23,01	Metric	99601	SKF Speedi-sleeve	Stainless steel	152,40	161,54	19,05	Metric
99424	SKF Speedi-sleeve	Stainless steel	107,95	117,09	25,40	Metric	99605	SKF Speedi-sleeve	Stainless steel	154,00	161,93	30,00	Metric
99434	SKF Speedi-sleeve	Stainless steel	110,01	124,99	14,96	Metric	99606	SKF Speedi-sleeve	Stainless steel	154,86	167,01	30,00	Metric
99435	SKF Speedi-sleeve	Stainless steel	109,93	124,99	16,51	Metric	99620	SKF Speedi-sleeve	Stainless steel	157,56	168,28	27,00	Metric
99437	SKF Speedi-sleeve	Stainless steel	111,13	120,65	25,40	Metric	99625	SKF Speedi-sleeve	Stainless steel	158,75	168,28	31,75	Metric
99438	SKF Speedi-sleeve	Stainless steel	111,99	120,65	22,50	Metric	99630	SKF Speedi-sleeve	Stainless steel	159,99	171,45	31,75	Metric
99439	SKF Speedi-sleeve	Stainless steel	112,73	122,25	29,01	Metric	99640	SKF Speedi-sleeve	Stainless steel	169,88	182,58	38,00	Metric
99450	SKF Speedi-sleeve	Stainless steel	114,30	124,46	25,40	Metric	99650	SKF Speedi-sleeve	Stainless steel	165,10	177,80	31,75	Metric
99452	SKF Speedi-sleeve	Stainless steel	115,01	127,00	23,83	Metric	99675	SKF Speedi-sleeve	Stainless steel	171,45	180,98	27,00	Metric
99463	SKF Speedi-sleeve	Stainless steel	117,48	128,60	31,75	Metric	99687	SKF Speedi-sleeve	Stainless steel	175,01	186,99	32,00	Metric
99465	SKF Speedi-sleeve	Stainless steel	117,48	127,00	15,88	Metric	99700	SKF Speedi-sleeve	Stainless steel	177,80	189,87	31,75	Metric
99468	SKF Speedi-sleeve	Stainless steel	119,08	128,60	25,40	Metric	99721	SKF Speedi-sleeve	Stainless steel	180,01	190,50	38,00	Metric
99471	SKF Speedi-sleeve	Stainless steel	119,99	129,79	11,00	Metric	99725	SKF Speedi-sleeve	Stainless steel	184,15	197,10	38,10	Metric
99472	SKF Speedi-sleeve	Stainless steel	122,00	131,50	24,00	Metric	99726	SKF Speedi-sleeve	Stainless steel	184,86	197,10	38,00	Metric
99473	SKF Speedi-sleeve	Stainless steel	119,99	129,79	24,99	Metric	99745	SKF Speedi-sleeve	Stainless steel	189,31	199,64	25,40	Metric
99475	SKF Speedi-sleeve	Stainless steel	120,65	127,00	19,05	Metric	99750	SKF Speedi-sleeve	Stainless steel	190,50	200,03	25,40	Metric
99481	SKF Speedi-sleeve	Stainless steel	88,00	95,28	34,27	Metric	99775	SKF Speedi-sleeve	Stainless steel	196,85	210,06	33,35	Metric
99482	SKF Speedi-sleeve	Stainless steel	128,00	135,26	34,27	Metric	99787	SKF Speedi-sleeve	Stainless steel	200,03	212,73	38,10	Metric
99487	SKF Speedi-sleeve	Stainless steel	123,83	133,35	19,05	Metric	99799	SKF Speedi-sleeve	Stainless steel	201,63	212,73	31,75	Metric
99490	SKF Speedi-sleeve	Stainless steel	124,99	137,16	14,00	Metric	99800	SKF Speedi-sleeve	Stainless steel	203,20	212,73	31,75	Metric
99491	SKF Speedi-sleeve	Stainless steel	130,18	139,52	25,30	Metric	99810	SKF Speedi-sleeve	Stainless steel	15,88	19,05	10,31	Metric
99492	SKF Speedi-sleeve	Stainless steel	124,99	137,16	32,00	Metric	99811	SKF Speedi-sleeve	Stainless steel	19,05	24,00	11,13	Metric
99494	SKF Speedi-sleeve	Stainless steel	129,90	139,52	23,83	Metric	99812	SKF Speedi-sleeve	Stainless steel	22,23	27,79	11,13	Metric
99498	SKF Speedi-sleeve	Stainless steel	127,00	137,16	22,23	Metric	99813	SKF Speedi-sleeve	Stainless steel	24,99	33,02	11,00	Metric
99499	SKF Speedi-sleeve	Stainless steel	127,00	136,91	25,40	Metric	99814	SKF Speedi-sleeve	Stainless steel	25,40	30,96	11,13	Metric
99501	SKF Speedi-sleeve	Stainless steel	127,00	137,16	17,30	Metric	99815	SKF Speedi-sleeve	Stainless steel	27,00	33,53	11,13	Metric
99513	SKF Speedi-sleeve	Stainless steel	130,18	139,70	25,40	Metric	99816	SKF Speedi-sleeve	Stainless steel	28,58	38,10	11,13	Metric
99525	SKF Speedi-sleeve	Stainless steel	133,35	141,22	25,40	Metric	99817	SKF Speedi-sleeve	Stainless steel	31,75	38,10	11,13	Metric
99533	SKF Speedi-sleeve	Stainless steel	134,90	145,67	25,40	Metric	99818	SKF Speedi-sleeve	Stainless steel	33,35	40,49	15,88	Metric
99537	SKF Speedi-sleeve	Stainless steel	136,53	149,23	25,40	Metric	99819	SKF Speedi-sleeve	Stainless steel	34,93	41,61	15,88	Metric
99547	SKF Speedi-sleeve	Stainless steel	139,09	149,86	19,05	Metric	99820	SKF Speedi-sleeve	Stainless steel	34,93	41,61	16,00	Metric
99548	SKF Speedi-sleeve	Stainless steel	138,13	146,05	42,88	Metric	99821	SKF Speedi-sleeve	Stainless steel	36,53	45,24	17,48	Metric
99549	SKF Speedi-sleeve	Stainless steel	139,70	150,83	25,40	Metric	99822	SKF Speedi-sleeve	Stainless steel	38,10	45,24	17,48	Metric
99550	SKF Speedi-sleeve	Stainless steel	139,70	150,83	17,91	Metric	99823	SKF Speedi-sleeve	Stainless steel	38,10	45,24	12,70	Metric
99552	SKF Speedi-sleeve	Stainless steel	140,00	151,00	25,40	Metric	99824	SKF Speedi-sleeve	Stainless steel	39,67	47,22	17,48	Metric
99560	SKF Speedi-sleeve	Stainless steel	142,88	157,18	25,40	Metric	99825	SKF Speedi-sleeve	Stainless steel	40,08	46,99	16,00	Metric
99562	SKF Speedi-sleeve	Stainless steel	145,64	154,94	19,05	Metric	99826	SKF Speedi-sleeve	Stainless steel	41,28	47,63	17,48	Metric
99571	SKF Speedi-sleeve	Stainless steel	145,01	154,94	22,23	Metric	99827	SKF Speedi-sleeve	Stainless steel	44,45	52,40	17,48	Metric
99575	SKF Speedi-sleeve	Stainless steel	146,05	156,97	25,40	Metric	99828	SKF Speedi-sleeve	Stainless steel	44,45	52,40	22,23	Metric
99587	SKF Speedi-sleeve	Stainless steel	149,23	157,18	31,75	Metric	99829	SKF Speedi-sleeve	Stainless steel	44,86	52,40	17,48	Metric

Numerical designation	Design	Material	Inner diameter	Outer diameter	Width	Metric or inch value	Numerical designation	Design	Material	Inner diameter	Outer diameter	Width	Metric or inch value
99830	SKF Speedi-sleeve	Stainless steel	45,01	53,01	16,99	Metric	99878	SKF Speedi-sleeve	Stainless steel	51,99	62,71	15,88	Metric
99831	SKF Speedi-sleeve	Stainless steel	46,05	53,09	17,48	Metric	100044	CRWHA1	NBR	10,000	11,252	0,625	Inch
99832	SKF Speedi-sleeve	Stainless steel	47,63	55,96	17,48	Metric	100051	CRWH1	NBR	10,000	12,000	0,625	Inch
99833	SKF Speedi-sleeve	Stainless steel	49,23	56,36	17,48	Metric	100075	CRWA1	NBR	10,000	12,000	0,625	Inch
99834	SKF Speedi-sleeve	Stainless steel	50,80	61,11	17,48	Metric	102520	CRWH1	NBR	10,250	11,250	0,563	Inch
99835	SKF Speedi-sleeve	Stainless steel	50,80	61,11	25,40	Metric	102540	CRWH1	NBR	10,250	12,250	0,625	Inch
99836	SKF Speedi-sleeve	Stainless steel	53,98	61,52	23,83	Metric	105010	CRWH1	NBR	10,500	11,750	0,625	Inch
99837	SKF Speedi-sleeve	Stainless steel	57,15	64,29	23,83	Metric	105051	CRWH1	NBR	10,500	12,500	0,625	Inch
99838	SKF Speedi-sleeve	Stainless steel	57,15	64,29	11,13	Metric	107551	CRWH1	NBR	10,750	12,750	0,625	Inch
99839	SKF Speedi-sleeve	Stainless steel	60,33	69,85	23,83	Metric	108710	HDDF	Steel	276,23	329,41		Metric
99840	SKF Speedi-sleeve	Stainless steel	63,50	71,63	23,83	Metric	110030	CRWHA1	NBR	11,000	12,250	0,625	Inch
99841	SKF Speedi-sleeve	Stainless steel	65,00	72,39	22,99	Metric	110051	CRWH1	NBR	11,000	13,000	0,625	Inch
99842	SKF Speedi-sleeve	Stainless steel	66,68	77,39	23,83	Metric	113740	CRW1	NBR	11,375	13,000	0,625	Inch
99843	SKF Speedi-sleeve	Stainless steel	69,85	79,38	23,83	Metric	115021	CRWH1	NBR	11,500	13,000	0,625	Inch
99844	SKF Speedi-sleeve	Stainless steel	69,85	79,38	23,83	Metric	115041	CRWH1	NBR	11,500	13,500	0,625	Inch
99845	SKF Speedi-sleeve	Stainless steel	72,09	81,92	16,66	Metric	116500	HDDF	Steel	295,28	336,55		Metric
99846	SKF Speedi-sleeve	Stainless steel	73,03	81,76	23,83	Metric	120060	CRW1	NBR	12,000	14,000	0,625	Inch
99847	SKF Speedi-sleeve	Stainless steel	74,63	84,94	23,83	Metric	122555	CRWH1	NBR	12,250	13,375	0,625	Inch
99848	SKF Speedi-sleeve	Stainless steel	76,20	82,17	25,40	Metric	122580	CRW1	NBR	12,250	13,813	0,625	Inch
99849	SKF Speedi-sleeve	Stainless steel	79,38	89,69	25,40	Metric	122590	CRWHA1	NBR	12,250	14,250	1,000	Inch
99850	SKF Speedi-sleeve	Stainless steel	82,55	90,81	18,26	Metric	124020	HDDF	Steel	314,96	365,13		Metric
99851	SKF Speedi-sleeve	Stainless steel	82,55	91,06	25,40	Metric	137570	HDDF	Steel	349,25	401,75		Metric
99852	SKF Speedi-sleeve	Stainless steel	88,90	97,64	25,40	Metric	171025	HDDF	Steel	434,98	488,70		Metric
99853	SKF Speedi-sleeve	Stainless steel	95,25	102,11	22,23	Metric	191022	HDDF	Steel	485,78	546,10		Metric
99854	SKF Speedi-sleeve	Stainless steel	100,03	109,55	25,40	Metric	238020	HDDF	Steel	606,43	682,63		Metric
99855	SKF Speedi-sleeve	Stainless steel	101,60	111,13	25,40	Metric							
99856	SKF Speedi-sleeve	Stainless steel	114,30	123,19	25,40	Metric							
99857	SKF Speedi-sleeve	Stainless steel	127,00	137,16	22,23	Metric							
99858	SKF Speedi-sleeve	Stainless steel	127,00	136,91	25,40	Metric							
99859	SKF Speedi-sleeve	Stainless steel	139,70	150,83	25,40	Metric							
99860	SKF Speedi-sleeve	Stainless steel	23,11	30,94	11,13	Metric							
99861	SKF Speedi-sleeve	Stainless steel	56,64	64,29	15,88	Metric							
99862	SKF Speedi-sleeve	Stainless steel	149,23	157,18	31,75	Metric							
99863	SKF Speedi-sleeve	Stainless steel	54,99	62,00	22,99	Metric							
99864	SKF Speedi-sleeve	Stainless steel	177,80	189,87	31,75	Metric							
99866	SKF Speedi-sleeve	Stainless steel	27,99	34,93	12,70	Metric							
99868	SKF Speedi-sleeve	Stainless steel	25,40	30,96	11,13	Metric							
99869	SKF Speedi-sleeve	Stainless steel	59,99	70,74	22,99	Metric							
99870	SKF Speedi-sleeve	Stainless steel	72,01	81,92	22,23	Metric							
99872	SKF Speedi-sleeve	Stainless steel	84,89	93,98	24,99	Metric							
99873	SKF Speedi-sleeve	Stainless steel	42,01	53,01	17,50	Metric							
99874	SKF Speedi-sleeve	Stainless steel	130,00	139,52	25,30	Metric							
99875	SKF Speedi-sleeve	Stainless steel	75,01	83,95	26,01	Metric							
Numerical designation	Design	Material	Inner diameter	Outer diameter	Width	Metric or inch value	Numerical designation	Design	Material	Shaft size min.	Shaft size max.	Width	Metric or inch value
400030	VR1	NBR			2,70	3,50	3,00	Metric					
400034	VR1	FKM			2,70	3,50	3,00	Metric					
400040	VR1	NBR			3,50	4,50	3,70	Metric					
400044	VR1	FKM			3,50	4,50	3,70	Metric					
400050	VR1	NBR			4,50	5,50	3,70	Metric					
400051	VR2	NBR			4,50	5,50	5,20	Metric					
400054	VR1	FKM			4,50	5,50	3,70	Metric					
400055	VR2	FKM			4,50	5,50	5,20	Metric					
400060	VR1	NBR			5,50	6,50	3,70	Metric					
400061	VR2	NBR			5,50	6,50	5,20	Metric					
400064	VR1	FKM			5,50	6,50	3,70	Metric					
400065	VR2	FKM			5,50	6,50	5,20	Metric					
400070	VR1	NBR			6,50	8,00	3,70	Metric					
400071	VR2	NBR			6,50	8,00	5,20	Metric					
400074	VR1	FKM			6,50	8,00	3,70	Metric					
400075	VR2	FKM			6,50	8,00	5,20	Metric					
400080	VR1	NBR			8,00	9,50	3,70	Metric					
400081	VR2	NBR			8,00	9,50	5,20	Metric					
400084	VR1	FKM			8,00	9,50	3,70	Metric					
400085	VR2	FKM			8,00	9,50	5,20	Metric					
400100	VR1	NBR			9,50	11,50	5,50	Metric					
400101	VR2	NBR			9,50	11,50	7,70	Metric					
400104	VR1	FKM			9,50	11,50	5,50	Metric					
400105	VR2	FKM			9,50	11,50	7,70	Metric					
400120	VR1	NBR			11,50	12,50	5,50	Metric					
400121	VR2	NBR			11,50	12,50	7,70	Metric					
400124	VR1	FKM			11,50	12,50	5,50	Metric					
400125	VR2	FKM			11,50	12,50	7,70	Metric					
400130	VR1	NBR			12,50	13,50	5,50	Metric					
400134	VR1	FKM			12,50	13,50	5,50	Metric					
400140	VR1	NBR			13,50	15,50	5,50	Metric					
400141	VR2	NBR			13,50	15,50	7,70	Metric					
400144	VR1	FKM			13,50	15,50	5,50	Metric					
400145	VR2	FKM			13,50	15,50	7,70	Metric					
400160	VR1	NBR			15,50	17,00	5,50	Metric					
400161	VR2	NBR			15,50	17,50	7,70	Metric					
400164	VR1	FKM			15,50	17,00	5,50	Metric					
400165	VR2	FKM			15,50	17,50	7,70	Metric					
400180	VR1	NBR			17,50	19,00	5,50	Metric					
400181	VR2	NBR			17,50	19,00	7,70	Metric					
400184	VR1	FKM			17,50	19,00	5,50	Metric					











US Designation index  
from 528002 to 807199

Numerical designation	Design	Material	Inner diameter	Outer diameter	Width	Metric or inch value	Numerical designation	Design	Material	Inner diameter	Outer diameter	Width	Metric or inch value
528002	CT4	NBR	44.016			Inch	807115	HDDF	Steel	374,65	424,05		Metric
528070	CT4	NBR	17.689			Inch	807149	HDDF	Steel	736,60	812,80		Metric
528210	CT1	NBR	31.496			Inch	807199	HDDF	Steel	606,43	682,63		Metric
528267	CT4	NBR	23.752			Inch							
528268	CT4	NBR	27.756			Inch							
528269	CT4	NBR	29.016			Inch							
528270	CT4	NBR	29.370			Inch							
528271	CT4	NBR	41.968			Inch							
528272	CT4	NBR	41.890			Inch							
528273	CT4	NBR	44.016			Inch							
528415	CT1	NBR	44.016			Inch							
528416	CT1	NBR	35.984			Inch							
528525	CT1	NBR	57.008			Inch							
528526	CT1	NBR	52.992			Inch							
528532	CT1	NBR	40.512			Inch							
528535	CT1	NBR	17.008			Inch							
528631	CT1	NBR	9.016			Inch							
528651	CT4	NBR	23.740			Inch							
528927	CT1	NBR	52.008			Inch							
528975	CT1	NBR	67.756			Inch							
529086	CT1	NBR	46.496			Inch							
529129	CT1	NBR	50.000			Inch							
529130	CT1	NBR	51.260			Inch							
529276	CT4	NBR	24.252			Inch							
529379	CT1	NBR	39.882			Inch							
529452	CT1	NBR	39.488			Inch							
529489	CT1	NBR	6.626			Inch							
529490	CT1	NBR	8.622			Inch							
529517	CT1	NBR	77.480			Inch							
530396	CT4	NBR	40.079			Inch							
530448	CT1	NBR	41.378			Inch							
530466	CT1	NBR	36.000			Inch							
530484	HM21	NBR	1.000	1.781	0.250	Inch							
530606	CT1	NBR	47.500			Inch							
530661	CT1	NBR	51.496			Inch							
530733	CT1	NBR	14.000			Inch							
531456	CT1	NBR	72.992			Inch							
531635	CT1	NBR	8.937			Inch							
532866	CRW1	ACM	1.063	1.512	0.256	Inch							
538266	X15	NBR	1.000	2.356	0.270	Inch							
541405	CRW1	NBR	8.250	9.500	0.578	Inch							
541974	CRWH1	NBR	4.375	6.063	0.500	Inch							
546751	HM14	FKM	2.750	3.500	0.250	Inch							
546770	HM14	FKM	3.500	4.125	0.250	Inch							
550085	CRSA1	NBR	2.063	2.875	0.375	Inch							
550154	CRWA1	NBR	1.750	2.441	0.313	Inch							
592934	CT4	NBR	16.260			Inch							
593037	CT1	NBR	14.000			Inch							
593171	CT1	NBR	14.961			Inch							
593180	CT1	NBR	44.016			Inch							
593285	CT1	NBR	36.575			Inch							
593604	CT4	NBR	26.929			Inch							
593606	CT1	NBR	36.000			Inch							
593629	CT1	NBR	11.748			Inch							
593637	CT1	NBR	7.284			Inch							
593949	CT1	NBR	32.374			Inch							
594025	CT1	NBR	15.000			Inch							
594082	CT1	NBR	163.071			Inch							
594083	CT1	NBR	102.992			Inch							
594110	CT1	NBR	13.811			Inch							
594163	CT4	NBR	58.606			Inch							
594181	CT1	NBR	19.488			Inch							
594202	CT4	NBR	36.575			Inch							
594241	CT1	NBR	20.984			Inch							
594334	CT1	NBR	6.614			Inch							
594369	CT1	NBR	10.748			Inch							
594431	CT1	NBR	23.622			Inch							
594494	CT4	NBR	42.004			Inch							
594784	CT4	NBR	25.787			Inch							
594785	CT1	NBR	32.480			Inch							
594954	CT1	NBR	15.236			Inch							
595110	CT1	NBR	16.142			Inch							
806715	HDDF	Steel	374,65	424,05		Metric							



A close-up photograph of a metal bearing ring, showing its curved surface and a textured inner track. A solid blue horizontal band is overlaid across the middle of the image, containing the text 'Product index'.

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123-0622

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**PUB SE/P1 18729 EN** · November 2019

This publication supersedes publication 10919.

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