

# Industrial shaft seals



### SI conversion table

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

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From one simple but inspired solution to a misalignment problem in a textile mill in Sweden, and fifteen employees in 1907, SKF has grown to become a global industrial knowledge leader. Over the years we have built on our expertise in bearings, extending it to seals, mechatronics, services and lubrication systems. Our knowledge network includes 46 000 employees, 15 000 distributor partners, offices in more than 130 countries, and a growing number of SKF Solution Factory sites around the world.



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*SKF Solution Factory makes SKF knowledge and manufacturing expertise available locally, to provide unique solutions and services to our customers.*

## Meeting the toughest challenges

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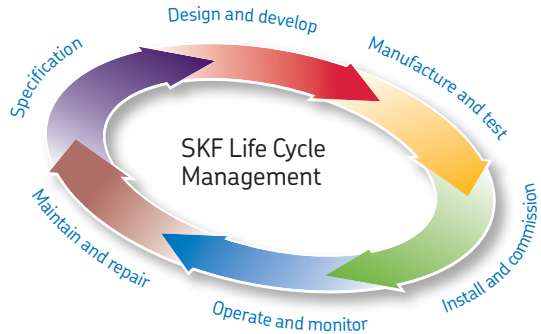
*Working with SKF IT and logistics systems and application experts, SKF Authorized Distributors deliver a valuable mix of product and application knowledge to customers worldwide.*



# SKF – the knowledge engineering company

## Our knowledge – your success

*SKF Life Cycle Management is how we combine our technology platforms and advanced services, and apply them at each stage of the asset life cycle, to help our customers to be more successful, sustainable and profitable.*



### Working closely with you

Our objective is to help our customers improve productivity, minimize maintenance, achieve higher energy and resource efficiency, and optimize designs for long service life and reliability.

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Whether the application is linear or rotary or a combination of the two, SKF engineers can work with you at each stage of the asset life cycle to improve machine performance by looking at the

entire application. This approach doesn't just focus on individual components like bearings or seals. It looks at the whole application to see how each component interacts with the next.

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*Condition monitoring technologies and maintenance services from SKF can help minimize unplanned downtime, improve operational efficiency and reduce maintenance costs.*



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*SKF offers standard seals and custom engineered sealing solutions to increase uptime, improve machine reliability, reduce friction and power losses, and extend lubricant life.*



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*With a wide assortment of products – from actuators and ball screws to profile rail guides – SKF can work with you to solve your most pressing linear system challenges.*

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# Foreword

This edition of the Industrial shaft seals catalogue supersedes the one published in 2006 (publication number 5300). 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. Always contact your SKF sales representative for complete and updated availability information.

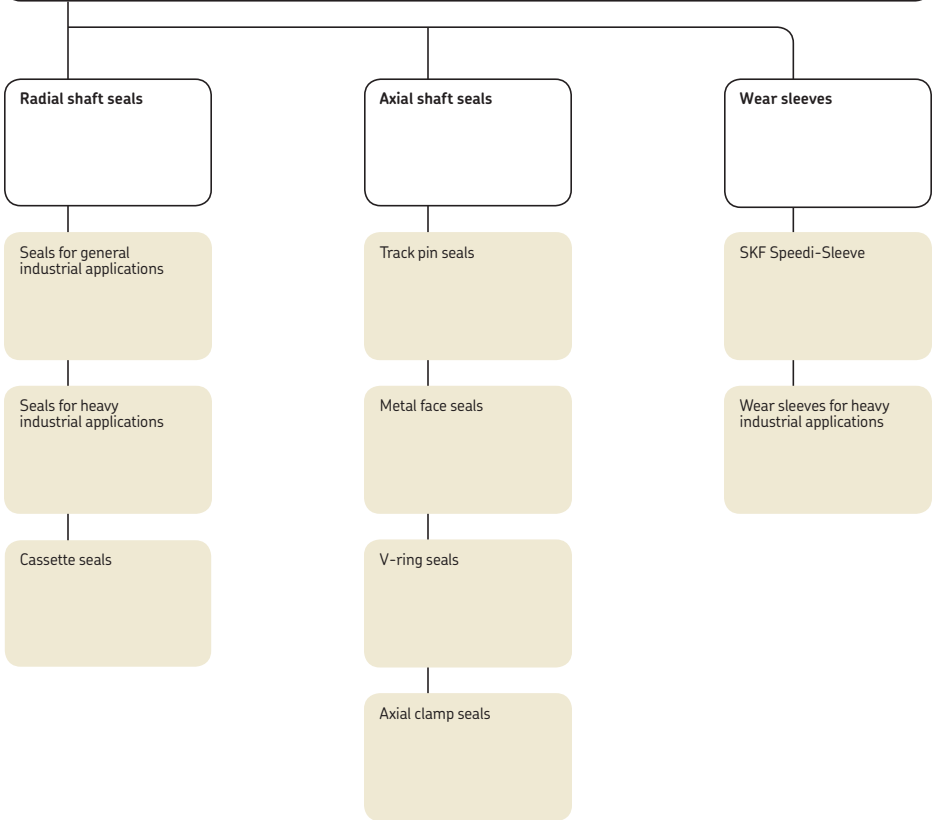
## The SKF Interactive Engineering Catalogue

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



# Product data – general

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# 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.

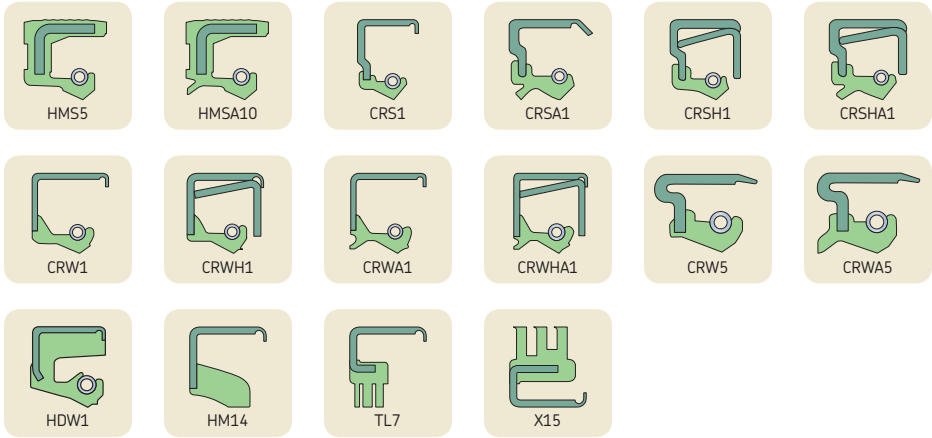
## Guidance values

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.

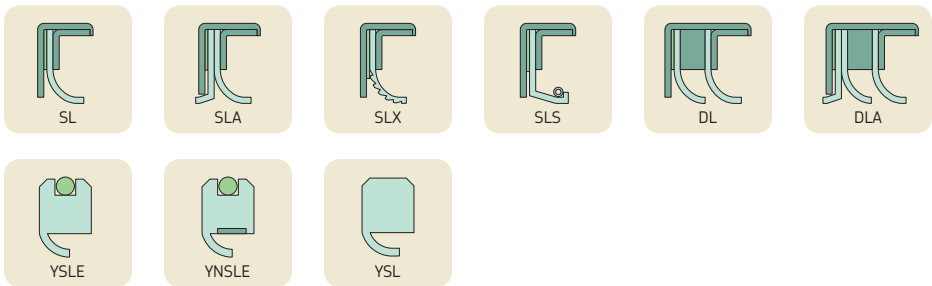
# Profile overview selection

## Radial shaft seals

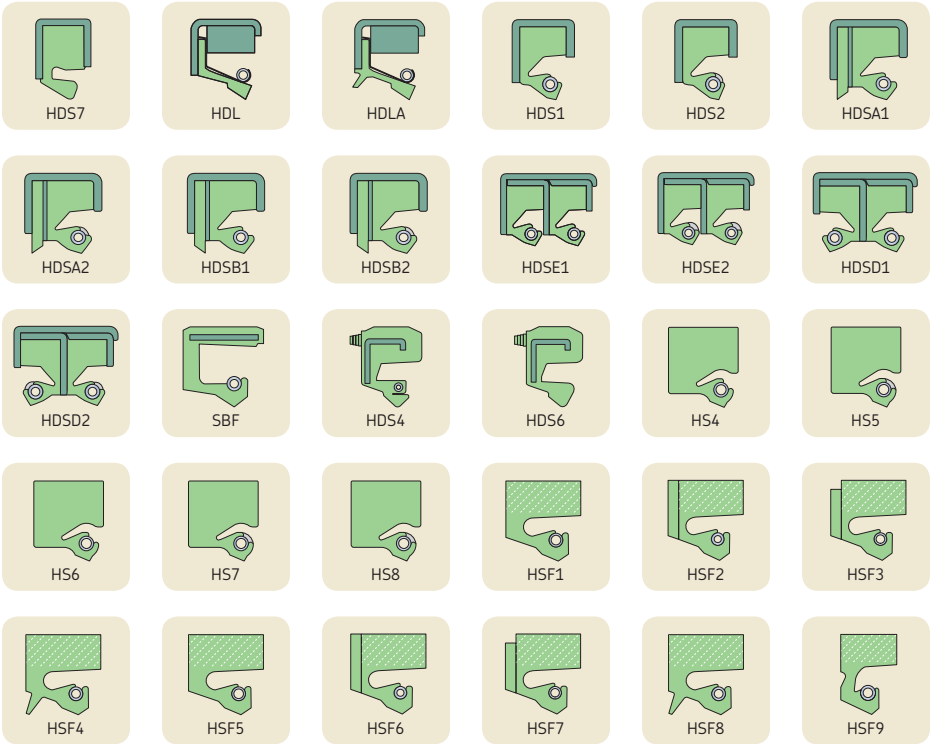
### Seals for general industrial applications, elastomeric sealing lip(s)



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

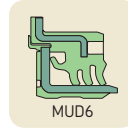
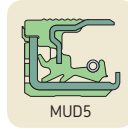


Seals for heavy industrial applications

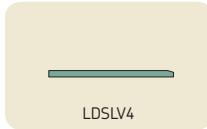
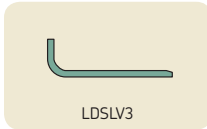




Cassette seals, SKF Mudblock



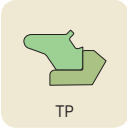
Wear sleeves



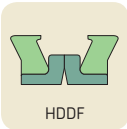
## Product data – general

### Axial shaft seals

#### Track pin seals, SKF Trackstar



### Metal face seals



### V-ring seals



### Axial clamp seals

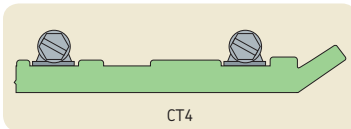
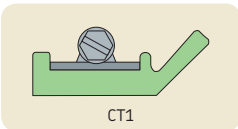


Fig. 1

V-ring

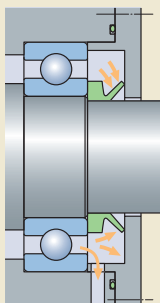


Fig. 2

HMS5 seal

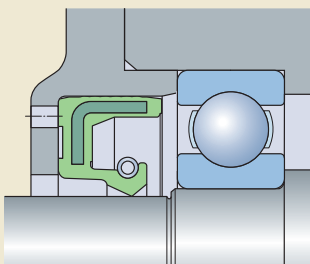
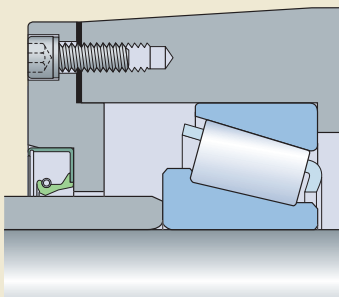


Fig. 3

CRW1 seal



## Selection of seal design and material

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

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.

**Matrix 1 and 2** on **pages 90 to 91** and **198 to 201** list 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.

Fig. 4

HMS5 seal

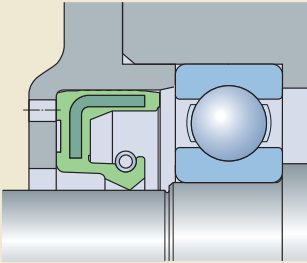


Fig. 5

CRW1 seal

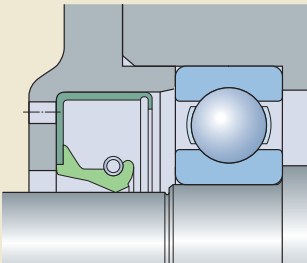


Fig. 6

HDDF metal face seal

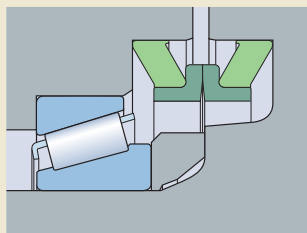
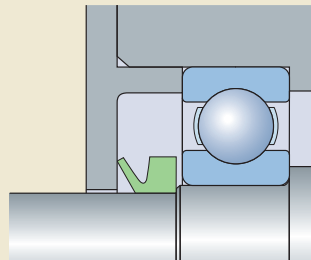


Fig. 7

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. 6 on page 57**). Another way of increasing a seal's pumping ability is to add a helix pattern, i.e. hydrodynamic features, to the sealing lip design.

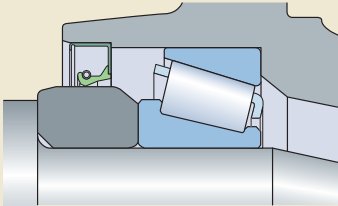
The rubber outside diameter, like the one found on HMS5 seals, helps compensate for small imperfections in the housing bore surface and is therefore recommended when the required housing bore surface is questionable.

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.

Fig. 8

CRW1 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.

None of these seal arrangements are intended for oil retention.

Fig. 9

CRW1 seals in tandem

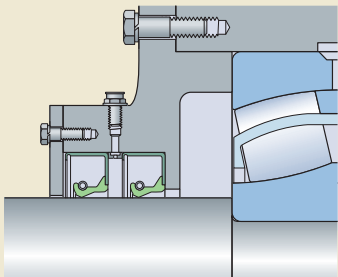


Fig. 10

HDSE1 seal

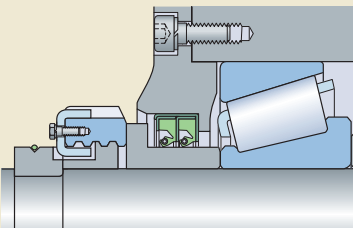


Fig. 11

V-ring

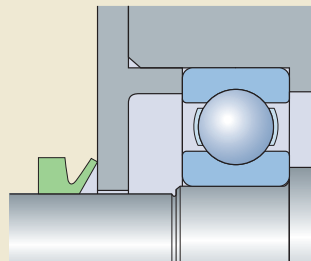
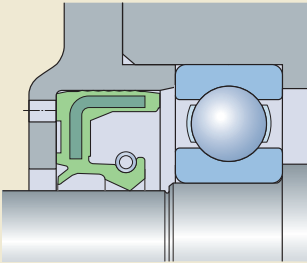


Fig. 12

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 HDDDF metal face seals (→ fig. 6 on page 18), provided that the sliding velocity of the mating surfaces lies within the permissible range.

Fig. 13

Two seals in opposite direction

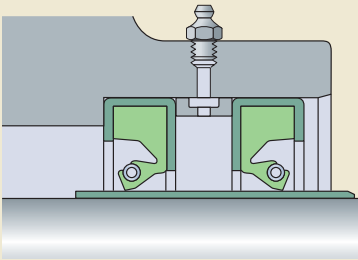


Fig. 14

Two seals in opposite direction

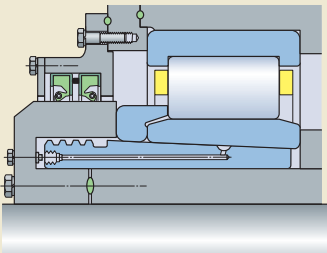


Fig. 15

V-ring

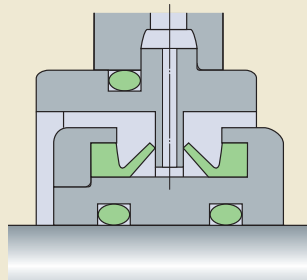
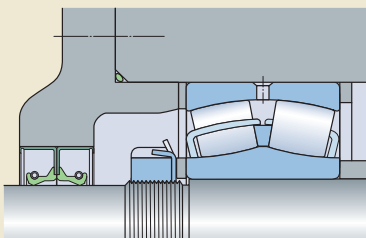


Fig. 16

CRW1 seals



## 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
- the use of HSD1 double-lip seals (→ **fig. 18**)

In both alternatives, the sealing lips must be spring-loaded. When using an HSD1 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 or during operation via lubrication holes drilled through the metal case into the cavity.

Fig. 17

HMS5 seals

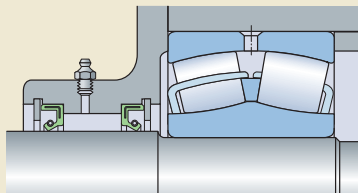
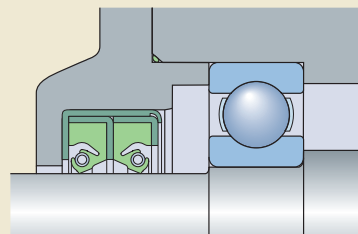


Fig. 18

HSD1 seal



### 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.

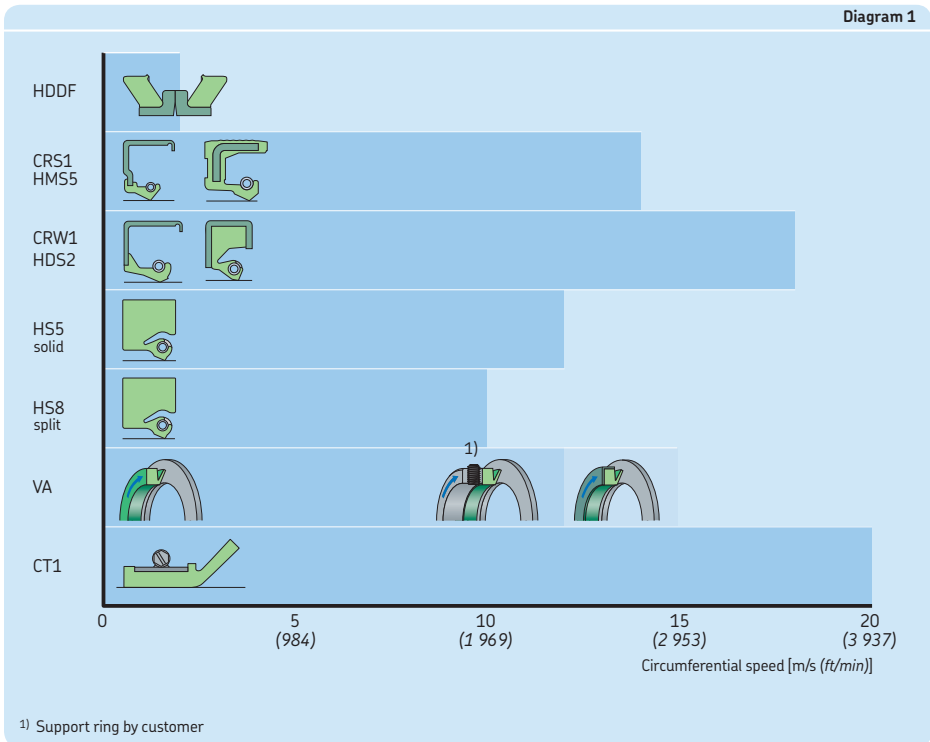
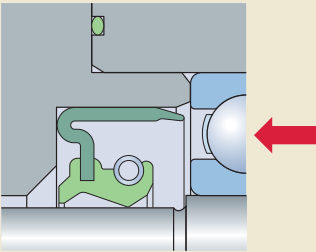




Fig. 19

CRWA5 seal



## Pressure differentials

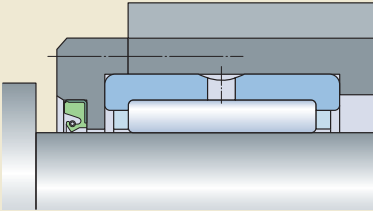
When subjected to a pressure differential, the seal must resist the additional radial load generated by the pressure. If the seal is not designed to resist the pressure, it will be forced against the shaft, increasing the radial load, underlip temperature, friction and wear of the seal and the counterface,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

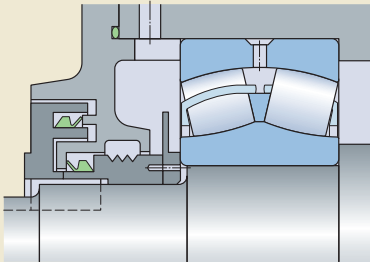


Fig. 22

HS8 seal

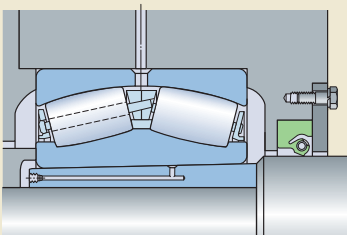
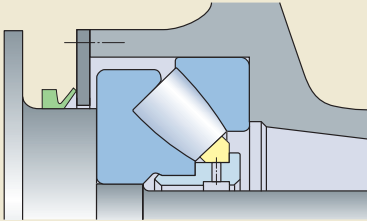


Fig. 23

V-ring seal



## Installation restrictions

In applications where the seal cannot be installed via the shaft end, a V-ring or any of the split HSF or HS designs can be used (→ **pages 208 to 210**).

After being positioned on the shaft, HS and HSF 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. 24

V-ring seals

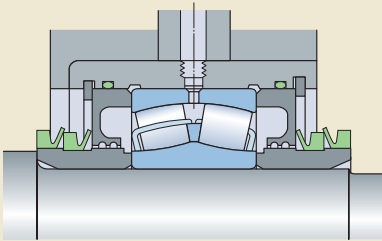


Fig. 25

V-ring seal

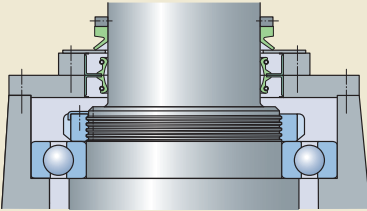


Fig. 26

V-ring seal

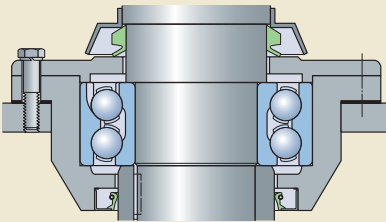


Fig. 27

CRW5 seals + V-ring seal

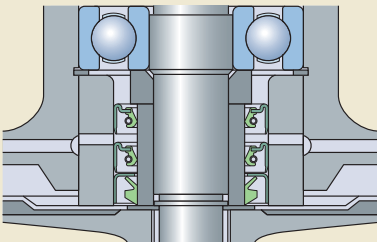
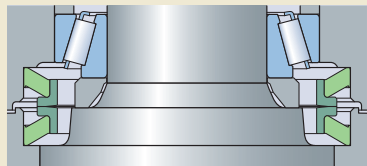


Fig. 28

HDDF metal face 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.

## 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.

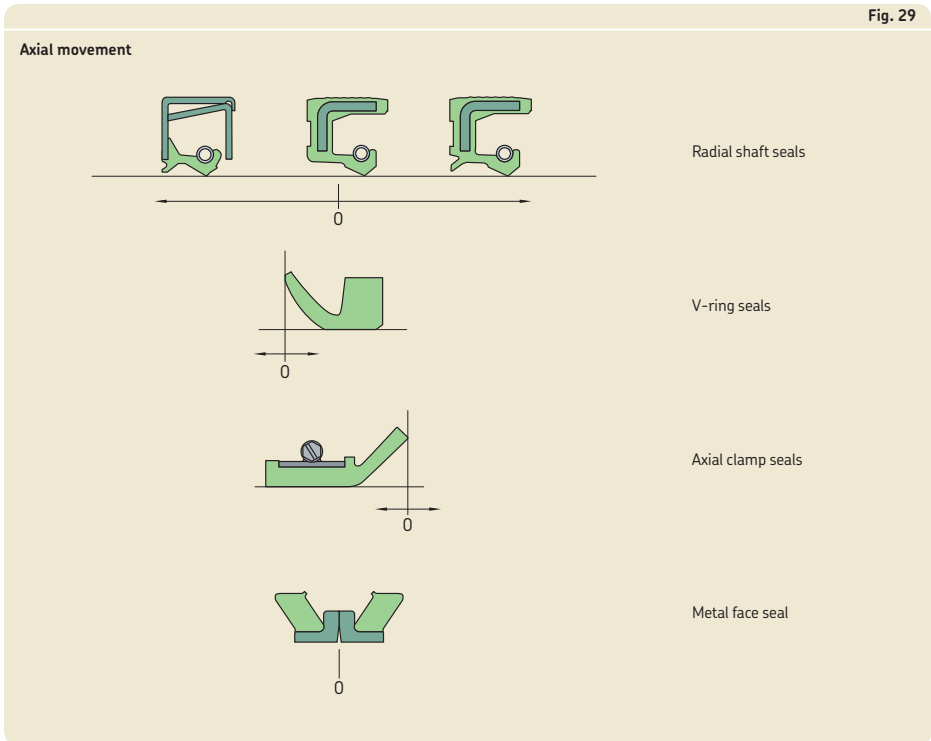
Unlike radial shaft seals, V-rings and axial clamp seals are not affected by normal coaxiality deviations or runout.

### 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.

Fig. 29



## Seal materials

### Cases and inserts

Metal cases and

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SKF

### Garter springs

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wi

HDS

t HS 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  $200 \text{ }^\circ\text{C}$  (*390 }^\circ\text{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**. 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 35**.

A code is used to identify the sealing lip material of SKF seals (→ **table 1**). 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).

Table 1

SKF sealing lip materials			
Composition of basic material	Designation according to SKF	Designation according to	
		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	VMQ	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*



## 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 and 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 33**). 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 34**). 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.

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

The fluoro rubber (FKM) 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 seal elements or for primary sealing lips for special applications. For optimum performance, PTFE seal elements require a high-quality seal 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).

### 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.

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

## 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  $-70$  to  $+160$  °C ( $-90$  to  $+320$  °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.

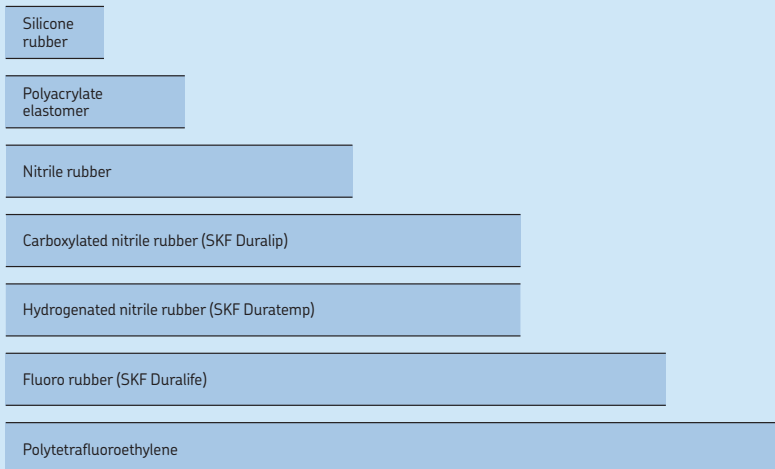
## Wear resistance

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



## 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, 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.

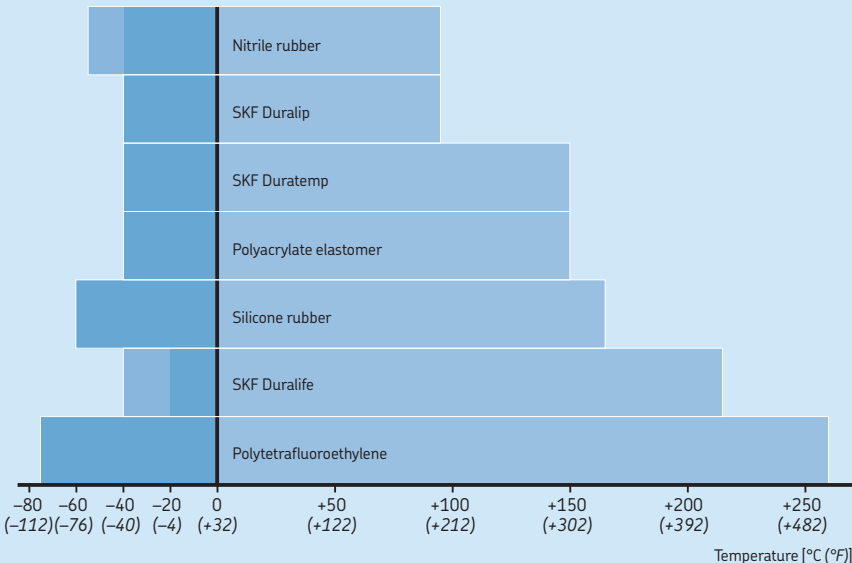
The static sealing ability between the outside diameter of the seal and the housing bore may

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 36 to 43**), 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 36 to 43), *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 sulphononic 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
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, glycol ether	80 (175)	4	5	4	1
Brine (sodium chloride, aq)	RT / 50 (120)	1	1	4	1
Bromine, anhydrous (liquid/gaseous)	RT	4	1	4	4
Bromine trifluoride	RT	4	4	4	4
Bromine water	RT	4	1	4	4
Bromobenzene	RT	4	1	4	4

## Chemical resistance

Medium	Temperature	Medium's effect on sealing lip material			
		R, D, H	V	P	S
–	°C (°F)	–			
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
Butyraldehyde	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	5	1
Cobalt chloride (aq)	RT	1	1	4	2
Coconut oil	50 (120) / 80 (175)	1	1	1	1
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

Chemical resistance

Medium	Temperature	Medium's effect on sealing lip material			
		R, D, H	V	P	S
–	°C (°F)	–			
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- and triethanolamine)	50 (120)	5	4	4	2
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
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>					
– Aero engine fuels 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



## Chemical resistance

Medium	Temperature	Medium's effect on sealing lip material			
		R, D, H	V	P	S
–	°C (°F)	–			
–ASTM reference fuels:					
–ASTM-A (MIL-S-3136 B Typ 1)	RT / 60 (140)	1	1	2	4
–ASTM-B (MIL-S-3136 B 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
<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

Chemical resistance

Medium	Temperature	Medium's effect on sealing lip material			
		R, D, H	V	P	S
–	°C (°F)	–			
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
–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-7118 A	80 (175)	1	1	3	3
–Grease MIL-G-7711 A	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
–RP-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	4	4	1
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
Prussic acid (hydrocyanic acid)	RT	2	1	4	3
Pyridine	RT	4	4	4	4
Pyroigneous 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)					
– R 11	RT	2	1	5	4
– R 12	RT	1	2	1	4
– R 13	RT	1	1	5	4

Chemical resistance

Medium	Temperature	Medium's effect on sealing lip material			
		R, D, H	V	P	S
–	°C (°F)	–			
– 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 B2	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
Soybean 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
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

## Chemical resistance

Medium	Temperature	Medium's effect on sealing lip material			
		R, D, H	V	P	S
–	°C (°F)	–			
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
<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 elastomer 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).

Elastomer products 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, elastomer products 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.





# Radial shaft seals

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# Radial shaft seals

## General

Radial shaft seals are used between rotating and stationary machine components (→ **fig. 1**) 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.

Fig. 1

Radial shaft seal, HMS5



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 53**. 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. 2** and **3** on **page 52** for the terminology used in this publication.

Fig. 2

Metal-cased seal with spring-loaded sealing lip

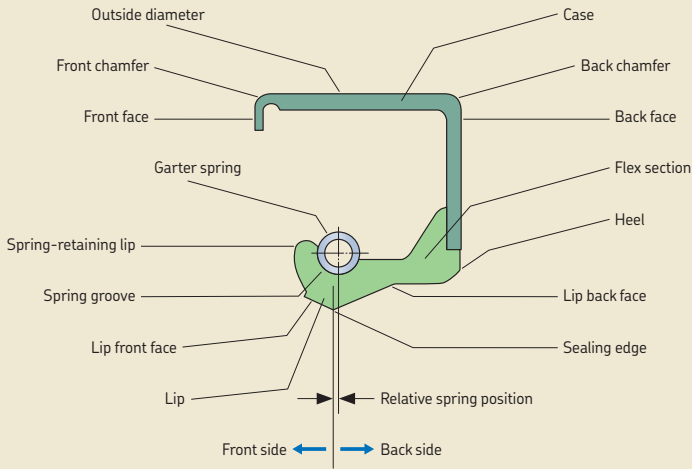
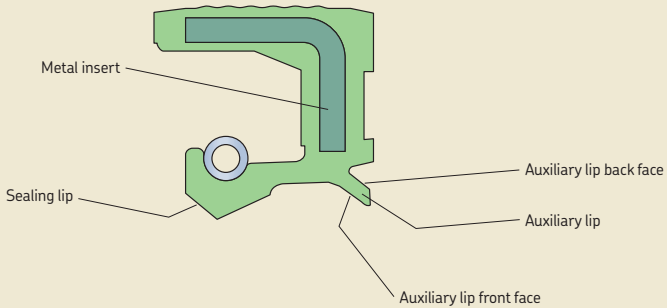


Fig. 3

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



## 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 OS-1-1	Shaft requirements for rotary shaft seals
RMA OS-4	Application guide for radial lip type shaft seals
RMA OS-7	Storage and handling guide for radial lip type shaft seals
RMA OS-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. 4a** to **4c**).

Seals with a rubber outside diameter (→ **fig. 4a**) 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. 4b**) 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. 4c**) 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. 4d**) that is typically used in automotive applications.

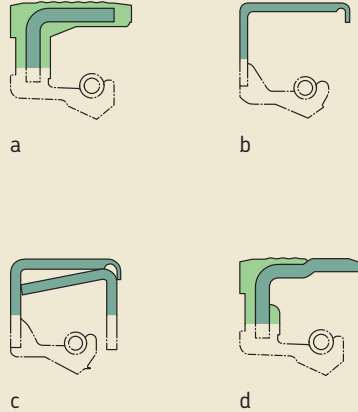
In addition to the seal designs for general industrial applications described above, SKF also manufactures seals for heavy industrial applications with special features to meet specific requirements (→ **page 202**).

### 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 29**.

Fig. 4

Outside diameter designs





## 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 56**, for metric seals, and **table 3** on **page 56** for inch-size seals. These are, where standardized, in accordance with ISO 6194-1, DIN 3760 and RMA OS-4.

## Radial shaft seals

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 tolerance		Seal outside diameter tolerance	
		high	low	high	low
mm		mm		mm	
50	50	+0,20	+0,08	+0,30	+0,15
80	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	2.000	±0.001	+0.005	±0.002	+0.008	±0.003
3.000	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

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. 2** on **page 52**) 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 30 to 32**. There are two main sealing lip designs that differ in the execution of the sealing lip edge. The “conventional” sealing lip (→ **fig. 5**) has a straight edge, whereas the SKF Wave lips (→ **fig. 6**) 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. 6**) on the counterface surface and at the same time reduces the specific surface pressure at the sealing lip/counterface contact.

Fig. 5

Conventional sealing lip with straight edge

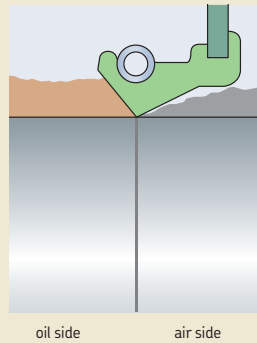
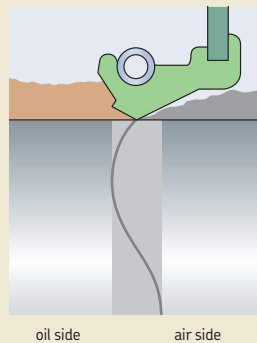


Fig. 6

SKF Wave sealing lip with sinusoidal sealing lip edge



## Radial shaft seals

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**). 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 18**.

## Auxiliary lips

SKF radial shaft seals can also be designed with an auxiliary lip for increased protection against contaminants (→ **fig. 3 on page 52**). 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/CRWA1 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.

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

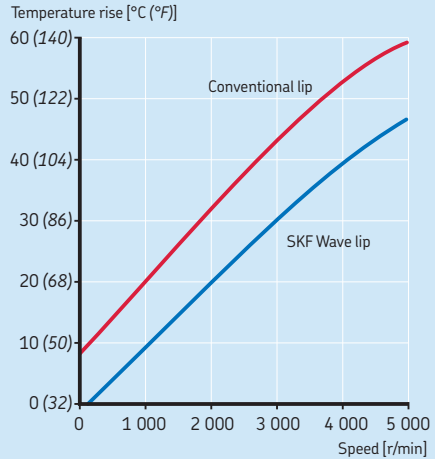
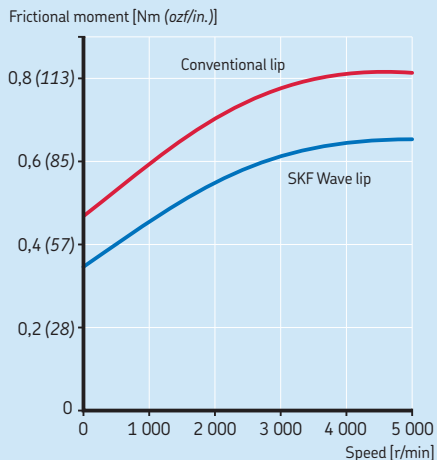


Diagram 2

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



## 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.

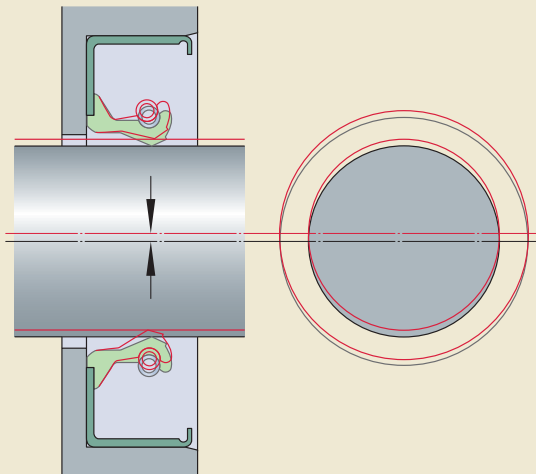
## Coaxiality

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 ( $\rightarrow$  fig. 7). 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 60**.

2

Fig. 7

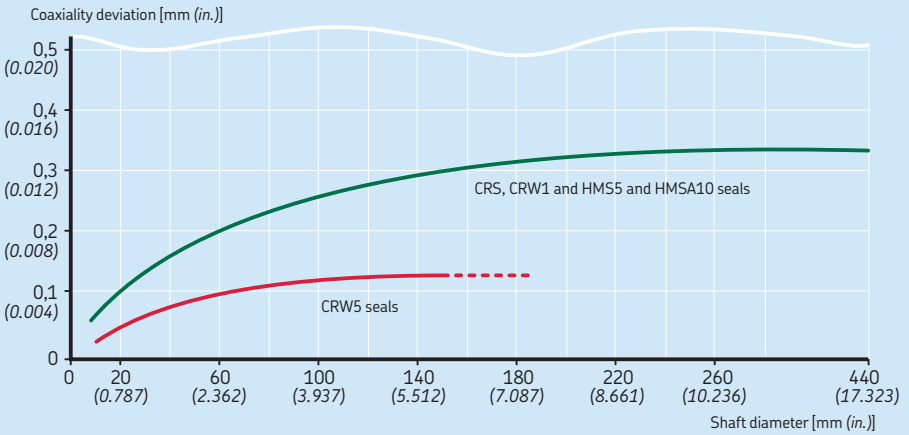
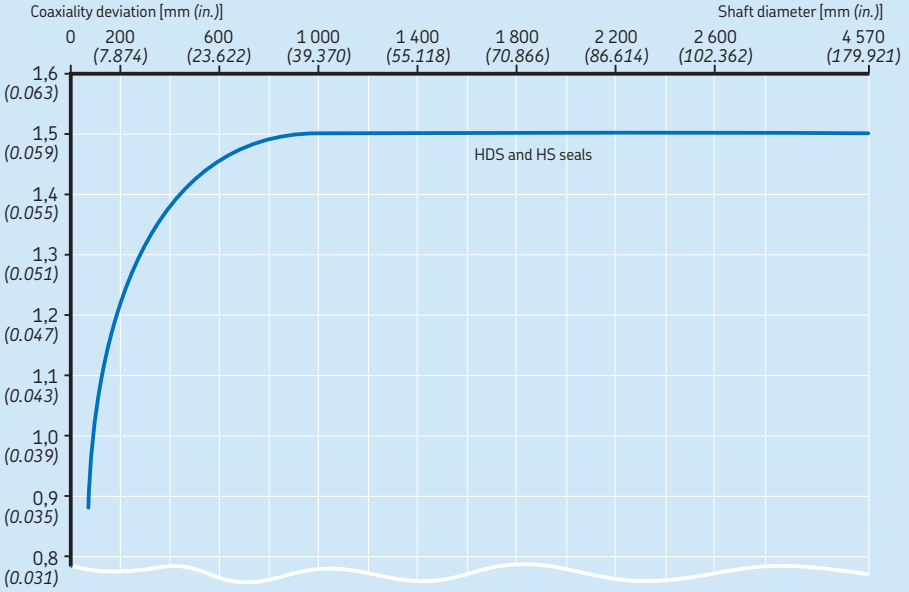
Coaxiality



# Radial shaft seals

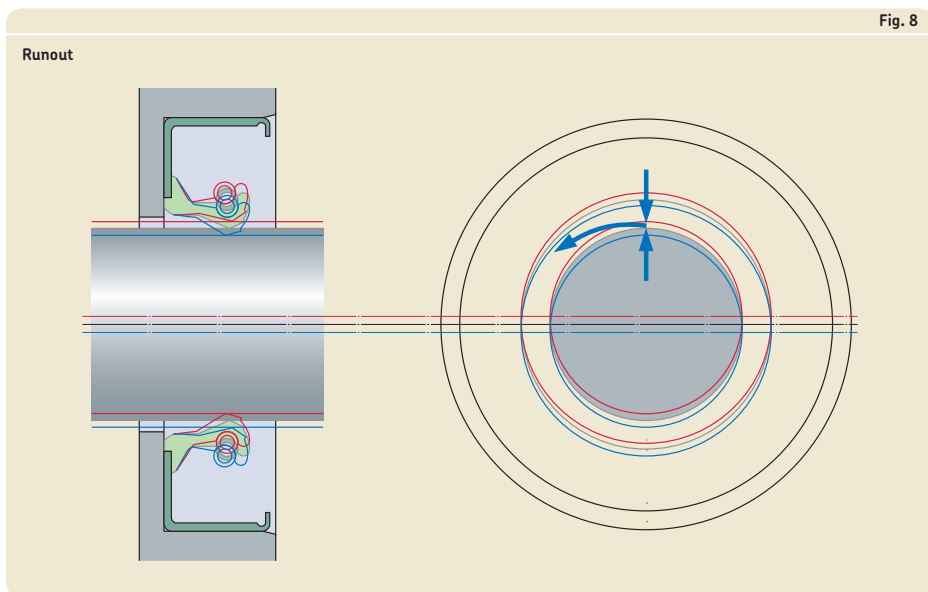
Diagram 3

Maximum permissible deviation from coaxiality as a function of shaft diameter

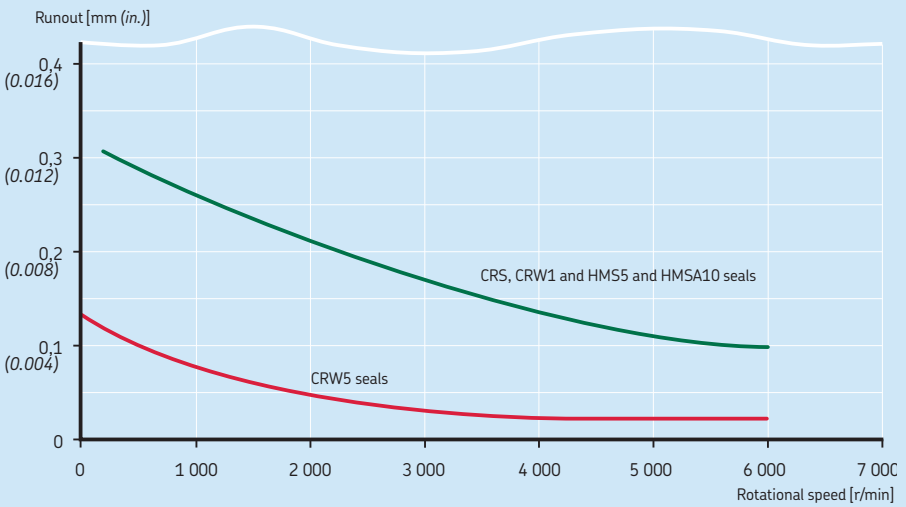
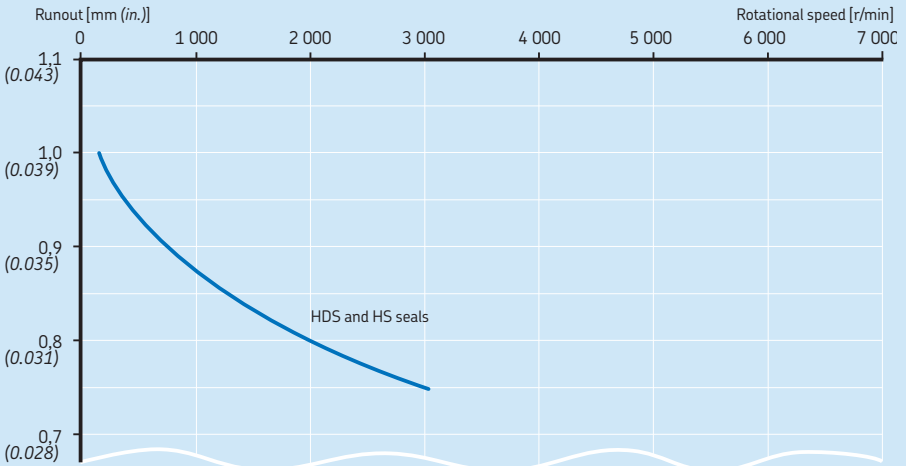


## Runout

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. 8**). 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 62**. These values are normally lower for narrow seals.



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 relative 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 198 to 201**). If the circumferential speeds provided in the matrix are not sufficient for a particular sealing position, **diagram 5** from DIN 3760 on **page 64** 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).

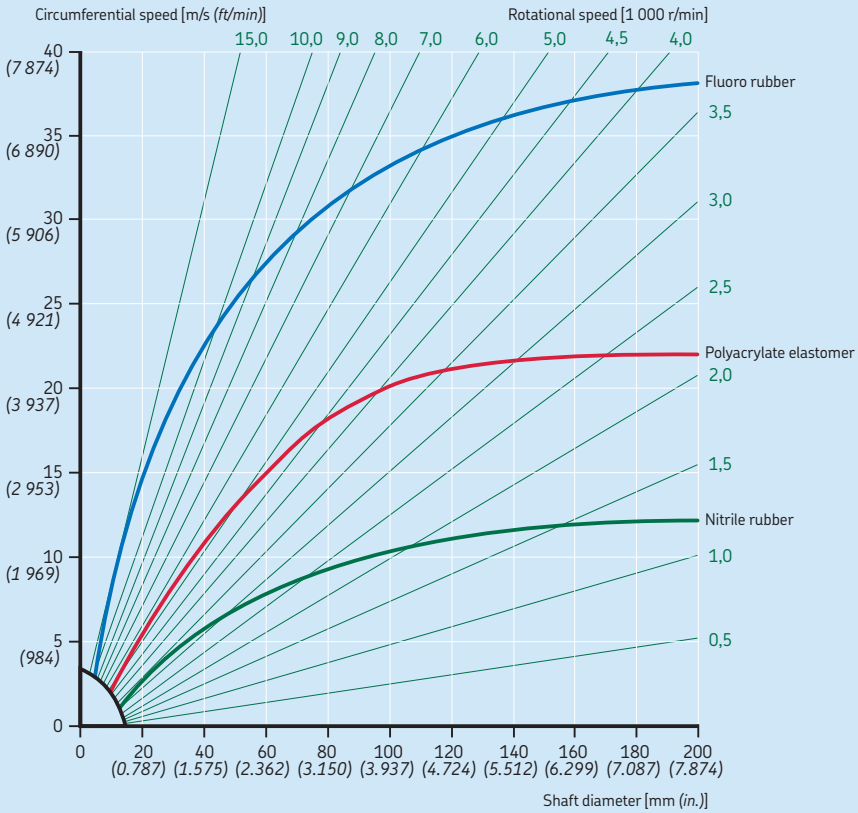
**Diagram 5** shows that large diameter shafts can accommodate higher circumferential speeds than shafts with smaller diameters. This is because the cross section of the shaft does not increase linearly with the increase in diameter but by the square of the increase in diameter. Therefore, the heat dissipation 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** because of the hydrodynamic form of the lip.

The values obtained from **diagram 5** 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
- there is a pressure differential across the seal

**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 92.



Source: DIN standard 3760

# Lubrication

For a radial shaft seal to seal efficiently over a long period, the sealing lip 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 must not only lubricate the sealing lip to reduce friction and wear, but also dissipate heat generated by the seal. To promote heat dissipation, a sufficient quantity of lubricant must be able 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 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 supplied separately to provide lip lubrication. In some cases, it may be sufficient to provide an initial grease fill between the two lips.

## Lubrication of paired arrangements

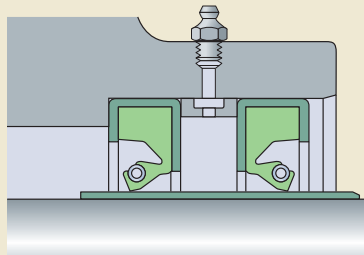
When two radial shaft seals are installed back-to-back or in tandem, the space between the seals should be filled with a suitable lubricant to eliminate the risk of the sealing lip running dry.

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. 9**).

2

Fig. 9

Lubrication of a paired arrangement



## 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

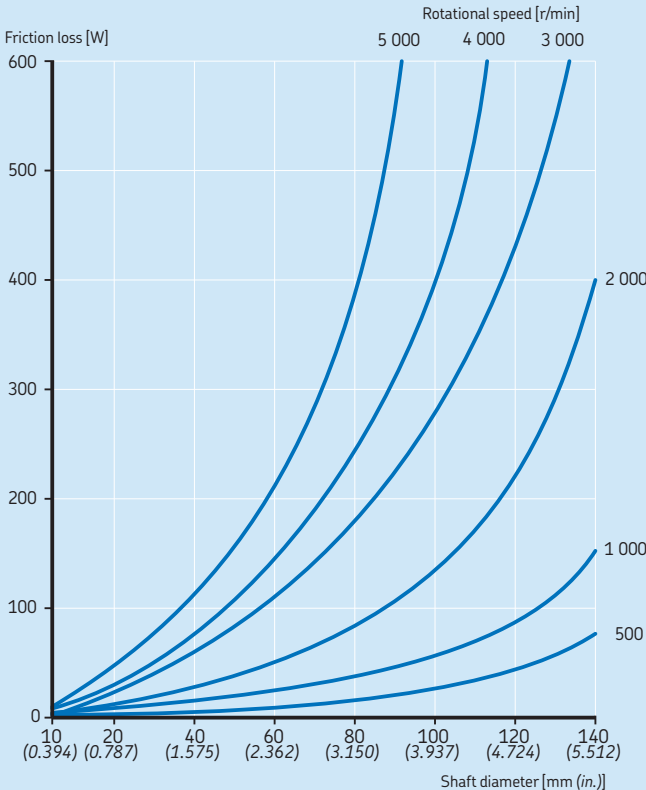
**Diagram 6** provides an indication of the friction losses that may be expected when a radial shaft seal with a conventional sealing lip is properly installed and fully lubricated.

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** on **page 68** 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 seal materials to media not listed in **table 4** on **page 68**, refer to the section *Chemical resistance* (→ **page 35**) or contact SKF.

Table 4

**Chemical and thermal resistance, radial shaft seal lip materials**

Medium to be sealed	Permissible operating temperatures (continuous) for SKF radial shaft seal 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	□		■		□	
Water	90	195	■		■		100	210
Alkaline washing solutions	90	195	■		■		100	210
<b>Permissible temperature range for sealing lip</b>								
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 64** do not apply.

**Diagram 7** shows an example of lip distortion of a conventional sealing lip design as sump pressure increases, resulting in reduced seal service life.

SKF CRW5 and CRWA5 pressure profile seals ( $\rightarrow$  **fig. 10**) 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. 11**).

Fig. 10

### Pressure profile seals

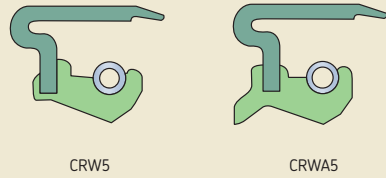


Fig. 11

### CRWA5 seal

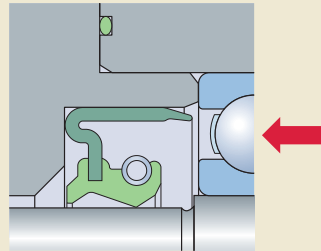
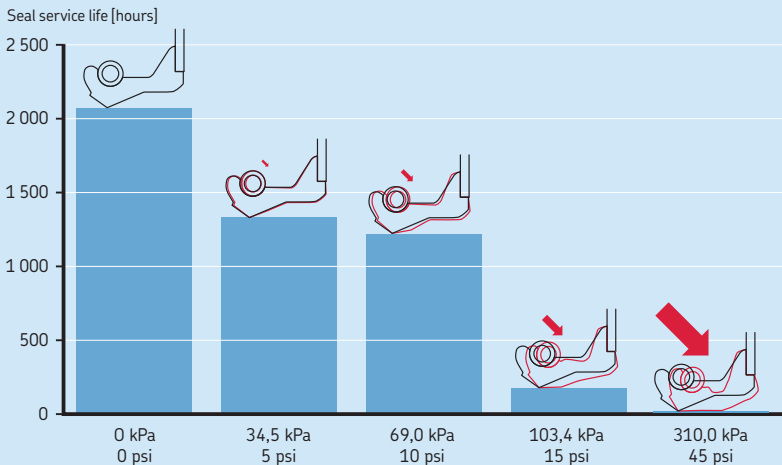


Diagram 7

### Seals under pressure

Example of conventional sealing lip distortion as sump pressure increases, resulting in 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. 12).

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 (LDSSLV). Detailed information about sleeves is provided in the chapter *Wear sleeves* starting on **page 327**.

### Tolerances

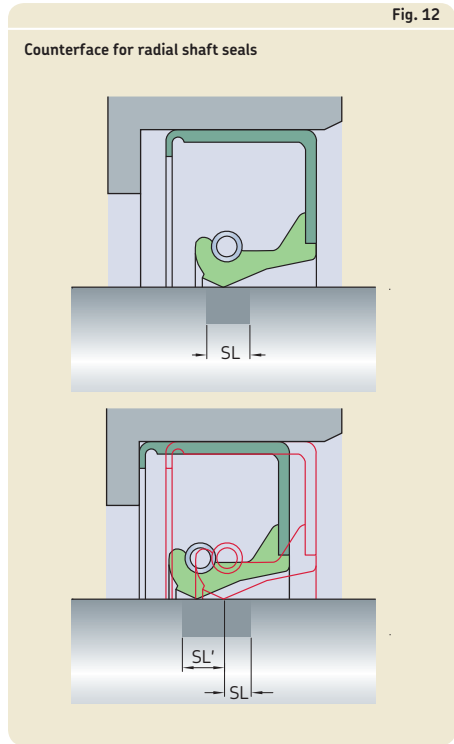
The diameter of the shaft  $d_1$  at the counterface should be machined to the tolerances provided in **table 6** for metric shafts and **table 7** for inch-size shafts.

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.). The seal that was originally chosen can still be used without adversely affecting seal performance.

### 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

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



Table 6

## Counterface tolerances for metric shafts

Shaft diameter		Diameter tolerance (ISO h11) <sup>1)</sup>	
Nominal		Deviation	
d <sub>1</sub>		high	low
over	incl.		
mm		µm	
6	10	0	-90
10	18	0	-110
18	30	0	-130
30	50	0	-160
50	80	0	-190
80	120	0	-220
120	180	0	-250
180	250	0	-290
250	315	0	-320
315	400	0	-360
400	500	0	-400
500	630	0	-440
630	800	0	-500
800	1 000	0	-560
1 000	1 250	0	-660
1 250	1 600	0	-780
1 600	2 000	0	-920
2 000	2 500	0	-1 100
2 500	3 150	0	-1 350
3 150	4 000	0	-1 650
4 000	5 000	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 05-4)	
Nominal		Deviation	
d <sub>1</sub>		high	low
over	incl.		
in.		in.	
-	4	+0.003	-0.003
4	6	+0.004	-0.004
6	10	+0.005	-0.005
10		+0.006	-0.006

## Radial shaft seals

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.

### 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.

### Lead-in chamfers

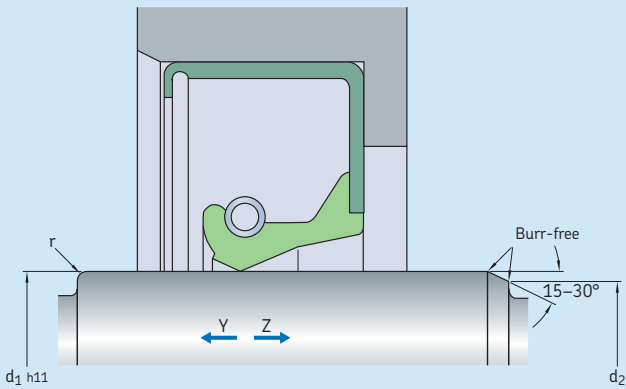
To install radial shaft seals without damaging the sealing lip, SKF recommends chamfering or rounding the shaft ends or shoulders (→ **table 8**).

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 79**.

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	
mm		in.		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 9**.

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

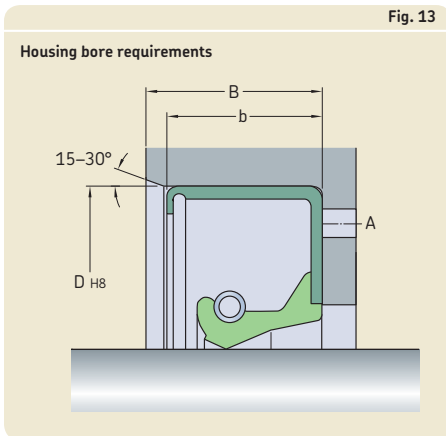
### Metal-reinforced seals

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. 13**). The corresponding values for an inch housing bore B are 0.016 in. (0,4 mm).

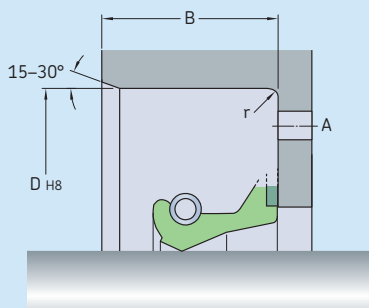
### Seals without metal-reinforcement

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  $\pm 0,13$  mm (0.005 in.) and  $\pm 0,10$  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 82**).

Fig. 13



## 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 cover 286-2

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

## Radial shaft seals

### Tolerances

The housing bore diameter D should be machined to tolerance H8 (→ **table 9** on **page 75**). 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 10**.

Table 10

#### Recommended housing bore surface roughness values

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

<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  $2,5 \mu\text{m}$  ( $100 \mu\text{in.}$ )  $R_a$ , a sealant should be used.

<sup>3)</sup> RMA – Turned bores, where a lubricant head of up to 0,20 bar ( $3.0 \text{ psi}$ ) 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.

# 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 requirements* and *Housing bore requirements* on **pages 70 to 76**.

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. 14**).

When pressing seals up against a shoulder or retaining ring, it is advisable to use tools of the type shown in **figs. 15 and 16**. The necessary ring dimensions can be supplied on request.

Fig. 14

### Preferred installation method

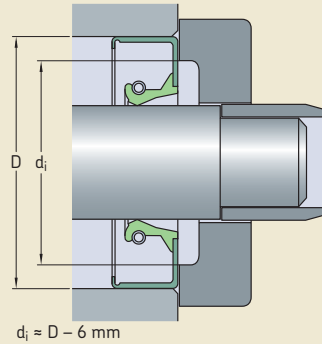


Fig. 15

### Alternative installation method

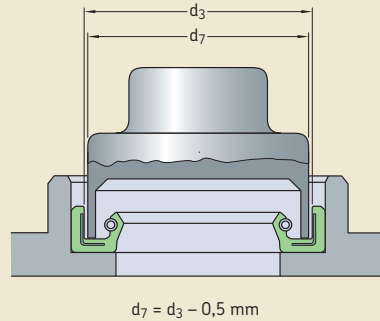
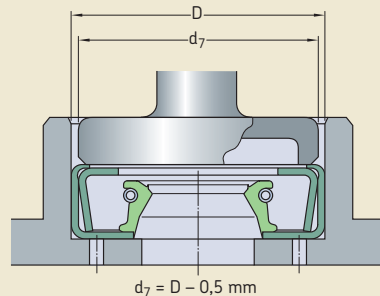


Fig. 16

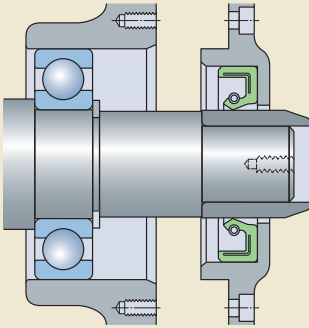
### Alternative installation method



## Radial shaft seals

Fig. 17

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 made of silicone rubber 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. 18

Thin-walled installation sleeve

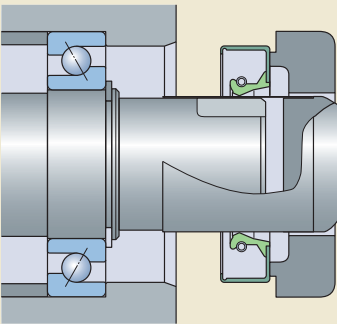
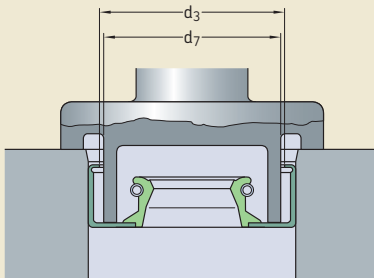


Fig. 19

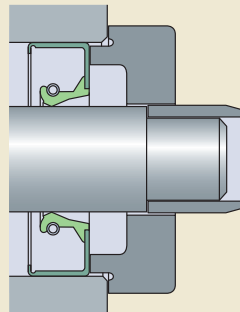
Installation in a cylindrical opening



$$d_7 = d_3 - 0,5 \text{ mm}$$

Fig. 20

Installation in a cylindrical opening





# Seal installation, heavy industrial applications

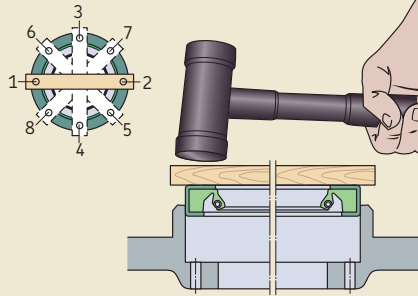
## Metal-reinforced seals

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. 21**).

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. 22**).

Fig. 21

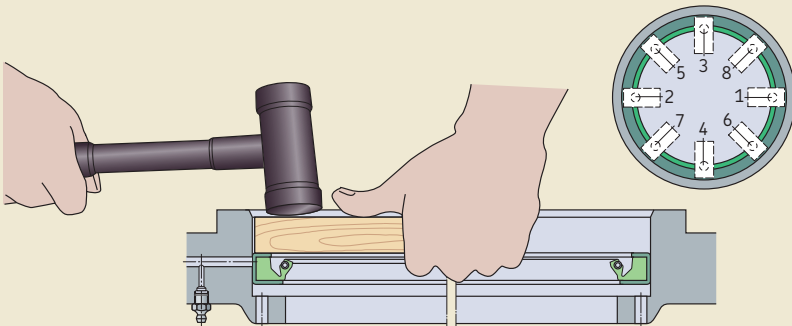
Use a dead blow hammer



2

Fig. 22

Installation deeper into the bore



## Radial shaft seals

### Seals without metal reinforcement

Be sure that the shaft surface and housing bore are clean and that they meet the specifications listed in *Shaft requirements* and *Housing bore requirements* on **pages 70 to 76**. Special care must be taken to avoid nicks and burrs on the shaft and to make sure that the spring is retained in the spring groove.

HS seals are installed differently depending on whether their main purpose in a specific application is to retain lubricant or to exclude contaminants (→ **fig. 23**).

### Split seals

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.

Lightly coat both the seal and counterface surface with a lubricant, preferably the same lubricant that will be used to lubricate the application (**B**).

Join the ends of the garter spring by using the spring connector (**C**).

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 over-stretch 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.

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.

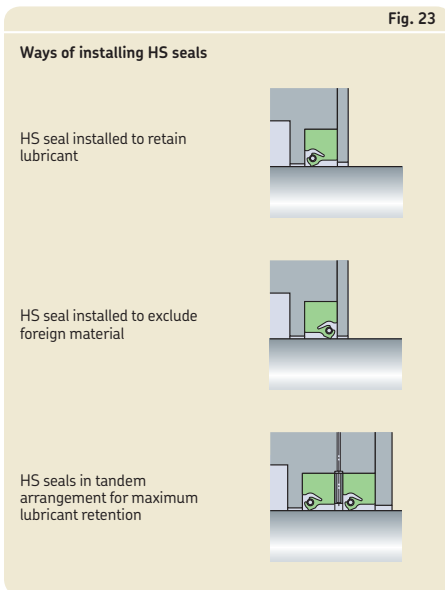
Continue at the 3 and 9 o'clock positions, push the rest of the seal into position (**E**) and finish simultaneously at the 6 and 12 o'clock positions. For shaft diameters  $\geq 1\,200$  mm (47 in.), it is advisable to fix the seal at the 12, 3, 6 and 9 o'clock positions before locating the remaining sections of the seal.

Use a small block of wood to push the seal in the housing bore until it contacts the housing shoulder (**E**).

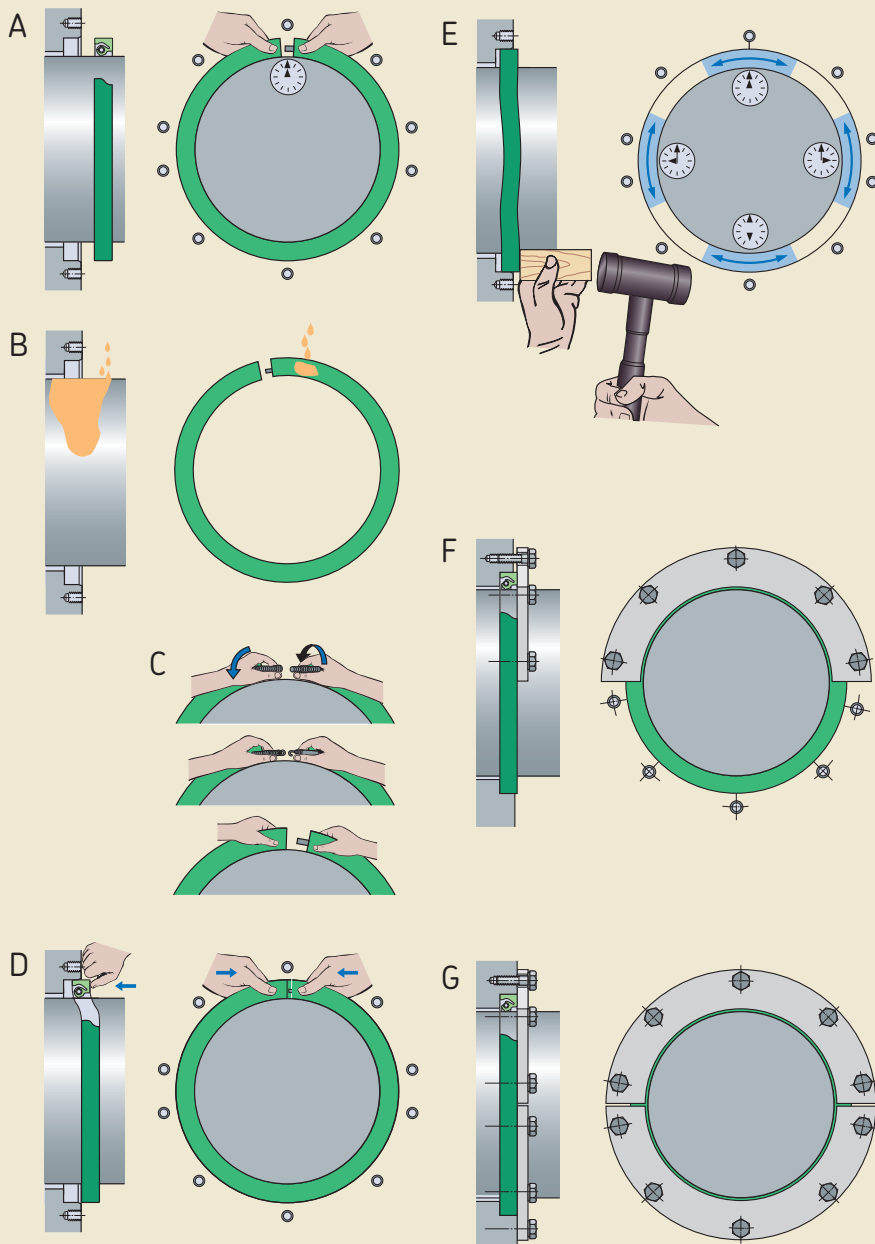
Check the seal condition, particularly at the joint, to make sure that it has been positioned properly.

Install the cover plate (see paragraph *Cover plates* on **page 82**) on the housing face. Tighten the bolts evenly until the end cover abuts the housing face (**F** and **G**).

Fig. 23



Installing a split seal



2

## Radial shaft seals

### 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.

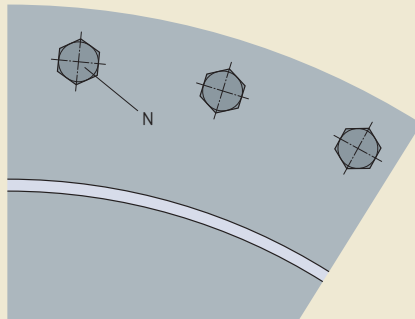
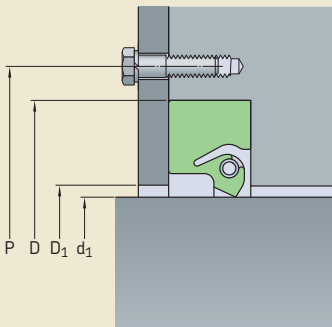
The plate should be fastened with bolts, no more than 150 mm (6 in.) apart, on a bolt circle located as close to the seal housing bore as practical. The cover plate should be flat and the housing bore depth uniform. Splitting the cover plate at 180° will make seal replacement easier, particularly in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

Fig. 25

#### Cover plate recommendations



Inside diameter of cover:  $D_1 = d_1 + 6 \dots 8$  [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  
 $= d_1 + 6 \text{ to } 10 \text{ mm } (0.25 \text{ to } 0.4 \text{ in.})$

washer outside diameter  
 $= D - 0,5 \text{ to } 1,5 \text{ mm } (0.02 \text{ to } 0.06 \text{ in.})$

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 84**). 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. 26

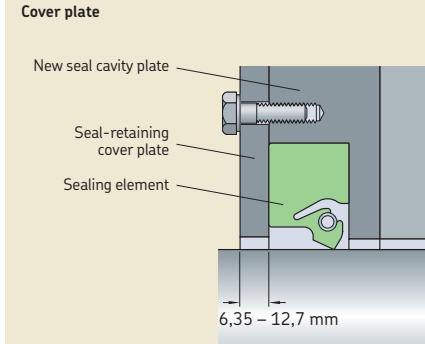


Fig. 27

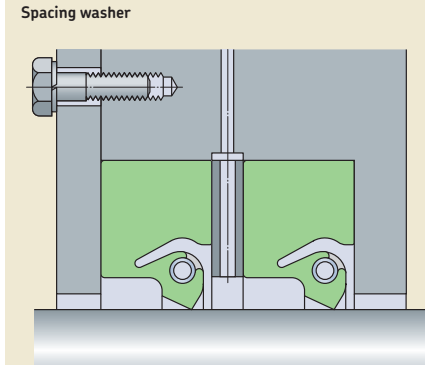
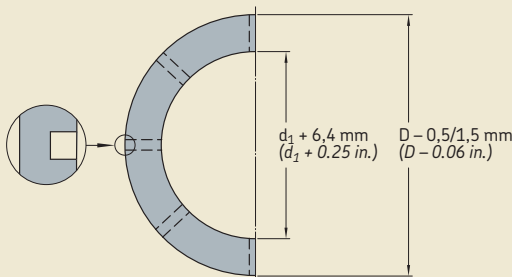


Fig. 28

### Details of spacing washer for central lubrication

A separator between two seals can be a slotted washer to promote distribution of the lubricant.



## Radial shaft seals

### 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.

Fig. 29

Spacing washer and grease fitting

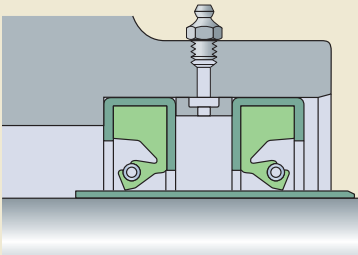
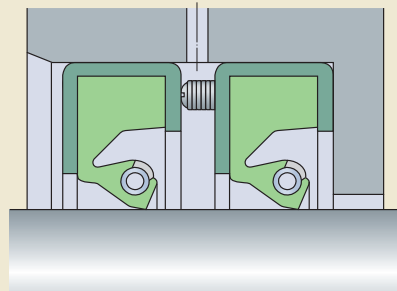


Fig. 30

Spacer lug



## 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 32**.

## Radial shaft seals

### 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

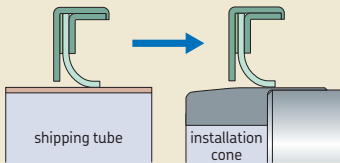
installation cones if detailed drawings of the shaft and sealing areas are provided. In lieu of installation cones, longer than normal lead-in chamfers on the shaft would be required. However, shaft features that could damage the seal (keyways, etc.) must still be covered, possibly with tape.

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**).

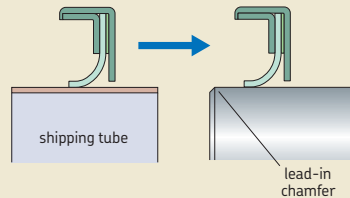
Some seals have two PTFE lips facing opposite directions. In this case, installation is always against one of the lips and an installation cone is recommended.

Fig. 31

#### Seals with a PTFE sealing lip

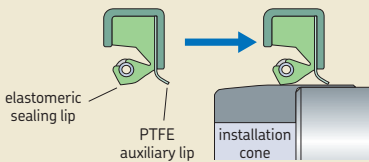


a) Installation against the PTFE lip

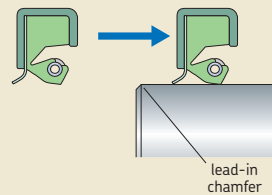


b) Installation with the PTFE lip

#### Seals with an elastomeric sealing lip and a PTFE auxiliary lip



c) Installation against the PTFE lip



d) Installation with the PTFE lip



## 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 re-used, 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 9, page 75**, 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 327**.
- 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 11** 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.

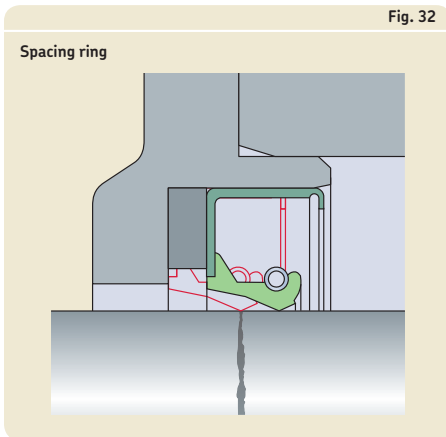


Fig. 32

Table 11

### Replacement sealing lip materials

Original	Replacement
Felt	Nitrile rubber Polyacrylate elastomer Fluoro rubber
Leather	Nitrile rubber Fluoro rubber
Nitrile rubber	Polyacrylate elastomer Fluoro rubber Silicone rubber
Polyacrylate elastomer	Fluoro rubber Silicone rubber
Silicone rubber	Fluoro rubber

### 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 12).

#### 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.

### Assortment and availability

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.

## Designation system for metric radial shaft seals

		<u>55 x 72 x 8</u>	<u>HMSA10</u>	<u>RG</u>	<u>1</u>
<b>Dimensions</b>					
55	Shaft diameter				
72	Housing bore diameter				
8	Nominal seal width (bore depth for HSF and HS seals)				
<b>Design</b>					
HMSA10					
<b>Lip material</b>					
RG	Acrylonitrile-butadiene rubber, SKF developed, used for the HMS5 and HMSA10 seals				
<b>Execution</b>					
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				

# Radial shaft seals

## Seals for general industrial applications, selected main designs

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

### Seal designs

### Design
























Outside diameter  
 Configuration

Material  
 code

Sealing lip  
 Configuration

Material  
 code

Auxiliary lip  
 A = Contacting  
 B = Non-contacting

			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 misalignment (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	*	*	*	*	*	*	*	*

# Seals for general industrial applications

## HMS5 and HMSA10 seals

### 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.

HMS5



HMSA10



### 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 seal 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 13**). In **diagram 8**, 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 69**.

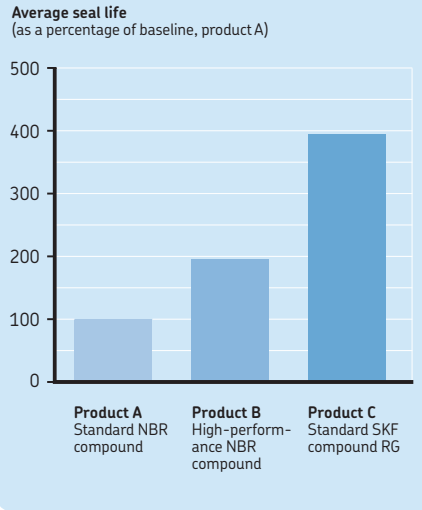
Table 13

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

Shaft diameter 60 mm, engine oil SAE 30

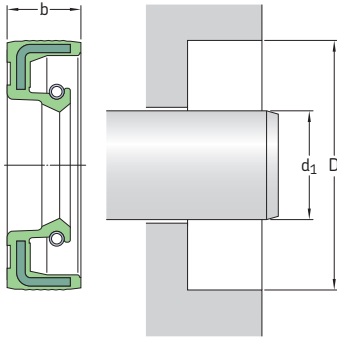


Diagram 8



# Radial shaft seals – HMS5 and HMSA10

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 89**.

Please see **pages 74 to 76** for housing bore requirements.

Dimensions			Designation <sup>1)</sup>	ISO/DIN
Shaft	Bore	Nominal seal width		
d <sub>1</sub>	D	b		
mm				
<b>6</b>	16	5	<b>6x16x5</b>	•
	16	7	<b>6x16x7</b>	
	22	7	<b>6x22x7</b>	•
	22	7	<b>7x16x7<sup>2)</sup></b>	
<b>7</b>	16	7	<b>7x16x7<sup>2)</sup></b>	•
	22	7	<b>7x22x7</b>	
<b>8</b>	18	5	<b>8x18x5</b>	•
	18	7	<b>8x18x7</b>	
	22	7	<b>8x22x7</b>	
	24	7	<b>8x24x7</b>	
<b>9</b>	22	7	<b>9x22x7</b>	•
<b>10</b>	19	7	<b>10x19x7<sup>2)</sup></b>	•
	20	6	<b>10x20x6</b>	
	20	7	<b>10x20x7</b>	
	22	7	<b>10x22x7</b>	
	24	7	<b>10x24x7</b>	
	25	7	<b>10x25x7</b>	
	26	7	<b>10x26x7</b>	
	30	7	<b>10x30x7</b>	
<b>12</b>	19	5	<b>12x19x5<sup>2)</sup></b>	•
	22	5	<b>12x22x5</b>	
	22	6	<b>12x22x6</b>	
	22	7	<b>12x22x7</b>	
	24	7	<b>12x24x7</b>	
	25	7	<b>12x25x7</b>	

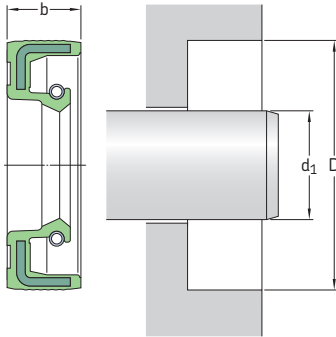
Dimensions			Designation <sup>1)</sup>	ISO/DIN
Shaft	Bore	Nominal seal width		
d <sub>1</sub>	D	b		
mm				
<b>12 cont.</b>	28	7	<b>12x28x7</b>	•
	30	7	<b>12x30x7</b>	
	32	7	<b>12x32x7</b>	
	37	7	<b>12x37x7</b>	•
	37	7	<b>12x37x7</b>	
<b>13</b>	26	7	<b>13x26x7</b>	•
<b>14</b>	24	7	<b>14x24x7</b>	•
	25	5	<b>14x25x5</b>	
	28	7	<b>14x28x7</b>	
	30	7	<b>14x30x7</b>	
<b>15</b>	24	7	<b>15x24x7<sup>2)</sup></b>	•
	25	5	<b>15x25x5</b>	
	25	6	<b>15x25x6</b>	
	26	7	<b>15x26x7</b>	
	30	7	<b>15x30x7</b>	
	32	7	<b>15x32x7</b>	
	35	7	<b>15x35x7</b>	
	40	7	<b>15x40x7</b>	
40	10	<b>15x40x10</b>		
<b>16</b>	24	7	<b>16x24x7<sup>2)</sup></b>	•
	28	7	<b>16x28x7</b>	
	30	7	<b>16x30x7</b>	
	32	7	<b>16x32x7</b>	



Dimensions					Dimensions					
Shaft	Bore	Nominal seal width	Designation <sup>1)</sup>	ISO/DIN	Shaft	Bore	Nominal seal width	Designation <sup>1)</sup>	ISO/DIN	
d <sub>1</sub>	D	b			d <sub>1</sub>	D	b			
mm					mm					
<b>16</b>	35	7	<b>16x35x7</b>	•	<b>21</b>	35	7	<b>21x35x7</b>		
	<b>cont.</b>	28	<b>17x28x7</b>				40	7	<b>21x40x7</b>	
<b>17</b>	29	5	<b>17x29x5</b>		<b>22</b>	32	7	<b>22x32x7</b>		
	30	7	<b>17x30x7</b>			35	7	<b>22x35x7</b>	•	
	32	7	<b>17x32x7</b>			36	7	<b>22x36x7</b>		
	35	7	<b>17x35x7</b>			38	8	<b>22x38x8</b>		
	37	7	<b>17x37x7</b>			40	7	<b>22x40x7</b>	•	
	40	7	<b>17x40x7</b>			40	10	<b>22x40x10</b>		
	40	10	<b>17x40x10</b>			42	10	<b>22x42x10</b>		
	47	7	<b>17x47x7</b>			45	7	<b>22x45x7</b>		
	47	10	<b>17x47x10</b>			47	7	<b>22x47x7</b>	•	
	<b>18</b>	28	7	<b>18x28x7</b>			<b>23</b>	40	10	<b>23x40x10</b>
30		6	<b>18x30x6</b>		<b>24</b>	35		7	<b>24x35x7</b>	
30		7	<b>18x30x7</b>	•		37		7	<b>24x37x7</b>	
32		7	<b>18x32x7</b>			40		7	<b>24x40x7</b>	
35		7	<b>18x35x7</b>	•		42		8	<b>24x42x8</b>	
40		7	<b>18x40x7</b>			47		7	<b>24x47x7</b>	
<b>19</b>	30	7	<b>19x30x7</b>			50	10	<b>24x50x10</b>		
	30	8	<b>19x30x8</b>		<b>25</b>	35	6	<b>25x35x6</b>		
	32	7	<b>19x32x7</b>			35	7	<b>25x35x7</b>	•	
	42	6	<b>19x42x6</b>			37	5	<b>25x37x5</b>		
<b>20</b>	30	5	<b>20x30x5</b>			37	6	<b>25x37x6</b>		
	30	7	<b>20x30x7</b>	•		37	7	<b>25x37x7</b>		
	32	6	<b>20x32x6</b>			38	7	<b>25x38x7</b>		
	32	7	<b>20x32x7</b>			40	5	<b>25x40x5</b>		
	34	7	<b>20x34x7</b>			40	7	<b>25x40x7</b>	•	
	35	6	<b>20x35x6</b>			40	8	<b>25x40x8</b>		
	35	7	<b>20x35x7</b>	•		40	10	<b>25x40x10</b>		
	35	8	<b>20x35x8</b>		42	6	<b>25x42x6</b>			
	35	10	<b>20x35x10</b>		42	7	<b>25x42x7</b>			
	36	7	<b>20x36x7</b>		42	10	<b>25x42x10</b>			
	38	7	<b>20x38x7</b>		<b>25</b>	45	7	<b>25x45x7</b>		
	40	7	<b>20x40x7</b>			45	8	<b>25x45x8</b>		
	40	10	<b>20x40x10</b>	•		45	10	<b>25x45x10</b>		
	42	7	<b>20x42x7</b>			46	7	<b>25x46x7</b>		
	42	10	<b>20x42x10</b>			47	7	<b>25x47x7</b>	•	
	45	7	<b>20x45x7</b>			47	10	<b>25x47x10</b>		
	47	7	<b>20x47x7</b>			50	10	<b>25x50x10</b>		
	47	10	<b>20x47x10</b>			52	7	<b>25x52x7</b>	•	
	52	7	<b>20x52x7</b>			52	8	<b>25x52x8</b>		
	52	10	<b>20x52x10</b>			52	10	<b>25x52x10</b>		

## Radial shaft seals – HMS5 and HMSA10

$d_1$  25 – 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**

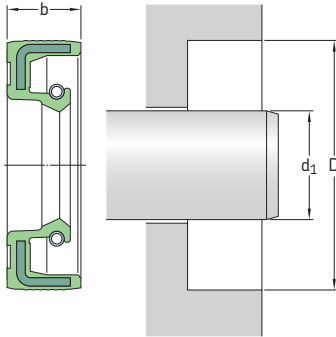
Pl ase see **pages 74 to 76** for housing bore re

Dimensions			Designation <sup>1)</sup>	ISO/DIN	Dimensions			Designation <sup>1)</sup>	ISO/DIN
Shaft	Bore	Nominal seal width			Shaft	Bore	Nominal seal width		
$d_1$	D	b		$d_1$	D	b			
mm			–	mm			–	–	
<b>25</b> cont.	62	7	<b>25x62x7</b>	<b>30</b>	40	7	<b>30x40x7</b>	•	
	62	8	<b>25x62x8</b>		42	6	<b>30x42x6</b>	•	
	62	10	<b>25x62x10</b>		42	7	<b>30x42x7</b>		
	72	7	<b>25x72x7</b>		42	8	<b>30x42x8</b>		
<b>26</b>	37	7	<b>26x37x7</b>		44	7	<b>30x44x7</b>		
	38	5	<b>26x38x5</b>		45	7	<b>30x45x7</b>		
	38	7	<b>26x38x7</b>		45	8	<b>30x45x8</b>		
	42	7	<b>26x42x7</b>		46	7	<b>30x46x7</b>		
	47	7	<b>26x47x7</b>	47	6	<b>30x47x6</b>	•		
<b>27</b>	37	7	<b>27x37x7</b>	47	7	<b>30x47x7</b>			
	42	10	<b>27x42x10</b>	47	8	<b>30x47x8</b>			
	43	7	<b>27x43x7</b>	47	10	<b>30x47x10</b>			
	47	7	<b>27x47x7</b>	48	8	<b>30x48x8</b>			
	47	10	<b>27x47x10</b>	50	5	<b>30x50x5</b>			
<b>28</b>	38	7	<b>28x38x7</b>	50	7	<b>30x50x7</b>			
	38	8	<b>28x38x8</b>	50	8	<b>30x50x8</b>			
	40	7	<b>28x40x7</b>	50	10	<b>30x50x10</b>			
	40	8	<b>28x40x8</b>	•	52	7	<b>30x52x7</b>	•	
	42	7	<b>28x42x7</b>	52	8	<b>30x52x8</b>			
	42	8	<b>28x42x8</b>	52	10	<b>30x52x10</b>			
	44	6	<b>28x44x6</b>	55	7	<b>30x55x7</b>			
	45	8	<b>28x45x8</b>	55	10	<b>30x55x10</b>			
	47	7	<b>28x47x7</b>	62	7	<b>30x62x7</b>			
	47	10	<b>28x47x10</b>	62	10	<b>30x62x10</b>			
	52	7	<b>28x52x7</b>	72	10	<b>30x72x10</b>			
	52	10	<b>28x52x10</b>	•	<b>32</b>	42	7	<b>32x42x7</b>	
			•	43		7	<b>32x43x7</b>		
			•	44		7	<b>32x44x7</b>		

Dimensions		Nominal seal width b	Designation <sup>1)</sup>	ISO/DIN	Dimensions		Nominal seal width b	Designation <sup>1)</sup>	ISO/DIN			
Shaft	Bore				Shaft	Bore						
d <sub>1</sub>	D											
mm			–	–	mm			–	–			
<b>32</b> cont.	45	7	32x45x7	•	<b>35</b> cont.	72	7	35x72x7				
	45	8	32x45x8	•		72	10	35x72x10				
	47	6	32x47x6			72	12	35x72x12				
	47	7	32x47x7	•		80	12	35x80x12				
	47	8	32x47x8	•		<b>36</b>	47	7	36x47x7			
	47	10	32x47x10				50	7	36x50x7			
	48	8	32x48x8				52	7	36x52x7			
	50	8	32x50x8				58	10	36x58x10			
	50	10	32x50x10				62	7	36x62x7			
	52	7	32x52x7	•			<b>37</b>	50	6	37x50x6		
	52	8	32x52x8	•				50	7	38x50x7		
	55	10	32x55x10					52	7	38x52x7		
	62	10	32x62x10					52	8	38x52x8		
	72	7	32x72x7					<b>38</b>	54	10	38x54x10	
	80	7	32x80x7						55	7	38x55x7	•
<b>33</b>	45	7	33x45x7		55				8	38x55x8	•	
	50	6	33x50x6		55				10	38x55x10		
	<b>34</b>	44	8	34x44x8					58	8	38x58x8	•
48		8	34x48x8		58				10	38x58x10		
52		8	34x52x8		60	10			38x60x10			
<b>35</b>	62	10	34x62x10		62	7			38x62x7	•		
	<b>34</b>	44	8	34x44x8		62			8	38x62x8	•	
		48	8	34x48x8		62			10	38x62x10		
		52	8	34x52x8		<b>38,5</b>			72	10	38x72x10	
	62	10	34x62x10		80		8		38x80x8			
	<b>35</b>	45	7	35x45x7			58		7	38.5x58x7		
		47	6	35x47x6			<b>40</b>		50	8	40x50x8	
		47	7	35x47x7	•				52	6	40x52x6	
	47	8	35x47x8	•	52			7	40x52x7	•		
	48	8	35x48x8		52			8	40x52x8	•		
	49	6	35x49x6		55			7	40x55x7	•		
	50	7	35x50x7	•	55			8	40x55x8	•		
	50	8	35x50x8	•	56			8	40x56x8			
	50	10	35x50x10		58			7	40x58x7			
	52	7	35x52x7	•	58			8	40x58x8			
52	8	35x52x8	•	58	10			40x58x10				
52	10	35x52x10		60	8			40x60x8				
55	7	35x55x7	•	60	10			40x60x10				
55	8	35x55x8	•	62	6	40x62x6						
55	10	35x55x10		62	7	40x62x7		•				
56	10	35x56x10		62	8	40x62x8		•				
58	10	35x58x10		62	10	40x62x10						
60	10	35x60x10		65	10	40x65x10						
62	7	35x62x7		65	12	40x65x12						
62	8	35x62x8										
62	10	35x62x10										

## Radial shaft seals – HMS5 and HMSA10

$d_1$  40 – 65 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 89**.

Please see **pages 74 to 76** for housing bore requirements.

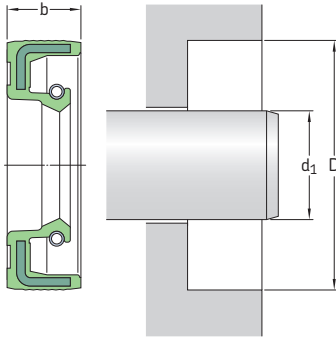
Dimensions			Designation <sup>1)</sup>	ISO/DIN
Shaft	Bore	Nominal seal width		
$d_1$	D	b		
mm			–	–
<b>40</b> cont.	68	8	<b>40x68x8</b>	
	68	10	<b>40x68x10</b>	
	70	8	<b>40x70x8</b>	
	72	7	<b>40x72x7</b>	
	72	10	<b>40x72x10</b>	
	80	8	<b>40x80x8</b>	
	80	10	<b>40x80x10</b>	
	80	12	<b>40x80x12</b>	
	90	10	<b>40x90x10</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>	
<b>42</b>	72	8	<b>42x72x8</b>	
	72	10	<b>42x72x10</b>	
<b>43</b>	62	8	<b>43x62x8</b>	

Dimensions			Designation <sup>1)</sup>	ISO/DIN
Shaft	Bore	Nominal seal width		
$d_1$	D	b		
mm			–	–
<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>	
	62	7	<b>45x62x7</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>	

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		–	–	
47	65	10	47×65×10		55 cont.	75	8	55×75×8	
	70	10	47×70×10			75	10	55×75×10	
	90	10	47×90×10			78	10	55×78×10	
48	62	8	48×62×8	•	78	12	55×78×12		
	65	10	48×65×10		80	8	55×80×8	•	
	68	10	48×68×10		80	10	55×80×10		
	70	10	48×70×10		85	8	55×85×8		
	72	7	48×72×7		85	10	55×85×10		
	72	8	48×72×8		90	8	55×90×8		
	72	10	48×72×10		90	10	55×90×10		
	72	10	48×72×10		100	10	55×100×10		
50	62	7	50×62×7		100	12	55×100×12		
	64	6	50×64×6		56	72	8	56×72×8	
	65	8	50×65×8	•	57	67	7	57×67×7	
	65	10	50×65×10		58	72	8	58×72×8	
	68	7	50×68×7		80	8	58×80×8		
	68	8	50×68×8	•	80	10	58×80×10		
	68	10	50×68×10		80	12	58×80×12		
	70	10	50×70×10		60	72	8	60×72×8	
	72	8	50×72×8	•	75	8	60×75×8	•	
	72	10	50×72×10		80	7	60×80×7		
	72	12	50×72×12		80	8	60×80×8	•	
	75	10	50×75×10		80	10	60×80×10		
	80	8	50×80×8		82	12	60×82×12		
	80	10	50×80×10		85	8	60×85×8	•	
	85	10	50×85×10		85	10	60×85×10		
	90	10	50×90×10		90	8	60×90×8		
100	10	50×100×10		90	10	60×90×10			
52	63	8	52×63×8		95	10	60×95×10		
	65	8	52×65×8		100	10	60×100×10		
	68	8	52×68×8		110	8	60×110×8		
	72	8	52×72×8		110	8	60×110×10		
	72	10	52×72×10		62	80	10	62×80×10	
	80	10	52×80×10		85	10	62×85×10		
	85	10	52×85×10		90	10	62×90×10		
	100	10	52×100×10		63	85	10	63×85×10	
55	68	8	55×68×8		90	10	63×90×10		
	70	8	55×70×8	•	64	80	8	64×80×8	
	70	10	55×70×10		65	80	8	65×80×8	
	72	8	55×72×8	•	85	8	65×85×8		
	72	10	55×72×10		85	10	65×85×10	•	
					85	12	65×85×12		

# Radial shaft seals – HMS5 and HMSA10

d<sub>1</sub> 65 – 190 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: **6×16×5 HMSA10 RG**

<sup>2)</sup> Design execution differs from the basic design and is indicated by a number, see also **page 89**.

Please see **pages 74 to 76** for housing bore requirements.

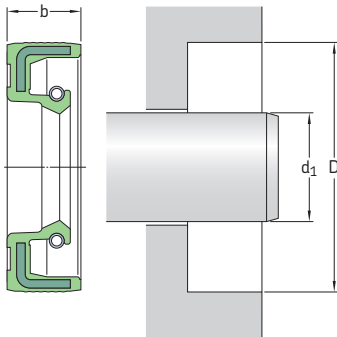
Dimensions		Nominal seal width b	Designation <sup>1)</sup>	ISO/DIN
Shaft	Bore			
d <sub>1</sub>	D			
mm				
<b>65</b> cont.	88	12	<b>65×88×12</b>	
	90	10	<b>65×90×10</b>	•
	95	10	<b>65×95×10</b>	
	97	7	<b>65×97×7</b>	
	100	10	<b>65×100×10</b>	
	110	10	<b>65×110×10</b>	
	120	12	<b>65×120×12</b>	
	140	12	<b>65×140×12</b>	
<b>68</b>	90	10	<b>68×90×10</b>	
<b>70</b>	85	8	<b>70×85×8</b>	
	90	7	<b>70×90×7<sup>2)</sup></b>	
	90	10	<b>70×90×10</b>	•
	90	12	<b>70×90×12</b>	
	92	12	<b>70×92×12</b>	
	95	10	<b>70×95×10</b>	•
	100	10	<b>70×100×10</b>	
	110	10	<b>70×110×10</b>	
110	12	<b>70×110×12</b>		
<b>72</b>	90	10	<b>72×90×10</b>	
	95	10	<b>72×95×10</b>	
	95	12	<b>72×95×12</b>	
	100	10	<b>72×100×10</b>	
	140	12	<b>72×140×12</b>	

Dimensions		Nominal seal width b	Designation <sup>1)</sup>	ISO/DIN
Shaft	Bore			
d <sub>1</sub>	D			
mm				
<b>75</b>	90	10	<b>75×90×10</b>	
	95	10	<b>75×95×10</b>	•
	95	12	<b>75×95×12</b>	
	100	10	<b>75×100×10</b>	•
	100	12	<b>75×100×12</b>	
	105	10	<b>75×105×10</b>	
	110	12	<b>75×110×12</b>	
	120	12	<b>75×120×12</b>	
	130	12	<b>75×130×12</b>	
	<b>78</b>	100	10	<b>78×100×10</b>
<b>80</b>	95	10	<b>80×95×10</b>	
	100	10	<b>80×100×10</b>	•
	100	12	<b>80×100×12</b>	
	105	10	<b>80×105×10</b>	
	110	10	<b>80×110×10</b>	•
	110	12	<b>80×110×12</b>	
	115	12	<b>80×115×12</b>	
	125	12	<b>80×125×12</b>	
	170	13	<b>80×170×13</b>	
	<b>82</b>	120	12	<b>82×120×12</b>
<b>85</b>	160	15	<b>82×160×15</b>	
	100	9	<b>85×100×9</b>	
	100	10	<b>85×100×10</b>	
	105	12	<b>85×105×12</b>	

Dimensions					ISO/DIN	Dimensions				
Shaft	Bore	Nominal seal width	Designation <sup>1)</sup>	ISO/DIN		Shaft	Bore	Nominal seal width	Designation <sup>1)</sup>	ISO/DIN
d <sub>1</sub>	D	b			d <sub>1</sub>	D	b			
mm			–	–	mm			–	–	
<b>85</b> cont.	110	12	<b>85×110×12</b>	•	<b>118</b>	150	12	<b>118×150×12</b>		
	115	12	<b>85×115×12</b>		<b>120</b>	140	12	<b>120×140×12</b>		
	120	12	<b>85×120×12</b>	•		140	13	<b>120×140×13</b>		
	130	12	<b>85×130×12</b>			150	12	<b>120×150×12</b>		
	140	12	<b>85×140×12</b>			160	12	<b>120×160×12</b>		
	150	12	<b>85×150×12</b>			180	15	<b>120×180×15</b>		
<b>90</b>	110	10	<b>90×110×10</b>		<b>125</b>	150	12	<b>125×150×12</b>	•	
	110	12	<b>90×110×12</b>	•		160	15	<b>125×160×15</b>		
	115	12	<b>90×115×12</b>			200	15	<b>125×200×15</b>		
	120	12	<b>90×120×12</b>	•	<b>130</b>	160	12	<b>130×160×12</b>	•	
<b>95</b>	110	12	<b>95×110×12</b>			160	15	<b>130×160×15</b>		
	115	12	<b>95×115×12</b>		170	12	<b>130×170×12</b>			
	120	12	<b>95×120×12</b>	•	180	12	<b>130×180×12</b>			
	125	12	<b>95×125×12</b>	•	190	12	<b>130×190×12</b>			
	140	12	<b>95×140×12</b>		<b>135</b>	170	12	<b>135×170×12</b>	•	
	145	12	<b>95×145×12</b>			160	12	<b>140×160×12</b>		
	170	13	<b>95×170×13</b>		170	12	<b>140×170×12</b>	•		
<b>100</b>	120	10	<b>100×120×10</b>		170	15	<b>140×170×15</b>	•		
	120	12	<b>100×120×12</b>	•	<b>140</b>	180	12	<b>140×180×12</b>		
	125	12	<b>100×125×12</b>	•		175	15	<b>145×175×15</b>	•	
	130	12	<b>100×130×12</b>	•	180	12	<b>145×180×12</b>			
	140	12	<b>100×140×12</b>		<b>148</b>	170	15	<b>148×170×15</b>		
	145	12	<b>100×145×12</b>			170	12	<b>150×170×12</b>		
	150	12	<b>100×150×12</b>		180	12	<b>150×180×12</b>	•		
	150	12	<b>100×150×12</b>		180	15	<b>150×180×15</b>	•		
<b>105</b>	130	12	<b>105×130×12</b>	•	200	12	<b>150×200×12</b>			
	135	12	<b>105×135×12</b>		<b>155</b>	180	15	<b>155×180×15</b>		
	140	12	<b>105×140×12</b>			185	15	<b>160×185×15</b>		
<b>108</b>	140	15	<b>108×140×15</b>	•	190	15	<b>160×190×15</b>	•		
	170	15	<b>108×170×15</b>		<b>165</b>	190	15	<b>165×190×15</b>		
<b>110</b>	130	12	<b>110×130×12</b>	•		<b>170</b>	200	15	<b>170×200×15</b>	•
	130	13	<b>110×130×13</b>		175		200	15	<b>175×200×15</b>	
	140	12	<b>110×140×12</b>	•	<b>180</b>	200	15	<b>180×200×15</b>		
	150	12	<b>110×150×12</b>			210	15	<b>180×210×15</b>	•	
<b>115</b>	140	12	<b>115×140×12</b>	•	<b>190</b>	220	15	<b>190×220×15</b>	•	
	145	12	<b>115×145×12</b>			225	15	<b>190×225×15</b>		
	150	12	<b>115×150×12</b>							

## Radial shaft seals – HMS5 and HMSA10

$d_1$  200 – 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 89**.

Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Nominal seal width b	Designation <sup>1)</sup>	ISO/DIN
Shaft $d_1$	Bore D			
mm			–	–
200	230	15	<b>200x230x15</b>	•
210	240	15	<b>210x240x15</b>	•
220	250	15	<b>220x250x15</b>	•
230	260	15	<b>230x260x15</b>	•
240	270	15	<b>240x270x15</b>	•
250	280	15	<b>250x280x15</b>	•
	285	15	<b>250x285x15</b>	





## Radial shaft seals

### CRW1, CRWA1, CRWH1 and CRWHA1 seals

These radial shaft seals are low-friction seals with SKF Wave lip design for reduced heat generation. See **pages 57 and 58** for more information on SKF Wave lip design. The 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:** Seal with a single steel case, SKF Wave lip and a carbon steel garter spring.

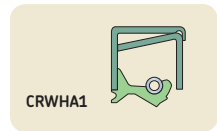
**CRWH1:** Seal with a double steel case, SKF Wave lip and a carbon steel garter spring.

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

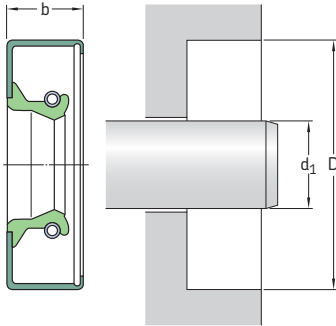
**CRWHA1:** Seal with a double steel case, SKF Wave lip, a carbon steel garter spring and an auxiliary, non-contacting lip.

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 90 and 91** for permissible operating conditions.



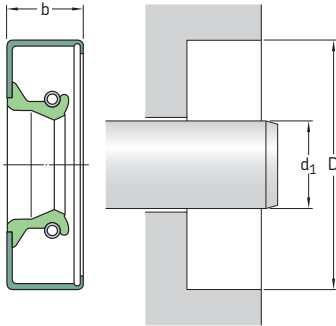
**Radial shaft seals – CRW1, CRWA1, CRWH1 and CRWHA1 – metric dimensions**  
 $d_1$  12 – 17 mm



Please see pages 74 to 76 for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
$d_1$	D	b		
mm			–	–
12	22	7	CRW1 V	12x22x7 CRW1 V
	22	7	CRW1 R	12x22x7 CRW1 R
	25	7	CRW1 R	12x25x7 CRW1 R
	26	7	CRW1 R	12x26x7 CRW1 R
	28	7	CRW1 R	12x28x7 CRW1 R
	28	7	CRW1 P	12x28x7 CRW1 P
12	32	7	CRW1 R	12x32x7 CRW1 R
	32	7	CRW1 V	12x32x7 CRW1 V
	35	7	CRW1 R	12x35x7 CRW1 R
14	26	7	CRW1 V	14x26x7 CRW1 V
	32	7	CRW1 R	14x32x7 CRW1 R
15	25	7	CRW1 P	15x25x7 CRW1 P
	28	7	CRW1 R	15x28x7 CRW1 R
	32	7	CRW1 R	15x32x7 CRW1 R
	32	7	CRW1 V	15x32x7 CRW1 V
15	35	7	CRW1 R	15x35x7 CRW1 R
	35	7	CRW1 P	15x35x7 CRW1 P
16	28	7	CRW1 R	16x28x7 CRW1 R
	30	7	CRW1 R	16x30x7 CRW1 R
	32	7	CRW1 R	16x32x7 CRW1 R
	35	7	CRW1 R	16x35x7 CRW1 R
16	40	7	CRW1 R	16x40x7 CRW1 R
	40	7	CRWA1 R	16x40x7 CRWA1 R
17	27	6,35	CRW1 R	17x27x6 CRW1 R
	28	7	CRW1 R	17x28x7 CRW1 R
	28	7	CRW1 V	17x28x7 CRW1 V
	30	7	CRW1 R	17x30x7 CRW1 R
	32	7	CRW1 R	17x32x7 CRW1 R
	35	7	CRW1 R	17x35x7 CRW1 R
17	35	7	CRW1 V	17x35x7 CRW1 V
	40	7	CRW1 R	17x40x7 CRW1 R
17	47	7	CRW1 R	17x47x7 CRW1 R

**Radial shaft seals – CRW1, CRWA1, CRWH1 and CRWHA1 – metric dimensions**  
 $d_1$  18 – 28 mm

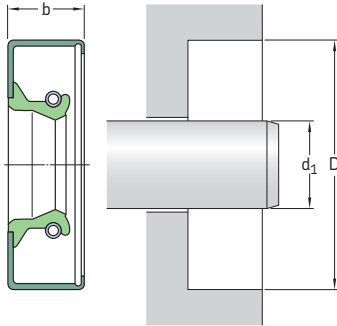


Please see **pages 74 to 76** for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
$d_1$	D			
mm			–	–
<b>18</b>	30	7	CRW1 R	18x30x7 CRW1 R
	30	7	CRW1 V	18x30x7 CRW1 V
	32	7	CRW1 R	18x32x7 CRW1 R
	32	7	CRW1 V	18x32x7 CRW1 V
	35	7	CRW1 R	18x35x7 CRW1 R
	40	7	CRW1 R	18x40x7 CRW1 R
<b>19</b>	35	7	CRW1 R	19x35x7 CRW1 R
<b>20</b>	30	7	CRW1 R	20x30x7 CRW1 R
	31	7	CRW1 R	20x31x7 CRW1 R
	32	7	CRW1 R	20x32x7 CRW1 R
	35	7	CRW1 R	20x35x7 CRW1 R
	35	7	CRW1 V	20x35x7 CRW1 V
	36	7	CRW1 R	20x36x7 CRW1 R
	36	7	CRW1 V	20x36x7 CRW1 V
	37	7	CRW1 R	20x37x7 CRW1 R
	38	7	CRW1 R	20x38x7 CRW1 R
	40	7	CRW1 R	20x40x7 CRW1 R
	40	7	CRW1 V	20x40x7 CRW1 V
	42	7	CRW1 R	20x42x7 CRW1 R
	47	7	CRW1 R	20x47x7 CRW1 R
	52	7	CRW1 R	20x52x7 CRW1 R
	52	7	CRW1 P	20x52x7 CRW1 P
<b>21</b>	35	7	CRW1 R	21x35x7 CRW1 R
	35	7	CRW1 V	21x35x7 CRW1 V
	40	8	CRW1 R	21x40x8 CRW1 R

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
$d_1$	D			
mm			–	–
22	31	7	CRW1 P	22x31x7 CRW1 P
	32	7	CRW1 R	22x32x7 CRW1 R
	35	7	CRW1 R	22x35x7 CRW1 R
	35	7	CRW1 V	22x35x7 CRW1 V
	38	7	CRW1 R	22x38x7 CRW1 R
	38	7	CRW1 V	22x38x7 CRW1 V
	40	6,35	CRW1 R	22x40x6 CRW1 R
	40	6,35	CRW1 V	22x40x6 CRW1 V
	42	7	CRW1 R	22x42x7 CRW1 R
	47	8	CRW1 R	22x47x8 CRW1 R
24	36	7	CRW1 V	24x36x7 CRW1 V
	38	7	CRW1 V	24x38x7 CRW1 V
	47	8	CRW1 R	24x47x8 CRW1 R
25	35	7	CRW1 R	25x35x7 CRW1 R
	35	7	CRW1 V	25x35x7 CRW1 V
	36	7	CRW1 R	25x36x7 CRW1 R
	37	7	CRW1 R	25x37x7 CRW1 R
	37	7	CRW1 V	25x37x7 CRW1 V
	38	7	CRW1 R	25x38x7 CRW1 R
	38	7	CRW1 V	25x38x7 CRW1 V
	40	7	CRW1 R	25x40x7 CRW1 R
	40	7	CRW1 R	25x40x7 CRW1 R
	40	7	CRW1 V	25x40x7 CRW1 V
	42	8	CRW1 V	25x42x8 CRW1 V
	42	8	CRW1 R	25x42x8 CRW1 R
	45	7	CRW1 R	25x45x7 CRW1 R
	47	6,35	CRW1 R	25x47x6 CRW1 R
	48	8	CRW1 R	25x48x8 CRW1 R
	48	8	CRW1 V	25x48x8 CRW1 V
	50	8	CRW1 R	25x50x8 CRW1 R
52	8	CRW1 R	25x52x8 CRW1 R	
52	8	CRW1 V	25x52x8 CRW1 V	
27	62	7	CRW1 R	25x62x7 CRW1 R
	62	7	CRW1 V	25x62x7 CRW1 V
	42	7	CRW1 R	27x42x7 CRW1 R
	42	7	CRW1 V	27x42x7 CRW1 V
	43	8	CRW1 V	27x43x8 CRW1 V
	45	8	CRW1 V	27x45x8 CRW1 V
28	52	8	CRW1 R	27x52x8 CRW1 R
	40	7	CRW1 R	28x40x7 CRW1 R
	40	7	CRW1 V	28x40x7 CRW1 V
	42	7	CRW1 R	28x42x7 CRW1 R
	42	7	CRW1 V	28x42x7 CRW1 V
	45	7	CRW1 V	28x45x7 CRW1 V
	47	7	CRW1 V	28x47x7 CRW1 V
	47	8	CRW1 R	28x47x8 CRW1 R
	52	8	CRW1 R	28x52x8 CRW1 R

**Radial shaft seals – CRW1, CRWA1, CRWH1 and CRWHA1 – metric dimensions**  
**d<sub>1</sub> 30 – 36 mm**



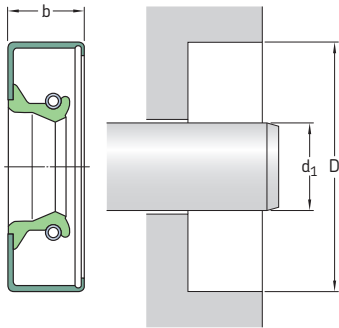
Please see **pages 74 to 76** for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width	Design and lip material	Designation
d <sub>1</sub>	D	b		
mm			–	–
30	40	7	CRW1 R	30×40×7 CRW1 R
	40	7	CRW1 V	30×40×7 CRW1 V
	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	8	CRW1 V	30×47×8 CRW1 V
	48	8	CRW1 R	30×48×8 CRW1 R
	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	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	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	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	8	CRW1 R	32×47×8 CRW1 R
	47	8	CRW1 V	32×47×8 CRW1 V
	48	8	CRW1 R	32×48×8 CRW1 R
	48	8	CRW1 V	32×48×8 CRW1 V
	50	8	CRW1 R	32×50×8 CRW1 R
	50	8	CRW1 V	32×50×8 CRW1 V
	52	8	CRW1 R	32×52×8 CRW1 R
	52	8	CRW1 V	32×52×8 CRW1 V

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

1) Without SKF Bore Tite Coating

**Radial shaft seals – CRW1, CRWA1, CRWH1 and CRWHA1 – metric dimensions**  
 $d_1$  38 – 43 mm



Please see **pages 74 to 76** for housing bore requirements.

Dimensions	Bore	Nominal seal width	Design and lip material	Designation
Shaft	D	b		
$d_1$				
mm			–	–
<b>38</b>	50	7	CRW1 R	<b>38×50×7 CRW1 R</b>
	50	7	CRW1 V	<b>38×50×7 CRW1 V</b>
	52	8	CRW1 R	<b>38×52×8 CRW1 R</b>
	52	8	CRWA1 R	<b>38×52×8 CRWA1 R</b>
	52	8	CRW1 V	<b>38×52×8 CRW1 V</b>
	53	8	CRW1 R	<b>38×53×8 CRW1 R</b>
	54	7	CRW1 P	<b>38×54×7 CRW1 P<sup>1)</sup></b>
	55	8	CRW1 R	<b>38×55×8 CRW1 R</b>
	55	8	CRW1 V	<b>38×55×8 CRW1 V</b>
	56	8	CRW1 V	<b>38×56×8 CRW1 V</b>
	56	8	CRW1 R	<b>38×56×8 CRW1 R</b>
	58	8	CRW1 R	<b>38×58×8 CRW1 R</b>
	58	8	CRW1 V	<b>38×58×8 CRW1 V</b>
	60	8	CRW1 R	<b>38×60×8 CRW1 R</b>
	60	8	CRW1 V	<b>38×60×8 CRW1 V</b>
	62	8	CRW1 R	<b>38×62×8 CRW1 R</b>
	62	8	CRWA1 R	<b>38×62×8 CRWA1 R</b>
	62	8	CRW1 V	<b>38×62×8 CRW1 V</b>
	65	8	CRW1 R	<b>38×65×8 CRW1 R</b>
	68	8	CRW1 R	<b>38×68×8 CRW1 R</b>
	70	8	CRW1 R	<b>38×70×8 CRW1 R</b>
	72	8	CRW1 R	<b>38×72×8 CRW1 R</b>
	73	8	CRW1 R	<b>38×73×8 CRW1 R</b>
	74	11	CRWA1 R	<b>38×74×11 CRWA1 R</b>
	74	11	CRW1 V	<b>38×74×11 CRW1 V</b>
	80	8	CRW1 R	<b>38×80×8 CRW1 R</b>
	90	8	CRWA1 R	<b>38×90×8 CRWA1 R</b>

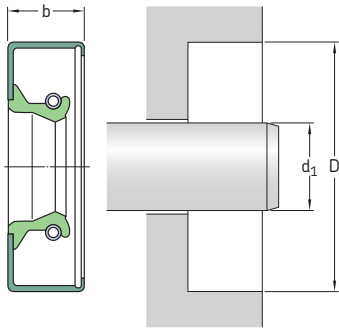
<sup>1)</sup> Without SKF Bore Tite Coating



Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
d <sub>1</sub>	D			
mm			-	-
40	52	7	CRW1 V	40x52x7 CRW1 V
	52	7	CRW1 R	40x52x7 CRW1 R
	54	7	CRW1 R	40x54x7 CRW1 R
	55	8	CRW1 R	40x55x8 CRW1 R
	55	8	CRW1 V	40x55x8 CRW1 V
	56	7	CRW1 V	40x56x7 CRW1 V
	56	8	CRW1 R	40x56x8 CRW1 R
	57	8	CRW1 R	40x57x8 CRW1 R
	58	8	CRW1 R	40x58x8 CRW1 R
	58	8	CRW1 V	40x58x8 CRW1 V
	60	8	CRW1 R	40x60x8 CRW1 R
	60	8	CRW1 V	40x60x8 CRW1 V
	62	8	CRW1 R	40x62x8 CRW1 R
	62	8	CRW1 V	40x62x8 CRW1 V
	65	8	CRW1 R	40x65x8 CRW1 R
	68	8	CRW1 R	40x68x8 CRW1 R
	70	8	CRW1 R	40x70x8 CRW1 R
	72	8	CRW1 R	40x72x8 CRW1 R
	74	8	CRW1 R	40x74x8 CRW1 R
	75	8	CRW1 V	40x75x8 CRW1 V
	80	8	CRW1 R	40x80x8 CRW1 R
80	8	CRW1 V	40x80x8 CRW1 V <sup>1)</sup>	
90	8	CRW1 R	40x90x8 CRW1 R	
41	53	7	CRW1 R	41x53x7 CRW1 R
	55	8	CRW1 R	41x55x8 CRW1 R
	62	8	CRW1 R	41x62x8 CRW1 R
42	55	8	CRW1 R	42x55x8 CRW1 R
	55	8	CRW1 V	42x55x8 CRW1 V
	56	7	CRW1 V	42x56x7 CRW1 V
	56	8	CRW1 R	42x56x8 CRW1 R
	58	8	CRW1 R	42x58x8 CRW1 R
	58	8	CRW1 V	42x58x8 CRW1 V
	60	8	CRW1 R	42x60x8 CRW1 R
	60	8	CRW1 V	42x60x8 CRW1 V
	62	8	CRW1 R	42x62x8 CRW1 R
	62	8	CRW1 V	42x62x8 CRW1 V
	65	8	CRW1 R	42x65x8 CRW1 R
	65	8	CRW1 V	42x65x8 CRW1 V
72	8	CRW1 V	42x72x8 CRW1 V	
72	8	CRW1 R	42x72x8 CRW1 R	
43	57	8	CRW1 R	43x57x8 CRW1 R
	60	8	CRW1 R	43x60x8 CRW1 R
	69	8	CRW1 R	43x69x8 CRW1 R
	73	8	CRW1 R	43x73x8 CRW1 R

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

**Radial shaft seals – CRW1, CRWA1, CRWH1 and CRWHA1 – metric dimensions**  
**d<sub>1</sub> 44 – 54 mm**



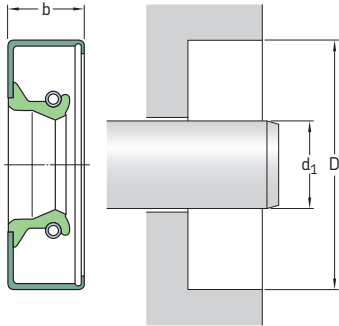
Please see **pages 74 to 76** for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
d <sub>1</sub>	D	b		
mm			–	–
<b>44</b>	60	8	CRW1 R	44×60×8 CRW1 R
	60	8	CRW1 V	44×60×8 CRW1 V <sup>1)</sup>
	62	8	CRW1 R	44×62×8 CRW1 R
	65	8	CRW1 R	44×65×8 CRW1 R
	68	8	CRW1 V	44×68×8 CRW1 V
	70	8	CRW1 R	44×70×8 CRW1 R
	72	8	CRW1 R	44×72×8 CRW1 R
<b>45</b>	60	8	CRW1 R	45×60×8 CRW1 R
	60	8	CRW1 V	45×60×8 CRW1 V
	62	8	CRWA1 V	45×62×8 CRWA1 V
	62	8	CRW1 R	45×62×8 CRW1 R
	65	8	CRW1 R	45×65×8 CRW1 R
	65	8	CRW1 V	45×65×8 CRW1 V
	68	8	CRW1 R	45×68×8 CRW1 R
	68	8	CRW1 V	45×68×8 CRW1 V
	68	8	CRWA1 R	45×68×8 CRWA1 R
	72	8	CRW1 V	45×72×8 CRW1 V
	72	8	CRW1 R	45×72×8 CRW1 R
	75	8	CRW1 R	45×75×8 CRW1 R
	75	8	CRW1 V	45×75×8 CRW1 V
<b>46</b>	60	8	CRW1 R	46×60×8 CRW1 R
	65	8	CRW1 R	46×65×8 CRW1 R
	68	8	CRW1 R	46×68×8 CRW1 R
	72	8	CRW1 R	46×72×8 CRW1 R
	73	8	CRW1 R	46×73×8 CRW1 R

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

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation	
$d_1$	D				
mm			-	-	
47	60	7	CRW1 R	47×60×7 CRW1 R	
	62	8	CRW1 R	47×62×8 CRW1 R	
	72	8	CRW1 R	47×72×8 CRW1 R	
48	62	8	CRW1 R	48×62×8 CRW1 R	
	62	8	CRW1 P	48×62×8 CRW1 P	
	65	8	CRW1 R	48×65×8 CRW1 R	
	65	8	CRW1 V	48×65×8 CRW1 V	
	68	8	CRW1 V	48×68×8 CRW1 V	
	70	8	CRW1 R	48×70×8 CRW1 R	
	70	8	CRW1 V	48×70×8 CRW1 V	
	72	8	CRW1 R	48×72×8 CRW1 R	
	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
		65	8	CRW1 V	50×65×8 CRW1 V
68		8	CRW1 R	50×68×8 CRW1 R	
68		8	CRW1 V	50×68×8 CRW1 V	
70		8	CRW1 R	50×70×8 CRW1 R	
70		8	CRW1 V	50×70×8 CRW1 V	
72		8	CRW1 R	50×72×8 CRW1 R	
72		8	CRW1 V	50×72×8 CRW1 V	
75		8	CRWA1 R	50×75×8 CRWA1 R	
80		8	CRW1 R	50×80×8 CRW1 R	
80		8	CRW1 V	50×80×8 CRW1 V	
82		8	CRWA1 R	50×82×8 CRWA1 R	
85		8	CRW1 R	50×85×8 CRW1 R	
90		8	CRW1 R	50×90×8 CRW1 R	
90		8	CRW1 V	50×90×8 CRW1 V	
51		65	7	CRWA1 R	51×65×7 CRWA1 R
		73	8	CRW1 R	51×73×8 CRW1 R
		80	9,53	CRW1 R	51×80×10 CRW1 R
	81	9,53	CRWH1 R	51×81×10 CRWH1 R	
	81	9,53	CRWHA1 R	51×81×10 CRWHA1 R	
	92	11,13	CRWH1 R	51×92×11 CRWH1 R	
52	68	8	CRW1 R	52×68×8 CRW1 R	
	68	8	CRW1 V	52×68×8 CRW1 V	
	70	8	CRW1 R	52×70×8 CRW1 R	
	72	8	CRWA1 V	52×72×8 CRWA1 V	
	72	8	CRW1 R	52×72×8 CRW1 R	
	72	8	CRW1 V	52×72×8 CRW1 V	
	85	8	CRW1 R	52×85×8 CRW1 R	
	53	68	8	CRW1 V	53×68×8 CRW1 V
54	65	8	CRW1 R	54×65×8 CRW1 R	
	65	8	CRW1 V	54×65×8 CRW1 V	
	73	11,13	CRW1 R	54×73×11 CRW1 R	
	73	11,13	CRWA1 R	54×73×11 CRWA1 R	
	81	9,53	CRWA1 R	54×81×10 CRWA1 R	

**Radial shaft seals – CRW1, CRWA1, CRWH1 and CRWHA1 – metric dimensions**  
 $d_1$  55 – 70 mm

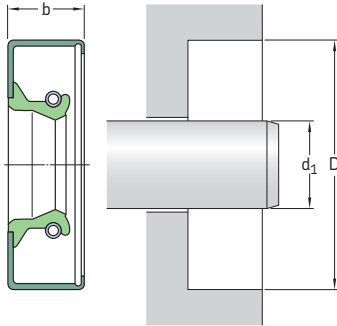


Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Nominal seal width b	Design and lip material	Designation
Shaft	Bore			
$d_1$	D			
mm			–	–
55	70	8	CRW1 R	55×70×8 CRW1 R
	70	8	CRW1 V	55×70×8 CRW1 V
	72	8	CRW1 R	55×72×8 CRW1 R
	72	8	CRW1 V	55×72×8 CRW1 V
	73	8	CRW1 V	55×73×8 CRW1 V
	75	8	CRW1 R	55×75×8 CRW1 R
	75	8	CRW1 V	55×75×8 CRW1 V
	80	8	CRW1 R	55×80×8 CRW1 R
	80	8	CRW1 V	55×80×8 CRW1 V
	85	8	CRW1 R	55×85×8 CRW1 R
	90	8	CRW1 R	55×90×8 CRW1 R
	100	8	CRW1 R	55×100×8 CRW1 R
56	75	8	CRW1 R	56×75×8 CRW1 R
57	81	11	CRW1 R	57×81×11 CRW1 R
	81	11	CRWA1 P	57×81×11 CRWA1 P
	92	11	CRWH1 R	57×92×11 CRWH1 R
	92	11	CRWHA1 R	57×92×11 CRWHA1 R
58	72	8	CRW1 R	58×72×8 CRW1 R
	72	8	CRW1 S	58×72×8 CRW1 S
	75	8	CRW1 R	58×75×8 CRW1 R
	80	8	CRW1 R	58×80×8 CRW1 R
	80	8	CRW1 V	58×80×8 CRW1 V
	85	8	CRW1 R	58×85×8 CRW1 R
	90	8	CRW1 R	58×90×8 CRW1 R

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
$d_1$	D			
mm			–	–
60	75	8	CRW1 R	60×75×8 CRW1 R
	75	8	CRW1 V	60×75×8 CRW1 V
	80	8	CRW1 R	60×80×8 CRW1 R
	80	8	CRW1 V	60×80×8 CRW1 V
	82	8	CRWA1 R	60×82×8 CRWA1 R
	85	8	CRW1 V	60×85×8 CRW1 V
	85	8	CRW1 R	60×85×8 CRW1 R
	90	8	CRW1 R	60×90×8 CRW1 R
	105	8	CRW1 R	60×105×8 CRW1 R
	110	8	CRW1 R	60×110×8 CRW1 R
62	80	8	CRW1 V	62×80×8 CRW1 V
	85	8	CRW1 R	62×85×8 CRW1 R
	90	8	CRW1 R	62×90×8 CRW1 R
	90	11,13	CRWH1 R	62×90×11 CRWH1 R
63	78	8	CRW1 R	63×78×8 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
65	80	8	CRW1 R	65×80×8 CRW1 R
	80	8	CRW1 V	65×80×8 CRW1 V
	85	8	CRW1 R	65×85×8 CRW1 R
	85	8	CRW1 V	65×85×8 CRW1 V
	88	8	CRW1 R	65×88×8 CRW1 R
	90	8	CRW1 R	65×90×8 CRW1 R
	90	8	CRW1 V	65×90×8 CRW1 V
	92	11,13	CRWH1 R	65×92×11 CRWH1 R
	100	8	CRW1 R	65×100×8 CRW1 R
	100	8	CRW1 V	65×100×8 CRW1 V
68	110	10	CRW1 R	65×110×10 CRW1 R
	120	8	CRW1 R	65×120×8 CRW1 R
	85	8	CRW1 R	68×85×8 CRW1 R
	88	8	CRW1 R	68×88×8 CRW1 R
	90	8	CRW1 R	68×90×8 CRW1 R
	90	8	CRW1 V	68×90×8 CRW1 V
	95	10	CRW1 R	68×95×10 CRW1 R
	95	10	CRW1 V	68×95×10 CRW1 V
	100	10	CRW1 R	68×100×10 CRW1 R
	70	85	8	CRW1 R
88		8	CRW1 R	70×88×8 CRW1 R
88		8	CRW1 V	70×88×8 CRW1 V
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	

**Radial shaft seals – CRW1, CRWA1, CRWH1 and CRWHA1 – metric dimensions**  
**d<sub>1</sub> 70 – 110 mm**



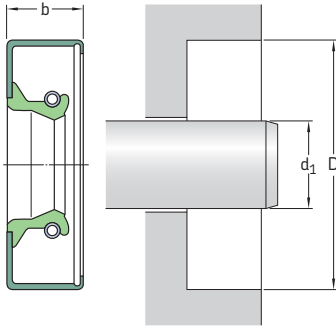
Please see **pages 74 to 76** for housing bore requirements.

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

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

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

**Radial shaft seals – CRW1, CRWA1, CRWH1 and CRWHA1 – metric dimensions**  
**d<sub>1</sub> 115 – 280 mm**



Please see **pages 74 to 76** for housing bore requirements.

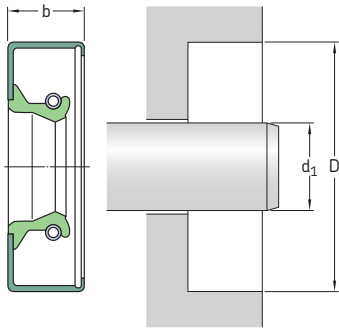
Dimensions		Nominal seal width b	Design and lip material	Designation
Shaft	Bore			
d <sub>1</sub>	D			
mm			–	–
115	135	12	CRW1 R	115×135×12 CRW1 R
	140	12	CRW1 R	115×140×12 CRW1 R
	140	12	CRW1 V	115×140×12 CRW1 V
	145	12	CRW1 R	115×145×12 CRW1 R
	150	12	CRW1 R	115×150×12 CRW1 R
	160	12	CRW1 R	115×160×12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

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



<b>Dimensions</b>			<b>Design and lip material</b>	<b>Designation</b>
Shaft	Bore	Nominal seal width		
$d_1$	D	b		
mm			–	–
<b>220</b>	250	16	CRWH1 R	<b>220×250×16 CRWH1 R</b>
<b>280</b>	320 320	20 20	CRWA1 R CRWA1 V	<b>280×320×20 CRWA1 R</b> <b>280×320×20 CRWA1 V</b>

**Radial shaft seals – CRW1, CRWA1, CRWH1 and CRWHA1 – inch dimensions**  
 $d_1$  0.250 – 0.669 in.



Please see **pages 74 to 76** for housing bore requirements.

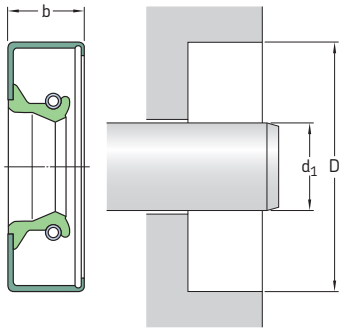
Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation	
$d_1$	D	b			
in.			–	–	
<b>0.250</b>	0.749	0.250	CRW1 V	<b>2513<sup>1)</sup></b>	
	0.749	0.250	CRW1 R	<b>2514</b>	
<b>0.375</b>	0.749	0.250	CRW1 R	<b>3687<sup>1)</sup></b>	
	0.749	0.250	CRW1 V	<b>3688</b>	
	0.750	0.250	CRWA1 R	<b>3680</b>	
	0.836	0.188	CRW1 P	<b>3719</b>	
	0.875	0.250	CRW1 R	<b>3725</b>	
	0.999	0.250	CRW1 R	<b>3751<sup>1)</sup></b>	
	0.999	0.250	CRW1 V	<b>3752</b>	
	1.124	0.250	CRW1 R	<b>3806<sup>1)</sup></b>	
	<b>0.438</b>	0.875	0.250	CRW1 P	<b>4249</b>
		0.875	0.250	CRW1 R	<b>4251<sup>1)</sup></b>
0.875		0.375	CRWA1 R	<b>4261<sup>1)</sup></b>	
0.875		0.375	CRWA1 V	<b>4262</b>	
0.999		0.250	CRW1 V	<b>4356</b>	
0.999		0.375	CRW1 P	<b>4353</b>	
0.999		0.375	CRW1 R	<b>4355</b>	
1.124		0.250	CRW1 R	<b>4390</b>	
<b>0.500</b>		0.875	0.250	CRW1 R	<b>4931</b>
		0.875	0.250	CRW1 V	<b>4932</b>
	0.875	0.250	CRWA1 V	<b>4933</b>	
	0.875	0.250	CRWA1 V	<b>4935</b>	
	0.875	0.250	CRW1 D	<b>4936</b>	
	0.875	0.313	CRWA1 R	<b>4939</b>	
	0.987	0.250	CRW1 R	<b>4943</b>	
	0.999	0.250	CRW1 V	<b>4980</b>	
	0.999	0.250	CRW1 R	<b>4984</b>	
	0.999	0.250	CRWA1 R	<b>4985</b>	
	1.124	0.250	CRW1 P	<b>5045</b>	
	1.124	0.250	CRWA1 R	<b>5062</b>	
	1.124	0.250	CRW1 V	<b>5066</b>	

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

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
d <sub>1</sub>	D			
in.			–	–
<b>0.500</b>	1.124	0.250	CRWA1 V	<b>5067</b>
cont.	1.124	0.250	CRW1 R	<b>5068</b>
	1.124	0.313	CRW1 P	<b>5046</b>
	1.250	0.250	CRW1 R	<b>5133</b>
	1.375	0.250	CRW1 R	<b>5150</b>
	1.375	0.250	CRW1 V	<b>5151</b>
<b>0.531</b>	0.999	0.250	CRWA1 S	<b>5321</b>
<b>0.546</b>	0.875	0.250	CRW1 P	<b>5385<sup>1)</sup></b>
<b>0.554</b>	0.999	0.250	CRW1 R	<b>5605</b>
<b>0.563</b>	0.875	0.188	CRW1 D	<b>5523</b>
	0.999	0.250	CRW1 R	<b>5541</b>
	0.999	0.250	CRW1 V	<b>5542</b>
	0.999	0.250	CRW1 R	<b>5543</b>
	0.999	0.250	CRWA1 R	<b>5606</b>
	1.124	0.250	CRW1 V	<b>5650</b>
	1.124	0.250	CRW1 R	<b>5652</b>
	1.124	0.250	CRWA1 R	<b>5662</b>
	1.250	0.250	CRW1 R	<b>5707</b>
	1.375	0.250	CRW1 R	<b>5756</b>
<b>0.594</b>	1.124	0.313	CRW1 R	<b>5926</b>
	1.124	0.313	CRW1 V	<b>5927</b>
<b>0.625</b>	0.987	0.250	CRW1 R	<b>6134</b>
	0.999	0.250	CRWA1 V	<b>6139</b>
	0.999	0.250	CRWA1 R	<b>6141</b>
	0.999	0.250	CRW1 R	<b>6143</b>
	1.063	0.250	CRW1 R	<b>6157</b>
	1.124	0.250	CRW1 R	<b>6903</b>
	1.124	0.250	CRWA1 R	<b>6904</b>
	1.124	0.250	CRW1 V	<b>6823</b>
	1.124	0.250	CRWA1 V	<b>6825</b>
	1.181	0.250	CRWA1 R	<b>6247</b>
	1.181	0.256	CRWA1 V	<b>6248</b>
	1.250	0.250	CRW1 V	<b>6909</b>
	1.250	0.250	CRW1 R	<b>6925</b>
	1.250	0.250	CRWA1 R	<b>6916</b>
	1.375	0.250	CRW1 R	<b>6372</b>
	1.375	0.250	CRWA1 R	<b>6373</b>
	1.375	0.250	CRW1 V	<b>6979</b>
	1.375	0.250	CRWA1 V	<b>6383</b>
	1.377	0.250	CRWHA1 R	<b>6391</b>
	1.499	0.250	CRW1 R	<b>6422</b>
<b>0.656</b>	1.124	0.313	CRW1 R	<b>6523</b>
	1.250	0.250	CRW1 R	<b>6541</b>
	1.375	0.313	CRW1 R	<b>6556</b>
	1.575	0.250	CRW1 R	<b>6582</b>
<b>0.669</b>	0.999	0.188	CRW1 R	<b>6595</b>
	1.064	0.250	CRW1 R	<b>6728</b>
	1.064	0.250	CRW1 R	<b>6729</b>
	1.573	0.281	CRW1 V	<b>6597<sup>1)</sup></b>

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

**Radial shaft seals – CRW1, CRWA1, CRWH1 and CRWA1 – inch dimensions**  
 $d_1$  **0.688 – 0.875 in.**



Please see **pages 74 to 76** for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
$d_1$	D			
in.			–	–
<b>0.688</b>	1.124	0.190	CRW1 R	<b>6738</b>
	1.124	0.250	CRW1 R	<b>6741</b>
	1.124	0.250	CRW1 R	<b>6743</b>
	1.124	0.250	CRW1 V	<b>6745</b>
	1.187	0.188	CRW1 V	<b>6770</b>
	1.188	0.188	CRW1 R	<b>6763</b>
	1.250	0.256	CRWA1 R	<b>6765</b>
	1.250	0.256	CRWA1 V	<b>6751</b>
	1.250	0.313	CRW1 R	<b>6767</b>
	1.250	0.313	CRW1 V	<b>6768</b>
	1.252	0.220	CRWH1 V	<b>6769</b>
	1.375	0.250	CRWA1 R	<b>6814</b>
	1.375	0.313	CRW1 R	<b>6816</b>
	1.375	0.313	CRW1 V	<b>6817</b>
	1.499	0.250	CRW1 R	<b>6935</b>
	1.624	0.250	CRWA1 R	<b>6990</b>
<b>0.750</b>	1.124	0.188	CRW1 R	<b>7414</b>
	1.124	0.188	CRW1 V	<b>7417</b>
	1.249	0.188	CRW1 V	<b>7467<sup>1)</sup></b>
	1.250	0.188	CRW1 R	<b>7439</b>
	1.250	0.188	CRW1 R	<b>7478<sup>1)</sup></b>
	1.250	0.250	CRW1 R	<b>7438</b>
	1.250	0.250	CRW1 R	<b>7440</b>
	1.250	0.250	CRWA1 R	<b>7443</b>
	1.250	0.250	CRW1 V	<b>7450</b>
	1.250	0.250	CRWA1 V	<b>7453</b>
	1.250	0.250	CRWA1 V	<b>7455</b>
	1.252	0.188	CRW1 R	<b>7469</b>
	1.260	0.250	CRW1 R	<b>7473</b>
	1.312	0.250	CRW1 R	<b>7474</b>
	1.312	0.250	CRWA1 R	<b>7475</b>
	1.375	0.250	CRW1 R	<b>7512</b>

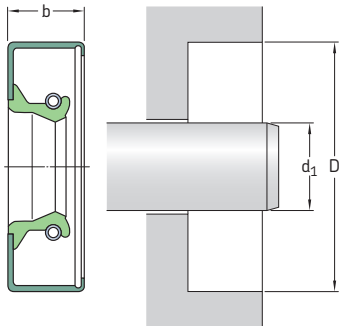
<sup>1)</sup> Without SKF Bore Tite Coating

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
d <sub>1</sub>	D			
in.			–	–
<b>0.750</b>	1.375	0.250	CRWA1 R	<b>7513</b>
cont.	1.375	0.250	CRW1 V	<b>7515</b>
	1.375	0.250	CRWA1 V	<b>7517</b>
	1.375	0.250	CRWA1 P	<b>7533</b>
	1.499	0.250	CRW1 V	<b>7567</b>
	1.499	0.250	CRW1 R	<b>7572<sup>1)</sup></b>
	1.499	0.250	CRWA1 R	<b>7573</b>
	1.575	0.250	CRW1 R	<b>7591</b>
	1.624	0.250	CRW1 V	<b>7623</b>
	1.624	0.250	CRWA1 V	<b>7624</b>
	1.624	0.250	CRW1 R	<b>7627</b>
	1.624	0.250	CRWA1 R	<b>7628</b>
	1.752	0.250	CRW1 R	<b>7636</b>
	1.752	0.250	CRWA1 V	<b>7638</b>
	1.828	0.250	CRW1 R	<b>7661</b>
	1.874	0.250	CRW1 R	<b>7690</b>
	2.047	0.313	CRW1 R	<b>7693</b>
<b>0.781</b>	1.375	0.313	CRW1 V	<b>7824</b>
	1.375	0.313	CRW1 R	<b>7829<sup>1)</sup></b>
	1.499	0.313	CRW1 R	<b>7849</b>
	1.624	0.313	CRW1 R	<b>7872</b>
	1.828	0.250	CRW1 P	<b>7889</b>
<b>0.787</b>	1.124	0.188	CRW1 R	<b>7740</b>
<b>0.813</b>	1.187	0.313	CRWA1 V	<b>8013</b>
	1.250	0.188	CRW1 R	<b>8017<sup>1)</sup></b>
	1.250	0.188	CRW1 P	<b>8018</b>
	1.375	0.375	CRW1 V	<b>8053</b>
	1.375	0.375	CRW1 R	<b>8060</b>
	1.499	0.250	CRW1 R	<b>8088<sup>1)</sup></b>
	1.624	0.250	CRW1 V	<b>8178</b>
	1.752	0.375	CRW1 R	<b>8215</b>
<b>0.875</b>	1.250	0.188	CRW1 R	<b>8624</b>
	1.250	0.250	CRW1 V	<b>8621</b>
	1.308	0.250	CRW1 V	<b>8649</b>
	1.375	0.250	CRW1 V	<b>8646</b>
	1.375	0.250	CRW1 R	<b>8648</b>
	1.437	0.250	CRW1 R	<b>8691</b>
	1.499	0.250	CRW1 R	<b>8700</b>
	1.499	0.250	CRWA1 R	<b>8702</b>
	1.499	0.250	CRW1 V	<b>8704</b>
	1.499	0.250	CRWA1 V	<b>8707</b>
	1.499	0.313	CRW1 R	<b>8703<sup>1)</sup></b>
	1.502	0.313	CRWA1 R	<b>8748</b>
	1.575	0.250	CRW1 R	<b>8763</b>
	1.624	0.250	CRWA1 R	<b>8782</b>
	1.624	0.250	CRW1 V	<b>8795</b>
	1.624	0.250	CRW1 R	<b>8796</b>
	1.752	0.250	CRW1 R	<b>8821</b>
	1.828	0.250	CRW1 R	<b>8842</b>
	1.874	0.250	CRW1 R	<b>8860</b>

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

# Radial shaft seals – CRW1, CRWA1, CRWH1 and CRWA1 – inch dimensions

$d_1$  0.875 – 1.063 in.



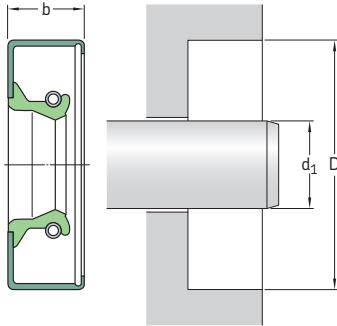
Please see pages 74 to 76 for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
$d_1$	D			
in.			–	–
<b>0.875</b>	2.000	0.250	CRW1 R	<b>8870</b>
cont.	2.050	0.375	CRWH1 V	<b>8871</b>
<b>0.882</b>	2.088	0.313	CRWA1 R	<b>9000</b>
<b>0.938</b>	1.375	0.250	CRWA1 R	<b>9244</b>
	1.500	0.250	CRW1 R	<b>9303</b>
	1.500	0.250	CRW1 V	<b>9304</b>
	1.624	0.250	CRW1 R	<b>9307</b>
	1.624	0.250	CRW1 V	<b>9308</b>
	1.752	0.250	CRW1 R	<b>9347</b>
	1.828	0.250	CRW1 R	<b>9409</b>
<b>0.950</b>	1.358	0.275	CRW1 P	<b>9520</b>
<b>0.969</b>	1.406	0.250	CRWA1 P	<b>9604</b>
	1.499	0.313	CRW1 V	<b>9611</b>
	1.499	0.313	CRW1 R	<b>9613<sup>1)</sup></b>
	1.624	0.250	CRW1 R	<b>9646</b>
	1.624	0.250	CRW1 V	<b>9647</b>
	1.686	0.313	CRWA1 R	<b>9663</b>
	1.686	0.313	CRW1 R	<b>9664</b>
	1.752	0.250	CRW1 R	<b>9667</b>
	1.828	0.313	CRW1 R	<b>9681</b>
<b>0.981</b>	1.376	0.313	CRW1 V	<b>9888<sup>1)</sup></b>
<b>0.984</b>	1.499	0.250	CRW1 V	<b>9686</b>
	1.749	0.375	CRWA1 V	<b>9803<sup>1)</sup></b>
<b>1.000</b>	1.367	0.313	CRW1 R	<b>9822</b>
	1.375	0.250	CRW1 P	<b>9826<sup>1)</sup></b>
	1.375	0.250	CRW1 V	<b>9831</b>

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

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
d <sub>1</sub>	D			
in.			–	–
<b>1.000</b>	1.437	0.250	CRW1 V	<b>9833</b>
cont.	1.437	0.250	CRW1 R	<b>9837</b>
	1.437	0.250	CRWA1 R	<b>9838</b>
	1.437	0.250	CRWA1 V	<b>9847</b>
	1.496	0.390	CRW1 R	<b>9850</b>
	1.499	0.250	CRW1 R	<b>9852</b>
	1.499	0.250	CRW1 V	<b>9854</b>
	1.499	0.250	CRW1 R	<b>9876</b>
	1.499	0.250	CRWA1 R	<b>9878</b>
	1.499	0.250	CRWA1 V	<b>9879</b>
	1.499	0.315	CRWA1 V	<b>9862</b>
	1.499	0.315	CRW1 V	<b>9892</b>
	1.561	0.250	CRW1 R	<b>9894</b>
	1.575	0.313	CRWA1 R	<b>9907</b>
	1.624	0.250	CRW1 R	<b>9934</b>
	1.624	0.250	CRWA1 R	<b>9935</b>
	1.624	0.250	CRW1 V	<b>9937</b>
	1.624	0.250	CRWA1 V	<b>9939</b>
	1.686	0.250	CRW1 R	<b>9960</b>
	1.752	0.250	CRW1 V	<b>9982</b>
	1.752	0.250	CRWA1 V	<b>9983</b>
	1.752	0.250	CRW1 R	<b>9997</b>
	1.752	0.250	CRWA1 R	<b>9998</b>
	1.828	0.250	CRW1 V	<b>10058</b>
	1.828	0.250	CRW1 P	<b>10047</b>
	1.828	0.250	CRW1 R	<b>10049</b>
	1.828	0.250	CRWA1 R	<b>10050</b>
	1.851	0.250	CRW1 R	<b>10071</b>
	1.874	0.250	CRW1 R	<b>10075</b>
	1.938	0.250	CRW1 R	<b>10104</b>
	1.983	0.250	CRWA1 V	<b>10111</b>
	1.983	0.313	CRWA1 R	<b>10114</b>
	2.000	0.250	CRW1 R	<b>10123</b>
	2.000	0.250	CRWA1 R	<b>10124</b>
	2.000	0.250	CRWA1 R	<b>10127</b>
	2.000	0.250	CRW1 V	<b>10128</b>
	2.000	0.250	CRWA1 V	<b>10129</b>
	2.047	0.250	CRWA1 R	<b>10157</b>
	2.062	0.250	CRW1 R	<b>10158</b>
	2.250	0.250	CRW1 R	<b>10169</b>
<b>1.063</b>	1.499	0.250	CRW1 R	<b>10515</b>
	1.499	0.250	CRW1 V	<b>10518</b>
	1.512	0.256	CRW1 P	<b>532866</b>
	1.561	0.250	CRW1 R	<b>10581</b>
	1.577	0.250	CRW1 R	<b>10583</b>
	1.624	0.250	CRW1 R	<b>10598</b>
	1.686	0.250	CRW1 R	<b>10632</b>
	1.752	0.250	CRW1 R	<b>10653</b>
	1.828	0.250	CRW1 R	<b>10681</b>
	1.828	0.250	CRW1 V	<b>10682</b>
	1.874	0.250	CRW1 R	<b>10700</b>
	1.979	0.250	CRW1 R	<b>10728</b>
	1.983	0.250	CRW1 R	<b>10733</b>

**Radial shaft seals – CRW1, CRWA1, CRWH1 and CRWA1 – inch dimensions**  
 $d_1$  **1.063 – 1.250 in.**



Please see **pages 74 to 76** for housing bore requirements.

Dimensions Shaft	Bore D	Nominal seal width b	Design and lip material	Designation
$d_1$	D	b		
in.			–	–
<b>1.063</b>	2.000	0.250	CRW1 R	<b>10740</b>
cont.	2.062	0.250	CRW1 R	<b>10766</b>
<b>1.125</b>	1.499	0.188	CRW1 V	<b>11059<sup>1)</sup></b>
	1.499	0.188	CRW1 R	<b>11061<sup>1)</sup></b>
	1.561	0.250	CRW1 P	<b>11066</b>
	1.561	0.250	CRW1 R	<b>11067</b>
	1.561	0.250	CRW1 V	<b>11071</b>
	1.565	0.250	CRW1 R	<b>11082</b>
	1.624	0.250	CRW1 P	<b>11111</b>
	1.624	0.250	CRW1 R	<b>11123</b>
	1.624	0.250	CRWA1 R	<b>11124</b>
	1.624	0.250	CRW1 V	<b>11133</b>
	1.624	0.250	CRWA1 V	<b>11134</b>
	1.733	0.375	CRW1 R	<b>11137</b>
	1.752	0.250	CRW1 R	<b>11138</b>
	1.752	0.250	CRW1 V	<b>11144</b>
	1.828	0.250	CRW1 R	<b>11170</b>
	1.828	0.250	CRWA1 R	<b>11171</b>
	1.828	0.250	CRW1 V	<b>11172</b>
	1.828	0.250	CRWA1 V	<b>11175</b>
	1.852	0.313	CRWH1 R	<b>11197</b>
	1.852	0.313	CRWA1 R	<b>11200</b>
	1.874	0.250	CRW1 V	<b>11225</b>
	1.874	0.250	CRWA1 V	<b>11218</b>
	1.874	0.250	CRW1 R	<b>11224</b>
	1.874	0.250	CRWA1 R	<b>11223</b>
	1.983	0.250	CRW1 R	<b>11299</b>
	2.000	0.250	CRW1 R	<b>11340</b>
	2.000	0.250	CRW1 V	<b>11344</b>
	2.000	0.374	CRWA1 V	<b>12138</b>
	2.000	0.375	CRWA1 R	<b>11343</b>

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

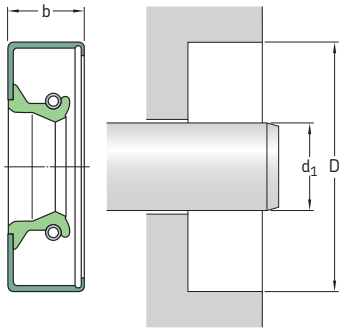


Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
d <sub>1</sub>	D			
in.			–	–
<b>1.125</b>	2.047	0.313	CRWA1 R	<b>11353</b>
cont.	2.062	0.250	CRWA1 V	<b>11368</b>
	2.062	0.313	CRW1 R	<b>11366</b>
	2.125	0.313	CRW1 R	<b>11372</b>
	2.125	0.313	CRW1 V	<b>11373</b>
	2.250	0.250	CRW1 R	<b>11378</b>
	2.441	0.250	CRW1 R	<b>11392</b>
<b>1.126</b>	1.575	0.236	CRWA1 R	<b>11086</b>
<b>1.156</b>	1.686	0.250	CRWA1 R	<b>11518</b>
	1.752	0.250	CRWA1 R	<b>11514</b>
	1.874	0.250	CRW1 R	<b>11524</b>
	1.875	0.375	CRWA1 R	<b>11536<sup>1)</sup></b>
	2.000	0.250	CRW1 R	<b>11544</b>
	2.000	0.250	CRWA1 R	<b>11545</b>
	2.000	0.250	CRW1 V	<b>11550</b>
	2.062	0.313	CRW1 R	<b>11558</b>
<b>1.175</b>	2.031	0.500	CRW1 R	<b>11553</b>
<b>1.178</b>	2.073	0.335	CRW1 S	<b>11650</b>
<b>1.188</b>	1.561	0.313	CRW1 V	<b>11710<sup>1)</sup></b>
	1.686	0.250	CRW1 P	<b>11728</b>
	1.687	0.250	CRW1 R	<b>11730</b>
	1.752	0.250	CRW1 R	<b>11734</b>
	1.752	0.250	CRW1 V	<b>11736</b>
	1.828	0.375	CRW1 R	<b>11740</b>
	1.875	0.250	CRW1 P	<b>11763</b>
	1.875	0.375	CRW1 R	<b>11585</b>
	1.983	0.250	CRW1 R	<b>11776</b>
	1.983	0.250	CRWA1 R	<b>11777</b>
	2.000	0.250	CRW1 R	<b>11800</b>
	2.000	0.250	CRWA1 R	<b>11801</b>
	2.000	0.250	CRW1 V	<b>11806</b>
	2.062	0.250	CRW1 R	<b>11878</b>
	2.062	0.250	CRW1 P	<b>11879</b>
	2.125	0.313	CRW1 R	<b>11907</b>
	2.165	0.250	CRW1 R	<b>11911</b>
	2.250	0.250	CRW1 R	<b>11914</b>
	2.437	0.250	CRW1 R	<b>11923</b>
	2.441	0.250	CRW1 R	<b>11930</b>
<b>1.190</b>	2.125	0.313	CRWHA1 R	<b>11908</b>
<b>1.234</b>	2.250	0.250	CRW1 R	<b>12590</b>
<b>1.250</b>	1.625	0.188	CRW1 R	<b>12329</b>
	1.687	0.250	CRW1 V	<b>12335</b>
	1.687	0.250	CRW1 R	<b>12336</b>
	1.687	0.250	CRWA1 V	<b>12337</b>
	1.687	0.313	CRWA1 R	<b>12350</b>

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

# Radial shaft seals – CRW1, CRWA1, CRWH1 and CRWA1 – inch dimensions

$d_1$  1.250 – 1.375 in.



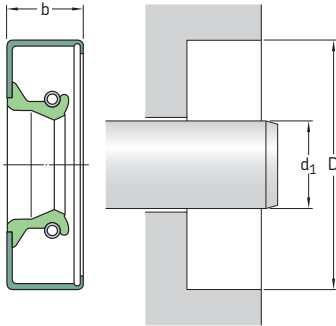
Please see pages 74 to 76 for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
$d_1$	D			
in.			–	–
<b>1.250</b>	1.752	0.250	CRW1 V	<b>12340</b>
cont.	1.752	0.250	CRWA1 V	<b>12343</b>
	1.752	0.250	CRW1 R	<b>12363</b>
	1.752	0.250	CRWA1 R	<b>12364</b>
	1.874	0.250	CRW1 P	<b>12382</b>
	1.874	0.250	CRWA1 V	<b>12383</b>
	1.874	0.250	CRW1 R	<b>12384</b>
	1.874	0.250	CRWA1 R	<b>12386</b>
	1.938	0.250	CRW1 R	<b>12391</b>
	1.955	0.250	CRWA1 R	<b>12396</b>
	1.983	0.250	CRW1 R	<b>12427</b>
	1.983	0.250	CRWA1 R	<b>12428</b>
	1.983	0.250	CRW1 V	<b>12432</b>
	2.000	0.250	CRW1 V	<b>12445</b>
	2.000	0.250	CRWA1 V	<b>12446</b>
	2.000	0.250	CRW1 R	<b>12456</b>
	2.000	0.250	CRWA1 R	<b>12458</b>
	2.000	0.438	CRW1 P	<b>12483</b>
	2.062	0.250	CRWA1 V	<b>12531</b>
	2.062	0.433	CRWA1 V	<b>12533</b>
	2.062	0.438	CRWH1 R	<b>12530</b>
	2.125	0.250	CRW1 V	<b>12544</b>
	2.125	0.250	CRW1 R	<b>12545</b>
	2.125	0.250	CRWA1 R	<b>12551</b>
	2.250	0.250	CRW1 R	<b>12577</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>

Dimensions Shaft d <sub>1</sub>	Bore D	Nominal seal width b	Design and lip material	Designation
in.			–	–
<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>
	1.874	0.250	CRW1 P	<b>13512</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>

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

**Radial shaft seals – CRW1, CRWA1, CRWH1 and CRWA1 – inch dimensions**  
 $d_1$  **1.375 – 1.500 in.**



Please see **pages 74 to 76** for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
$d_1$	D			
in.			–	–
<b>1.375</b>	2.374	0.313	CRW1 V	<b>13734</b>
cont.	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>
	2.502	0.313	CRW1 R	<b>13865</b>
	2.502	0.313	CRW1 V	<b>13867</b>
	2.502	0.374	CRWA1 V	<b>13856</b>
	2.562	0.375	CRW1 R	<b>13875</b>
	2.562	0.375	CRWA1 R	<b>13876</b>
	2.562	0.375	CRWA1 V	<b>13878</b>
	2.623	0.313	CRWA1 V	<b>13882</b>
	2.686	0.500	CRW1 R	<b>13892</b>
	2.716	0.313	CRW1 R	<b>13900</b>
	2.812	0.375	CRWA1 R	<b>13912</b>
	2.835	0.313	CRWA1 R	<b>13918</b>
	2.835	0.313	CRW1 R	<b>13920</b>
	2.835	0.313	CRWA1 P	<b>13925</b>
	2.875	0.313	CRWA1 P	<b>13929</b>
<b>1.378</b>	2.835	0.313	CRWA1 V	<b>13926</b>
<b>1.417</b>	2.616	0.313	CRW1 R	<b>14092</b>
<b>1.438</b>	2.062	0.313	CRW1 V	<b>14212<sup>1)</sup></b>
	2.062	0.313	CRWA1 R	<b>14214</b>
	2.125	0.313	CRW1 R	<b>14223</b>
	2.125	0.313	CRWA1 V	<b>14225</b>
	2.250	0.313	CRWA1 R	<b>14247</b>
	2.250	0.313	CRWA1 V	<b>14259</b>
	2.250	0.313	CRW1 V	<b>14260</b>
	2.250	0.313	CRW1 R	<b>14262</b>

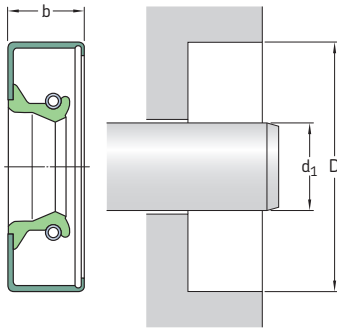
<sup>1)</sup> Without SKF Bore Tite Coating

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
d <sub>1</sub>	D			
in.			–	–
<b>1.438</b>	2.374	0.313	CRW1 R	<b>14282</b>
cont.	2.374	0.313	CRWA1 R	<b>14285</b>
	2.437	0.313	CRW1 R	<b>14363</b>
	2.502	0.313	CRW1 R	<b>14383</b>
	2.623	0.313	CRW1 R	<b>14404</b>
	2.686	0.313	CRW1 R	<b>14423</b>
	2.750	0.313	CRW1 R	<b>14458</b>
<b>1.484</b>	2.254	0.313	CRW1 R	<b>14907</b>
<b>1.494</b>	2.060	0.270	CRW1 R	<b>14789</b>
<b>1.496</b>	2.165	0.315	CRWA1 R	<b>550250</b>
<b>1.500</b>	1.874	0.250	CRW1 R	<b>14807<sup>1)</sup></b>
	1.918	0.250	CRW1 V	<b>14809<sup>1)</sup></b>
	1.983	0.250	CRW1 V	<b>14821</b>
	1.983	0.250	CRWA1 R	<b>14824</b>
	1.983	0.313	CRW1 R	<b>14832</b>
	2.000	0.313	CRWA1 R	<b>14846</b>
	2.000	0.313	CRW1 R	<b>14855</b>
	2.000	0.313	CRW1 V	<b>14861</b>
	2.048	0.313	CRWA1 R	<b>14858</b>
	2.062	0.313	CRW1 R	<b>14864</b>
	2.062	0.313	CRW1 V	<b>14867</b>
	2.125	0.313	CRW1 R	<b>14875</b>
	2.125	0.313	CRWA1 R	<b>14876</b>
	2.125	0.313	CRW1 V	<b>14886</b>
	2.125	0.313	CRWA1 V	<b>14887</b>
	2.222	0.313	CRW1 R	<b>14903</b>
	2.250	0.313	CRW1 S	<b>14935</b>
	2.250	0.313	CRW1 R	<b>14938</b>
	2.250	0.313	CRWA1 R	<b>14939</b>
	2.250	0.313	CRW1 V	<b>14940</b>
	2.250	0.313	CRWA1 V	<b>14942</b>
	2.260	0.406	CRW1 R	<b>14968</b>
	2.374	0.313	CRW1 V	<b>14992</b>
	2.374	0.313	CRWA1 V	<b>14994</b>
	2.374	0.313	CRW1 R	<b>15004</b>
	2.374	0.313	CRWA1 R	<b>15005</b>
	2.374	0.500	CRWH1 R	<b>15039</b>
	2.377	0.453	CRWA1 R	<b>15041</b>
	2.437	0.313	CRW1 R	<b>15076</b>
	2.441	0.313	CRW1 R	<b>15092<sup>1)</sup></b>
	2.441	0.313	CRWA1 R	<b>15093</b>
	2.441	0.313	CRW1 V	<b>15097</b>
	2.502	0.313	CRW1 V	<b>15138</b>
	2.502	0.313	CRW1 R	<b>15141</b>
	2.502	0.313	CRWA1 R	<b>15142</b>
	2.561	0.313	CRW1 R	<b>15176</b>
	2.623	0.313	CRW1 R	<b>15194</b>
	2.686	0.500	CRW1 R	<b>15207</b>

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

## Radial shaft seals – CRW1, CRWA1, CRWH1 and CRWA1 – inch dimensions

$d_1$  1.500 – 1.645 in.



Please see **pages 74 to 76** for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
$d_1$	D			
in.			–	–
<b>1.500</b>	2.716	0.438	CRW1 R	<b>15204</b>
cont.	2.750	0.313	CRW1 R	<b>15214</b>
	2.758	0.313	CRW1 R	<b>15230</b>
	2.835	0.313	CRW1 R	<b>15234</b>
	2.875	0.313	CRW1 R	<b>15235</b>
<b>1.552</b>	2.502	0.500	CRWA1 R	<b>15450</b>
	2.686	0.500	CRW1 R	<b>15460</b>
	2.750	0.500	CRWHA1 P	<b>15462</b>
<b>1.563</b>	2.062	0.250	CRW1 V	<b>15506</b>
	2.062	0.250	CRW1 R	<b>15508</b>
	2.125	0.313	CRW1 R	<b>15517<sup>1)</sup></b>
	2.125	0.313	CRWA1 P	<b>15518</b>
	2.250	0.313	CRW1 R	<b>15522</b>
	2.374	0.313	CRW1 P	<b>15540<sup>1)</sup></b>
	2.374	0.313	CRW1 R	<b>15542</b>
	2.374	0.313	CRWA1 R	<b>15543</b>
	2.374	0.313	CRWA1 V	<b>15549</b>
	2.437	0.313	CRW1 R	<b>15592<sup>1)</sup></b>
	2.441	0.500	CRWA1 R	<b>15620</b>
	2.465	0.374	CRWA1 P	<b>15624</b>
	2.502	0.313	CRWA1 R	<b>15635</b>
	2.502	0.313	CRW1 R	<b>15655</b>
	2.502	0.313	CRW1 V	<b>15656</b>
	2.561	0.313	CRW1 R	<b>15677</b>
	2.623	0.313	CRW1 R	<b>15699</b>
	2.686	0.313	CRW1 R	<b>15707</b>
	2.750	0.500	CRWH1 R	<b>15761</b>
	2.875	0.313	CRW1 R	<b>15773</b>
	2.875	0.313	CRWA1 P	<b>15779</b>

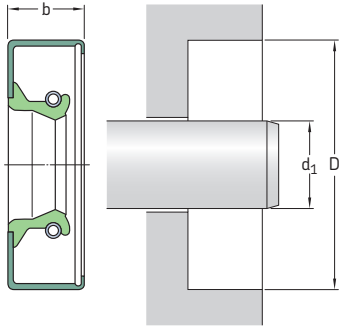
<sup>1)</sup> Without SKF Bore Tite Coating

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
d <sub>1</sub>	D			
in.			–	–
<b>1.578</b>	2.082 2.408	0.250 0.313	CRW1 R CRWHA1 R	<b>15510</b> <b>15557</b>
<b>1.594</b>	2.125 2.437 2.437	0.313 0.313 0.313	CRW1 P CRW1 P CRW1 R	<b>15915</b> <b>15940</b> <b>15955</b>
	2.502 2.623 2.758	0.313 0.313 0.313	CRW1 R CRW1 R CRW1 R	<b>15960</b> <b>15968</b> <b>15975</b>
<b>1.618</b>	2.531	0.438	CRWA1 R	<b>16449</b>
<b>1.625</b>	2.000 2.000	0.250 0.250	CRW1 V CRW1 R	<b>16039</b> <b>16046<sup>1)</sup></b>
	2.116 2.125 2.125	0.313 0.250 0.250	CRWA1 R CRW1 V CRW1 R	<b>16047</b> <b>16048</b> <b>16054</b>
	2.248 2.250 2.250 2.250 2.282	0.313 0.313 0.313 0.375 0.313	CRWA1 R CRW1 R CRW1 V CRW1 P CRW1 R	<b>16062</b> <b>16061</b> <b>16078<sup>1)</sup></b> <b>16049</b> <b>16083</b>
	2.374 2.374 2.374	0.250 0.313 0.313	CRW1 R CRWH1 R CRW1 V	<b>16094<sup>1)</sup></b> <b>16072</b> <b>16077</b>
	2.374 2.374 2.374 2.374	0.313 0.313 0.313 0.500	CRW1 R CRWA1 R CRWA1 P CRWH1 R	<b>16084</b> <b>16085</b> <b>16091<sup>1)</sup></b> <b>16079</b>
	2.437 2.437 2.437 2.437	0.313 0.313 0.313 0.313	CRW1 R CRWA1 R CRW1 V CRWA1 V	<b>16113</b> <b>16128</b> <b>16119</b> <b>16120</b>
	2.441 2.441	0.313 0.313	CRW1 R CRWA1 R	<b>16180</b> <b>16201</b>
	2.502 2.502 2.502	0.313 0.313 0.313	CRWA1 V CRW1 R CRWA1 R	<b>16243</b> <b>16245</b> <b>16246</b>
	2.502 2.502 2.502 2.562	0.313 0.374 0.375 0.313	CRWA1 P CRWHA1 V CRWHA1 R CRWA1 V	<b>16247<sup>1)</sup></b> <b>16257</b> <b>16254</b> <b>16290</b>
	2.623 2.623 2.623 2.686 2.686	0.313 0.313 0.313 0.313 0.313	CRW1 R CRWA1 R CRW1 V CRW1 R CRW1 V	<b>16314</b> <b>16315</b> <b>16316</b> <b>16337</b> <b>16338</b>
	2.750 2.750 2.758	0.250 0.313 0.313	CRW1 R CRWH1 R CRW1 R	<b>16364</b> <b>16368</b> <b>16374</b>
	2.875 3.000	0.313 0.313	CRW1 R CRWH1 R	<b>16406</b> <b>16422</b>
<b>1.645</b>	2.656	0.313	CRWA1 P	<b>16500</b>

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

## Radial shaft seals – CRW1, CRWA1, CRWH1 and CRWA1 – inch dimensions

$d_1$  1.656 – 1.813 in.



Please see pages 74 to 76 for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
$d_1$	D			
in.			–	–
<b>1.656</b>	2.623 2.686	0.375 0.313	CRWA1 P CRW1 R	<b>16545</b> <b>16556</b>
<b>1.688</b>	2.279 2.328  2.437 2.437 2.437 2.437	0.500 0.313  0.250 0.313 0.313 0.469	CRWH1 R CRWA1 R  CRW1 S CRW1 R CRWA1 R CRW1 S	<b>16650</b> <b>16657</b>  <b>16692</b> <b>16679</b> <b>16680</b> <b>16696</b>
	2.502 2.623 2.623 2.623 2.686	0.313 0.313 0.500 0.500 0.313	CRW1 R CRWA1 R CRW1 R CRWA1 V CRW1 R	<b>16719</b> <b>16814</b> <b>16816</b> <b>16817</b> <b>16842</b>
	2.716 2.750 2.750 2.875	0.313 0.313 0.375 0.313	CRW1 R CRW1 R CRWA1 R CRW1 R	<b>16854</b> <b>16900<sup>1)</sup></b> <b>16903</b> <b>16999</b>
	3.061 3.125	0.375 0.375	CRW1 R CRWA1 R	<b>17035</b> <b>17038</b>
<b>1.704</b>	3.034	0.500	CRWA1 R	<b>17100</b>
<b>1.719</b>	2.561	0.315	CRWA1 R	<b>17144</b>
<b>1.750</b>	2.250 2.250	0.313 0.313	CRW1 R CRW1 V	<b>17231</b> <b>17234</b>
	2.374 2.374 2.374	0.313 0.313 0.313	CRWA1 V CRW1 R CRWA1 R	<b>17261</b> <b>17270</b> <b>17271</b>
	2.411 2.437 2.437	0.375 0.313 0.313	CRW1 P CRW1 R CRW1 R	<b>17280</b> <b>17283</b> <b>17284</b>

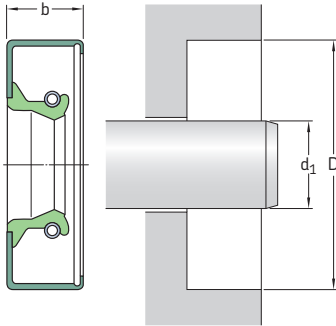
<sup>1)</sup> Without SKF Bore Tite Coating



Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
d <sub>1</sub>	D			
in.			-	-
<b>1.750</b> cont.	2.437	0.313	CRWA1 R	17285
	2.437	0.313	CRW1 V	17292
	2.437	0.313	CRWA1 V	17293
	2.441	0.313	CRW1 R	17315
	2.441	0.313	CRWA1 R	550154
	2.441	0.375	CRWA1 V	17320
	2.502	0.313	CRW1 V	17379
	2.502	0.313	CRWA1 V	17381
	2.502	0.313	CRW1 R	17386
	2.502	0.313	CRWA1 R	17387
	2.502	0.375	CRWHA1 V	17395
	2.502	0.375	CRW1 S	17399
	2.561	0.313	CRW1 R	17404
	2.565	0.313	CRWA1 R	17413
	2.623	0.313	CRW1 R	17442
	2.623	0.313	CRWA1 R	17443
	2.623	0.313	CRW1 S	17444
	2.623	0.313	CRWA1 V	17448
	2.623	0.375	CRWH1 R	17456
	2.686	0.313	CRW1 R	17484 <sup>1)</sup>
	2.717	0.438	CRWA1 R	17607
	2.750	0.313	CRWA1 R	17523
	2.750	0.313	CRW1 R	17557
	2.750	0.313	CRW1 V	17558
	2.758	0.313	CRW1 R	17605
	2.810	0.313	CRWA1 R	17624 <sup>1)</sup>
	2.810	0.313	CRWA1 V	17627
	2.875	0.313	CRW1 R	17653
	2.875	0.313	CRW1 V	17657
	2.875	0.375	CRWHA1 R	17645
	2.981	0.438	CRWHA1 R	17675 <sup>1)</sup>
	2.997	0.313	CRWHA1 R	17678
	2.997	0.313	CRW1 R	17695
	3.000	0.313	CRWA1 R	17699
	3.000	0.313	CRW1 R	17707
	3.000	0.313	CRW1 V	17709
	3.061	0.313	CRW1 R	17716
	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	
<b>1.768</b>	2.363	0.313	CRWHA1 V	17780
<b>1.781</b>	2.252	0.313	CRWA1 R	17806
	2.502	0.313	CRWH1 R	17810
	2.502	0.313	CRWH1 V	17811
	2.623	0.313	CRW1 R	17821
2.686	0.313	CRW1 R	17832 <sup>1)</sup>	
<b>1.812</b>	2.623	0.374	CRWA1 V	17949
<b>1.813</b>	2.279	0.313	CRW1 R	18025
	2.437	0.313	CRW1 R	18039
	2.562	0.313	CRWA1 V	18049

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

**Radial shaft seals – CRW1, CRWA1, CRWH1 and CRWHA1 – inch dimensions**  
 $d_1$  **1.813 – 1.938 in.**



Please see **pages 74 to 76** for housing bore requirements.

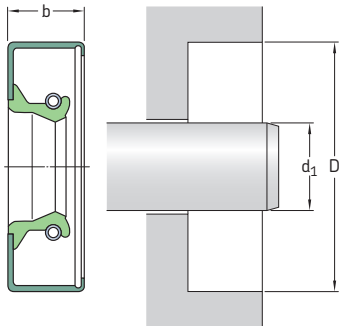
Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
$d_1$	D			
in.			–	–
<b>1.813</b>	2.623	0.313	CRW1 R	<b>18104</b>
cont.	2.686	0.313	CRWA1 P	<b>18114</b>
	2.750	0.313	CRW1 R	<b>18159</b>
	2.875	0.313	CRW1 R	<b>18242</b>
	3.000	0.375	CRWA1 P	<b>18264</b>
<b>1.844</b>	2.623	0.313	CRW1 R	<b>18425</b>
	2.750	0.313	CRW1 P	<b>18444</b>
<b>1.868</b>	2.518	0.315	CRWA1 P	<b>18492</b>
<b>1.875</b>	2.398	0.250	CRW1 R	<b>18549</b>
	2.471	0.313	CRWA1 R	<b>18545</b>
	2.500	0.313	CRW1 P	<b>18555</b>
	2.502	0.313	CRW1 R	<b>18565</b>
	2.562	0.313	CRWA1 V	<b>18546</b>
	2.562	0.313	CRW1 P	<b>18562</b>
	2.623	0.313	CRW1 R	<b>18580</b>
	2.623	0.313	CRWA1 R	<b>18581</b>
	2.623	0.313	CRW1 V	<b>18582</b>
	2.623	0.313	CRWA1 V	<b>18584</b>
	2.623	0.374	CRW1 S	<b>18592</b>
	2.686	0.313	CRW1 R	<b>18626</b>
	2.750	0.313	CRW1 V	<b>18652</b>
	2.750	0.313	CRW1 R	<b>18657</b>
	2.750	0.313	CRWA1 R	<b>18658</b>
	2.750	0.313	CRW1 P	<b>18666</b>
	2.758	0.313	CRW1 P	<b>18671</b>
	2.758	0.313	CRW1 S	<b>18679</b>
	2.782	0.438	CRWH1 R	<b>18693</b>
	2.782	0.438	CRWHA1 R	<b>18695</b>
	2.875	0.313	CRW1 V	<b>18732</b>
	2.875	0.313	CRW1 R	<b>18733</b>
	2.875	0.313	CRWA1 R	<b>18734</b>

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
d <sub>1</sub>	D			
in.			–	–
<b>1.875</b> cont.	2.875	0.313	CRWA1 V	<b>18737</b>
	2.997	0.313	CRW1 R	<b>18785</b>
	3.000	0.313	CRW1 R	<b>18817</b>
	3.000	0.313	CRW1 V	<b>18818</b>
	3.061	0.313	CRWA1 R	<b>18872</b>
	3.105	0.500	CRWA1 R	<b>18880</b>
	3.189	0.469	CRWH1 R	<b>18899</b>
	3.249	0.484	CRWA1 R	<b>18922</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>
	3.061	0.313	CRW1 R	<b>19380</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>

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

# Radial shaft seals – CRW1, CRWA1, CRWH1 and CRWAH1 – inch dimensions

$d_1$  1.969 – 2.125 in.



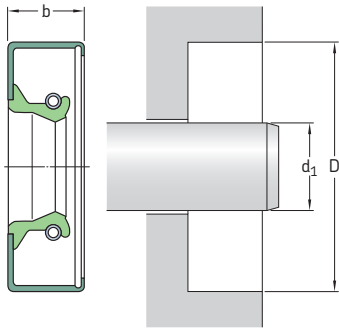
Please see pages 74 to 76 for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
$d_1$	D			
in.			–	–
<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	CRWAH1 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>
	2.997	0.375	CRWH1 R	<b>19969</b>
	2.997	0.375	CRWAH1 R	<b>19970</b>
	2.997	0.375	CRWH1 V	<b>19979</b>
	3.000	0.313	CRW1 R	<b>19992</b>
	3.000	0.313	CRWA1 R	<b>19993</b>
	3.000	0.313	CRWA1 V	<b>19995</b>

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
d <sub>1</sub>	D			
in.			–	–
<b>2.000</b>	3.000	0.375	CRWH1 V	<b>20002</b>
cont.	3.000	0.375	CRWH1 R	<b>20004</b>
	3.000	0.375	CRWHA1 R	<b>20005</b>
	3.061	0.375	CRW1 R	<b>20045</b>
	3.061	0.500	CRWH1 R	<b>20055</b>
	3.061	0.500	CRWHA1 R	<b>20059</b>
	3.125	0.375	CRW1 R	<b>20070</b>
	3.150	0.375	CRW1 R	<b>20079</b>
	3.189	0.469	CRWH1 R	<b>20098</b>
	3.189	0.469	CRWHA1 R	<b>20100</b>
	3.251	0.438	CRWH1 R	<b>20109</b>
	3.371	0.438	CRW1 V	<b>20122</b>
	3.371	0.438	CRWH1 R	<b>20124</b>
	3.371	0.438	CRWHA1 R	<b>20125</b>
	3.371	0.438	CRWH1 V	<b>20127<sup>1)</sup></b>
	3.543	0.438	CRWH1 R	<b>20140</b>
	3.623	0.438	CRWH1 R	<b>20144</b>
	4.003	0.438	CRWH1 R	<b>20158</b>
<b>2.047</b>	2.561	0.315	CRW1 R	<b>20420</b>
<b>2.063</b>	2.561	0.313	CRW1 V	<b>20520</b>
	2.750	0.313	CRWH1 R	<b>20530<sup>1)</sup></b>
	2.842	0.438	CRWH1 R	<b>20538</b>
	2.875	0.438	CRWH1 R	<b>20554</b>
	2.997	0.438	CRWH1 R	<b>20586</b>
	3.000	0.375	CRW1 R	<b>20594</b>
	3.000	0.375	CRWA1 V	<b>20596</b>
	3.061	0.313	CRWH1 R	<b>20643</b>
	3.125	0.375	CRW1 R	<b>20659</b>
	3.189	0.375	CRW1 R	<b>20702</b>
	3.251	0.438	CRWHA1 R	<b>20747</b>
	3.251	0.438	CRWH1 R	<b>20749</b>
<b>2.125</b>	2.750	0.375	CRW1 V	<b>21063<sup>1)</sup></b>
	2.750	0.500	CRWA1 R	<b>21061</b>
	2.763	0.250	CRW1 R	<b>21069</b>
	2.875	0.375	CRW1 S	<b>21103</b>
	2.875	0.438	CRW1 V	<b>21091</b>
	2.875	0.438	CRW1 R	<b>21098</b>
	2.875	0.438	CRWA1 R	<b>21100</b>
	2.875	0.438	CRWHA1 R	<b>21108</b>
	2.997	0.438	CRWH1 R	<b>21134</b>
	2.997	0.438	CRWHA1 R	<b>21136</b>
	3.000	0.313	CRWHA1 V	<b>21167</b>
	3.000	0.375	CRW1 R	<b>21163</b>
	3.000	0.375	CRWA1 R	<b>21164</b>
	3.000	0.438	CRWH1 V	<b>21171</b>
	3.000	0.438	CRWH1 R	<b>21172</b>
	3.000	0.438	CRWHA1 R	<b>21173</b>

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

**Radial shaft seals – CRW1, CRWA1, CRWH1 and CRWA1 – inch dimensions**  
 $d_1$  2.125 – 2.328 in.



Please see **pages 74 to 76** for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
$d_1$	D	b		
in.			–	–
<b>2.125</b>	3.061	0.438	CRWH1 V	<b>21215</b>
cont.	3.061	0.500	CRW1 R	<b>21210</b>
	3.061	0.500	CRWA1 R	<b>21211<sup>1)</sup></b>
	3.061	0.500	CRWA1 R	<b>21213</b>
	3.125	0.438	CRWH1 R	<b>21234</b>
	3.125	0.438	CRWA1 P	<b>21245</b>
	3.189	0.375	CRWA1 R	<b>21267</b>
	3.189	0.375	CRWA1 V	<b>21269</b>
	3.189	0.469	CRWA1 S	<b>21270</b>
	3.251	0.438	CRWH1 R	<b>21302</b>
	3.350	0.438	CRWH1 R	<b>21336</b>
	3.371	0.375	CRWA1 R	<b>21352</b>
	3.371	0.438	CRWH1 R	<b>21353</b>
	3.543	0.438	CRWH1 R	<b>21358</b>
<b>2.188</b>	2.875	0.438	CRWH1 R	<b>21736</b>
	2.997	0.438	CRWH1 R	<b>21749</b>
	3.000	0.375	CRWA1 R	<b>21759</b>
	3.000	0.375	CRWA1 V	<b>21763</b>
	3.000	0.500	CRWH1 R	<b>21764</b>
	3.061	0.500	CRWH1 R	<b>21787</b>
	3.251	0.438	CRWH1 R	<b>21840</b>
	3.350	0.438	CRWH1 R	<b>21890</b>
	3.371	0.438	CRWH1 R	<b>21910</b>
<b>2.250</b>	2.875	0.313	CRWA1 R	<b>22328</b>
	2.891	0.563	CRWA1 R	<b>22347</b>
	2.997	0.438	CRWH1 R	<b>22336</b>
	2.997	0.438	CRWA1 R	<b>22340</b>
	3.000	0.375	CRW1 R	<b>22353</b>
	3.000	0.375	CRWA1 R	<b>22354</b>
	3.000	0.375	CRWA1 V	<b>22361</b>
	3.000	0.375	CRW1 V	<b>22363</b>

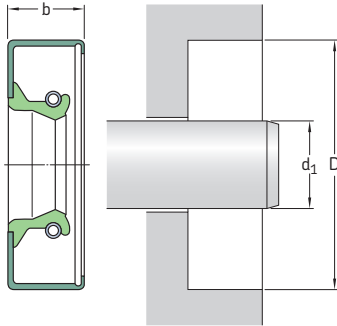
<sup>1)</sup> Without SKF Bore Tite Coating

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
d <sub>1</sub>	D			
in.			–	–
<b>2.250</b>	3.000	0.438	CRWH1 R	<b>22358</b>
cont.	3.000	0.438	CRWHA1 R	<b>22359</b>
	3.000	0.438	CRWH1 V	<b>22367</b>
	3.061	0.375	CRW1 R	<b>22382</b>
	3.061	0.438	CRWH1 R	<b>22390</b>
	3.061	0.438	CRWHA1 R	<b>22391</b>
	3.061	0.438	CRWHA1 S	<b>22394</b>
	3.125	0.375	CRWA1 R	<b>22400</b>
	3.125	0.375	CRWA1 V	<b>22405</b>
	3.125	0.500	CRWH1 R	<b>22407<sup>1)</sup></b>
	3.189	0.438	CRW1 R	<b>22424</b>
	3.189	0.438	CRWA1 P	<b>22425</b>
	3.251	0.375	CRW1 R	<b>22440</b>
	3.251	0.375	CRWA1 R	<b>22441</b>
	3.251	0.438	CRWH1 R	<b>22446</b>
	3.251	0.438	CRWHA1 R	<b>22448</b>
	3.251	0.438	CRWH1 V	<b>22449</b>
	3.350	0.375	CRW1 P	<b>22484</b>
	3.350	0.438	CRWH1 R	<b>22492<sup>1)</sup></b>
	3.350	0.438	CRWHA1 R	<b>22493</b>
	3.350	0.438	CRWH1 V	<b>22495</b>
	3.371	0.438	CRWHA1 R	<b>22532</b>
	3.371	0.438	CRWH1 R	<b>22558</b>
	3.371	0.438	CRWH1 V	<b>22561</b>
	3.500	0.438	CRWHA1 R	<b>22582</b>
	3.500	0.438	CRWH1 R	<b>22583</b>
	3.500	0.438	CRWHA1 V	<b>22590</b>
	3.565	0.438	CRWA1 R	<b>22610</b>
	3.623	0.438	CRWH1 R	<b>22618</b>
	3.623	0.438	CRWHA1 R	<b>22619</b>
	3.751	0.438	CRWH1 R	<b>22626</b>
	3.876	0.438	CRWH1 R	<b>22644</b>
	4.003	0.438	CRWH1 R	<b>22647</b>
<b>2.313</b>	2.997	0.375	CRW1 R	<b>23030</b>
	3.000	0.438	CRWH1 V	<b>23040</b>
	3.061	0.313	CRW1 R	<b>23046</b>
	3.125	0.375	CRW1 R	<b>23061</b>
	3.125	0.375	CRWA1 V	<b>23063</b>
	3.251	0.438	CRWH1 R	<b>23093</b>
	3.251	0.438	CRWHA1 V	<b>23099<sup>1)</sup></b>
	3.350	0.438	CRWH1 R	<b>23152</b>
	3.371	0.438	CRW1 R	<b>23167</b>
	3.374	0.438	CRWHA1 R	<b>23169</b>
	3.500	0.313	CRW1 R	<b>23184<sup>1)</sup></b>
	3.751	0.500	CRW1 R	<b>23277</b>
<b>2.328</b>	3.000	0.395	CRW1 P	<b>23300</b>

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

## Radial shaft seals – CRW1, CRWA1, CRWH1 and CRWA1 – inch dimensions

$d_1$  2.375 – 2.500 in.



Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Nominal seal width b	Design and lip material	Designation
Shaft	Bore			
$d_1$	D			
in.			–	–
2.375	2.997	0.438	CRWH1 R	23632
	3.000	0.375	CRW1 V	23641
	3.061	0.438	CRWH1 R	23644
	3.061	0.438	CRWH1 P	23645
	3.061	0.438	CRWH1 V	23655
	3.125	0.375	CRW1 R	23646
	3.125	0.438	CRWH1 R	23652
	3.125	0.438	CRWA1 R	23654
	3.125	0.438	CRWA1 V	23656
	3.189	0.438	CRWH1 R	23666
	3.251	0.438	CRWA1 V	23678
	3.251	0.453	CRW1 P	23685
	3.350	0.375	CRW1 R	23701
	3.350	0.375	CRWA1 R	23702
	3.350	0.375	CRW1 P	23703
	3.350	0.375	CRW1 S	23706
	3.350	0.438	CRWH1 R	23708
	3.350	0.438	CRWA1 R	23710
	3.371	0.438	CRWH1 R	23742
	3.371	0.438	CRWH1 V	23746
	3.481	0.438	CRWH1 R	23755
	3.481	0.438	CRWA1 R	23756 <sup>1)</sup>
	3.500	0.375	CRWA1 P	23770
	3.500	0.375	CRWH1 V	23771
	3.500	0.375	CRWH1 R	23779
	3.500	0.438	CRWA1 R	23782
	3.543	0.438	CRWH1 R	23808
	3.543	0.438	CRWA1 V	23809
	3.601	0.438	CRW1 R	23820
	3.623	0.438	CRWH1 R	23839

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

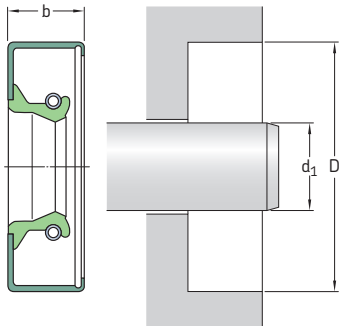


Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation	
d <sub>1</sub>	D				
in.			–	–	
<b>2.375</b> cont.	3.623	0.438	CRWHA1 P	<b>23841</b>	
	3.623	0.438	CRWHA1 V	<b>23843</b>	
	3.876	0.438	CRWH1 R	<b>23844</b>	
<b>2.438</b>	3.125	0.500	CRWH1 R	<b>24255</b>	
	3.251	0.438	CRWH1 R	<b>24263</b>	
	3.350	0.375	CRW1 R	<b>24286</b>	
	3.350	0.375	CRWA1 R	<b>24287</b>	
	3.371	0.438	CRWH1 R	<b>24320</b>	
	3.481	0.438	CRWH1 R	<b>24340</b>	
	3.500	0.438	CRWH1 R	<b>24370</b>	
	3.500	0.438	CRWH1 V	<b>24372</b>	
	3.543	0.438	CRWH1 R	<b>24445</b>	
	<b>2.500</b>	3.189	0.438	CRWH1 R	<b>24881</b>
		3.189	0.438	CRWH1 V	<b>24883</b>
		3.245	0.438	CRWH1 R	<b>24889</b>
		3.251	0.375	CRW1 R	<b>24897</b>
		3.251	0.375	CRWA1 R	<b>24898</b>
		3.251	0.375	CRWA1 V	<b>24899</b>
3.251		0.438	CRWH1 R	<b>24910</b>	
3.251		0.438	CRWHA1 R	<b>24911</b>	
3.251		0.438	CRWH1 V	<b>24914</b>	
3.251		0.438	CRWHA1 V	<b>24916</b>	
3.251		0.500	CRW1 V	<b>24913</b>	
3.350		0.438	CRWH1 R	<b>24931</b>	
3.350		0.438	CRWHA1 R	<b>24932</b>	
3.371		0.375	CRWHA1 R	<b>24934<sup>1)</sup></b>	
3.371		0.438	CRWHA1 V	<b>24936</b>	
3.371	0.438	CRWH1 R	<b>24954</b>		
3.428	0.375	CRWA1 P	<b>24949</b>		
3.428	0.375	CRWA1 R	<b>24951</b>		
3.500	0.375	CRWA1 V	<b>24971</b>		
3.500	0.438	CRW1 R	<b>24980</b>		
3.500	0.438	CRWA1 R	<b>24982</b>		
3.500	0.438	CRWH1 V	<b>24984</b>		
3.500	0.438	CRWH1 R	<b>24986</b>		
3.500	0.438	CRWHA1 R	<b>24988</b>		
3.500	0.438	CRWH1 P	<b>24989</b>		
3.500	0.438	CRWHA1 V	<b>24990</b>		
3.502	0.406	CRW1 S	<b>25082</b>		
3.543	0.438	CRWH1 R	<b>25043</b>		
3.543	0.438	CRWHA1 P	<b>25065<sup>1)</sup></b>		
3.544	0.433	CRWA1 V	<b>25037</b>		
3.623	0.375	CRW1 R	<b>25074</b>		
3.623	0.375	CRWA1 R	<b>25075</b>		
3.623	0.375	CRWA1 V	<b>25076</b>		
3.623	0.438	CRWH1 R	<b>25071<sup>1)</sup></b>		
3.751	0.438	CRWH1 R	<b>25091<sup>1)</sup></b>		
3.876	0.438	CRWH1 R	<b>25100</b>		
3.876	0.469	CRWHA1 P	<b>25102</b>		
4.003	0.375	CRWA1 R	<b>25108</b>		
4.003	0.375	CRWA1 V	<b>25110</b>		

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

# Radial shaft seals – CRW1, CRWA1, CRWH1 and CRWHA1 – inch dimensions

$d_1$  2.563 – 2.750 in.



Please see pages 74 to 76 for housing bore requirements.

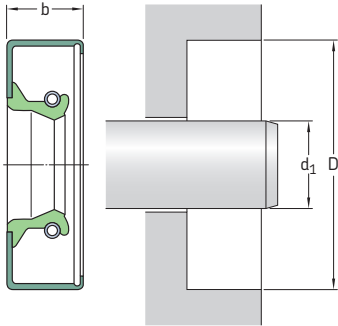
Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
$d_1$	D			
in.			–	–
<b>2.563</b>	3.481 3.500	0.500 0.438	CRWHA1 R CRWH1 R	<b>25561</b> <b>25597</b>
	3.623 3.623	0.438 0.469	CRWH1 R CRWA1 P	<b>25641</b> <b>25661</b>
	3.751 3.751 3.751	0.438 0.438 0.438	CRWH1 R CRWHA1 R CRWH1 V	<b>25713</b> <b>25714</b> <b>25725</b>
	3.873 3.876	0.438 0.438	CRWHA1 R CRWH1 R	<b>25745<sup>1)</sup></b> <b>25748</b>
<b>2.598</b>	3.481	0.438	CRWHA1 P	<b>25970</b>
<b>2.607</b>	3.350	0.375	CRWH1 P	<b>25950</b>
<b>2.625</b>	3.251 3.350 3.350 3.350 3.350	0.438 0.375 0.375 0.375 0.438	CRWH1 R CRW1 V CRW1 R CRWA1 R CRW1 R	<b>26110</b> <b>26122</b> <b>26123</b> <b>26124</b> <b>26128<sup>1)</sup></b>
	3.371 3.374 3.481	0.438 0.438 0.438	CRWHA1 R CRWHA1 R CRWH1 R	<b>26153</b> <b>26141</b> <b>26163</b>
	3.500 3.500 3.500 3.500	0.375 0.375 0.438 0.438	CRW1 V CRWA1 R CRWH1 R CRWHA1 R	<b>26177</b> <b>26186</b> <b>26189</b> <b>26190</b>
	3.500 3.543	0.438 0.438	CRWA1 P CRWH1 R	<b>26191</b> <b>26194</b>
	3.623 3.623 3.623	0.375 0.375 0.375	CRW1 V CRWA1 P CRW1 R	<b>26204</b> <b>26220</b> <b>26237</b>

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

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
d <sub>1</sub>	D	b		
in.			–	–
<b>2.625</b> cont.	3.623 3.623 3.623 3.623	0.375 0.438 0.438 0.438	CRWA1 R CRWH1 V CRWH1 R CRWHA1 R	<b>26238</b> <b>26208</b> <b>26209</b> <b>26211</b>
	3.751 3.751	0.375 0.438	CRWA1 R CRWH1 R	<b>26284</b> <b>26297</b>
	3.751 3.751	0.438 0.438	CRWHA1 R CRWHA1 V	<b>26298</b> <b>26299</b>
	3.876 3.936	0.438 0.438	CRWH1 R CRWH1 R	<b>26328</b> <b>26346</b>
	4.003 4.003	0.375 0.438	CRWA1 R CRWH1 R	<b>26354</b> <b>26356</b>
	4.370 4.438	0.438 0.438	CRWHA1 R CRWH1 R	<b>26359</b> <b>26368</b>
<b>2.688</b>	3.751 3.876 4.003	0.438 0.438 0.469	CRWH1 R CRWH1 R CRWH1 R	<b>26761</b> <b>26921</b> <b>26975</b>
<b>2.750</b>	3.481 3.500	0.438 0.375	CRW1 R CRW1 R	<b>27251<sup>1)</sup></b> <b>27268</b>
	3.500 3.500 3.500 3.538	0.375 0.375 0.438 0.438	CRWA1 R CRWA1 V CRWH1 R CRWH1 R	<b>27269</b> <b>27272</b> <b>27280</b> <b>27284</b>
	3.543 3.543 3.543	0.438 0.438 0.438	CRWH1 P CRWH1 V CRWHA1 P	<b>27292</b> <b>27293</b> <b>27295</b>
	3.623 3.623	0.438 0.438	CRWH1 V CRWH1 R	<b>27324</b> <b>27334</b>
	3.751 3.751 3.751	0.438 0.438 0.438	CRW1 R CRWA1 R CRWH1 V	<b>27361</b> <b>27362</b> <b>27365</b>
	3.751 3.751 3.751 3.765	0.438 0.438 0.438 0.438	CRWH1 R CRWHA1 R CRWA1 P CRWH1 R	<b>27368</b> <b>27370</b> <b>27377</b> <b>27426</b>
	3.876 3.876 3.876 3.876	0.433 0.438 0.438 0.438	CRWHA1 P CRWA1 R CRWH1 R CRWHA1 R	<b>27452</b> <b>27467</b> <b>27470</b> <b>27471</b>
	3.936 3.937	0.438 0.438	CRWH1 R CRWA1 P	<b>27525</b> <b>27526</b>
	4.003 4.003 4.003	0.375 0.438 0.438	CRWA1 V CRWH1 R CRWHA1 P	<b>27539</b> <b>27541</b> <b>27565<sup>1)</sup></b>
	4.249 4.249	0.438 0.438	CRWH1 R CRWHA1 P	<b>27600</b> <b>27601</b>
	4.331 4.500	0.500 0.469	CRWHA1 R CRWH1 R	<b>27625</b> <b>28848</b>

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

**Radial shaft seals – CRW1, CRWA1, CRWH1 and CRWA1 – inch dimensions**  
 $d_1$  2.813 – 3.125 in.



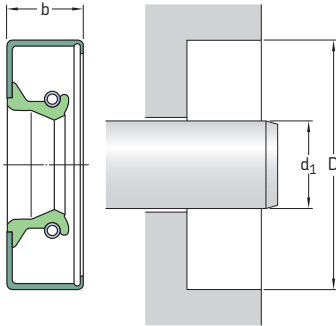
Please see **pages 74 to 76** for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width	Design and lip material	Designation
$d_1$	D	b		
in.			–	–
<b>2.813</b>	3.751	0.438	CRWH1 R	<b>28035</b>
	3.876	0.438	CRWH1 R	<b>28116</b>
	4.003	0.438	CRWH1 R	<b>28175</b>
	4.249	0.313	CRW1 R	<b>28270</b>
	4.249	0.438	CRWH1 R	<b>28275</b>
4.250	0.438	CRWH1 P	<b>28276</b>	
<b>2.844</b>	3.939	0.500	CRWA1 R	<b>28425</b>
	3.939	0.550	CRWA1 R	<b>28426</b>
	4.003	0.438	CRWH1 R	<b>28464</b>
	4.003	0.500	CRWH1 V	<b>28474</b>
<b>2.875</b>	3.623	0.438	CRWH1 R	<b>28654</b>
	3.623	0.438	CRWA1 R	<b>28655</b>
	3.751	0.375	CRWA1 R	<b>28669</b>
	3.751	0.375	CRWA1 V	<b>28670</b>
	3.751	0.438	CRWH1 R	<b>28686</b>
	3.751	0.438	CRWA1 R	<b>28687</b>
	3.751	0.438	CRWH1 P	<b>28697</b>
	3.751	0.438	CRWH1 V	<b>28698</b>
	3.751	0.438	CRWA1 V	<b>28699</b>
	3.876	0.438	CRWH1 R	<b>28745</b>
	3.876	0.438	CRWA1 R	<b>28746</b>
	3.876	0.438	CRWA1 V	<b>28748</b>
	4.003	0.375	CRWA1 R	<b>28778</b>
	4.003	0.375	CRWA1 V	<b>28779</b>
	4.003	0.438	CRWH1 R	<b>28760</b>
4.003	0.438	CRWA1 R	<b>28761</b>	
4.125	0.375	CRWH1 R	<b>28817</b>	
4.331	0.438	CRWA1 P	<b>28841</b>	

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation	
d <sub>1</sub>	D	b			
in.			–	–	
<b>2.938</b>	3.623	0.375	CRW1 R	<b>29218</b>	
	3.751	0.375	CRW1 R	<b>29223</b>	
	3.751	0.375	CRWA1 R	<b>29224</b>	
	3.751	0.375	CRWA1 V	<b>29226</b>	
	3.876	0.375	CRWHA1 R	<b>29263<sup>1)</sup></b>	
	3.876	0.375	CRWHA1 V	<b>29262</b>	
	3.937	0.438	CRWA1 P	<b>29273</b>	
	4.003	0.438	CRWH1 R	<b>29316</b>	
	4.003	0.438	CRWHA1 R	<b>29393<sup>1)</sup></b>	
	4.003	0.438	CRWA1 P	<b>29350</b>	
	4.004	0.433	CRWHA1 V	<b>29383</b>	
	4.125	0.375	CRWH1 R	<b>29184</b>	
	4.125	0.375	CRWHA1 R	<b>29385</b>	
	4.501	0.438	CRWH1 R	<b>29465</b>	
	<b>3.000</b>	3.500	0.375	CRW1 V	<b>29841</b>
		3.751	0.375	CRW1 R	<b>29865<sup>1)</sup></b>
		3.751	0.375	CRWA1 R	<b>29866</b>
		3.751	0.375	CRWA1 P	<b>29867</b>
		3.751	0.375	CRW1 V	<b>29868</b>
		3.751	0.375	CRWA1 V	<b>29870</b>
		3.751	0.438	CRWH1 R	<b>29871</b>
		3.751	0.438	CRWHA1 R	<b>29872</b>
		3.876	0.313	CRW1 V	<b>29877</b>
		3.876	0.438	CRWH1 R	<b>29887</b>
3.876		0.469	CRWH1 V	<b>29891</b>	
4.003		0.375	CRW1 R	<b>29906</b>	
4.003		0.375	CRWA1 R	<b>29907</b>	
4.003		0.375	CRWA1 V	<b>29912</b>	
4.003		0.375	CRWH1 P	<b>29950</b>	
4.003		0.438	CRWHA1 P	<b>29925<sup>1)</sup></b>	
4.003		0.438	CRWH1 R	<b>29951<sup>1)</sup></b>	
4.003		0.438	CRWHA1 R	<b>29952</b>	
4.003		0.438	CRWH1 V	<b>29958</b>	
4.125		0.438	CRWH1 R	<b>30000</b>	
4.125		0.438	CRWH1 V	<b>30003</b>	
4.249		0.438	CRWH1 R	<b>30033<sup>1)</sup></b>	
4.249		0.438	CRWHA1 P	<b>30056</b>	
4.331		0.438	CRWH1 R	<b>30060</b>	
4.376	0.438	CRWH1 R	<b>30070</b>		
4.500	0.438	CRWH1 R	<b>30087</b>		
4.500	0.438	CRWHA1 R	<b>30095</b>		
4.501	0.438	CRWH1 V	<b>30098</b>		
4.999	0.438	CRWH1 R	<b>30125</b>		
<b>3.125</b>	3.811	0.355	CRW1 V	<b>31132</b>	
	3.811	0.355	CRW1 R	<b>31135</b>	
	4.003	0.375	CRWA1 R	<b>31139</b>	
	4.003	0.375	CRWHA1 V	<b>31152</b>	
	4.003	0.438	CRWH1 R	<b>31147</b>	
	4.003	0.438	CRWHA1 R	<b>31148</b>	

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

**Radial shaft seals – CRW1, CRWA1, CRWH1 and CRWA1 – inch dimensions**  
 $d_1$  3.125 – 3.500 in.



Please see **pages 74 to 76** for housing bore requirements.

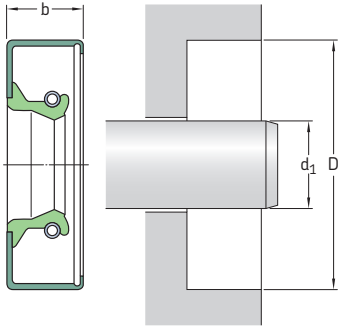
Dimensions Shaft	Bore D	Nominal seal width b	Design and lip material	Designation
$d_1$	D	b		
in.			–	–
<b>3.125</b>	4.125	0.375	CRW1 R	<b>31177</b>
cont.	4.125	0.375	CRWA1 V	<b>31179</b>
	4.125	0.438	CRWA1 P	<b>31173</b>
	4.125	0.438	CRWA1 S	<b>31185</b>
	4.125	0.438	CRWH1 R	<b>31189<sup>1)</sup></b>
	4.249	0.438	CRWH1 R	<b>31227</b>
	4.249	0.438	CRWA1 R	<b>31228</b>
	4.249	0.438	CRWA1 V	<b>31237</b>
	4.376	0.438	CRWH1 R	<b>31250</b>
	4.376	0.438	CRWA1 P	<b>31261</b>
	4.501	0.438	CRWH1 R	<b>31269</b>
	4.626	0.438	CRWH1 R	<b>31299</b>
	4.751	0.438	CRWH1 R	<b>31327</b>
	4.999	0.438	CRWH1 R	<b>31333</b>
	5.251	0.438	CRWH1 R	<b>31353</b>
<b>3.150</b>	3.946	0.394	CRW1 V	<b>31511</b>
<b>3.188</b>	4.249	0.438	CRWH1 R	<b>31758</b>
	4.376	0.438	CRWH1 R	<b>31825</b>
	4.501	0.438	CRWH1 R	<b>31855</b>
	4.626	0.438	CRWH1 R	<b>31870</b>
	4.999	0.438	CRWH1 R	<b>31955</b>
<b>3.250</b>	3.876	0.375	CRW1 P	<b>32330</b>
	4.003	0.375	CRW1 R	<b>32344</b>
	4.003	0.375	CRWA1 P	<b>32347</b>
	4.249	0.375	CRWA1 V	<b>32392</b>
	4.249	0.375	CRW1 R	<b>32393</b>
	4.249	0.375	CRWA1 R	<b>32395</b>
	4.249	0.438	CRWH1 P	<b>32380<sup>1)</sup></b>
	4.249	0.438	CRWA1 P	<b>32385</b>
	4.249	0.438	CRWH1 R	<b>32396</b>
	4.249	0.438	CRWA1 R	<b>32397</b>
	4.249	0.438	CRWH1 V	<b>32403</b>

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

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
d <sub>1</sub>	D			
in.			–	–
<b>3.250</b> cont.	4.376	0.438	CRWH1 R	<b>32424</b>
	4.500	0.438	CRWA1 P	<b>32448</b>
	4.501	0.375	CRW1 R	<b>32477</b>
	4.501	0.438	CRWH1 R	<b>32501</b>
	4.501	0.438	CRWHA1 R	<b>32502</b>
	4.626	0.433	CRWHA1 R	<b>32514<sup>1)</sup></b>
	4.626	0.438	CRWH1 R	<b>32540</b>
	4.718	0.438	CRWH1 R	<b>32555</b>
	4.751	0.438	CRWH1 R	<b>32560</b>
	4.999	0.438	CRWH1 R	<b>32582</b>
	4.999	0.438	CRWHA1 R	<b>32583</b>
<b>3.313</b>	4.125	0.438	CRWH1 R	<b>33033</b>
	4.249	0.438	CRWH1 R	<b>33073</b>
	4.500	0.438	CRWH1 R	<b>33136</b>
	4.999	0.438	CRWH1 R	<b>33306</b>
<b>3.375</b>	4.125	0.375	CRW1 R	<b>33645</b>
	4.125	0.375	CRWA1 V	<b>34647</b>
	4.249	0.438	CRWHA1 R	<b>33665</b>
	4.280	0.406	CRWA1 S	<b>33654</b>
	4.376	0.375	CRWA1 V	<b>33699</b>
	4.376	0.375	CRW1 R	<b>33700</b>
	4.376	0.375	CRWA1 R	<b>33701</b>
	4.376	0.438	CRWH1 R	<b>33711</b>
	4.376	0.438	CRWHA1 R	<b>33712</b>
	4.501	0.438	CRWA1 V	<b>33733</b>
	4.501	0.438	CRWH1 R	<b>33735</b>
	4.626	0.438	CRWH1 R	<b>33772</b>
	4.626	0.438	CRWHA1 R	<b>33773</b>
	4.626	0.438	CRWHA1 V	<b>33775</b>
	4.686	0.438	CRWH1 R	<b>33807<sup>1)</sup></b>
	4.999	0.438	CRWH1 R	<b>33837<sup>1)</sup></b>
	5.251	0.438	CRWHA1 R	<b>33866</b>
<b>3.438</b>	4.249	0.375	CRW1 R	<b>34256</b>
	4.501	0.375	CRWA1 R	<b>34279</b>
	4.501	0.438	CRWH1 R	<b>34282</b>
	4.501	0.438	CRWHA1 R	<b>34283</b>
	4.626	0.438	CRWH1 R	<b>34336</b>
	4.626	0.438	CRWHA1 R	<b>34338</b>
	4.751	0.438	CRWA1 R	<b>34379</b>
	4.756	0.438	CRWH1 R	<b>34383</b>
	4.876	0.438	CRWH1 R	<b>34398</b>
	4.999	0.438	CRWH1 R	<b>34407</b>
	4.999	0.438	CRWHA1 R	<b>34408</b>
<b>3.500</b>	4.249	0.438	CRWHA1 V	<b>34857</b>
	4.376	0.375	CRW1 R	<b>34860</b>
	4.376	0.375	CRWA1 R	<b>34861</b>
	4.376	0.375	CRWA1 V	<b>34866</b>
	4.376	0.433	CRWHA1 V	<b>34869</b>
	4.376	0.438	CRWH1 R	<b>34867</b>
	4.376	0.438	CRWHA1 R	<b>34868</b>

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

**Radial shaft seals – CRW1, CRWA1, CRWH1 and CRWA1 – inch dimensions**  
 $d_1$  3.500 – 3.875 in.



Please see **pages 74 to 76** for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
$d_1$	D			
in.			–	–
<b>3.500</b>	4.501	0.375	CRWA1 V	<b>34883</b>
cont.	4.501	0.375	CRW1 R	<b>34886</b>
	4.501	0.375	CRWA1 R	<b>34887</b>
	4.501	0.438	CRWH1 R	<b>34888</b>
	4.501	0.438	CRWA1 V	<b>34889</b>
	4.501	0.438	CRWA1 P	<b>34891<sup>1)</sup></b>
	4.501	0.438	CRWH1 V	<b>34892</b>
	4.626	0.438	CRWH1 R	<b>34985</b>
	4.751	0.375	CRWA1 V	<b>35039</b>
	4.751	0.375	CRWA1 P	<b>35040</b>
	4.751	0.438	CRWH1 R	<b>35012</b>
	4.751	0.438	CRWA1 R	<b>35020</b>
	4.751	0.625	CRWH1 R	<b>35029</b>
	4.999	0.438	CRWA1 V	<b>35080</b>
	4.999	0.438	CRWH1 R	<b>35082</b>
	4.999	0.438	CRWA1 P	<b>35083</b>
	5.126	0.438	CRWH1 R	<b>35086</b>
	5.126	0.438	CRWA1 R	<b>35095</b>
	5.251	0.438	CRWH1 R	<b>35096</b>
<b>3.563</b>	4.501	0.438	CRWH1 R	<b>35556</b>
	4.626	0.438	CRWH1 R	<b>35593</b>
	4.751	0.438	CRWH1 R	<b>35649</b>
	4.876	0.438	CRWH1 R	<b>35676</b>
	4.999	0.438	CRWH1 R	<b>35716</b>
<b>3.625</b>	4.376	0.375	CRWA1 V	<b>36153</b>
	4.376	0.375	CRWA1 R	<b>36155</b>
	4.376	0.375	CRWH1 R	<b>36157</b>
	4.376	0.375	CRWH1 P	<b>36158</b>
	4.501	0.375	CRW1 R	<b>36166</b>

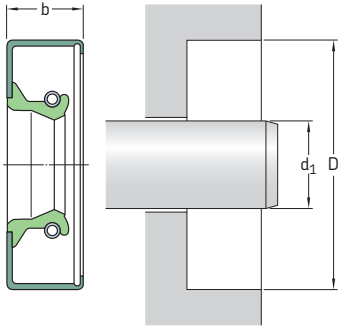
<sup>1)</sup> Without SKF Bore Tite Coating



Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
d <sub>1</sub>	D			
in.			–	–
<b>3.625</b>	4.626	0.375	CRW1 R	<b>36177</b>
cont.	4.626	0.375	CRWA1 V	<b>36179</b>
	4.626	0.438	CRWH1 R	<b>36185</b>
	4.626	0.438	CRWHA1 R	<b>36186</b>
	4.751	0.438	CRWH1 R	<b>36220</b>
	4.751	0.500	CRWA1 S	<b>36234</b>
	4.876	0.438	CRWH1 R	<b>36314</b>
	4.999	0.375	CRWA1 V	<b>36359</b>
	4.999	0.375	CRWA1 R	<b>36361</b>
	4.999	0.438	CRWH1 R	<b>36363</b>
	4.999	0.438	CRWHA1 R	<b>36364</b>
	5.251	0.375	CRWA1 R	<b>36382</b>
	5.375	0.438	CRWHA1 R	<b>36391</b>
<b>3.688</b>	4.501	0.438	CRWHA1 R	<b>36740</b>
	4.751	0.438	CRWH1 R	<b>36770</b>
	4.999	0.438	CRWH1 R	<b>36880</b>
	5.126	0.438	CRWA1 R	<b>36895</b>
	5.626	0.438	CRWA1 R	<b>36910</b>
<b>3.750</b>	4.501	0.375	CRW1 R	<b>37327<sup>1)</sup></b>
	4.501	0.375	CRW1 V	<b>37328</b>
	4.501	0.469	CRWHA1 P	<b>37330</b>
	4.502	0.469	CRWHA1 V	<b>37332</b>
	4.750	0.438	CRWHA1 P	<b>37403</b>
	4.751	0.375	CRW1 P	<b>37387</b>
	4.751	0.375	CRW1 R	<b>37388</b>
	4.751	0.375	CRWA1 R	<b>37389</b>
	4.751	0.438	CRWA1 P	<b>37390</b>
	4.751	0.438	CRWHA1 S	<b>37395</b>
	4.751	0.438	CRWH1 R	<b>37396</b>
	4.751	0.438	CRWH1 V	<b>37405</b>
	4.876	0.438	CRWH1 R	<b>37433</b>
	4.999	0.375	CRW1 V	<b>37524</b>
	4.999	0.375	CRW1 R	<b>37525</b>
	4.999	0.375	CRWA1 R	<b>37526</b>
	4.999	0.438	CRWH1 R	<b>37532</b>
	4.999	0.438	CRWHA1 R	<b>37533</b>
	5.251	0.438	CRWH1 R	<b>37574</b>
	5.251	0.438	CRWH1 V	<b>37577</b>
<b>3.875</b>	4.751	0.375	CRW1 R	<b>38646</b>
	4.751	0.375	CRWA1 R	<b>38647</b>
	4.751	0.375	CRWA1 V	<b>38649</b>
	4.751	0.438	CRWH1 R	<b>38653</b>
	4.876	0.438	CRWHA1 R	<b>38673</b>
	4.876	0.500	CRWH1 R	<b>38669</b>
	4.876	0.500	CRWHA1 V	<b>38678</b>
	4.999	0.375	CRW1 R	<b>38691</b>
	4.999	0.375	CRWA1 R	<b>38692</b>
	4.999	0.375	CRWA1 V	<b>38694</b>
	5.126	0.438	CRWHA1 V	<b>38702</b>
	5.126	0.438	CRWH1 R	<b>38703</b>
	5.126	0.438	CRWHA1 R	<b>38713</b>

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

**Radial shaft seals – CRW1, CRWA1, CRWH1 and CRWA1 – inch dimensions**  
 $d_1$  3.875 – 4.477 in.



Please see **pages 74 to 76** for housing bore requirements.

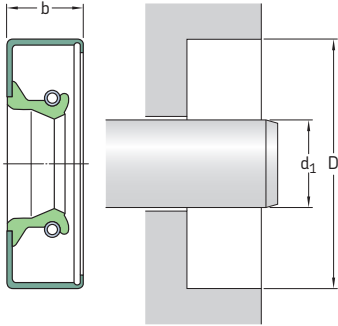
Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
$d_1$	D			
in.			–	–
<b>3.875</b>	5.251	0.438	CRWH1 R	<b>38730</b>
cont.	5.251	0.438	CRWA1 R	<b>38731</b>
	5.251	0.438	CRWA1 P	<b>38739</b>
	5.376	0.438	CRWH1 R	<b>38745</b>
	5.626	0.433	CRWA1 R	<b>38758</b>
	5.690	0.500	CRWH1 R	<b>38774</b>
<b>3.938</b>	4.876	0.438	CRWH1 R	<b>39245</b>
	4.999	0.438	CRWH1 R	<b>39275</b>
	4.999	0.438	CRWH1 V	<b>39276</b>
	4.999	0.438	CRWH1 R	<b>39277</b>
	5.126	0.472	CRWA1 V	<b>39304</b>
	5.251	0.438	CRWH1 R	<b>39320</b>
	5.375	0.438	CRWH1 R	<b>39350</b>
	5.501	0.438	CRWH1 R	<b>39423</b>
<b>4.000</b>	4.876	0.438	CRW1 R	<b>39851</b>
	4.999	0.375	CRW1 P	<b>39895</b>
	4.999	0.375	CRWA1 V	<b>39921</b>
	4.999	0.375	CRW1 R	<b>39922</b>
	4.999	0.375	CRWA1 R	<b>39923</b>
	4.999	0.438	CRWA1 P	<b>39930</b>
	4.999	0.438	CRWH1 V	<b>39932</b>
	4.999	0.438	CRWH1 R	<b>39933</b>
	4.999	0.438	CRWA1 R	<b>39934</b>
	4.999	0.438	CRWH1 S	<b>39935</b>
	5.126	0.438	CRWH1 R	<b>39975</b>
	5.251	0.438	CRWH1 V	<b>39996</b>
	5.251	0.438	CRWH1 R	<b>39997</b>
	5.251	0.438	CRWA1 R	<b>40000</b>
	5.310	0.500	CRWA1 R	<b>40020</b>
	5.376	0.438	CRWH1 R	<b>40036</b>
	5.501	0.438	CRWH1 R	<b>40049</b>

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
d <sub>1</sub>	D			
in.			–	–
<b>4.000</b>	5.626	0.375	CRWA1 R	<b>40077</b>
cont.	5.626	0.438	CRWH1 R	<b>40078</b>
	5.751	0.438	CRWH1 R	<b>40108</b>
	6.001	0.500	CRWH1 R	<b>40138</b>
	6.250	0.500	CRWH1 R	<b>40158</b>
<b>4.125</b>	4.999	0.438	CRWH1 R	<b>41125</b>
	4.999	0.438	CRWH1 V	<b>41126<sup>1)</sup></b>
	5.126	0.438	CRWH1 R	<b>41170</b>
	5.126	0.438	CRWH1 V	<b>41171</b>
	5.251	0.438	CRWH1 R	<b>41185</b>
	5.251	0.438	CRWH1 V	<b>41186</b>
	5.501	0.438	CRWH1 R	<b>41265</b>
	5.501	0.438	CRWH1 V	<b>41266</b>
	5.751	0.438	CRWH1 R	<b>41287</b>
	6.001	0.438	CRWH1 R	<b>41305</b>
	6.001	0.438	CRWH1 V	<b>41307</b>
<b>4.250</b>	5.251	0.375	CRWA1 R	<b>42419</b>
	5.251	0.375	CRW1 S	<b>42422</b>
	5.251	0.438	CRWH1 R	<b>42426</b>
	5.251	0.438	CRWHA1 R	<b>42427</b>
	5.251	0.438	CRWH1 V	<b>42433</b>
	5.373	0.438	CRWA1 V	<b>42474</b>
	5.376	0.438	CRWH1 R	<b>42475</b>
	5.501	0.438	CRWH1 R	<b>42528</b>
	5.626	0.438	CRWA1 R	<b>42557</b>
	5.751	0.438	CRWH1 R	<b>42573</b>
	5.876	0.500	CRWH1 V	<b>42592</b>
	6.001	0.500	CRWH1 R	<b>42616</b>
	6.126	0.500	CRWH1 R	<b>42635</b>
	6.250	0.500	CRWH1 R	<b>42644</b>
<b>4.313</b>	5.501	0.433	CRWHA1 P	<b>43072</b>
	5.501	0.438	CRWHA1 R	<b>43073</b>
<b>4.331</b>	5.626	0.472	CRWHA1 V	<b>43345</b>
<b>4.375</b>	5.376	0.438	CRWH1 R	<b>43650</b>
	5.501	0.438	CRWH1 R	<b>43691</b>
	5.751	0.438	CRWH1 R	<b>43751</b>
	6.001	0.500	CRWH1 R	<b>43771</b>
	6.063	0.500	CRWH1 R	<b>54197<sup>4)</sup></b>
	6.250	0.500	CRWH1 R	<b>43820</b>
<b>4.438</b>	5.501	0.500	CRWH1 R	<b>44275</b>
	5.501	0.500	CRWH1 V	<b>44276</b>
	5.751	0.500	CRWH1 R	<b>44295</b>
	6.001	0.500	CRWH1 R	<b>44320</b>
	6.250	0.500	CRWH1 R	<b>44350</b>
<b>4.477</b>	6.250	0.500	CRWH1 R	<b>44630</b>

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

# Radial shaft seals – CRW1, CRWA1, CRWH1 and CRWA1 – inch dimensions

$d_1$  4.500 – 5.125 in.



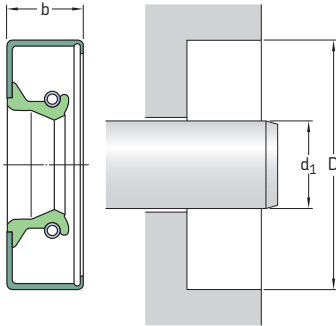
Please see pages 74 to 76 for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width	Design and lip material	Designation
$d_1$	D	b		
in.			–	–
4.500	5.251	0.438	CRWH1 R	44913
	5.251	0.438	CRWA1 V	44917
	5.376	0.438	CRWH1 R	44920
	5.376	0.438	CRWA1 V	44926
	5.501	0.375	CRW1 R	44959
	5.501	0.375	CRWA1 R	44960
	5.501	0.435	CRWH1 V	44980
	5.501	0.438	CRWH1 R	44967
	5.501	0.438	CRWA1 R	44968
	5.501	0.438	CRWH1 V	44973
	5.626	0.438	CRWH1 R	45032
	5.626	0.438	CRWA1 V	45033
	5.751	0.375	CRWA1 V	45064
	5.751	0.438	CRWH1 R	45069
	5.751	0.438	CRWA1 R	45070
	6.001	0.500	CRWH1 R	45110
	6.001	0.500	CRWA1 R	45111
	6.001	0.500	CRWA1 V	45112
	6.126	0.563	CRWH1 R	45140
	6.250	0.500	CRWH1 R	45150
4.625	5.626	0.500	CRWH1 R	46144
	5.626	0.500	CRWH1 V	46155
	5.751	0.500	CRWH1 R	46200
	5.751	0.500	CRWH1 S	46208
	6.001	0.500	CRWH1 R	46285
	6.250	0.500	CRWH1 R	46324
4.688	5.751	0.512	CRWH1 S	46770
	5.751	0.512	CRWH1 R	46800
	6.250	0.500	CRWH1 R	46950

Dimensions Shaft d <sub>1</sub>	Bore D	Nominal seal width b	Design and lip material	Designation
in.			–	–
<b>4.750</b>	5.749	0.438	CRW1 P	<b>47375</b>
	5.751	0.500	CRW1 V	<b>47379</b>
	5.751	0.500	CRWA1 V	<b>47382</b>
	5.751	0.500	CRW1 R	<b>47383</b>
	5.751	0.500	CRWH1 R	<b>47394</b>
	5.751	0.500	CRWHA1 R	<b>47395</b>
	5.875	0.500	CRWH1 R	<b>47441</b>
	6.001	0.500	CRWH1 R	<b>47474</b>
	6.001	0.500	CRWHA1 R	<b>47475</b>
	6.001	0.500	CRW1 V	<b>47481</b>
	6.250	0.500	CRWH1 R	<b>47583</b>
	6.250	0.500	CRWHA1 V	<b>47586</b>
<b>4.813</b>	5.751	0.563	CRWH1 P	<b>48060</b>
	5.751	0.563	CRWH1 V	<b>48062</b>
	5.751	0.563	CRWH1 S	<b>48065</b>
<b>4.875</b>	6.001	0.500	CRWH1 V	<b>48692</b>
	6.001	0.500	CRWH1 R	<b>48693</b>
	6.126	0.500	CRWH1 R	<b>48726</b>
	6.250	0.500	CRWHA1 R	<b>48768</b>
	6.250	0.500	CRWH1 R	<b>48769</b>
	6.250	0.500	CRWH1 V	<b>48772</b>
<b>4.921</b>	6.375	0.500	CRWHA1 V	<b>49274</b>
<b>4.938</b>	6.001	0.500	CRWH1 R	<b>49251</b>
	6.250	0.500	CRWH1 R	<b>49301</b>
<b>5.000</b>	6.001	0.500	CRWHA1 V	<b>49927</b>
	6.001	0.500	CRWH1 R	<b>49928</b>
	6.001	0.500	CRWHA1 R	<b>49929</b>
	6.126	0.500	CRW1 V	<b>49960</b>
	6.250	0.500	CRWH1 R	<b>49966</b>
	6.250	0.500	CRW1 R	<b>49984</b>
	6.250	0.500	CRWA1 R	<b>49985</b>
	6.250	0.500	CRWH1 P	<b>49990<sup>1)</sup></b>
	6.250	0.500	CRWH1 V	<b>49991</b>
	6.250	0.500	CRWHA1 R	<b>49998</b>
	6.375	0.500	CRWH1 R	<b>50130</b>
	6.375	0.500	CRWHA1 R	<b>50138</b>
	6.500	0.500	CRWH1 R	<b>50148</b>
	6.500	0.500	CRWH1 V	<b>50151</b>
	6.750	0.500	CRWH1 R	<b>50168</b>
6.750	0.500	CRWHA1 R	<b>50172</b>	
<b>5.063</b>	6.126	0.500	CRWH1 R	<b>50618</b>
	6.375	0.500	CRWH1 R	<b>50650</b>
<b>5.125</b>	6.126	0.500	CRWHA1 R	<b>51240</b>
	6.126	0.500	CRW1 V	<b>51243</b>
	6.126	0.500	CRW1 R	<b>51247</b>
	6.250	0.500	CRWHA1 R	<b>51252</b>
	6.250	0.500	CRWA1 V	<b>51253</b>
	6.375	0.500	CRWH1 R	<b>51248<sup>1)</sup></b>
	6.375	0.500	CRWH1 V	<b>51255</b>

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

**Radial shaft seals – CRW1, CRWA1, CRWH1 and CRWA1 – inch dimensions**  
 $d_1$  5.188 – 7.000 in.



Please see **pages 74 to 76** for housing bore requirements.

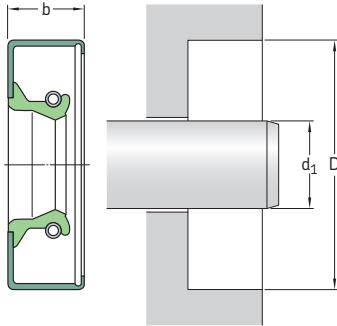
Dimensions Shaft	Bore	Nominal seal width	Design and lip material	Designation
$d_1$	D	b		
in.			–	–
<b>5.188</b>	6.501	0.625	CRWH1 V	<b>51852</b>
<b>5.250</b>	6.001	0.375	CRW1 R	<b>52440</b>
	6.001	0.500	CRWH1 V	<b>52443</b>
	6.250	0.500	CRWH1 R	<b>52445</b>
	6.250	0.500	CRWH1 V	<b>52447</b>
	6.500	0.500	CRWH1 R	<b>52488</b>
	6.500	0.500	CRWH1 V	<b>52489</b>
	6.750	0.500	CRWH1 R	<b>52648</b>
	6.750	0.500	CRWH1 V	<b>52649</b>
<b>5.375</b>	6.625	0.500	CRWH1 R	<b>53701</b>
	6.625	0.500	CRWH1 V	<b>53702</b>
	6.750	0.500	CRWH1 V	<b>53771</b>
	6.750	0.500	CRWH1 R	<b>53775</b>
<b>5.500</b>	6.250	0.500	CRWA1 R	<b>54925</b>
	6.500	0.500	CRWH1 R	<b>54931</b>
	6.500	0.500	CRWH1 V	<b>54934</b>
	6.500	0.500	CRWH1 P	<b>54936</b>
	6.750	0.500	CRW1 R	<b>54959</b>
	6.750	0.500	CRWA1 R	<b>54960</b>
	6.750	0.500	CRWA1 R	<b>54971</b>
	6.750	0.500	CRWH1 R	<b>54972</b>
	6.750	0.500	CRWH1 V	<b>54974</b>
<b>5.512</b>	6.693	0.472	CRWH1 V	<b>546747<sup>1)</sup></b>
<b>5.625</b>	6.625	0.500	CRWH1 R	<b>56101</b>
	6.625	0.500	CRWH1 V	<b>56102</b>
	6.875	0.500	CRWH1 R	<b>56136</b>
	6.875	0.500	CRWH1 V	<b>56137</b>

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

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
d <sub>1</sub>	D			
in.			–	–
<b>5.625</b> cont.	7.125 7.125	0.500 0.500	CRWHA1 R CRWHA1 V	<b>56160</b> <b>56161</b>
<b>5.750</b>	6.625 6.625	0.500 0.500	CRWH1 R CRW1 V	<b>57505</b> <b>57506</b>
	6.750 6.750 6.751	0.500 0.500 0.500	CRWH1 R CRWH1 V CRWHA1 R	<b>57510</b> <b>57522</b> <b>57509<sup>1)</sup></b>
	7.000 7.000 7.000	0.500 0.500 0.500	CRWH1 R CRWH1 V CRWHA1 R	<b>57521</b> <b>57523</b> <b>57531</b>
<b>5.875</b>	7.125 7.125 7.125	0.500 0.500 0.500	CRWH1 R CRWH1 V CRWHA1 R	<b>58716</b> <b>58717</b> <b>58741</b>
	7.500	0.500	CRWH1 R	<b>58760</b>
<b>6.000</b>	6.750 6.750	0.500 0.500	CRWA1 V CRW1 V	<b>59999</b> <b>60000</b>
	7.500 7.500 7.500	0.500 0.500 0.500	CRWA1 R CRWHA1 V CRWHA1 R	<b>60016</b> <b>60026</b> <b>60028</b>
<b>6.125</b>	7.125 7.625 7.625	0.625 0.625 0.625	CRWH1 R CRWH1 R CRWH1 P	<b>61210<sup>1)</sup></b> <b>61255<sup>1)</sup></b> <b>61256<sup>1)</sup></b>
<b>6.250</b>	7.252 7.500 7.500	0.500 0.500 0.500	CRWH1 R CRWH1 R CRWH1 V	<b>62482<sup>1)</sup></b> <b>62495<sup>1)</sup></b> <b>62497</b>
	7.750 7.875	0.500 0.625	CRWH1 R CRWH1 R	<b>62535</b> <b>62572</b>
<b>6.375</b>	7.375	0.625	CRWH1 R	<b>63700</b>
	7.875 7.875	0.563 0.625	CRWHA1 R CRWH1 R	<b>63734</b> <b>63733<sup>1)</sup></b>
<b>6.500</b>	7.500 7.500 7.500	0.500 0.500 0.500	CRWA1 R CRWH1 R CRWH1 V	<b>64993</b> <b>64994<sup>1)</sup></b> <b>64998</b>
	8.000 8.000	0.500 0.500	CRW1 R CRWHA1 R	<b>65021</b> <b>65037<sup>1)</sup></b>
<b>6.625</b>	8.125	0.500	CRWH1 R	<b>66241<sup>1)</sup></b>
<b>6.750</b>	8.000 8.250	0.500 0.500	CRWH1 R CRWH1 R	<b>67515</b> <b>67533<sup>1)</sup></b>
<b>6.875</b>	8.375	0.500	CRWH1 R	<b>68745<sup>1)</sup></b>
<b>7.000</b>	8.000 8.250	0.630 0.625	CRWH1 R CRWH1 R	<b>70016</b> <b>70028<sup>1)</sup></b>
	8.500 8.500 8.500 8.500	0.500 0.625 0.625 0.625	CRWA1 R CRWH1 R CRWHA1 R CRWHA1 V	<b>70080</b> <b>70052</b> <b>70053</b> <b>70054</b>

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

**Radial shaft seals – CRW1, CRWA1, CRWH1 and CRWA1 – inch dimensions**  
 $d_1$  7.125 – 12.250 in.



Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Nominal seal width b	Design and lip material	Designation
Shaft	Bore			
$d_1$	D			
in.				
<b>7.125</b>	8.625	0.625	CRWH1 R	<b>71245<sup>1)</sup></b>
<b>7.250</b>	8.250	0.625	CRW1 R	<b>72515<sup>1)</sup></b>
	8.750	0.625	CRWA1 R	<b>72539</b>
	8.750	0.750	CRWH1 P	<b>72542<sup>1)</sup></b>
	9.055	0.625	CRWA1 R	<b>72570</b>
<b>7.375</b>	8.875	0.625	CRWH1 R	<b>73745<sup>1)</sup></b>
<b>7.500</b>	8.500	0.625	CRWH1 R	<b>75030<sup>1)</sup></b>
	9.000	0.625	CRWH1 R	<b>75050</b>
	9.000	0.625	CRWA1 P	<b>75052</b>
<b>7.625</b>	8.625	0.563	CRWH1 R	<b>76215<sup>1)</sup></b>
	9.125	0.625	CRWH1 R	<b>76255<sup>1)</sup></b>
<b>7.750</b>	9.250	0.625	CRWH1 R	<b>77540<sup>1)</sup></b>
<b>7.875</b>	9.250	1.000	CRWA1 R	<b>78725<sup>1)</sup></b>
	9.375	0.625	CRWH1 R	<b>78738<sup>1)</sup></b>
<b>8.000</b>	9.000	0.625	CRWH1 R	<b>79960<sup>1)</sup></b>
	9.000	0.625	CRWA1 R	<b>79961<sup>1)</sup></b>
<b>8.125</b>	9.250	0.625	CRWH1 R	<b>79997<sup>1)</sup></b>
	9.250	0.625	CRWA1 R	<b>79998</b>
	9.500	0.625	CRWH1 R	<b>80010</b>
	10.000	0.625	CRWA1 R	<b>80038<sup>1)</sup></b>
<b>8.125</b>	10.125	0.625	CRWH1 R	<b>81245<sup>1)</sup></b>
	10.125	0.625	CRWA1 R	<b>81246<sup>1)</sup></b>
<b>8.250</b>	9.250	0.625	CRWH1 R	<b>82510<sup>1)</sup></b>
	9.252	0.500	CRWH1 R	<b>82527</b>
	9.500	0.578	CRW1 R	<b>541405<sup>1)</sup></b>
	10.250	0.625	CRWH1 R	<b>82560<sup>1)</sup></b>

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



Dimensions Shaft d <sub>1</sub>	Bore D	Nominal seal width b	Design and lip material	Designation
in.			–	–
<b>8.500</b>	9.750	0.625	CRWH1 R	<b>85002</b>
	10.000	0.625	CRWH1 R	<b>85009<sup>1)</sup></b>
	10.500	0.625	CRWH1 R	<b>85015<sup>1)</sup></b>
	10.625	0.625	CRWHA1 R	<b>85085<sup>1)</sup></b>
<b>8.625</b>	10.625	0.625	CRWH1 R	<b>86260<sup>1)</sup></b>
<b>8.750</b>	10.750	0.625	CRWH1 R	<b>87541<sup>1)</sup></b>
<b>8.875</b>	10.125	0.625	CRWH1 R	<b>88710<sup>1)</sup></b>
	10.875	0.625	CRWH1 R	<b>88760<sup>1)</sup></b>
<b>9.000</b>	10.000	0.625	CRWH1 R	<b>90006<sup>1)</sup></b>
	11.000	0.625	CRWH1 R	<b>90036<sup>1)</sup></b>
<b>9.250</b>	11.250	0.625	CRWHA1 R	<b>92536</b>
	12.750	0.625	CRWHA1 R	<b>92570<sup>1)</sup></b>
	12.750	1.250	CRWHA1 R	<b>92574<sup>1)</sup></b>
<b>9.500</b>	10.500	0.438	CRW1 R	<b>95048</b>
	11.500	0.625	CRW1 R	<b>95062</b>
<b>9.625</b>	11.625	0.625	CRWH1 R	<b>96245<sup>1)</sup></b>
	11.125	0.625	CRWH1 R	<b>97542<sup>1)</sup></b>
	11.250	0.625	CRWH1 R	<b>97545<sup>1)</sup></b>
	11.750	0.625	CRWH1 R	<b>97550<sup>1)</sup></b>
<b>10.000</b>	11.252	0.625	CRWHA1 R	<b>100044<sup>1)</sup></b>
	12.000	0.625	CRWH1 R	<b>100051<sup>1)</sup></b>
	12.000	0.625	CRWA1 R	<b>100075</b>
<b>10.250</b>	11.250	0.563	CRWH1 R	<b>102520<sup>1)</sup></b>
	12.250	0.625	CRWH1 R	<b>102540<sup>1)</sup></b>
<b>10.500</b>	11.750	0.625	CRWH1 R	<b>105010<sup>1)</sup></b>
	12.500	0.625	CRWH1 R	<b>105051<sup>1)</sup></b>
<b>10.750</b>	12.750	0.625	CRWH1 R	<b>107551<sup>1)</sup></b>
<b>11.000</b>	12.250	0.625	CRWHA1 R	<b>110030<sup>1)</sup></b>
	13.000	0.625	CRWH1 R	<b>110051<sup>1)</sup></b>
<b>11.375</b>	13.000	0.625	CRW1 R	<b>113740<sup>1)</sup></b>
<b>11.500</b>	13.000	0.625	CRWH1 R	<b>115021<sup>1)</sup></b>
	13.500	0.625	CRWH1 R	<b>115041<sup>1)</sup></b>
<b>12.000</b>	14.000	0.625	CRW1 R	<b>120060<sup>1)</sup></b>
<b>12.250</b>	13.375	0.625	CRWH1 R	<b>122555<sup>1)</sup></b>
	13.813	0.625	CRW1 R	<b>122580<sup>1)</sup></b>
	14.250	1.000	CRWHA1 R	<b>122590<sup>1)</sup></b>

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

## Radial shaft seals

### CRW5 and CRWA5 seals

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 57 and 58** 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.

**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.

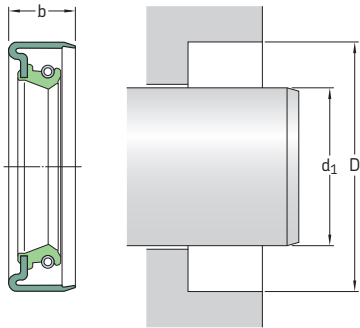
The CRW5 and CRWA5 seals are available in inch sizes with sealing lips made of either nitrile rubber or the SKF fluoro rubber compound SKF Duralife. Other materials are also available on request.

See **matrix 1** on **pages 90 and 91** for permissible operating conditions.



## Radial shaft seals – CRW5 and CRWA5 – inch dimensions

$d_1$  0.313 – 0.875 in.



2.3

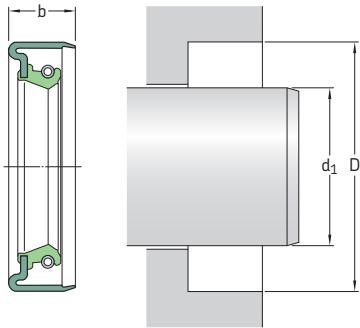
Please see pages 74 to 76 for housing bore requirements.

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

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

## Radial shaft seals – CRW5 and CRWA5 – inch dimensions

$d_1$  0.984 – 2.500 in.



Please see **pages 74 to 76** for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
$d_1$	D			
in.			–	–
<b>0.984</b>	1.596 1.752	0.250 0.313	CRWA5 R CRWA5 V	<b>9700</b> <b>9805</b>
<b>1.000</b>	1.375 1.499 1.499 1.499	0.250 0.250 0.250 0.250	CRWA5 R CRWA5 R CRW5 R CRWA5 V	<b>9814</b> <b>9843</b> <b>9855<sup>1)</sup></b> <b>9858</b>
	1.500 1.752 2.000	0.250 0.313 0.313	CRWA5 R CRWA5 R CRWA5 R	<b>9863</b> <b>9967</b> <b>10131</b>
<b>1.125</b>	1.626	0.250	CRWA5 V	<b>11139</b>
<b>1.250</b>	1.687 1.750 1.750	0.313 0.250 0.250	CRWA5 R CRWA5 V CRWA5 R	<b>12333</b> <b>12339</b> <b>12360</b>
	1.997 2.328 2.502	0.438 0.500 0.500	CRWA5 V CRWA5 R CRWA5 R	<b>12438</b> <b>12609</b> <b>12640</b>
<b>1.500</b>	1.997 2.064 2.311 2.328	0.250 0.375 0.500 0.500	CRWA5 V CRWA5 V CRWA5 V CRWA5 R	<b>14844</b> <b>14868</b> <b>14979</b> <b>14977</b>
<b>1.750</b>	2.502	0.500	CRWA5 R	<b>17374</b>
<b>1.938</b>	2.675 2.835	0.250 0.250	CRWA5 R CRWA5 R	<b>19213</b> <b>19278</b>
<b>2.500</b>	3.251	0.350	CRWA5 R	<b>24892</b>

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



## Radial shaft seals

### HDW1 seals

HDW1 seals are heavy-duty SKF Wave lip seals, designed for use in grease or oil lubricated applications. The seals are produced 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.

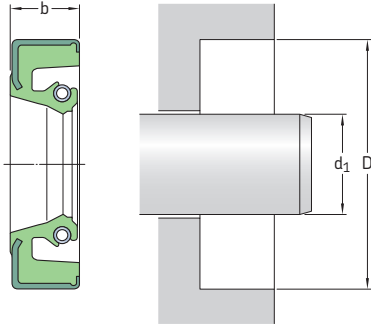
The rigid seal body can withstand operating pressures up to 0,24 MPa (35 *psi*), dynamic, and 0,34 MPa (50 *psi*), static, while withstanding shaft speeds up to 25 m/s (4 900 *ft/min*) at shaft diameters < 203 mm (8 *in.*).

The HDW1 seals are available in inch sizes.



## Radial shaft seals – HDW1 – inch dimensions

$d_1$  5.000 – 7.938 in.



Please see pages 74 to 76 for housing bore requirements.

Dimensions			Design and lip material	Designation
Shaft	Bore	Nominal seal width		
$d_1$	D	b		
in.			–	–
<b>5.000</b>	6.125 7.125	0.500 0.500	HDW1 R HDW1 R	<b>49951</b> <b>50186</b>
<b>5.063</b>	6.125	0.500	HDW1 R	<b>50620</b>
<b>5.125</b>	6.625 7.000	0.500 0.500	HDW1 R HDW1 R	<b>51277</b> <b>51330</b>
<b>5.188</b>	6.250	0.500	HDW1 R	<b>51800</b>
<b>5.250</b>	6.750 7.125	0.500 0.500	HDW1 R HDW1 R	<b>52651</b> <b>52655</b>
<b>5.313</b>	6.375	0.500	HDW1 R	<b>53100</b>
<b>5.438</b>	6.625	0.500	HDW1 R	<b>54300</b>
<b>5.875</b>	6.875 7.000	0.500 0.500	HDW1 R HDW1 R	<b>58709<sup>1)</sup></b> <b>58710</b>
<b>5.938</b>	7.000	0.500	HDW1 R	<b>59300</b>
<b>6,000</b>	7.250	0.500	HDW1 R	<b>60009</b>
<b>6.063</b>	7.500	0.500	HDW1 R	<b>60650</b>
<b>6.125</b>	7.125 7.250 7.375	0.500 0.500 0.500	HDW1 R HDW1 R HDW1 R	<b>61215</b> <b>61230</b> <b>61235</b>
<b>6.250</b>	7.250	0.500	HDW1 R	<b>62480</b>
<b>6.375</b>	7.500	0.500	HDW1 R	<b>63717</b>
<b>6.438</b>	7.500	0.500	HDW1 R	<b>64330</b>

Dimensions			Design and lip material	Designation
Shaft	Bore	Nominal seal width		
$d_1$	D	b		
in.			–	–
<b>6.625</b>	7.625 7.750 7.875 8.000	0.500 0.500 0.500 0.500	HDW1 R HDW1 R HDW1 R HDW1 R	<b>66217</b> <b>66219</b> <b>66222</b> <b>66230</b>
<b>6.750</b>	7.750 8.750	0.500 0.500	HDW1 R HDW1 R	<b>67510</b> <b>67600</b>
<b>6.875</b>	8.250 8.500	0.500 0.500	HDW1 R HDW1 R	<b>68730</b> <b>68760</b>
<b>7.125</b>	8.250	0.500	HDW1 R	<b>71220</b>
<b>7.375</b>	8.375 8.500	0.500 0.500	HDW1 R HDW1 R	<b>73720</b> <b>73730</b>
<b>7.500</b>	8.750 9.250	0.500 0.500	HDW1 R HDW1 R	<b>75046</b> <b>75069</b>
<b>7.625</b>	8.875	0.500	HDW1 R	<b>76225</b>
<b>7.750</b>	8.750	0.500	HDW1 R	<b>77506</b>
<b>7.875</b>	8.875	0.500	HDW1 R	<b>78710</b>
<b>7.938</b>	9.125	0.500	HDW1 R	<b>79620</b>

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

## Radial shaft seals

### CRS1, CRSH1, CRSA1 and CRSHA1 seals

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.

**CRS1:** Seal with a single steel case, a conventional sealing lip and a carbon steel garter spring.

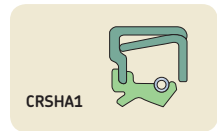
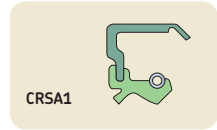
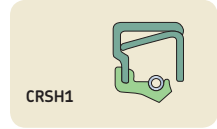
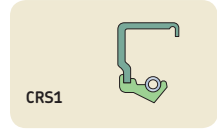
**CRSA1:** Seal with a single steel case, a conventional sealing lip, a carbon steel garter spring and an auxiliary, contacting lip.

**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 an auxiliary, contacting lip.

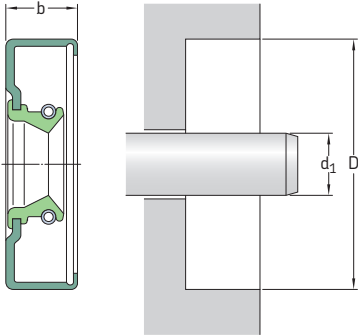
CRS seals are available with sealing lips made of nitrile rubber for general-purpose applications and of fluoro rubber, providing improved high temperature and chemical resistance.

See **matrix 1** on **pages 90** and **91** for permissible operating conditions.





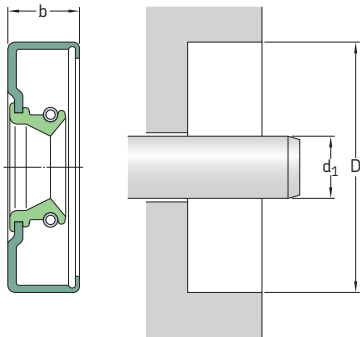
**Radial shaft seals – CRS1, CRSH1, CRSA1 and CRSHA1 – metric dimensions**  
 $d_1$  12 – 37 mm



Please see **pages 74 to 76** for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width	Design and lip material	Designation
$d_1$	D	b		
mm.			–	–
12	20	5	CRSA1 R	12x20x5 CRSA1 R
13	28	7	CRS1 R	13x28x7 CRS1 R
19	37	10	CRS1 V	19x37x10 CRS1 V
20	30	5	CRS1 R	20x30x5 CRS1 R
	30	7	CRS1 V	20x30x7 CRS1 V
	32	7	CRS1 V	20x32x7 CRS1 V
	42	7	CRS1 V	20x42x7 CRS1 V
22	32	7	CRS1 V	22x32x7 CRS1 V
24	38	10	CRS1 R	24x38x10 CRS1 R
25	32	7	CRSA1 R	25x32x7 CRSA1 R
	47	10	CRSA1 V	25x47x10 CRSA1 V
	52	7	CRS1 R	25x52x7 CRS1 R
26	35	7	CRS1 R	26x35x7 CRS1 R
	42	8	CRS1 R	26x42x8 CRS1 R
27	37	7	CRS1 V	27x37x7 CRS1 V
	41	10	CRSH1 R	27x41x10 CRSH1 R
28	62	12	CRSH1 R	28x62x12 CRSH1 R
30	45	8	CRS1 V	30x45x8 CRS1 V
	52	9	CRSH1 R	30x52x9 CRSH1 R
32	46	8	CRS1 R	32x46x8 CRS1 R
34	52	10	CRS1 R	34x52x10 CRS1 R
	54	11	CRS1 R	34x54x11 CRS1 R
35	64	8	CRSA1 P	35x64x8 CRSA1 P
	65	12	CRSA1 R	35x65x12 CRSA1 R
36	46	9	CRS1 R	36x46x9 CRS1 R
	56	10	CRS1 R	36x56x10 CRS1 R
37	55	10	CRSH1 R	37x55x10 CRSH1 R

**Radial shaft seals – CRS1, CRSH1, CRSA1 and CRSHA1 – metric dimensions**  
**d<sub>1</sub> 40 – 260 mm**



Please see **pages 74 to 76** for housing bore requirements.

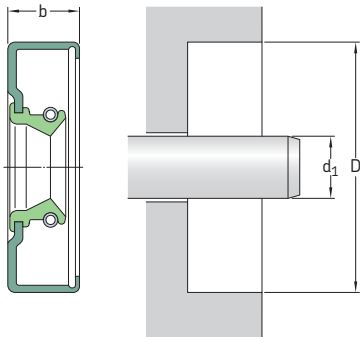
Dimensions Shaft	Bore	Nominal seal width	Design and lip material	Designation
d <sub>1</sub>	D	b		
mm			–	–
40	55 60	10 10	CRS1 R CRSA1 R	40×55×10 CRS1 R 40×60×10 CRSA1 R
42	62	10	CRS1 R	42×62×10 CRS1 R
43	62	10	CRSH1 R	43×62×10 CRSH1 R
45	58 62	9 7	CRSA1 R CRSA1 R	45×58×9 CRSA1 R 45×62×7 CRSA1 R
48	70	9	CRSA1 R	48×70×9 CRSA1 R
50	62 62 85	7 10 13	CRS1 R CRS1 R CRSH1 R	50×62×7 CRS1 R 50×62×10 CRS1 R 50×85×13 CRSH1 R
54	72 80	10 10	CRSA1 R CRSH1 R	54×72×10 CRSA1 R 54×80×10 CRSH1 R
57	72	10	CRSH1 R	57×72×10 CRSH1 R
58	85	13	CRSH1 R	58×85×13 CRSH1 R
59	75	10	CRSA1 R	59×75×10 CRSA1 R
60	70 78 80 90	7 9 10 10	CRS1 R CRS1 R CRSHA1 R CRSH1 R	60×70×7 CRS1 R 60×78×9 CRS1 R <sup>1)</sup> 60×80×10 CRSHA1 R 60×90×10 CRSH1 R
62	75	10	CRS1 R	62×75×10 CRS1 R
66	80 85 90	8,9 10 13	CRSHA1 R CRSHA1 R CRSH1 R	66×80×9 CRSHA1 R 66×85×10 CRSHA1 R 66×90×13 CRSH1 R
68	85	10	CRS1 R	68×85×10 CRS1 R
74	100	13	CRSH1 R	74×100×13 CRSH1 R

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

Dimensions Shaft $d_1$	Bore D	Nominal seal width b	Design and lip material	Designation
mm			–	–
75	115	13	CRSH1 R	75×115×13 CRSH1 R
80	100 125	13 13	CRSA1 R CRSH1 R	80×100×13 CRSA1 R 80×125×13 CRSH1 R
85	100	9	CRS1 R	85×100×9 CRS1 R
88	110	13	CRSH1 R	88×110×13 CRSH1 R
90	125	13	CRSH1 R	90×125×13 CRSH1 R
95	110	9	CRS1 R	95×110×9 CRS1 R
100	120	13	CRSH1 R	100×120×13 CRSH1 R
105	125	12	CRS1 R	105×125×12 CRS1 R
107	123	11	CRSA1 R	107×123×11 CRSA1 R
108	130	13	CRSH1 R	108×130×13 CRSH1 R
113	140	13	CRSH1 R	113×140×13 CRSH1 R
115	160	15	CRSH1 R	115×160×15 CRSH1 R
120	150	15	CRSH1 R	120×150×15 CRSH1 R
125	146	14	CRSA1 P	125×146×14 CRSA1 P
126	147	11	CRSA1 R	126×147×11 CRSA1 R
130	150 150 155 160 160 165	10 14 10 13 13 13	CRSA1 R CRSA1 R CRSH1 R CRS1 R CRSA1 R CRSH1 R	130×150×10 CRSA1 R 130×150×14 CRSA1 R 130×155×10 CRSH1 R 130×160×13 CRS1 R 130×160×13 CRSA1 R 130×165×13 CRSH1 R
135	160 170	13 15	CRSH1 R CRSH1 R	135×160×13 CRSH1 R 135×170×15 CRSH1 R
138	152	12	CRSA1 R	138×152×12 CRSA1 R
145	164 175	14 14	CRSA1 R CRS1 R	145×164×14 CRSA1 R 145×175×14 CRS1 R
150	170 180 200	15 13 15	CRSH1 R CRSH1 R CRSH1 R	150×170×15 CRSH1 R 150×180×13 CRSH1 R 150×200×15 CRSH1 R
154	175	13	CRSA1 R	154×175×13 CRSA1 R
160	185	13	CRSA1 V	160×185×13 CRSA1 V
168	200	15	CRSH1 R	168×200×15 CRSH1 R
170	190	15	CRSH1 R	170×190×15 CRSH1 R
180	200 215 220	12 16 16	CRS1 R CRS1 R CRSA1 R	180×200×12 CRS1 R 180×215×16 CRS1 R 180×220×16 CRSA1 R
190	215	16	CRSH1 R	190×215×16 CRSH1 R
195	230	15	CRSH1 R	195×230×15 CRSH1 R
200	250	15	CRSH1 R	200×250×15 CRSH1 R
260	300	20	CRS1 R	260×300×20 CRS1 R

## Radial shaft seals – CRS1, CRSH1, CRSA1 and CRSHA1 – inch dimensions

$d_1$  0.531 – 2.008 in.



Please see **pages 74 to 76** for housing bore requirements.

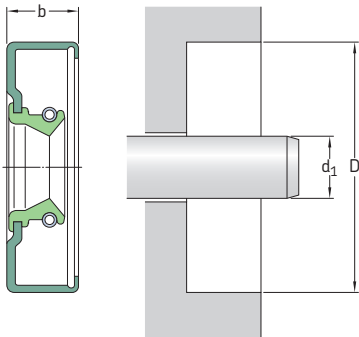
Dimensions Shaft	Bore	Nominal seal width	Design and lip material	Designation
$d_1$	D	b		
in.			–	–
<b>0.531</b>	1.124	0.313	CRSA1 R	<b>5334</b>
<b>0.594</b>	1.250 1.375	0.313 0.313	CRSA1 R CRSA1 R	<b>5950</b> <b>5966<sup>1)</sup></b>
<b>0.669</b>	1.339	0.311	CRSA1 P	<b>6992</b>
<b>0.709</b>	1.339	0.315	CRSA1 P	<b>7089</b>
<b>0.781</b>	1.752	0.313	CRSHA1 R	<b>8213</b>
<b>0.844</b>	1.828	0.313	CRSA1 R	<b>8485</b>
<b>0.945</b>	1.575	0.315	CRS1 R	<b>9515</b>
<b>0.969</b>	2.048	0.375	CRS1 R	<b>9688<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>1.156</b>	2.125	0.438	CRSH1 R	<b>11566<sup>1)</sup></b>
<b>1.219</b>	2.000	0.438	CRSH1 R	<b>12131<sup>1)</sup></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>1.301</b>	2.000	0.438	CRSA1 P	<b>12905</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>1.328</b>	2.312	0.433	CRS1 R	<b>13419<sup>1)</sup></b>
<b>1.362</b>	2.191	0.250	CRS1 P	<b>13500</b>

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

Dimensions Shaft d <sub>1</sub>	Bore D	Nominal seal width b	Design and lip material	Designation
in.			–	–
<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>1.399</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>1.414</b>	2.250	0.250	CRSHA1 R	<b>14035<sup>1)</sup></b>
<b>1.469</b>	2.374	0.375	CRSA1 R	<b>14641<sup>1)</sup></b>
<b>1.491</b>	2.191	0.250	CRSA1 R	<b>14780</b>
<b>1.500</b>	2.996 3.000	0.500 0.375	CRSH1 R CRSA1 R	<b>15240</b> <b>15241</b>
<b>1.524</b>	2.374	0.500	CRSH1 R	<b>15343</b>
<b>1.563</b>	2.716	0.469	CRSH1 R	<b>15748<sup>1)</sup></b>
<b>1.618</b>	2.575	0.500	CRSA1 R	<b>16404<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>1.656</b>	2.502	0.500	CRSH1 R	<b>16532<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>1.705</b>	3.084	0.500	CRS1 R	<b>17053</b>
<b>1.719</b>	2.623	0.500	CRSH1 R	<b>17136<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>1.781</b>	2.750 2.758	0.500 0.500	CRSH1 R CRSH1 R	<b>17847</b> <b>17851<sup>1)</sup></b>
<b>1.844</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>1.875</b>	3.125	0.313	CRSA1 R	<b>18879<sup>1)</sup></b>
<b>1.889</b>	3.110	0.688	CRSA1 P	<b>18983</b>
<b>1.890</b>	2.874	0.276	CRSA1 P	<b>18979</b>
<b>1.906</b>	3.189	0.313	CRSA1 P	<b>19062</b>
<b>1.938</b>	2.762 2.825 3.751	0.500 0.500 0.500	CRSA1 R CRSH1 P CRSH1 R	<b>19273<sup>1)</sup></b> <b>19274</b> <b>19466<sup>1)</sup></b>
<b>1.969</b>	2.638 2.686 2.742 2.875	0.354 0.500 0.500 0.469	CRSA1 R CRSH1 R CRSH1 P CRSH1 R	<b>19628</b> <b>19615</b> <b>19620</b> <b>19643</b>
<b>2.008</b>	2.953	0.354	CRSA1 P	<b>20012</b>

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

**Radial shaft seals – CRS1, CRSH1, CRSA1 and CRSHA1 – inch dimensions**  
 $d_1$  2.063 – 7.000 in.



Please see **pages 74 to 76** for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
$d_1$	D			
in.			–	–
<b>2.063</b>	2.875	0.375	CRSA1 R	<b>550085<sup>1)</sup></b>
<b>2.125</b>	3.623	0.469	CRSA1 P	<b>21379</b>
<b>2.145</b>	3.188	0.469	CRSH1 R	<b>21538</b>
<b>2.188</b>	3.623	0.500	CRSHA1 R	<b>21950</b>
<b>2.432</b>	3.070	0.227	CRSA1 P	<b>24110</b>
<b>2.563</b>	3.500	0.500	CRSHA1 P	<b>25587</b>
<b>2.648</b>	3.812	0.500	CRS1 R	<b>26877</b>
<b>2.750</b>	4.125 4.125	0.438 0.563	CRS1 P CRSA1 R	<b>27576<sup>1)</sup></b> <b>27577</b>
<b>2.875</b>	3.434	0.294	CRSA1 R	<b>28646<sup>1)</sup></b>
<b>2.913</b>	3.543	0.394	CRS1 P	<b>29105</b>
<b>3.125</b>	3.936	0.512	CRSA1 V	<b>31144<sup>1)</sup></b>
<b>3.250</b>	3.876 4.125	0.375 0.563	CRSA1 V CRSH1 R	<b>32332<sup>1)</sup></b> <b>32362<sup>1)</sup></b>
<b>3.298</b>	4.125	0.563	CRSA1 R	<b>32815<sup>1)</sup></b>
<b>3.469</b>	4.626	0.625	CRSA1 R	<b>34700</b>
<b>3.500</b>	5.751	0.563	CRSH1 R	<b>35111<sup>1)</sup></b>
<b>3.504</b>	4.173	0.354	CRSA1 V	<b>35120</b>
<b>3.813</b>	4.999 5.251	0.469 0.469	CRSH1 R CRSH1 R	<b>38160</b> <b>38220<sup>1)</sup></b>
<b>3.875</b>	5.501 5.751	0.500 0.563	CRSHA1 R CRSH1 R	<b>38749<sup>1)</sup></b> <b>38810</b>

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

Dimensions Shaft $d_1$	Bore D	Nominal seal width b	Design and lip material	Designation
in.			–	–
<b>3.898</b>	4.680	0.370	CRSA1 VR	<b>38770</b>
<b>4.188</b>	4.999 5.251 5.751	0.469 0.469 0.500	CRSHA1 R CRSH1 R CRSHA1 R	<b>41751</b> <b>41761</b> <b>41833</b>
<b>4.313</b>	5.751	0.500	CRSH1 R	<b>43231</b>
<b>4.563</b>	5.751 6.250	0.500 0.500	CRSHA1 R CRSH1 R	<b>45550</b> <b>45560</b>
<b>5.000</b>	7.000 7.500	0.500 0.500	CRSHA1 R CRSHA1 R	<b>50185</b> <b>50195</b>
<b>5.125</b>	6.500	0.500	CRSHA1 R	<b>51276</b>
<b>5.313</b>	6.500	0.500	CRSHA1 R	<b>53151</b>
<b>5.375</b>	6.374 6.499	0.500 0.563	CRSHA1 R CRSH1 R	<b>53688<sup>1)</sup></b> <b>53692</b>
<b>5.500</b>	6.626 6.876 7.501	0.563 0.563 0.563	CRSHA1 R CRSHA1 R CRSH1 R	<b>54949</b> <b>55157</b> <b>55179</b>
<b>5.750</b>	6.876 7.126 7.502	0.563 0.563 0.563	CRSHA1 R CRSHA1 R CRSHA1 R	<b>57519</b> <b>57578</b> <b>57584</b>
<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

## Radial shaft seals

### PTFE radial shaft seals

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:

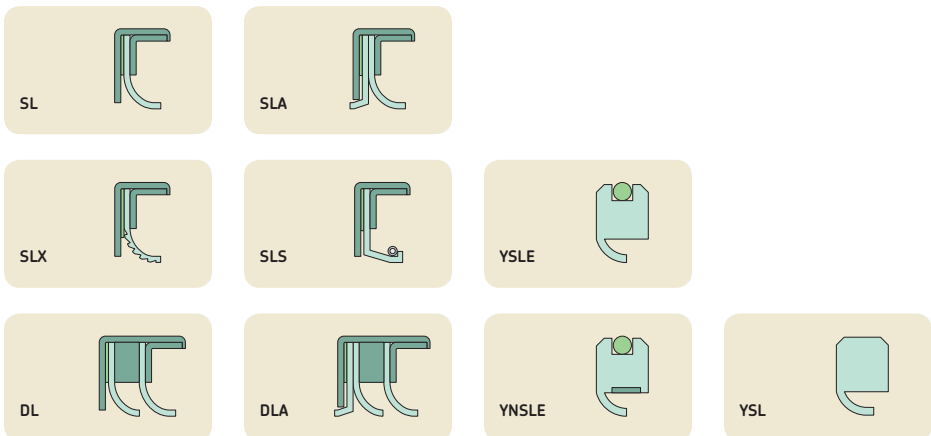
- High chemical resistance
- Withstand speeds up to 30 m/s (5 900 ft/min)
- Wide operating temperature range, -70 to +250 °C (-95 to +480 °F)
- Withstand pressures up to 3,5 MPa (500 psi)
- Withstand dry running

### Assortment

The profiles shown below 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 seal 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 14** on **page 176**. In addition to PTFE-based compounds, SKF also offers radial shaft seals in other modified plastics, some of which are listed in **table 15** on **page 177**.

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 85** and **86**.

## 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.

## Radial shaft seals

Table 14

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 16**

Table 15

Modified plastic materials

<b>UHMWPE</b>	Ultra-high molecular weight polyethylene. Significantly improved wear and abrasion resistance over 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>Nylon</b>	Improved strength, limited media compatibility and temperature resistance. Hydroscopic. 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>Ertalyte</b>	Similar to POM but offers improved media compatibility and improved wear resistance.
<b>PEEK</b>	Polyetheretherketone. Similar strength properties as nylon 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 nylon or POM materials but not as good as PEEK. Adding fillers can create a "bearing-grade" PPS for high-performance applications.
<b>PA</b>	Polyamide. Exceptional mechanical, thermal and chemical resistance properties.

Table 16

Material selection with shaft hardness + velocity

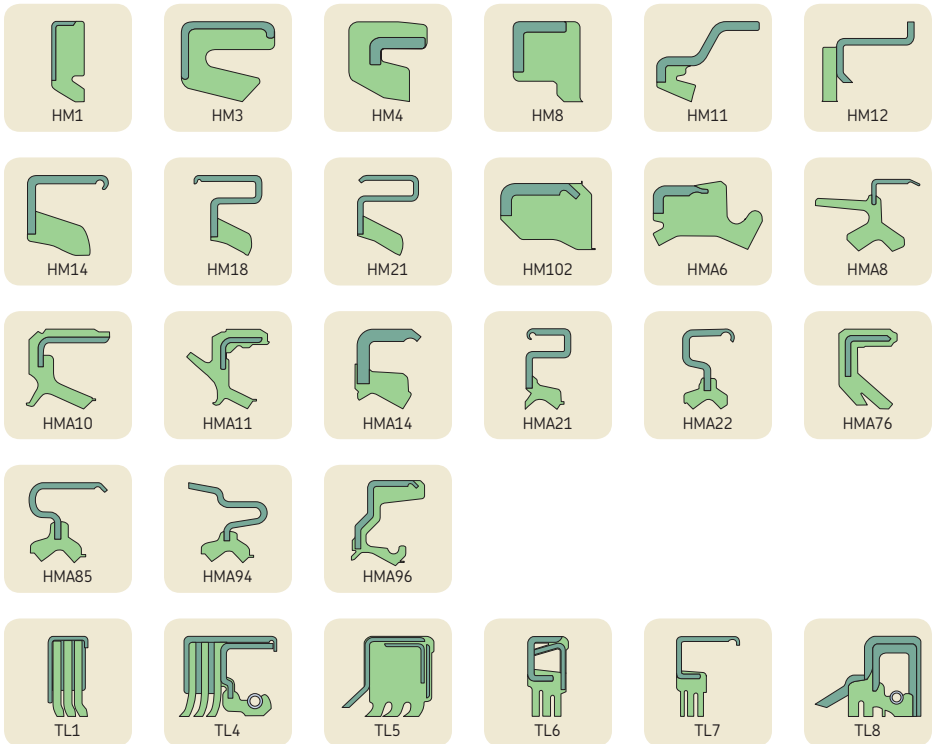
Surface speed	< 30 HRC	45 HRC	≥ 58 HRC
<b>Low</b>	A or B	A, B, C	A, B, C
<b>Medium</b>	A	A, B	A, B, C
<b>High</b>	A	A, B	A, B

## Radial shaft seals

### HM and TL seals for grease lubricated applications

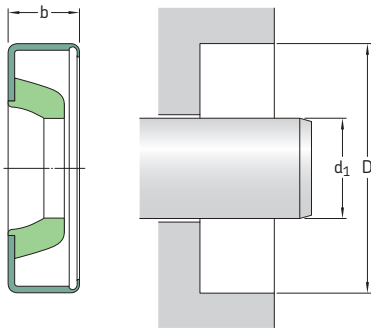
SKF offers an extensive assortment of radial shaft seals for less demanding grease lubricated applications operating at moderate speeds. The majority of these seals are designed without a spring. The seals are generally installed with the sealing lip facing outward to provide maximum exclusion ability. 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 90** and **91** for permissible operating conditions, valid for both HM and TL seals.



## Radial shaft seals – HM and TL seals – metric dimensions

$d_1$  6 – 22 mm



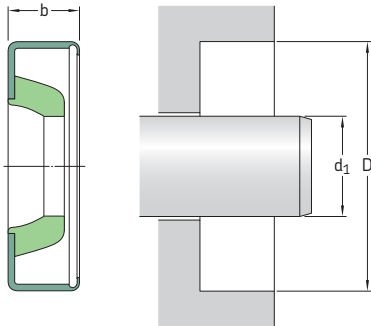
2.6

Please see **pages 74 to 76** for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
$d_1$	D	b		
mm			–	–
6	12	2	HM3 R	6×12×2 HM3 R
8	12	3	HM4 R	8×12×3 HM4 R
9	13	3	HM4 R	9×13×3 HM4 R
10	14	3	HM4 R	10×14×3 HM4 R
	16	4	HM102 R	10×16×4 HM102 R
12	16	3	HM4 R	12×16×3 HM4 R
	18	3	HM4 R	12×18×3 HM4 R
	19	3	HM4 R	12×19×3 HM4 R
	22	4	HM4 R	12×22×4 HM4 R
14	20	3	HM4 R	14×20×3 HM4 R
	22	3	HM4 R	14×22×3 HM4 R
15	21	3	HM4 R	15×21×3 HM4 R
	23	3	HM4 R	15×23×3 HM4 R
	25	5	HMA10 R	15×25×5 HMA10 R
16	22	3	HM4 R	16×22×3 HM4 R
	22	4	HM4 R	16×22×4 HM4 R
	24	4	HM102 R	16×24×4 HM102 R
17	23	3	HM4 R	17×23×3 HM4 R
18	24	3	HM4 R	18×24×3 HM4 R
	26	4	HMA1 R	18×26×4 HMA1 R
19	27	4	HM4 R	19×27×4 HM4 R
20	26	4	HM4 R	20×26×4 HM4 R
	28	4	HM4 R	20×28×4 HM4 R
22	28	4	HM1 R	22×28×4 HM1 R
	28	4	HMA10 R	22×28×4 HM10 R
	30	4	HM4 R	22×30×4 HM4 R
	35	5	HM14 R	22×35×5 HM14 R

## Radial shaft seals – HM and TL seals – metric dimensions

$d_1$  23 – 65 mm



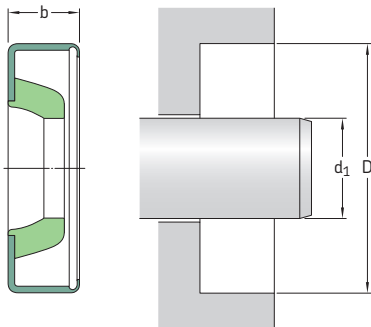
Please see **pages 74 to 76** for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
$d_1$	D	b		
mm			–	–
23	32 35	5,50 6	HM1 R HMA10 R	23x32x6 HM1 R 23x35x6 HMA10 R
24	32	4	HM4 R	24x32x4 HM4 R
25	32 33 35	4 4 4	HM4 R HM4 R HM4 R	25x32x4 HM4 R 25x33x4 HM4 R 25x35x4 HM4 R
26	34	4	HM4 R	26x34x4 HM4 R
28	35 35 37	4 6 4	HM4 R HM102 R HM4 R	28x35x4 HM4 R 28x35x6 HM102 R 28x37x4 HM4 R
30	37 40	4 4	HM4 R HM4 R	30x37x4 HM4 R 30x40x4 HM4 R
32	42	4	HM4 R	32x42x4 HM4 R
35	42 45 47	4 4 5	HM4 R HM4 R HM4 R	35x42x4 HM4 R 35x45x4 HM4 R 35x47x5 HM4 R
37	47	4	HM4 R	37x47x4 HM4 R
38	48	4	HM4 R	38x48x4 HM4 R
40	47 50 52 53 62	4 4 5 5 10	HM4 R HM4 R HM4 R HMA76 R HMA10 R	40x47x4 HM4 R 40x50x4 HM4 R 40x52x5 HM4 R 40x53x5 HMA76 R 40x62x10 HMA10 R
42	52 55 64	4 6 6	HM4 R HM1 R HMA1 R	42x52x4 HM4 R 42x55x6 HM1 R 42x64x6 HMA1 R

<b>Dimensions</b>			<b>Design and lip material</b>	<b>Designation</b>
Shaft	Bore	Nominal seal width		
$d_1$	D	b		
<hr/>				
mm			–	–
<hr/>				
<b>45</b>	52	4	HM4 R	45×52×4 HM4 R
	55	4	HM4 R	45×55×4 HM4 R
	72	8	HMA22 R	45×72×8 HMA22 R
<b>47</b>	72	6	HMA85 R	47×72×6 HMA85 R
<b>48</b>	58	4	HM4 R	48×58×4 HM4 R
<b>50</b>	60	6	HMA10 R	50×60×6 HMA10 R
	62	5	HM4 R	50×62×5 HM4 R
<b>62</b>	78	7	HMA8 R	62×78×7 HMA8 R
<b>65</b>	75	8	HM102 R	65×75×8 HM102 R

## Radial shaft seals – HM and TL seals – inch dimensions

$d_1$  0.188 – 0.750 in.



Please see **pages 74 to 76** for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width b	Clearance $B_3$	Design and lip material	Designation	
$d_1$	D					
in.				–	–	
<b>0.188</b>	0.500	0.125		HM1 R	<b>1850</b>	
<b>0.250</b>	0.499	0.188		HM14 R	<b>2450</b>	
	0.499	0.188		HMA14 V	<b>2452</b>	
	0.562	0.188		HM14 R	<b>2470<sup>1)</sup></b>	
	0.626	0.250		HM14 R	<b>2490</b>	
	0.749	0.188		HM14 R	<b>2560</b>	
<b>0.313</b>	0.500	0.125		HM4 R	<b>3044</b>	
	0.626	0.156		HM14 R	<b>3060<sup>1)</sup></b>	
	0.626	0.156		HM14 V	<b>3061</b>	
	0.626	0.203		HM1 R	<b>3050<sup>1)</sup></b>	
	0.633	0.141		HM14 R	<b>3080</b>	
	0.749	0.250		HM14 R	<b>3140</b>	
	0.750	0.250		HM3 R	<b>3141</b>	
	0.862	0.250		HM14 R	<b>3086</b>	
	<b>0.375</b>	0.562	0.093		HM3 V	<b>535835</b>
		0.563	0.094		HM3 R	<b>3621</b>
0.628		0.197		HMA10 P	<b>3632</b>	
0.687		0.156		HM14 R	<b>3645<sup>1)</sup></b>	
0.749		0.250		HM14 R	<b>3683</b>	
	0.875	0.250		HM14 R	<b>3727</b>	
<b>0.404</b>	0.620	0.188		HM14 R	<b>4010</b>	
	0.862	0.250		HM14 R	<b>4012</b>	
<b>0.438</b>	0.836	0.188		HM14 R	<b>4231</b>	
	0.879	0.180		HM8 R	<b>4256</b>	
	0.999	0.250		HM14 R	<b>4340</b>	
<b>0.469</b>	0.836	0.188		HM14 P	<b>4623</b>	
	0.875	0.219		HM14 R	<b>4628</b>	
<b>0.500</b>	0.687	0.093		HM3 V	<b>538545</b>	
	0.688	0.094		HM3 R	<b>4911</b>	
	0.750	0.125		HM14 R	<b>4912<sup>1)</sup></b>	

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



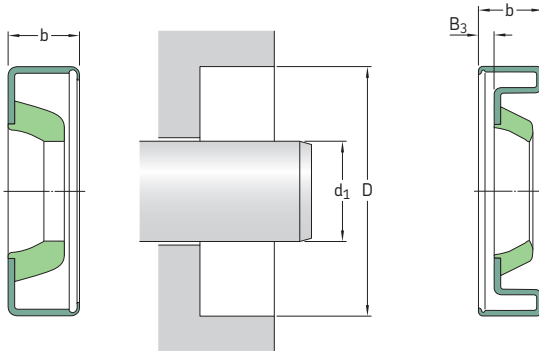
Dimensions Shaft	Bore	Nominal seal width b	Clearance B <sub>3</sub>	Design and lip material	Designation
d <sub>1</sub>	D	b	B <sub>3</sub>		
in.				–	–
<b>0.500</b> cont.	0.820	0.156		HM14 R	4914 <sup>1)</sup>
	0.843	0.250		HM14 R	4923 <sup>1)</sup>
	0.875	0.125		HM14 R	4925
	0.875	0.250		HM14 R	4938
	0.999	0.188		HM14 R	4950 <sup>1)</sup>
0.999	0.250		HM14 R	4990 <sup>1)</sup>	
	1.124	0.250		HM14 R	5085 <sup>1)</sup>
	1.124	0.203		HM21 R	5399 <sup>1)</sup>
<b>0.563</b>	0.750	0.094		HM3 R	5500
	0.875	0.188		HM14 R	5522 <sup>1)</sup>
	0.999	0.219		HM14 R	5569 <sup>1)</sup>
	1.124	0.250		HM14 R	5685
<b>0.594</b>	1.124	0.250		HM14 R	5946 <sup>1)</sup>
<b>0.624</b>	1.131	0.188		HM14 R	6243 <sup>1)</sup>
<b>0.625</b>	0.812	0.094		HM3 R	6105
	0.813	0.094		HM3 V	6106
0.933	0.188		HM14 R	6125 <sup>1)</sup>	
	0.188		HM14 V	6126 <sup>1)</sup>	
	0.188		HM14 R	6130 <sup>1)</sup>	
1.000	0.125		HM14 P	6152 <sup>1)</sup>	
	0.125		HM14 R	6153	
1.063	0.250		HM14 R	6158 <sup>1)</sup>	
	0.250		HM14 R	6225 <sup>1)</sup>	
	0.250		HM14 R	6323 <sup>1)</sup>	
1.259	0.250		HM14 R	6335 <sup>1)</sup>	
	0.250		HM14 R	6370 <sup>1)</sup>	
<b>0.669</b>	1.250	0.250		HM14 R	6806 <sup>1)</sup>
<b>0.688</b>	0.999	0.188		HM14 R	6720 <sup>1)</sup>
	1.124	0.250		HM14 R	6759 <sup>1)</sup>
	1.187	0.125		HM14 R	6762 <sup>1)</sup>
	1.375	0.125		HM14 R	6915 <sup>1)</sup>
	1.375	0.250		HM14 R	6920 <sup>1)</sup>
<b>0.750</b>	0.999	0.125		HM14 R	7410
	1.000	0.125		HM14 D	7408 <sup>1)</sup>
	1.000	0.125		HM3 V	535909
	1.004	0.156		HM8 R	7409
	1.006	0.125		HM14 R	7411 <sup>1)</sup>
	1.031	0.313		HMA6 R	7412
		0.188		HM14 R	7413
	1.124	0.156		HM14 R	7415 <sup>1)</sup>
		0.156		HM14 R	7421
	1.249	0.250		HM14 R	530716 <sup>2)</sup>
		0.250		HM14 R	7464 <sup>1)</sup>
		0.250		HM14 R	7477 <sup>1)</sup>
	1.375	0.250		HM14 R	7536
0.250			HM14 P	7537	
0.250			HM14 R	7550 <sup>1)</sup>	
0.250			HM14 R	7571 <sup>1)</sup>	
0.250			HM14 R	7571 <sup>1)</sup>	

1) SKF Bore Tite Coating

2) Stainless steel case

## Radial shaft seals – HM and TL seals – inch dimensions

$d_1$  0.781 – 1.375 in.



Please see pages 74 to 76 for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width b	Clearance $B_3$	Design and lip material	Designation
$d_1$	D		$B_3$		
in.				–	–
<b>0.781</b>	1.375	0.197		HM14 R	<b>7831</b> <sup>1)</sup>
<b>0.813</b>	1.063	0.125		HM3 R	<b>8009</b>
<b>0.875</b>	1.125	0.125		HM14 R	<b>8620</b>
	1.125	0.125		HM14 V	<b>8619</b> <sup>1)</sup>
	1.246	0.188		HM14 R	<b>8625</b> <sup>1)</sup>
	1.251	0.188		HM14 R	<b>8627</b>
	1.251	0.188		HM3 R	<b>8631</b> <sup>2)</sup>
	1.255	0.188		HM14 R	<b>8632</b> <sup>2)</sup>
	1.308	0.250		HM14 R	<b>8637</b> <sup>1)</sup>
	1.312	0.250		HM14 R	<b>8645</b> <sup>1)</sup>
	1.375	0.188		HM14 R	<b>8677</b> <sup>1)</sup>
	1.437	0.250		HM14 R	<b>8690</b> <sup>1)</sup>
	1.499	0.250		HM21 R	<b>8741</b> <sup>1)</sup>
	1.562	0.250		HM14 R	<b>8761</b>
	1.575	0.250		HM14 R	<b>8772</b>
	1.624	0.188		HM8 R	<b>8802</b>
<b>0.938</b>	1.375	0.250		HM14 R	<b>9243</b> <sup>1)</sup>
	1.499	0.250		HM14 R	<b>9298</b> <sup>1)</sup>
	1.734	0.250		HM14 R	<b>9354</b> <sup>1)</sup>
<b>1.000</b>	1.250	0.125		HM14 R	<b>9815</b> <sup>1)</sup>
	1.312	0.125		HM14 R	<b>9818</b> <sup>1)</sup>
	1.375	0.188		HM14 R	<b>9820</b> <sup>1)</sup>
	1.437	0.250		HM14 R	<b>9835</b> <sup>1)</sup>
	1.499	0.188		HM14 R	<b>9859</b> <sup>1)</sup>
	1.510	0.219		HM21 R	<b>9853</b> <sup>1)</sup>
	1.561	0.250		HM14 R	<b>9900</b> <sup>1)</sup>
	1.575	0.250		HM14 R	<b>9903</b> <sup>1)</sup>
	1.624	0.250		HM14 R	<b>9932</b> <sup>1)</sup>

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

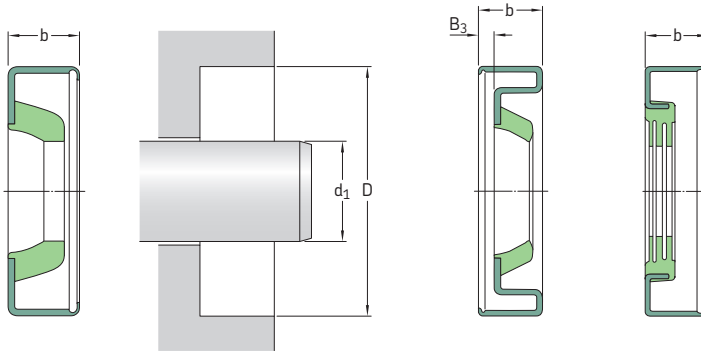
<sup>2)</sup> Stainless steel case

Dimensions Shaft	Bore	Nominal seal width b	Clearance	Design and lip material	Designation	
d <sub>1</sub>	D	b	B <sub>3</sub>			
in.				–	–	
<b>1.000</b> cont.	1.752	0.250	0.265	HM21 R	9995 <sup>1)</sup>	
	1.781	0.250		HM21 R	530484	
	1.781	0.469		HM14 R	10034 <sup>1)</sup>	
	1.781	0.469		HM18 R	10035 <sup>1)</sup>	
	1.851	0.250	0.250	HM14 R	10074 <sup>1)</sup>	
	1.938	0.250		HM14 R	10112 <sup>1)</sup>	
	2.000	0.250	0.250	HM21 R	10152 <sup>1)</sup>	
	2.250	0.250		HM14 R	10185 <sup>1)</sup>	
	<b>1.125</b>	1.375	0.125	0.265	HM14 R	11050
		1.375	0.125		HM14 V	11052 <sup>1)</sup>
1.438		0.203	0.188	HM14 R	11055 <sup>1)</sup>	
1.499		0.188		HM14 R	11060 <sup>1)</sup>	
1.562		0.188	0.250	HM8 R	11065	
1.562		0.250		HM14 R	11081	
1.624		0.250		HM21 R	11130 <sup>1)</sup>	
1.750		0.250	0.265	HM14 R	11150 <sup>1)</sup>	
1.781		0.250		HM21 R	11161 <sup>1)</sup>	
1.781		0.469		HM18 R	11164	
1.828	0.250	0.352	HM21 R	11191		
1.938	0.343		HM14 R	11269		
2.000	0.250	0.250	HM21 R	11334 <sup>1)</sup>		
2.047	0.250		HM21 R	11352 <sup>1)</sup>		
<b>1.188</b>	2.000	0.250	HM1 R	11836		
<b>1.190</b>	1.996	0.250	HM1 R	11846 <sup>1)</sup>		
<b>1.250</b>	1.500	0.125	0.250	HM14 R	12330 <sup>1)</sup>	
	1.624	0.250		HM14 R	12325 <sup>1)</sup>	
	1.625	0.188	0.188	HM14 R	11096	
	1.686	0.188		HM14 R	12334 <sup>1)</sup>	
	1.752	0.188		HM21 R	12361 <sup>1)</sup>	
	1.752	0.250	0.250	HM21 R	12369	
	1.828	0.188		HM8 R	12375	
	1.874	0.250		HM21 R	12379 <sup>1)</sup>	
	1.968	0.438	0.254	HM14 R	12398 <sup>1)</sup>	
	1.968	0.469		HM18 R	12399 <sup>1)</sup>	
1.979	0.250	HM21 R		12407 <sup>1)</sup>		
1.979	0.406	0.200	HM18 R	12411		
1.980	0.406		HMA22 R	12506 <sup>1)</sup>		
1.983	0.250		HM21 R	12437		
2.000	0.250	0.250	HM21 R	12481 <sup>1)</sup>		
2.062	0.250		HM21 R	12508 <sup>1)</sup>		
2.125	0.250	0.286	HM21 R	12565 <sup>1)</sup>		
2.250	0.250		HM14 R	12582 <sup>1)</sup>		
2.328	0.500		HM18 R	12611 <sup>1)</sup>		
<b>1.375</b>	1.750	0.197	HM14 R	13529		
	1.750	0.197	HM14 V	13509 <sup>1)</sup>		

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

## Radial shaft seals – HM and TL seals – inch dimensions

$d_1$  1.375 – 1.750 in.



Please see pages 74 to 76 for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width b	Clearance $B_3$	Design and lip material	Designation
$d_1$	D				
in.				–	–
<b>1.375</b>	1.834	0.188		HM8 R	<b>13533</b> <sup>1)</sup>
cont.	1.874	0.188		HM14 R	<b>13543</b>
	1.874	0.250		HM14 R	<b>13548</b> <sup>1)</sup>
	1.874	0.250		HM14 P	<b>13545</b> <sup>1)</sup>
	1.938	0.250		HM14 R	<b>13556</b> <sup>1)</sup>
	2.000	0.250		HM21 R	<b>13573</b> <sup>1)</sup>
	2.106	0.250		HM21 R	<b>13612</b> <sup>1)</sup>
	2.125	0.250		HM21 R	<b>13662</b> <sup>1)</sup>
	2.250	0.250		HM14 R	<b>13689</b> <sup>1)</sup>
	2.282	0.250		HM14 R	<b>13710</b> <sup>1)</sup>
	2.328	0.406	0.188	HM18 R	<b>13711</b>
	2.374	0.250		HM21 R	<b>13758</b> <sup>1)</sup>
	2.437	0.250		HM21 R	<b>13796</b> <sup>1)</sup>
	2.502	0.250		HM21 R	<b>13862</b> <sup>1)</sup>
	2.835	0.594		TL8 R	<b>13916</b> <sup>1)</sup>
<b>1.438</b>	2.000	0.125		HM4 R	<b>14209</b>
	2.250	0.250		HM14 R	<b>14257</b> <sup>1)</sup>
	2.437	0.250		HM21 R	<b>14359</b> <sup>1)</sup>
	2.437	0.250		HM21 V	<b>564365</b> <sup>1)</sup>
<b>1.457</b>	2.047	0.328		HMA11 R	<b>14600</b> <sup>2)</sup>
<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</b> <sup>1)</sup>
	1.874	0.250		HM14 R	<b>14810</b> <sup>1)</sup>
	1.938	0.250		HM14 R	<b>14816</b> <sup>1)</sup>
	1.983	0.188		HM14 R	<b>14840</b>
	1.989	0.250		HMA22 R	<b>14848</b> <sup>1)</sup>

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

<sup>2)</sup> Press-fit width 0.288 in., axial auxiliary lip

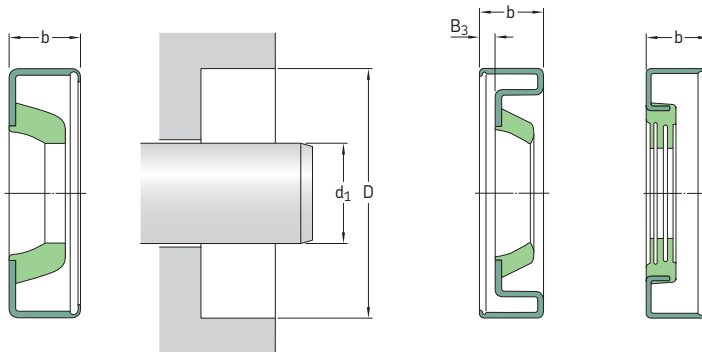
Dimensions Shaft	Bore	Nominal seal width b	Clearance	Design and lip material	Designation
d <sub>1</sub>	D	b	B <sub>3</sub>		
in.				–	–
<b>1.500</b> cont.	2.000	0.188		HM8 R	<b>14869</b>
	2.000	0.250		HM14 R	<b>14857<sup>1)</sup></b>
	2.250	0.250		HM21 R	<b>14960</b>
	2.254	0.250		HM21 R	<b>14966<sup>1)</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>
	2.328	0.438	0.235	HM18 R	<b>16069<sup>1)</sup></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>16520</b>
<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>	

1) SKF Bore Tite Coating

2) Stainless steel case

## Radial shaft seals – HM and TL seals – inch dimensions

$d_1$  1.750 – 2.500 in.



Please see pages 74 to 76 for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width b	Clearance $B_3$	Design and lip material	Designation
$d_1$	D				
in.				–	–
<b>1.750</b>	3.000	0.250		HM21 R	<b>17702</b> <sup>1)</sup>
cont.	3.149	0.290		TL6 R	<b>17724</b>
<b>1.781</b>	2.126	0.250		HM14 R	<b>17802</b> <sup>2)</sup>
<b>1.811</b>	2.697	0.295		HMA8 R	<b>17955</b>
<b>1.813</b>	2.562	0.438	0.224	HM18 R	<b>18050</b> <sup>1)</sup>
	2.719	0.270		TL7 R	<b>18127</b>
	2.965	0.250		HM1 R	<b>18258</b>
<b>1.875</b>	2.502	0.250		HM21 R	<b>18558</b> <sup>1)</sup>
	2.623	0.250		HM21 R	<b>18591</b> <sup>1)</sup>
	2.750	0.250		HM21 R	<b>18659</b> <sup>1)</sup>
	2.780	0.250		HM21 R	<b>18704</b> <sup>1)</sup>
	2.875	0.250		HM21 R	<b>18750</b> <sup>1)</sup>
	2.997	0.250		HM14 R	<b>18808</b> <sup>1)</sup>
	3.000	0.250		HM21 R	<b>18823</b> <sup>1)</sup>
	3.150	0.250		HM21 R	<b>18889</b> <sup>1)</sup>
<b>1.938</b>	2.502	0.281		HM14 R	<b>19219</b> <sup>1)</sup>
	2.875	0.250		HM21 R	<b>19306</b> <sup>1)</sup>
	2.686	0.594		TL8 R	<b>19251</b> <sup>1)</sup>
<b>1.945</b>	2.892	0.294		TL6 R	<b>19510</b> <sup>1)</sup>
<b>1.970</b>	2.362	0.158		HM14 D	<b>532627</b>
<b>2.000</b>	2.371	0.250		HM14 R	<b>19737</b> <sup>1)</sup>
	2.375	0.188		HM14 R	<b>19733</b>
	2.500	0.250		HM1 R	<b>19748</b>
	2.502	0.250		HM14 R	<b>19754</b> <sup>1)</sup>

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

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

Dimensions Shaft	Bore	Nominal seal width b	Clearance B <sub>3</sub>	Design and lip material	Designation
d <sub>1</sub>	D				
in.				–	–
<b>2.000</b> cont.	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>2)</sup> <b>19770</b> <sup>1)</sup> <b>19783</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>
	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>
	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>2.063</b>	3.149 3.150	0.500 0.266		TL6 D TL7 R	<b>20672</b> <sup>1)3)</sup> <b>20674</b>
<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>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>
	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>2.240</b>	3.189	0.610		HM14 R	<b>22614</b> <sup>1)</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>
	3.000 3.061	0.250 0.250		HM21 R HM21 R	<b>22368</b> <sup>1)</sup> <b>22392</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>2.297</b>	3.148	0.359	0.185	HM18 R	<b>22870</b>
<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>
<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>2.500</b>	3.000 3.000	0.313 0.250		HM1 R HM14 R	<b>24865</b> <b>24863</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>
	3.251 3.500	0.250 0.250		HM21 R HM21 R	<b>24904</b> <sup>1)</sup> <b>25007</b> <sup>1)</sup>

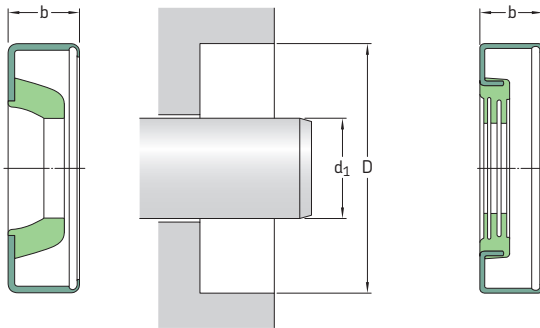
1) SKF Bore Tite Coating

2) Press-fit width 0.257 in.

3) Press-fit width 0.395 in.

## Radial shaft seals – HM and TL seals – inch dimensions

$d_1$  2.625 – 9.500 in.



Please see pages 74 to 76 for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width b	Clearance $B_3$	Design and lip material	Designation
$d_1$	D				
in.				–	–
<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>2)</sup> <b>26310</b> <sup>3)</sup>
<b>2.750</b>	3.125 3.250  3.500 3.500 3.751	0.188 0.313  0.250 0.250 0.250		HM1 R HM1 R  HM14 R HM14 V HM21 R	<b>27210</b> <b>27225</b>  <b>27271</b> <sup>1)</sup> <b>546751</b> <sup>1)</sup> <b>27394</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>
<b>2.953</b>	4.724	0.320		TL1 R	<b>29852</b> <sup>1)</sup>
<b>3.000</b>	3.500 3.623 3.751  4.000 4.003 4.249	0.313 0.250 0.250  0.250 0.250 0.250		HM1 R HM14 R HM21 R  HM21 V HM21 R HM21 R	<b>29840</b> <b>29850</b> <b>29863</b> <sup>1)</sup>  <b>539075</b> <b>29968</b> <b>30049</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>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>

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

<sup>2)</sup> Press-fit width 0.640 in.

<sup>3)</sup> Press-fit width 0.300 in.



Dimensions Shaft	Bore	Nominal seal width b	Clearance B <sub>3</sub>	Design and lip material	Designation
d <sub>1</sub>	D				
in.				–	–
<b>3.500</b>	4.000 4.003	0.300 0.250		HM1 R HM14 R	<b>34835</b> <b>34840<sup>1)</sup></b>
	4.125 4.125	0.250 0.250		HM14 R HM14 V	<b>34848</b> <b>546770<sup>1)</sup></b>
	4.450 4.501 4.751	0.531 0.250 0.250		HM12 R HM21 R HM21 R	<b>34885</b> <b>34967</b> <b>35042<sup>1)</sup></b>
<b>3.750</b>	4.376 4.376	0.250 0.250		HM14 R HM14 V	<b>37320<sup>1)</sup></b> <b>37325<sup>1)</sup></b>
<b>4.000</b>	4.501 4.501 4.876 4.999	0.250 0.250 0.250 0.250		HM14 R HM14 V HM21 R HM21 R	<b>39835<sup>1)</sup></b> <b>546387<sup>1)</sup></b> <b>39860<sup>1)</sup></b> <b>39961<sup>1)</sup></b>
<b>4.250</b>	4.813 5.126 5.251	0.313 0.250 0.250		HM14 R HM21 R HM21 R	<b>42340</b> <b>42380<sup>1)</sup></b> <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 7.003	0.250 0.250		HMA1 R HMA21 R	<b>57502</b> <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

## Radial shaft seals

### X seals, sealing against housing bore

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 74 to 76** should be adhered to for the shaft. Shaft requirements specified on **pages 70 to 72** 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 90 and 91** for general permissible operating conditions.

X1



X2



X4



X12



X13



X14



X15

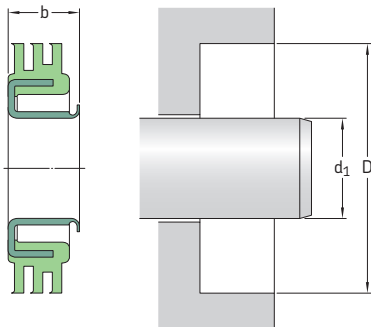


XH15



## Radial shaft seals – X seals – metric dimensions

$d_1$  25,40 – 82,55 mm

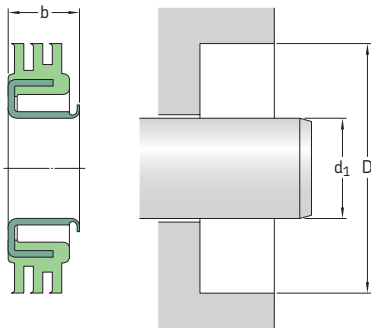


For proper press fit on shaft, refer to housing bore tolerances specified on **pages 74 to 76**.

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
$d_1$	D			
mm			–	–
<b>25,40</b>	59,84	6,86	X15 R	<b>538266</b>
<b>38,10</b>	55,55	12,70	X1 L	<b>14896</b>
	58,06	6,86	X15 R	<b>14970</b>
	58,06	10,67	XH15 R	<b>14971</b>
	62,53	7,37	X13 R	<b>15174</b>
<b>39,70</b>	56,82	7,37	X4 R	<b>15530</b>
	64,29	7,24	X15 R	<b>15660</b>
	69,85	11,13	XR	<b>15702</b>
<b>41,28</b>	62,53	6,35	X15 R	<b>16286</b>
<b>42,88</b>	67,31	7,37	X4 R	<b>16818</b>
<b>44,45</b>	69,04	7,47	X4 R	<b>17485</b>
	70,76	7,47	X15 R	<b>17620</b>
<b>46,05</b>	61,16	7,62	X15 R	<b>18030</b>
<b>47,57</b>	68,99	7,14	X13 R	<b>18630</b>
<b>50,57</b>	73,66	7,37	X4 R	<b>19720</b>
<b>50,80</b>	71,17	6,35	X15 D	<b>19844</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>63,40</b>	93,27	7,95	X15 R	<b>25078</b>
<b>76,20</b>	101,60	12,70	X2 L	<b>29900</b>
	114,94	9,53	X12 R	<b>30108</b>
<b>80,00</b>	101,45	15,00	X15 R	<b>31514</b>
<b>82,55</b>	113,49	8,00	X4 R	<b>32437</b>
	114,30	7,95	X15 R	<b>32441</b>

## Radial shaft seals – X seals – metric dimensions

$d_1$  86,36 – 158,75 mm



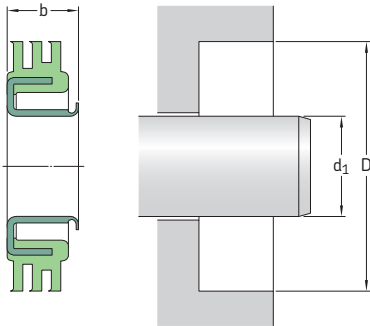
For proper press fit on shaft, refer to housing bore tolerances specified on **pages 74 to 76**.

Dimensions Shaft	Bore	Nominal seal width b	Design and lip material	Designation
$d_1$	D			
mm			–	–
<b>86,36</b>	114,30	7,14	X14 V	<b>34000<sup>1)</sup></b>
<b>92,08</b>	114,30	7,47	X15 R	<b>36172</b>
<b>98,43</b>	136,91	9,53	X12 R	<b>38590</b>
<b>101,60</b>	147,65	12,70	X R	<b>40131</b>
<b>111,13</b>	136,47	14,48	X1 P	<b>44269</b>
<b>114,30</b>	152,78 162,79	13,97 10,54	X12 R X12 D	<b>44892</b> <b>45161</b>
<b>120,65</b>	152,45	7,62	X15 R	<b>47455</b>
<b>139,70</b>	172,21	9,65	X R	<b>55152</b>
<b>158,75</b>	196,85	8,89	X R	<b>62530</b>

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

## Radial shaft seals – X seals – inch dimensions

$d_1$  1.000 – 3.250 in.

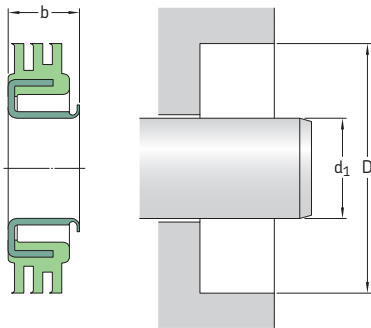


For proper press fit on shaft, refer to housing bore tolerances specified on **pages 74 to 76**.

Dimensions Shaft	Bore	Nominal seal width	Design and lip material	Designation
$d_1$	D	b		
in.			–	–
<b>1.000</b>	2.356	0.270	X15 R	<b>538266</b>
<b>1.500</b>	2.187	0.500	X1 L	<b>14896</b>
	2.286	0.270	X15 R	<b>14970</b>
	2.286	0.420	XH15 R	<b>14971</b>
	2.462	0.290	X13 R	<b>15174</b>
<b>1.563</b>	2.237	0.290	X4 R	<b>15530</b>
	2.531	0.285	X15 R	<b>15660</b>
	2.684	0.438	XR	<b>15702</b>
<b>1.625</b>	2.462	0.250	X15 R	<b>16286</b>
<b>1.688</b>	2.650	0.290	X4 R	<b>16818</b>
<b>1.750</b>	2.718	0.294	X4 R	<b>17485</b>
	2.786	0.294	X15 R	<b>17620</b>
<b>1.813</b>	2.408	0.300	X15 R	<b>18030</b>
<b>1.873</b>	2.716	0.281	X13 R	<b>18630</b>
<b>1.991</b>	2.900	0.290	X4 R	<b>19720</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>
<b>3.000</b>	4.000	0.500	X2 L	<b>29900</b>
	4.525	0.375	X12 R	<b>30108</b>
<b>3.150</b>	3.994	0.591	X15 R	<b>31514</b>
<b>3.250</b>	4.468	0.315	X4 R	<b>32437</b>
	4.500	0.313	X15 R	<b>32441</b>

## Radial shaft seals – X seals – inch dimensions

$d_1$  3.400 – 6.250 in.



For proper press fit on shaft, refer to housing bore tolerances specified on **pages 74 to 76**.

















Dimensions Shaft	Bore D	Nominal seal width b	Design and lip material	Designation
$d_1$	D	b		
in.			–	–
<b>3.400</b>	4.500	0.281	X14 V	<b>34000<sup>1)</sup></b>
<b>3.625</b>	4.500	0.294	X15 R	<b>36172</b>
<b>3.875</b>	5.390	0.375	X12 R	<b>38590</b>
<b>4.000</b>	5.813	0.500	X R	<b>40131</b>
<b>4.375</b>	5.373	0.570	X1 P	<b>44269</b>
<b>4.500</b>	6.015 6.409	0.550 0.415	X12 R X12 D	<b>44892</b> <b>45161</b>
<b>4.750</b>	6.002	0.300	X15 R	<b>47455</b>
<b>5.500</b>	6.780	0.380	X R	<b>55152</b>
<b>6.250</b>	7.750	0.350	X R	<b>62530</b>

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



# Radial shaft seals

## Seals for heavy industrial applications, selected main designs, self-retaining (open housing)

Standard design (preferred design)	Other basic designs		Material code	Operating temperature range				Pressure differential
				from		to		
				–	°C	–	°F	
 HDS7	 HDS6		R D H V (HDS6 only)	–40 –40 –40 –40	+100 +100 +150 +200	–40 –40 –40 –40	+210 +210 +300 +390	0
 HDL	 HDLA		R H V	–40 –40 –40	+100 +150 +200	–40 –40 –40	+210 +300 +390	0,1 (15)
 SBF			R V	–40 –40	+100 +200	–40 –40	+210 +390	0,1 (15)
 HDS2	 HDS1	 HDS4	R D H V	–40 –40 –40 –40	+100 +100 +150 +200	–40 –40 –40 –40	+210 +210 +300 +390	0,1 (15)
 HDSA2	 HDSA1	 HDSB2	R D H V	–40 –40 –40 –40	+100 +100 +150 +200	–40 –40 –40 –40	+210 +210 +300 +390	0,1 (15)
	 HDSB1							
 HDS2E	 HDS1E	 HDS2D	R D H V	–40 –40 –40 –40	+100 +100 +150 +200	–40 –40 –40 –40	+210 +210 +300 +390	0,1 (15)
	 HDS01							

















Shaft-to-bore misalignment (STBM) TIR	Dynamic runout (DRO) TIR	Maximum shaft surface speed	Ease of installation	Retention and exclusion ability
mm (in.)	mm (in.)	m/s (ft/min)	–	–
1,6 (0.062)	2,4 (0.093)	25 (4 900)	Excellent	Highly effective exclusion of water and solid contaminants and excellent retention of grease
2,5 (0.1)	2,4 (0.093)	24 (4 700) 25 (4 900) 35 (6 900)	Good	Excellent retention of light oils, even at high surface speeds and misalignment
1,5 (0.06)	2,4 (0.093)	25 (4 900)	Excellent	Excellent oil or grease retention
1,6 (0.062)	2,4 (0.093)	25 (4 900)	HDS2, HDS4: Excellent  HDS1: Good	Excellent oil or grease retention
1,6 (0.062)	2,4 (0.093)	25 (4 900)	Excellent to good, varies with equipment design	HDSA/B: Excellent oil or grease retention and exclusion of light to moderate contaminants
1,6 (0.062)	2,4 (0.093)	25 (4 900)	HDSD2/HDSE2: Excellent  HDSD1/HDSE1: Good	Excellent oil or grease retention and exclusion of light to moderate contaminants or separation of two media  Good grease retention, increased protection against contaminants

Continued →

# Radial shaft seals

Seals for heavy industrial applications, selected main designs, axially compressed (housing with cover plate)

Standard design (preferred design)	Other basic designs		Material code	Operating temperature range				Pressure differential
				from		to		
				°C	°F	°C	°F	
 HS5	 HS4		R D H V	-40 -40 -40 -40	+100 +100 +150 +200	-40 -40 -40 -40	+210 +210 +300 +390	0,07 (11)
 HS8	 HS6	 HS7	R D H V	-40 -40 -40 -40	+100 +100 +150 +200	-40 -40 -40 -40	+210 +210 +300 +390	0
 HSF5	 HSF6	 HSF7	R V	-40 -40	+100 +100	-40 -40	+210 +390	0,03 (5)
	 HSF8	 HSF9						
 HSF1	 HSF2	 HSF3	R V	-40 -40	+100 +200	-40 -40	+210 +390	0
	 HSF4							

Shaft-to-bore misalignment (STBM) TIR	Dynamic runout (DRO) TIR	Maximum shaft surface speed	Ease of installation	Retention and exclusion ability
mm (in.)	mm (in.)	m/s (ft/min)	–	–
1,6 (0.062)	2,4 (0.093)	HS4: 15 (2 950) HS5: 13 (2 560)	Good	HS4, HS5: Good oil retention
1,6 (0.062)	2,4 (0.093)	HS6: 10 (1 970) HS7: 7,5 (1 480) HS8: 10 (1 970)	HS6: Fair HS7: Excellent HS8: Good	HS6, HS8: Good to excellent oil or grease retention HS7: Good (grease retention only)
1,5 (0.06)	2,4 (0.093)	15 (2 950) depending on the operating conditions	Good to excellent	Excellent oil retention
1,5 (0.06)	2,4 (0.093)	15 (2 950) depending on the operating conditions	Fair to good depending on the available space for installation	Good to excellent oil retention

# Seals for heavy industrial applications

## General

Heavy industries like metal, construction, wind energy, forestry, mining and pulp and paper provide a challenging environment for radial shaft seals. Operating within a wide range of speeds, temperatures and environmental conditions, these seals need to reliably retain lubricants while preventing harsh contaminants from entering the system.

SKF seals for heavy industrial applications are available in a wide assortment of designs and materials to meet the varying demands of each challenging application. The assortment includes heavy-duty metal-cased seals, rubber outside diameter seals with metal inserts or fabric-reinforcement and all-rubber seals. To simplify seal selection, **table 18** on **page 213** can be used for general guidance. See also **matrix 2** on **pages 198 to 201**.

## Metal-cased seals

### General

SKF metal-cased seals are specially designed to withstand the extreme conditions encountered in heavy-duty applications. The designs include the highly engineered HDS7, the high-performance HDL seals and the commonly used HDS1 and HDS2 seals as well as the HDSA, B, C, D and E seals. These seals perform exceptionally well in the very contaminated environment of metal rolling mills, the high-speed and high-temperature environment of paper mills, as well as more universal applications like industrial gearboxes.

### HDS7

The ingress of water and solid contaminants is a common cause of bearing failures. To solve this, SKF developed the HDS7 seal with enhanced exclusion capabilities (→ **fig. 33**). 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 gearboxes, coal pulverizers and cement grinders. Customers have reported that the HDS7 seal is easier to install and provides longer service life than similar 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. 35** and **36**), in the includer position.

HDS7 seals can also be equipped with a PTFE auxiliary lip positioned and directed as shown in **fig. 42** on **page 206** and/or with an elastomer applied to the metal outside diameter (→ **fig. 43** on **page 206**).

The HDS7 seal is available with a nitrile sealing lip for general use, SKF Duralip for increased wear resistance in abrasive environments and SKF Duratemp that combines improved wear resistance with increased temperature capability. For certain applications, SKF Duralife can also be specified. See **page 30** for additional information about different sealing lip materials.

Spacer lugs are available as an option. See **page 211** for additional information.

HDS7 seals are available for all shaft diameters within the ranges listed in **table 19** on **page 214**. The product tables, starting on **page 216**, list a selection of sizes. Contact your SKF sales representative for additional information.

## HDL seals

HDL seals (→ **fig. 34**) are premium metal-cased radial shaft seals for oil lubricated applications. They are specially designed for tough operating conditions including high speeds and temperatures, considerable runout and/or misalignment. The high-speed performance characteristics of HDL seals make them an excellent choice for the severe operating conditions encountered in the rolls of paper-making machines.

HDL seals feature the combination of a stainless steel garter spring and individual stainless steel finger springs around the entire circumference of the seal. This spring combination enables the seal to work effectively and provides long service life, even under severe operating conditions.

HDLA seals are designed with an elastomeric auxiliary lip for added protection against contaminants.

Both HDL and HDLA seals are available with a sealing lip made of either nitrile rubber, hydrogenated nitrile rubber or fluoro rubber (→ **page 31**). These materials enable the seals to perform well under a variety of operating speeds and temperatures. Fixed-width spacer lugs are available for both HDL and HDLA seals on a quotation basis.

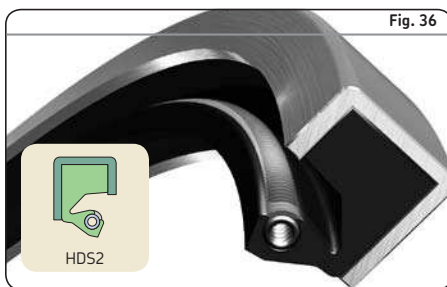
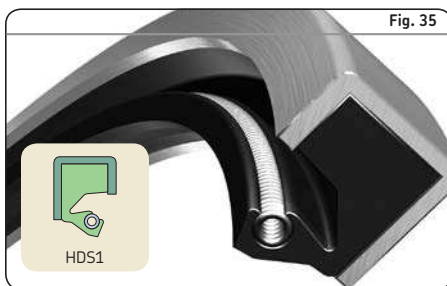
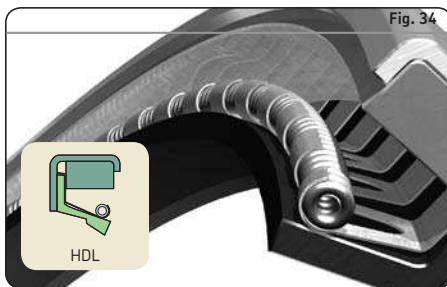
A selection of available sizes is listed in the product tables starting on **page 226**. Contact your SKF sales representative for additional information regarding availability.

## 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. 35**) has a spring installed in the SKF Springlock groove (→ **fig. 56** on **page 212**). For blind installations, where spring displacement may go undetected, HDS2 seals (→ **fig. 36**) have an SKF Springcover (→ **fig. 57** on **page 212**) that retains the spring in the groove. The HDS1 and HDS2 seals are available with adjustable or fixed-width spacer lugs (→ **page 211**).

The HDS1 and HDS2 seals can be designed with a PTFE auxiliary lip, positioned and directed in either of the two ways shown in **figs. 41** and **42** and/or with an elastomer applied to the metal outside diameter (→ **fig. 43** on **page 206**).



Nitrile rubber is standard for these seal designs, but both of them are also available in SKF Duralip, SKF Duratemp and SKF Duralife.

The HDS1 and HDS2 seals are available for all shaft diameters within the ranges listed in **table 19** on **page 214**. The product tables starting on **page 242** list a selection of sizes. Contact your SKF sales representative for additional information.

## Radial shaft seals

### HDSA and HDSB seals

HDSA and HDSB seals are designed with an elastomeric auxiliary lip in addition to the sealing lip (→ **figs. 37 to 38**). They are generally used where additional protection from contaminants is needed and where there is insufficient space for more than one seal.

The chamfer on the auxiliary lip of an HDSA seal faces the sealing lip, enabling easier shaft installation from the sealing lip direction. The chamfer of the auxiliary lip of HDSB seals faces away from the sealing lip, enabling easier shaft installation from the other direction. The disadvantage is, however, a slightly reduced exclusion ability.

HDSA2 and HDSB2 seals are designed with an SKF Springcover, while HDSA1 and HDSB1 seals are designed without an SKF Springcover (→ **fig. 57** on **page 212**).

HDSA and HDSB seals can also be designed with an elastomer applied to the metal outside diameter (→ **fig. 43** on **page 206**).

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

These seals are available for all shaft diameters within the ranges listed in **table 19** on **page 214**. Also, see the product tables starting on **page 264** for a selection of sizes. Contact your SKF sales representative for additional information.



## HDSD and HDSE seals

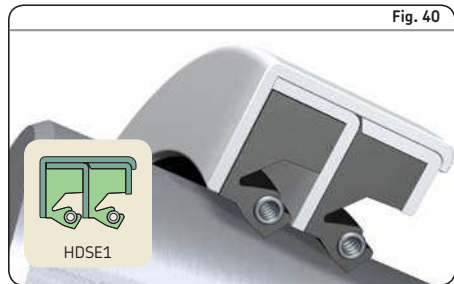
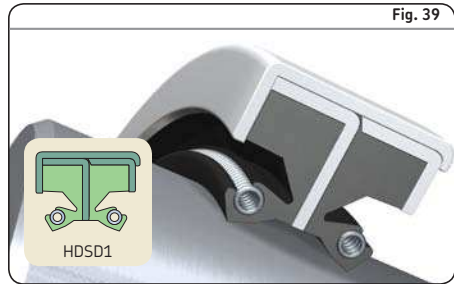
HDSD seals (→ **fig. 39**) are designed with two sealing lips facing opposite directions. These seals are typically used in applications where two fluids must be kept separated. When using an HDSD seal, it is very important to provide a means to lubricate the sealing lips. To do this, the cavity between the sealing lips must be filled with grease prior to installation and/or during operation via lubrication holes drilled through the metal case into the cavity.

HDSE seals (→ **fig. 40**) feature two sealing lips facing the same direction. They are typically used when a back-up seal would otherwise be needed for retention or exclusion purposes. Like HDSD seals, HDSE seals must be equipped with a means to lubricate the sealing lips so that the seal functions properly.

HDSD and HDSE seals are available with an SKF Springcover (HDSD2, HDSE2) or without an SKF Springcover (HDSD1, HDSE1) (→ **fig. 57** on **page 212**). All of them are available in nitrile rubber, SKF Duralip, SKF Duratemp or SKF Duralife.

HDSE seals can also be designed with a PTFE auxiliary lip positioned and directed in either of the two ways shown in **figs. 41** and **42** on **page 206**.

HDSD and HDSE seals are available for all shaft diameters within the ranges listed in **table 19** on **page 214**. The product tables starting on **page 272** list a selection of sizes. Contact your SKF sales representative for additional information.



## Radial shaft seals

### Additional design options

HDS1, HDS2, HDS7 and HDSE seals can be designed with an auxiliary PTFE lip to further protect the bearing and sealing lip(s) from dust particles in heavily contaminated environments, for example mining and cement industries. The PTFE lip is then positioned and directed as shown in **fig. 41**.

The PTFE lip can also be positioned and directed to provide additional lubricant retention (**→ fig. 42**).

The PTFE lip is clamped between the metal case and the rubber seal body without significantly increasing the total seal width. It has very good chemical and wear resistance, can withstand dry running and contributes to improved sealing performance while only generating a minimal friction torque. The combination of a PTFE auxiliary lip and a sealing lip made of the fluoro rubber compound SKF Duralife, developed by SKF, creates a particularly effective sealing solution.

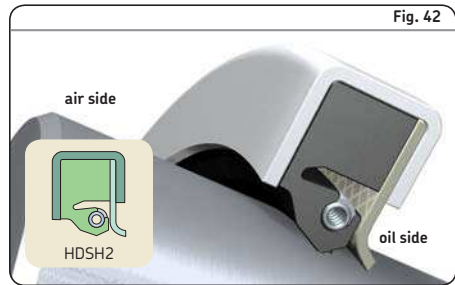
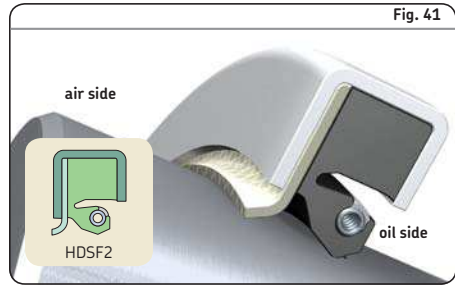
Special care must be taken to prevent damaging the PTFE lip during installation. Refer to instructions in paragraph *PTFE seals* on **page 85**.

The letters F and H in the product name indicate a PTFE auxiliary lip design including the lip's position and direction; see for example the HDSF2 (**→ fig. 41**) and HDSH2 (**→ fig. 42**).

HDS1, HDS2 and HDS7 seals (with or without an auxiliary PTFE lip) as well as the HDSA and HDSB seals are available with an elastomer applied to the outside diameter for use in applications where bore temperatures reach maximum 100 °C (210 °F) (**→ fig. 43**). This design feature has several important advantages:

- Compensates for imperfections in the housing bore surface, improving the sealing performance by minimizing bypass leakage.
- Prevents contaminants from entering through gaps between housing bore and the seal outside diameter at, for example, out-of-round conditions.
- Minimizes the risk of damage to the housing bore during installation and removal.

This design option is indicated by the letter K in the product name; see for example the HDS2K (**→ fig. 43**).





## Rubber outside diameter seals

### General

The assortment of SKF rubber outside diameter seals includes metal-inserted, fabric-reinforced and all-rubber designs. The fabric-reinforced and all-rubber seals are available in solid and split designs.

Rubber outside diameter seals offer a number of important operating and installation benefits and are especially suitable for split housings. The rubber prevents damage to the housing bore during installation, which otherwise can cause bypass leakage. Compared to metal-cased seals, rubber outside diameter seals can tolerate higher surface roughness in the housing bore. They also resist corrosion and do not seize in the bore, even years after installation.

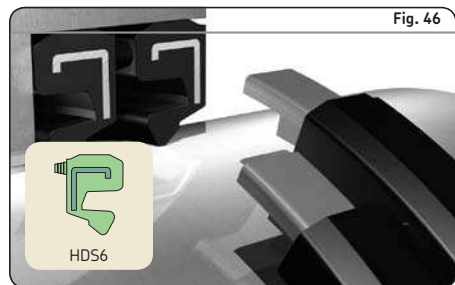
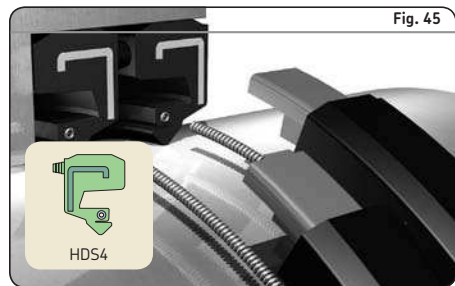
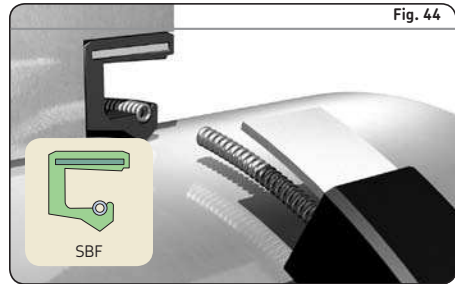
As a result of lower press-in forces, rubber outside diameter seals are often easier to install than metal-cased seals. They can be installed by hand or with simple tools even when the diameters are very large. This is especially true of the fabric-reinforced and all-rubber designs. Furthermore, in the case of split seals, there is no need to remove the shaft or other machine components when replacing the seal.

### SBF metal-inserted seals

SBF seals (→ **fig. 44**) are spring-loaded and designed with a flexible metal stiffening ring that enables the seal to be installed without the use of a cover plate. SBF seals can be used as an upgrade to fabric-reinforced seals in many applications that are either grease or oil lubricated. SBF seals are available in both nitrile and fluoro rubber. A selection of available sizes is listed in the product tables starting on **page 274**. Contact your SKF sales representative for additional information regarding availability.

### HDS4 and HDS6 metal-inserted seals

HDS4 seals (→ **fig. 45**) feature a patented moulded-in garter spring that cannot be displaced during installation. They also provide very good oil retention while minimizing wear on the shaft. HDS4 seals are typically used in the high-speed applications found in the pulp and paper industry. HDS6 seals (→ **fig. 46**) are similar in design to HDS4 seals but do not contain a garter spring. HDS6 seals are designed for grease retention.



Both types are made standard of nitrile rubber. They are also available in any of the sealing lip materials used for the metal-cased HDS seals. Both HDS4 and HDS6 seals are equipped with moulded 12,7 mm (0.5 in.) spacer lugs that can be trimmed or removed if necessary.

Contact your SKF sales representative for information regarding availability.

## Radial shaft seals

### HSF fabric-reinforced seals

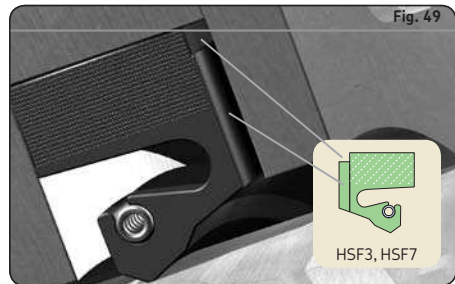
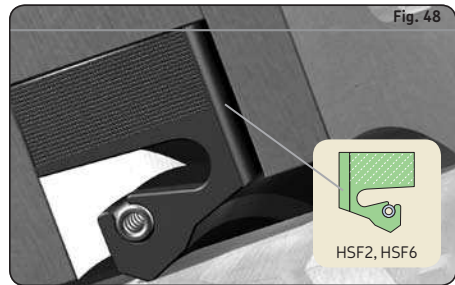
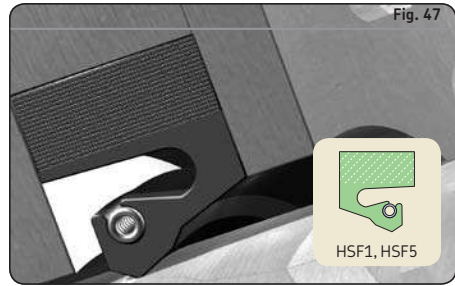
The spring-loaded HSF seal assortment consists of the HSF5, HSF6, HSF7 and HSF8 solid seals and their split versions, HSF1, HSF2, HSF3 and HSF4 seals (→ **figs. 47 to 49**). There is also a pressure profile seal, HSF9, available in the solid version only. These seals are mainly used in heavy-duty applications like gear drives, propeller shafts, cold and hot mill work rolls, pumps, paper machinery, etc.

HSF5, HSF6 and HSF7 seals have a strong, flexible, fabric-reinforced rubber back instead of a metal case. HSF5 seals have a basic single-lip design. HSF6 seals are equipped with radial lubrication grooves in the back of the seal and HSF7 seals include a circumferential lubrication groove. HSF4 and HSF8 seals are designed with an auxiliary lip for additional protection against contaminants.

Threaded spring connections are standard for all HSF seals (→ **fig. 54a on page 211**). For the split versions, a hook-and-eye connection can also be specified (→ **fig. 54b on page 211**).

All HSF seals are manufactured oversized relative to the housing bore diameter and depth to enable proper compression and stability. A cover plate is required to properly install and apply all HSF seals (→ **figs. 25 and 26 on pages 82 and 83**). The plate creates an axial preload to provide reliable static sealing performance. The plate should also avoid seal distortion during installation. HSF seals are available in nitrile rubber, hydrogenated nitrile rubber and fluoro rubber materials.

A selection of available HSF seal sizes is listed in the product tables starting on **page 276**. Contact your SKF sales representative for additional information regarding availability.



## HS all-rubber seals

HS seals, available in solid and split executions, are all-rubber seals, designed without any re-inforcement. They are manufactured oversized relative to the housing bore diameter and depth to enable proper compression and stability. A cover plate (→ **figs. 25 and 26 on pages 82 and 83**) 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. 56 on page 212**) provides the appropriate radial load against the shaft.

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

HS seals are available in nitrile rubber, SKF Duralip, SKF Duratemp or SKF Duralife for all shaft diameters within the ranges listed in **table 20 on page 215**. Also, see the product tables starting on **page 302** for a selection of sizes. Contact your SKF sales representative for additional information.

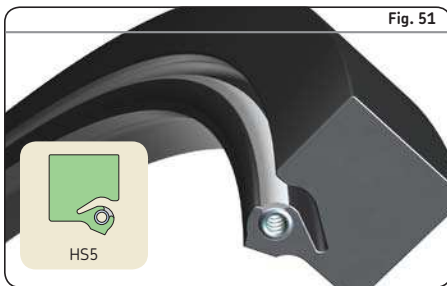
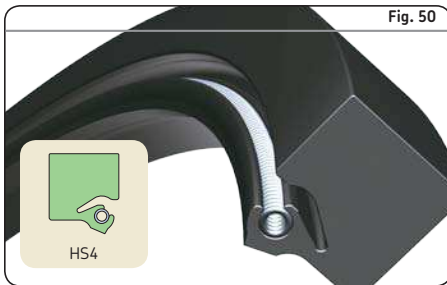
### HS solid seals

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. 50**) have a solid, all-rubber design and incorporate a spring-loaded sealing lip. They feature an SKF Springlock groove (→ **fig. 56 on page 212**) and are suitable for both vertical and horizontal shafts. For a proper fit in the housing bore, a cover plate is required (→ **figs. 25 and 26 on pages 82 and 83**).

HS5 seals (→ **fig. 51**) have the same basic design as HS4 seals with the addition of an SKF Springcover (→ **fig. 57 on page 212**) to hold the spring in place during installation and protect it from contaminants.

Both designs have a threaded spring connection (→ **fig. 54a on page 211**).



## Radial shaft seals

### HS split seals

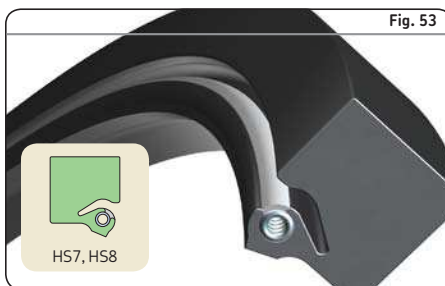
In applications where shaft removal is impractical, HS all-rubber split seals are an excellent choice. They are simply placed around the shaft and pushed into the housing bore with the split at the 12 o'clock position. A cover plate must be used to compress the seal axially to stabilize it in the housing 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. 52**) are designed with a spring-loaded sealing lip and an SKF Springlock (→ **fig. 56** on **page 212**). 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. 54b** on **page 211**). Other sizes of HS6 seals come with a threaded spring connection. For a proper fit in the housing bore, a cover plate is required (→ **figs. 25** and **26**, on **pages 82** and **83**).

HS7 seals (→ **fig. 53**), designed for grease lubricated applications only, have a spring-loaded sealing lip and are designed with both an SKF Springlock and SKF Springcover (→ **figs. 56** and **57** on **page 212**). All HS7 seals feature a control-wire spring connection (→ **fig. 54c** on **page 211**). 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. Due to the unique design that enables easier installation, a gap may occur at the joint even after the cover plate is installed. It is necessary that the split be placed at the 12 o'clock position during installation. HS7 seals do not have the high-performance characteristics of other HS seals, but are the easiest to install.

HS8 seals (→ **fig. 53**) are designed with a spring-loaded sealing lip, SKF Springlock, SKF Springcover (→ **figs. 56** and **57** on **page 212**) and a hook-and-eye spring connection (→ **fig. 54b** on **page 211**) for shaft diameters above 455 mm (18 in.). Other 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. For a proper fit, a cover plate is required.

### Reinforced all-rubber HSS seals

SKF also offers a range of reinforced all-rubber seals in nitrile rubber (NBR), SKF Duratemp (HNBR) and SKF Duralife (FKM). The standard grade of the material is used for the sealing lip, while the part of the seal body contacting the housing bore is made from a harder grade to provide improved stability in operation and during installation. For further information, refer to publication *Reinforced all-rubber HSS seals*.

## Additional design features

### Spring connections

There are different ways to connect the stainless steel garter springs of HS and HSF seals. A threaded spring connection (→ **fig. 54a**) is used for all HSF seals unless otherwise specified and for the solid HS4 and HS5 seals as well as the split HS6 and HS8 seals for shaft diameters ≤ 455 mm (18 in.). A hook-and-eye spring connection (→ **fig. 54b**) is used for HS6 and HS8 seals for shaft diameters > 455 mm (18 in.). All HS7 seals feature the special control-wire connection (→ **fig. 54c**), available only for these seals.

### Spacer lugs

Spacer lugs are available for all metal-cased designs to separate seals in tandem or back-to-back arrangements to provide space for sealing lip lubrication (→ **fig. 55**).

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 17**).

Fixed-width lugs are available for HDL seals on request.

Fig. 54

#### Spring connections

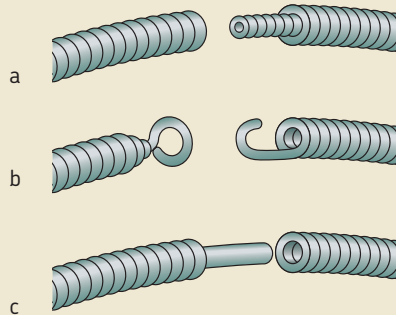


Fig. 55

#### Spacer lugs

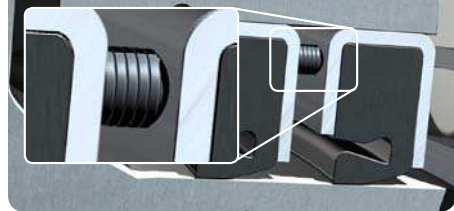


Table 17

#### Number of spacer lugs needed

Spacer lugs	Housing bore diameter			
	from	incl.	from	incl.
–	mm		in.	
4		762		30
6	762	1 143	30	45
8	1 143		45	

## Radial shaft seals

### SKF Springlock

The SKF Springlock is a sealing lip feature that surrounds 270° of the garter spring diameter (→ **fig. 56**). It helps hold the spring in position during installation and is standard on all HS seals and spring-loaded, metal-cased HDS seals.

### SKF Springcover

For blind installations, where spring displacement may go undetected, the SKF Springcover (→ **fig. 57**) 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.



Table 18

## Seals for heavy industrial applications, selection guide per application

Application	General machinery Industrial gearboxes	Rolling mills, metals Hot strip mills Cold rolled plate mills Industrial gearboxes	Industrial gearboxes General machinery Rolling mills, paper mills	Special machinery Crushers, shredders, bailers, etc.
Type	General purpose	Water/scale exclusion	High speed	High Dynamic Runout (DRO) or Shaft-To-Bore Misalignment (STBM)
HDS1-2, HDS-D-E	3	2	1	2
HDS4, 6	3	2	3	2
HDS7	2	3	1	2
HDSA-B	3	2	1	2
HDL	2	2	3	3
HS4-8	2	1	1	2
SBF, HSF1-9	3	2	1	2

1 = Good solution   2 = Better solution   3 = Best solution

Table 19

Standard sections for metal-cased HDS seal designs

Designs with metal outside diameter	Shaft diameter		Bore diameter		Nominal seal width		Difference between bore and shaft diameter	
	from	to	from	to	from	to	from	to
–	mm/in.		mm/in.		mm/in.		mm/in.	
HDS7	165,10 6.500	1 606,55 63.250	196,85 7.750	1 638,30 64.500	15,88 0.625	31,75 1.250	31,75 1.250	63,50 2.500
HDSH7	165,10 6.500	1 606,55 63.250	196,85 7.750	1 638,30 64.500	19,99 0.787	31,75 1.250	31,75 1.250	63,50 2.500
HDS1–3, HDSF1–3	165,10 6.500	1 606,55 63.250	196,85 7.750	1 638,30 64.500	15,88 0.625	31,75 1.250	31,75 1.250	76,20 3.000
HDSH1–3	165,10 6.500	1 606,55 63.250	196,85 7.750	1 638,30 64.500	19,99 0.787	31,75 1.250	31,75 1.250	76,20 3.000
HDSA1–2, HDSB1–2	165,10 6.500	1 189,74 46.840	196,85 7.750	1 219,20 48.000	21,36 0.841	38,10 1.500	31,75 1.250	76,20 3.000
HDS1–2, HDSE1–2, HDSEF1–2	165,10 6.500	1 603,50 63.130	202,18 7.960	1 638,30 64.500	30,89 1.216	50,80 2.000	37,08 1.460	76,20 3.000
HDSEH1–2	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

Designs with an elastomer applied to the outside diameter	Shaft diameter		Bore diameter		Nominal seal width		Difference between bore and shaft diameter	
	from	to	from	to	from	to	from	to
–	mm/in.		mm/in.		mm/in.		mm/in.	
HDS7K	165,10 6.500	1 606,55 63.250	201,62 7.938	1 643,08 64.688	15,88 0.625	31,75 1.250	36,52 1.438	76,20 3.000
HDSH7K	165,10 6.500	1 606,55 63.250	201,62 7.938	1 643,08 64.688	19,99 0.787	31,75 1.250	36,52 1.438	76,20 3.000
HDS1–3K, HDSF1–3K	165,10 6.500	1 606,55 63.250	201,62 7.938	1 643,08 64.688	15,88 0.625	31,75 1.250	36,52 1.438	76,20 3.000
HDSH1–3K	165,10 6.500	1 606,55 63.250	201,62 7.938	1 643,08 64.688	19,99 0.787	31,75 1.250	36,52 1.438	76,20 3.000
HDSA1–2K, HDSB1–2K	165,10 6.500	1 606,55 63.250	201,62 7.938	1 643,08 64.688	15,88 0.841	31,75 1.250	36,52 1.438	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.



## Size options of metal-cased HDS seals and all-rubber HS seals

All SKF metal-cased HDS seals and all-rubber HS seals are made upon order in any inch or metric size within the ranges listed in **tables 19** and **20**. Since new sizes are manufactured without additional tooling, they can be supplied without extended lead times. The product tables starting on **page 216** and **302**, respectively, 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 20**
**Standard size options of HS seals**

Shaft diameter <sup>1)</sup>		Bore diameter <sup>2)</sup>		Bore depth <sup>3)</sup>		Difference between bore and shaft diameter	
from	to	from	to	from	to	from	to
mm/in.		mm/in.		mm/in.		mm/in.	
165,10 6.500	4 572,00 180.000	190,50 7.500	4 597,40 181.000	12,70 0.500		25,40 1.000	
165,10 6.500	4 572,00 180.000	195,10 7.681	4 602,00 181.181	12,70 0.500	19,99 0.787	30,00 1.181	50,80 2.000
330,20 13.000	4 572,00 180.000	368,30 14.500	4 610,10 181.500	16,51 0.650	25,40 1.000	38,10 1.500	63,50 2.500

<sup>1)</sup> Tolerance h11

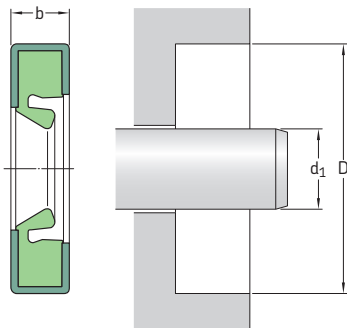
<sup>2)</sup> Tolerance H8

<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.

## Radial shaft seals – HDS7 – metric dimensions

$d_1$  200 – 1 250 mm



The table includes only a selection of sizes. For the full size range, please refer to **table 19** on **page 214**.

Please see **pages 74 to 76** for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width	Design	Lip material	Designation
$d_1$	D	b			
mm			–	–	–
200	230	15	HDS7	R	200×230×15 HDS7 R
210	240	18	HDS7	D <sup>1)</sup>	210×240×18 HDS7 D <sup>1)</sup>
220	250	15	HDS7	R	220×250×15 HDS7 R
230	260	15	HDS7	R	230×260×15 HDS7 R
235	270	15	HDS7	H	235×270×15 HDS7 H
	270	16	HDS7	H	235×270×16 HDS7 H
260	300	16	HDS7	R	260×300×16 HDS7 R
290	350	25	HDS7	R	290×350×25 HDS7 R
300	340	18	HDS7	R	300×340×18 HDS7 R
	340	20	HDS7	R	300×340×20 HDS7 R
	344	20	HDS7	R	300×344×20 HDS7 R
310	350	20	HDS7	R	310×350×20 HDS7 R
320	380	28	HDS7	R	320×380×28 HDS7 R
330	370	20	HDS7	R	330×370×20 HDS7 R
346	375	15	HDS7	R	346×375×15 HDS7 R
360	404	20	HDS7	R	360×404×20 HDS7 R
364	406	17	HDS7	D	364×406×17 HDS7 D
400	444	20	HDS7	R	400×444×20 HDS7 R
432	463	17	HDS7	R	432×463×17 HDS7 R
440	480	20	HDS7	R	440×480×20 HDS7 R
450	510	25	HDS7	R	450×510×25 HDS7 R

<sup>1)</sup> 12,7 mm adjustable spacer lugs (4)

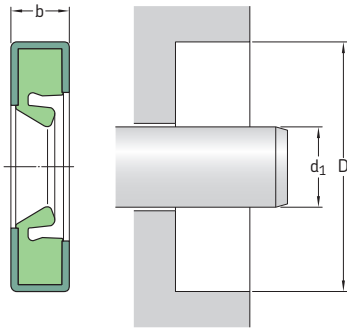
Dimensions Shaft $d_1$	Bore D	Nominal seal width b	Design	Lip material	Designation
mm			–	–	–
<b>461</b>	495	20	HDS7	H	<b>461x495x20 HDS7 H</b>
<b>470</b>	530 530	25 28	HDS7 HDS7	R R	<b>470x530x25 HDS7 R</b> <b>470x530x28 HDS7 R</b>
<b>500</b>	550	20	HDS7	D	<b>500x550x20 HDS7 D<sup>2)</sup></b>
<b>515</b>	555	20	HDS7	R	<b>515x555x20 HDS7 R</b>
<b>520</b>	570	22	HDS7	R	<b>520x570x22 HDS7 R</b>
<b>530</b>	580 580	20 22	HDS7 HDS7	D R	<b>530x580x20 HDS7 D<sup>2)</sup></b> <b>530x580x22 HDS7 R</b>
<b>542</b>	578	16	HDS7	D	<b>542x578x16 HDS7 D<sup>1)</sup></b>
<b>560</b>	604 610 610 620	20 20 22 29,34	HDS7 HDS7 HDS7 HDS7	R R R R	<b>560x604x20 HDS7 R</b> <b>560x610x20 HDS7 R</b> <b>560x610x22 HDS7 R</b> <b>560x620x29 HDS7 R</b>
<b>590</b>	630 640	20 20	HDS7 HDS7	D R	<b>590x630x20 HDS7 D<sup>2)</sup></b> <b>590x640x20 HDS7 R</b>
<b>610</b>	660	25	HDS7	R	<b>610x660x25 HDS7 R</b>
<b>640</b>	690	25	HDS7	R	<b>640x690x25 HDS7 R</b>
<b>647</b>	700	25	HDS7	H	<b>647x700x25 HDS7 H</b>
<b>720</b>	784	23	HDS7	R	<b>720x784x23 HDS7 R</b>
<b>760</b>	810	25	HDS7	R	<b>760x810x25 HDS7 R</b>
<b>1 250</b>	1 314	21,54	HDS7	R	<b>1250x1314x22 HDS7 R</b>

<sup>1)</sup> 12,7 mm adjustable spacer lugs (4)

<sup>2)</sup> 12,7 mm adjustable spacer lugs (6)

## Radial shaft seals – HDS7 – inch dimensions

$d_1$  6.750 – 15.359 in.



The table includes only a selection of sizes. For the full size range, please refer to **table 19** on **page 214**.

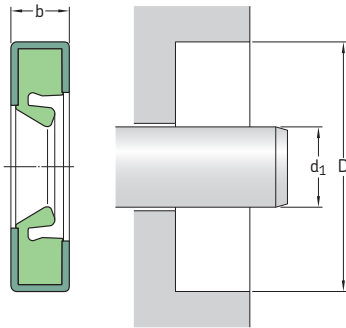
Please see **pages 74 to 76** for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width b	Design	Lip material	Designation
$d_1$	D				
in./mm					
<b>6.750</b> 171,45	8.000 203,20	0.750 19,05	HDS7	R	<b>597627</b>
<b>8.000</b> 203,20	9.500 241,30	0.625 15,88	HDS7	H	<b>596567</b>
<b>8.375</b> 212,73	9.750 247,65	0.750 19,05	HDS7	R	<b>596198</b>
<b>8.500</b> 215,90	10.000 254,00	0.625 15,88	HDS7	R	<b>596415</b>
<b>9.000</b> 228,60	10.498 266,65	0.750 19,05	HDS7	R	<b>596200</b>
	10.500 266,70	0.625 15,88	HDS7	R	<b>597535</b>
<b>9.125</b> 231,78	11.125 282,58	0.813 20,65	HDS7	R	<b>597472</b>
<b>9.375</b> 238,13	11.500 292,10	0.590 14,99	HDS7	R	<b>597408</b>
<b>9.500</b> 241,30	11.000 279,40	0.625 15,88	HDS7	H	<b>596566</b>
<b>9.750</b> 247,65	11.000 279,40	0.625 15,88	HDS7	R	<b>596561</b>
<b>10.000</b> 254,00	11.250 285,75	0.625 15,88	HDS7	R	<b>1000129</b>
<b>10.500</b> 266,70	12.000 304,80	0.688 17,48	HDS7	H	<b>1050211</b>
<b>10.750</b> 273,05	11.750 298,45	0.591 15,01	HDS7	R	<b>1075020</b>
	12.750 323,85	0.625 15,88	HDS7	R	<b>596171</b>
	12.750 323,85	0.813 20,65	HDS7	R	<b>1075559</b>

Dimensions Shaft d <sub>1</sub>	Bore D	Nominal seal width b	Design	Lip material	Designation
in./mm			–	–	–
<b>11.000</b> 279,40	12.250 311,15	0.625 15,88	HDS7	R	<b>1100120</b>
	13.000 330,20	0.813 20,65	HDS7	R	<b>1100519</b>
<b>11.250</b> 285,75	12.750 323,85	0.625 15,88	HDS7	H	<b>1125219</b>
<b>11.500</b> 292,10	13.000 330,20	0.688 17,48	HDS7	R	<b>1150229</b>
<b>11.750</b> 298,45	13.250 336,55	0.688 17,48	HDS7	R	<b>1175219</b>
<b>12.000</b> 304,80	13.500 342,90	0.625 15,88	HDS7	R	<b>1213210</b>
	13.938 354,03	0.688 17,48	HDS7	R	<b>1200500</b>
	14.000 355,60	0.813 20,65	HDS7	R	<b>1200521</b>
<b>12.250</b> 311,15	13.750 349,25	0.750 19,05	HDS7	D	<b>1225259</b>
	14.000 355,60	0.688 17,48	HDS7	R	<b>1225379</b>
	14.250 361,95	0.750 19,05	HDS7	R	<b>1225549</b>
	14.250 361,95	0.813 20,65	HDS7	R	<b>1225370</b>
	14.250 361,95	1.250 31,75	HDS7	R	<b>1225589</b>
<b>12.500</b> 317,50	14.000 355,60	0.688 17,48	HDS7	R	<b>1250239</b>
<b>12.750</b> 323,85	14.250 361,95	0.625 15,88	HDS7	H	<b>1275219</b>
<b>13.000</b> 330,20	15.000 381,00	1.000 25,40	HDS7	R	<b>1300600</b>
<b>13.250</b> 336,55	15.250 387,35	0.750 19,05	HDS7	R	<b>1325569</b>
<b>13.500</b> 342,90	15.500 393,70	0.813 20,65	HDS7	R	<b>1350520</b>
<b>13.750</b> 349,25	15.250 387,35	0.625 15,88	HDS7	H	<b>1375719</b>
<b>13.875</b> 352,43	16.000 406,40	1.000 25,40	HDS7	R	<b>1387610</b>
<b>14.500</b> 368,30	16.000 406,40	0.688 17,48	HDS7	R	<b>1450220</b>
<b>14.750</b> 374,65	16.500 419,10	0.688 17,48	HDS7	R	<b>1475430</b>
<b>15.000</b> 381,00	17.000 431,80	0.813 20,65	HDS7	R	<b>1500510</b>
<b>15.250</b> 387,35	17.250 438,15	0.625 15,88	HDS7	R	<b>1525511</b>
<b>15.359</b> 390,12	17.709 449,81	0.906 23,01	HDS7	R	<b>1536691</b>

## Radial shaft seals – HDS7 – inch dimensions

$d_1$  15.500 – 63.250 in.



The table includes only a selection of sizes. For the full size range, please refer to **table 19** on **page 214**.

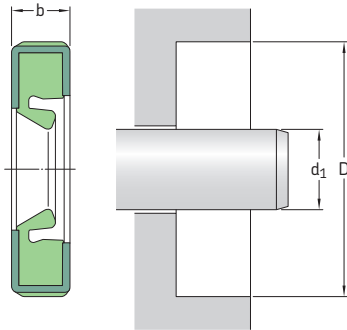
Please see **pages 74 to 76** for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width b	Design	Lip material	Designation
$d_1$	D				
in./mm					
<b>15.500</b> 393,70	17.500 444,50	0.813 20,65	HDS7	R	<b>1550559</b>
<b>15.750</b> 400,05	17.250 438,15	0.750 19,05	HDS7	H	<b>1575210</b>
<b>15.875</b> 403,23	17.500 444,50	0.750 19,05	HDS7	H	<b>1587330</b>
<b>16.000</b> 406,40	17.500 444,50	0.625 15,88	HDS7	H	<b>1600211</b>
	18.000 457,20	0.813 20,65	HDS7	H	<b>1600519</b>
<b>16.250</b> 412,75	17.750 450,85	0.688 17,48	HDS7	R	<b>1625210</b>
<b>16.500</b> 419,10	18.000 457,20	0.750 19,05	HDS7	R	<b>1650280</b>
<b>17.000</b> 431,80	18.500 469,90	0.625 15,88	HDS7	R	<b>1700280</b>
	19.000 482,60	0.813 20,65	HDS7	R	<b>1700579</b>
<b>17.375</b> 441,33	18.875 479,43	0.750 19,05	HDS7	R	<b>1737219</b>
<b>17.500</b> 444,50	19.000 482,60	0.688 17,48	HDS7	H	<b>1750220</b>
	19.000 482,60	0.688 17,48	HDS7	R	<b>1750221</b>
<b>17.875</b> 454,03	19.875 504,83	0.750 19,05	HDS7	R	<b>1787540</b>
<b>19.000</b> 482,60	20.500 520,70	0.750 19,05	HDS7	R	<b>1900211</b>
<b>19.250</b> 488,95	20.750 527,05	0.625 15,88	HDS7	R	<b>596180</b>

Dimensions Shaft $d_1$	Bore D	Nominal seal width b	Design	Lip material	Designation
in./mm			–	–	–
<b>19.500</b> 495,30	21.500 546,10	0.750 19,05	HDS7	R	<b>1950211</b>
<b>20.000</b> 508,00	21.500 546,10	0.750 19,05	HDS7	R	<b>2000240</b>
<b>20.750</b> 527,05	22.750 577,85	0.875 22,23	HDS7	D	<b>2075569</b>
<b>21.260</b> 540,00	23.228 590,00	0.984 25,00	HDS7	R	<b>2126510</b>
<b>21.750</b> 552,45	23.750 603,25	0.875 22,23	HDS7	R	<b>2175569</b>
<b>22.250</b> 565,15	24.250 615,95	0.875 22,23	HDS7	H	<b>2225511</b>
<b>24.250</b> 615,95	26.000 660,40	1.000 25,40	HDS7	H	<b>2425419</b>
<b>25.000</b> 635,00	26.500 673,10	0.750 19,05	HDS7	R	<b>2500210</b>
<b>26.500</b> 673,10	28.000 711,20	0.750 19,05	HDS7	R	<b>2650240</b>
<b>27.000</b> 685,80	29.000 736,60	0.875 22,23	HDS7	R	<b>2700519</b>
<b>27.500</b> 698,50	29.500 749,30	0.875 22,23	HDS7	R	<b>2750510</b>
<b>27.875</b> 708,03	29.815 757,30	0.875 22,23	HDS7	R	<b>2788600</b>
<b>28.000</b> 711,20	29.500 749,30	0.750 19,05	HDS7	R	<b>2800240</b>
	30.000 762,00	0.875 22,23	HDS7	R	<b>2800590</b>
	30.500 774,70	1.000 25,40	HDS7	H	<b>2800650</b>
<b>28.500</b> 723,90	30.500 774,70	0.875 22,23	HDS7	H	<b>2850211</b>
<b>29.000</b> 736,60	31.000 787,40	0.875 22,23	HDS7	R	<b>2900579</b>
<b>30.500</b> 774,70	32.500 825,50	0.875 22,23	HDS7	H	<b>3050511</b>
<b>30.615</b> 777,62	33.268 845,01	1.094 27,79	HDS7	R	<b>3061721</b>
<b>31.496</b> 800,00	33.465 850,01	0.984 24,99	HDS7	R	<b>3149470</b>
<b>40.500</b> 1 028,70	41.750 1 060,45	0.750 19,05	HDS7	H	<b>4050061</b>
<b>47.000</b> 1 193,80	49.000 1 244,60	0.875 22,23	HDS7	H	<b>4700511</b>
<b>57.875</b> 1 470,03	60.000 1 524,00	0.938 23,83	HDS7	R	<b>5787611</b>
<b>63.250</b> 1 606,55	64.500 1 638,30	1.188 31,75	HDS7	R	<b>6325100</b>

## Radial shaft seals – HDS7K – metric dimensions

$d_1$  200 – 810 mm



The table includes only a selection of sizes. For the full size range, please refer to **table 19** on **page 214**.

Please see **pages 74 to 76** for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width b	Design	Lip material	Designation
$d_1$	D				
mm			–	–	–
200	230	15	HDS7K	R	200×230×15 HDS7K R
230	260	15	HDS7K	R	230×260×15 HDS7K R
280	310	15	HDS7K	R	280×310×15 HDS7K R
	320	18	HDS7K	R	280×320×18 HDS7K R <sup>1)</sup>
	320	20	HDS7K	R	280×320×20 HDS7K R
310	350	20	HDS7K	R	310×350×20 HDS7K R
320	360	25	HDS7K	R	320×360×25 HDS7K R <sup>2)</sup>
360	404	20	HDS7K	R	360×404×20 HDS7K R
400	450	18	HDS7K	R	400×450×18 HDS7K R
	450	22	HDS7K	R	400×450×22 HDS7K R
446	496	22	HDS7K	R	446×496×22 HDS7K R
450	500	18	HDS7K	R	450×500×18 HDS7K R
	500	22	HDS7K	R	450×500×22 HDS7K R
485	535	22	HDS7K	R	485×535×22 HDS7K R
520	570	18	HDS7K	H	520×570×18 HDS7K H
	570	18	HDS7K	H	520×570×18 HDS7K H <sup>3)</sup>
530	580	22	HDS7K	R	530×580×22 HDS7K R
	580	20	HDS7K	R	530×580×20 HDS7K R <sup>1)</sup>
540	590	18	HDS7K	R	540×590×18 HDS7K R
560	610	20	HDS7K	R	560×610×20 HDS7K R <sup>1)</sup>

<sup>1)</sup> 3,18 mm lugs (4)

<sup>2)</sup> 4,77 mm lugs (4)

<sup>3)</sup> 7,95 mm lugs (6)

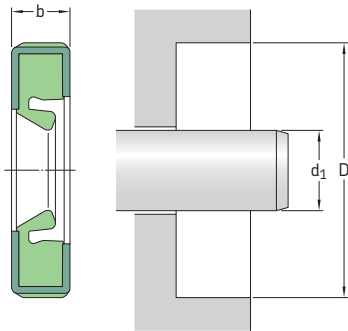


<b>Dimensions</b>			<b>Design</b>	<b>Lip material</b>	<b>Designation</b>
Shaft	Bore	Nominal seal width			
$d_1$	D	b			
mm			–	–	–
<b>570</b>	610	18	HDS7K	H	<b>570×610×18 HDS7K H</b>
	610	18	HDS7K	H	<b>570×610×18 HDS7K H<sup>4)</sup></b>
	620	22	HDS7K	R	<b>570×620×22 HDS7K R</b>
<b>760</b>	824	25	HDS7K	R	<b>760×824×25 HDS7K R</b>
<b>810</b>	874	25	HDS7K	R	<b>810×874×25 HDS7K R</b>

<sup>4)</sup> 1,60 mm lugs (6)

## Radial shaft seals – HDS7K – inch dimensions

$d_1$  15.750 – 16.500 in.



The table includes only a selection of sizes. For the full size range, please refer to **table 19** on **page 214**.

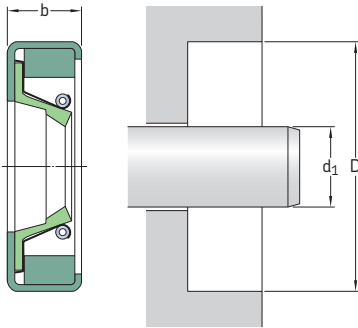
Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Nominal seal width $b$	Design	Lip material	Designation
Shaft	Bore				
$d_1$	$D$				
in./mm			–	–	–
<b>15.750</b> 400,05	17.250 438,15	0.688 17,48	HDS7K	R	<b>1575241</b>
<b>16.000</b> 406,40	18.000 457,20	0.807 20,50	HDS7K	R	<b>1600562</b>
<b>16.500</b> 419,10	18.000 457,20	0.750 19,05	HDS7K	R	<b>1650248</b>



## Radial shaft seals – HDL – metric dimensions

$d_1$  200 – 1 380 mm



The table includes only a selection of available sizes. Contact your SKF sales representative for more information.

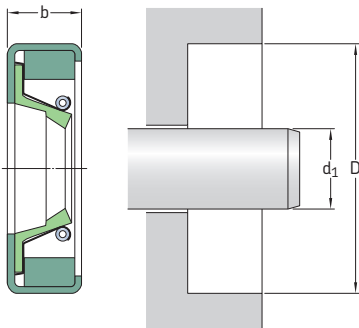
Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Nominal seal width b	Designations	
Shaft $d_1$	Bore D		Lip material R	V
mm			–	
200	240	20	200×240×20 HDL R	200×240×20 HDL V
220	250	18	220×250×18 HDL R	220×250×18 HDL V
232	269,87	17,45	232×270×17 HDL R	232×270×17 HDL V
240	270	15	240×270×15 HDL R	240×270×15 HDL V
	280	20	240×280×20 HDL R	240×280×20 HDL V
270	308	17,45	270×308×17 HDL R	270×308×17 HDL V
280	320	19,98	280×320×20 HDL R	280×320×20 HDL V
	340	20,62	280×340×21 HDL R	280×340×21 HDL V
330	370	18	330×370×18 HDL R	330×370×18 HDL V
360	404	17,45	360×404×17 HDL R	360×404×17 HDL V
390	430	16	390×430×16 HDL R	390×430×16 HDL V
400	440	20	400×440×20 HDL R	400×440×20 HDL V
	450	17,45	400×450×17 HDL R	400×450×17 HDL V
420	460	17,45	420×460×17 HDL R	420×460×17 HDL V
	460	20	420×460×20 HDL R	420×460×20 HDL V
	470	17,45	420×470×17 HDL R	420×470×17 HDL V
440	480	20	440×480×20 HDL R	440×480×20 HDL V
470	520	22	470×520×22 HDL R	470×520×22 HDL V
480	520	20	480×520×20 HDL R	480×520×20 HDL V
485	535	19	485×535×19 HDL R	485×535×19 HDL V
500	550	19	500×550×19 HDL R	500×550×19 HDL V
508	560	25	508×560×25 HDL R	508×560×25 HDL V
513	543	16	513×543×16 HDL R	513×543×16 HDL V

Dimensions Shaft	Bore	Nominal seal width b	Designation Lip material	
$d_1$	D	b	R	V
mm			–	
520	560	18	520×560×18 HDL R	520×560×18 HDL V
	570	22	520×570×22 HDL R	520×570×22 HDL V
530	580	20,62	530×580×21 HDL R	530×580×21 HDL V
540	590	24,98	540×590×25 HDL R	540×590×25 HDL V
560	610	20	560×610×20 HDL R	560×610×20 HDL V
565	601	20	565×601×20 HDL R	565×601×20 HDL V
600	640	20	600×640×20 HDL R	600×640×20 HDL V
630	670	20	630×670×20 HDL R	630×670×20 HDL V
640	680	20	640×680×20 HDL R	640×680×20 HDL V
650	714	25	650×714×25 HDL R	650×714×25 HDL V
668	706	25,40	668×706×25 HDL R	668×706×25 HDL V
750	814	25	750×814×25 HDL R	750×814×25 HDL V
760	804	18	760×804×18 HDL R	760×804×18 HDL V
780	844	25	780×844×25 HDL R	780×844×25 HDL V
790	854	25	790×854×25 HDL R	790×854×25 HDL V
837	889	22,22	837×889×22 HDL R	837×889×22 HDL V
838,10	881	20	838×881×20 HDL R	838×881×20 HDL V
840	904	25	840×904×25 HDL R	840×904×25 HDL V
920	958,01	19,05	920×958×19 HDL R	920×958×19 HDL V
930	980	22,22	930×980×22 HDL R	930×980×22 HDL V
990	1 040	25	990×1040×25 HDL R	990×1040×25 HDL V
1 000	1 050	22,22	1000×1050×22 HDL R	1000×1050×22 HDL V
1 055	1 100	25	1055×1100×25 HDL R	1055×1100×25 HDL V
1 105	1 160	22	1105×1160×22 HDL R	1105×1160×22 HDL V
1 350	1 414	22	1350×1414×22 HDL R	1350×1414×22 HDL V
	1 415	25	1350×1415×25 HDL R	1350×1415×25 HDL V
1 380	1 440	25	1380×1440×25 HDL R	1380×1440×25 HDL V

## Radial shaft seals – HDL – inch dimensions

$d_1$  6.125 – 11.750 in.



The table includes only a selection of available sizes. Contact your SKF sales representative for more information.

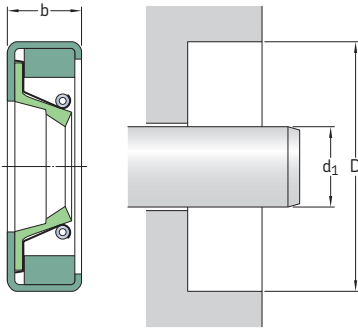
Please see pages 74 to 76 for housing bore requirements.

Dimensions		Nominal seal width b	Designations Lip material	V
Shaft	Bore			
$d_1$	D		R	
in./mm			–	
<b>6.125</b> 155,58	7.625 193,68	0.687 17,45	<b>HDL 1299 R</b>	<b>HDL 1299 V</b>
<b>7.125</b> 180,98	8.250 209,55	0.750 19,05	<b>HDL 3011 R</b>	<b>HDL 3011 V</b>
<b>7.875</b> 200,03	9.375 238,13	0.687 17,45	<b>HDL 9176 R</b>	<b>HDL 9176 V</b>
<b>8.000</b> 203,20	9.500 241,30	0.687 17,45	<b>HDL 3921 R</b>	<b>HDL 3921 V</b>
<b>8.125</b> 206,38	10.125 257,18	0.687 17,45	<b>HDL 9712 R</b>	<b>HDL 9712 V</b>
<b>8.250</b> 209,55	10.250 260,35	0.813 20,65	<b>HDL 4499 R</b>	<b>HDL 4499 V</b>
<b>8.375</b> 212,73	9.875 250,83	0.687 17,45	<b>HDL 3933 R</b>	<b>HDL 3933 V</b>
	10.375 263,53	0.813 20,65	<b>HDL 4500 R</b>	<b>HDL 4500 V</b>
<b>8.500</b> 215,90	9.750 247,65	0.562 14,28	<b>HDL 1705 R</b>	<b>HDL 1705 V</b>
	10.000 254,00	0.687 17,45	<b>HDL 8453 R</b>	<b>HDL 8453 V</b>
<b>8.625</b> 219,08	10.125 257,18	0.687 17,45	<b>HDL 3939 R</b>	<b>HDL 3939 V</b>
	10.750 273,05	0.813 20,65	<b>HDL 7718 R</b>	<b>HDL 7718 V</b>
<b>8.750</b> 222,25	10.250 260,35	0.687 17,45	<b>HDL 3946 R</b>	<b>HDL 3946 V</b>
	10.750 273,05	0.813 20,65	<b>HDL 3952 R</b>	<b>HDL 3952 V</b>
<b>8.875</b> 225,43	10.875 276,23	0.813 20,65	<b>HDL 3953 R</b>	<b>HDL 3953 V</b>

Dimensions Shaft d <sub>1</sub>	Bore D	Nominal seal width b	Designations	
			Lip material R	V
in./mm			–	
<b>9.000</b> 228,60	10.500 266,70	0.688 17,45	<b>HDL 3954 R</b>	<b>HDL 3954 V</b>
<b>9.125</b> 231,78	10.625 269,88	0.687 17,45	<b>HDL 3957 R</b>	<b>HDL 3957 V</b>
<b>9.250</b> 234,95	10.750 273,05	0.687 17,45	<b>HDL 3963 R</b>	<b>HDL 3963 V</b>
<b>9.375</b> 238,13	11.375 288,93	0.813 20,65	<b>HDL 4610 R</b>	<b>HDL 4610 V</b>
<b>9.500</b> 241,30	10.750 273,05	0.562 14,28	<b>HDL 3145 R</b>	<b>HDL 3145 V</b>
	11.500 292,10	0.813 20,65	<b>HDL 3984 R</b>	<b>HDL 3984 V</b>
<b>9.750</b> 247,65	11.125 282,58	0.562 14,28	<b>HDL 1692 R</b>	<b>HDL 1692 V</b>
	11.750 298,45	0.687 17,45	<b>HDL 9425 R</b>	<b>HDL 9425 V</b>
<b>10.000</b> 254,00	11.500 292,10	0.687 17,45	<b>HDL 3992 R</b>	<b>HDL 3992 V</b>
	12.000 304,80	0.813 20,65	<b>HDL 3997 R</b>	<b>HDL 3997 V</b>
<b>10.125</b> 257,18	11.625 295,28	0.687 17,45	<b>HDL 3999 R</b>	<b>HDL 3999 V</b>
<b>10.250</b> 260,35	11.750 298,45	0.687 17,45	<b>HDL 4004 R</b>	<b>HDL 4004 V</b>
<b>10.500</b> 266,70	12.000 304,80	0.687 17,45	<b>HDL 4011 R</b>	<b>HDL 4011 V</b>
<b>10.750</b> 273,05	12.250 311,15	0.687 17,45	<b>HDL 4023 R</b>	<b>HDL 4023 V</b>
	12.750 323,85	0.625 15,88	<b>HDL 3014 R</b>	<b>HDL 3014 V</b>
<b>10.875</b> 276,23	12.375 314,33	0.687 17,45	<b>HDL 4027 R</b>	<b>HDL 4027 V</b>
<b>11.000</b> 279,40	12.250 311,15	0.562 14,28	<b>HDL 3135 R</b>	<b>HDL 3135 V</b>
	13.000 330,20	0.688 17,45	<b>HDL 6034 R</b>	<b>HDL 6034 V</b>
<b>11.125</b> 282,58	13.000 330,20	0.687 17,45	<b>HDL 3699 R</b>	<b>HDL 3699 V</b>
<b>11.250</b> 285,75	12.750 323,85	0.687 17,45	<b>HDL 4527 R</b>	<b>HDL 4527 V</b>
	13.250 336,55	0.813 20,65	<b>HDL 4047 R</b>	<b>HDL 4047 V</b>
<b>11.375</b> 288,93	13.375 339,73	0.813 20,65	<b>HDL 4052 R</b>	<b>HDL 4052 V</b>
<b>11.500</b> 292,10	13.000 330,20	0.687 17,45	<b>HDL 4057 R</b>	<b>HDL 4057 V</b>
<b>11.750</b> 298,45	13.250 336,55	0.687 17,45	<b>HDL 4064 R</b>	<b>HDL 4064 V</b>

## Radial shaft seals – HDL – inch dimensions

$d_1$  12.000 – 15.125 in.



The table includes only a selection of available sizes. Contact your SKF sales representative for more information.

Please see pages 74 to 76 for housing bore requirements.

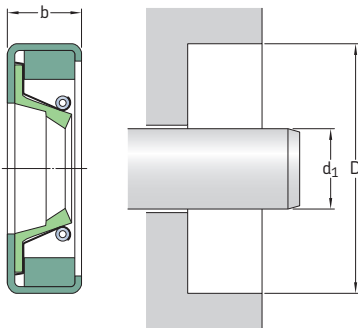
Dimensions		Nominal seal width b	Designations	
Shaft	Bore		Lip material	
$d_1$	D		R	V
in./mm			–	
<b>12.000</b> 304,80	13.500	0.687	<b>HDL 4612 R</b>	<b>HDL 4612 V</b>
	342,90	17,45		
	13.750	0.687	<b>HDL 3701 R</b>	<b>HDL 3701 V</b>
	349,25	17,45		
<b>12.125</b> 307,98	13.875	0.687	<b>HDL 4053 R</b>	<b>HDL 4053 V</b>
	352,43	17,45		
<b>12.250</b> 311,15	13.750	0.687	<b>HDL 4613 R</b>	<b>HDL 4613 V</b>
	349,25	17,45		
	14.000	0.687	<b>HDL 4055 R</b>	<b>HDL 4055 V</b>
	355,60	17,45		
<b>12.375</b> 314,33	13.875	0.687	<b>HDL 4076 R</b>	<b>HDL 4076 V</b>
	352,43	17,45		
	14.375	0.687	<b>HDL 4097 R</b>	<b>HDL 4097 V</b>
	365,13	17,45		
<b>12.500</b> 317,50	14.000	0.687	<b>HDL 4079 R</b>	<b>HDL 4079 V</b>
	355,60	17,45		
<b>12.625</b> 320,68	14.125	0.687	<b>HDL 4081 R</b>	<b>HDL 4081 V</b>
	358,78	17,45		
<b>12.687</b> 322,24	14.750	0.813	<b>HDL 9766 R</b>	<b>HDL 9766 V</b>
	374,65	20,65		
<b>12.750</b> 323,85	14.250	0.687	<b>HDL 4089 R</b>	<b>HDL 4089 V</b>
	361,95	17,45		
	15.000	0.813	<b>HDL 4092 R</b>	<b>HDL 4092 V</b>
	381,00	20,65		
<b>12.875</b> 327,03	15.000	0.813	<b>HDL 5404 R</b>	<b>HDL 5404 V</b>
	381,00	20,65		
<b>13.000</b> 330,20	14.500	0.687	<b>HDL 4093 R</b>	<b>HDL 4093 V</b>
	368,30	17,45		



Dimensions Shaft d <sub>1</sub>	Bore D	Nominal seal width b	Designations	
			Lip material R	V
in./mm			–	
<b>13.250</b>	14.750	0.687	<b>HDL 4101 R</b>	<b>HDL 4101 V</b>
336,55	374,65	17,45		
	15,000	0,687	<b>HDL 7169 R</b>	<b>HDL 7169 V</b>
	381,00	17,45		
<b>13.500</b>	15,000	0,687	<b>HDL 4121 R</b>	<b>HDL 4121 V</b>
342,90	381,00	17,45		
	15,750	0,813	<b>HDL 4123 R</b>	<b>HDL 4123 V</b>
	400,05	20,65		
<b>13.625</b>	15,500	0,687	<b>HDL 4120 R</b>	<b>HDL 4120 V</b>
346,08	393,70	17,45		
<b>13.750</b>	15,250	0,687	<b>HDL 4529 R</b>	<b>HDL 4529 V</b>
349,25	387,35	17,45		
<b>13.813</b>	16,000	0,813	<b>HDL 4108 R</b>	<b>HDL 4108 V</b>
350,85	406,40	20,65		
<b>13.875</b>	16,000	0,813	<b>HDL 4110 R</b>	<b>HDL 4110 V</b>
352,43	406,40	20,65		
<b>13.937</b>	15,437	0,687	<b>HDL 4130 R</b>	<b>HDL 4130 V</b>
354,00	392,10	17,45		
	15,500	0,687	<b>HDL 4111 R</b>	<b>HDL 4111 V</b>
	393,70	17,45		
<b>14.000</b>	15,500	0,687	<b>HDL 4131 R</b>	<b>HDL 4131 V</b>
355,60	393,70	17,45		
	15,750	0,750	<b>HDL 4134 R</b>	<b>HDL 4134 V</b>
	400,05	19,05		
<b>14.187</b>	16,732	0,813	<b>HDL 9280 R</b>	<b>HDL 9280 V</b>
360,34	424,99	20,65		
<b>14.250</b>	15,750	0,687	<b>HDL 4118 R</b>	<b>HDL 4118 V</b>
361,95	400,05	17,45		
<b>14.375</b>	16,000	0,687	<b>HDL 5481 R</b>	<b>HDL 5481 V</b>
365,13	406,40	17,45		
<b>14.500</b>	16,000	0,687	<b>HDL 4142 R</b>	<b>HDL 4142 V</b>
368,30	406,40	17,45		
<b>14.625</b>	16,250	0,687	<b>HDL 3856 R</b>	<b>HDL 3856 V</b>
371,48	412,75	17,45		
<b>14.750</b>	16,250	0,687	<b>HDL 4147 R</b>	<b>HDL 4147 V</b>
374,65	412,75	17,45		
	16,500	0,687	<b>HDL 5990 R</b>	<b>HDL 5990 V</b>
	419,10	17,45		
<b>14.875</b>	16,500	0,687	<b>HDL 3858 R</b>	<b>HDL 3858 V</b>
377,83	419,10	17,45		
	16,875	0,937	<b>HDL 2622 R</b>	<b>HDL 2622 V</b>
	428,63	23,80		
<b>14.906</b>	17,000	0,813	<b>HDL 3861 R</b>	<b>HDL 3861 V</b>
378,61	431,80	20,65		
<b>15.000</b>	16,500	0,687	<b>HDL 4151 R</b>	<b>HDL 4151 V</b>
381,00	419,10	17,45		
<b>15.125</b>	16,750	0,687	<b>HDL 4165 R</b>	<b>HDL 4165 V</b>
384,18	425,45	17,45		

## Radial shaft seals – HDL – inch dimensions

$d_1$  15.250 – 19.250 in.



The table includes only a selection of available sizes. Contact your SKF sales representative for more information.

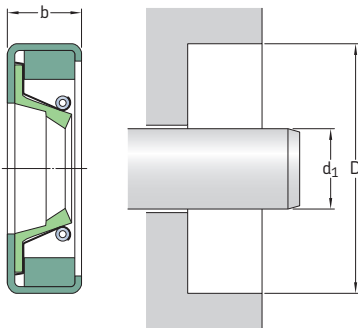
Please see pages 74 to 76 for housing bore requirements.

Dimensions		Nominal seal width b	Designations	
Shaft	Bore		Lip material	
$d_1$	D		R	V
in./mm			–	
<b>15.250</b>	16.750	0.687	<b>HDL 4615 R</b>	<b>HDL 4615 V</b>
387,35	425,45	17,45		
	17.250	0.875	<b>HDL 3030 R</b>	<b>HDL 3030 V</b>
	438,15	22,23		
<b>15.313</b>	16.875	0.687	<b>HDL 4158 R</b>	<b>HDL 4158 V</b>
388,95	428,63	17,45		
<b>15.359</b>	17.717	0.687	<b>HDL 4166 R</b>	<b>HDL 4166 V</b>
390,11	450,01	17,45		
<b>15.375</b>	17.250	0.687	<b>HDL 4167 R</b>	<b>HDL 4167 V</b>
390,53	438,15	17,45		
<b>15.500</b>	17.496	0.813	<b>HDL 4163 R</b>	<b>HDL 4163 V</b>
393,70	444,40	20,65		
<b>15.750</b>	17.165	0.687	<b>HDL 9986 R</b>	<b>HDL 9986 V</b>
400,05	436,00	17,45		
	17.312	0.687	<b>HDL 9271 R</b>	<b>HDL 9271 V</b>
	439,72	17,45		
<b>15.875</b>	17.875	0.813	<b>HDL 4176 R</b>	<b>HDL 4176 V</b>
403,23	454,03	20,65		
<b>16.000</b>	17.500	0.687	<b>HDL 4177 R</b>	<b>HDL 4177 V</b>
406,40	444,50	17,45		
	18.000	0.813	<b>HDL 4180 R</b>	<b>HDL 4180 V</b>
	457,20	20,65		
<b>16.250</b>	17.750	0.687	<b>HDL 4181 R</b>	<b>HDL 4181 V</b>
412,75	450,85	17,45		
	18.000	0.750	<b>HDL 4184 R</b>	<b>HDL 4184 V</b>
	457,20	19,05		
<b>16.375</b>	17.875	0.687	<b>HDL 4179 R</b>	<b>HDL 4179 V</b>
415,93	454,03	17,45		
<b>16.500</b>	18.000	0.687	<b>HDL 9863 R</b>	<b>HDL 9863 V</b>
419,10	457,20	17,45		
	18.500	0.813	<b>HDL 4186 R</b>	<b>HDL 4186 V</b>
	469,90	20,65		

<b>Dimensions</b>			<b>Designations</b>	
Shaft	Bore	Nominal seal width	Lip material	
$d_1$	D	b	R	V
in./mm			-	
<b>16.535</b> 419,98	18.504 470,00	0.875 22,23	<b>HDL 1929 R</b>	<b>HDL 1929 V</b>
<b>16.750</b> 425,45	18.250 463,55	0.687 17,45	<b>HDL 3744 R</b>	<b>HDL 3744 V</b>
	19.000 482,60	0.813 20,65	<b>HDL 3748 R</b>	<b>HDL 3748 V</b>
<b>16.937</b> 430,19	19.291 489,99	0.813 20,65	<b>HDL 9695 R</b>	<b>HDL 9695 V</b>
<b>17.000</b> 431,80	18.500 469,90	0.687 17,45	<b>HDL 4188 R</b>	<b>HDL 4188 V</b>
	19.250 488,95	0.813 20,65	<b>HDL 4191 R</b>	<b>HDL 4191 V</b>
<b>17.250</b> 438,15	18.750 476,25	0.687 17,45	<b>HDL 3751 R</b>	<b>HDL 3751 V</b>
<b>17.500</b> 444,50	19.000 482,60	0.687 17,45	<b>HDL 4194 R</b>	<b>HDL 4194 V</b>
	19.250 488,95	1.000 25,40	<b>HDL 3005 R</b>	<b>HDL 3005 V</b>
<b>17.625</b> 447,68	19.250 488,95	0.687 17,45	<b>HDL 4199 R</b>	<b>HDL 4199 V</b>
	19.625 498,48	0.687 17,45	<b>HDL 6850 R</b>	<b>HDL 6850 V</b>
<b>17.750</b> 450,85	19.750 501,65	0.813 20,65	<b>HDL 4200 R</b>	<b>HDL 4200 V</b>
	20.078 509,98	0.875 22,23	<b>HDL 9084 R</b>	<b>HDL 9084 V</b>
<b>17.875</b> 454,03	19.875 504,83	0.813 20,65	<b>HDL 4204 R</b>	<b>HDL 4204 V</b>
<b>18.000</b> 457,20	19.500 495,30	0.687 17,45	<b>HDL 4206 R</b>	<b>HDL 4206 V</b>
	19.750 501,65	0.687 17,45	<b>HDL 5728 R</b>	<b>HDL 5728 V</b>
<b>18.120</b> 460,25	20.500 520,70	0.875 22,23	<b>HDL 3754 R</b>	<b>HDL 3754 V</b>
<b>18.125</b> 460,38	20.500 520,70	0.875 22,23	<b>HDL 3756 R</b>	<b>HDL 3756 V</b>
<b>18.250</b> 463,55	19.750 501,65	0.687 17,45	<b>HDL 3757 R</b>	<b>HDL 3757 V</b>
<b>18.375</b> 466,73	19.875 504,83	0.687 17,45	<b>HDL 4213 R</b>	<b>HDL 4213 V</b>
	19.937 506,39	0.687 17,45	<b>HDL 7103 R</b>	<b>HDL 7103 V</b>
<b>18.500</b> 469,90	20.000 508,00	0.687 17,45	<b>HDL 3768 R</b>	<b>HDL 3768 V</b>
	20.250 514,35	0.687 17,45	<b>HDL 3772 R</b>	<b>HDL 3772 V</b>
<b>19.000</b> 482,60	20.500 520,70	0.750 19,05	<b>HDL 4218 R</b>	<b>HDL 4218 V</b>
	21.000 533,40	0.875 22,23	<b>HDL 4219 R</b>	<b>HDL 4219 V</b>
<b>19.250</b> 488,95	20.750 527,05	0.750 19,05	<b>HDL 4617 R</b>	<b>HDL 4617 V</b>

## Radial shaft seals – HDL – inch dimensions

$d_1$  19.375 – 23.375 in.



The table includes only a selection of available sizes. Contact your SKF sales representative for more information.

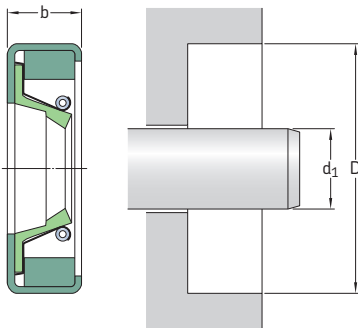
Please see pages 74 to 76 for housing bore requirements.

Dimensions		Nominal seal width b	Designations	
Shaft $d_1$	Bore D		Lip material R	V
in./mm			–	
19.375 492,13	21.000 533,40	0.750 19,05	HDL 3778 R	HDL 3778 V
19.500 495,30	21.000 533,40	0.750 19,05	HDL 3779 R	HDL 3779 V
	21.500 546,10	0.875 22,23	HDL 4221 R	HDL 4221 V
19.750 501,65	21.750 552,45	0.875 22,23	HDL 4228 R	HDL 4228 V
	22.125 561,98	0.875 22,23	HDL 7400 R	HDL 7400 V
19.875 504,83	22.000 558,80	0.875 22,23	HDL 3788 R	HDL 3788 V
19.937 506,40	21.687 550,84	0.625 15,88	HDL 4233 R	HDL 4233 V
	21.500 546,10	0.750 19,05	HDL 3789 R	HDL 3789 V
20.000 508,00	21.500 546,10	0.750 19,05	HDL 4235 R	HDL 4235 V
20.143 511,63	22.250 565,15	0.875 22,23	HDL 3792 R	HDL 3792 V
20.250 514,35	21.750 552,45	0.750 19,05	HDL 4239 R	HDL 4239 V
	22.250 565,15	0.875 22,23	HDL 4240 R	HDL 4240 V
20.438 519,13	22.500 571,50	0.813 20,65	HDL 4242 R	HDL 4242 V
20.500 520,70	22.000 558,80	0.750 19,05	HDL 4619 R	HDL 4619 V
20.625 523,88	22.625 574,68	0.813 20,65	HDL 9893 R	HDL 9893 V

<b>Dimensions</b>			<b>Designations</b>	
Shaft	Bore	Nominal seal width	Lip material	
$d_1$	D	b	R	V
in./mm			-	
<b>20.750</b> 527,05	22.750 577,85	0.875 22,23	HDL 4248 R	HDL 4248 V
<b>20.875</b> 530,23	22.875 581,03	0.875 22,23	HDL 4250 R	HDL 4250 V
<b>21.000</b> 533,40	22.500 571,50	0.750 19,05	HDL 5259 R	HDL 5259 V
	23.000 584,20	0.813 20,65	HDL 6535 R	HDL 6535 V
<b>21.250</b> 539,75	23.000 584,20	0.750 19,05	HDL 4255 R	HDL 4255 V
<b>21.437</b> 544,49	23.187 588,94	0.750 19,05	HDL 4256 R	HDL 4256 V
	23.250 590,55	0.750 19,05	HDL 4257 R	HDL 4257 V
<b>21.500</b> 546,10	23.500 596,90	0.875 22,23	HDL 4259 R	HDL 4259 V
	23.375 593,73	0.750 19,05	HDL 4261 R	HDL 4261 V
<b>21.750</b> 552,45	23.250 590,55	0.750 19,05	HDL 4621 R	HDL 4621 V
	24.750 628,65	0.875 22,23	HDL 4262 R	HDL 4262 V
<b>22.000</b> 558,80	23.500 596,90	0.750 19,05	HDL 4269 R	HDL 4269 V
	24.250 615,95	0.813 20,65	HDL 9082 R	HDL 9082 V
<b>22.250</b> 565,15	24.250 615,95	0.875 22,23	HDL 3764 R	HDL 3764 V
	<b>22.375</b> 568,33	24.250 615,95	0.750 19,05	HDL 4268 R
24.375 619,13		0.875 22,23	HDL 2576 R	HDL 2576 V
<b>22.437</b> 569,89	24.000 609,60	0.750 19,05	HDL 4275 R	HDL 4275 V
	<b>22.500</b> 571,50	24.000 609,60	0.750 19,05	HDL 4271 R
24.500 622,30		0.875 22,23	HDL 4279 R	HDL 4279 V
<b>22.750</b> 577,85	24.750 628,65	0.875 22,23	HDL 4273 R	HDL 4273 V
	<b>23.000</b> 584,20	24.750 628,65	0.875 22,23	HDL 4281 R
24.500 622,30		0.750 19,05	HDL 4283 R	HDL 4283 V
<b>23.250</b> 590,55	24.750 628,65	0.750 19,05	HDL 5421 R	HDL 5421 V
	25.000 635,00	0.750 19,05	HDL 4286 R	HDL 4286 V
<b>23.375</b> 593,73	25.250 641,35	0.750 19,05	HDL 9371 R	HDL 9371 V
	25.375 644,53	0.875 22,23	HDL 4287 R	HDL 4287 V

## Radial shaft seals – HDL – inch dimensions

$d_1$  23.500 – 29.500 in.



The table includes only a selection of available sizes. Contact your SKF sales representative for more information.

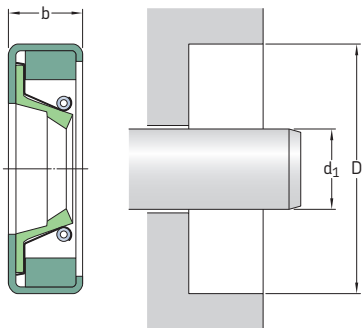
Please see pages 74 to 76 for housing bore requirements.

Dimensions		Nominal seal width b	Designations	
Shaft	Bore		Lip material	
$d_1$	D		R	V
in./mm			–	
<b>23.500</b> 596,90	24.681 626,90	0.591 15,00	HDL 3033 R	HDL 3033 V
<b>23.562</b> 598,47	25.250 641,35	0.750 19,05	HDL 4290 R	HDL 4290 V
	25.375 644,53	0.750 19,05	HDL 4291 R	HDL 4291 V
<b>23.625</b> 600,08	26.000 660,40	0.875 22,23	HDL 4292 R	HDL 4292 V
<b>23.750</b> 603,25	25.250 641,35	1.000 25,40	HDL 6239 R	HDL 6239 V
<b>23.875</b> 606,43	26.000 660,40	0.875 22,23	HDL 4293 R	HDL 4293 V
<b>24.000</b> 609,60	25.500 647,70	0.750 19,05	HDL 4623 R	HDL 4623 V
	26.000 660,40	0.813 20,65	HDL 4295 R	HDL 4295 V
<b>24.250</b> 615,95	26.250 666,75	0.875 22,23	HDL 4301 R	HDL 4301 V
<b>24.437</b> 620,69	26.000 660,40	0.750 19,05	HDL 4302 R	HDL 4302 V
	26.935 684,15	1.000 25,40	HDL 9990 R	HDL 9990 V
<b>24.500</b> 622,30	26.500 673,10	0.875 22,23	HDL 4305 R	HDL 4305 V
<b>25.000</b> 635,00	26.500 673,10	0.750 19,05	HDL 4308 R	HDL 4308 V
<b>25.187</b> 639,74	26.875 682,63	0.750 19,05	HDL 4311 R	HDL 4311 V
<b>25.250</b> 641,35	27.250 692,15	0.750 19,05	HDL 4299 R	HDL 4299 V

<b>Dimensions</b> Shaft	Bore	Nominal seal width b	<b>Designations</b> Lip material	
d <sub>1</sub>	D		R	V
in./mm			-	
<b>25.500</b> 647,70	26.750 679,45 27.500 698,50	0.750 19,05 0.875 22,23	<b>HDL 3022 R</b> <b>HDL 4318 R</b>	<b>HDL 3022 V</b> <b>HDL 4318 V</b>
<b>25.750</b> 654,05	27.500 698,50	0.750 19,05	<b>HDL 6998 R</b>	<b>HDL 6998 V</b>
<b>25.875</b> 657,23	28.000 711,20	0.875 22,23	<b>HDL 4303 R</b>	<b>HDL 4303 V</b>
<b>25.988</b> 660,09	27.625 701,68	0.750 19,05	<b>HDL 4306 R</b>	<b>HDL 4306 V</b>
<b>26.000</b> 660,40	27.625 701,68	0.750 19,05	<b>HDL 5921 R</b>	<b>HDL 5921 V</b>
<b>26.125</b> 663,58	27.625 701,68	0.750 19,05	<b>HDL 4329 R</b>	<b>HDL 4329 V</b>
<b>26.375</b> 669,93	28.188 715,98	0.875 22,23	<b>HDL 4307 R</b>	<b>HDL 4307 V</b>
<b>26.500</b> 673,10	28.000 711,20	0.750 19,05	<b>HDL 4533 R</b>	<b>HDL 4533 V</b>
<b>27.000</b> 685,80	29.000 736,60	0.875 22,23	<b>HDL 4333 R</b>	<b>HDL 4333 V</b>
<b>27.250</b> 692,15	29.250 742,95	0.875 22,23	<b>HDL 4626 R</b>	<b>HDL 4626 V</b>
<b>27.500</b> 698,50	29.000 736,60	0.750 19,05	<b>HDL 4315 R</b>	<b>HDL 4315 V</b>
<b>27.625</b> 701,68	29.625 752,48	0.750 19,05	<b>HDL 5001 R</b>	<b>HDL 5001 V</b>
<b>27.875</b> 708,03	29.813 757,25	0.875 22,23	<b>HDL 4341 R</b>	<b>HDL 4341 V</b>
<b>28.000</b> 711,20	29.500 749,30 29.813 757,25	0.750 19,05 0.750 19,05	<b>HDL 4343 R</b> <b>HDL 4316 R</b>	<b>HDL 4343 V</b> <b>HDL 4316 V</b>
<b>28.438</b> 722,33	31.000 787,40	0.875 22,23	<b>HDL 4321 R</b>	<b>HDL 4321 V</b>
<b>28.500</b> 723,90	30.500 774,70	0.875 22,23	<b>HDL 4346 R</b>	<b>HDL 4346 V</b>
<b>28.750</b> 730,25	30.750 781,05	0.875 22,23	<b>HDL 4628 R</b>	<b>HDL 4628 V</b>
<b>29.000</b> 736,60	30.500 774,70 31.500 800,10	0.750 19,05 1.000 25,40	<b>HDL 4347 R</b> <b>HDL 8793 R</b>	<b>HDL 4347 V</b> <b>HDL 8793 V</b>
<b>29.500</b> 749,30	31.500 800,10 32.000 812,80	0.875 22,23 0.875 22,23	<b>HDL 4352 R</b> <b>HDL 4538 R</b>	<b>HDL 4352 V</b> <b>HDL 4538 V</b>

## Radial shaft seals – HDL – inch dimensions

$d_1$  30.000 – 37.000 in.



The table includes only a selection of available sizes. Contact your SKF sales representative for more information.

Please see pages 74 to 76 for housing bore requirements.

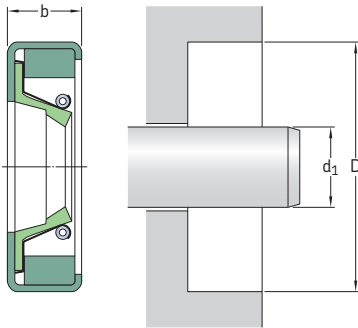
Dimensions		Nominal seal width b	Designations	
Shaft	Bore		Lip material	
$d_1$	D		R	V
in./mm			–	
<b>30.000</b>	31.500	0.750	<b>HDL 4356 R</b>	<b>HDL 4356 V</b>
762,00	800,10	19,05		
	31.625	0.750	<b>HDL 7870 R</b>	<b>HDL 7870 V</b>
	803,28	19,05		
	32.500	0.875	<b>HDL 4358 R</b>	<b>HDL 4358 V</b>
	825,50	22,23		
	32.750	0.875	<b>HDL 4359 R</b>	<b>HDL 4359 V</b>
	831,85	22,23		
<b>30.250</b>	32.500	0.875	<b>HDL 4906 R</b>	<b>HDL 4906 V</b>
768,35	825,50	22,23		
<b>30.313</b>	32.375	0.875	<b>HDL 4361 R</b>	<b>HDL 4361 V</b>
769,95	822,33	22,23		
<b>30.500</b>	32.500	0.875	<b>HDL 4365 R</b>	<b>HDL 4365 V</b>
774,70	825,50	22,23		
<b>31.000</b>	32.500	0.750	<b>HDL 5739 R</b>	<b>HDL 5739 V</b>
787,40	825,50	19,05		
	33.500	0.875	<b>HDL 4540 R</b>	<b>HDL 4540 V</b>
	850,90	22,23		
<b>31.250</b>	32.750	0.750	<b>HDL 4631 R</b>	<b>HDL 4631 V</b>
793,75	831,85	19,05		
<b>31.750</b>	33.750	0.875	<b>HDL 5016 R</b>	<b>HDL 5016 V</b>
806,45	857,25	22,23		
<b>32.000</b>	33.500	0.750	<b>HDL 3023 R</b>	<b>HDL 3023 V</b>
812,80	850,90	19,05		
<b>32.125</b>	34.125	0.875	<b>HDL 4371 R</b>	<b>HDL 4371 V</b>
815,98	866,78	22,23		
	34.125	0.750	<b>HDL 3002 R</b>	<b>HDL 3002 V</b>
	866,78	19,05		
<b>32.313</b>	34.500	0.875	<b>HDL 4373 R</b>	<b>HDL 4373 V</b>
820,75	876,30	22,23		
<b>32.500</b>	34.500	0.875	<b>HDL 4377 R</b>	<b>HDL 4377 V</b>
825,50	876,30	22,22		



<b>Dimensions</b>			<b>Designations</b>	
Shaft	Bore	Nominal seal width	Lip material	
$d_1$	D	b	R	V
in./mm			-	
<b>32.750</b> 831,85	34.250 869,95	0.750 19,05	HDL 4542 R	HDL 4542 V
<b>33.000</b> 838,20	34.500 876,30	0.750 19,05	HDL 4381 R	HDL 4381 V
	34.650 880,10	0.787 20,00	HDL 4634 R	HDL 4634 V
	35.000 889,00	0.875 22,23	HDL 4382 R	HDL 4382 V
<b>33.500</b> 850,90	35.000 889,00	0.875 22,23	HDL 9504 R	HDL 9504 V
	35.625 904,88	0.875 22,23	HDL 4548 R	HDL 4548 V
<b>33.625</b> 854,08	35.625 904,88	0.875 22,23	HDL 4328 R	HDL 4328 V
<b>34.000</b> 863,60	35.625 904,88	0.875 22,23	HDL 4331 R	HDL 4331 V
<b>34.250</b> 869,95	36.000 914,40	0.750 19,05	HDL 3017 R	HDL 3017 V
	36.750 933,45	0.875 22,23	HDL 4335 R	HDL 4335 V
<b>34.500</b> 876,30	36.000 914,40	0.750 19,05	HDL 6908 R	HDL 6908 V
	36.500 927,10	1.000 25,40	HDL 3021 R	HDL 3021 V
<b>34.750</b> 882,65	36.750 933,45	0.875 22,23	HDL 3831 R	HDL 3831 V
<b>35.000</b> 889,00	37.000 939,80	0.875 22,23	HDL 3835 R	HDL 3835 V
<b>35.250</b> 895,35	37.250 946,15	0.875 22,23	HDL 4416 R	HDL 4416 V
<b>35.375</b> 898,53	37.375 949,33	0.875 22,23	HDL 4417 R	HDL 4417 V
<b>35.437</b> 900,09	38.583 980,00	0.875 22,23	HDL 9079 R	HDL 9079 V
<b>35.496</b> 901,60	37.996 965,10	0.984 25,00	HDL 3001 R	HDL 3001 V
<b>35.500</b> 901,70	37.500 952,50	0.875 22,23	HDL 4553 R	HDL 4553 V
<b>35.827</b> 910,00	38.077 967,15	0.687 17,45	HDL 3003 R	HDL 3003 V
<b>36.000</b> 914,40	38.000 965,20	0.875 22,23	HDL 4421 R	HDL 4421 V
<b>36.500</b> 927,10	38.000 965,20	0.750 19,05	HDL 4429 R	HDL 4429 V
<b>36.750</b> 933,45	38.750 984,25	0.875 22,23	HDL 4432 R	HDL 4432 V
<b>37.000</b> 939,80	39.000 990,60	0.875 22,23	HDL 4434 R	HDL 4434 V

## Radial shaft seals – HDL – inch dimensions

$d_1$  37.250 – 51.250 in.



The table includes only a selection of available sizes. Contact your SKF sales representative for more information.

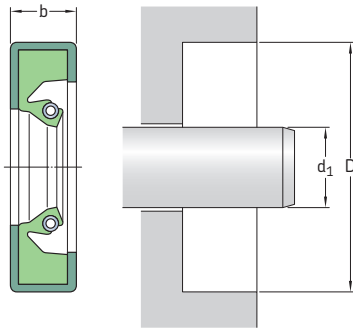
Please see pages 74 to 76 for housing bore requirements.

Dimensions		Nominal seal width b	Designations	
Shaft	Bore		Lip material	
$d_1$	D		R	V
in./mm			–	
<b>37.250</b> 946,15	39.250 996,95	0.875 22,23	<b>HDL 4436 R</b>	<b>HDL 4436 V</b>
<b>37.374</b> 949,30	39.500 1 003,30	0.875 22,23	<b>HDL 4425 R</b>	<b>HDL 4425 V</b>
<b>37.437</b> 950,89	39.500 1 003,30	0.875 22,23	<b>HDL 3847 R</b>	<b>HDL 3847 V</b>
<b>37.500</b> 952,50	39.000 990,60	0.750 19,05	<b>HDL 9411 R</b>	<b>HDL 9411 V</b>
<b>38.000</b> 965,20	39.500 1 003,30	0.750 19,05	<b>HDL 3004 R</b>	<b>HDL 3004 V</b>
	41.000 1 041,40	0.875 22,23	<b>HDL 4340 R</b>	<b>HDL 4340 V</b>
<b>38.250</b> 971,55	40.250 1 022,35	0.875 22,23	<b>HDL 4454 R</b>	<b>HDL 4454 V</b>
<b>38.258</b> 971,75	40.750 1 035,05	0.875 22,23	<b>HDL 4342 R</b>	<b>HDL 4342 V</b>
<b>38.500</b> 977,90	41.000 1 041,40	0.875 22,23	<b>HDL 4349 R</b>	<b>HDL 4349 V</b>
<b>38.750</b> 984,25	40.750 1 035,05	0.875 22,23	<b>HDL 4456 R</b>	<b>HDL 4456 V</b>
<b>38.937</b> 988,99	41.000 1 041,40	0.875 22,23	<b>HDL 4462 R</b>	<b>HDL 4462 V</b>
<b>39.000</b> 990,60	41.000 1 041,40	0.875 22,23	<b>HDL 4465 R</b>	<b>HDL 4465 V</b>
	42.250 1 073,15	0.875 22,23	<b>HDL 4577 R</b>	<b>HDL 4577 V</b>
<b>39.750</b> 1 009,65	42.250 1 073,15	0.875 22,23	<b>HDL 7538 R</b>	<b>HDL 7538 V</b>
<b>40.000</b> 1 016,00	42.000 1 066,80	0.875 22,23	<b>HDL 4467 R</b>	<b>HDL 4467 V</b>

<b>Dimensions</b> Shaft	Bore	Nominal seal width b	<b>Designations</b> Lip material	
d <sub>1</sub>	D		R	V
in./mm			–	
<b>40.500</b> 1 028,70	42.500 1 079,50	0.875 22,23	<b>HDL 4468 R</b>	<b>HDL 4468 V</b>
	43.020 1 092,70	0.875 22,23	<b>HDL 1964 R</b>	<b>HDL 1964 V</b>
<b>41.500</b> 1 054,10	43.500 1 104,90	0.875 22,23	<b>HDL 4635 R</b>	<b>HDL 4635 V</b>
<b>41.875</b> 1 063,63	43.500 1 104,90	1.000 25,40	<b>HDL 8628 R</b>	<b>HDL 8628 V</b>
<b>42.248</b> 1 073,10	44.248 1 123,90	1.000 25,40	<b>HDL 4470 R</b>	<b>HDL 4470 V</b>
<b>42.500</b> 1 079,50	44.250 1 123,95	0.875 22,23	<b>HDL 5555 R</b>	<b>HDL 5555 V</b>
<b>43.000</b> 1 092,20	45.500 1 155,70	0.875 22,23	<b>HDL 7189 R</b>	<b>HDL 7189 V</b>
<b>43.500</b> 1 104,90	45.500 1 155,70	0.875 22,23	<b>HDL 4637 R</b>	<b>HDL 4637 V</b>
<b>43.750</b> 1 111,25	45.750 1 162,05	0.875 22,23	<b>HDL 4638 R</b>	<b>HDL 4638 V</b>
<b>44.000</b> 1 117,60	46.000 1 168,40	0.875 22,23	<b>HDL 7087 R</b>	<b>HDL 7087 V</b>
<b>44.500</b> 1 130,30	46.000 1 168,40	0.750 19,05	<b>HDL 4563 R</b>	<b>HDL 4563 V</b>
<b>46.004</b> 1 168,50	47.500 1 206,50	0.750 19,05	<b>HDL 3006 R</b>	<b>HDL 3006 V</b>
<b>46.500</b> 1 181,10	48.500 1 231,90	0.875 22,23	<b>HDL 4578 R</b>	<b>HDL 4578 V</b>
<b>46.850</b> 1 189,99	48.819 1 240,00	0.875 22,23	<b>HDL 8317 R</b>	<b>HDL 8317 V</b>
<b>48.000</b> 1 219,20	50.000 1 270,00	0.875 22,23	<b>HDL 8579 R</b>	<b>HDL 8579 V</b>
<b>48.250</b> 1 225,55	50.250 1 276,35	0.875 22,23	<b>HDL 4639 R</b>	<b>HDL 4639 V</b>
<b>51.248</b> 1 301,71	53.289 1 353,55	0.875 22,23	<b>HDL 6747 R</b>	<b>HDL 6747 V</b>
<b>51.250</b> 1 301,75	53.300 1 353,82	0.875 22,23	<b>HDL 1914 R</b>	<b>HDL 1914 V</b>

## Radial shaft seals – HDS1, HDS2 and HDS3 – metric dimensions

$d_1$  170 – 380 mm



The table includes only a selection of sizes. For the full size range, please refer to **table 19** on **page 214**.

Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Nominal seal width b	Design	Lip material	Designation
Shaft	Bore				
$d_1$	D				
mm					
170	210	16	HDS1	R	170×210×16 HDS1 R
200	230	15,87	HDS1	R	200×230×16 HDS1 R
	238	19	HDS1	V	200×238×19 HDS1 V
	240	20	HDS2	R	200×240×20 HDS2 R
210	245	16	HDS1	R	210×245×16 HDS1 R
	250	20	HDS1	V	210×250×20 HDS1 V
215	270	23	HDS2	R	215×270×23 HDS2 R
220	255	16	HDS1	R	220×255×16 HDS1 R <sup>1)</sup>
	260	16	HDS1	R	220×260×16 HDS1 R
	260	20	HDS1	R	220×260×20 HDS1 R
225	257	16	HDS1	R	225×257×16 HDS1 R
230	270	16	HDS2	V	230×270×16 HDS2 V
235	270	16	HDS2	R	235×270×16 HDS2 R
240	280	16	HDS2	R	240×280×16 HDS2 R
	280	16	HDS2	D	240×280×16 HDS2 D
245	305	28	HDS2	R	245×305×28 HDS2 R
250	280	16	HDS2	R	250×280×16 HDS2 R
	280	16	HDS1	D	250×280×16 HDS1 D
	285	16	HDS2	D	250×285×16 HDS2 D
	310	25	HDS1	R	250×310×25 HDS1 R
260	290	16	HDS2	D	260×290×16 HDS2 D
	290	16	HDS2	V	260×290×16 HDS2 V
	300	16	HDS2	R	260×300×16 HDS2 R
	300	20	HDS2	D	260×300×20 HDS2 D
265	310	16	HDS1	R	265×310×16 HDS1 R

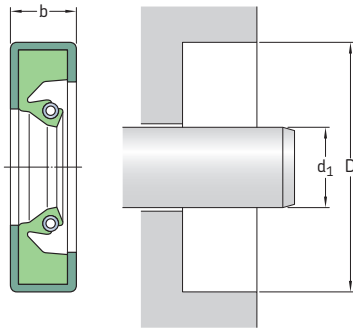
<sup>1)</sup> 12,7 mm adjustable spacer lugs (4)

Dimensions Shaft	Bore	Nominal seal width b	Design	Lip material	Designation
d <sub>1</sub>	D				
mm			–	–	–
270	310	16	HDS3	V	270×310×16 HDS3 V <sup>2)</sup>
	310	20	HDS2	V	270×310×20 HDS2 V
	330	25	HDS2	V	270×330×25 HDS2 V
275	310	16	HDS1	R	275×310×16 HDS1 R
280	310	16	HDS1	R	280×310×16 HDS1 R
	320	16	HDS1	R	280×320×16 HDS1 R
	320	20	HDS1	R	280×320×20 HDS1 R
	340	25	HDS1	R	280×340×25 HDS1 R
285	320	16	HDS2	R	285×320×16 HDS2 R
	325	16	HDS1	R	285×325×16 HDS1 R
290	330	18	HDS2	R	290×330×18 HDS2 R
	350	25	HDS2	R	290×350×25 HDS2 R
295	335	18	HDS1	R	295×335×18 HDS1 R
300	332	16	HDS2	R	300×332×16 HDS2 R
	335	18	HDS2	R	300×335×18 HDS2 R
	340	18	HDS1	V	300×340×18 HDS1 V
	340	18	HDS1	D	300×340×18 HDS1 D
	340	20	HDS1	V	300×340×20 HDS1 V
	345	22	HDS1	R	300×345×22 HDS1 R
	360	25	HDS2	V	300×360×25 HDS2 V
310	350	18	HDS2	V	310×350×18 HDS2 V
	350	20	HDS2	D	310×350×20 HDS2 D
	370	25	HDS2	D	310×370×25 HDS2 D
315	355	18	HDS1	V	315×355×18 HDS1 V
318	360	20	HDS2	R	318×360×20 HDS2 R
320	350	18	HDS1	R	320×350×18 HDS1 R
	360	18	HDS1	R	320×360×18 HDS1 R
	360	18	HDS2	V	320×360×18 HDS2 V
	380	25	HDS1	R	320×380×25 HDS1 R
330	370	18	HDS1	R	330×370×18 HDS1 R
	390	25	HDS1	R	330×390×25 HDS1 R
335	375	18	HDS3	D	335×375×18 HDS3 D <sup>2)</sup>
340	380	18	HDS2	V	340×380×18 HDS2 V
	380	18	HDS2	D	340×380×18 HDS2 D
	380	20	HDS2	H	340×380×20 HDS2 H
	380	20	HDS2	R	340×380×20 HDS2 R
350	380	16	HDS2	R	350×380×16 HDS2 R
	390	18	HDS2	D	350×390×18 HDS2 D
360	400	18	HDS1	R	360×400×18 HDS1 R
	400	20	HDS1	V	360×400×20 HDS1 V
	410	17	HDS1	R	360×410×17 HDS1 R
365	405	18	HDS2	R	365×405×18 HDS2 R
370	410	16	HDS2	R	370×410×16 HDS2 R
375	420	18	HDS2	R	375×420×18 HDS2 R
380	420	20	HDS2	R	380×420×20 HDS2 R
	420	20	HDS2	V	380×420×20 HDS2 V
	440	25	HDS2	R	380×440×25 HDS2 R

<sup>2)</sup> 12,7 mm adjustable spacer lugs (6)

## Radial shaft seals – HDS1, HDS2 and HDS3 – metric dimensions

$d_1$  390 – 700 mm



The table includes only a selection of sizes. For the full size range, please refer to **table 19** on **page 214**.

Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Nominal seal width b	Design	Lip material	Designation
Shaft	Bore				
$d_1$	D				
mm					
390	430	16	HDS2	R	390×430×16 HDS2 R
395	430	18	HDS2	R	395×430×18 HDS2 R <sup>2)</sup>
400	440	20	HDS1	R	400×440×20 HDS1 R
	440	20	HDS2	R	400×440×20 HDS2 R
	460	25	HDS1	R	400×460×25 HDS1 R
410	450	20	HDS2	R	410×450×20 HDS2 R
	460	22	HDS2	R	410×460×22 HDS2 R
420	460	20	HDS2	R	420×460×20 HDS2 R
	470	22	HDS1	R	420×470×22 HDS1 R <sup>1)</sup>
430	480	22	HDS1	V	430×480×22 HDS1 V
	480	25	HDS2	R	430×480×25 HDS2 R
435	485	18	HDS2	R	435×485×18 HDS2 R <sup>2)</sup>
440	470	20	HDS1	R	440×470×20 HDS1 R
	480	20	HDS1	R	440×480×20 HDS1 R
445	485	20	HDS1	R	445×485×20 HDS1 R
450	490	20	HDS1	R	450×490×20 HDS1 R
448	480	16	HDS2	R	448×480×16 HDS2 R
460	500	20	HDS1	R	460×500×20 HDS1 R
	500	20	HDS1	V	460×500×20 HDS1 V
	510	22	HDS2	V	460×510×22 HDS2 V
	520	25	HDS2	R	460×520×25 HDS2 R
470	510	20	HDS1	R	470×510×20 HDS1 R
	530	26	HDS2	R	470×530×26 HDS2 R
480	520	20	HDS1	R	480×520×20 HDS1 R

<sup>1)</sup> 12,7 mm adjustable spacer lugs (4)

<sup>2)</sup> 12,7 mm adjustable spacer lugs (6)

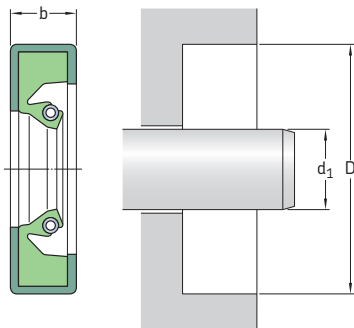
Dimensions Shaft	Bore	Nominal seal width b	Design	Lip material	Designation
d <sub>1</sub>	D				
mm			–	–	–
485	535	22	HDS1	R	485×535×22 HDS1 R
490	530	20	HDS1	R	490×530×20 HDS1 R
500	540 550	20 18	HDS1 HDS1	R R	500×540×20 HDS1 R 500×550×18 HDS1 R <sup>2)</sup>
505	555	20,62	HDS2	R	505×555×21 HDS2 R
510	554	20	HDS1	D	510×554×20 HDS1 D
515	555	20	HDS2	R	515×555×20 HDS2 R
520	560	20	HDS1	R	520×560×20 HDS1 R
525	575	20	HDS3	D	525×575×20 HDS3 D <sup>1)</sup>
530	580 580	20 22	HDS1 HDS1	V R	530×580×20 HDS1 V 530×580×22 HDS1 R
535	580	20	HDS3	D	535×580×20 HDS3 D <sup>2)</sup>
540	590	20	HDS2	V	540×590×20 HDS2 V
545	595	22	HDS1	R	545×595×22 HDS1 R
550	590	20	HDS1	R	550×590×20 HDS1 R
560	610	20	HDS1	V	560×610×20 HDS1 V
570	620	22	HDS2	R	570×620×22 HDS2 R <sup>2)</sup>
580	620	20	HDS3	D	580×620×20 HDS3 D <sup>2)</sup>
585	620	20	HDS2	R	585×620×20 HDS2 R
590	630	20	HDS1	R	590×630×20 HDS1 R
600	640 650 650	20 22 25	HDS1 HDS2 HDS1	R R V	600×640×20 HDS1 R 600×650×22 HDS2 R 600×650×25 HDS1 V
610	660	20	HDS2	R	610×660×20 HDS2 R
630	670	20	HDS3	D	630×670×20 HDS3 D <sup>1)</sup>
640	690	25	HDS1	R	640×690×25 HDS1 R
650	700 710	22 25	HDS2 HDS2	V R	650×700×22 HDS2 V 650×710×25 HDS2 R
660	700	18	HDS1	R	660×700×18 HDS1 R
670	714	20	HDS3	D	670×714×20 HDS3 D <sup>2)</sup>
680	730	20	HDS2	R	680×730×20 HDS2 R
685	720	20	HDS2	R	685×720×20 HDS2 R
690	730	20	HDS2	R	690×730×20 HDS2 R
695	770	30	HDS1	R	695×770×30 HDS1 R
700	740	20	HDS1	R	700×740×20 HDS1 R

<sup>1)</sup> 12,7 mm adjustable spacer lugs (4)

<sup>2)</sup> 12,7 mm adjustable spacer lugs (6)

## Radial shaft seals – HDS1, HDS2 and HDS3 – metric dimensions

$d_1$  710 – 1 550 mm



The table includes only a selection of sizes. For the full size range, please refer to **table 19** on **page 214**.

Please see **pages 74 to 76** for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width	Design	Lip material	Designation
$d_1$	D	b			
mm			–	–	–
710	760	20	HDS1	V	710×760×20 HDS1 V
720	770	25	HDS2	R	720×770×25 HDS2 R
740	780	16,50	HDS1	R	740×780×17 HDS1 R
750	780	18	HDS1	R	750×780×18 HDS1 R
	790	23	HDS1	V	750×790×23 HDS1 V
	800	25	HDS2	R	750×800×25 HDS2 R
	814	25	HDS1	R	750×814×25 HDS1 R <sup>2)</sup>
760	800	20	HDS1	V	760×800×20 HDS1 V
	810	25	HDS1	R	760×810×25 HDS1 R
770	810	20	HDS1	V	770×810×20 HDS1 V
	845	27,79	HDS1	R	770×845×28 HDS1 R
780	820	19,05	HDS2	R	780×820×19 HDS2 R
790	850	25	HDS1	V	790×850×25 HDS1 V
800	840	20	HDS1	R	800×840×20 HDS1 R
810	860	25	HDS2	R	810×860×25 HDS2 R
825	860	20	HDS2	R	825×860×20 HDS2 R
850	914	25	HDS1	R	850×914×25 HDS1 R
860	920	25	HDS1	R	860×920×25 HDS1 R
880	940	25	HDS2	R	880×940×25 HDS2 R <sup>2)</sup>
	944	25	HDS3	D	880×944×25 HDS3 D <sup>2)</sup>
893	925	20	HDS2	H	893×925×20 HDS2 H
900	960	25	HDS1	R	900×960×25 HDS1 R <sup>2)</sup>

<sup>2)</sup> 12,7 mm adjustable spacer lugs (6)



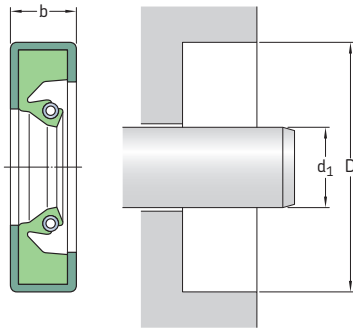
Dimensions Shaft d <sub>1</sub>	Bore D	Nominal seal width b	Design	Lip material	Designation
mm			–	–	–
<b>910</b>	974	22	HDS1	R	<b>910×974×22 HDS1 R<sup>2)</sup></b>
<b>920</b>	984	25	HDS2	V	<b>920×984×25 HDS2 V</b>
<b>927</b>	978	22	HDS2	D	<b>927×978×22 HDS2 D</b>
<b>939</b>	971	15,88	HDS3	H	<b>939×971×16 HDS3 H<sup>2)</sup></b>
<b>940</b>	1 000	25	HDS1	R	<b>940×1000×25 HDS1 R<sup>1)</sup></b>
<b>950</b>	1 006	20	HDS2	R	<b>950×1006×20 HDS2 R</b>
<b>960</b>	1 020 1 040	25 23	HDS2 HDS2	H V	<b>960×1020×25 HDS2 H</b> <b>960×1040×23 HDS2 V</b>
<b>990</b>	1 045	25	HDS1	R	<b>990×1045×25 HDS1 R</b>
<b>1 000</b>	1 035	20	HDS2	R	<b>1000×1035×20 HDS2 R</b>
<b>1 020</b>	1 084	25	HDS1	R	<b>1020×1084×25 HDS1 R</b>
<b>1 055</b>	1 100	25	HDS2	D	<b>1055×1100×25 HDS2 D</b>
<b>1 105</b>	1 160	25	HDS1	R	<b>1105×1160×25 HDS1 R</b>
<b>1 120</b>	1 184	25	HDS2	R	<b>1120×1184×25 HDS2 R<sup>2)</sup></b>
<b>1 140</b>	1 180	20	HDS1	V	<b>1140×1180×20 HDS1 V</b>
<b>1 220</b>	1 255	20	HDS2	R	<b>1220×1255×20 HDS2 R</b>
<b>1 250</b>	1 314	25	HDS2	R	<b>1250×1314×25 HDS2 R</b>
<b>1 260</b>	1 300	18	HDS1	R	<b>1260×1300×18 HDS1 R</b>
<b>1 370</b>	1 420 1 420	19,05 20	HDS2 HDS1	H R	<b>1370×1420×19 HDS2 H</b> <b>1370×1420×20 HDS1 R</b>
<b>1 530</b>	1 580	20	HDS1	R	<b>1530×1580×20 HDS1 R</b>
<b>1 550</b>	1 610	25	HDS2	V	<b>1550×1610×25 HDS2 V</b>

<sup>1)</sup> 12,7 mm adjustable spacer lugs (4)

<sup>2)</sup> 12,7 mm adjustable spacer lugs (6)

## Radial shaft seals – HDS1, HDS2 and HDS3 – inch dimensions

$d_1$  6.000 – 9.750 in.



The table includes only a selection of sizes. For the full size range, please refer to **table 19** on **page 214**.

Please see **pages 74 to 76** for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width b	Design	Lip material	Lug <sup>1)</sup>	Designation
$d_1$	D					
in./mm						
<b>6.000</b> 152,40	7.500 190,50	0.625 15,88	HDS1	R		<b>597623</b>
<b>6.750</b> 171,45	7.750 196,85	0.625 15,88	HDS1	V		<b>67512</b>
<b>7.250</b> 184,15	8.750 222,25	0.625 15,88	HDS2	V		<b>72510</b>
<b>7.500</b> 190,50	8.750 222,25	0.625 15,88	HDS1	V		<b>75048</b>
<b>7.750</b> 196,85	9.000 228,60	0.625 15,88	HDS1	R		<b>77531</b>
	9.250 234,95	0.625 15,88	HDS1	V		<b>77539</b>
<b>8.000</b> 203,20	9.250 234,95	0.625 15,88	HDS1	V		<b>77996</b>
	9.500 241,30	0.687 17,45	HDS2	V		<b>80009</b>
	10.000 254,00	1.000 25,40	HDS1	R		<b>80088</b>
<b>8.125</b> 206,38	9.378 238,20	0.625 15,88	HDS1	R		<b>593198</b>
	10.125 257,18	1.000 25,40	HDS1	R		<b>81253</b>
<b>8.250</b> 209,55	9.500 241,30	0.625 15,88	HDS2	V		<b>82526</b>
	10.250 260,35	0.625 15,88	HDS2	V		<b>82559</b>
<b>8.345</b> 211,96	10.750 273,05	1.250 31,75	HDS1	R		<b>594186</b>
<b>8.375</b> 212,73	9.750 247,65	0.625 15,88	HDS3	D	4	<b>83702</b>

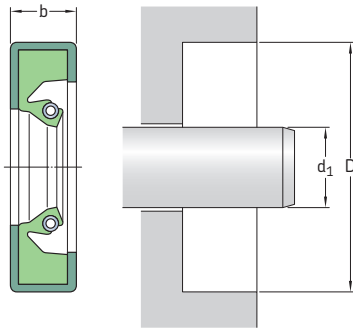
<sup>1)</sup> Number of 0,5 in. adjustable spacer lugs

Dimensions Shaft d <sub>1</sub>	Bore D	Nominal seal width b	Design	Lip material	Lug <sup>1)</sup>	Designation
in./mm			-	-	-	-
<b>8.500</b> 215,90	9.750	0.625	HDS2	D		<b>593768</b>
	247,65	15,88				
	10.500	0.625	HDS1	V		<b>85018</b>
	266,70	15,88				
<b>8.540</b> 215,90	9.750	0.625	HDS2	D		<b>593855</b>
	247,65	15,88				
<b>8.625</b> 219,08	10.500	0.750	HDS1	R		<b>590758</b>
	266,70	19,05				
	10.625	0.750	HDS1	V		<b>86240</b>
	269,88	19,05				
<b>8.750</b> 222,25	10.000	0.625	HDS2	R		<b>592626</b>
	254,00	15,88				
<b>8.875</b> 225,43	10.125	0.625	HDS2	D		<b>593779</b>
	257,18	15,88				
<b>9.000</b> 228,60	10.250	0.750	HDS1	R		<b>90017</b>
	260,35	19,05				
	10.500	0.625	HDS3	D	4	<b>90027</b>
	266,70	15,88				
	11.000	0.750	HDS2	R		<b>590787</b>
	279,40	19,05				
<b>9.125</b> 231,78	10.375	0.625	HDS1	R		<b>592653</b>
	263,53	15,88				
	10.625	0.688	HDS1	R		<b>590270</b>
	269,88	17,48				
	11.125	0.688	HDS1	R		<b>590174</b>
	282,58	17,48				
	11.125	0.813	HDS2	R		<b>91202</b>
	282,50	20,65				
<b>9.250</b> 234,95	10.750	0.750	HDS1	R		<b>590093</b>
	273,05	19,05				
	11.250	0.813	HDS2	V		<b>92544</b>
	285,75	20,65				
	11.250	1.000	HDS1	R		<b>590798</b>
	285,75	25,40				
<b>9.375</b> 238,13	11.375	0.875	HDS1	R		<b>93751</b>
	288,93	22,23				
<b>9.438</b> 239,73	10.635	0.750	HDS1	R		<b>593894</b>
	270,13	19,05				
<b>9.500</b> 241,30	10.750	0.625	HDS2	R		<b>95045</b>
	273,05	15,88				
	11.000	0.625	HDS1	R		<b>590653</b>
	279,40	15,88				
	11.500	0.813	HDS1	V		<b>95068</b>
	292,10	20,65				
	11.500	1.000	HDS1	R		<b>590820</b>
292,10	25,40					
<b>9.688</b> 246,08	10.875	0.625	HDS1	R		<b>594080</b>
	276,23	15,88				
<b>9.750</b> 247,65	11.000	0.625	HDS3	D	4	<b>97527</b>
	279,40	15,88				
	11.750	1.000	HDS1	R		<b>97548</b>
	298,45	25,40				

<sup>1)</sup> Number of 0,5 in. adjustable spacer lugs

## Radial shaft seals – HDS1, HDS2 and HDS3 – inch dimensions

$d_1$  9.844 – 11.813 in.



The table includes only a selection of sizes. For the full size range, please refer to **table 19** on **page 214**.

Please see **pages 74 to 76** for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width	Design	Lip material	Lug <sup>1)</sup>	Designation	
$d_1$	D	b					
in./mm			–	–	–	–	
<b>9.844</b> 250,04	11.409 289,79	0.625 15,88	HDS2	R		<b>98444</b>	
<b>9.875</b> 250,83	11.375 288,93	0.750 19,05	HDS2	R		<b>592763</b>	
	11.500 292,10	0.750 19,05	HDS1	R		<b>592727</b>	
<b>9.938</b> 252,43	12.000 304,80	1.000 25,40	HDS2	R		<b>529752</b>	
<b>10.000</b> 254,00	11.250 285,75	0.625 15,88	HDS1	R		<b>1000110</b>	
	11.250 285,75	0.625 15,88	HDS2	R		<b>1000111</b>	
	11.500 292,10	0.625 15,88	HDS3	D	4	<b>1000239</b>	
	11.750 298,45	0.625 15,88	HDS1	R		<b>1000360</b>	
	<b>10.125</b> 257,18	11.625 295,28	0.688 17,48	HDS1	R		<b>1013240</b>
		11.625 295,28	0.688 17,48	HDS2	R		<b>1013242</b>
<b>10.236</b> 259,99	12.590 319,79	0.984 24,99	HDS1	R		<b>1024690</b>	
<b>10.250</b> 260,35	11.500 292,10	0.625 15,88	HDS2	D		<b>1025112</b>	
	11.750 298,45	0.688 17,48	HDS3	D	4	<b>1025249</b>	
	11.750 298,45	0.750 19,05	HDS2	R		<b>1025252</b>	
	<b>10.375</b> 263,53	11.625 295,28	0.875 22,23	HDS1	R		<b>1038140</b>

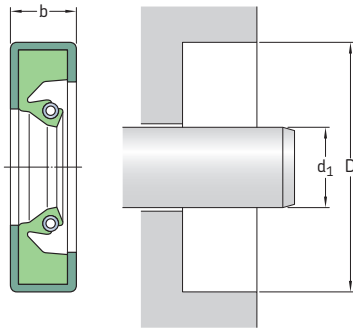
<sup>1)</sup> Number of 0,5 in. adjustable spacer lugs

Dimensions Shaft d <sub>1</sub>	Bore D	Nominal seal width b	Design	Lip material	Lug <sup>1)</sup>	Designation
in./mm			-	-	-	-
<b>10.438</b> 265,13	12.438 315,93	0.875 22,23	HDS1	R		<b>1044560</b>
<b>10.500</b> 266,70	11.750 298,45	0.625 15,88	HDS1	V		<b>1050113</b>
	12.000 304,80	0.625 15,88	HDS3	D	4	<b>1050239</b>
	12.000 304,80	0.750 19,05	HDS2	V		<b>1050251</b>
<b>10.688</b> 271,48	12.500 317,50	0.625 15,88	HDS1	V		<b>1068456</b>
	13.000 330,20	0.688 17,48	HDS2	V		<b>1068693</b>
<b>10.750</b> 273,05	12.000 304,80	0.625 15,88	HDS2	R		<b>1075112</b>
	12.000 304,80	0.625 15,88	HDS1	R		<b>1075110</b>
	12.250 311,15	0.625 15,88	HDS1	R		<b>1075230</b>
<b>10.938</b> 277,83	12.750 323,85	0.625 15,88	HDS1	R		<b>1093440</b>
<b>11.000</b> 279,40	12.250 311,15	0.625 15,88	HDS2	D		<b>1100113</b>
	12.250 311,15	0.625 15,88	HDS2	V		<b>1100104</b>
	12.500 317,50	0.750 19,05	HDS1	R		<b>1100250</b>
	13.000 330,20	0.813 20,65	HDS2	R		<b>1100553</b>
<b>11.250</b> 285,75	12.500 317,50	0.625 15,88	HDS2	R		<b>1125111</b>
	12.500 317,50	0.625 15,88	HDS1	R		<b>1125110</b>
<b>11.375</b> 288,93	13.000 330,20	0.750 19,05	HDS1	R		<b>1138330</b>
<b>11.500</b> 292,10	13.000 330,20	0.750 19,05	HDS2	R		<b>1150253</b>
	13.500 342,90	0.813 20,65	HDS1	R		<b>1150550</b>
	13.500 342,90	1.000 25,40	HDS1	R		<b>1150580</b>
<b>11.688</b> 296,88	12.938 328,63	0.625 15,88	HDS1	R		<b>1169110</b>
<b>11.750</b> 298,45	13.250 336,55	0.688 17,48	HDS2	V		<b>1175224</b>
	13.250 336,55	0.750 19,05	HDS2	R		<b>1175252</b>
<b>11.811</b> 300,00	13.378 339,80	0.709 18,01	HDS1	R		<b>1181300</b>
<b>11.813</b> 300,05	13.812 350,82	0.875 22,23	HDS1	R		<b>1181560</b>

<sup>1)</sup> Number of 0,5 in. adjustable spacer lugs

## Radial shaft seals – HDS1, HDS2 and HDS3 – inch dimensions

$d_1$  12.000 – 15.250 in.



The table includes only a selection of sizes. For the full size range, please refer to **table 19** on **page 214**.

Please see **pages 74 to 76** for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width b	Design	Lip material	Lug <sup>1)</sup>	Designation
$d_1$	D	b				
in./mm						
<b>12.000</b>	13,500	0,625	HDS2	R		<b>1200231</b>
<i>304,80</i>	<i>342,90</i>	<i>15,88</i>				
	13,500	0,625	HDS1	R		<b>1200230</b>
	<i>342,90</i>	<i>15,88</i>				
	13,500	0,625	HDS3	D	4	<b>1200239</b>
	<i>342,90</i>	<i>15,88</i>				
	13,500	0,688	HDS1	R		<b>1200240</b>
	<i>342,90</i>	<i>17,48</i>				
	13,500	0,750	HDS2	R		<b>1200255</b>
	<i>342,90</i>	<i>19,05</i>				
	14,000	0,625	HDS1	V		<b>1200523</b>
	<i>355,60</i>	<i>15,88</i>				
	14,000	1,000	HDS2	R		<b>1200585</b>
	<i>355,60</i>	<i>25,40</i>				
<b>12.250</b>	13,750	0,625	HDS3	D	4	<b>1225239</b>
<i>311,15</i>	<i>349,25</i>	<i>15,88</i>				
<b>12.500</b>	13,750	0,625	HDS1	R		<b>1250110</b>
<i>317,50</i>	<i>349,25</i>	<i>15,88</i>				
	14,000	0,688	HDS3	D	4	<b>1250249</b>
	<i>355,60</i>	<i>17,48</i>				
	14,500	0,750	HDS1	R		<b>1250540</b>
	<i>368,30</i>	<i>19,05</i>				
	14,500	0,813	HDS2	V		<b>1250554</b>
	<i>368,30</i>	<i>20,65</i>				
<b>12.750</b>	14,250	0,688	HDS2	V		<b>1275243</b>
<i>323,85</i>	<i>361,95</i>	<i>17,48</i>				
	14,250	0,750	HDS2	R		<b>1275252</b>
	<i>361,95</i>	<i>19,05</i>				
<b>13.000</b>	14,500	0,688	HDS2	R		<b>1300244</b>
<i>330,20</i>	<i>368,30</i>	<i>17,48</i>				
	14,500	0,688	HDS2	V		<b>1300283</b>
	<i>368,30</i>	<i>17,48</i>				
	15,000	0,750	HDS2	R		<b>1300542</b>
	<i>381,00</i>	<i>19,05</i>				

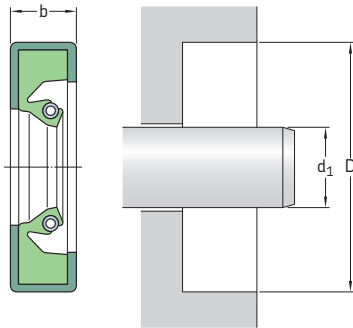
<sup>1)</sup> Number of 0,5 in. adjustable spacer lugs

Dimensions Shaft d <sub>1</sub>	Bore D	Nominal seal width b	Design	Lip material	Lug <sup>1)</sup>	Designation
in./mm			-	-	-	-
<b>13.250</b> 336,55	14.750 374,65	0.625 15,88	HDS3	D	4	1325239
	14.750 374,65	0.688 17,48	HDS2	R		1325242
<b>13.500</b> 342,90	15.250 387,35	0.750 19,05	HDS1	R		1350380
	15.500 393,70	0.813 20,65	HDS2	V		1350564
<b>13.750</b> 349,25	15.000 381,00	0.750 19,05	HDS1	R		1375130
	15.250 387,35	0.625 15,88	HDS1	R		1375230
	15.250 387,35	0.688 17,48	HDS1	R		1375240
	15.500 393,70	0.750 19,05	HDS1	R		1375380
	15.750 400,05	0.813 20,65	HDS2	V		1375553
<b>14.000</b> 355,60	15.500 393,70	0.625 15,88	HDS2	V		1400234
	15.500 393,70	0.625 15,88	HDS2	R		1400232
	15.500 393,70	0.750 19,05	HDS1	R		1400250
	15.750 400,05	0.688 17,48	HDS1	R		1400370
	16.000 406,40	1.000 25,40	HDS1	R		1400580
<b>14.250</b> 361,95	15.750 400,05	0.750 19,05	HDS2	R		1425252
	16.250 412,75	0.813 20,65	HDS2	R		1425552
<b>14.375</b> 365,13	16.000 406,40	0.688 17,48	HDS2	D		1438321
<b>14.500</b> 368,30	16.000 406,40	0.688 17,48	HDS2	R		1450242
	16.500 419,10	0.750 19,05	HDS2	R		1450542
<b>14.750</b> 374,65	16.500 419,10	0.875 22,23	HDS2	R		1475411
<b>15.000</b> 381,00	16.500 419,10	0.688 17,48	HDS1	R		1500240
	16.500 419,10	0.750 19,05	HDS1	R		1500250
	16.750 425,45	0.750 19,05	HDS1	R		1500380
	17.000 431,80	0.750 19,05	HDS3	D	4	1500549
<b>15.250</b> 387,35	16.750 425,45	0.750 19,05	HDS2	R		1525252
	17.250 438,15	0.750 19,05	HDS2	R		1525542
	17.250 438,15	0.875 22,23	HDS1	R		1525560

<sup>1)</sup> Number of 0,5 in. adjustable spacer lugs

## Radial shaft seals – HDS1, HDS2 and HDS3 – inch dimensions

$d_1$  15.500 – 22.250 in.



The table includes only a selection of sizes. For the full size range, please refer to **table 19** on **page 214**.

Please see **pages 74 to 76** for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width b	Design	Lip material	Lug <sup>1)</sup>	Designation
$d_1$	D	b				
in./mm						
<b>15.500</b>	16.875	0.625	HDS1	R		<b>1550160</b>
393,70	428,63	15,88				
	17.500	0.750	HDS2	R		<b>1550542</b>
	444,50	19,05				
	17.500	0.813	HDS1	R		<b>1550550</b>
	444,50	20,65				
<b>15.625</b>	17.625	0.875	HDS1	R		<b>1563560</b>
396,88	447,68	22,23				
<b>15.750</b>	17.250	0.688	HDS3	D	4	<b>1575249</b>
400,05	438,15	17,48				
<b>16.000</b>	17.500	0.750	HDS1	R		<b>1600250</b>
406,40	444,50	19,05				
	18.000	1.000	HDS2	R		<b>1600585</b>
	457,20	25,40				
<b>16.250</b>	17.750	0.688	HDS1	R		<b>1625240</b>
412,75	450,85	17,48				
<b>16.500</b>	18.000	0.750	HDS2	R		<b>1650252</b>
419,10	457,20	19,05				
<b>16.750</b>	18.500	0.875	HDS1	V		<b>1675413</b>
425,45	469,90	22,23				
<b>17.000</b>	18.500	0.688	HDS2	R		<b>1700245</b>
431,80	469,90	17,48				
	18.500	0.750	HDS2	D		<b>1700251</b>
	469,90	19,05				
	19.000	0.750	HDS2	R		<b>1700541</b>
	482,60	19,05				
<b>17.250</b>	18.750	0.750	HDS2	R		<b>1725255</b>
438,15	476,25	19,05				

<sup>1)</sup> Number of 0,5 in. adjustable spacer lugs

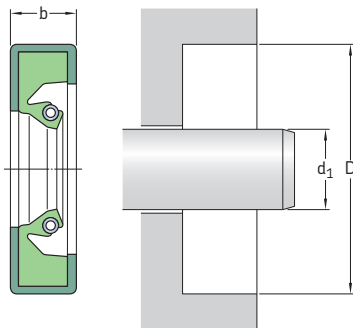


Dimensions Shaft d <sub>1</sub>	Bore D	Nominal seal width b	Design	Lip material	Lug <sup>1)</sup>	Designation
in./mm			-	-	-	-
<b>17.500</b> 444,50	19,000 482,60	0.625 15,88	HDS1	R		<b>1750230</b>
	19,250 488,95	0.688 17,48	HDS1	R		<b>1750370</b>
	19,500 495,30	0.688 17,48	HDS1	R		<b>1750530</b>
<b>17.625</b> 447,68	19,250 488,95	0.688 17,48	HDS1	R		<b>1763320</b>
<b>18.000</b> 457,20	19,500 495,30	0.688 17,48	HDS3	D	4	<b>1800249</b>
	19,750 501,65	0.750 19,05	HDS2	R		<b>1800382</b>
<b>18.250</b> 463,55	19,750 501,65	0.750 19,05	HDS2	R		<b>1825252</b>
<b>18.500</b> 469,90	20,500 520,70	0.875 22,23	HDS1	R		<b>1850560</b>
<b>18.750</b> 476,25	20,750 527,05	0.813 20,65	HDS2	R		<b>1875553</b>
<b>19.000</b> 482,60	20,500 520,70	0.750 19,05	HDS1	R		<b>1900250</b>
	21,000 533,40	0.875 22,23	HDS2	V		<b>1900562</b>
<b>19.250</b> 488,95	21,250 539,75	0.938 23,24	HDS1	R		<b>1925570</b>
<b>19.500</b> 495,30	21,500 546,10	0.875 22,23	HDS1	R		<b>1950560</b>
<b>20.000</b> 508,00	21,500 546,10	0.625 15,88	HDS3	D	4	<b>2000239</b>
<b>20.250</b> 514,35	21,750 552,45	0.750 19,05	HDS1	R		<b>2025250</b>
<b>20.500</b> 520,70	22,500 571,50	0.750 19,05	HDS2	R		<b>2050542</b>
	22,500 571,50	0.875 22,23	HDS1	R		<b>2050560</b>
<b>20.750</b> 527,05	22,750 577,85	0.875 22,23	HDS2	D		<b>2075562</b>
<b>21.000</b> 533,40	22,750 577,85	0.813 20,65	HDS1	R		<b>2100390</b>
	23,000 584,20	0.625 15,87	HDS3	D	4	<b>2100529</b>
<b>21.500</b> 546,10	23,500 596,90	0.813 20,65	HDS1	R		<b>2150550</b>
<b>22.000</b> 558,80	23,500 596,90	0.750 19,05	HDS2	V		<b>2200213</b>
	24,000 609,60	0.875 22,23	HDS2	R		<b>2200565</b>
	24,000 609,60	1.250 31,75	HDS1	D		<b>526339</b>
<b>22.250</b> 565,15	24,250 615,95	0.875 22,23	HDS3	H	4	<b>2225568</b>

<sup>1)</sup> Number of 0,5 in. adjustable spacer lugs

## Radial shaft seals – HDS1, HDS2 and HDS3 – inch dimensions

$d_1$  23.000 – 63.340 in.



The table includes only a selection of sizes. For the full size range, please refer to **table 19** on **page 214**.

Please see **pages 74 to 76** for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width	Design	Lip material	Lug <sup>1)</sup>	Designation
$d_1$	D	b				
in./mm			–	–	–	–
<b>23.000</b> 584,20	24.750 628,65	0.750 19,05	HDS2	V		<b>2300384</b>
<b>23.500</b> 596,90	25.500 647,70	0.875 22,23	HDS1	R		<b>2350560</b>
<b>24.000</b> 609,60	25.500 647,70	0.750 19,05	HDS1	R		<b>2400250</b>
		26.000 660,40	HDS2	R		<b>2400559</b>
<b>24.250</b> 615,95	26.250 666,75	0.875 22,23	HDS2	V		<b>2425562</b>
<b>25.000</b> 635,00	27.000 685,80	1.000 25,40	HDS1	R		<b>2500580</b>
		27.500 698,50	HDS2	R		<b>2550585</b>
<b>26.000</b> 660,40	27.625 701,68	0.750 19,05	HDS2	R		<b>2600332</b>
		28.500 723,90	HDS1	R		<b>2600760</b>
		28.500 723,90	HDS1	R		<b>2650560</b>
<b>28.000</b> 711,20	29.625 752,48	0.750 19,05	HDS2	R		<b>2800331</b>
		30.000 762,00	HDS2	R		<b>2800565</b>
		31.000 787,40	HDS2	R		<b>2900563</b>
<b>29.500</b> 749,30	31.500 800,10	0.875 22,23	HDS2	D		<b>2950564</b>

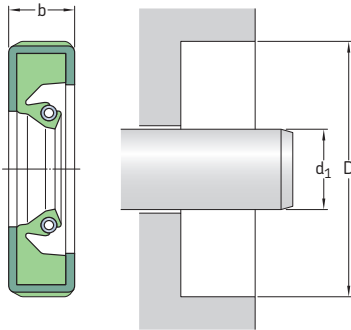
<sup>1)</sup> Number of 0,5 in. adjustable spacer lugs

Dimensions Shaft d <sub>1</sub>	Bore D	Nominal seal width b	Design	Lip material	Lug <sup>1)</sup>	Designation
in./mm			–	–	–	–
<b>30.250</b> 768,35	32.500 825,50	0.875 22,23	HDS1	R		<b>3025660</b>
<b>30.500</b> 774,70	32.500 825,50	0.875 22,23	HDS2	V		<b>3050514</b>
	33.000 838,20	1.000 25,40	HDS2	R		<b>3050785</b>
<b>31.000</b> 787,40	33.000 838,20	0.813 20,65	HDS1	R		<b>3100550</b>
<b>32.500</b> 825,50	34.500 876,30	0.875 22,23	HDS1	R		<b>3250560</b>
<b>33.000</b> 838,20	34.688 881,08	0.750 19,05	HDS2	R		<b>3300351</b>
<b>33.500</b> 850,90	36.000 914,40	0.875 22,23	HDS1	R		<b>3350760</b>
<b>34.000</b> 863,60	36.000 914,40	0.875 22,23	HDS1	R		<b>3400560</b>
<b>34.500</b> 876,30	36.500 927,10	0.875 22,23	HDS2	D		<b>3450563</b>
<b>37.500</b> 952,50	39.000 990,60	0.875 22,23	HDS2	R		<b>3750272</b>
	39.500 1 003,30	0.875 22,23	HDS1	D		<b>3750561</b>
<b>38.000</b> 965,20	40.000 1 016,00	0.875 22,23	HDS2	R		<b>3800565</b>
<b>40.500</b> 1 028,70	43.000 1 092,20	0.875 22,23	HDS2	V		<b>4050774</b>
<b>43.500</b> 1 104,90	45.500 1 155,70	0.875 22,23	HDS2	R		<b>4350565</b>
	45.500 1 155,70	0.875 22,23	HDS1	R		<b>4350560</b>
<b>45.000</b> 1 143,00	47.000 1 193,80	0.875 22,23	HDS1	R		<b>4500560</b>
<b>46.000</b> 1 168,40	47.500 1 206,50	0.750 19,05	HDS2	H		<b>4600252</b>
<b>49.000</b> 1 244,60	50.625 1 285,88	0.813 20,65	HDS1	R		<b>4900340</b>
<b>51.500</b> 1 308,10	53.500 1 358,90	1.500 38,10	HDS1	R		<b>5150590</b>
<b>54.750</b> 1 390,65	56.375 1 431,93	0.875 22,23	HDS1	R		<b>5475340</b>
<b>62.500</b> 1 587,50	64.000 1 625,60	0.875 22,23	HDS1	R		<b>6250270</b>
<b>63.340</b> 1 608,84	64.500 1 638,30	0.750 19,05	HDS2	D		<b>6334342</b>

<sup>1)</sup> Number of 0,5 in. adjustable spacer lugs

## Radial shaft seals – HDS1K – inch dimensions

$d_1$  7.939 in.



The table includes only a selection of sizes. For the full size range, please refer to **table 19** on **page 214**.

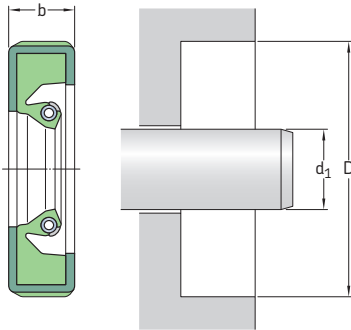
Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Nominal seal width $b$	Design	Lip material	Designation
Shaft	Bore				
$d_1$	$D$				
in./mm			–	–	–
<b>7.939</b> 201,65	10,125 257,18	0,688 17,48	HDS1K	H	<b>597606</b>



## Radial shaft seals – HDS2K – metric dimensions

$d_1$  340 – 810 mm



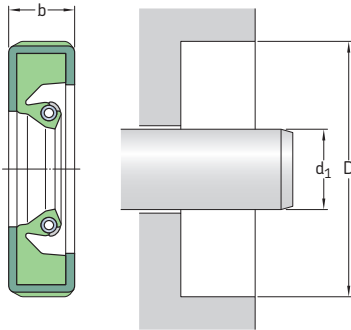
The table includes only a selection of sizes. For the full size range, please refer to **table 19** on **page 214**.

Please see **pages 74 to 76** for housing bore requirements.

Dimensions	Bore	Nominal seal width	Design	Lip material	Designation
Shaft		$b$			
$d_1$	$D$				
mm			–	–	–
<b>340</b>	380	18	HDS2K	V	<b>340×380×18 HDS2K V</b>
<b>360</b>	404	20	HDS2K	R	<b>360×404×20 HDS2K R</b>
<b>400</b>	450	18	HDS2K	R	<b>400×450×18 HDS2K R</b>
<b>810</b>	874	25	HDS2K	R	<b>810×874×25 HDS2K R</b>

## Radial shaft seals – HDS2K – inch dimensions

$d_1$  16.500 in.



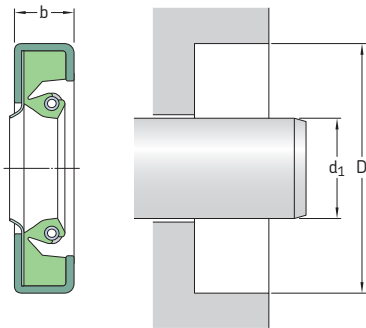
The table includes only a selection of sizes. For the full size range, please refer to **table 19** on **page 214**.

Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Nominal seal width $b$	Design	Lip material	Designation
Shaft	Bore				
$d_1$	$D$				
in./mm			–	–	–
<b>16,500</b> 419,10	18,000 457,20	0.750 19,05	HDS2K	R	<b>1650230</b>

## Radial shaft seals – HDSF and HDSH seals – metric dimensions

$d_1$  440 – 760 mm



The table includes only a selection of sizes. For the full size range, please refer to **table 19** on **page 214**.

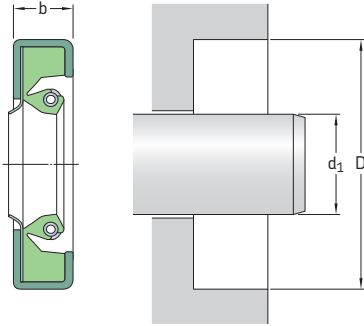
Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Nominal seal width $b$	Design	Lip material	Designation
Shaft $d_1$	Bore $D$				
mm			–	–	–
440	490	20,40	HDSF2	VT	440x490x20 HDSF2 VT
	490	20,40	HDSH7	HT	440x490x20 HDSH7 HT
500	540	20	HDSF2	RT	500x540x20 HDSF2 RT
760	800	20	HDSF2	HT	760x800x20 HDSF2 HT
	800	20	HDSF7	HT	760x800x20 HDSF7 HT



## Radial shaft seals – HDSF and HDSH seals – inch dimensions

$d_1$  10.500 – 31.890 in.



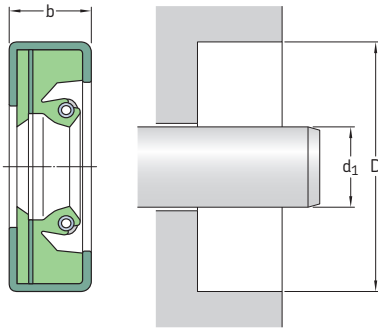
The table includes only a selection of sizes. For the full size range, please refer to **table 19** on **page 214**.

Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Nominal seal width $b$	Design	Lip material	Designation
Shaft	Bore				
$d_1$	$D$				
in./mm			–	–	–
<b>10.500</b> 266,70	12.500 317,50	1.000 25,40	HDSF1	VT	<b>1050966</b>
<b>14.000</b> 355,60	16.000 406,40	1.000 25,40	HDSF1	VT	<b>1400957</b>
<b>15.500</b> 393,70	17.500 444,50	0.750 19,05	HDSH7	RT	<b>1550951</b>
	17.500 444,50	0.750 19,05	HDSF2	HT	<b>1550952</b>
<b>16.000</b> 406,40	18.000 457,20	0.875 22,23	HDSF2	HT	<b>1600510</b>
<b>18.500</b> 469,90	20.500 520,70	0.875 22,23	HDSF2	DT	<b>1850953</b>
<b>19.000</b> 482,60	21.000 533,40	0.870 22,10	HDSF2	VT	<b>1900954</b>
<b>31.890</b> 810,01	34.409	0.921	HDSF2	VT	<b>3189981</b>
	873,99	23,39			
	34.409	0.921	HDSH7	HT	<b>3189988</b>
	873,99	23,39			

## Radial shaft seals – HDSA and HDSB seals – metric dimensions

$d_1$  240 – 790 mm



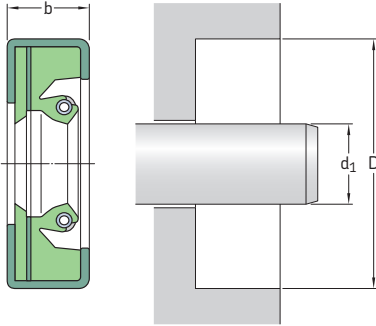
The table includes only a selection of sizes. For the full size range, please refer to **table 19** on **page 214**.

Please see **pages 74 to 76** for housing bore requirements.

Dimensions Shaft	Bore	Nominal seal width b	Design	Lip material	Designation
$d_1$	D				
mm			–	–	–
240	280	23	HDSA1	RD	240×280×23 HDSA1 RD
270	330	25,40	HDSA1	RD	270×330×25 HDSA1 RD
310	370	25,40	HDSA1	RD	310×370×25 HDSA1 RD
317	352	23	HDSA1	RD	317×352×23 HDSA1 RD
320	360	25	HDSB2	RD	320×360×25 HDSB2 RD
	380	28	HDSA2	RD	320×360×28 HDSA2 RD
364	420	25	HDSA2	RD	364×420×25 HDSA2 RD
380	420	22,20	HDSA2	VD	380×420×22 HDSA2 VD
	440	28	HDSA2	RD	380×440×28 HDSA2 RD
390	434	22	HDSA2	VD	390×434×22 HDSA2 VD
400	460	28	HDSA2	RD	400×460×28 HDSA2 RD
430	470	20	HDSB1	RD	430×470×20 HDSB1 RD
440	480	22,23	HDSA2	VD	440×480×22 HDSA2 VD
560	620	30	HDSA2	RD	560×620×30 HDSA2 RD
580	640	30	HDSA2	RD	580×640×30 HDSA2 RD
	640	30	HDSB1	RD	580×640×30 HDSB1 RD
790	850	25	HDSA1	RD	790×850×25 HDSA1 RD

## Radial shaft seals – HDSA and HDSB seals – inch dimensions

$d_1$  6.000 – 9.620 in.



The table includes only a selection of sizes. For the full size range, please refer to **table 19** on **page 214**.

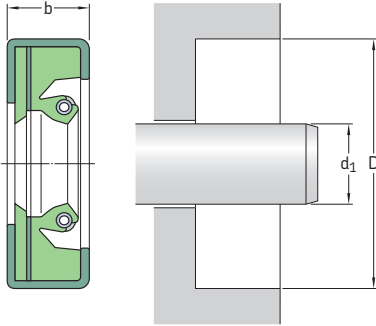
Please see **pages 74 to 76** for housing bore requirements.

Dimensions			Design	Lip material	Designation
Shaft	Bore	Nominal seal width			
$d_1$	D	b			
in./mm					
<b>6.000</b> 152,40	7.500 190,50	0.750 19,05	HDSA1	RD	<b>597625</b>
<b>6.625</b> 168,28	8.125 206,38	0.875 22,23	HDSA2	VD	<b>594828</b>
<b>7.250</b> 184,15	8.750 222,25	0.875 22,23	HDSA2	VD	<b>72594</b>
<b>8.000</b> 203,20	10.000 254,00	1.000 25,40	HDSB1	RD	<b>592328</b>
	10.000 254,00	1.250 31,75	HDSA1	RD	<b>592336</b>
	10.125 257,18	1.250 31,75	HDSB1	RD	<b>80092</b>
	10.125 257,18	1.250 31,75	HDSB1	RD	<b>80092</b>
<b>8.250</b> 209,55	10.250 260,35	0.875 22,23	HDSB1	RD	<b>591921</b>
	10.250 260,35	1.250 31,75	HDSB1	RD	<b>590357</b>
<b>8.500</b> 215,90	9.750 247,65	0.870 22,10	HDSA2	DD	<b>595513</b>
	10.000 254,00	0.875 22,23	HDSA1	VD	<b>596196</b>
	10.000 254,00	1.000 25,40	HDSA1	RD	<b>590731</b>
	10.500 266,70	0.875 22,23	HDSA1	VD	<b>592798</b>
	10.500 266,70	1.000 25,40	HDSB1	RD	<b>592149</b>
	10.500 266,70	1.000 25,40	HDSA2	VD	<b>594902</b>
	10.500 266,70	1.250 31,75	HDSA1	RD	<b>590245</b>
	10.500 266,70	1.250 31,75	HDSA1	RD	<b>590245</b>
	10.500 266,70	1.250 31,75	HDSA1	RD	<b>590245</b>
	10.500 266,70	1.250 31,75	HDSA1	RD	<b>590245</b>

Dimensions			Design	Lip material	Designation
Shaft	Bore	Nominal seal width			
$d_1$	D	b			
in./mm					
<b>8.750</b> 222,25	10.750 273,05	0.875 22,23	HDSA1	RD	<b>592492</b>
<b>8.875</b> 225,43	10.125 257,18	0.875 22,23	HDSA2	DD	<b>595127</b>
	10.875 276,23	0.875 22,23	HDSA1	RD	<b>591984</b>
	11.250 285,75	0.875 22,23	HDSA1	RD	<b>592464</b>
	11.250 285,75	0.875 22,23	HDSA1	RD	<b>592464</b>
<b>9.000</b> 228,60	10.250 260,35	0.875 22,23	HDSA2	VD	<b>90054</b>
	10.500 266,70	0.875 22,23	HDSA1	RD	<b>597343</b>
	11.000 279,40	1.000 25,40	HDSA2	VD	<b>594903</b>
	11.000 279,40	1.000 25,40	HDSA2	VD	<b>594903</b>
<b>9.250</b> 234,95	10.438 265,13	0.875 22,23	HDSA1	RD	<b>92591</b>
	11.000 279,40	1.375 34,93	HDSA1	RD	<b>592452</b>
	11.250 285,75	0.875 22,23	HDSA1	VD	<b>593312</b>
<b>9.375</b> 238,13	12.750 323,85	1.250 31,75	HDSB1	RD	<b>590688</b>
	11.500 292,10	1.250 31,75	HDSA2	RD	<b>590375</b>
<b>9.500</b> 241,30	11.500 292,10	1.250 31,75	HDSA2	RD	<b>590375</b>
	11.500 292,10	1.250 31,75	HDSA2	DD	<b>593667</b>
<b>9.620</b> 244,35	12.750 323,85	1.250 31,75	HDSA1	RD	<b>96290</b>
	12.750 323,85	1.250 31,75	HDSA1	RD	<b>96290</b>

# Radial shaft seals – HDSA and HDSB seals – inch dimensions

$d_1$  9.750 – 15.750 in.



The table includes only a selection of sizes. For the full size range, please refer to **table 19** on **page 214**.

Dimensions		Nominal seal width $b$	Design	Lip material	Designation
Shaft	Bore				
$d_1$	D				
in./mm					
<b>9.750</b> 247,65	11.000	0.875	HDSA1	RD	<b>593053</b>
	279,40	22,23			
	11.000	1.000	HDSA1	DD	<b>593428</b>
	279,40	25,40			
	11.125	0.875	HDSA2	DD	<b>594974</b>
	282,58	22,23			
	11.250	0.875	HDSA2	DD	<b>595514</b>
	285,75	22,23			
<b>9.875</b> 250,83	11.750	1.000	HDSA1	DD	<b>595568</b>
	298,45	25,40			
	11.875	1.000	HDSA2	RD	<b>592847</b>
	301,63	25,40			
<b>10.000</b> 254,00	11.250	0.875	HDSA1	RD	<b>1000910</b>
	285,75	22,23			
	11.250	0.875	HDSA2	VD	<b>1000914</b>
	285,75	22,23			
	11.500	1.250	HDSA1	RD	<b>1000920</b>
	292,10	31,75			
	12.000	0.875	HDSA1	RD	<b>1000950</b>
	304,80	22,23			
	12.000	1.250	HDSA1	RD	<b>1000952</b>
	304,80	31,75			
	12.000	1.250	HDSB1	RD	<b>1000953</b>
	304,80	31,75			
<b>10.375</b> 263,53	12.000	1.500	HDSA1	RD	<b>1000954</b>
	304,80	38,10			
	12.500	1.000	HDSA1	RD	<b>1000971</b>
	317,50	25,40			
	11.625	0.875	HDSA2	DD	<b>1037912</b>
	295,28	22,23			

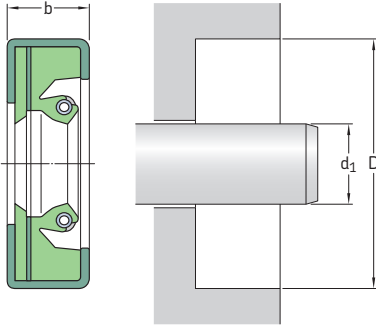
Dimensions		Nominal seal width $b$	Design	Lip material	Designation
Shaft	Bore				
$d_1$	D				
in./mm					
<b>10.500</b> 266,70	12.500	1.000	HDSA1	RD	<b>1050956</b>
	317,50	25,40			
	12.500	1.000	HDSB1	RD	<b>1050958</b>
	317,50	25,40			
	12.500	1.000	HDSA1	VT	<b>1050966</b>
	317,50	25,40			
<b>10.625</b> 269,88	12.500	0.969	HDSA1	RD	<b>1062945</b>
	317,50	24,61			
	13.000	1.000	HDSB1	RD	<b>1063971</b>
	330,20	25,40			
<b>10.688</b> 271,48	12.500	1.000	HDSA1	RD	<b>1068940</b>
	317,50	25,40			
<b>10.750</b> 273,05	12.500	0.875	HDSA2	RD	<b>1075942</b>
	317,50	22,23			
	13.371	1.250	HDSB1	RD	<b>1075991</b>
	339,62	31,75			
<b>11.000</b> 279,40	12.500	1.250	HDSA1	RD	<b>1100918</b>
	317,50	31,75			
	13.000	0.875	HDSA1	RD	<b>1100950</b>
	330,20	22,23			
	13.000	1.000	HDSA1	RD	<b>1100951</b>
	330,20	25,40			
	13.000	1.250	HDSA1	RD	<b>1100952</b>
	330,20	31,75			
	13.000	1.250	HDSB1	RD	<b>1100953</b>
	330,20	31,75			
<b>11.417</b> 290,00	13.500	1.250	HDSA1	RD	<b>1100971</b>
	330,20	31,75			
	12.994	0.875	HDSA1	VD	<b>1141937</b>
	330,00	22,23			
	13.000	0.875	HDSA2	VD	<b>1141273</b>
	330,20	22,23			

Dimensions			Design	Lip material	Designation
Shaft	Bore	Nominal seal width b			
d <sub>1</sub>	D				
in./mm			-	-	-
<b>11.500</b> 292,10	13.000 330,20	0.750 19,05	HDSA1	RD	<b>115025</b>
	13.000 330,20	0.875 22,23	HDSA1	DD	<b>1150925</b>
	13.000 330,20	1.063 27,00	HDSA1	RD	<b>1150920</b>
<b>11.750</b> 298,45	13.250 336,55	0.875 22,23	HDSA2	VD	<b>1175924</b>
	13.250 336,55	0.875 22,23	HDSA2	RD	<b>527709</b>
	13.750 349,25	1.250 31,75	HDSB1	RD	<b>1175952</b>
<b>12.000</b> 304,80	13.500 342,90	0.875 22,23	HDSA1	RD	<b>1200920</b>
	14.000 355,60	0.844 21,44	HDSA2	VD	<b>1200962</b>
	14.000 355,60	1.000 25,40	HDSB1	RD	<b>1200958</b>
	14.000 355,60	1.250 31,75	HDSB1	RD	<b>1200952</b>
<b>12.250</b> 311,15	14.250 361,95	1.250 20,65	HDSA2	RD	<b>1225588</b>
	14.250 361,95	1.250 31,75	HDSA1	RD	<b>1225960</b>
<b>12.500</b> 317,50	13.750 349,25	0.906 23,00	HDSA2	RD	<b>1250912</b>
	14.000 356,60	0.875 22,23	HDSA2	DD	<b>1250272</b>
	14.000 355,60	0.875 22,23	HDSA2	DD	<b>1250922</b>
	14.500 368,30	1.250 31,75	HDSA1	RD	<b>1250950</b>
<b>12.750</b> 323,85	14.750 374,65	1.250 31,75	HDSB1	RD	<b>1275950</b>
<b>12.875</b> 327,03	14.125 358,78	0.875 22,23	HDSA2	RD	<b>1287912</b>
<b>13.000</b> 330,20	14.500 368,30	0.875 22,23	HDSA1	RD	<b>1300900</b>
	14.500 368,30	0.875 22,23	HDSB1	RD	<b>1300929</b>
	14.500 368,30	1.000 25,40	HDSA1	RD	<b>1300920</b>
<b>13.250</b> 336,55	14.750 374,65	0.906 23,00	HDSA2	DD	<b>1325922</b>
	14.750 374,65	0.906 23,00	HDSA2	VD	<b>1325928</b>
	14.875 377,83	1.000 25,40	HDSA2	DD	<b>1325932</b>
	15.000 381,00	1.250 31,75	HDSA1	RD	<b>1325940</b>
	15.250 387,35	1.000 25,40	HDSA1	RD	<b>1325950</b>

Dimensions			Design	Lip material	Designation
Shaft	Bore	Nominal seal width b			
d <sub>1</sub>	D				
in./mm			-	-	-
<b>13.386</b> 340,00	15.000 381,00	0.875 22,23	HDSA2	VD	<b>1338273</b>
<b>13.500</b> 342,90	15.500 393,70	0.875 22,23	HDSA2	RD	<b>1350954</b>
	15.500 393,70	1.250 31,75	HDSB1	RD	<b>1350970</b>
	15.500 393,70	1.250 31,75	HDSB1	VD	<b>593517</b>
<b>13.750</b> 349,25	15.500 393,70	0.875 22,23	HDSA1	VD	<b>1375418</b>
<b>13.875</b> 352,43	15.125 384,18	0.875 22,23	HDSA2	RD	<b>1387912</b>
<b>13.938</b> 354,03	15.744 399,90	1.250 31,75	HDSA2	RD	<b>1394942</b>
<b>14.000</b> 355,60	15.500 393,90	1.000 25,40	HDSA1	RD	<b>1400925</b>
	16.000 406,40	1.000 25,40	HDSA1	VT	<b>1400957</b>
	16.000 406,40	1.375 34,93	HDSA1	RD	<b>1400950</b>
	16.250 412,75	1.000 25,40	HDSA2	RD	<b>1400965</b>
	16.250 412,75	1.000 25,40	HDSA2	VD	<b>528307</b>
	16.750 425,45	0.968 24,59	HDSB2	RD	<b>1400981</b>
<b>14.250</b> 361,95	15.750 400,05	1.000 25,40	HDSA1	RD	<b>1425920</b>
	16.250 412,75	1.000 25,40	HDSB1	RD	<b>1425950</b>
<b>14.400</b> 365,76	15.587 395,91	0.875 22,23	HDSB1	RD	<b>1440901</b>
<b>15.000</b> 381,00	17.000 431,80	0.875 22,23	HDSA1	RD	<b>1500951</b>
	17.000 431,80	1.250 31,75	HDSA1	RD	<b>1500950</b>
	17.500 444,50	1.000 25,40	HDSA1	RD	<b>1500973</b>
<b>15.125</b> 384,18	16.375 415,93	0.875 22,23	HDSA2	RD	<b>1512912</b>
<b>15.313</b> 388,95	17.313 439,75	0.813 20,65	HDSA2	RD	<b>592865</b>
	17.313 439,75	0.875 22,23	HDSA1	RD	<b>1531950</b>
<b>15.375</b> 390,53	16.625 422,28	0.875 22,23	HDSA2	RD	<b>1537142</b>
<b>15.750</b> 400,05	17.750 450,85	1.250 31,75	HDSA1	RD	<b>1575910</b>

## Radial shaft seals – HDSA and HDSB seals – inch dimensions

$d_1$  16.000 – 46.840 in.



The table includes only a selection of sizes. For the full size range, please refer to **table 19** on **page 214**.

Please see **pages 74 to 76** for housing bore requirements.

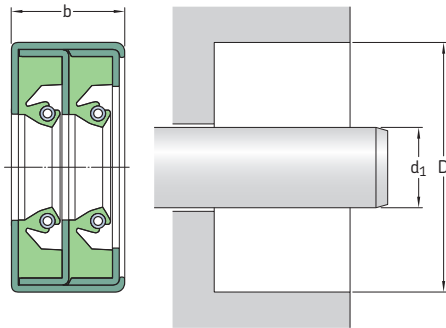
Dimensions		Nominal seal width $b$	Design	Lip material	Designation
Shaft $d_1$	Bore $D$				
in./mm					
<b>16.000</b> 406,40	18.000	0.875	HDSA1	RD	<b>1600951</b>
	457,20	22,23			
	18.000	1.000	HDSA2	RD	<b>1600955</b>
	457,20	25,40			
	18.000	1.125	HDSB1	RD	<b>1600940</b>
	457,20	28,58			
<b>16.375</b> 415,93	18.000	1.125	HDSA1	RD	<b>1600941</b>
	457,20	28,58			
	17.562	1.000	HDSA1	RD	<b>1637901</b>
415,93	446,07	25,40			
<b>17.000</b> 431,80	18.250	0.875	HDSA2	RD	<b>1700142</b>
	463,55	22,23			
	19.000	1.250	HDSA1	RD	<b>1700950</b>
	482,60	31,75			
<b>17.500</b> 444,50	19.000	1.250	HDSA1	RD	<b>1750920</b>
	482,60	31,75			
	19.500	1.000	HDSA2	RD	<b>1750958</b>
	495,30	25,40			
	19.500	1.250	HDSA1	RD	<b>1750952</b>
495,30	31,75				
<b>18.000</b> 457,20	20.000	1.500	HDSA1	RD	<b>1800950</b>
	508,00	38,10			
	20.250	1.000	HDSA2	RD	<b>1800965</b>
	514,35	25,40			
	20.250	1.000	HDSA2	VD	<b>528308</b>
514,35	25,40				
<b>18.500</b> 469,90	20.500	0.968	HDSA2	VD	<b>1850952</b>
	520,70	24,59			
<b>19.250</b> 488,95	20.750	0.875	HDSA1	RD	<b>1925920</b>
	527,05	22,23			

Dimensions		Nominal seal width $b$	Design	Lip material	Designation
Shaft $d_1$	Bore $D$				
in./mm					
<b>19.500</b> 495,30	21.500	1.250	HDSA1	RD	<b>1950950</b>
	546,10	31,75			
<b>19.750</b> 501,65	22.125	1.000	HDSA1	RD	<b>1975972</b>
	561,98	25,40			
<b>20.000</b> 508,00	21.250	1.375	HDSA1	RD	<b>2000913</b>
	539,75	34,93			
	21.500	0.875	HDSA1	VD	<b>593789</b>
508,00	546,10	22,23			
<b>20.438</b> 519,13	22.500	1.000	HDSA1	RD	<b>2044580</b>
	571,50	25,40			
<b>20.500</b> 520,70	22.000	1.500	HDSA2	RD	<b>2050282</b>
	558,80	38,10			
	22.500	0.875	HDSA2	VD	<b>2050954</b>
520,70	571,50	22,23			
<b>20.750</b> 527,05	22.750	1.250	HDSA1	RD	<b>2075950</b>
	577,85	31,75			
<b>21.000</b> 533,40	22.250	1.375	HDSA1	RD	<b>2100913</b>
	565,15	34,93			
<b>21.250</b> 539,75	23.000	0.875	HDSA1	RD	<b>2125940</b>
	584,20	22,23			
<b>21.500</b> 546,10	23.500	1.000	HDSA1	RD	<b>594356</b>
	596,90	25,40			
<b>22.000</b> 558,80	23.500	0.875	HDSA1	RD	<b>2200920</b>
	596,90	22,23			
<b>23.000</b> 584,20	24.500	0.875	HDSB1	RD	<b>2300921</b>
	622,30	22,23			

Dimensions			Design	Lip material	Designation
Shaft	Bore	Nominal seal width			
$d_1$	D	b			
in./mm			-	-	-
<b>24.000</b> 609,60	26.250 666,75	0.875 22,23	HDSA2	RD	<b>2400962</b>
<b>24.250</b> 615,95	26.250 666,75	0.875 22,23	HDSA1	VD	<b>2425950</b>
<b>25.000</b>	27.500 698,50	1.000 25,40	HDSB1	RD	<b>2500971</b>
<b>32.000</b> 812,80	34.000 863,60	0.875 22,23	HDSA2	DD	<b>3200958</b>
<b>45.000</b> 1 143,00	46.627 1 184,33	1.000 25,40	HDSB2	RD	<b>4500930</b>
<b>46.840</b> 1 189,74	48.000 1 219,20	1.188 30,18	HDSA2	RD	<b>4684912</b>

## Radial shaft seals – HDSE1 – metric dimensions

$d_1$  850 mm



The table includes only a selection of sizes. For the full size range, please refer to **table 19** on **page 214**.

Please see **pages 74 to 76** for housing bore requirements.

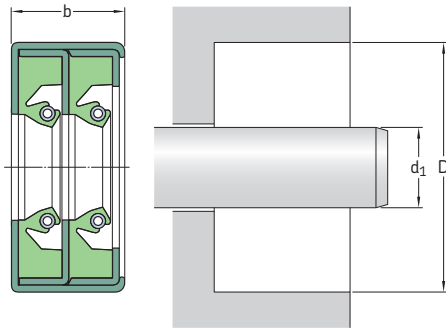
Dimensions		Nominal seal width $b$	Design	Lip material	Designation
Shaft	Bore				
$d_1$	$D$				
mm			–	–	–
<b>850</b>	<b>910</b>	<b>50</b>	<b>HDSE1</b>	<b>RR</b>	<b>850×910×50 HDSE1 RR</b>





## Radial shaft seals – HDSD and HDSE seals – inch dimensions

$d_1$  18.000 – 63.130 in.



The table includes only a selection of sizes. For the full size range, please refer to **table 19** on **page 214**.

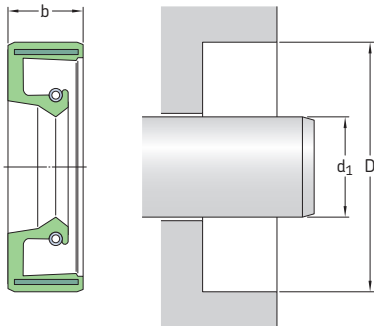
Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Nominal seal width b	Design	Lip material	Designation
Shaft	Bore				
$d_1$	D				
in./mm					
<b>18.000</b>	20.000	1.250	HDSD2	RR	<b>1800570</b>
457,20	508,00	31,75			
	20.000	1.500	HDSD1	RR	<b>1800956</b>
	508,00	38,10			
	20.250	1.250	HDSE2	RR	<b>1800966</b>
	514,35	31,75			
<b>18.500</b>	20.000	1.250	HDSD2	RR	<b>1850922</b>
469,90	508,00	31,75			
<b>19.125</b>	21.250	1.750	HDSD1	RR	<b>1913960</b>
485,78	539,75	44,45			
<b>20.000</b>	22.000	1.813	HDSE1	RR	<b>2000951</b>
508,00	558,80	46,05			
<b>21.750</b>	24.750	1.500	HDSD1	RR	<b>2175920</b>
552,45	628,65	38,10			
	24.750	1.500	HDSD2	VV	<b>2175992</b>
	628,65	38,10			
	24.750	1.500	HDSD1	VV	<b>2175997</b>
	628,65	38,10			
	24.750	1.500	HDSE1	VV	<b>2175998</b>
	628,65	38,10			
<b>22.000</b>	24.000	1.250	HDSD1	RR	<b>2200953</b>
558,80	609,60	31,75			
	24.000	1.250	HDSE2	DD	<b>2200958</b>
	609,60	31,75			
	24.000	1.250	HDSD2	DD	<b>2200962</b>
	609,60	31,75			
<b>23.000</b>	24.750	1.250	HDSE1	VV	<b>2300983</b>
584,20	628,65	31,75			
<b>23.500</b>	25.500	1.250	HDSD2	RR	<b>2350955</b>
596,90	647,70	31,75			
<b>25.500</b>	28.500	1.250	HDSD2	RR	<b>2550912</b>
647,70	723,90	31,75			

Dimensions Shaft $d_1$	Bore D	Nominal seal width b	Design	Lip material	Designation
in./mm			–	–	–
<b>27.000</b> 685,80	29,000 736,60	1.875 47,63	HDSE2	DD	<b>2700953</b>
<b>27.688</b> 703,28	29,812 757,23	1.250 31,75	HDSE2	RR	<b>2769915</b>
<b>28.000</b> 711,20	31,000 787,40	1.250 31,75	HDSD2	DD	<b>2800998</b>
<b>29.000</b> 736,60	31,000 787,40	1.750 44,45	HDSD1	RR	<b>2900954</b>
<b>31.000</b> 787,40	34,000 863,60	1.250 31,75	HDSD2	RR	<b>3100992</b>
<b>33.000</b> 838,20	34,500 876,30	1.250 31,75	HDSD1	RR	<b>3300920</b>
	34,500 876,30	1.250 31,75	HDSE1	RR	<b>3300921</b>
<b>33.500</b> 850,90	35,500 901,70	1.750 44,45	HDSE1	RR	<b>3350950</b>
<b>35.500</b> 901,70	38,000 965,20	1.250 31,75	HDSE2	VV	<b>3550974</b>
<b>36.000</b> 914,40	38,000 965,20	1.500 38,10	HDSE2	RR	<b>3600954</b>
<b>38.000</b> 965,20	40,000 1 016,00	1.313 33,35	HDSE1	RR	<b>3800950</b>
<b>63.130</b> 1 603,50	64,625 1 641,48	1.375 34,93	HDSD1	RD	<b>6313922</b>

## Radial shaft seals – SBF – metric dimensions

$d_1$  175 – 900 mm



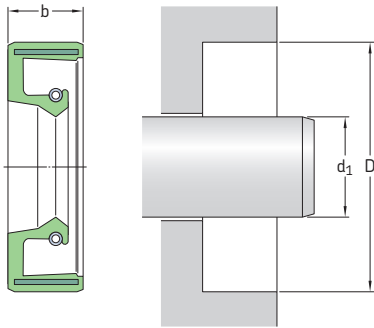
The table includes only a selection of available sizes. Contact your SKF sales representative for more information.

Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Nominal seal width b	Designations	
Shaft $d_1$	Bore D		Lip material R	V
mm			–	
175	205	15	175×205×15 SBF R	175×205×15 SBF V
230	260	15	230×260×15 SBF R	230×260×15 SBF V
240	270	15	240×270×15 SBF R	240×270×15 SBF V
	280	16	240×280×16 SBF R	240×280×16 SBF V
245	275	16	245×275×16 SBF R	245×275×16 SBF V
260	290	16	260×290×16 SBF R	260×290×16 SBF V
	310	16	260×310×16 SBF R	260×310×16 SBF V
270	235	16	270×235×16 SBF R	270×235×16 SBF V
290	330	18	290×330×18 SBF R	290×330×18 SBF V
	334	20	290×334×20 SBF R	290×334×20 SBF V
300	344	20	300×344×20 SBF R	300×344×20 SBF V
316	360	20	316×360×20 SBF R	316×360×20 SBF V
325	365	16	325×365×16 SBF R	325×365×16 SBF V
340	380	20	340×380×20 SBF R	340×380×20 SBF V
360	400	20	360×400×20 SBF R	360×400×20 SBF V
385	430	25	385×430×25 SBF R	385×430×25 SBF V
390	430	20	390×430×20 SBF R	390×430×20 SBF V
400	440	20	400×440×20 SBF R	400×440×20 SBF V
430	480	22	430×480×22 SBF R	430×480×22 SBF V
440	490	25	440×490×25 SBF R	440×490×25 SBF V
450	500	25	450×500×25 SBF R	450×500×25 SBF V
900	960	27	900×960×27 SBF R	900×960×27 SBF V

## Radial shaft seals – SBF – inch dimensions

$d_1$  11.000 – 27.500 in.



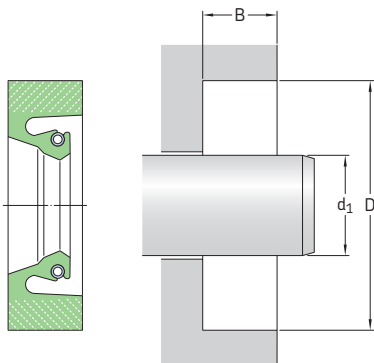
The table includes only a selection of available sizes. Contact your SKF sales representative for more information.

Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Nominal seal width $b$	Designations Lip material R	V
Shaft $d_1$	Bore D			
in./mm		–		
<b>11.000</b> 279,40	12.500 317,50	0.625 15,88	<b>SBF 5809 R</b>	<b>SBF 5809 V</b>
<b>20.500</b> 520,70	22.500 571,50	0.875 22,23	<b>SBF 7083 R</b>	<b>SBF 7083 V</b>
<b>21.500</b> 546,10	23.469 596,10	0.875 22,23	<b>SBF 7175 R</b>	<b>SBF 7175 V</b>
<b>23.000</b> 584,20	24.500 622,30	0.750 19,05	<b>SBF 7270 R</b>	<b>SBF 7270 V</b>
<b>27.500</b> 698,50	29.500 749,30	1.000 25,40	<b>SBF 7406 R</b>	<b>SBF 7406 V</b>

## Radial shaft seals – HSF1 (split) and HSF5 (solid) – metric dimensions

### $d_1$ 40 – 215 mm



The table includes only a selection of available sizes. Contact your SKF sales representative for more information.

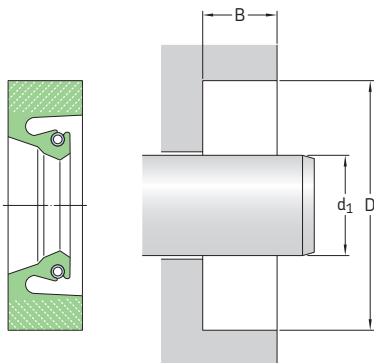
Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Designations		
Shaft diameter $d_1$	Bore diameter D	Bore depth B	Split version (HSF1) Lip material R, V	Solid version (HSF5) Lip material R, V
mm				
40	60	10	40×60×10 HSF1 R	40×60×10 HSF5 R
			40×60×10 HSF1 V	40×60×10 HSF5 V
55	80	12,20	55×80×12 HSF1 R	55×80×12 HSF5 R
			55×80×12 HSF1 V	55×80×12 HSF5 V
60	80	10	60×80×10 HSF1 R	60×80×10 HSF5 R
			60×80×10 HSF1 V	60×80×10 HSF5 V
70	102	12,50	70×102×13 HSF1 R	70×102×13 HSF5 R
			70×102×13 HSF1 V	70×102×13 HSF5 V
80	100	8	80×100×8 HSF1 R	80×100×8 HSF5 R
			80×100×8 HSF1 V	80×100×8 HSF5 V
	112	12,50	80×112×13 HSF1 R	80×112×13 HSF5 R
			80×112×13 HSF1 V	80×112×13 HSF5 V
84	100	8	84×100×8 HSF1 R	84×100×8 HSF5 R
			84×100×8 HSF1 V	84×100×8 HSF5 V
85	101	8	85×101×8 HSF1 R	85×101×8 HSF5 R
			85×101×8 HSF1 V	85×101×8 HSF5 V
	120	12	85×120×12 HSF1 R	85×120×12 HSF5 R
			85×120×12 HSF1 V	85×120×12 HSF5 V
90	110	12	90×110×12 HSF1 R	90×110×12 HSF5 R
			90×110×12 HSF1 V	90×110×12 HSF5 V
100	116	8	100×116×8 HSF1 R	100×116×8 HSF5 R
			100×116×8 HSF1 V	100×116×8 HSF5 V
	130	10	100×130×10 HSF1 R	100×130×10 HSF5 R
			100×130×10 HSF1 V	100×130×10 HSF5 V
110	130	12	110×130×12 HSF1 R	110×130×12 HSF5 R
			110×130×12 HSF1 V	110×130×12 HSF5 V
120	150	13	120×150×13 HSF1 R	120×150×13 HSF5 R
			120×150×13 HSF1 V	120×150×13 HSF5 V

Dimensions Shaft diameter $d_1$	Bore diameter D	Bore depth B	Designations	
			Split version (HSF1) Lip material R, V	Solid version (HSF5) Lip material R, V
mm			–	
125	155	12,50	125×155×13 HSF1 R	125×155×13 HSF5 R
			125×155×13 HSF1 V	125×155×13 HSF5 V
	160	12	125×160×12 HSF1 R	125×160×12 HSF5 R
			125×160×12 HSF1 V	125×160×12 HSF5 V
127	165	16	127×165×16 HSF1 R	127×165×16 HSF5 R
			127×165×16 HSF1 V	127×165×16 HSF5 V
135	160	12	135×160×12 HSF1 R	135×160×12 HSF5 R
			135×160×12 HSF1 V	135×160×12 HSF5 V
140	170	12	140×170×12 HSF1 R	140×170×12 HSF5 R
			140×170×12 HSF1 V	140×170×12 HSF5 V
145	180	14	145×180×14 HSF1 R	145×180×14 HSF5 R
			145×180×14 HSF1 V	145×180×14 HSF5 V
150	180	12	150×180×12 HSF1 R	150×180×12 HSF5 R
			150×180×12 HSF1 V	150×180×12 HSF5 V
160	190	15	160×190×15 HSF1 R	160×190×15 HSF5 R
			160×190×15 HSF1 V	160×190×15 HSF5 V
	200	10	160×200×10 HSF1 R	160×200×10 HSF5 R
			160×200×10 HSF1 V	160×200×10 HSF5 V
170	200	12	170×200×12 HSF1 R	170×200×12 HSF5 R
			170×200×12 HSF1 V	170×200×12 HSF5 V
	200	16	170×200×16 HSF1 R	170×200×16 HSF5 R
			170×200×16 HSF1 V	170×200×16 HSF5 V
	211	16	170×211×16 HSF1 R	170×211×16 HSF5 R
		170×211×16 HSF1 V	170×211×16 HSF5 V	
175	200	15	175×200×15 HSF1 R	175×200×15 HSF5 R
			175×200×15 HSF1 V	175×200×15 HSF5 V
180	200	15	180×200×15 HSF1 R	180×200×15 HSF5 R
			180×200×15 HSF1 V	180×200×15 HSF5 V
	222	16	180×222×16 HSF1 R	180×222×16 HSF5 R
			180×222×16 HSF1 V	180×222×16 HSF5 V
185	225	16	185×225×16 HSF1 R	185×225×16 HSF5 R
			185×225×16 HSF1 V	185×225×16 HSF5 V
190	220	15	190×220×15 HSF1 R	190×220×15 HSF5 R
			190×220×15 HSF1 V	190×220×15 HSF5 V
	225	18	190×225×18 HSF1 R	190×225×18 HSF5 R
			190×225×18 HSF1 V	190×225×18 HSF5 V
	230	16	190×230×16 HSF1 R	190×230×16 HSF5 R
		190×230×16 HSF1 V	190×230×16 HSF5 V	
200	240	16	200×240×16 HSF1 R	200×240×16 HSF5 R
			200×240×16 HSF1 V	200×240×16 HSF5 V
	250	18	200×250×18 HSF1 R	200×250×18 HSF5 R
			200×250×18 HSF1 V	200×250×18 HSF5 V
210	240	12	210×240×12 HSF1 R	210×240×12 HSF5 R
			210×240×12 HSF1 V	210×240×12 HSF5 V
	250	16	210×250×16 HSF1 R	210×250×16 HSF5 R
			210×250×16 HSF1 V	210×250×16 HSF5 V
215	248	15	215×248×15 HSF1 R	215×248×15 HSF5 R
			215×248×15 HSF1 V	215×248×15 HSF5 V
	250	16	215×250×16 HSF1 R	215×250×16 HSF5 R
		215×250×16 HSF1 V	215×250×16 HSF5 V	

## Radial shaft seals – HSF1 (split) and HSF5 (solid) – metric dimensions

d<sub>1</sub> 220 – 335 mm



The table includes only a selection of available sizes. Contact your SKF sales representative for more information.

Please see **pages 74 to 76** for housing bore requirements.

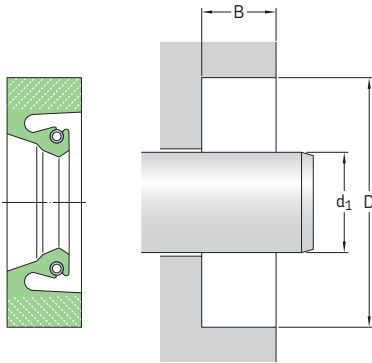
Dimensions		Designations		
Shaft diameter d <sub>1</sub>	Bore diameter D	Bore depth B	Split version (HSF1) Lip material R, V	Solid version (HSF5) Lip material R, V
mm			–	
220	180	16	220×180×16 HSF1 R 220×180×16 HSF1 V	220×180×16 HSF5 R 220×180×16 HSF5 V
	260	16	220×260×16 HSF1 R 220×260×16 HSF1 V	220×260×16 HSF5 R 220×260×16 HSF5 V
226	276	22,22	226×276×22 HSF1 R 226×276×22 HSF1 V	226×276×22 HSF5 R 226×276×22 HSF5 V
230	260	15	230×260×15 HSF1 R 230×260×15 HSF1 V	230×260×15 HSF5 R 230×260×15 HSF5 V
	270	16	230×270×16 HSF1 R 230×270×16 HSF1 V	230×270×16 HSF5 R 230×270×16 HSF5 V
235	265	15	235×265×15 HSF1 R 235×265×15 HSF1 V	235×265×15 HSF5 R 235×265×15 HSF5 V
	275	20	235×275×20 HSF1 R 235×275×20 HSF1 V	235×275×20 HSF5 R 235×275×20 HSF5 V
236	276	16	236×276×16 HSF1 R 236×276×16 HSF1 V	236×276×16 HSF5 R 236×276×16 HSF5 V
240	275	18	240×275×18 HSF1 R 240×275×18 HSF1 V	240×275×18 HSF5 R 240×275×18 HSF5 V
	280	18	240×280×18 HSF1 R 240×280×18 HSF1 V	240×280×18 HSF5 R 240×280×18 HSF5 V
	290	25	240×290×25 HSF1 R 240×290×25 HSF1 V	240×290×25 HSF5 R 240×290×25 HSF5 V
250	280	15	250×280×15 HSF1 R 250×280×15 HSF1 V	250×280×15 HSF5 R 250×280×15 HSF5 V
	290	16,50	250×290×17 HSF1 R 250×290×17 HSF1 V	250×290×17 HSF5 R 250×290×17 HSF5 V
260	290	16	260×290×16 HSF1 R 260×290×16 HSF1 V	260×290×16 HSF5 R 260×290×16 HSF5 V
	304	20	260×304×20 HSF1 R 260×304×20 HSF1 V	260×304×20 HSF5 R 260×304×20 HSF5 V
270	310	15	270×310×15 HSF1 R 270×310×15 HSF1 V	270×310×15 HSF5 R 270×310×15 HSF5 V
	314	20	270×314×20 HSF1 R 270×314×20 HSF1 V	270×314×20 HSF5 R 270×314×20 HSF5 V



Dimensions Shaft diameter $d_1$	Bore diameter D	Bore depth B	Designations	
			Split version (HSF1) Lip material R, V	Solid version (HSF5) Lip material R, V
mm			–	
275	315	20	275×315×20 HSF1 R 275×315×20 HSF1 V	275×315×20 HSF5 R 275×315×20 HSF5 V
280	320	16	280×320×16 HSF1 R 280×320×16 HSF1 V	280×320×16 HSF5 R 280×320×16 HSF5 V
	320	20	280×320×20 HSF1 R 280×320×20 HSF1 V	280×320×20 HSF5 R 280×320×20 HSF5 V
	324	20	280×324×20 HSF1 R 280×324×20 HSF1 V	280×324×20 HSF5 R 280×324×20 HSF5 V
285	310	15	285×310×15 HSF1 R 285×310×15 HSF1 V	285×310×15 HSF5 R 285×310×15 HSF5 V
289	327	19	289×327×19 HSF1 R 289×327×19 HSF1 V	289×327×19 HSF5 R 289×327×19 HSF5 V
290	330	20	290×330×20 HSF1 R 290×330×20 HSF1 V	290×330×20 HSF5 R 290×330×20 HSF5 V
	334	20	290×334×20 HSF1 R 290×334×20 HSF1 V	290×334×20 HSF5 R 290×334×20 HSF5 V
292	330	15,87	292×330×16 HSF1 R 292×330×16 HSF1 V	292×330×16 HSF5 R 292×330×16 HSF5 V
300	340	16,50	300×340×17 HSF1 R 300×340×17 HSF1 V	300×340×17 HSF5 R 300×340×17 HSF5 V
	340	20	300×340×20 HSF1 R 300×340×20 HSF1 V	300×340×20 HSF5 R 300×340×20 HSF5 V
304	348	20	304×348×20 HSF1 R 304×348×20 HSF1 V	304×348×20 HSF5 R 304×348×20 HSF5 V
308	352	20	308×352×20 HSF1 R 308×352×20 HSF1 V	308×352×20 HSF5 R 308×352×20 HSF5 V
310	345	18	310×345×18 HSF1 R 310×345×18 HSF1 V	310×345×18 HSF5 R 310×345×18 HSF5 V
	354	20,50	310×354×21 HSF1 R 310×354×21 HSF1 V	310×354×21 HSF5 R 310×354×21 HSF5 V
311	345	18,30	311×345×18 HSF1 R 311×345×18 HSF1 V	311×345×18 HSF5 R 311×345×18 HSF5 V
314	355	20	314×355×20 HSF1 R 314×355×20 HSF1 V	314×355×20 HSF5 R 314×355×20 HSF5 V
316	360	20	316×360×20 HSF1 R 316×360×20 HSF1 V	316×360×20 HSF5 R 316×360×20 HSF5 V
320	350	15	320×350×15 HSF1 R 320×350×15 HSF1 V	320×350×15 HSF5 R 320×350×15 HSF5 V
	360	18	320×360×18 HSF1 R 320×360×18 HSF1 V	320×360×18 HSF5 R 320×360×18 HSF5 V
328	372	20,20	328×372×20 HSF1 R 328×372×20 HSF1 V	328×372×20 HSF5 R 328×372×20 HSF5 V
330	370	18	330×370×18 HSF1 R 330×370×18 HSF1 V	330×370×18 HSF5 R 330×370×18 HSF5 V
	374	20	330×374×20 HSF1 R 330×374×20 HSF1 V	330×374×20 HSF5 R 330×374×20 HSF5 V
335	373	19	335×373×19 HSF1 R 335×373×19 HSF1 V	335×373×19 HSF5 R 335×373×19 HSF5 V

## Radial shaft seals – HSF1 (split) and HSF5 (solid) – metric dimensions

$d_1$  340 – 530 mm



The table includes only a selection of available sizes. Contact your SKF sales representative for more information.

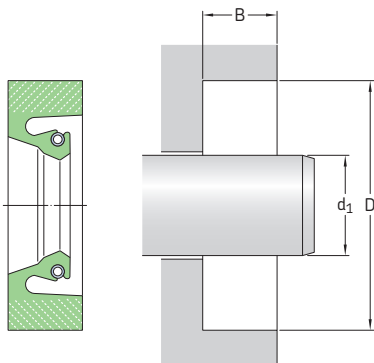
Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Designations		
Shaft diameter $d_1$	Bore diameter D	Bore depth B	Split version (HSF1) Lip material R, V	Solid version (HSF5) Lip material R, V
mm				
340	380	16	CR340×380×16 HSF1 R 340×380×16 HSF1 V	340×380×16 HSF5 R 340×380×16 HSF5 V
	380	20	340×380×20 HSF1 R 340×380×20 HSF1 V	340×380×20 HSF5 R 340×380×20 HSF5 V
350	380	17,70	350×380×18 HSF1 R 350×380×18 HSF1 V	350×380×18 HSF5 R 350×380×18 HSF5 V
	394	20	350×394×20 HSF1 R 350×394×20 HSF1 V	350×394×20 HSF5 R 350×394×20 HSF5 V
360	404	20	360×404×20 HSF1 R 360×404×20 HSF1 V	360×404×20 HSF5 R 360×404×20 HSF5 V
	410	20	360×410×20 HSF1 R 360×410×20 HSF1 V	360×410×20 HSF5 R 360×410×20 HSF5 V
362	400	20	362×400×20 HSF1 R 362×400×20 HSF1 V	362×400×20 HSF5 R 362×400×20 HSF5 V
	406	22	362×406×22 HSF1 R 362×406×22 HSF1 V	362×406×22 HSF5 R 362×406×22 HSF5 V
370	410	20	370×410×20 HSF1 R 370×410×20 HSF1 V	370×410×20 HSF5 R 370×410×20 HSF5 V
	414	20	370×414×20 HSF1 R 370×414×20 HSF1 V	370×414×20 HSF5 R 370×414×20 HSF5 V
380	420	20	380×420×20 HSF1 R 380×420×20 HSF1 V	380×420×20 HSF5 R 380×420×20 HSF5 V
	387	431	22,50	387×431×23 HSF1 R 387×431×23 HSF1 V
438		25,40	387×438×25 HSF1 R 387×438×25 HSF1 V	387×438×25 HSF5 R 387×438×25 HSF5 V
390	430	20	390×430×20 HSF1 R 390×430×20 HSF1 V	390×430×20 HSF5 R 390×430×20 HSF5 V
	395	439	20	395×439×20 HSF1 R 395×439×20 HSF1 V
439		20,50	395×439×21 HSF1 R 395×439×21 HSF1 V	395×439×21 HSF5 R 395×439×21 HSF5 V

Dimensions Shaft diameter d <sub>1</sub>	Bore diameter D	Bore depth B	Designations	Solid version (HSF5)
			Split version (HSF1) Lip material R, V	Lip material R, V
mm			–	
400	440	20	400×440×20 HSF1 R 400×440×20 HSF1 V	400×440×20 HSF5 R 400×440×20 HSF5 V
	450	22	400×450×22 HSF1 R 400×450×22 HSF1 V	400×450×22 HSF5 R 400×450×22 HSF5 V
420	460	20	420×460×20 HSF1 R 420×460×20 HSF1 V	420×460×20 HSF5 R 420×460×20 HSF5 V
	470	25	420×470×25 HSF1 R 420×470×25 HSF1 V	420×470×25 HSF5 R 420×470×25 HSF5 V
430	480	25	430×480×25 HSF1 R 430×480×25 HSF1 V	430×480×25 HSF5 R 430×480×25 HSF5 V
435	485	22	435×485×22 HSF1 R 435×485×22 HSF1 V	435×485×22 HSF5 R 435×485×22 HSF5 V
438	476	24	438×476×24 HSF1 R 438×476×24 HSF1 V	438×476×24 HSF5 R 438×476×24 HSF5 V
440	480	20	440×480×20 HSF1 R 440×480×20 HSF1 V	440×480×20 HSF5 R 440×480×20 HSF5 V
	490	20	440×490×20 HSF1 R 440×490×20 HSF1 V	440×490×20 HSF5 R 440×490×20 HSF5 V
446	486	16,50	446×486×17 HSF1 R 446×486×17 HSF1 V	446×486×17 HSF5 R 446×486×17 HSF5 V
450	490	18	450×490×18 HSF1 R 450×490×18 HSF1 V	450×490×18 HSF5 R 450×490×18 HSF5 V
	500	22	450×500×22 HSF1 R 450×500×22 HSF1 V	450×500×22 HSF5 R 450×500×22 HSF5 V
460	510	22	460×510×22 HSF1 R 460×510×22 HSF1 V	460×510×22 HSF5 R 460×510×22 HSF5 V
	510	25	460×510×25 HSF1 R 460×510×25 HSF1 V	460×510×25 HSF5 R 460×510×25 HSF5 V
470	520	25	470×520×25 HSF1 R 470×520×25 HSF1 V	470×520×25 HSF5 R 470×520×25 HSF5 V
480	520	18	480×520×18 HSF1 R 480×520×18 HSF1 V	480×520×18 HSF5 R 480×520×18 HSF5 V
	530	22	480×530×22 HSF1 R 480×530×22 HSF1 V	480×530×22 HSF5 R 480×530×22 HSF5 V
	550	25	480×550×25 HSF1 R 480×550×25 HSF1 V	480×550×25 HSF5 R 480×550×25 HSF5 V
495	545	22	495×545×22 HSF1 R 495×545×22 HSF1 V	495×545×22 HSF5 R 495×545×22 HSF5 V
500	540	10	500×540×10 HSF1 R 500×540×10 HSF1 V	500×540×10 HSF5 R 500×540×10 HSF5 V
	550	20	500×550×20 HSF1 R 500×550×20 HSF1 V	500×550×20 HSF5 R 500×550×20 HSF5 V
520	560	18	520×560×18 HSF1 R 520×560×18 HSF1 V	520×560×18 HSF5 R 520×560×18 HSF5 V
	560	20	520×560×20 HSF1 R 520×560×20 HSF1 V	520×560×20 HSF5 R 520×560×20 HSF5 V
525	575	22	525×575×22 HSF1 R 525×575×22 HSF1 V	525×575×22 HSF5 R 525×575×22 HSF5 V
530	580	22	530×580×22 HSF1 R 530×580×22 HSF1 V	530×580×22 HSF5 R 530×580×22 HSF5 V
	580	25	530×580×25 HSF1 R 530×580×25 HSF1 V	530×580×25 HSF5 R 530×580×25 HSF5 V

## Radial shaft seals – HSF1 (split) and HSF5 (solid) – metric dimensions

### d<sub>1</sub> 535 – 840 mm



The table includes only a selection of available sizes. Contact your SKF sales representative for more information.

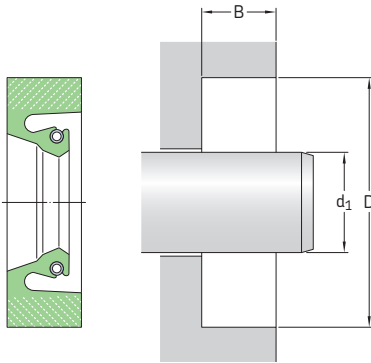
Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Designations		
Shaft diameter d <sub>1</sub>	Bore diameter D	Bore depth B	Split version (HSF1) Lip material R, V	Solid version (HSF5) Lip material R, V
mm				
535	585	22	535×585×22 HSF1 R	535×585×22 HSF5 R
			535×585×22 HSF1 V	535×585×22 HSF5 V
540	590	22	540×590×22 HSF1 R	540×590×22 HSF5 R
			540×590×22 HSF1 V	540×590×22 HSF5 V
	590	30	540×590×30 HSF1 R	540×590×30 HSF5 R
540×590×30 HSF1 V			540×590×30 HSF5 V	
550	600	22,30	550×600×22 HSF1 R	550×600×22 HSF5 R
			550×600×22 HSF1 V	550×600×22 HSF5 V
560	604	20	560×604×20 HSF1 R	560×604×20 HSF5 R
			560×604×20 HSF1 V	560×604×20 HSF5 V
	610	22,30	560×610×22 HSF1 R	560×610×22 HSF5 R
560×610×22 HSF1 V			560×610×22 HSF5 V	
570	616	19	570×616×19 HSF1 R	570×616×19 HSF5 R
			570×616×19 HSF1 V	570×616×19 HSF5 V
	620	25	570×620×25 HSF1 R	570×620×25 HSF5 R
570×620×25 HSF1 V			570×620×25 HSF5 V	
575	625	22	575×625×22 HSF1 R	575×625×22 HSF5 R
			575×625×22 HSF1 V	575×625×22 HSF5 V
580	630	22	580×630×22 HSF1 R	580×630×22 HSF5 R
			580×630×22 HSF1 V	580×630×22 HSF5 V
600	650	22	600×650×22 HSF1 R	600×650×22 HSF5 R
			600×650×22 HSF1 V	600×650×22 HSF5 V
620	670	22	620×670×22 HSF1 R	620×670×22 HSF5 R
			620×670×22 HSF1 V	620×670×22 HSF5 V
	684	25	620×684×25 HSF1 R	620×684×25 HSF5 R
			620×684×25 HSF1 V	620×684×25 HSF5 V
625	689	25	625×689×25 HSF1 R	625×689×25 HSF5 R
			625×689×25 HSF1 V	625×689×25 HSF5 V
630	690	30	630×690×30 HSF1 R	630×690×30 HSF5 R
			630×690×30 HSF1 V	630×690×30 HSF5 V

Dimensions Shaft diameter $d_1$	Bore diameter D	Bore depth B	Designations	
			Split version (HSF1) Lip material R, V	Solid version (HSF5) Lip material R, V
mm			–	
635	705	30	635×705×30 HSF1 R 635×705×30 HSF1 V	635×705×30 HSF5 R 635×705×30 HSF5 V
650	690	18	650×690×18 HSF1 R 650×690×18 HSF1 V	650×690×18 HSF5 R 650×690×18 HSF5 V
660	724	25	660×724×25 HSF1 R 660×724×25 HSF1 V	660×724×25 HSF5 R 660×724×25 HSF5 V
670	734	25	670×734×25 HSF1 R 670×734×25 HSF1 V	670×734×25 HSF5 R 670×734×25 HSF5 V
685	749	25	685×749×25 HSF1 R 685×749×25 HSF1 V	685×749×25 HSF5 R 685×749×25 HSF5 V
700	760	30	700×760×30 HSF1 R 700×760×30 HSF1 V	700×760×30 HSF5 R 700×760×30 HSF5 V
710	770	30	710×770×30 HSF1 R 710×770×30 HSF1 V	710×770×30 HSF5 R 710×770×30 HSF5 V
	774	25	710×774×25 HSF1 R 710×774×25 HSF1 V	710×774×25 HSF5 R 710×774×25 HSF5 V
730	794	25	730×794×25 HSF1 R 730×794×25 HSF1 V	730×794×25 HSF5 R 730×794×25 HSF5 V
736	800	25	736×800×25 HSF1 R 736×800×25 HSF1 V	736×800×25 HSF5 R 736×800×25 HSF5 V
740	785	18	740×785×18 HSF1 R 740×785×18 HSF1 V	740×785×18 HSF5 R 740×785×18 HSF5 V
744	808	25	744×808×25 HSF1 R 744×808×25 HSF1 V	744×808×25 HSF5 R 744×808×25 HSF5 V
	810	30	750×810×30 HSF1 R 750×810×30 HSF1 V	750×810×30 HSF5 R 750×810×30 HSF5 V
750	814	25	750×814×25 HSF1 R 750×814×25 HSF1 V	750×814×25 HSF5 R 750×814×25 HSF5 V
	820	30	760×820×30 HSF1 R 760×820×30 HSF1 V	760×820×30 HSF5 R 760×820×30 HSF5 V
770	834	25	770×834×25 HSF1 R 770×834×25 HSF1 V	770×834×25 HSF5 R 770×834×25 HSF5 V
780	844	25	780×844×25 HSF1 R 780×844×25 HSF1 V	780×844×25 HSF5 R 780×844×25 HSF5 V
790	850	30	790×850×30 HSF1 R 790×850×30 HSF1 V	790×850×30 HSF5 R 790×850×30 HSF5 V
800	860	30	800×860×30 HSF1 R 800×860×30 HSF1 V	800×860×30 HSF5 R 800×860×30 HSF5 V
	865	25	800×865×25 HSF1 R 800×865×25 HSF1 V	800×865×25 HSF5 R 800×865×25 HSF5 V
810	860	25	810×860×25 HSF1 R 810×860×25 HSF1 V	810×860×25 HSF5 R 810×860×25 HSF5 V
	874	22	810×874×22 HSF1 R 810×874×22 HSF1 V	810×874×22 HSF5 R 810×874×22 HSF5 V
840	904	25	840×904×25 HSF1 R 840×904×25 HSF1 V	840×904×25 HSF5 R 840×904×25 HSF5 V

## Radial shaft seals – HSF1 (split) and HSF5 (solid) – metric dimensions

d<sub>1</sub> 850 – 1 110 mm



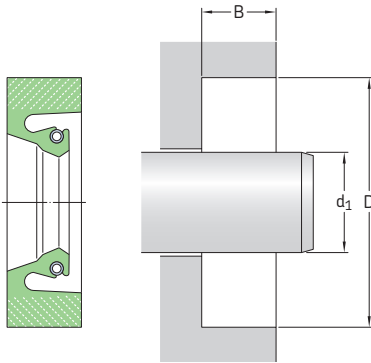
The table includes only a selection of available sizes. Contact your SKF sales representative for more information.

Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Designations		
Shaft diameter d <sub>1</sub>	Bore diameter D	Bore depth B	Split version (HSF1) Lip material R, V	Solid version (HSF5) Lip material R, V
mm				
850	900	22	850×900×22 HSF1 R 850×900×22 HSF1 V	850×900×22 HSF5 R 850×900×22 HSF5 V
	904	25	850×904×25 HSF1 R 850×904×25 HSF1 V	850×904×25 HSF5 R 850×904×25 HSF5 V
	910	30	850×910×30 HSF1 R 850×910×30 HSF1 V	850×910×30 HSF5 R 850×910×30 HSF5 V
900	960	30	900×960×30 HSF1 R 900×960×30 HSF1 V	900×960×30 HSF5 R 900×960×30 HSF5 V
	964	32	900×964×32 HSF1 R 900×964×32 HSF1 V	900×964×32 HSF5 R 900×964×32 HSF5 V
910	974	25	910×974×25 HSF1 R 910×974×25 HSF1 V	910×974×25 HSF5 R 910×974×25 HSF5 V
	974	25,40	910×974×25 HSF1 R 910×974×25 HSF1 V	910×974×25 HSF5 R 910×974×25 HSF5 V
920	984	25	920×984×25 HSF1 R 920×984×25 HSF1 V	920×984×25 HSF5 R 920×984×25 HSF5 V
	1 000	25	950×1000×25 HSF1 R 950×1000×25 HSF1 V	950×1000×25 HSF5 R 950×1000×25 HSF5 V
950	1 010	30	950×1010×30 HSF1 R 950×1010×30 HSF1 V	950×1010×30 HSF5 R 950×1010×30 HSF5 V
	1 024	25	960×1024×25 HSF1 R 960×1024×25 HSF1 V	960×1024×25 HSF5 R 960×1024×25 HSF5 V
970	1 020	25	970×1020×25 HSF1 R 970×1020×25 HSF1 V	970×1020×25 HSF5 R 970×1020×25 HSF5 V
	1 034	25	970×1034×25 HSF1 R 970×1034×25 HSF1 V	970×1034×25 HSF5 R 970×1034×25 HSF5 V
1 000	1 064	25	1000×1064×25 HSF1 R 1000×1064×25 HSF1 V	1000×1064×25 HSF5 R 1000×1064×25 HSF5 V
	1 043,10	13,70	1016×1043×14 HSF1 R 1016×1043×14 HSF1 V	1016×1043×14 HSF5 R 1016×1043×14 HSF5 V
1 110	1 174	25	1110×1174×25 HSF1 R 1110×1174×25 HSF1 V	1110×1174×25 HSF5 R 1110×1174×25 HSF5 V

# Radial shaft seals – HSF1 (split) and HSF5 (solid) – inch dimensions

d<sub>1</sub> 1.000 – 5.874 in.



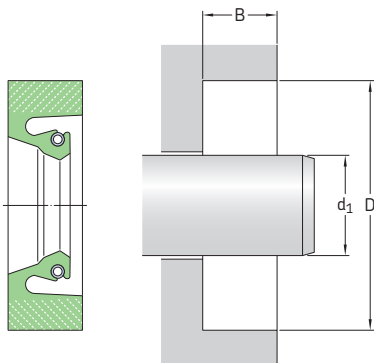
The table includes only a selection of available sizes. Contact your SKF sales representative for more information.

Please see pages 74 to 76 for housing bore requirements.

Dimensions		Designations				
Shaft diameter d <sub>1</sub>	Bore diameter D	Bore depth B	Split version (HSF1) Lip material R	V	Solid version (HSF5) Lip material R	V
in./mm			–			
<b>1.000</b> 25,40	1.874 47,60	0.375 9,53	<b>HSF1 5001 R</b>	<b>HSF1 5001 V</b>	<b>HSF5 5001 R</b>	<b>HSF5 5001 V</b>
<b>2.750</b> 69,85	3.375 85,73	0.313 7,95	<b>HSF1 5156 R</b>	<b>HSF1 5156 V</b>	<b>HSF5 5156 R</b>	<b>HSF5 5156 V</b>
<b>3.248</b> 82,50	4.500 114,30	0.500 12,70	<b>HSF1 5225 R</b>	<b>HSF1 5225 V</b>	<b>HSF5 5225 R</b>	<b>HSF5 5225 V</b>
<b>3.500</b> 88,90	4.500 114,30	0.500 12,70	<b>HSF1 5252 R</b>	<b>HSF1 5252 V</b>	<b>HSF5 5252 R</b>	<b>HSF5 5252 V</b>
<b>3.874</b> 98,40	4.878 123,90	0.500 12,70	<b>HSF1 5265 R</b>	<b>HSF1 5265 V</b>	<b>HSF5 5265 R</b>	<b>HSF5 5265 V</b>
<b>4.000</b> 101,60	5.000 127,00	0.500 12,70	<b>HSF1 5310 R</b>	<b>HSF1 5310 V</b>	<b>HSF5 5310 R</b>	<b>HSF5 5310 V</b>
<b>4.425</b> 112,40	5.500 139,70	0.562 14,27	<b>HSF1 5353 R</b>	<b>HSF1 5353 V</b>	<b>HSF5 5353 R</b>	<b>HSF5 5353 V</b>
<b>4.437</b> 112,70	5.465 138,81	0.583 14,81	<b>HSF1 5351 R</b>	<b>HSF1 5351 V</b>	<b>HSF5 5351 R</b>	<b>HSF5 5351 V</b>
<b>4.874</b> 123,80	5.874 149,20	0.500 12,70	<b>HSF1 5391 R</b>	<b>HSF1 5391 V</b>	<b>HSF5 5391 R</b>	<b>HSF5 5391 V</b>
<b>5.205</b> 132,21	6.504 165,20	0.591 15,01	<b>HSF1 5431 R</b>	<b>HSF1 5431 V</b>	<b>HSF5 5431 R</b>	<b>HSF5 5431 V</b>
<b>5.622</b> 142,80	6.622 168,20	0.625 15,88	<b>HSF1 5471 R</b>	<b>HSF1 5471 V</b>	<b>HSF5 5471 R</b>	<b>HSF5 5471 V</b>
<b>5.750</b> 146,05	7.000 177,80	0.625 15,88	<b>HSF1 5489 R</b>	<b>HSF1 5489 V</b>	<b>HSF5 5489 R</b>	<b>HSF5 5489 V</b>
<b>5.874</b> 149,20	7.000 177,80	0.492 12,50	<b>HSF1 5498 R</b>	<b>HSF1 5498 V</b>	<b>HSF5 5498 R</b>	<b>HSF5 5498 V</b>

## Radial shaft seals – HSF1 (split) and HSF5 (solid) – inch dimensions

$d_1$  6.000 – 17.000 in.



The table includes only a selection of available sizes. Contact your SKF sales representative for more information.

Please see **pages 74 to 76** for housing bore requirements.

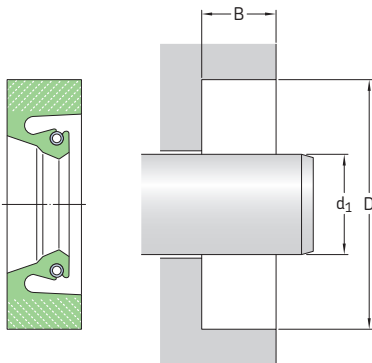
Dimensions		Designations				
Shaft diameter $d_1$	Bore diameter D	Bore depth B	Split version (HSF1) Lip material R	V	Solid version (HSF5) Lip material R	V
in./mm			–			
<b>6.000</b> 152,40	7.126 181,00	0.630 16,00	<b>HSF1 5509 R</b>	<b>HSF1 5509 V</b>	<b>HSF5 5509 R</b>	<b>HSF5 5509 V</b>
	7.500 190,50	0.625 15,88	<b>HSF1 5510 R</b>	<b>HSF1 5510 V</b>	<b>HSF5 5510 R</b>	<b>HSF5 5510 V</b>
<b>6.500</b> 165,10	8.000 203,20	0.750 19,05	<b>HSF1 5570 R</b>	<b>HSF1 5570 V</b>	<b>HSF5 5570 R</b>	<b>HSF5 5570 V</b>
<b>6.748</b> 171,40	7.750 196,85	0.750 19,05	<b>HSF1 5585 R</b>	<b>HSF1 5585 V</b>	<b>HSF5 5585 R</b>	<b>HSF5 5585 V</b>
<b>7.000</b> 177,80	8.000 203,20	0.437 11,10	<b>HSF1 5587 R</b>	<b>HSF1 5587 V</b>	<b>HSF5 5587 R</b>	<b>HSF5 5587 V</b>
	8.250 209,55	0.750 19,05	<b>HSF1 5600 R</b>	<b>HSF1 5600 V</b>	<b>HSF5 5600 R</b>	<b>HSF5 5600 V</b>
<b>7.250</b> 184,15	8.500 215,90	0.625 15,88	<b>HSF1 5624 R</b>	<b>HSF1 5624 V</b>	<b>HSF5 5624 R</b>	<b>HSF5 5624 V</b>
<b>7.500</b> 190,50	8.500 215,90	0.625 15,88	<b>HSF1 5662 R</b>	<b>HSF1 5662 V</b>	<b>HSF5 5662 R</b>	<b>HSF5 5662 V</b>
<b>7.677</b> 195,00	8.677 220,40	0.500 12,70	<b>HSF1 5667 R</b>	<b>HSF1 5667 V</b>	<b>HSF5 5667 R</b>	<b>HSF5 5667 V</b>
<b>8.598</b> 218,39	9.843 250,01	0.591 15,01	<b>HSF1 5764 R</b>	<b>HSF1 5764 V</b>	<b>HSF5 5764 R</b>	<b>HSF5 5764 V</b>
<b>8.750</b> 222,25	10.000 254,00	0.625 15,88	<b>HSF1 5790 R</b>	<b>HSF1 5790 V</b>	<b>HSF5 5790 R</b>	<b>HSF5 5790 V</b>
<b>9.625</b> 244,48	11.635 295,53	1.000 25,40	<b>HSF1 5878 R</b>	<b>HSF1 5878 V</b>	<b>HSF5 5878 R</b>	<b>HSF5 5878 V</b>
<b>9.843</b> 250,01	10.843 275,41	0.500 12,70	<b>HSF1 5885 R</b>	<b>HSF1 5885 V</b>	<b>HSF5 5885 R</b>	<b>HSF5 5885 V</b>
<b>10.000</b> 254,00	11.250 285,75	0.625 15,88	<b>HSF1 5910 R</b>	<b>HSF1 5910 V</b>	<b>HSF5 5910 R</b>	<b>HSF5 5910 V</b>
<b>10.250</b> 260,35	12.250 311,15	0.750 19,05	<b>HSF1 5950 R</b>	<b>HSF1 5950 V</b>	<b>HSF5 5950 R</b>	<b>HSF5 5950 V</b>



Dimensions Shaft diameter d <sub>1</sub>	Bore diameter D	Bore depth B	Designations		Solid version (HSF5)	
			Split version (HSF1) Lip material R	V	Lip material R	V
in./mm			-			
<b>11.000</b> 279,40	12.181 309,40	0.591 15,01	<b>HSF1 6000 R</b>	<b>HSF1 6000 V</b>	<b>HSF5 6000 R</b>	<b>HSF5 6000 V</b>
<b>11.250</b> 285,75	12.500 317,50	0.625 15,88	<b>HSF1 6040 R</b>	<b>HSF1 6040 V</b>	<b>HSF5 6040 R</b>	<b>HSF5 6040 V</b>
<b>11.260</b> 286,00	13.250 336,55	0.591 15,01	<b>HSF1 6049 R</b>	<b>HSF1 6049 V</b>	<b>HSF5 6049 R</b>	<b>HSF5 6049 V</b>
<b>11.417</b> 289,99	12.417 315,39	0.500 12,70	<b>HSF1 6055 R</b>	<b>HSF1 6055 V</b>	<b>HSF5 6055 R</b>	<b>HSF5 6055 V</b>
<b>12.250</b> 311,15	14.250 361,95	0.813 20,65	<b>HSF1 6150 R</b>	<b>HSF1 6150 V</b>	<b>HSF5 6150 R</b>	<b>HSF5 6150 V</b>
<b>12.484</b> 317,09	14.000 355,60	0.630 16,00	<b>HSF1 6172 R</b>	<b>HSF1 6172 V</b>	<b>HSF5 6172 R</b>	<b>HSF5 6172 V</b>
<b>12.500</b> 317,50	14.000 355,60	0.750 19,05	<b>HSF1 6173 R</b>	<b>HSF1 6173 V</b>	<b>HSF5 6173 R</b>	<b>HSF5 6173 V</b>
<b>12.504</b> 317,60	14.000 355,60	0.687 17,45	<b>HSF1 6175 R</b>	<b>HSF1 6175 V</b>	<b>HSF5 6175 R</b>	<b>HSF5 6175 V</b>
<b>12.746</b> 323,75	14.248 361,90	0.687 17,45	<b>HSF1 6192 R</b>	<b>HSF1 6192 V</b>	<b>HSF5 6192 R</b>	<b>HSF5 6192 V</b>
	14.750 374,65	1.000 25,40	<b>HSF1 6195 R</b>	<b>HSF1 6195 V</b>	<b>HSF5 6195 R</b>	<b>HSF5 6195 V</b>
<b>13.000</b> 330,20	14.500 368,30	0.687 17,45	<b>HSF1 6230 R</b>	<b>HSF1 6230 V</b>	<b>HSF5 6230 R</b>	<b>HSF5 6230 V</b>
	14.500 368,30	0.687 17,45	<b>HSF1 6230 R</b>	<b>HSF1 6230 V</b>	<b>HSF5 6230 R</b>	<b>HSF5 6230 V</b>
<b>13.500</b> 342,90	15.000 381,00	0.750 19,05	<b>HSF1 6271 R</b>	<b>HSF1 6271 V</b>	<b>HSF5 6271 R</b>	<b>HSF5 6271 V</b>
<b>14.370</b> 365,00	16.118 409,40	0.750 19,05	<b>HSF1 6350 R</b>	<b>HSF1 6350 V</b>	<b>HSF5 6350 R</b>	<b>HSF5 6350 V</b>
<b>14.500</b> 368,30	16.250 412,75	0.625 15,88	<b>HSF1 6370 R</b>	<b>HSF1 6370 V</b>	<b>HSF5 6370 R</b>	<b>HSF5 6370 V</b>
<b>14.961</b> 380,01	16.961 430,81	0.813 20,65	<b>HSF1 6425 R</b>	<b>HSF1 6425 V</b>	<b>HSF5 6425 R</b>	<b>HSF5 6425 V</b>
<b>15.250</b> 387,35	17.250 438,15	0.875 22,23	<b>HSF1 6460 R</b>	<b>HSF1 6460 V</b>	<b>HSF5 6460 R</b>	<b>HSF5 6460 V</b>
<b>15.992</b> 406,20	17.500 444,50	0.687 17,45	<b>HSF1 6550 R</b>	<b>HSF1 6550 V</b>	<b>HSF5 6550 R</b>	<b>HSF5 6550 V</b>
<b>16.000</b> 406,40	18.000 457,20	0.750 19,05	<b>HSF1 6560 R</b>	<b>HSF1 6560 V</b>	<b>HSF5 6560 R</b>	<b>HSF5 6560 V</b>
	18.000 457,20	0.813 20,65	<b>HSF1 6565 R</b>	<b>HSF1 6565 V</b>	<b>HSF5 6565 R</b>	<b>HSF5 6565 V</b>
	18.000 457,20	0.906 23,01	<b>HSF1 6575 R</b>	<b>HSF1 6575 V</b>	<b>HSF5 6575 R</b>	<b>HSF5 6575 V</b>
<b>16.226</b> 412,14	17.750 450,85	0.687 17,45	<b>HSF1 6590 R</b>	<b>HSF1 6590 V</b>	<b>HSF5 6590 R</b>	<b>HSF5 6590 V</b>
<b>16.500</b> 419,10	17.750 450,85	0.750 19,05	<b>HSF1 6600 R</b>	<b>HSF1 6600 V</b>	<b>HSF5 6600 R</b>	<b>HSF5 6600 V</b>
<b>17.000</b> 431,80	19.000 482,60	0.813 20,65	<b>HSF1 6645 R</b>	<b>HSF1 6645 V</b>	<b>HSF5 6645 R</b>	<b>HSF5 6645 V</b>

## Radial shaft seals – HSF1 (split) and HSF5 (solid) – inch dimensions

d<sub>1</sub> 17.248 – 48.000 in.



The table includes only a selection of available sizes. Contact your SKF sales representative for more information.

Please see **pages 74 to 76** for housing bore requirements.

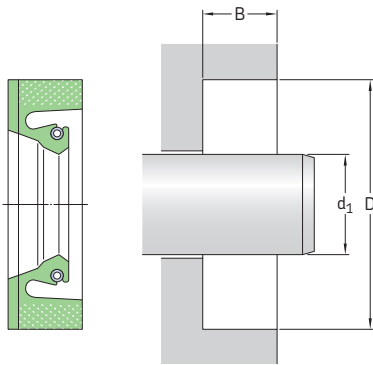
Dimensions		Designations				
Shaft diameter d <sub>1</sub>	Bore diameter D	Bore depth B	Split version (HSF1) Lip material R	V	Solid version (HSF5) Lip material R	V
in./mm			–			
<b>17.248</b> 438,10	18.748 476,20	0.750 19,05	<b>HSF1 6656 R</b>	<b>HSF1 6656 V</b>	<b>HSF5 6656 R</b>	<b>HSF5 6656 V</b>
<b>18.169</b> 461,49	21.260 540,00	1.220 30,99	<b>HSF1 6734 R</b>	<b>HSF1 6734 V</b>	<b>HSF5 6734 R</b>	<b>HSF5 6734 V</b>
<b>20.500</b> 520,70	22.500 571,50	1.000 25,40	<b>HSF1 6890 R</b>	<b>HSF1 6890 V</b>	<b>HSF5 6890 R</b>	<b>HSF5 6890 V</b>
<b>21.000</b> 533,40	23.000 584,20	0.875 22,23	<b>HSF1 6930 R</b>	<b>HSF1 6930 V</b>	<b>HSF5 6930 R</b>	<b>HSF5 6930 V</b>
<b>22.000</b> 558,80	24.000 609,60	0.875 22,23	<b>HSF1 7000 R</b>	<b>HSF1 7000 V</b>	<b>HSF5 7000 R</b>	<b>HSF5 7000 V</b>
<b>23.248</b> 590,50	25.250 641,35	0.813 20,65	<b>HSF1 7100 R</b>	<b>HSF1 7100 V</b>	<b>HSF5 7100 R</b>	<b>HSF5 7100 V</b>
<b>23.501</b> 596,93	22.001 558,83	0.750 19,05	<b>HSF1 6990 R</b>	<b>HSF1 6990 V</b>	<b>HSF5 6990 R</b>	<b>HSF5 6990 V</b>
<b>30.000</b> 762,00	32.500 825,50	1.000 25,40	<b>HSF1 7520 R</b>	<b>HSF1 7520 V</b>	<b>HSF5 7520 R</b>	<b>HSF5 7520 V</b>
<b>30.461</b> 773,71	32.500 825,50	0.906 23,01	<b>HSF1 7525 R</b>	<b>HSF1 7525 V</b>	<b>HSF5 7525 R</b>	<b>HSF5 7525 V</b>
<b>31.000</b> 787,40	33.000 838,20	0.906 23,01	<b>HSF1 7570 R</b>	<b>HSF1 7570 V</b>	<b>HSF5 7570 R</b>	<b>HSF5 7570 V</b>
<b>31.250</b> 793,75	33.250 844,55	0.750 19,05	<b>HSF1 7580 R</b>	<b>HSF1 7580 V</b>	<b>HSF5 7580 R</b>	<b>HSF5 7580 V</b>
<b>32.500</b> 825,50	34.500 876,30	0.875 22,23	<b>HSF1 7700 R</b>	<b>HSF1 7700 V</b>	<b>HSF5 7700 R</b>	<b>HSF5 7700 V</b>
	34.500 876,30	1.000 25,40	<b>HSF1 7710 R</b>	<b>HSF1 7710 V</b>	<b>HSF5 7710 R</b>	<b>HSF5 7710 V</b>
<b>33.000</b> 838,20	35.000 889,00	0.906 23,01	<b>HSF1 7730 R</b>	<b>HSF1 7730 V</b>	<b>HSF5 7730 R</b>	<b>HSF5 7730 V</b>

Dimensions Shaft diameter d <sub>1</sub>	Bore diameter D	Bore depth B	Designations		Solid version (HSF5)	
			Split version (HSF1) Lip material R	V	Lip material R	V
in./mm			-			
<b>34.375</b> 873,13	36.875 936,63	1.250 31,75	<b>HSF1 7810 R</b>	<b>HSF1 7810 V</b>	<b>HSF5 7810 R</b>	<b>HSF5 7810 V</b>
<b>36.500</b> 927,10	39.000 990,60	1.250 31,75	<b>HSF1 7895 R</b>	<b>HSF1 7895 V</b>	<b>HSF5 7895 R</b>	<b>HSF5 7895 V</b>
<b>36.748</b> 933,40	38.749 984,22	0.875 22,23	<b>HSF1 7900 R</b>	<b>HSF1 7900 V</b>	<b>HSF5 7900 R</b>	<b>HSF5 7900 V</b>
<b>38.000</b> 965,20	40.000 1016,00	0.875 22,23	<b>HSF1 7990 R</b>	<b>HSF1 7990 V</b>	<b>HSF5 7990 R</b>	<b>HSF5 7990 V</b>
<b>39.118</b> 993,60	40.000 1016,00	0.500 12,70	<b>HSF1 8170 R</b>	<b>HSF1 8170 V</b>	<b>HSF5 8170 R</b>	<b>HSF5 8170 V</b>
<b>48.000</b> 1219,20	49.000 1244,60	1.260 32,00	<b>HSF1 8400 R</b>	<b>HSF1 8400 V</b>	<b>HSF5 8400 R</b>	<b>HSF5 8400 V</b>

2.19

## Radial shaft seals – HSF2 (split) and HSF6 (solid) – metric dimensions

$d_1$  127 – 800 mm

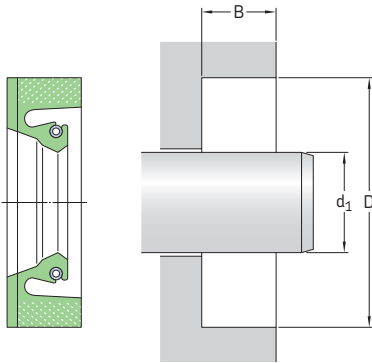


The table includes only a selection of available sizes. Contact your SKF sales representative for more information.

Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Designations		
Shaft diameter $d_1$	Bore diameter D	Bore depth B	Split version (HSF2) Lip material R, V	Solid version (HSF6) Lip material R, V
mm				
127	158,80	12,30	127×159×12 HSF2 R 127×159×12 HSF2 V	127×159×12 HSF6 R 127×159×12 HSF6 V
275	319,50	19	275×320×19 HSF2 R 275×320×19 HSF2 V	275×320×19 HSF6 R 275×320×19 HSF6 V
320	364	18	320×364×18 HSF2 R 320×364×18 HSF2 V	320×364×18 HSF6 R 320×364×18 HSF6 V
800	864	21,60	800×864×22 HSF2 R 800×864×22 HSF2 V	800×864×22 HSF6 R 800×864×22 HSF6 V

**Radial shaft seals – HSF2 (split) and HSF6 (solid) – inch dimensions**  
 $d_1$  21.000 in.



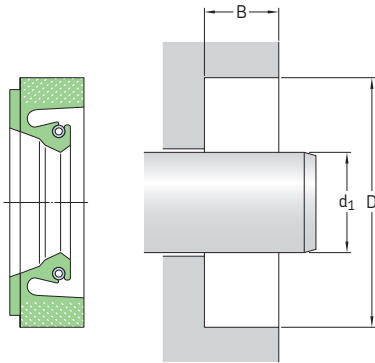
The table includes only a selection of available sizes. Contact your SKF sales representative for more information.

Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Designations				
Shaft diameter $d_1$	Bore diameter D	Bore depth B	Split version (HSF2) Lip material R	V	Solid version (HSF6) Lip material R	V
in./mm			–			
21.000 533,40	23.000 584,20	0.875 22,23	HSF2 6930 R	HSF2 6930 V	HSF6 6930 R	HSF6 6930 V

## Radial shaft seals – HSF3 (split) and HSF7 (solid) – metric dimensions

$d_1$  80 – 380 mm



The table includes only a selection of available sizes. Contact your SKF sales representative for more information.

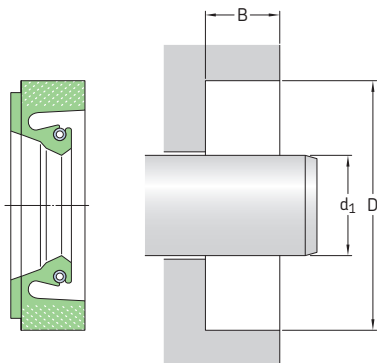
Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Designations		
Shaft diameter $d_1$	Bore diameter D	Bore depth B	Split version (HSF3) Lip material R, V	Solid version (HSF7) Lip material R, V
mm				
80	95	10	80×95×10 HSF3 R 80×95×10 HSF3 V	80×95×10 HSF7 R 80×95×10 HSF7 V
100	130	12,50	100×130×13 HSF3 R 100×130×13 HSF3 V	100×130×13 HSF7 R 100×130×13 HSF7 V
140	180	16	140×180×16 HSF3 R 140×180×16 HSF3 V	140×180×16 HSF7 R 140×180×16 HSF7 V
150	190	16	150×190×16 HSF3 R 150×190×16 HSF3 V	150×190×16 HSF7 R 150×190×16 HSF7 V
160	200	16	160×200×16 HSF3 R 160×200×16 HSF3 V	160×200×16 HSF7 R 160×200×16 HSF7 V
165	195	15	165×195×15 HSF3 R 165×195×15 HSF3 V	165×195×15 HSF7 R 165×195×15 HSF7 V
220	250	15	220×250×15 HSF3 R 220×250×15 HSF3 V	220×250×15 HSF7 R 220×250×15 HSF7 V
	260	18	220×260×18 HSF3 R 220×260×18 HSF3 V	220×260×18 HSF7 R 220×260×18 HSF7 V
230	270	16	230×270×16 HSF3 R 230×270×16 HSF3 V	230×270×16 HSF7 R 230×270×16 HSF7 V
235	265	15,30	235×265×15 HSF3 R 235×265×15 HSF3 V	235×265×15 HSF7 R 235×265×15 HSF7 V
240	280	18	240×280×18 HSF3 R 240×280×18 HSF3 V	240×280×18 HSF7 R 240×280×18 HSF7 V
	290	25	240×290×25 HSF3 R 240×290×25 HSF3 V	240×290×25 HSF7 R 240×290×25 HSF7 V
245	285	16	245×285×16 HSF3 R 245×285×16 HSF3 V	245×285×16 HSF7 R 245×285×16 HSF7 V
250	280	16	250×280×16 HSF3 R 250×280×16 HSF3 V	250×280×16 HSF7 R 250×280×16 HSF7 V
	290	16,50	250×290×17 HSF3 R 250×290×17 HSF3 V	250×290×17 HSF7 R 250×290×17 HSF7 V

Dimensions Shaft diameter $d_1$	Bore diameter D	Bore depth B	Designations	
			Split version (HSF3) Lip material R, V	Solid version (HSF7) Lip material R, V
mm			–	
270	310	18	270×310×18 HSF3 R 270×310×18 HSF3 V	270×310×18 HSF7 R 270×310×18 HSF7 V
280	320	18	280×320×18 HSF3 R 280×320×18 HSF3 V	280×320×18 HSF7 R 280×320×18 HSF7 V
285	325	18	285×325×18 HSF3 R 285×325×18 HSF3 V	285×325×18 HSF7 R 285×325×18 HSF7 V
290	334	20,30	290×334×20 HSF3 R 290×334×20 HSF3 V	290×334×20 HSF7 R 290×334×20 HSF7 V
300	340	16,50	300×340×17 HSF3 R 300×340×17 HSF3 V	300×340×17 HSF7 R 300×340×17 HSF7 V
	340	18	300×340×18 HSF3 R 300×340×18 HSF3 V	300×340×18 HSF7 R 300×340×18 HSF7 V
	344	20	300×344×20 HSF3 R 300×344×20 HSF3 V	300×344×20 HSF7 R 300×344×20 HSF7 V
310	353	20	310×353×20 HSF3 R 310×353×20 HSF3 V	310×353×20 HSF7 R 310×353×20 HSF7 V
	354	20	310×354×20 HSF3 R 310×354×20 HSF3 V	310×354×20 HSF7 R 310×354×20 HSF7 V
315	360	20	315×360×20 HSF3 R 315×360×20 HSF3 V	315×360×20 HSF7 R 315×360×20 HSF7 V
320	350	15	320×350×15 HSF3 R 320×350×15 HSF3 V	320×350×15 HSF7 R 320×350×15 HSF7 V
	360	17,70	320×360×18 HSF3 R 320×360×18 HSF3 V	320×360×18 HSF7 R 320×360×18 HSF7 V
325	365	16	325×365×16 HSF3 R 325×365×16 HSF3 V	325×365×16 HSF7 R 325×365×16 HSF7 V
330	370	20	330×370×20 HSF3 R 330×370×20 HSF3 V	330×370×20 HSF7 R 330×370×20 HSF7 V
	374	20	330×374×20 HSF3 R 330×374×20 HSF3 V	330×374×20 HSF7 R 330×374×20 HSF7 V
340	372	16	340×372×16 HSF3 R 340×372×16 HSF3 V	340×372×16 HSF7 R 340×372×16 HSF7 V
345	389	20	345×389×20 HSF3 R 345×389×20 HSF3 V	345×389×20 HSF7 R 345×389×20 HSF7 V
350	390	18	350×390×18 HSF3 R 350×390×18 HSF3 V	350×390×18 HSF7 R 350×390×18 HSF7 V
	394	20	350×394×20 HSF3 R 350×394×20 HSF3 V	350×394×20 HSF7 R 350×394×20 HSF7 V
	394	22	350×394×22 HSF3 R 350×394×22 HSF3 V	350×394×22 HSF7 R 350×394×22 HSF7 V
360	404	20	360×404×20 HSF3 R 360×404×20 HSF3 V	360×404×20 HSF7 R 360×404×20 HSF7 V
365	409,40	19,05	365×409×19 HSF3 R 365×409×19 HSF3 V	365×409×19 HSF7 R 365×409×19 HSF7 V
366	410	20	366×410×20 HSF3 R 366×410×20 HSF3 V	366×410×20 HSF7 R 366×410×20 HSF7 V
370	410	18	370×410×18 HSF3 R 370×410×18 HSF3 V	370×410×18 HSF7 R 370×410×18 HSF7 V
380	419	24	380×419×24 HSF3 R 380×419×24 HSF3 V	380×419×24 HSF7 R 380×419×24 HSF7 V
	424	20	380×424×20 HSF3 R 380×424×20 HSF3 V	380×424×20 HSF7 R 380×424×20 HSF7 V

## Radial shaft seals – HSF3 (split) and HSF7 (solid) – metric dimensions

$d_1$  385 – 750 mm



The table includes only a selection of available sizes. Contact your SKF sales representative for more information.

Please see **pages 74 to 76** for housing bore requirements.

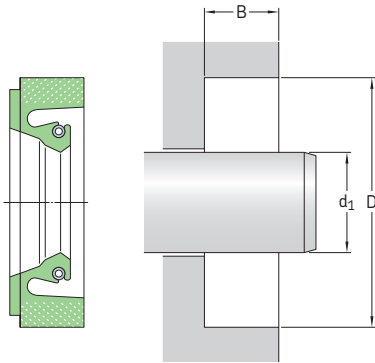
Dimensions		Bore depth B	Designations	
Shaft diameter $d_1$	Bore diameter D		Split version (HSF3) Lip material R, V	Solid version (HSF7) Lip material R, V
mm				
385	425	18,30	385×425×18 HSF3 R	385×425×18 HSF7 R
			385×425×18 HSF3 V	385×425×18 HSF7 V
387	431	22,50	387×431×23 HSF3 R	387×431×23 HSF7 R
			387×431×23 HSF3 V	387×431×23 HSF7 V
390	430	18	390×430×18 HSF3 R	390×430×18 HSF7 R
			390×430×18 HSF3 V	390×430×18 HSF7 V
400	440	18	400×440×18 HSF3 R	400×440×18 HSF7 R
			400×440×18 HSF3 V	400×440×18 HSF7 V
	440	22	400×440×22 HSF3 R	400×440×22 HSF7 R
			400×440×22 HSF3 V	400×440×22 HSF7 V
	444	20	400×444×20 HSF3 R	400×444×20 HSF7 R
			400×444×20 HSF3 V	400×444×20 HSF7 V
450	22	400×450×22 HSF3 R	400×450×22 HSF7 R	
		400×450×22 HSF3 V	400×450×22 HSF7 V	
420	470	22	420×470×22 HSF3 R	420×470×22 HSF7 R
			420×470×22 HSF3 V	420×470×22 HSF7 V
430	480	22	430×480×22 HSF3 R	430×480×22 HSF7 R
			430×480×22 HSF3 V	430×480×22 HSF7 V
440	490	22	440×490×22 HSF3 R	440×490×22 HSF7 R
			440×490×22 HSF3 V	440×490×22 HSF7 V
450	494	20	450×494×20 HSF3 R	450×494×20 HSF7 R
			450×494×20 HSF3 V	450×494×20 HSF7 V
460	510	22	460×510×22 HSF3 R	460×510×22 HSF7 R
			460×510×22 HSF3 V	460×510×22 HSF7 V
480	530	22	480×530×22 HSF3 R	480×530×22 HSF7 R
			480×530×22 HSF3 V	480×530×22 HSF7 V
500	544	20	500×544×20 HSF3 R	500×544×20 HSF7 R
			500×544×20 HSF3 V	500×544×20 HSF7 V
515	555	20	515×555×20 HSF3 R	515×555×20 HSF7 R
			515×555×20 HSF3 V	515×555×20 HSF7 V



Dimensions Shaft diameter $d_1$	Bore diameter D	Bore depth B	Designations	
			Split version (HSF3) Lip material R, V	Solid version (HSF7) Lip material R, V
mm				
520	564	20	520×564×20 HSF3 R 520×564×20 HSF3 V	520×564×20 HSF7 R 520×564×20 HSF7 V
	570	22	520×570×22 HSF3 R 520×570×22 HSF3 V	520×570×22 HSF7 R 520×570×22 HSF7 V
530	580	22	530×580×22 HSF3 R 530×580×22 HSF3 V	530×580×22 HSF7 R 530×580×22 HSF7 V
	590	22	540×590×22 HSF3 R 540×590×22 HSF3 V	540×590×22 HSF7 R 540×590×22 HSF7 V
540	590	25	540×590×25 HSF3 R 540×590×25 HSF3 V	540×590×25 HSF7 R 540×590×25 HSF7 V
	590	25	540×590×25 HSF3 R 540×590×25 HSF3 V	540×590×25 HSF7 R 540×590×25 HSF7 V
545	596,90	19,05	545×597×19 HSF3 R 545×597×19 HSF3 V	545×597×19 HSF7 R 545×597×19 HSF7 V
550	600	22	550×600×22 HSF3 R 550×600×22 HSF3 V	550×600×22 HSF7 R 550×600×22 HSF7 V
	603	20	560×603×20 HSF3 R 560×603×20 HSF3 V	560×603×20 HSF7 R 560×603×20 HSF7 V
560	604	20	560×604×20 HSF3 R 560×604×20 HSF3 V	560×604×20 HSF7 R 560×604×20 HSF7 V
	604	20	560×604×20 HSF3 R 560×604×20 HSF3 V	560×604×20 HSF7 R 560×604×20 HSF7 V
580	630	22	580×630×22 HSF3 R 580×630×22 HSF3 V	580×630×22 HSF7 R 580×630×22 HSF7 V
	640	22	590×640×22 HSF3 R 590×640×22 HSF3 V	590×640×22 HSF7 R 590×640×22 HSF7 V
590	640	22	590×640×22 HSF3 R 590×640×22 HSF3 V	590×640×22 HSF7 R 590×640×22 HSF7 V
600	640	18	600×640×18 HSF3 R 600×640×18 HSF3 V	600×640×18 HSF7 R 600×640×18 HSF7 V
	640	18	600×640×18 HSF3 R 600×640×18 HSF3 V	600×640×18 HSF7 R 600×640×18 HSF7 V
614	658	20	614×658×20 HSF3 R 614×658×20 HSF3 V	614×658×20 HSF7 R 614×658×20 HSF7 V
	658	20	614×658×20 HSF3 R 614×658×20 HSF3 V	614×658×20 HSF7 R 614×658×20 HSF7 V
620	670	22	620×670×22 HSF3 R 620×670×22 HSF3 V	620×670×22 HSF7 R 620×670×22 HSF7 V
	670	22	620×670×22 HSF3 R 620×670×22 HSF3 V	620×670×22 HSF7 R 620×670×22 HSF7 V
640	680	20	640×680×20 HSF3 R 640×680×20 HSF3 V	640×680×20 HSF7 R 640×680×20 HSF7 V
	680	20	640×680×20 HSF3 R 640×680×20 HSF3 V	640×680×20 HSF7 R 640×680×20 HSF7 V
650	700	22	650×700×22 HSF3 R 650×700×22 HSF3 V	650×700×22 HSF7 R 650×700×22 HSF7 V
	700	22	650×700×22 HSF3 R 650×700×22 HSF3 V	650×700×22 HSF7 R 650×700×22 HSF7 V
660	700	18	660×700×18 HSF3 R 660×700×18 HSF3 V	660×700×18 HSF7 R 660×700×18 HSF7 V
	700	18	660×700×18 HSF3 R 660×700×18 HSF3 V	660×700×18 HSF7 R 660×700×18 HSF7 V
665	715	22	665×715×22 HSF3 R 665×715×22 HSF3 V	665×715×22 HSF7 R 665×715×22 HSF7 V
	715	22	665×715×22 HSF3 R 665×715×22 HSF3 V	665×715×22 HSF7 R 665×715×22 HSF7 V
670	714	22	670×714×22 HSF3 R 670×714×22 HSF3 V	670×714×22 HSF7 R 670×714×22 HSF7 V
	714	22	670×714×22 HSF3 R 670×714×22 HSF3 V	670×714×22 HSF7 R 670×714×22 HSF7 V
700	764	25	700×764×25 HSF3 R 700×764×25 HSF3 V	700×764×25 HSF7 R 700×764×25 HSF7 V
	764	25	700×764×25 HSF3 R 700×764×25 HSF3 V	700×764×25 HSF7 R 700×764×25 HSF7 V
710	774	25	710×774×25 HSF3 R 710×774×25 HSF3 V	710×774×25 HSF7 R 710×774×25 HSF7 V
	774	25	710×774×25 HSF3 R 710×774×25 HSF3 V	710×774×25 HSF7 R 710×774×25 HSF7 V
724	775	22	724×775×22 HSF3 R 724×775×22 HSF3 V	724×775×22 HSF7 R 724×775×22 HSF7 V
	775	22	724×775×22 HSF3 R 724×775×22 HSF3 V	724×775×22 HSF7 R 724×775×22 HSF7 V
740	780	16,50	740×780×17 HSF3 R 740×780×17 HSF3 V	740×780×17 HSF7 R 740×780×17 HSF7 V
	780	16,50	740×780×17 HSF3 R 740×780×17 HSF3 V	740×780×17 HSF7 R 740×780×17 HSF7 V
750	814	28	750×814×28 HSF3 R 750×814×28 HSF3 V	750×814×28 HSF7 R 750×814×28 HSF7 V
	814	28	750×814×28 HSF3 R 750×814×28 HSF3 V	750×814×28 HSF7 R 750×814×28 HSF7 V

## Radial shaft seals – HSF3 (split) and HSF7 (solid) – metric dimensions

$d_1$  775 – 985 mm

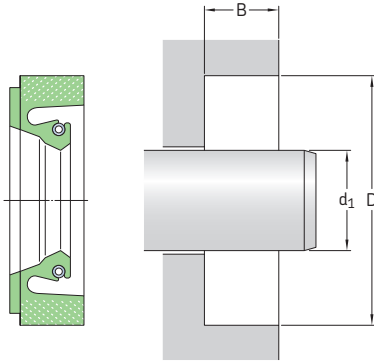


The table includes only a selection of available sizes. Contact your SKF sales representative for more information.

Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Bore depth B	Designations	
Shaft diameter $d_1$	Bore diameter D		Split version (HSF3) Lip material R, V	Solid version (HSF7) Lip material R, V
mm				
775	839	25	775×839×25 HSF3 R	775×839×25 HSF7 R
			775×839×25 HSF3 V	775×839×25 HSF7 V
790	834	25	790×834×25 HSF3 R	790×834×25 HSF7 R
			790×834×25 HSF3 V	790×834×25 HSF7 V
	854	25	790×854×25 HSF3 R	790×854×25 HSF7 R
			790×854×25 HSF3 V	790×854×25 HSF7 V
800	864	25	800×864×25 HSF3 R	800×864×25 HSF7 R
			800×864×25 HSF3 V	800×864×25 HSF7 V
840	880	18	840×880×18 HSF3 R	840×880×18 HSF7 R
			840×880×18 HSF3 V	840×880×18 HSF7 V
880	944	25,40	880×944×25.4 HSF3 R	880×944×25.4 HSF7 R
			880×944×25.4 HSF3 V	880×944×25.4 HSF7 V
890	930	18	890×930×18 HSF3 R	890×930×18 HSF7 R
			890×930×18 HSF3 V	890×930×18 HSF7 V
910	974	25	910×974×25 HSF3 R	910×974×25 HSF7 R
			910×974×25 HSF3 V	910×974×25 HSF7 V
970	1 034	25	970×1034×25 HSF3 R	970×1034×25 HSF7 R
			970×1034×25 HSF3 V	970×1034×25 HSF7 V
985	1 045	25	985×1045×25 HSF3 R	985×1045×25 HSF7 R
			985×1045×25 HSF3 V	985×1045×25 HSF7 V

**Radial shaft seals – HSF3 (split) and HSF7 (solid) – inch dimensions**  
 $d_1$  8.500 – 45.500 in.

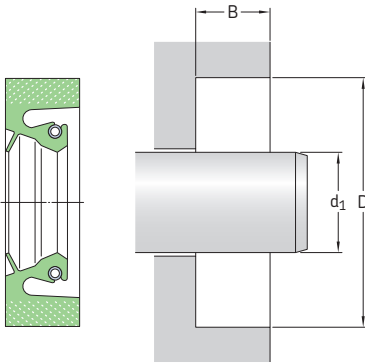


The table includes only a selection of available sizes. Contact your SKF sales representative for more information.

Please see pages 74 to 76 for housing bore requirements.

Dimensions		Designations				
Shaft diameter $d_1$	Bore diameter D	Bore depth B	Split version (HSF3) Lip material R	V	Solid version (HSF7) Lip material R	V
in./mm			–			
<b>8.500</b> 215,90	9.750 247,65	0.813 20,65	<b>HSF3 5766 R</b>	<b>HSF3 5766 V</b>	<b>HSF7 5766 R</b>	<b>HSF7 5766 V</b>
<b>10.000</b> 254,00	11.500 292,10	0.630 16,00	<b>HSF3 5920 R</b>	<b>HSF3 5920 V</b>	<b>HSF7 5920 R</b>	<b>HSF7 5920 V</b>
<b>11.500</b> 292,10	13.780 350,01	0.630 16,00	<b>HSF3 6075 R</b>	<b>HSF3 6075 V</b>	<b>HSF7 6075 R</b>	<b>HSF7 6075 V</b>
<b>12.250</b> 311,15	14.250 361,95	0.813 20,65	<b>HSF3 6150 R</b>	<b>HSF3 6150 V</b>	<b>HSF7 6150 R</b>	<b>HSF7 6150 V</b>
<b>14.500</b> 368,30	16.500 419,10	0.813 20,65	<b>HSF3 6370 R</b>	<b>HSF3 6370 V</b>	<b>HSF7 6370 R</b>	<b>HSF7 6370 V</b>
	16.500 419,10	1.152 29,26	<b>HSF3 6375 R</b>	<b>HSF3 6375 V</b>	<b>HSF7 6375 R</b>	<b>HSF7 6375 V</b>
<b>14.750</b> 374,65	16.500 419,10	0.875 22,23	<b>HSF3 6395 R</b>	<b>HSF3 6395 V</b>	<b>HSF7 6395 R</b>	<b>HSF7 6395 V</b>
<b>15.250</b> 387,35	17.250 438,15	1.000 25,40	<b>HSF3 6465 R</b>	<b>HSF3 6465 V</b>	<b>HSF7 6465 R</b>	<b>HSF7 6465 V</b>
<b>16.500</b> 419,10	18.000 457,20	0.750 19,05	<b>HSF3 6611 R</b>	<b>HSF3 6611 V</b>	<b>HSF7 6611 R</b>	<b>HSF7 6611 V</b>
<b>35.500</b> 901,70	37.500 952,50	0.875 22,23	<b>HSF3 7860 R</b>	<b>HSF3 7860 V</b>	<b>HSF7 7860 R</b>	<b>HSF7 7860 V</b>
<b>36.000</b> 914,40	38.500 977,90	0.875 22,23	<b>HSF3 7890 R</b>	<b>HSF3 7890 V</b>	<b>HSF7 7890 R</b>	<b>HSF7 7890 V</b>
<b>45.500</b> 1 155,70	47.000 1 193,80	0.813 20,65	<b>HSF3 9000 R</b>	<b>HSF3 9000 V</b>	<b>HSF7 9000 R</b>	<b>HSF7 9000 V</b>

## Radial shaft seals – HSF4 (split) and HSF8 (solid) – metric dimensions d<sub>1</sub> 75 – 660 mm

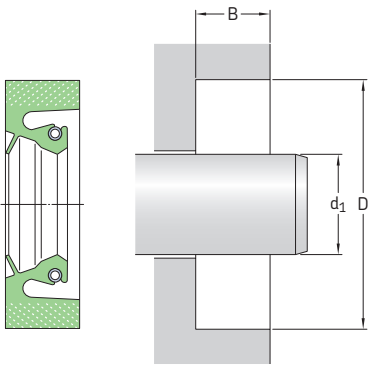


The table includes only a selection of available sizes. Contact your SKF sales representative for more information.

Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Designations		
Shaft diameter d <sub>1</sub>	Bore diameter D	Bore depth B	Split version (HSF4) Lip material R, V	Solid version (HSF8) Lip material R, V
mm			–	
75	107	12,50	75×107×13 HSF4 R 75×107×13 HSF4 V	75×107×13 HSF8 R 75×107×13 HSF8 V
105	145	16	105×145×16 HSF4 R 105×145×16 HSF4 V	105×145×16 HSF8 R 105×145×16 HSF8 V
215	250	16	215×250×16 HSF4 R 215×250×16 HSF4 V	215×250×16 HSF8 R 215×250×16 HSF8 V
300	340	16	300×340×16 HSF4 R 300×340×16 HSF4 V	300×340×16 HSF8 R 300×340×16 HSF8 V
330	374	20	330×374×20 HSF4 R 330×374×20 HSF4 V	330×374×20 HSF8 R 330×374×20 HSF8 V
370	410	15	370×410×15 HSF4 R 370×410×15 HSF4 V	370×410×15 HSF8 R 370×410×15 HSF8 V
	420	20	380×420×20 HSF4 R 380×420×20 HSF4 V	380×420×20 HSF8 R 380×420×20 HSF8 V
380	420	22	380×420×22 HSF4 R 380×420×22 HSF4 V	380×420×22 HSF8 R 380×420×22 HSF8 V
	490	20	440×490×20 HSF4 R 440×490×20 HSF4 V	440×490×20 HSF8 R 440×490×20 HSF8 V
440	490	22	440×490×22 HSF4 R 440×490×22 HSF4 V	440×490×22 HSF8 R 440×490×22 HSF8 V
450	500	22	450×500×22 HSF4 R 450×500×22 HSF4 V	450×500×22 HSF8 R 450×500×22 HSF8 V
460	500	16	460×500×16 HSF4 R 460×500×16 HSF4 V	460×500×16 HSF8 R 460×500×16 HSF8 V
500	540	22	500×540×22 HSF4 R 500×540×22 HSF4 V	500×540×22 HSF8 R 500×540×22 HSF8 V
660	704	20	660×704×20 HSF4 R 660×704×20 HSF4 V	660×704×20 HSF8 R 660×704×20 HSF8 V

**Radial shaft seals – HSF4 (split) and HSF8 (solid) – inch dimensions**  
 $d_1$  38.000 in.



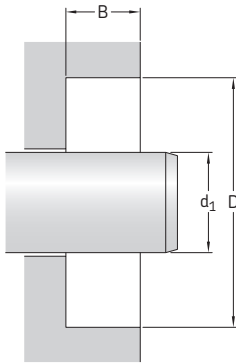
The table includes only a selection of available sizes. Contact your SKF sales representative for more information.

Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Designations				
Shaft diameter $d_1$	Bore diameter D	Bore depth B	Split version (HSF4) Lip material R	V	Solid version (HSF8) Lip material R	V
in./mm			–			
<b>38,000</b> 965,20	40,000 1 016,00	0,875 22,23	<b>HSF4 7990 R</b>	<b>HSF4 7990 V</b>	<b>HSF8 7990 R</b>	<b>HSF8 7990 V</b>

## Radial shaft seals – HSF9 – metric dimensions

$d_1$  200 – 860 mm



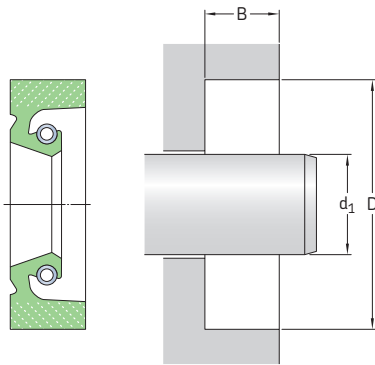
The table includes only a selection of available sizes. Contact your SKF sales representative for more information.

Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Bore depth B	Designations	
Shaft diameter $d_1$	Bore diameter D		Lip material R	V
mm			–	
200	240	16,50	200×240×17 HSF9 R	200×240×17 HSF9 V
335	379	20	335×379×20 HSF9 R	335×379×20 HSF9 V
346	390	18	346×390×18 HSF9 R	346×390×18 HSF9 V
360	404	17,45	360×404×17 HSF9 R	360×404×17 HSF9 V
480	530	22	480×530×22 HSF9 R	480×530×22 HSF9 V
500	540	20	500×540×20 HSF9 R	500×540×20 HSF9 V
515	555	20	515×555×20 HSF9 R	515×555×20 HSF9 V
600	644	20	600×644×20 HSF9 R	600×644×20 HSF9 V
700	750	25	700×750×25 HSF9 R	700×750×25 HSF9 V
751	814	25,40	751×814×25 HSF9 R	751×814×25 HSF9 V
840	904	25	840×904×25 HSF9 R	840×904×25 HSF9 V
860	924	25	860×924×25 HSF9 R	860×924×25 HSF9 V

## Radial shaft seals – HSF9 – inch dimensions

$d_1$  17.875 – 25.996 in.



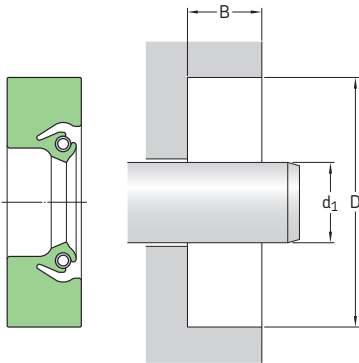
The table includes only a selection of available sizes. Contact your SKF sales representative for more information.

Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Designations		
Shaft diameter $d_1$	Bore diameter D	Bore depth B	Lip material	
			R	V
in./mm		–		
<b>17.875</b> 454,03	19.850 504,19	0.813 20,65	<b>HSF9 6715 R</b>	<b>HSF9 6715 V</b>
<b>25.996</b> 660,30	28.000 711,20	1.000 25,40	<b>HSF9 7233 R</b>	<b>HSF9 7233 V</b>

## Radial shaft seals – HS4 and HS5 – metric dimensions

$d_1$  230 – 1 055 mm



The table includes only a selection of sizes. For the full size range, please refer to **table 20** on **page 215**.

Please see **pages 74 to 76** for housing bore requirements.

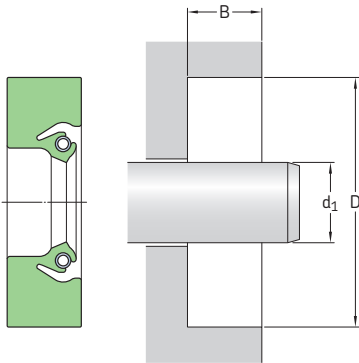
Dimensions	Bore diameter	Bore depth	Design	Lip material	Designation
Shaft diameter $d_1$	D	B			
mm			–	–	–
230	269	22	HS5	R	230×269×22 HS5 R
240	279	22	HS5	R	240×279×22 HS5 R
245	290	15	HS4	V	245×290×15 HS4 V
260	285,40	12,70	HS5	R	260×285,40×12,70 HS5 R
280	325	24	HS5	R	280×325×24 HS5 R
310	354	20	HS5	R	310×354×20 HS5 R
315	355	16	HS4	V	315×355×16 HS4 V
325	368	20	HS5	R	325×368×20 HS5 R
350	400	25,40	HS5	R	350×400×25 HS5 R
360	390	18	HS5	H	360×390×18 HS5 H
390	434	20	HS5	R	390×434×20 HS5 R
400	444	20	HS5	R	400×444×20 HS5 R
	447	20	HS5	R	400×447×20 HS5 R
	450	25	HS5	R	400×450×25 HS5 R
410	454	20	HS5	R	410×454×20 HS5 R
470	520	20,70	HS4	R	470×520×21 HS4 R
475	525	25	HS4	R	475×525×25 HS4 R
480	530	25	HS5	R	480×530×25 HS5 R
490	530	20,50	HS5	D	490×530×21 HS5 D
515	555	20	HS5	R	515×555×20 HS5 R
519	560	25	HS5	D	519×560×25 HS5 D
520	570	24	HS5	R	520×570×24 HS5 R



<b>Dimensions</b>			<b>Design</b>	<b>Lip material</b>	<b>Designation</b>
Shaft diameter $d_1$	Bore diameter D	Bore depth B			
mm			–	–	–
<b>525</b>	575	20,70	HS4	R	<b>525×575×21 HS4 R</b>
<b>530</b>	575	20	HS5	R	<b>530×575×20 HS5 R</b>
<b>540</b>	584	20	HS4	R	<b>540×584×20 HS4 R</b>
<b>700</b>	740	20	HS5	D	<b>700×740×20 HS5 D</b>
<b>710</b>	760	25	HS5	D	<b>710×760×25 HS5 D</b>
<b>712</b>	757	20,50	HS5	D	<b>712×757×21 HS5 D</b>
<b>778</b>	818	20,50	HS5	D	<b>778×818×21 HS5 D</b>
<b>780</b>	830	22	HS5	R	<b>780×830×22 HS5 R</b>
<b>910</b>	966	17,86	HS5	R	<b>910×966×18 HS5 R</b>
<b>978</b>	1 018	18	HS5	R	<b>978×1018×18 HS5 R</b>
<b>1 055</b>	1 100	25	HS5	R	<b>1055×1100×25 HS5 R</b>
	1 100	25	HS5	D	<b>1055×1100×25 HS5 D</b>

## Radial shaft seals – HS4 and HS5 – inch dimensions

$d_1$  6.438– 72.750 in.



The table includes only a selection of sizes. For the full size range, please refer to **table 20** on **page 215**.

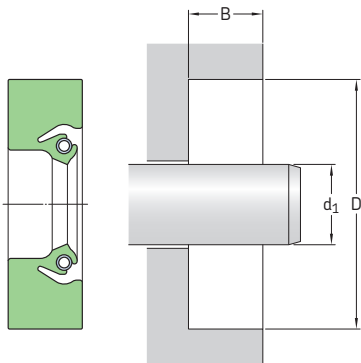
Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Bore diameter D	Bore depth B	Design	Lip material	Designation
Shaft diameter $d_1$						
in./mm						
<b>6.438</b> 163,53	7.688 195,28	0.625 15,88	HS5	R	<b>596043</b>	
<b>7.125</b> 180,98	8.125 206,38	0.500 12,70	HS5	R	<b>595761</b>	
<b>7.188</b> 182,58	8.640 219,46	0.625 15,88	HS5	R	<b>595643</b>	
<b>7.500</b> 190,50	8.750 222,25	0.625 15,88	HS5	D	<b>595822</b>	
<b>7.750</b> 196,85	8.750 222,25	0.625 15,88	HS5	D	<b>595813</b>	
<b>8.000</b> 203,20	9.500 241,30	0.625 15,88	HS5	R	<b>595404</b>	
<b>8.625</b> 219,08	10.125 257,18	0.609 15,47	HS5	R	<b>595566</b>	
<b>9.000</b> 228,60	10.500 266,70	0.625 15,88	HS5	R	<b>594641</b>	
<b>10.250</b> 260,35	12.017 305,23	0.750 19,05	HS5	R	<b>1025435</b>	
<b>11.250</b> 285,75	12.750 323,85	0.625 15,88	HS5	R	<b>1125235</b>	
<b>11.500</b> 292,10	13.250 336,55	0.750 19,05	HS5	R	<b>594850</b>	
<b>12.000</b> 304,80	13.000 330,20	0.500 12,70	HS5	R	<b>1200015</b>	
<b>12.250</b> 311,15	13.750 349,25	0.750 19,05	HS5	R	<b>1225125</b>	
<b>13.375</b> 339,73	14.875 377,83	0.625 15,88	HS5	R	<b>1338235</b>	

Dimensions			Design	Lip material	Designation
Shaft diameter $d_1$	Bore diameter D	Bore depth B			
in./mm			–	–	–
<b>13.500</b> 342,90	15,000 381,00	0.625 15,88	HS5	D	<b>1350235</b>
<b>13.985</b> 355,22	15,500 393,70	0.625 15,88	HS4	R	<b>526447</b>
<b>14.361</b> 364,77	15,748 400,00	0.709 18,01	HS4	R	<b>595175</b>
<b>15.748</b> 400,00	17,717 450,01	0.890 22,61	HS4	R	<b>1574443</b>
<b>16.000</b> 406,40	17,000 431,80	0.500 12,70	HS4	R	<b>1600014</b>
<b>20.000</b> 508,00	22,000 558,80	0.500 12,70	HS5	R	<b>595044</b>
<b>21.000</b> 533,40	23,000 584,20	0.813 20,65	HS4	R	<b>526719</b>
<b>21.750</b> 552,45	23,250 590,55	0.625 15,88	HS5	R	<b>593520</b>
<b>24.000</b> 609,60	25,500 647,70	0.750 19,05	HS5	R	<b>593519</b>
<b>25.000</b> 635,00	27,000 685,80	0.875 22,23	HS5	R	<b>593183</b>
<b>27.000</b> 685,80	29,000 736,60	0.813 20,65	HS5	R	<b>2700555</b>
<b>33.000</b> 838,20	34,250 869,95	0.625 15,88	HS5	D	<b>530414</b>
<b>53.000</b> 1346,20	54,875 1393,83	0.813 20,65	HS4	R	<b>595881</b>
<b>72.750</b> 1847,85	74,000 1879,60	0.719 18,26	HS5	R	<b>7275135</b>

## Radial shaft seals – HS6, HS7 and HS8 – metric dimensions

$d_1$  145 – 460 mm



The table includes only a selection of sizes. For the full size range, please refer to **table 20** on **page 215**.

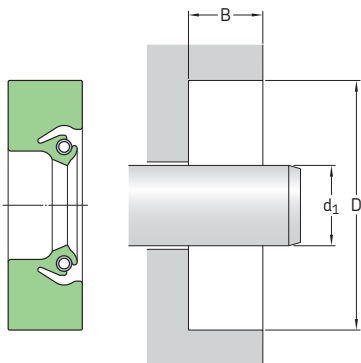
Please see **pages 74 to 76** for housing bore requirements.

Dimensions			Design	Lip material	Designation
Shaft diameter $d_1$	Bore diameter D	Bore depth B			
mm			–	–	–
145	175	14	HS8	R	145×175×14 HS8 R
150	180	15,88	HS8	R	150×180×16 HS8 R
160	200	15,88	HS8	D	160×200×16 HS8 D
170	200	16	HS8	V	170×200×16 HS8 V
180	222	16	HS7	R	180×222×16 HS7 R
185	220	12,70	HS8	R	185×220×13 HS8 R
186	226	16	HS8	R	186×226×16 HS8 R
190	220	16	HS8	R	190×220×16 HS8 R
	230	16	HS8	R	190×230×16 HS8 R
200	238	19	HS6	R	200×238×19 HS6 R
	238,10	19,10	HS8	R	200×238×19 HS8 R
220	250	15	HS8	R	220×250×15 HS8 R
	250	16	HS8	D	220×250×16 HS8 D
	260	14,27	HS8	R	220×260×14 HS8 R
	260	15	HS8	R	220×260×15 HS8 R
	260	16	HS8	R	220×260×16 HS8 R
230	260	15	HS8	R	230×260×15 HS8 R
240	270	15	HS8	R	240×270×15 HS8 R
	275	15	HS8	R	240×275×15 HS8 R
	280	20	HS7	R	240×280×20 HS7 R
250	280	15	HS8	R	250×280×15 HS8 R
	290	15,88	HS8	R	250×290×16 HS8 R
260	290	16	HS8	R	260×290×16 HS8 R
	300	20	HS8	R	260×300×20 HS8 R
	304	20	HS8	R	260×304×20 HS8 R
265	310	22	HS7	R	265×310×22 HS7 R

Dimensions			Design	Lip material	Designation
Shaft diameter $d_1$	Bore diameter D	Bore depth B			
mm			–	–	–
<b>266</b>	310	20	HS8	R	266×310×20 HS8 R
<b>270</b>	310	20	HS8	R	270×310×20 HS8 R
<b>280</b>	310	15	HS8	R	280×310×15 HS8 R
	310	16	HS8	R	280×310×16 HS8 R
	320	19,05	HS8	R	280×320×19 HS8 R
	324	20	HS8	R	280×324×20 HS8 R
	325	22	HS8	H	280×325×22 HS8 H
<b>290</b>	330	20	HS8	R	290×330×20 HS8 R
	335	24	HS7	R	290×335×24 HS7 R
<b>300</b>	340	20	HS8	R	300×340×20 HS8 R
	345	22	HS7	R	300×345×22 HS7 R
<b>310</b>	340	15	HS8	V	310×340×15 HS8 V
	340	15	HS8	R	310×340×15 HS8 R
	350	20	HS8	D	310×350×20 HS8 D
<b>320</b>	360	20	HS8	R	320×360×20 HS8 R
	368,10	19,05	HS6	R	320×368×19 HS6 R
<b>330</b>	380	22	HS8	H	330×380×22 HS8 H
<b>340</b>	372	18	HS8	R	340×372×18 HS8 R
	380	20	HS8	R	340×380×20 HS8 R
<b>345</b>	390	25	HS8	R	345×390×25 HS8 R
<b>350</b>	390	18	HS8	R	350×390×18 HS8 R
<b>355</b>	393	20	HS8	R	355×393×20 HS8 R
<b>360</b>	400	18	HS8	R	360×400×18 HS8 R
	405	25	HS8	H	360×405×25 HS8 H
	410,80	22,26	HS8	R	360×411×22 HS8 R
<b>380</b>	418	19	HS7	R	380×418×19 HS7 R
	418	19	HS8	R	380×418×19 HS8 R
	420	19,05	HS8	V	380×420×19 HS8 V
	420	20	HS8	D	380×420×20 HS8 D
	420	20	HS7	R	380×420×20 HS7 R
	420	20	HS8	H	380×420×20 HS8 H
	420	20	HS8	D	380×420×20 HS8 D
	430	20	HS8	R	380×430×20 HS8 R
	<b>400</b>	440	20	HS7	R
444		13,50	HS8	R	400×444×14 HS8 R
450		25	HS8	R	400×450×25 HS8 R
451		22,23	HS8	R	400×451×22 HS8 R
<b>410</b>	454	19	HS8	R	410×454×19 HS8 R
<b>420</b>	460	20	HS7	R	420×460×20 HS7 R
<b>430</b>	480	22	HS8	R	430×480×22 HS8 R
<b>440</b>	480	20	HS8	R	440×480×20 HS8 R
	480	21	HS8	H	440×480×21 HS8 H
<b>450</b>	500	25	HS8	R	450×500×25 HS8 R
<b>452</b>	503	20,65	HS8	R	452×503×21 HS8 R
<b>460</b>	510	22	HS8	R	460×510×22 HS8 R

## Radial shaft seals – HS6, HS7 and HS8 – metric dimensions

$d_1$  480 – 3 000 mm



The table includes only a selection of sizes. For the full size range, please refer to **table 20** on **page 215**.

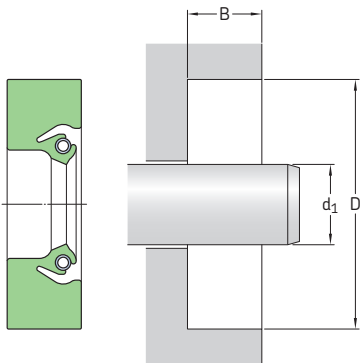
Please see **pages 74 to 76** for housing bore requirements.

Dimensions			Design	Lip material	Designation
Shaft diameter $d_1$	Bore diameter D	Bore depth B			
mm			–	–	–
<b>480</b>	530	20	HS8	R	<b>480×530×20 HS8 R</b>
<b>490</b>	530	20	HS8	R	<b>490×530×20 HS8 R</b>
	540	25	HS8	R	<b>490×540×25 HS8 R</b>
	541	20,70	HS6	R	<b>490×541×21 HS6 R</b>
<b>500</b>	550	25	HS8	R	<b>500×550×25 HS8 R</b>
<b>510</b>	548	24,50	HS8	R	<b>510×548×25 HS8 R</b>
<b>515</b>	555	20	HS8	R	<b>515×555×20 HS8 R</b>
<b>519</b>	560	25	HS8	D	<b>519×560×25 HS8 D</b>
<b>530</b>	576	21	HS8	R	<b>530×576×21 HS8 R</b>
	580	20	HS8	R	<b>530×580×20 HS8 R</b>
	580	22	HS8	R	<b>530×580×22 HS8 R</b>
	580	25	HS8	R	<b>530×580×25 HS8 R</b>
<b>550</b>	590	20	HS8	R	<b>550×590×20 HS8 R</b>
<b>556</b>	610	25,40	HS7	R	<b>556×610×25 HS7 R</b>
<b>560</b>	604	20	HS8	R	<b>560×604×20 HS8 R</b>
<b>590</b>	640	25	HS8	R	<b>590×640×25 HS8 R</b>
<b>600</b>	640	20	HS8	R	<b>600×640×20 HS8 R</b>
<b>615</b>	665	24	HS8	R	<b>615×665×24 HS8 R</b>
<b>620</b>	670	22	HS8	D	<b>620×670×22 HS8 D</b>
<b>625</b>	676	19	HS8	D	<b>625×676×19 HS8 D</b>
<b>630</b>	670	20	HS8	R	<b>630×670×20 HS8 R</b>
<b>650</b>	700	20	HS8	R	<b>650×700×20 HS8 R</b>
<b>690</b>	730	20	HS8	R	<b>690×730×20 HS8 R</b>

Dimensions			Design	Lip material	Designation
Shaft diameter $d_1$	Bore diameter D	Bore depth B			
mm			–	–	–
<b>700</b>	750	20	HS8	R	700×750×20 HS8 R
	765	25	HS8	R	700×765×25 HS8 R
<b>720</b>	771,10	21	HS8	D	720×771×21 HS8 D
<b>737</b>	790	15,88	HS6	R	737×790×16 HS6 R
<b>740</b>	790	15,88	HS8	R	740×790×16 HS8 R
	790	25	HS8	R	740×790×25 HS8 R
<b>760</b>	800	20,60	HS8	R	760×800×21 HS8 R
	810	20,60	HS8	R	760×810×21 HS8 R
	820	17,50	HS8	R	760×820×18 HS8 R
<b>780</b>	820	18	HS8	R	780×820×18 HS8 R
<b>800</b>	850	25,40	HS8	R	800×850×25 HS8 R
<b>810</b>	860	20,65	HS7	R	810×860×21 HS7 R
<b>840</b>	892	18	HS6	R	840×892×18 HS6 R
<b>850</b>	900	22	HS8	R	850×900×22 HS8 R
<b>865</b>	911	18	HS8	R	865×911×18 HS8 R
<b>867</b>	920	15,88	HS6	R	867×920×16 HS6 R
<b>870</b>	920	15,88	HS8	R	870×920×16 HS8 R
<b>910</b>	966	17,86	HS6	R	910×966×18 HS6 R
<b>925</b>	975	22	HS8	D	925×975×22 HS8 D
<b>930</b>	982	22,23	HS6	R	930×982×22 HS6 R
<b>1 055</b>	1 100	25	HS8	D	1055×1100×25 HS8 D
<b>1 070</b>	1 120	20	HS6	R	1070×1120×20 HS6 R
<b>1 105</b>	1 151	17,50	HS8	R	1105×1151×18 HS8 R
<b>1 180</b>	1 230	20	HS6	R	1180×1230×20 HS6 R
<b>1 248</b>	1 298	20,70	HS8	R	1248×1298×21 HS8 R
<b>1 370</b>	1 420	19,83	HS8	H	1370×1420×20 HS8 H
<b>1 380</b>	1 420	18	HS8	R	1380×1420×18 HS8 R
	1 725	20	HS8	R	1675×1725×20 HS8 R
<b>1 675</b>	1 725	20,62	HS8	D	1675×1725×21 HS8 D
	1 860	20	HS8	R	1810×1860×20 HS8 R
<b>1 810</b>	1 860	20,62	HS8	D	1810×1860×21 HS8 D
	2 900	20,63	HS8	D	2850×2900×21 HS8 D
<b>2 850</b>	2 900	20,63	HS8	D	2850×2900×21 HS8 D
<b>2 900</b>	2 959	17,33	HS6	R	2900×2959×17 HS6 R
<b>3 000</b>	3 050	20,63	HS8	D	3000×3050×21 HS8 D

## Radial shaft seals – HS6, HS7 and HS8 – inch dimensions

$d_1$  5.500 – 10.250 in.



The table includes only a selection of sizes. For the full size range, please refer to **table 20** on **page 215**.

Please see **pages 74 to 76** for housing bore requirements.

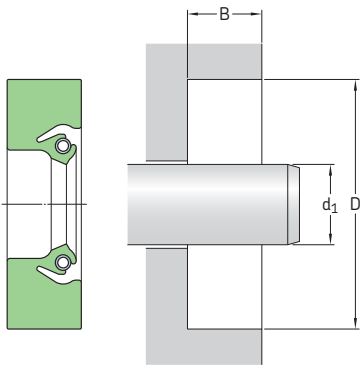
Dimensions		Bore diameter D	Bore depth B	Design	Lip material	Designation
Shaft diameter $d_1$						
in./mm						
<b>5.500</b> 139,70	6.500 165,10	0.500 12,70	HS8	V	<b>597548</b>	
<b>6.000</b> 152,40	7.250 184,15	0.625 15,88	HS8	R	<b>592986</b>	
	7.500 190,50	0.535 13,59	HS8	R	<b>60037</b>	
<b>6.300</b> 160,00	7.874 200,00	0.596 15,14	HS8	D	<b>595052</b>	
<b>6.438</b> 163,53	7.688 195,28	0.625 15,88	HS7	R	<b>594760</b>	
<b>7.000</b> 177,80	8.000 203,20	0.500 12,70	HS8	D	<b>70008</b>	
<b>7.250</b> 184,15	8.250 209,55	0.500 12,70	HS8	R	<b>595012</b>	
	8.250 209,55	0.500 12,70	HS7	R	<b>528377</b>	
<b>7.625</b> 193,68	8.875 225,43	0.625 15,88	HS8	R	<b>595207</b>	
<b>7.750</b> 196,85	8.750 222,25	0.500 12,70	HS8	R	<b>529601</b>	
<b>8.000</b> 203,20	9.000 228,60	0.625 15,88	HS8	V	<b>594935</b>	
	9.250 234,95	0.625 15,88	HS8	R	<b>592376</b>	
	10.000 254,00	0.750 19,05	HS7	R	<b>590326</b>	
	9.500 241,30	0.625 15,88	HS7	R	<b>592180</b>	
<b>8.250</b> 209,55	10.250 260,35	0.750 19,05	HS7	R	<b>591929</b>	



<b>Dimensions</b>			<b>Design</b>	<b>Lip material</b>	<b>Designation</b>
Shaft diameter $d_1$	Bore diameter D	Bore depth B			
in./mm			–	–	–
<b>8.500</b>	9.500	0.500	HS8	V	<b>594745</b>
215,90	241,30	12,70			
	10.000	0.625	HS8	R	<b>594318</b>
	254,00	15,88			
<b>8.750</b>	9.750	0.500	HS8	V	<b>87440</b>
222,25	247,65	12,70			
	10.000	0.625	HS8	R	<b>592627</b>
	254,00	15,88			
	10.750	0.750	HS7	R	<b>597553</b>
	273,05	19,05			
<b>8.938</b>	9.938	0.625	HS7	R	<b>595004</b>
227,03	254,43	15,88			
<b>9.000</b>	10.250	0.625	HS7	R	<b>592581</b>
228,60	260,35	15,88			
	10.500	0.750	HS8	R	<b>592600</b>
	266,70	19,05			
	10.674	0.703	HS8	R	<b>592779</b>
	271,12	17,86			
<b>9.250</b>	11.250	0.625	HS7	R	<b>593625</b>
234,95	285,75	15,88			
	11.250	0.750	HS8	R	<b>592858</b>
	285,75	19,05			
<b>9.438</b>	10.688	0.625	HS7	R	<b>592126</b>
239,73	271,48	15,88			
<b>9.500</b>	11.000	0.625	HS8	R	<b>531331</b>
241,30	279,40	15,88			
	11.500	0.625	HS8	R	<b>597507</b>
	292,10	15,88			
<b>9.750</b>	10.750	0.500	HS7	R	<b>592988</b>
247,65	273,05	12,70			
	11.250	0.625	HS7	R	<b>593385</b>
	285,75	15,88			
<b>9.938</b>	11.188	0.625	HS8	R	<b>594753</b>
252,43	284,18	15,88			
	11.438	0.750	HS8	R	<b>592731</b>
	290,53	19,05			
<b>10.000</b>	11.000	0.562	HS8	R	<b>1000018</b>
254,00	279,40	14,28			
	11.250	0.625	HS7	R	<b>1000117</b>
	285,75	15,88			
	11.500	0.750	HS7	R	<b>1000257</b>
	292,10	19,05			
	12.000	0.625	HS7	R	<b>1000527</b>
	304,80	15,88			
	12.000	0.625	HS7	V	<b>1000025</b>
	304,80	15,88			
<b>10.125</b>	11.750	0.750	HS8	R	<b>1012338</b>
257,18	298,45	19,05			
<b>10.188</b>	11.188	0.500	HS7	R	<b>1019017</b>
258,78	284,18	12,70			
<b>10.250</b>	11.250	0.625	HS7	R	<b>1025017</b>
260,35	285,75	15,88			
	12.000	0.625	HS8	R	<b>1025368</b>
	304,80	15,88			

## Radial shaft seals – HS6, HS7 and HS8 – inch dimensions

$d_1$  10.438 – 14.000 in.



The table includes only a selection of sizes. For the full size range, please refer to **table 20** on **page 215**.

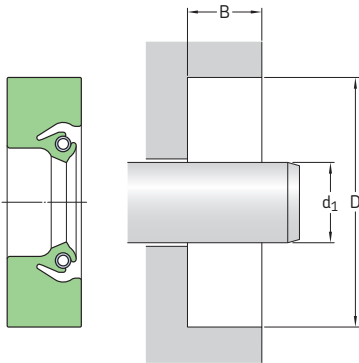
Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Bore diameter D	Bore depth B	Design	Lip material	Designation
Shaft diameter $d_1$						
in./mm						
<b>10.438</b> 265,13	11.688 296,88	0.875 22,23	HS8	R	<b>1043148</b>	
<b>10.500</b> 266,70	11.500 292,10	0.500 12,70	HS8	R	<b>1050018</b>	
	12.000 304,80	0.750 19,05	HS8	R	<b>1050258</b>	
	12.000 304,80	0.750 19,05	HS7	R	<b>1050257</b>	
<b>10.710</b> 272,03	12.511 317,78	0.625 15,88	HS8	R	<b>1071448</b>	
<b>10.875</b> 276,23	12.875 327,03	0.578 14,68	HS6	R	<b>527099</b>	
<b>11.000</b> 279,40	12.000 304,80	0.625 15,88	HS7	R	<b>1100027</b>	
	12.500 317,50	0.750 19,05	HS8	R	<b>1100258</b>	
	12.500 317,50	0.750 19,05	HS7	R	<b>1100257</b>	
	13.000 330,20	0.750 19,05	HS8	R	<b>1100538</b>	
<b>11.125</b> 282,58	12.375 314,33	0.625 15,88	HS8	R	<b>1113118</b>	
<b>11.250</b> 285,75	12.750 323,85	0.750 19,05	HS7	R	<b>1125257</b>	
<b>11.375</b> 288,93	12.375 314,33	0.500 12,70	HS7	R	<b>1138017</b>	
<b>11.422</b> 290,12	12.922 328,22	0.750 19,05	HS7	R	<b>1142257</b>	
<b>11.500</b> 292,10	12.500 317,50	0.500 12,70	HS8	R	<b>1150018</b>	
	13.000 330,20	0.750 19,05	HS8	R	<b>1150258</b>	

Dimensions			Design	Lip material	Designation
Shaft diameter $d_1$	Bore diameter D	Bore depth B			
in./mm			–	–	–
<b>11.750</b> 298,45	13.250 336,55	0.750 19,05	HS7	R	<b>1175257</b>
<b>11.875</b> 301,63	13.125 333,38	0.625 15,88	HS8	R	<b>1188118</b>
<b>12.000</b> 304,80	13.000 330,20	0.500 12,70	HS8	D	<b>1200028</b>
	13.500	0.750	HS8	R	<b>1200258</b>
	342,90	19,05			
	14.000 355,60	0.813 20,65	HS8	R	<b>1200558</b>
<b>12.375</b> 314,33	13.875 352,43	0.750 19,05	HS7	R	<b>1238257</b>
<b>12.500</b> 317,50	13.500 342,90	0.500 12,70	HS8	R	<b>1250018</b>
	14.000	0.750	HS7	R	<b>1250257</b>
	355,60	19,05			
<b>12.625</b> 320,68	14.125 358,78	0.750 19,05	HS7	R	<b>1263237</b>
<b>12.750</b> 323,85	14.250 361,95	0.625 15,88	HS8	R	<b>1275238</b>
	14.250	0.750	HS7	R	<b>1275257</b>
	361,95	19,05			
<b>13.000</b> 330,20	14.500 368,30	0.625 15,88	HS7	R	<b>1300237</b>
	14.500	0.750	HS8	R	<b>1300258</b>
	368,30	19,05			
	15.000 381,00	0.750 19,05	HS8	R	<b>1300548</b>
<b>13.125</b> 333,38	15.125 384,18	0.750 19,05	HS8	R	<b>592920</b>
<b>13.250</b> 336,55	14.750 374,65	0.625 15,88	HS7	R	<b>1325237</b>
<b>13.375</b> 339,73	14.875 377,83	0.625 15,88	HS8	R	<b>594057</b>
<b>13.500</b> 342,90	15.000 381,00	0.750 19,05	HS8	R	<b>1350258</b>
	15.500	0.625	HS7	R	<b>1350527</b>
	393,70	15,88			
<b>13.750</b> 349,25	15.250 387,35	0.750 19,05	HS7	R	<b>1375257</b>
<b>13.875</b> 352,43	15.375 390,53	0.750 19,05	HS7	R	<b>1388257</b>
<b>14.000</b> 355,60	15.000 381,00	0.500 12,70	HS8	R	<b>1400018</b>
	15.500	0.750	HS8	R	<b>1400258</b>
	393,70	19,05			
	15.500	0.750	HS7	R	<b>1400257</b>
	393,70	19,05			
	15.500	0.750	HS8	V	<b>594261</b>
	393,70	19,05			
	16.000	0.813	HS7	R	<b>1400557</b>
	406,40	20,65			
	16.000 406,40	1.000 25,40		HS8	R

## Radial shaft seals – HS6, HS7 and HS8 – inch dimensions

$d_1$  14.250 – 20.000 in.



The table includes only a selection of sizes. For the full size range, please refer to **table 20** on **page 215**.

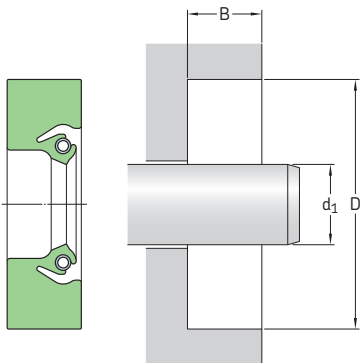
Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Bore diameter D	Bore depth B	Design	Lip material	Designation
Shaft diameter $d_1$						
in./mm						
<b>14.250</b> 361,95	16.250 412,75	1.000 25,40	HS7	R	<b>1425587</b>	
<b>14.500</b> 368,30	15.500 393,70	0.500 12,70	HS8	R	<b>1450018</b>	
<b>14.625</b> 371,48	16.125 409,58	0.750 19,05	HS7	R	<b>1463257</b>	
<b>15.000</b> 381,00	16.500 419,10	0.750 19,05	HS7	R	<b>1500257</b>	
	17.000 431,80	0.813 20,65	HS8	R	<b>1500558</b>	
<b>15.250</b> 387,35	16.625 422,28	0.500 12,70	HS8	R	<b>1525158</b>	
	16.750 425,45	0.750 19,05	HS7	R	<b>1525257</b>	
<b>15.500</b> 393,70	17.000 431,80	0.750 19,05	HS7	R	<b>1550257</b>	
	17.500 444,50	0.813 20,65	HS7	R	<b>1550557</b>	
<b>15.750</b> 400,05	17.250 438,15	0.685 19,05	HS8	R	<b>1575248</b>	
	<b>16.000</b> 406,40	17.000 431,80	0.500 12,70	HS8	R	<b>1600018</b>
17.000 431,80		0.500 12,70	HS8	D	<b>1600019</b>	
17.500 444,50		0.750 19,05	HS8	R	<b>1600258</b>	
18.000 457,20		0.750 19,05	HS8	R	<b>1600578</b>	
18.000 457,20		0.813 20,65	HS8	R	<b>1600558</b>	
<b>16.500</b> 419,10	17.500 444,50	0.500 12,70	HS7	R	<b>1650017</b>	
	18.500 469,90	0.813 20,65	HS7	R	<b>1650557</b>	

<b>Dimensions</b>			<b>Design</b>	<b>Lip material</b>	<b>Designation</b>
Shaft diameter $d_1$	Bore diameter D	Bore depth B			
in./mm			–	–	–
<b>16.750</b> 425,45	18.250 463,55	0.750 19,05	HS7	R	<b>1675257</b>
<b>16.875</b> 428,63	18.375 466,73	0.500 12,70	HS7	R	<b>1688217</b>
<b>17.500</b> 444,50	19.500 495,30	1.000 25,40	HS7	R	<b>1750587</b>
<b>17.716</b> 449,99	19.716 500,79	0.813 20,65	HS7	R	<b>1771557</b>
<b>17.750</b> 450,85	19.750 501,65	0.813 20,65	HS7	R	<b>1775557</b>
<b>18.000</b> 457,20	19.000 482,60	0.500 12,70	HS8	R	<b>1800018</b>
	19.500 495,30	0.750 19,05	HS7	R	<b>1800257</b>
	20.000 508,00	0.813 20,65	HS8	R	<b>1800558</b>
<b>18.250</b> 463,55	19.750 501,65	0.750 19,05	HS7	R	<b>1825257</b>
	20.250 514,35	0.813 20,65	HS7	R	<b>1825557</b>
<b>18.375</b> 466,73	20.375 517,53	0.813 20,65	HS8	R	<b>1838558</b>
	20.500 520,70	0.875 22,23	HS8	R	<b>1837608</b>
<b>18.500</b> 469,90	20.000 508,00	0.750 19,05	HS8	D	<b>1850248</b>
	20.500 520,70	1.000 25,40	HS7	R	<b>1850587</b>
<b>18.750</b> 476,25	20.250 514,35	0.750 19,05	HS7	R	<b>1875257</b>
<b>18.937</b> 481,00	20.937 531,80	0.813 20,65	HS7	R	<b>1894557</b>
<b>19.000</b> 482,60	20.500 520,70	0.750 19,05	HS8	R	<b>1900258</b>
	21.000 533,40	0.813 20,65	HS7	R	<b>1900557</b>
<b>19.500</b> 495,30	21.500 546,10	0.813 20,65	HS7	R	<b>1950557</b>
	21.500 546,10	0.813 20,65	HS8	R	<b>1950518</b>
<b>19.750</b> 501,65	21.750 552,45	0.625 15,88	HS8	R	<b>1975528</b>
<b>20.000</b> 508,00	21.500 546,10	0.625 15,88	HS8	R	<b>2000238</b>
	21.500 546,10	0.750 19,05	HS8	R	<b>2000258</b>
	22.000 558,80	0.625 15,88	HS7	R	<b>2000527</b>
	22.000 558,80	1.000 25,40	HS7	R	<b>2000587</b>
	22.125 561,98	0.916 23,27	HS8	R	<b>2000648</b>
	22.125 561,98	0.916 23,27	HS8	D	<b>2000649</b>

## Radial shaft seals – HS6, HS7 and HS8 – inch dimensions

$d_1$  20.500 – 33.125 in.



The table includes only a selection of sizes. For the full size range, please refer to **table 20** on **page 215**.

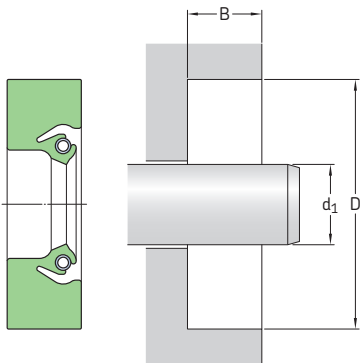
Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Bore diameter D	Bore depth B	Design	Lip material	Designation
Shaft diameter $d_1$						
in./mm						
<b>20.500</b> 520,70	22.500 571,50	0.875 22,23	HS8	R		<b>2050568</b>
<b>20.625</b> 523,88	22.625 574,68	0.813 20,65	HS7	R		<b>2063557</b>
<b>21.000</b> 533,40	22.580 573,53	0.578 14,68	HS8	R		<b>2100228</b>
	23.000 584,20	0.750 19,05	HS8	R		<b>2100518</b>
	23.000 584,20	0.813 20,65	HS8	V		<b>594201</b>
	23.000 584,20	0.813 20,65	HS7	R		<b>2100557</b>
	23.500 596,90	0.750 19,05	HS8	R		<b>2200257</b>
<b>22.000</b> 558,80	23.500 596,90	0.750 19,05	HS8	R		<b>2200218</b>
	24.000 609,60	0.813 20,65	HS8	V		<b>2200555</b>
	24.000 609,60	0.813 20,65	HS8	D		<b>2200558</b>
	24.000 609,60	0.813 20,65	HS7	R		<b>2200557</b>
	24.250 615,95	0.813 20,65	HS7	R		<b>2225557</b>
<b>22.500</b> 571,50	24.500 622,30	0.813 20,65	HS7	R		<b>2250557</b>
<b>22.638</b> 575,00	24.638 625,80	0.750 19,00	HS8	D		<b>2263548</b>
<b>22.750</b> 577,85	24.750 628,65	0.813 20,65	HS7	R		<b>2275557</b>
<b>22.875</b> 581,03	24.875 631,83	0.813 20,65	HS7	R		<b>2288557</b>

<b>Dimensions</b>			<b>Design</b>	<b>Lip material</b>	<b>Designation</b>
Shaft diameter $d_1$	Bore diameter D	Bore depth B			
in./mm			–	–	–
<b>23.000</b> 584,20	25.000 635,00	0.813 20,65	HS8	R	2300558
	25.000 635,00	0.813 20,65	HS8	D	2300559
<b>23.208</b> 589,48	25.208 640,28	0.813 20,65	HS8	R	2320558
<b>23.750</b> 603,25	25.750 654,05	0.813 20,65	HS8	R	2575558
<b>24.000</b> 609,60	25.500 647,70	0.750 19,05	HS8	R	2400258
	25.500 647,70	0.750 19,05	HS7	R	2400257
	26.000 660,40	1.000 25,40	HS8	D	2400598
<b>24.500</b> 622,30	26.000 660,40	0.750 19,05	HS7	R	2450257
<b>25.000</b> 635,00	26.500 673,10	0.750 19,05	HS7	D	2500247
	27.000 685,80	0.813 20,65	HS7	R	2500557
<b>26.000</b> 660,40	28.125 714,38	0.916 23,27	HS8	R	2600648
<b>26.375</b> 669,93	27.627 701,73	0.625 15,88	HS8	R	2637118
<b>27.000</b> 685,80	29.000 736,60	0.813 20,65	HS8	R	2700558
<b>27.500</b> 698,50	28.750 730,25	0.625 15,88	HS7	R	2750117
<b>28.000</b> 711,20	30.000 762,00	0.813 20,65	HS8	R	2800558
<b>28.875</b> 733,43	30.875 784,23	0.813 20,65	HS7	R	2888557
<b>29.000</b> 736,60	31.000 787,40	0.813 20,65	HS7	V	2900556
<b>29.750</b> 755,65	31.750 806,45	0.813 20,65	HS8	R	2975558
<b>30.000</b> 762,00	31.250 793,75	0.625 15,88	HS8	R	3000118
	32.000 812,80	1.000 25,40	HS8	H	3000519
<b>30.750</b> 781,05	31.750 806,45	0.500 12,70	HS7	R	3075017
<b>32.375</b> 822,33	34.375 873,13	1.000 25,40	HS8	H	3237519
<b>32.500</b> 825,50	34.500 876,30	0.916 23,27	HS7	R	3250577
<b>33.125</b> 841,38	35.125 892,18	0.813 20,65	HS8	R	3312558

## Radial shaft seals – HS6, HS7 and HS8 – inch dimensions

$d_1$  34.500 – 171.900 in.



The table includes only a selection of sizes. For the full size range, please refer to **table 20** on **page 215**.

Please see **pages 74 to 76** for housing bore requirements.

Dimensions		Bore diameter D	Bore depth B	Design	Lip material	Designation
Shaft diameter $d_1$						
in./mm						
<b>34.500</b> 876,30	36.500 927,10	0.813 20,65	HS7	R	<b>3450557</b>	
<b>38.000</b> 965,20	40.000 1 016,00	0.813 20,65	HS7	R	<b>3800557</b>	
<b>38.500</b> 977,90	40.500 1 028,70	0.813 20,65	HS7	R	<b>3850557</b>	
<b>40.250</b> 1 022,35	41.750 1 060,45	0.750 19,05	HS8	R	<b>4025258</b>	
<b>48.000</b> 1 219,20	50.000 1 270,00	0.813 20,65	HS8	R	<b>4800518</b>	
<b>51.000</b> 1 295,40	53.000 1 346,20	0.813 20,65	HS8	R	<b>5100558</b>	
<b>53.000</b> 1 346,20	54.875 1 393,83	0.813 20,65	HS8	R	<b>5300488</b>	
<b>54.000</b> 1 371,60	56.000 1 422,40	0.813 20,65	HS7	R	<b>5400557</b>	
<b>58.500</b> 1 485,90	60.500 1 536,70	0.813 20,65	HS8	R	<b>5850518</b>	
<b>60.250</b> 1 530,35	62.313 1 582,75	0.750 19,05	HS8	R	<b>531572</b>	
<b>62.598</b> 1 589,99	64.598 1 640,79	0.813 20,65	HS7	R	<b>6259557</b>	
<b>69.000</b> 1 752,60	71.000 1 803,40	0.813 20,65	HS8	R	<b>6900558</b>	
<b>72.500</b> 1 841,50	74.500 1 892,30	0.813 20,65	HS8	R	<b>7250558</b>	
<b>75.000</b> 1 905,00	77.000 1 955,80	0.815 20,70	HS8	R	<b>7500518</b>	



Dimensions			Design	Lip material	Designation
Shaft diameter $d_1$	Bore diameter D	Bore depth B			
in./mm			–	–	–
<b>76.000</b> <i>1 930,40</i>	78.000 <i>1 981,20</i>	0.813 <i>20,65</i>	HS8	R	<b>594316</b>
<b>81.000</b> <i>2 057,40</i>	83.000 <i>2 108,20</i>	0.813 <i>20,65</i>	HS8	R	<b>8100558</b>
<b>87.750</b> <i>2 228,85</i>	89.750 <i>2 279,65</i>	0.813 <i>20,65</i>	HS8	R	<b>8775558</b>
<b>94.750</b> <i>2 406,65</i>	97.000 <i>2 463,80</i>	0.688 <i>17,48</i>	HS8	R	<b>9475658</b>
<b>98.625</b> <i>2 505,08</i>	100.625 <i>2 555,88</i>	0.813 <i>20,65</i>	HS8	R	<b>9862568</b>
<b>106.000</b> <i>2 692,40</i>	107.000 <i>2 717,80</i>	0.500 <i>12,70</i>	HS8	R	<b>594926</b>
<b>125.000</b> <i>3 175,00</i>	126.250 <i>3 206,75</i>	0.625 <i>15,88</i>	HS8	R	<b>595208</b>
<b>171.900</b> <i>4 366,26</i>	173.876 <i>4 416,45</i>	0.813 <i>20,65</i>	HS8	R	<b>595214</b>

2.25



# Cassette seals

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# Cassette seals

## General

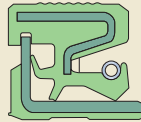
The design of SKF Mudblock cassette seals has been optimized to provide excellent retention of either grease or oil and maximum protection against liquid or solid contaminants (→ **fig. 1**). The seals are made to order to meet the demands of each specific application.

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

- tractors
- agricultural machinery
- construction equipment
- forestry equipment
- off-highway trucks

Fig. 1

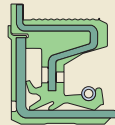
### SKF Mudblock designs for oil lubricated applications



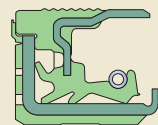
MUD1



MUD2

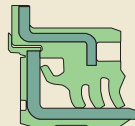


MUD4

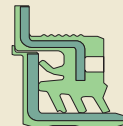


MUD5

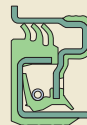
### SKF Mudblock designs for grease lubricated applications



MUD3



MUD6



MUD7

## 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 elastomeric material is normally 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 lip materials*, starting on **page 30**.

## Testing

SKF conducts tests in climatic cells 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. SKF Mudblock seals are engineered using Finite Element Analysis (FEA) to obtain optimum design solutions. FEA evaluates:

- 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

## Installation

Proper installation of SKF Mudblock seals is important for optimal functioning of the seals. Please contact SKF for information and support regarding the design of installation tools for SKF Mudblock seals.

## SKF Mudblock seal designs MUD5 and MUD7

SKF Mudblock seal designs MUD5 and MUD7 are a new generation of radial shaft sealing units, specifically developed for heavy-duty applications in harsh environments and tough operating conditions.

SKF Mudblock seals MUD5 (→ **fig. 2**) are designed for oil 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
- spring-loaded main lip with SKF Wave lip design for bi-directional pumping action
- axial and auxiliary radial lips for contaminant exclusion
- integrated wear sleeve, curled for a reliable unitized solution to facilitate installation and prevent damage to the lips during transportation, handling and installation
- centrifugal flap for exclusion of contaminants
- bumper maintaining the relative position between the seal and the sleeve as well as acting as a barrier against contaminants
- rubber covered inside diameter for high sealing ability and easy installation

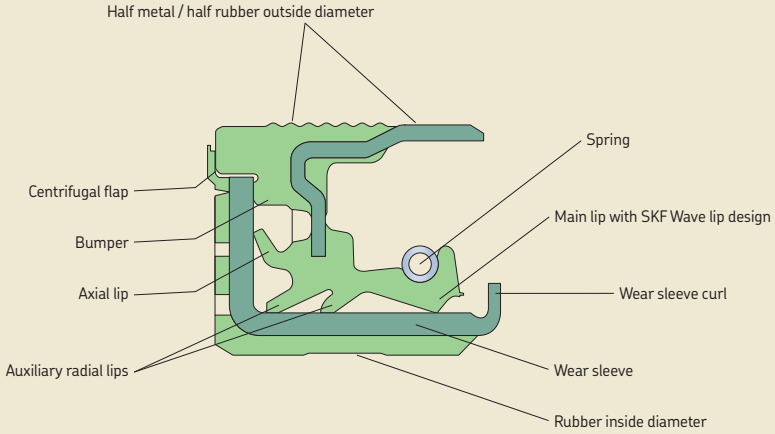
SKF Mudblock seals MUD7 (→ **fig. 3**) are designed for use in grease lubricated applications and provide features including:

- 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.

Fig. 2

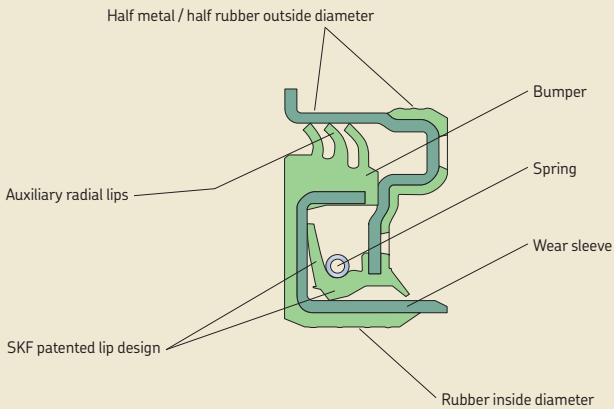
SKF Mudblock seal MUD5



3

Fig. 3

SKF Mudblock seal MUD7







# 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.

SKF Speedi-Sleeve (→ **fig. 1**) is a well-proven solution to overcome problems with worn

shafts without having to disassemble the shaft or changing the seal dimensions, while offering an excellent sealing surface. Now, SKF has developed a patent pending new generation SKF Speedi-Sleeve with features providing an even further enhanced sealing system performance. Using SKF Speedi-Sleeve, combined with an SKF radial shaft seal, customers will benefit from a more consistent and increased durability of the sealing system. This will enable a more stable maintenance planning with improved predictability of the system service life. SKF Speedi-Sleeve is available for shaft diameters up to approximately 203 mm (8 in.). For larger shaft diameters, SKF offers wear sleeves for heavy industrial applications, LDSLV3 and LDSLV4 (→ **figs. 2 and 3**). See **page 356** for information regarding LDSLV designs.

Fig. 1

SKF Speedi-Sleeve

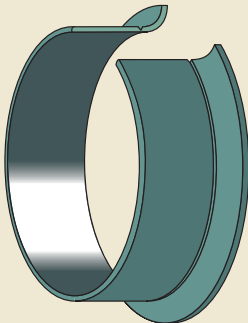
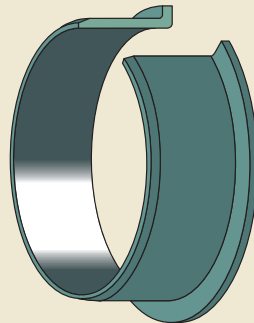


Fig. 2

LDSLV3 wear sleeve



# SKF Speedi-Sleeve

This thin-walled sleeve (0,28 mm (0.011 in.)), developed by SKF, is simply pushed in position over the worn area, 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. 4). The flange can

most often be left intact, but in applications where the flange will interfere with other system components, it should be removed so as not to 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 seal 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

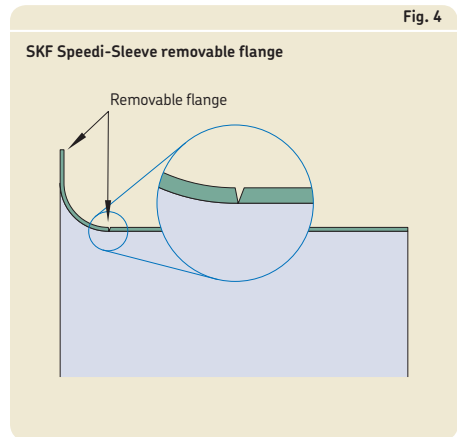
The standard size range covers sleeves for shaft diameters from 11,99 to 203,33 mm (0.472 to 8 in.). Depending on production quantities, non-standard sizes can be manufactured. Each sleeve is designed to fit a specific shaft diameter range, usually above and below the nominal shaft diameter. This permits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

4

Fig. 3



Fig. 4



## Wear sleeves

### 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 where there are abrasive contaminants, especially when combined with a seal manufactured from the SKF fluoro rubber material, SKF Duralife.

### 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 from 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. This reduction improves the sealing system reliability as well as the predictability of the system service life.

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

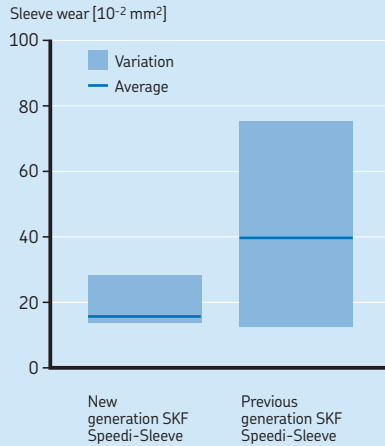
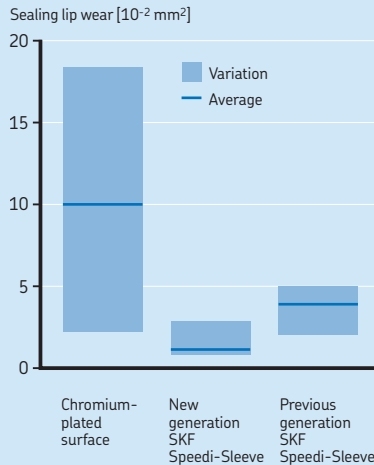


Diagram 2

**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. 5** for different SKF Speedi-Sleeve installations.

SKF Speedi-Sleeve installations

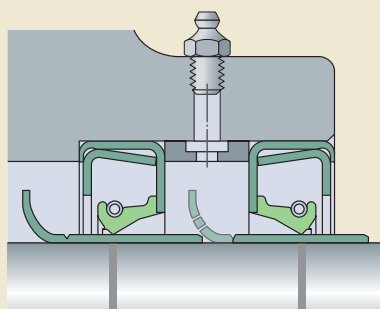
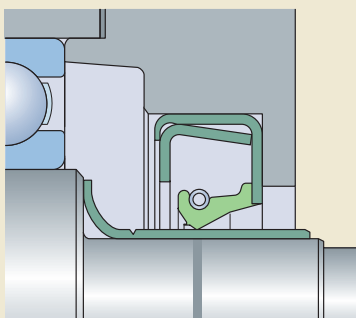


Fig. 6

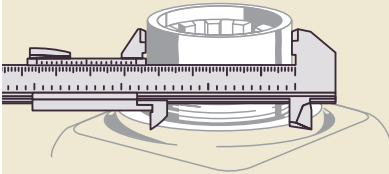


Fig. 7

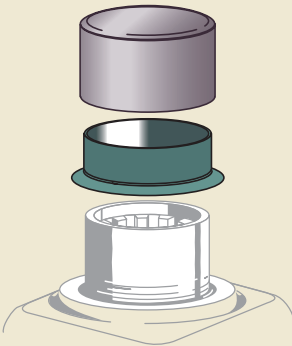
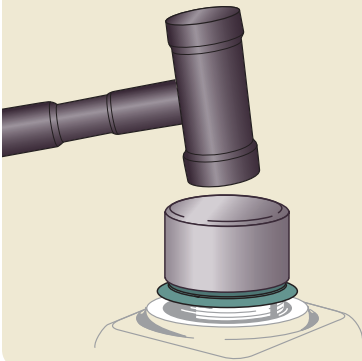


Fig. 8



### 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. 6). 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. 7).
- 8 Gently tap the centre of the installation tool until the sleeve covers the worn shaft surface (→ fig. 8). 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.

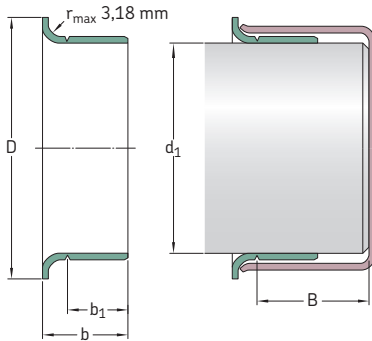
Alternatively, the sleeve can be removed in any of the following ways, always using care not to damage the shaft surface:

- 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.

## SKF Speedi-Sleeve – metric dimensions (converted from inch dimensions)

$d_1$  11,99 – 35,99 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 $\pm 0,8$	$B^1$		
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	

<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

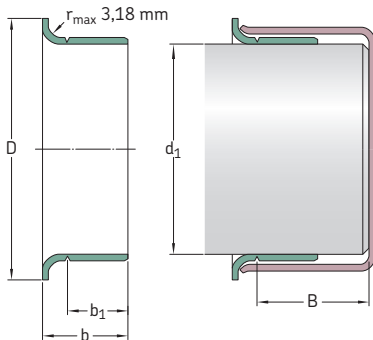


Shaft diameter range		Nominal dimensions					Designation
d <sub>1</sub> min	max	d <sub>1</sub>	D ±1,6	b <sub>1</sub> ±0,8	b ±0,8	B <sup>1)</sup>	
mm		mm					–
23,06	23,16	23,11	30,94	7,95	11,13	46,91	99860 <sup>2)</sup>
		23,11	30,94	7,95	11,13	46,91	99091
23,88	24,00	24,00	28,70	7,95	11,13	50,80	99092
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

<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

**SKF Speedi-Sleeve – metric dimensions (converted from inch dimensions)**  
**d<sub>1</sub> 36,37 – 54,10 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					–
<b>36,37</b>	<b>36,53</b>	36,53	45,24	14,30	17,48	25,81	<b>99821<sup>2)</sup></b>
		36,53	45,24	14,30	17,48	25,81	<b>99143</b>
<b>36,45</b>	<b>36,60</b>	36,53	45,24	9,53	12,70	25,81	<b>99144</b>
<b>37,85</b>	<b>38,00</b>	38,00	45,24	13,00	16,99	24,99	<b>99147</b>
<b>38,02</b>	<b>38,18</b>	38,10	45,24	9,53	12,70	25,81	<b>99823<sup>2)</sup></b>
		38,10	45,24	9,53	12,70	25,81	<b>99150</b>
		38,10	45,24	14,30	17,48	25,81	<b>99822<sup>2)</sup></b>
		38,10	45,24	14,30	17,48	25,81	<b>99149</b>
<b>38,61</b>	<b>38,76</b>	38,68	47,22	11,13	14,30	25,81	<b>99152</b>
<b>39,34</b>	<b>39,50</b>	39,42	47,22	11,13	14,30	25,81	<b>99155</b>
<b>39,60</b>	<b>39,75</b>	39,67	47,22	14,30	17,48	25,81	<b>99824<sup>2)</sup></b>
		39,67	47,22	14,30	17,48	25,81	<b>99156</b>
<b>39,78</b>	<b>39,93</b>	39,85	47,22	15,88	19,05	25,81	<b>99159</b>
<b>39,85</b>	<b>40,01</b>	40,01	46,99	9,91	12,93	25,40	<b>99153</b>
<b>39,93</b>	<b>40,08</b>	40,08	46,99	13,00	16,00	25,98	<b>99825<sup>2)</sup></b>
		40,08	46,99	13,00	16,00	25,98	<b>99157</b>
<b>40,69</b>	<b>40,84</b>	40,77	49,23	12,70	16,28	25,40	<b>99160</b>
<b>40,84</b>	<b>41,00</b>	41,00	49,23	12,70	15,88	25,81	<b>99163</b>
<b>41,20</b>	<b>41,35</b>	41,28	47,63	7,95	11,13	25,81	<b>99161</b>
		41,28	47,63	14,30	17,48	20,65	<b>99826<sup>2)</sup></b>
		41,28	47,63	14,30	17,48	20,65	<b>99162</b>
<b>41,83</b>	<b>42,01</b>	41,91	53,01	11,30	14,50	21,49	<b>99166</b>
		41,91	53,01	14,30	17,50	21,01	<b>99169</b>
		42,01	53,01	14,30	17,50	21,01	<b>99873<sup>2)</sup></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

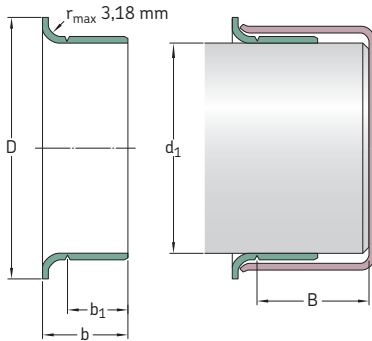
Shaft diameter range		Nominal dimensions					Designation
d <sub>1</sub> min	max	d <sub>1</sub>	D ±1,6	b <sub>1</sub> ±0,8	b ±0,8	B <sup>1)</sup>	
mm	mm	mm					–
41,99	42,14	42,06	53,01	13,97	17,50	21,01	99165
42,77	42,93	42,88	48,41	14,30	17,48	22,23	99168
42,80	42,95	42,88	48,41	7,95	11,13	22,23	99167
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		
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

<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

## SKF Speedi-Sleeve – metric dimensions (converted from inch dimensions)

$d_1$  54,91 – 74,75 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 $\pm 0,8$	$B^1$	
mm		mm					–
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
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

<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

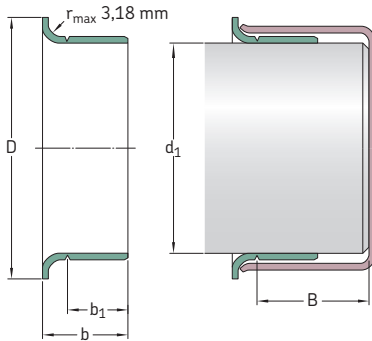
Shaft diameter range		Nominal dimensions					Designation
d <sub>1</sub> min	max	d <sub>1</sub>	D ±1,6	b <sub>1</sub> ±0,8	b ±0,8	B <sup>1)</sup>	
mm		mm					–
<b>61,85</b>	<b>62,00</b>	61,93	71,83	12,70	15,88	36,20	<b>99242</b>
<b>63,22</b>	<b>63,37</b>	63,30	73,03	19,84	23,83	35,38	<b>99249</b>
<b>63,42</b>	<b>63,58</b>	63,50	71,63	14,10	16,51	22,61	<b>99253</b>
<b>63,50</b>	<b>63,65</b>	63,50 63,50 63,50	71,83 71,63 71,63	12,70 19,84 19,84	16,66 23,83 23,83	35,38 34,93 34,93	<b>99248</b> <b>99840<sup>2)</sup></b> <b>99250</b>
<b>63,75</b>	<b>63,91</b>	63,91	71,83	19,84	23,01	36,53	<b>99251</b>
<b>64,92</b>	<b>65,07</b>	65,00 65,00	72,39 72,39	19,99 19,99	22,99 22,99	34,93 34,93	<b>99841<sup>2)</sup></b> <b>99254</b>
<b>65,02</b>	<b>65,18</b>	65,10	73,43	19,84	23,83	34,93	<b>99256</b>
<b>65,91</b>	<b>66,07</b>	65,99	75,95	19,84	23,83	31,75	<b>99259</b>
<b>66,50</b>	<b>66,65</b>	66,57	77,39	19,84	23,83	34,93	<b>99261</b>
<b>66,57</b>	<b>66,73</b>	66,68	77,39	19,84	23,01	34,93	<b>99264</b>
<b>66,60</b>	<b>66,75</b>	66,68	77,39	12,70	15,88	34,93	<b>99260</b>
<b>66,68</b>	<b>66,83</b>	66,68 66,68	77,39 77,39	19,84 19,84	23,83 23,83	34,93 34,93	<b>99842<sup>2)</sup></b> <b>99262</b>
<b>67,82</b>	<b>68,00</b>	68,00	79,38	19,05	22,23	42,88	<b>99266</b>
<b>69,27</b>	<b>69,42</b>	69,34	79,38	19,84	23,01	33,35	<b>99268</b>
<b>69,60</b>	<b>69,75</b>	69,67	77,85	19,84	23,83	31,75	<b>99273</b>
<b>69,72</b>	<b>69,88</b>	69,85 69,85	79,38 79,38	19,84 19,84	23,83 23,83	31,75 31,75	<b>99843<sup>2)</sup></b> <b>99274</b>
<b>69,77</b>	<b>69,93</b>	69,85	78,11	36,53	41,28	41,28	<b>99267</b>
<b>69,85</b>	<b>70,00</b>	69,85 69,85 69,85 69,85	79,38 79,38 79,38 79,38	10,31 19,84 19,84 19,84	14,30 23,83 23,83 28,58	31,75 31,75 31,75 33,32	<b>99272</b> <b>99844<sup>2)</sup></b> <b>99275</b> <b>99269</b>
<b>69,93</b>	<b>70,08</b>	70,00	79,38	19,99	24,00	31,75	<b>99276</b>
<b>71,35</b>	<b>71,50</b>	71,45	80,98	15,09	17,48	31,75	<b>99281</b>
<b>71,83</b>	<b>72,01</b>	72,01 72,01	81,92 81,92	19,05 19,05	22,23 22,23	34,11 34,11	<b>99870<sup>2)</sup></b> <b>99284</b>
<b>72,09</b>	<b>72,24</b>	72,09 72,09	81,92 81,92	12,70 12,70	16,66 16,66	31,75 31,75	<b>99845<sup>2)</sup></b> <b>99282</b>
<b>72,80</b>	<b>72,95</b>	72,87	80,98	19,84	23,83	31,75	<b>99286</b>
<b>72,97</b>	<b>73,13</b>	73,03 73,03	81,76 81,76	19,84 19,84	23,83 23,83	31,75 31,75	<b>99846<sup>2)</sup></b> <b>99287</b>
<b>74,60</b>	<b>74,75</b>	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	<b>99290</b> <b>99847<sup>2)</sup></b> <b>99293</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

## SKF Speedi-Sleeve – metric dimensions (converted from inch dimensions)

$d_1$  74,93 – 98,53 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					–
<b>74,93</b>	<b>75,08</b>	75,01	83,13	15,09	17,53	27,51	<b>99289</b>
		75,01	83,95	22,00	26,01	33,35	<b>99875</b> <sup>2)</sup>
		75,01	83,95	22,00	26,01	33,35	<b>99294</b>
<b>75,49</b>	<b>75,59</b>	75,54	82,17	20,65	25,40	31,75	<b>99292</b>
<b>75,95</b>	<b>76,10</b>	76,02	85,32	12,29	15,88	33,81	<b>99291</b>
		76,02	85,32	14,30	17,48	34,93	<b>99298</b>
		76,02	85,09	20,65	25,40	32,54	<b>99299</b>
<b>76,12</b>	<b>76,28</b>	76,20	82,30	20,65	23,83	34,93	<b>99296</b>
<b>76,20</b>	<b>76,35</b>	76,20	84,96	15,88	20,65	32,51	<b>99048</b>
		76,20	82,17	20,65	25,40	32,54	<b>99848</b> <sup>2)</sup>
		76,20	82,17	20,65	25,40	32,54	<b>99300</b>
<b>76,40</b>	<b>76,56</b>	76,48	85,22	12,70	15,88	50,80	<b>99301</b>
<b>77,83</b>	<b>78,00</b>	78,00	88,09	19,05	22,23	52,22	<b>99306</b>
<b>79,25</b>	<b>79,40</b>	79,38	89,69	17,48	20,65	50,80	<b>99311</b>
		79,38	89,69	20,65	25,40	50,80	<b>99849</b> <sup>2)</sup>
		79,38	89,69	20,65	25,40	50,80	<b>99312</b>
<b>79,35</b>	<b>79,55</b>	79,38	89,54	14,00	18,01	51,59	<b>99053</b>
<b>79,81</b>	<b>80,01</b>	80,01	89,92	19,05	22,50	34,93	<b>99313</b>
<b>79,91</b>	<b>80,09</b>	80,01	89,99	11,00	15,01	34,93	<b>99317</b>
		80,01	89,99	21,01	24,00	34,93	<b>99315</b>
<b>81,92</b>	<b>82,07</b>	81,99	91,06	16,76	21,54	44,45	<b>99328</b>
<b>82,47</b>	<b>82,63</b>	82,55	91,29	20,65	25,40	34,93	<b>99322</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

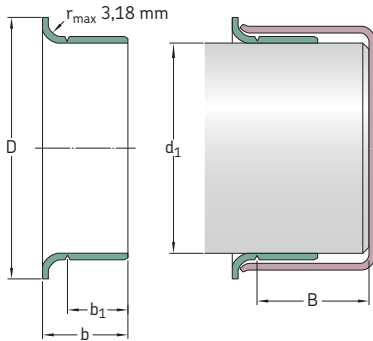
Shaft diameter range		Nominal dimensions					Designation
d <sub>1</sub> min	max	d <sub>1</sub>	D ±1,6	b <sub>1</sub> ±0,8	b ±0,8	B <sup>1)</sup>	
mm		mm					–
<b>82,55</b>	<b>82,70</b>	82,55	90,81	15,11	18,26	34,93	<b>99850<sup>2)</sup></b>
		82,55	90,81	15,11	18,26	34,93	<b>99324</b>
		82,55	91,06	17,48	22,23	31,75	<b>99326</b>
		82,55	91,06	20,65	25,40	34,93	<b>99851<sup>2)</sup></b>
		82,55	91,06	20,65	25,40	34,93	<b>99325</b>
<b>84,00</b>	<b>84,15</b>	84,07	93,68	20,65	25,40	34,93	<b>99331</b>
<b>84,76</b>	<b>85,01</b>	84,89	93,98	16,99	21,01	35,00	<b>99332</b>
		84,89	93,98	21,01	24,99	35,00	<b>99872<sup>2)</sup></b>
		84,89	93,98	21,01	24,99	35,00	<b>99333</b>
<b>84,79</b>	<b>85,01</b>	85,01	90,93	10,13	12,67	36,35	<b>99334</b>
<b>85,67</b>	<b>85,83</b>	85,73	93,68	9,53	12,70	35,81	<b>99338</b>
		85,73	93,85	20,65	25,40	34,93	<b>99337</b>
<b>87,25</b>	<b>87,40</b>	87,33	97,64	19,84	23,01	35,71	<b>99339</b>
<b>87,80</b>	<b>88,00</b>	88,00	95,28	29,21	34,27	42,50	<b>99481</b>
<b>88,32</b>	<b>88,47</b>	88,39	97,41	19,84	23,01	35,71	<b>99340</b>
<b>88,82</b>	<b>88,98</b>	88,90	97,64	15,88	20,65	34,21	<b>99346</b>
<b>88,90</b>	<b>89,05</b>	88,90	97,16	7,95	12,70	34,21	<b>99347</b>
		88,90	97,64	20,65	25,40	34,21	<b>99852<sup>2)</sup></b>
		88,90	97,64	20,65	25,40	34,21	<b>99350</b>
<b>88,93</b>	<b>89,08</b>	89,00	97,64	15,88	20,65	34,24	<b>99349</b>
<b>89,92</b>	<b>90,07</b>	89,99	101,60	11,13	13,67	46,05	<b>99352</b>
		89,99	101,60	13,36	16,94	44,45	<b>99353</b>
		89,99	101,60	18,03	23,01	46,05	<b>99351</b>
		89,99	101,60	23,01	27,99	44,45	<b>99354</b>
<b>90,42</b>	<b>90,58</b>	90,50	99,06	20,65	25,40	44,45	<b>99356</b>
<b>91,90</b>	<b>92,05</b>	91,97	102,39	20,65	25,40	44,45	<b>99360</b>
<b>92,02</b>	<b>92,18</b>	92,08	102,24	12,70	15,88	44,45	<b>99363</b>
		92,08	102,39	20,65	25,40	44,45	<b>99362</b>
<b>93,57</b>	<b>93,73</b>	93,68	102,39	7,95	11,13	22,23	<b>99368</b>
<b>93,60</b>	<b>93,75</b>	93,68	102,24	20,65	23,83	45,72	<b>99365</b>
<b>94,67</b>	<b>94,82</b>	94,74	102,01	11,91	15,09	45,72	<b>99359</b>
		94,74	102,24	19,84	23,01	45,72	<b>99366</b>
<b>94,92</b>	<b>95,07</b>	95,00	102,24	21,01	24,00	45,72	<b>99369</b>
<b>95,00</b>	<b>95,15</b>	95,07	102,39	8,74	12,70	45,72	<b>99374</b>
		95,07	102,49	11,91	15,09	45,72	<b>99364</b>
<b>95,15</b>	<b>95,30</b>	95,22	102,24	14,30	17,48	45,72	<b>99376</b>
<b>95,25</b>	<b>95,40</b>	95,25	102,11	17,48	22,23	45,72	<b>99853<sup>2)</sup></b>
		95,33	102,24	8,74	12,70	45,72	<b>99367</b>
		95,33	102,11	17,48	22,23	45,72	<b>99372</b>
<b>98,25</b>	<b>98,40</b>	98,32	106,30	20,65	25,40	47,63	<b>99386</b>
<b>98,37</b>	<b>98,53</b>	98,43	107,16	20,65	25,40	47,63	<b>99387</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

## SKF Speedi-Sleeve – metric dimensions (converted from inch dimensions)

$d_1$  99,95 – 152,48 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 $\pm 0,8$	$B^1$	
mm		mm					–
<b>99,95</b>	<b>100,10</b>	100,03	109,55	20,65	25,40	52,07	<b>99854<sup>2)</sup></b> <b>99393</b>
		100,03	109,55	20,65	25,40	52,07	
<b>101,55</b>	<b>101,75</b>	101,60	111,13	12,70	15,88	52,48	<b>99401</b> <b>99395</b> <b>99400</b> <b>99855<sup>2)</sup></b> <b>99399</b>
		101,60	111,13	15,24	18,42	52,07	
		101,60	111,13	16,51	19,69	34,93	
		101,60	111,13	20,65	25,40	52,07	
		101,60	111,13	20,65	25,40	52,07	
<b>103,89</b>	<b>104,09</b>	103,99	112,73	19,99	24,00	35,99	<b>99409</b>
<b>104,70</b>	<b>104,90</b>	104,78	113,54	20,65	25,40	34,93	<b>99412</b>
<b>104,90</b>	<b>105,11</b>	105,00	113,54	19,99	23,19	35,00	<b>99413</b>
<b>106,25</b>	<b>106,45</b>	106,38	114,30	20,65	25,40	34,93	<b>99418</b>
<b>107,34</b>	<b>107,54</b>	107,54	117,09	19,84	23,01	36,53	<b>99423</b>
<b>107,90</b>	<b>108,10</b>	107,95	117,09	20,65	25,40	36,53	<b>99424</b>
<b>109,78</b>	<b>110,01</b>	110,01	124,99	11,38	14,96	32,94	<b>99434</b>
<b>109,91</b>	<b>110,11</b>	109,93	124,99	12,93	16,51	31,75	<b>99435</b>
<b>111,00</b>	<b>111,20</b>	111,13	120,65	20,65	25,40	41,91	<b>99437</b>
<b>111,79</b>	<b>111,99</b>	111,99	120,65	19,05	22,50	33,02	<b>99438</b>
<b>112,62</b>	<b>112,83</b>	112,73	122,25	25,40	29,01	33,35	<b>99439</b>
<b>114,20</b>	<b>114,40</b>	114,30	123,19	20,65	25,40	31,75	<b>99856<sup>2)</sup></b> <b>99450</b>
		114,30	124,46	20,65	25,40	31,75	
<b>114,88</b>	<b>115,09</b>	115,01	127,00	20,65	23,83	31,75	<b>99452</b>
<b>117,37</b>	<b>117,58</b>	117,48	127,00	11,13	15,88	34,93	<b>99465</b> <b>99463</b>
		117,48	128,60	25,40	31,75	34,93	

<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



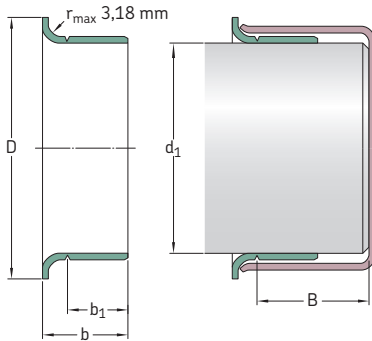
Shaft diameter range		Nominal dimensions					Designation
d <sub>1</sub> min	max	d <sub>1</sub>	D ±1,6	b <sub>1</sub> ±0,8	b ±0,8	B <sup>1)</sup>	
mm		mm					–
<b>119,00</b>	<b>119,20</b>	119,08	128,60	20,65	25,40	34,93	<b>99468</b>
<b>119,89</b>	<b>120,09</b>	119,99 119,99	129,79 129,79	8,00 19,99	11,00 24,99	33,60 32,00	<b>99471</b> <b>99473</b>
<b>120,55</b>	<b>120,75</b>	120,65	127,00	12,70	19,05	38,10	<b>99475</b>
<b>121,89</b>	<b>122,10</b>	122,00	131,50	19,99	24,00	32,00	<b>99472</b>
<b>122,91</b>	<b>123,11</b>	123,01	132,82	19,99	24,99	31,60	<b>99484</b>
<b>123,72</b>	<b>123,93</b>	123,83	133,35	15,88	19,05	36,53	<b>99487</b>
<b>124,89</b>	<b>125,10</b>	124,99 124,99	137,16 137,16	10,01 26,01	14,00 32,00	36,53 36,53	<b>99490</b> <b>99492</b>
<b>126,95</b>	<b>127,15</b>	127,00 127,00 127,00 127,00 127,00	137,16 137,16 137,16 136,91 136,91	13,72 17,48 17,48 20,65 20,65	17,30 22,23 22,23 25,40 25,40	36,53 36,53 36,53 36,53 36,53	<b>99501</b> <b>99857<sup>2)</sup></b> <b>99498</b> <b>99858<sup>2)</sup></b> <b>99499</b>
<b>127,80</b>	<b>128,00</b>	128,00	135,26	29,21	34,27	40,30	<b>99482</b>
<b>129,79</b>	<b>130,00</b>	129,90	139,52	19,05	23,83	30,00	<b>99494</b>
<b>129,97</b>	<b>130,18</b>	130,00 130,18	139,52 139,52	22,00 22,00	25,30 25,30	32,51 32,51	<b>99874<sup>2)</sup></b> <b>99491</b>
<b>130,05</b>	<b>130,25</b>	130,18	139,70	20,65	25,40	31,75	<b>99513</b>
<b>133,25</b>	<b>133,45</b>	133,35	141,22	20,65	25,40	31,75	<b>99525</b>
<b>134,80</b>	<b>135,00</b>	134,90	145,67	20,50	25,40	31,75	<b>99533</b>
<b>136,42</b>	<b>136,63</b>	136,53	149,23	20,65	25,40	31,75	<b>99537</b>
<b>138,02</b>	<b>138,23</b>	138,13	146,05	38,10	42,88	47,63	<b>99548</b>
<b>138,99</b>	<b>139,19</b>	139,09	149,86	14,30	19,05	31,34	<b>99547</b>
<b>139,65</b>	<b>139,85</b>	139,70 139,70 139,70	150,83 150,83 150,83	13,16 20,65 20,65	17,91 25,40 25,40	31,75 31,75 31,75	<b>99550</b> <b>99859<sup>2)</sup></b> <b>99549</b>
<b>139,90</b>	<b>140,11</b>	140,00	151,00	20,50	25,40	31,75	<b>99552</b>
<b>142,77</b>	<b>142,98</b>	142,88	157,18	22,23	25,40	46,02	<b>99560</b>
<b>144,75</b>	<b>145,01</b>	145,01	154,94	19,05	22,23	46,02	<b>99571</b>
<b>145,44</b>	<b>145,64</b>	145,64	154,94	14,30	19,05	49,23	<b>99562</b>
<b>145,95</b>	<b>146,15</b>	146,05	156,97	20,65	25,40	44,45	<b>99575</b>
<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>

<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

## SKF Speedi-Sleeve – metric dimensions (converted from inch dimensions)

$d_1$  153,87 – 203,33 mm



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

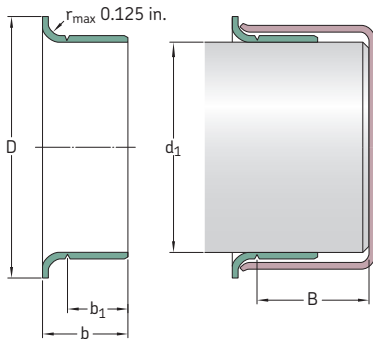
Shaft diameter range		Nominal dimensions					Designation
$d_1$ min	max	$d_1$	D $\pm 1,6$	$b_1$ $\pm 0,8$	b $\pm 0,8$	$B^1)$	
mm		mm					–
153,87	154,13	154,00	161,93	26,01	30,00	32,99	99605
154,74	154,99	154,86	167,01	26,01	30,00	32,99	99606
157,43	157,68	157,56	168,28	20,65	27,00	44,45	99620
158,62	158,88	158,75	168,28	26,19	31,75	44,45	99625
159,74	159,99	159,99	171,45	25,40	31,75	34,93	99630
164,97	165,23	165,10	177,80	25,40	31,75	34,93	99650
169,75	170,00	169,88	182,58	31,75	38,00	44,45	99640
171,32	171,58	171,45	180,98	20,65	27,00	44,45	99675
174,75	175,01	175,01	186,99	27,99	32,00	35,00	99687
177,67	177,93	177,80 177,80	189,87 189,87	25,40 25,40	31,75 31,75	42,88 42,88	99864 <sup>2)</sup> 99700
179,76	180,01	180,01	190,50	32,99	38,00	44,50	99721
184,00	184,25	184,15	197,10	31,75	38,10	55,25	99725
184,73	184,99	184,86	197,10	32,00	38,00	54,99	99726
189,08	189,33	189,31	199,64	20,65	25,40	31,75	99745
190,37	190,63	190,50	200,03	20,65	25,40	31,75	99750
196,72	196,98	196,85	210,06	25,40	33,35	47,63	99775
199,87	200,13	200,03	212,73	34,52	38,10	44,45	99787
201,50	201,75	201,63	212,73	25,40	31,75	44,45	99799
203,07	203,33	203,20	212,73	25,40	31,75	44,45	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

## SKF Speedi-Sleeve – inch dimensions

$d_1$  0.472 – 0.877 in.



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

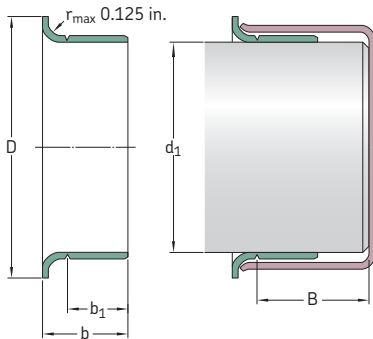
Shaft diameter range		Nominal dimensions					Designation	
$d_1$ min	max	$d_1$	D $\pm 0.063$	$b_1$ $\pm 0.031$	b $\pm 0.031$	$B^1$		
in.		in.						–
0.472	0.475	0.472	0.610	0.236	0.331	1.875	99049	
0.498	0.502	0.500	0.610	0.250	0.344	2.000	99050	
0.547	0.551	0.551	0.750	0.250	0.391	1.831	99055	
0.560	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	0.750	0.313	0.406	2.000	99810 <sup>2)</sup>	
		0.625	0.750	0.313	0.406	2.000	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	0.945	0.313	0.438	2.000	99811 <sup>2)</sup>	
		0.750	0.945	0.313	0.438	2.000	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	1.188	0.259	0.359	1.856	99084	
		0.866	1.188	0.315	0.472	1.812	99085	
0.873	0.877	0.875	1.094	0.313	0.438	2.000	99812 <sup>2)</sup>	
		0.875	1.094	0.313	0.438	2.000	99087	

<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

## SKF Speedi-Sleeve – inch dimensions

$d_1$  0.908 – 1.659 in.



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.					–	
<b>0.908</b>	<b>0.912</b>	0.910	1.218	0.313	0.438	1.847	<b>99860</b> <sup>2)</sup> <b>99091</b>	
		0.910	1.218	0.313	0.438	1.847		
<b>0.940</b>	<b>0.945</b>	0.945	1.130	0.313	0.438	2.000	<b>99092</b>	
<b>0.966</b>	<b>0.970</b>	0.969	1.130	0.313	0.438	2.000	<b>99094</b> <b>99096</b>	
		0.969	1.130	0.625	0.719	2.000		
<b>0.982</b>	<b>0.986</b>	0.984	1.300	0.313	0.433	2.000	<b>99813</b> <sup>2)</sup> <b>99098</b>	
		0.984	1.300	0.313	0.433	2.000		
<b>0.998</b>	<b>1.002</b>	1.000	1.219	0.313	0.438	2.000	<b>99814</b> <sup>2)</sup> <b>99868</b>	
		1.000	1.219	0.313	0.438	2.000		
<b>1.019</b>	<b>1.024</b>	1.024	1.313	0.315	0.472	1.813	<b>99103</b>	
<b>1.060</b>	<b>1.064</b>	1.063	1.320	0.313	0.438	1.843	<b>99815</b> <sup>2)</sup> <b>99106</b>	
		1.063	1.320	0.313	0.438	1.843		
<b>1.087</b>	<b>1.091</b>	1.089	1.406	0.313	0.438	0.625	<b>99108</b>	
<b>1.100</b>	<b>1.104</b>	1.102	1.375	0.375	0.500	1.843	<b>99866</b> <sup>2)</sup> <b>99111</b>	
		1.102	1.375	0.375	0.500	1.843		
<b>1.123</b>	<b>1.127</b>	1.125	1.500	0.313	0.438	0.688	<b>99816</b> <sup>2)</sup> <b>99112</b> <b>99116</b>	
		1.125	1.500	0.313	0.438	0.688		
		1.125	1.500	0.375	0.500	0.688		
<b>1.154</b>	<b>1.158</b>	1.156	1.350	0.375	0.500	0.688	<b>99865</b> <sup>2)</sup> <b>99120</b>	
		1.156	1.350	0.375	0.500	0.688		
<b>1.173</b>	<b>1.178</b>	1.175	1.400	0.313	0.438	0.688	<b>99122</b>	
<b>1.179</b>	<b>1.184</b>	1.181	1.400	0.315	0.433	0.688	<b>99114</b>	
<b>1.185</b>	<b>1.190</b>	1.188	1.400	0.313	0.438	0.688	<b>99118</b>	
<b>1.216</b>	<b>1.222</b>	1.219	1.563	0.313	0.433	0.625	<b>99123</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

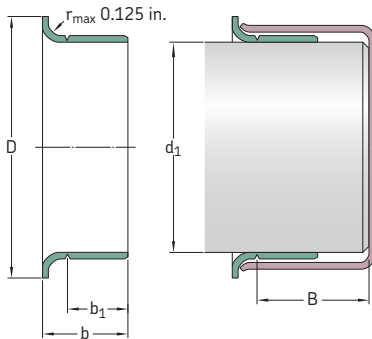
Shaft diameter range		Nominal dimensions					Designation
d <sub>1</sub> min	max	d <sub>1</sub>	D ±0.063	b <sub>1</sub> ±0.031	b ±0.031	B <sup>1)</sup>	
in.		in.					–
1.237	1.243	1.240	1.540	0.315	0.438	0.688	<b>99141</b>
1.247	1.253	1.250 1.250	1.500 1.500	0.313 0.313	0.438 0.438	0.688 0.688	<b>99817<sup>2)</sup></b> <b>99125</b>
1.257	1.263	1.260	1.500	0.315	0.438	0.688	<b>99128</b>
1.297	1.301	1.299	1.594	0.591	0.709	1.000	<b>99121</b>
1.308	1.314	1.313	1.600	0.250	0.375	0.813	<b>99129</b>
1.310	1.316	1.313 1.313	1.594 1.594	0.500 0.500	0.625 0.625	0.813 0.813	<b>99818<sup>2)</sup></b> <b>99131</b>
1.333	1.339	1.339	1.625	0.500	0.625	0.813	<b>99134</b>
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	<b>99133</b> <b>99819<sup>2)</sup></b> <b>99138</b>
1.375	1.381	1.375 1.375	1.638 1.638	0.512 0.512	0.630 0.630	0.813 0.813	<b>99820<sup>2)</sup></b> <b>99139</b>
1.411	1.417	1.417	1.781	0.512	0.669	0.984	<b>99146</b>
1.432	1.438	1.438 1.438	1.781 1.781	0.563 0.563	0.688 0.688	1.016 1.016	<b>99821<sup>2)</sup></b> <b>99143</b>
1.435	1.441	1.438	1.781	0.375	0.500	1.016	<b>99144</b>
1.490	1.496	1.496	1.781	0.512	0.669	0.984	<b>99147</b>
1.497	1.503	1.500 1.500 1.500 1.500	1.781 1.781 1.781 1.781	0.375 0.375 0.563 0.563	0.500 0.500 0.688 0.688	1.016 1.016 1.016 1.016	<b>99823<sup>2)</sup></b> <b>99150</b> <b>99822<sup>2)</sup></b> <b>99149</b>
1.520	1.526	1.523	1.859	0.438	0.563	1.016	<b>99152</b>
1.549	1.555	1.552	1.859	0.438	0.563	1.016	<b>99155</b>
1.559	1.565	1.562 1.562	1.859 1.859	0.563 0.563	0.688 0.688	1.016 1.016	<b>99824<sup>2)</sup></b> <b>99156</b>
1.566	1.572	1.569	1.859	0.625	0.750	1.016	<b>99159</b>
1.569	1.575	1.575	1.850	0.390	0.509	1.000	<b>99153</b>
1.572	1.578	1.578 1.578	1.850 1.850	0.512 0.512	0.630 0.630	1.023 1.023	<b>99825<sup>2)</sup></b> <b>99157</b>
1.602	1.608	1.605	1.938	0.500	0.641	1.000	<b>99160</b>
1.608	1.614	1.614	1.938	0.500	0.625	1.016	<b>99163</b>
1.622	1.628	1.625 1.625 1.625	1.875 1.875 1.875	0.313 0.563 0.563	0.438 0.688 0.688	1.016 0.813 0.813	<b>99161</b> <b>99826<sup>2)</sup></b> <b>99162</b>
1.647	1.654	1.650 1.650 1.654	2.087 2.087 2.087	0.445 0.563 0.563	0.571 0.689 0.689	0.846 0.827 0.827	<b>99166</b> <b>99169</b> <b>99873<sup>2)</sup></b>
1.653	1.659	1.656	2.087	0.550	0.689	0.827	<b>99165</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

## SKF Speedi-Sleeve – inch dimensions

$d_1$  1.684 – 2.441 in.



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 $\pm 0.031$	$B^1)$		
in.		in.						–
<b>1.684</b>	<b>1.690</b>	1.688	1.906	0.563	0.688	0.875	<b>99168</b>	
<b>1.685</b>	<b>1.691</b>	1.688	1.906	0.313	0.438	0.875	<b>99167</b>	
<b>1.687</b>	<b>1.693</b>	1.693	1.906	0.500	0.625	0.844	<b>99182</b>	
<b>1.715</b>	<b>1.721</b>	1.719	2.031	0.563	0.688	0.813	<b>99171</b>	
<b>1.736</b>	<b>1.742</b>	1.739	2.063	0.375	0.500	0.813	<b>99170</b>	
<b>1.747</b>	<b>1.753</b>	1.750	2.055	0.375	0.500	0.813	<b>99172</b>	
		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>	

<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

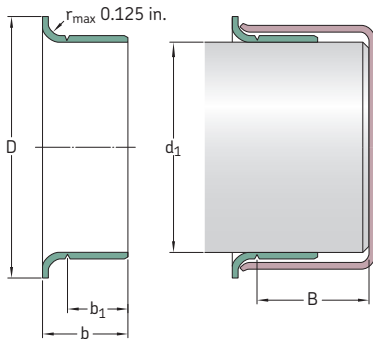
Shaft diameter range		Nominal dimensions					Designation
d <sub>1</sub> min	max	d <sub>1</sub>	D ±0.063	b <sub>1</sub> ±0.031	b ±0.031	B <sup>1)</sup>	
in.		in.					–
<b>1.887</b>	<b>1.893</b>	1.891	2.205	0.551	0.668	0.984	<b>99189</b>
<b>1.909</b>	<b>1.915</b>	1.912	2.219	0.375	0.500	1.000	<b>99192</b>
<b>1.934</b>	<b>1.940</b>	1.938 1.938	2.219 2.219	0.563 0.563	0.688 0.688	1.000 1.000	<b>99833<sup>2)</sup></b> <b>99193</b>
<b>1.965</b>	<b>1.971</b>	1.969 1.969	2.244 2.244	0.551 0.551	0.668 0.668	1.350 0.984	<b>99052</b> <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 2.000 2.000 2.000	2.406 2.406 2.406 2.406	0.563 0.563 0.875 0.875	0.688 0.688 1.000 1.000	1.006 1.000 1.000 1.000	<b>99834<sup>2)</sup></b> <b>99199</b> <b>99835<sup>2)</sup></b> <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 2.125	2.422 2.422	0.781 0.781	0.938 0.938	1.375 1.375	<b>99836<sup>2)</sup></b> <b>99212</b>
<b>2.162</b>	<b>2.168</b>	2.165 2.165	2.441 2.441	0.787 0.787	0.905 0.905	1.250 1.250	<b>99863<sup>2)</sup></b> <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 2.205	2.531 2.531	0.500 0.779	0.625 0.936	1.313 3.150	<b>99220</b> <b>99224</b>
<b>2.227</b>	<b>2.233</b>	2.230 2.230 2.230	2.531 2.531 2.531	0.500 0.500 0.781	0.625 0.625 0.906	1.313 1.313 1.250	<b>99861<sup>2)</sup></b> <b>99229</b> <b>99230</b>
<b>2.237</b>	<b>2.243</b>	2.240	2.563	0.764	0.900	1.250	<b>99226</b>
<b>2.249</b>	<b>2.255</b>	2.250 2.250 2.250 2.250	2.531 2.531 2.531 2.531	0.313 0.313 0.781 0.781	0.438 0.438 0.938 0.938	1.313 1.313 1.313 1.313	<b>99838<sup>2)</sup></b> <b>99227</b> <b>99837<sup>2)</sup></b> <b>99225</b>
<b>2.280</b>	<b>2.286</b>	2.283	2.598	0.787	0.938	1.375	<b>99219</b>
<b>2.309</b>	<b>2.315</b>	2.313	2.688	0.781	0.938	1.375	<b>99231</b>
<b>2.327</b>	<b>2.333</b>	2.328	2.750	0.750	0.875	1.500	<b>99233</b>
<b>2.359</b>	<b>2.365</b>	2.362 2.362 2.362	2.785 2.785 2.785	0.370 0.787 0.787	0.450 0.905 0.905	1.471 1.375 1.375	<b>99241</b> <b>99869<sup>2)</sup></b> <b>99235</b>
<b>2.372</b>	<b>2.378</b>	2.375	2.750	0.594	0.750	1.375	<b>99238</b>
<b>2.374</b>	<b>2.380</b>	2.375 2.375 2.375	2.750 2.750 2.750	0.526 0.781 0.781	0.683 0.938 0.938	1.375 1.375 1.375	<b>99240</b> <b>99839<sup>2)</sup></b> <b>99237</b>
<b>2.434</b>	<b>2.441</b>	2.438 2.441	2.828 2.828	0.781 0.500	0.938 0.625	1.393 1.425	<b>99243</b> <b>99244</b>
<b>2.435</b>	<b>2.441</b>	2.438	2.828	0.500	0.625	1.425	<b>99242</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

## SKF Speedi-Sleeve – inch dimensions

$d_1$  2.489 – 3.256 in.



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 $\pm 0.031$	$B^1$		
in.		in.						–
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	
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	

<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



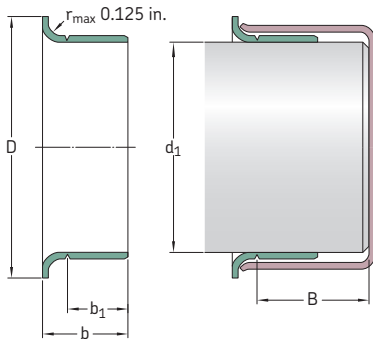
Shaft diameter range		Nominal dimensions					Designation
d <sub>1</sub> min	max	d <sub>1</sub>	D ±0.063	b <sub>1</sub> ±0.031	b ±0.031	B <sup>1)</sup>	
in.		in.					–
2.750	2.756	2.750	3.125	0.406	0.563	1.250	99272
		2.750	3.125	0.781	0.938	1.250	99844 <sup>2)</sup>
		2.750	3.125	0.781	0.938	1.250	99275
		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
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

<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

## SKF Speedi-Sleeve – inch dimensions

$d_1$  3.307 – 4.728 in.



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 $\pm 0.031$	$B^1)$	
in.		in.					–
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
3.618	3.624	3.621	4.031	0.813	1.000	1.750	99360
3.623	3.629	3.625	4.025	0.500	0.625	1.750	99363
		3.625	4.031	0.813	1.000	1.750	99362
3.684	3.690	3.688	4.031	0.313	0.438	0.875	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

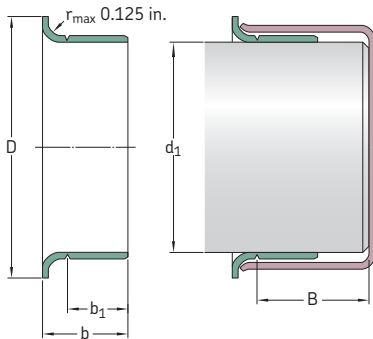
Shaft diameter range		Nominal dimensions					Designation
d <sub>1</sub> min	max	d <sub>1</sub>	D ±0.063	b <sub>1</sub> ±0.031	b ±0.031	B <sup>1)</sup>	
in.		in.					–
<b>3.685</b>	<b>3.691</b>	3.688	4.025	0.813	0.938	1.800	<b>99365</b>
<b>3.727</b>	<b>3.733</b>	3.730 3.730	4.016 4.025	0.469 0.781	0.594 0.906	1.800 1.800	<b>99359</b> <b>99366</b>
<b>3.737</b>	<b>3.743</b>	3.740	4.025	0.827	0.945	1.800	<b>99369</b>
<b>3.740</b>	<b>3.746</b>	3.743 3.743	4.031 4.035	0.344 0.469	0.500 0.594	1.800 1.800	<b>99374</b> <b>99364</b>
<b>3.746</b>	<b>3.752</b>	3.749	4.025	0.563	0.688	1.800	<b>99376</b>
<b>3.750</b>	<b>3.756</b>	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	<b>99853<sup>2)</sup></b> <b>99367</b> <b>99372</b>
<b>3.868</b>	<b>3.874</b>	3.871	4.185	0.813	1.000	1.875	<b>99386</b>
<b>3.873</b>	<b>3.879</b>	3.875	4.219	0.813	1.000	1.875	<b>99387</b>
<b>3.935</b>	<b>3.941</b>	3.938 3.938	4.313 4.313	0.813 0.813	1.000 1.000	2.050 2.050	<b>99854<sup>2)</sup></b> <b>99393</b>
<b>3.998</b>	<b>4.006</b>	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	<b>99401</b> <b>99395</b> <b>99400</b> <b>99855<sup>2)</sup></b> <b>99399</b>
<b>4.090</b>	<b>4.098</b>	4.094	4.438	0.787	0.945	1.417	<b>99409</b>
<b>4.122</b>	<b>4.130</b>	4.125	4.470	0.813	1.000	1.375	<b>99412</b>
<b>4.130</b>	<b>4.138</b>	4.134	4.470	0.787	0.913	1.378	<b>99413</b>
<b>4.183</b>	<b>4.191</b>	4.188	4.500	0.813	1.000	1.375	<b>99418</b>
<b>4.226</b>	<b>4.234</b>	4.234	4.610	0.781	0.906	1.438	<b>99423</b>
<b>4.248</b>	<b>4.256</b>	4.250	4.610	0.813	1.000	1.438	<b>99424</b>
<b>4.322</b>	<b>4.331</b>	4.331	4.921	0.448	0.589	1.297	<b>99434</b>
<b>4.327</b>	<b>4.335</b>	4.328	4.921	0.509	0.650	1.250	<b>99435</b>
<b>4.370</b>	<b>4.378</b>	4.375	4.750	0.813	1.000	1.650	<b>99437</b>
<b>4.401</b>	<b>4.409</b>	4.409	4.750	0.750	0.886	1.300	<b>99438</b>
<b>4.434</b>	<b>4.442</b>	4.438	4.813	1.000	1.142	1.313	<b>99439</b>
<b>4.496</b>	<b>4.504</b>	4.500 4.500	4.850 4.900	0.813 0.813	1.000 1.000	1.250 1.250	<b>99856<sup>2)</sup></b> <b>99450</b>
<b>4.523</b>	<b>4.531</b>	4.528	5.000	0.813	0.938	1.250	<b>99452</b>
<b>4.621</b>	<b>4.629</b>	4.625 4.625	5.000 5.063	0.438 1.000	0.625 1.250	1.375 1.375	<b>99465</b> <b>99463</b>
<b>4.685</b>	<b>4.693</b>	4.688	5.063	0.813	1.000	1.375	<b>99468</b>
<b>4.720</b>	<b>4.728</b>	4.724 4.724	5.110 5.110	0.315 0.787	0.433 0.984	1.323 1.260	<b>99471</b> <b>99473</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

## SKF Speedi-Sleeve – inch dimensions

$d_1$  4.746 – 8.005 in.



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 $\pm 0.031$	$B^{1)}$		
in.		in.						–
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	

<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.					–	
5.498	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	
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	6.188	1.000	1.250	1.313	99862 <sup>2)</sup>	
		5.875	6.188	1.000	1.250	1.313	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	6.360	0.500	0.750	1.750	99601	
		6.000	6.375	1.000	1.250	1.750	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	7.475	1.000	1.250	1.688	99864 <sup>2)</sup>	
		7.000	7.475	1.000	1.250	1.688	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 (LDSL3)

### General

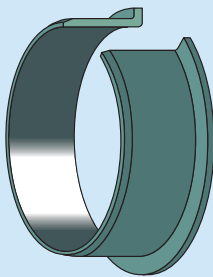
Outside contamination particles and polishing friction between a rotating shaft and a seal can, over time, result in severe shaft damage. Instead of repairing or replacing the damaged shaft, SKF recommends using wear sleeves for heavy industrial applications (LDSL3) for shaft diameters ranging from 211,15 to 1 143 mm (8.313 to 45 in.). The sleeves are made to order for shaft diameters within the primary ranges listed in **tables 1** and **2**. A selection of sizes is listed in the product tables starting on **page 362**.

LDSL3 and LDSLV4 are recommended for applications where operating conditions for the seals are difficult, particularly where solid contaminants can reach the seals, like in rolling mills, primary metal plants and in chemical and mineral plants.

In applications where seal wear and shaft damage can be expected, SKF recommends installing the sleeves before the machine is operational. By installing them from the outset, it will not be necessary to rework the shaft before installing a replacement sleeve and the original size can be used for the replacement seal.

Table 1

Primary dimension range of LDSLV3



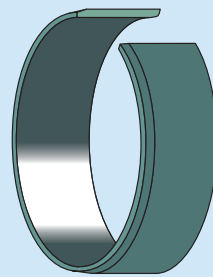
Shaft range		Width <sup>1)</sup>	
over	incl.	min	max
mm/in.		mm/in.	
211,15 8.313	736,60 29.000	17,48 0.688	63,50 2.500
736,60 29.000	1 143,00 45.000	25,40 1.000	63,50 2.500

<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 LDSLV3 designs outside the primary size range.

Table 2

Primary dimension range of LDSLV4



Shaft range		Width <sup>1)</sup>	
over	incl.	min	max
mm/in.		mm/in.	
211,15 8.313	736,60 29.000	12,70 0.500	63,50 2.500
736,60 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

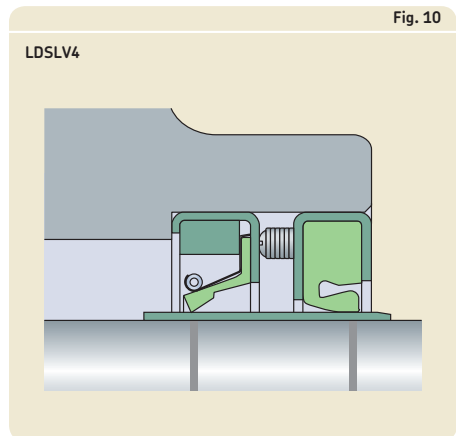
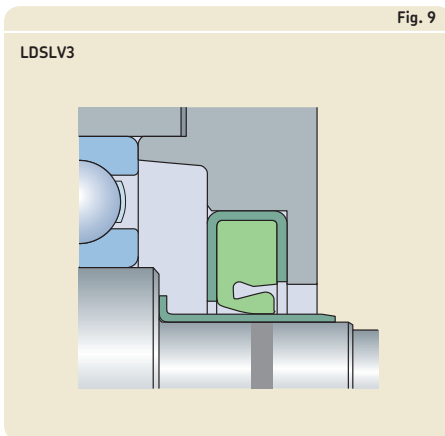
Contact SKF for LDSLV4 designs outside the primary size range.

## Designs and features

SKF wear sleeves for heavy industrial applications are available in two designs: the LDSLV3 with a flange (→ **fig. 9**) and the LDSLV4 without a flange (→ **fig. 10**). Both designs are 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.).

LDSLV3 is designed with a flange to simplify final positioning of the sleeve. The width of the counterface surface for the seal is 6,35 mm (0.25 in.) narrower than the total width of the sleeve. The flange adds a nominal 25,4 mm (1 in.) over the shaft diameter. The flange height is 12,7 mm (0.5 in.) for all sizes. Note that force should never be applied directly to the flange when installing an LDSLV3.

LDSLV4 has the same features as LDSLV3 but has no flange. LDSLV4 is intended for applications where a flange could interfere with other components during installation, or where a wider seal counterface surface is required.



## Wear sleeves

### Using LDSLV designs

There are two alternative ways of using SKF wear sleeves for heavy industrial applications (→ fig. 11)

- 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.

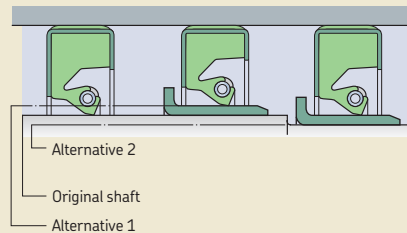
The sleeves should be installed immediately after heating since they cool rapidly and could seize on the shaft before the correct position is achieved. If repositioning is necessary, use a soft faced hammer and a wooden block. After the sleeve is in the desired position, check the lead-in chamfer for any damage during installation.

### Removal

The wear sleeves can be removed either by heating them or expanding them by light hammer blows. Prior to removal, the flange of the LDSLV3 should be cut at one point, taking care not to damage the shaft surface.

Fig. 11

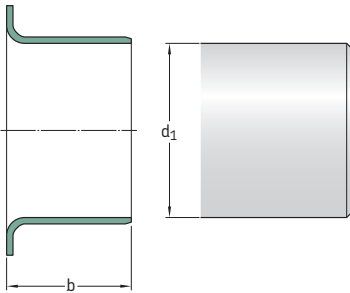
#### Using LDSLV designs



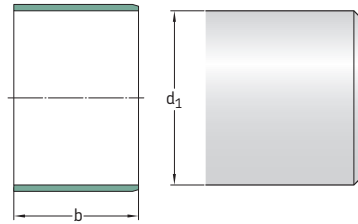




**Wear sleeves for heavy industrial applications – LDSLV3 and LDSLV4 – metric dimensions**  
 $d_1$  215,00 – 1 100,23 mm



LDSLV3

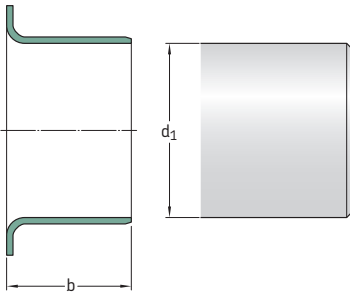


LDSLV4

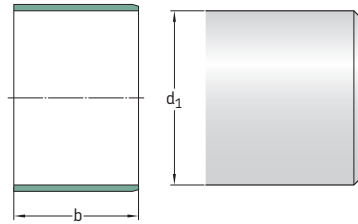
Shaft diameter $d_1$	Sleeve width $b$	Reference sleeve installed outside diameter	Design	Designation
mm	mm	mm	–	–
215,00	25,40	220	LDSLV3	90179
215,20	35	220	LDSLV3	87831
220,00	25 40 50,80	225 225 225	LDSLV3 LDSLV3 LDSLV3	90806 87914 87915
235,23	18	240	LDSLV4	90952
240,00	17,50	250	LDSLV3	90156
240,21	44	245	LDSLV4	87911
245,20	63,50	250	LDSLV3	90766
275,00	22	280	LDSLV4	90546
280,00	45	285	LDSLV4	90437
285,22	63,50	290	LDSLV4	90238
295,20	32	300	LDSLV3	90114
315,19	63,50	320	LDSLV4	90155
320,00	63,50	325	LDSLV4	90198
325,22	63,50	330	LDSLV4	90239
335,22	39 50	340 340	LDSLV4 LDSLV4	90777 90792
340,00	18 50 50	340 340 345	LDSLV4 LDSLV4 LDSLV3	87901 90801 90113
355,20	25,40 50	360 360	LDSLV4 LDSLV4	90778 90785
360,00	44	365	LDSLV4	87500

Shaft diameter $d_1$	Sleeve width $b$	Reference sleeve installed outside diameter	Design	Designation
mm	mm	mm	–	–
360,22	45	365	LDSL4	90788
365,20	20	370	LDSL4	87531
395,22	63,50	400	LDSL4	87461
405,23	50	410	LDSL4	90042
419,99	63,50	425	LDSL3	97064
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
503,25	24	508	LDSL4	90149
530,00	20	535	LDSL4	87783
535,23	63	540	LDSL4	90802
555,20	63,50	560	LDSL4	90075
575,23	63,50	580	LDSL4	90951
585,22	55	590	LDSL4	90292
595,20	58,20 63,50	600 600	LDSL3 LDSL4	90120 89997
595,22	50	600	LDSL3	90241
645,20	64	650	LDSL4	90004
645,24	63,50	650	LDSL3	87817
665,20	45	670	LDSL4	90799
685,22	63,50	690	LDSL4	90953
714,81	50	720	LDSL4	87820
735,23	63	740	LDSL4	89949
755,19	63,50	760	LDSL3	87981
865,23	63,50	870	LDSL4	90221
875,18	63,50	880	LDSL4	90103
1 015,20	25	1 020	LDSL4	90786
1 049,33	60	1 054	LDSL4	89947
1 100,23	63	1 105	LDSL4	89946

**Wear sleeves for heavy industrial applications – LDSLV3 and LDSLV4 – inch dimensions**  
 $d_1$  8.313 – 10.441 in.



LDSLV3

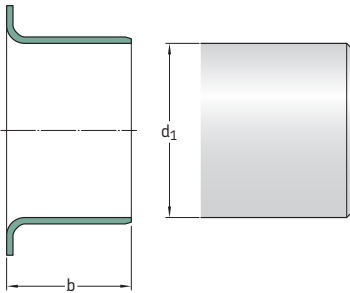


LDSLV4

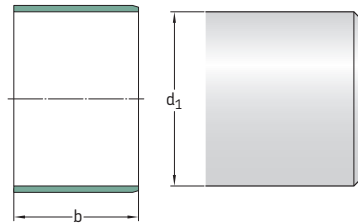
Shaft diameter	Sleeve width	Reference sleeve installed outside diameter	Design	Designation
$d_1$	$b$			
in./mm	in./mm	in./mm	–	–
<b>8.313</b> 211,15	1.250 31,75	8.501 215,93	LDSLV4	<b>85885</b>
<b>8.353</b> 212,17	1.500 38,10	8.541 216,94	LDSLV4	<b>86907</b>
<b>8.500</b> 215,90	1.000 25,40	8.688 220,68	LDSLV3	<b>85158</b>
<b>8.625</b> 219,08	2.750 69,85	8.813 223,85	LDSLV3	<b>85643</b>
<b>8.661</b> 220,00	1.000 25,40	8.849 224,76	LDSLV4	<b>87319</b>
<b>8.687</b> 220,65	2.250 57,15	8.875 225,43	LDSLV3	<b>86543</b>
<b>8.750</b> 222,25	1.500 38,10	8.938 227,03	LDSLV3	<b>87196</b>
<b>8.812</b> 223,82	2.000 50,80	9.000 228,60	LDSLV4	<b>86551</b>
<b>8.813</b> 223,85	1.000 25,40	9.001 228,63	LDSLV3	<b>85688</b>
<b>8.866</b> 225,20	2.500 63,50	9.054 229,97	LDSLV4	<b>87166</b>
<b>8.867</b> 225,22	1.000 25,40	9.055 230,00	LDSLV4	<b>87462</b>
<b>8.875</b> 225,43	1.250 31,75	9.063 230,20	LDSLV3	<b>85973</b>
	1.250 31,75	9.063 230,20	LDSLV4	<b>87526</b>
<b>8.938</b> 227,03	2.500 63,50	9.126 231,80	LDSLV4	<b>86546</b>

Shaft diameter $d_1$	Sleeve width b	Reference sleeve installed outside diameter	Design	Designation
in./mm	in./mm	in./mm	–	–
<b>9.000</b> 228,60	1.000 25,40	9.188 233,38	LDSL43	<b>87555</b>
<b>9.055</b> 230,00	1.000 25,40	9.243 234,77	LDSL43	<b>89943</b>
<b>9.063</b> 230,20	1.500 38,10	9.251 234,98	LDSL44	<b>85931</b>
<b>9.125</b> 231,78	1.000 25,40	9.313 236,55	LDSL44	<b>86547</b>
	1.500 38,10	9.313 236,55	LDSL44	<b>90130</b>
<b>9.250</b> 234,95	0.875 22,23	9.438 239,73	LDSL44	<b>84643</b>
<b>9.260</b> 235,20	1.102 27,99	9.448 239,98	LDSL44	<b>87789</b>
<b>9.313</b> 236,55	1.500 38,10	9.501 241,33	LDSL43	<b>85377</b>
<b>9.449</b> 240,00	1.181 30,00	9.637 244,78	LDSL44	<b>87144</b>
<b>9.500</b> 241,30	2.500 63,50	9.688 246,08	LDSL44	<b>86562</b>
	1.000 25,40	9.688 246,08	LDSL43	<b>86633</b>
<b>9.563</b> 242,90	1.000 25,40	9.751 247,68	LDSL44	<b>85073</b>
	2.000 50,80	9.751 247,68	LDSL44	<b>85397</b>
<b>9.750</b> 247,65	1.438 36,53	9.938 252,43	LDSL44	<b>84965</b>
	2.250 57,15	9.938 252,43	LDSL44	<b>85045</b>
<b>9.813</b> 249,25	1.125 28,58	10.001 254,03	LDSL44	<b>86413</b>
	2.000 50,80	10.001 254,03	LDSL43	<b>84156</b>
<b>9.835</b> 249,81	1.575 40,01	10.023 254,58	LDSL44	<b>90773</b>
<b>10.000</b> 254,00	1.000 25,40	10.188 258,78	LDSL43	<b>90070</b>
<b>10.063</b> 255,60	2.250 57,15	10.251 260,38	LDSL44	<b>86000</b>
<b>10.188</b> 258,78	1.125 28,58	10.376 263,55	LDSL44	<b>84962</b>
<b>10.240</b> 260,00	1.970 50,00	10.424 264,77	LDSL43	<b>87738</b>
<b>10.313</b> 261,95	2.000 50,80	10.501 266,73	LDSL44	<b>85629</b>
	2.250 57,15	10.501 266,73	LDSL43	<b>85191</b>
<b>10.441</b> 265,20	2.165 54,99	10.629 269,98	LDSL44	<b>86798</b>

**Wear sleeves for heavy industrial applications – LDSLV3 and LDSLV4 – inch dimensions**  
 $d_1$  10.500 – 12.598 in.



LDSLV3

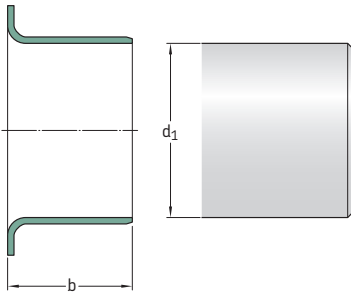


LDSLV4

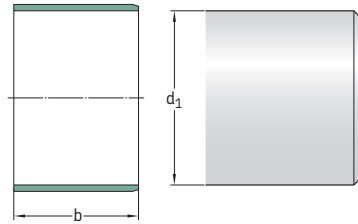
Shaft diameter	Sleeve width	Reference sleeve installed outside diameter	Design	Designation
$d_1$	$b$			
in./mm	in./mm	in./mm	–	–
<b>10.500</b> 266,70	2.750 69,85	10.688 271,48	LDSLV4	<b>86013</b>
<b>10.557</b> 268,15	2.250 57,15	10.745 272,92	LDSLV4	<b>85491</b>
<b>10.562</b> 268,27	0.984 24,99	10.750 273,05	LDSLV4	<b>90800</b>
	1.750 44,45	10.750 273,05	LDSLV4	<b>86468</b>
	1.813 46,05	10.750 273,05	LDSLV4	<b>86544</b>
<b>10.563</b> 268,30	1.500 38,10	10.751 273,08	LDSLV4	<b>87768</b>
<b>10.750</b> 273,05	2.500 63,50	10.938 277,83	LDSLV4	<b>86435</b>
<b>10.813</b> 274,65	1.000 25,40	11.001 279,43	LDSLV3	<b>81389</b>
	2.000 50,80	11.001 279,43	LDSLV4	<b>85033</b>
<b>10.846</b> 275,49	0.709 18,01	11.034 280,26	LDSLV4	<b>86601</b>
<b>10.875</b> 276,23	2.000 50,80	11.063 281,00	LDSLV4	<b>84510</b>
<b>11.000</b> 279,40	1.500 38,10	11.188 284,18	LDSLV4	<b>86486</b>
	2.500 63,50	11.188 284,18	LDSLV4	<b>86454</b>
<b>11.024</b> 280,00	1.181 30,00	11.212 284,78	LDSLV4	<b>87142</b>
<b>11.031</b> 280,19	1.260 32,00	11.219 284,96	LDSLV4	<b>87525</b>

Shaft diameter $d_1$	Sleeve width b	Reference sleeve installed outside diameter	Design	Designation
in./mm	in./mm	in./mm	–	–
<b>11.062</b> 280,97	1.750 44,45	11.250 285,75	LDSL4	<b>85469</b>
<b>11.187</b> 284,15	1.250 31,75	11.375 288,93	LDSL4	<b>86269</b>
<b>11.188</b> 284,18	2.250 57,15	11.376 288,95	LDSL4	<b>85212</b>
<b>11.190</b> 284,23	2.250 57,15	11.378 289,00	LDSL4	<b>87566</b>
<b>11.313</b> 287,35	1.500 38,10	11.501 292,13	LDSL4	<b>84094</b>
<b>11.375</b> 288,93	2.250 57,15	11.563 293,70	LDSL4	<b>86145</b>
<b>11.417</b> 290,00	1.750 44,45	11.605 294,77	LDSL4	<b>86441</b>
<b>11.500</b> 292,10	0.750 19,05	11.688 296,88	LDSL4	<b>90761</b>
<b>11.562</b> 293,67	1.000 25,40	11.750 298,45	LDSL4	<b>90333</b>
<b>11.623</b> 295,22	1.417 35,99	11.811 300,00	LDSL3	<b>87875</b>
<b>11.750</b> 298,45	2.375 60,33	11.938 303,23	LDSL3	<b>87872</b>
<b>11.812</b> 300,02	1.125 28,58	12.000 304,80	LDSL4	<b>86687</b>
<b>11.813</b> 300,05	1.500 38,10	12.001 304,83	LDSL4	<b>85979</b>
	2.250 57,15	12.001 304,83	LDSL3	<b>84819</b>
	2.750 69,85	12.001 304,83	LDSL4	<b>85844</b>
<b>11.969</b> 304,00	0.709 18,00	12.157 308,79	LDSL4	<b>86600</b>
<b>12.000</b> 304,80	2.250 57,15	12.188 309,58	LDSL4	<b>85577</b>
	2.250 57,15	12.188 309,58	LDSL3	<b>87406</b>
<b>12.063</b> 306,40	0.625 15,88	12.251 311,18	LDSL4	<b>85418</b>
	2.500 63,50	12.251 311,18	LDSL3	<b>86404</b>
<b>12.312</b> 312,72	1.500 38,10	12.500 317,50	LDSL4	<b>90174</b>
<b>12.313</b> 312,75	0.750 19,05	12.501 317,53	LDSL4	<b>83760</b>
<b>12.500</b> 317,50	2.125 53,98	12.688 322,28	LDSL3	<b>86169</b>
<b>12.598</b> 320,00	0.984 25,00	12.786 324,76	LDSL3	<b>87434</b>

**Wear sleeves for heavy industrial applications – LDSLV3 and LDSLV4 – inch dimensions**  
**d<sub>1</sub> 12.750 – 16.813 in.**



LDSLV3



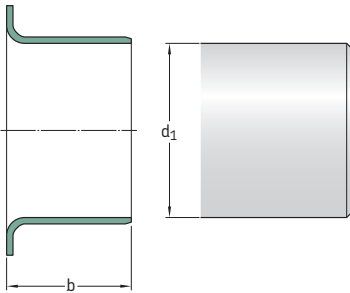
LDSLV4

Shaft diameter	Sleeve width	Reference sleeve installed outside diameter	Design	Designation
d <sub>1</sub>	b			
in./mm	in./mm	in./mm	–	–
<b>12.750</b>	0.688	12.938	LDSLV4	<b>87513</b>
<i>323,85</i>	<i>17,48</i>	<i>328,63</i>		
	1.125	12.938	LDSLV3	<b>82099</b>
	<i>28,58</i>	<i>328,63</i>		
	1.500	12.938	LDSLV3	<b>90143</b>
	<i>38,10</i>	<i>328,63</i>		
<b>12.813</b>	1.000	13.001	LDSLV4	<b>86258</b>
<i>325,45</i>	<i>25,40</i>	<i>330,23</i>		
	1.375	13.001	LDSLV4	<b>84263</b>
	<i>34,93</i>	<i>330,23</i>		
	2.000	13.001	LDSLV3	<b>84390</b>
	<i>50,80</i>	<i>330,23</i>		
	2.500	13.001	LDSLV4	<b>86722</b>
	<i>63,50</i>	<i>330,23</i>		
<b>13.000</b>	1.750	13.188	LDSLV4	<b>85535</b>
<i>330,20</i>	<i>44,45</i>	<i>334,98</i>		
<b>13.063</b>	1.125	13.251	LDSLV4	<b>84963</b>
<i>331,80</i>	<i>28,58</i>	<i>336,53</i>		
<b>13.313</b>	0.813	13.501	LDSLV4	<b>86688</b>
<i>338,15</i>	<i>20,65</i>	<i>342,93</i>		
	1.500	13.501	LDSLV4	<b>87463</b>
	<i>38,10</i>	<i>342,93</i>		
	2.000	13.501	LDSLV3	<b>85852</b>
	<i>50,80</i>	<i>342,93</i>		
<b>13.813</b>	1.500	14.001	LDSLV3	<b>81390</b>
<i>350,85</i>	<i>38,10</i>	<i>355,63</i>		
	2.000	14.001	LDSLV4	<b>85179</b>
	<i>50,80</i>	<i>355,63</i>		
<b>14.000</b>	1.375	14.188	LDSLV3	<b>89951</b>
<i>355,60</i>	<i>34,93</i>	<i>360,38</i>		
	1.500	14.188	LDSLV3	<b>81352</b>
	<i>38,10</i>	<i>360,38</i>		
<b>14.173</b>	1.000	14.361	LDSLV4	<b>87445</b>
<i>359,99</i>	<i>25,40</i>	<i>364,77</i>		

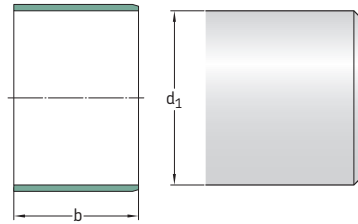


Shaft diameter $d_1$	Sleeve width $b$	Reference sleeve installed outside diameter	Design	Designation	
in./mm	in./mm	in./mm	–	–	
<b>14.313</b> 363,55	1.500 38,10	14.501 368,33	LDSL4	<b>86429</b>	
<b>14.438</b> 366,73	2.500 63,50	14.626 371,50	LDSL3	<b>86403</b>	
<b>14.500</b> 368,30	1.000 25,40	14.688 373,08	LDSL4	<b>85914</b>	
<b>14.813</b> 376,25	1.500 38,10	15.001 381,03	LDSL4	<b>87723</b>	
	2.125 53,98	15.001 381,03	LDSL3	<b>81391</b>	
<b>15.000</b> 381,00	1.000 25,40	15.188 385,78	LDSL4	<b>87247</b>	
	0.750 19,05	15.250 387,35	LDSL4	<b>90272</b>	
<b>15.062</b> 382,57	1.000 25,40	15.254 387,45	LDSL3	<b>87871</b>	
	2.500 63,50	15.376 390,55	LDSL4	<b>87569</b>	
<b>15.250</b> 387,35	0.750 19,05	15.438 392,13	LDSL3	<b>84964</b>	
	0.906 23,01	15.748 400,00	LDSL4	<b>85582</b>	
<b>15.812</b> 401,62	2.500 63,50	16.000 406,40	LDSL3	<b>87634</b>	
	2.000 50,80	16.001 406,43	LDSL4	<b>85181</b>	
2.000 50,80		16.001 406,43	LDSL3	<b>87446</b>	
	2.500 63,50	16.001 406,43	LDSL4	<b>86407</b>	
<b>15.998</b> 406,35		2.250 57,15	16.186 411,12	LDSL3	<b>85908</b>
	<b>16.000</b> 406,40	2.000 50,80	16.188 411,18	LDSL3	<b>81354</b>
<b>16.063</b> 408,00		0.500 12,70	16.251 412,78	LDSL4	<b>87613</b>
	1.250 31,75	16.251 412,78	LDSL4	<b>86175</b>	
	1.300 33,02	16.251 412,78	LDSL4	<b>86426</b>	
	2.000 50,80	16.251 412,78	LDSL4	<b>86575</b>	
	<b>16.313</b> 414,35	2.000 50,80	16.501 419,13	LDSL4	<b>84697</b>
		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>	
	2.250 57,15	17.001 431,83	LDSL4	<b>84616</b>	

**Wear sleeves for heavy industrial applications – LDSLV3 and LDSLV4 – inch dimensions**  
**d<sub>1</sub> 17.250 – 25.000 in.**



LDSLV3

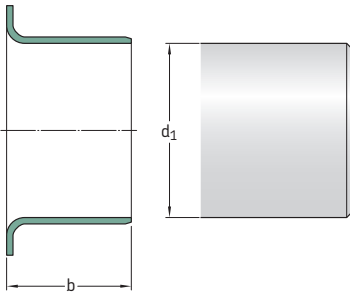


LDSLV4

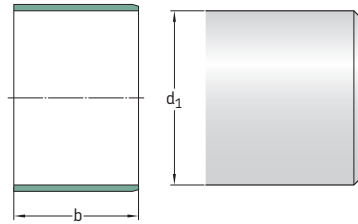
Shaft diameter	Sleeve width	Reference sleeve installed outside diameter	Design	Designation
d <sub>1</sub>	b			
in./mm	in./mm	in./mm	–	–
<b>17.250</b> 438,15	1.000 25,40	17.438 442,93	LDSLV4	<b>90779</b>
	2.000 50,80	17.438 442,93	LDSLV4	<b>84576</b>
<b>17.313</b> 439,75	1.500 38,10	17.501 444,53	LDSLV4	<b>86430</b>
<b>17.449</b> 443,20	2.000 50,80	17.637 447,98	LDSLV4	<b>85762</b>
<b>17.500</b> 444,50	1.250 31,75	17.688 449,28	LDSLV4	<b>90770</b>
<b>17.543</b> 445,59	2.362 59,99	17.731 450,37	LDSLV4	<b>86799</b>
<b>17.750</b> 450,85	1.250 31,75	17.938 455,63	LDSLV4	<b>90774</b>
	2.500 63,50	17.938 455,63	LDSLV3	<b>86631</b>
<b>17.812</b> 452,42	2.125 53,98	18.000 457,20	LDSLV4	<b>87271</b>
<b>17.813</b> 452,45	2.500 63,50	18.001 457,23	LDSLV3	<b>86405</b>
<b>18.163</b> 461,34	2.000 50,80	18.351 466,12	LDSLV4	<b>86343</b>
<b>18.312</b> 465,12	1.191 30,25	18.500 469,90	LDSLV4	<b>90790</b>
<b>18.813</b> 477,85	1.750 44,45	19.001 482,63	LDSLV4	<b>86563</b>
	2.250 57,15	19.001 482,63	LDSLV4	<b>87015</b>
	2.500 63,50	19.001 482,63	LDSLV4	<b>86716</b>

Shaft diameter $d_1$	Sleeve width $b$	Reference sleeve installed outside diameter	Design	Designation
in./mm	in./mm	in./mm	–	–
<b>19.496</b> 495,20	2.362 59,99	19.684 499,97	LDSL4	<b>87631</b>
<b>19.497</b> 495,22	1.575 40,01	19.685 500,00	LDSL4	<b>87785</b>
<b>19.500</b> 495,30	1.250 31,75	19.688 500,08	LDSL4	<b>90769</b>
<b>19.563</b> 496,90	2.750 69,85	19.751 501,68	LDSL4	<b>85654</b>
<b>19.813</b> 503,25	1.250 31,75	20.001 508,03	LDSL4	<b>84781</b>
<b>20.312</b> 515,92	1.000 25,40	20.500 520,70	LDSL4	<b>86739</b>
<b>20.813</b> 528,65	1.250 31,75	21.001 533,43	LDSL3	<b>85800</b>
	2.125 53,98	21.001 533,43	LDSL4	<b>85367</b>
	2.500 63,50	21.001 533,43	LDSL4	<b>87298</b>
<b>20.865</b> 529,97	2.250 57,15	21.053 534,75	LDSL4	<b>90805</b>
<b>20.990</b> 533,15	2.250 57,15	21.178 537,92	LDSL3	<b>84579</b>
<b>21.000</b> 533,40	2.250 57,15	21.188 538,18	LDSL4	<b>87090</b>
<b>21.803</b> 553,80	2.362 59,99	21.991 558,57	LDSL4	<b>87069</b>
<b>21.813</b> 554,05	2.250 57,15	22.001 558,83	LDSL4	<b>84590</b>
<b>22.250</b> 565,15	1.000 25,40	22.438 569,93	LDSL3	<b>85691</b>
<b>22.303</b> 566,50	2.362 59,99	22.491 571,27	LDSL4	<b>87070</b>
<b>22.313</b> 566,75	1.250 31,75	22.501 571,53	LDSL4	<b>85907</b>
<b>22.812</b> 579,42	2.000 50,80	23.000 584,20	LDSL4	<b>90163</b>
<b>23.000</b> 584,20	2.000 50,80	23.188 588,98	LDSL4	<b>90146</b>
<b>23.434</b> 595,22	0.984 24,99	23.622 600,00	LDSL4	<b>87777</b>
<b>23.687</b> 601,65	1.950 49,53	23.875 606,43	LDSL4	<b>87907</b>
<b>23.812</b> 604,82	0.750 19,05	24.000 609,60	LDSL4	<b>87922</b>
	2.500 63,50	24.000 609,60	LDSL4	<b>87960</b>
<b>25.000</b> 635,00	2.500 63,50	25.188 639,78	LDSL4	<b>86567</b>

**Wear sleeves for heavy industrial applications – LDSLV3 and LDSLV4 – inch dimensions**  
**d<sub>1</sub> 25.312 – 42.500 in.**



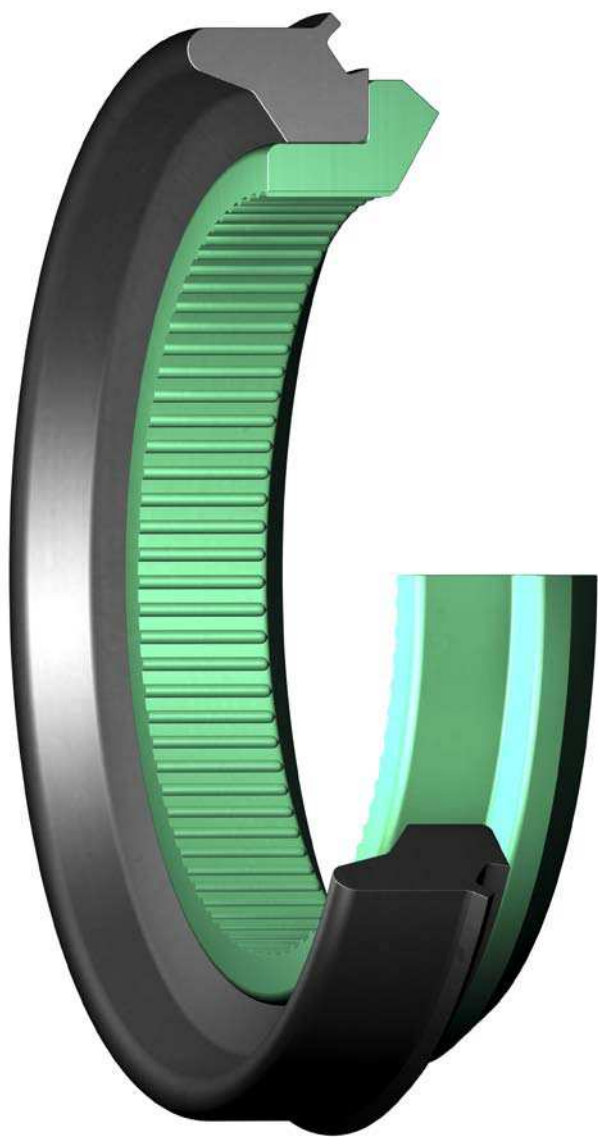
LDSLV3



LDSLV4

Shaft diameter	Sleeve width	Reference sleeve installed outside diameter	Design	Designation
d <sub>1</sub>	b			
in./mm	in./mm	in./mm	–	–
<b>25.312</b> 642,92	2.000 50,80	25.500 647,70	LDSLV4	<b>86091</b>
<b>25.313</b> 642,95	2.500 63,50	25.501 647,73	LDSLV4	<b>87802</b>
<b>26.000</b> 660,40	2.250 57,15	26.188 665,18	LDSLV3	<b>86640</b>
<b>26.312</b> 668,32	1.375 34,93	26.500 673,10	LDSLV4	<b>90809</b>
<b>26.813</b> 681,05	1.250 31,75	27.001 685,83	LDSLV4	<b>85384</b>
	2.250 57,15	27.001 685,83	LDSLV4	<b>85531</b>
<b>27.000</b> 685,80	2.000 50,80	27.188 690,58	LDSLV4	<b>86841</b>
<b>27.063</b> 687,40	2.250 57,15	27.251 692,18	LDSLV4	<b>84764</b>
<b>27.313</b> 693,75	2.250 57,15	27.501 698,53	LDSLV4	<b>91331</b>
<b>27.500</b> 698,50	2.250 57,15	27.688 703,28	LDSLV4	<b>84711</b>
<b>27.812</b> 706,42	2.500 63,50	28.000 711,20	LDSLV4	<b>87421</b>
<b>28.312</b> 719,12	2.313 58,75	28.500 723,90	LDSLV3	<b>87623</b>
<b>28.813</b> 731,85	2.250 57,15	29.001 736,63	LDSLV4	<b>84641</b>
<b>29.813</b> 757,25	2.250 57,15	30.001 762,03	LDSLV4	<b>84642</b>

Shaft diameter $d_1$	Sleeve width $b$	Reference sleeve installed outside diameter	Design	Designation
in./mm	in./mm	in./mm	–	–
<b>30.000</b> 762,00	2.500 63,50	30.188 766,78	LDSL43	<b>86641</b>
<b>30.309</b> 769,85	1.375 34,93	30.497 774,62	LDSL44	<b>87530</b>
<b>30.312</b> 769,92	2.500 63,50	30.500 774,70	LDSL43	<b>87842</b>
<b>30.813</b> 782,65	2.000 50,80	31.001 787,43	LDSL44	<b>85039</b>
<b>31.812</b> 808,02	2.500 63,50	32.000 812,80	LDSL44	<b>90810</b>
<b>32.313</b> 820,75	2.000 50,80	32.501 825,53	LDSL44	<b>86090</b>
<b>32.812</b> 833,42	2.220 56,39	33.000 838,20	LDSL44	<b>87850</b>
<b>33.313</b> 846,15	2.625 66,68	33.501 850,93	LDSL44	<b>84730</b>
<b>34.312</b> 871,52	1.750 44,45	34.500 876,30	LDSL44	<b>87529</b>
<b>35.313</b> 896,95	2.500 63,50	35.501 901,73	LDSL44	<b>85814</b>
<b>35.812</b> 909,62	1.500 38,10	36.000 914,40	LDSL44	<b>90332</b>
<b>36.375</b> 923,93	2.500 63,50	36.563 928,70	LDSL44	<b>86111</b>
<b>36.813</b> 935,05	2.500 63,50	37.001 939,83	LDSL44	<b>86458</b>
<b>37.813</b> 960,45	1.500 38,10	38.001 965,23	LDSL44	<b>86973</b>
<b>38.000</b> 965,20	1.500 38,10	38.188 969,98	LDSL44	<b>86840</b>
<b>38.500</b> 977,90	1.500 38,10	38.688 982,68	LDSL44	<b>81753</b>
<b>38.813</b> 985,85	2.125 53,98	39.001 990,63	LDSL44	<b>85123</b>
<b>39.813</b> 1011,25	2.125 53,98	40.001 1016,03	LDSL44	<b>81826</b>
<b>41.312</b> 1049,32	1.968 49,99	41.500 1054,10	LDSL44	<b>89948</b>
<b>42.063</b> 1068,40	2.125 53,98	42.251 1073,18	LDSL44	<b>85038</b>
<b>42.125</b> 1069,98	2.125 53,98	42.313 1074,75	LDSL44	<b>87054</b>
<b>42.312</b> 1074,72	1.250 31,75	42.500 1079,50	LDSL44	<b>87379</b>
<b>42.500</b> 1079,50	1.250 31,75	42.688 1084,28	LDSL44	<b>87392</b>



# Track pin seals

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# Track pin seals

## General

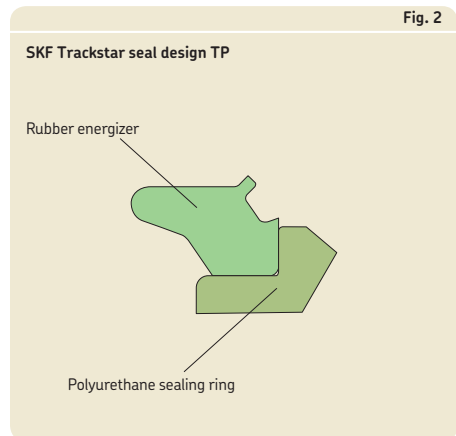
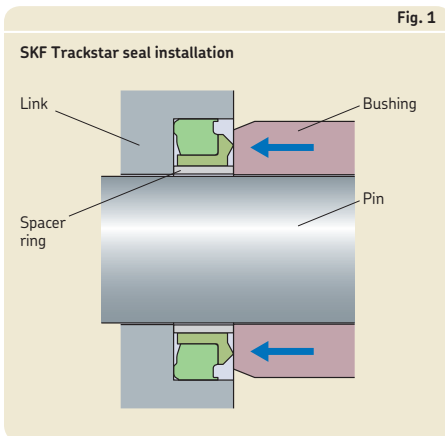
The SKF track pin seals, SKF Trackstar, are specifically designed for oil lubricated track chains in off-highway applications. The seals are installed on the pin that connects a pair of links in the chain (→ **fig. 1**).

## Features and benefits

The basic SKF Trackstar seal 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 to provide the necessary lubrication.

There is also a heavy-duty version designed with a metal reinforcement ring moulded into the polyurethane sealing ring, providing additional rigidity for severe operating conditions (→ **fig. 3**).

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.





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

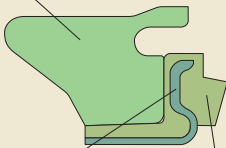
Fig. 3

SKF Trackstar seal design TPM

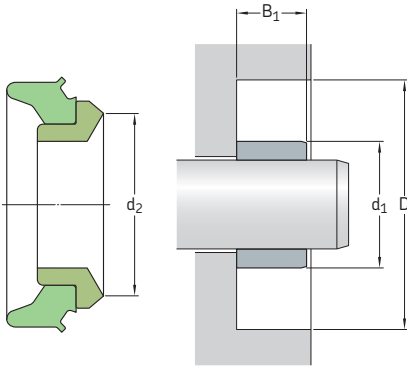
Rubber energizer

Metal reinforcement ring

Polyurethane sealing ring



**SKF Trackstar seals –TP and TPM – metric dimensions**  
**d<sub>1</sub> 33,22 – 80,72 mm**



Dimensions Spacer ring outside diameter d <sub>1</sub> max	Bore diameter, nominal D		Operating width B <sub>1</sub>		Lip diameter d <sub>2</sub> max	Designation
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>

<b>Dimensions</b> Spacer ring outside diameter $d_1$ max	Bore diameter, nominal D	Operating width $B_1$	Lip diameter $d_2$ max	<b>Designation</b>
mm/in.				–
<b>61,09</b> 2.405	82,55 ± 0,13 3.250 ± 0.005	11,10 ± 0,25 0.437 ± 0.010	70,00 2.756	<b>61.1×82.0×16.0 TP</b>
<b>63,14</b> 2.486	83,74 ± 0,25 3.297 ± 0.010	15,49 ± 0,25 0.610 ± 0.010	73,66 2.900	<b>63.2×83.1×19.3 TP</b>
<b>63,60</b> 2.504	83,49 ± 0,25 3.287 ± 0.010	11,13 ± 0,25 0.438 ± 0.010	74,22 2.922	<b>63.6×82.5×15.0 TP</b>
<b>67,21</b> 2.646	87,25 ± 0,25 3.435 ± 0.010	11,13 ± 0,25 0.438 ± 0.010	77,14 3.037	<b>67.1×86.7×15.4 TP</b>
<b>76,71</b> 3.020	99,80 ± 0,13 3.929 ± 0.005	11,10 ± 0,25 0.437 ± 0.010	89,08 3.507	<b>76.7×99.3×15.1 TP</b>
<b>80,72</b> 3.178	106,20 ± 0,13 4.181 ± 0.005	11,10 ± 0,25 0.437 ± 0.010	92,53 3.643	<b>80.8×105.8×15.9 TP</b>



# Metal face seals

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<b>6.1 Product table: HDDF</b> .....	<b>384</b>

# 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

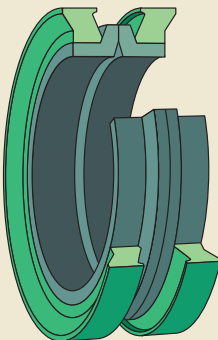
## Design features

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 383**). 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 critical that the bore diameter and bore depth are in accordance with the dimensions listed in the product table on **pages 384 to 387**. Adequate tolerances between the seal assembly and its mating component are critical to ensure a proper sealing performance.

Fig. 1

HDDF seal



## Lubricant requirements

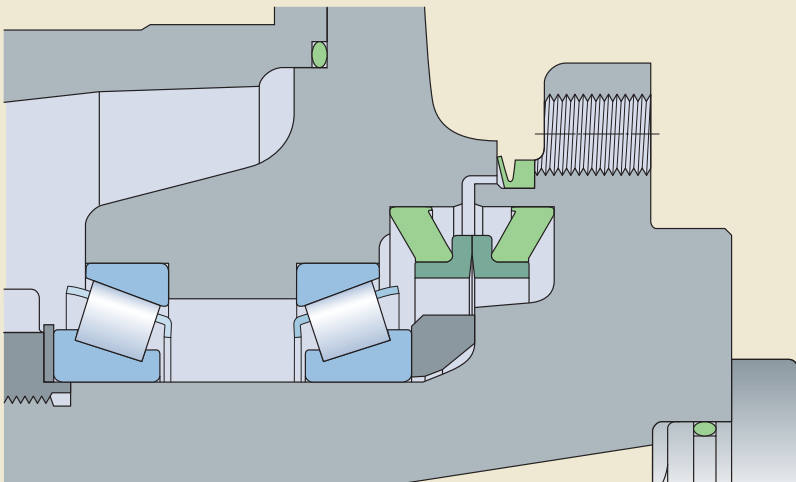
A lubricant should be applied on the dynamic sealing surfaces of a metal face seal to prevent scoring and cover at least 30% of the sealing surface to properly lubricate and cool the sealing rings. The lubricant can be either a detergent like SAE 10W-40 or a mineral based oil ranging from 10 WT to 90 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. 2

6

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 35**.

## 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 critical 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 from contaminants like dirt or lint. Always carefully observe installation instructions provided on **page 383**.

### Housing and seal preparation

All housing components contacting the Belleville washers must be free from 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

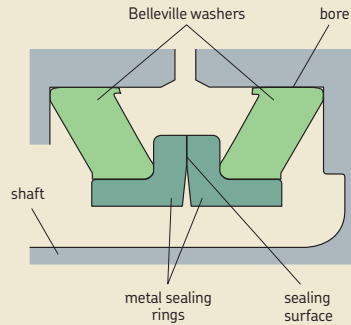
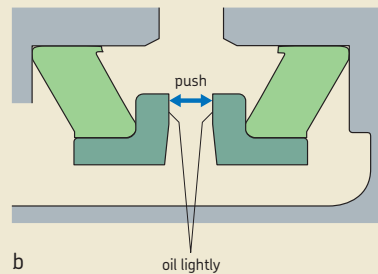
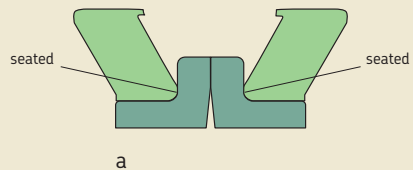


Fig. 4

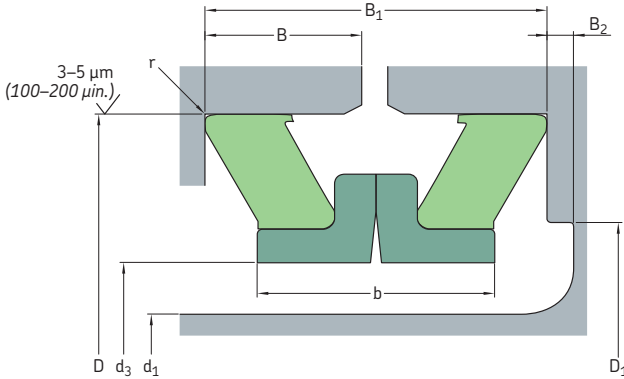
### Installation procedure



## Metal face seals – HDDF – inch and metric dimensions

$d_1$  1.688 – 7.800 in.

$d_1$  42,88 – 198,12 mm



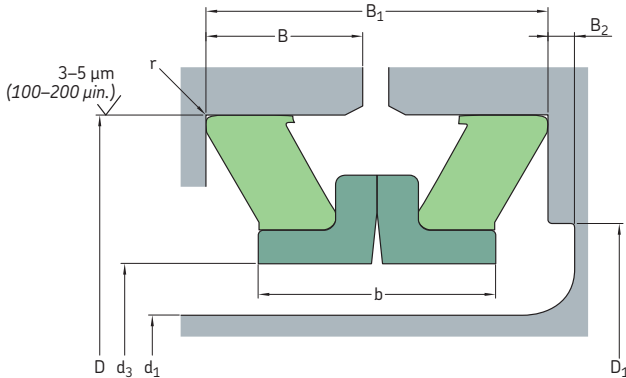
Designation	Lip material	Inch dimensions		Operating width $B_1$	Seal inside diameter $d_3$ min	Bore depth $B$	Recommended shoulder diameter		Under-ring width $B_2$ min	Sealing ring width $b$ max	Radius $r$ max
		Shaft diameter $d_1$ max	Bore diameter $D$				$D_1$ max	min			
–	–	in.									
16904	R	1.688	2.760 ±0.002	0.974 ±0.038	1.760	0.453	2.282	–	–	0.846	0.037
18259	R	1.812	3.003 ±0.002	0.892 ±0.031	1.910	0.416	2.475	–	–	0.790	0.042
21215	R	2.125	3.250 ±0.002	0.900 ±0.033	2.215	0.418	2.759	–	–	0.812	0.045
25096	R	2.500	3.762 ±0.002	0.907 ±0.033	2.580	0.422	3.188	–	–	0.840	0.042
27536	R	2.750	4.030 ±0.002	0.918 ±0.035	2.830	0.426	3.480	–	–	0.810	0.042
30651	R	3.063	4.500 ±0.002	1.016 ±0.035	3.170	0.475	3.833	–	–	0.912	0.042
35076	R	3.500	4.953 ±0.002	1.096 ±0.043	3.620	0.511	4.296	–	–	0.962	0.035
38740	R	3.875	5.312 ±0.003	1.102 ±0.024	4.040	0.524	4.750	–	–	1.002	0.042
38751	R	3.875	5.562 ±0.003	1.267 ±0.050	4.040	0.594	4.791	–	–	1.110	0.051
43135	R	4.312	5.823 ±0.003	1.102 ±0.024	4.420	0.524	5.125	–	–	1.002	0.042
43150	R	4.312	6.000 ±0.003	1.320 ±0.040	4.420	0.625	5.173	–	–	1.090	0.051
46975	R	4.688	6.400 ±0.003	1.525 ±0.050	4.795	0.722	5.583	–	–	1.254	0.047
50655	R	5.062	6.750 ±0.003	1.280 ±0.040	5.170	0.605	5.975	–	–	1.150	0.057
54000	R	5.400	6.990 ±0.003	1.310 ±0.030	5.625	0.625	6.625	–	–	1.182	0.057
56170	R	5.625	7.250 ±0.003	1.366 ±0.031	5.825	0.650	6.486	6.174	0.032	1.300	0.057
58775	R	5.875	7.641 ±0.003	1.510 ±0.031	6.000	0.724	6.868	6.548	0.056	1.490	0.073
63796	R	6.375	8.120 ±0.003	1.265 ±0.040	6.570	0.598	7.555	7.505	0.125	1.350	0.042
67560	R	6.750	8.620 ±0.004	1.375 ±0.030	6.920	0.656	7.750	–	–	1.260	0.042
74310	R	7.438	9.400 ±0.004	1.656 ±0.040	7.540	0.793	8.431	–	–	1.344	0.073
78020	R	7.800	10.000 ±0.004	1.750 ±0.050	7.940	0.835	8.910	–	–	1.500	0.058

Designation	Lip material	Metric dimensions		Operating width B <sub>1</sub>	Seal inside diameter d <sub>3</sub> min	Bore depth B	Recommended shoulder diameter		Undercut B <sub>2</sub> min	Sealing ring width b max	Radius r max
		Shaft diameter d <sub>1</sub> max	Bore diameter D				D <sub>1</sub> max	min			
–	–	mm									
<b>16904</b>	R	<b>42,88</b>	70,10 ±0,06	24,74 ±0,97	44,70	11,51	57,96	-	-	21,49	0,94
<b>18259</b>	R	<b>46,03</b>	76,28 ±0,06	22,66 ±0,79	48,51	10,57	62,87	-	-	20,07	1,07
<b>21215</b>	R	<b>53,98</b>	82,55 ±0,06	22,86 ±0,84	56,26	10,62	70,08	-	-	20,62	1,14
<b>25096</b>	R	<b>63,50</b>	95,56 ±0,06	23,04 ±0,84	65,53	10,72	80,98	-	-	21,34	1,07
<b>27536</b>	R	<b>69,85</b>	102,36 ±0,06	23,32 ±0,89	71,88	10,82	88,39	-	-	20,57	1,07
<b>30651</b>	R	<b>77,80</b>	114,30 ±0,06	25,81 ±0,89	80,52	12,07	97,36	-	-	23,16	1,07
<b>35076</b>	R	<b>88,90</b>	125,81 ±0,06	27,84 ±1,09	91,95	12,98	109,12	-	-	24,43	0,89
<b>38740</b>	R	<b>98,43</b>	134,92 ±0,08	27,99 ±0,61	102,62	13,31	120,65	-	-	25,45	1,07
<b>38751</b>	R	<b>98,43</b>	141,27 ±0,08	32,18 ±1,27	102,62	15,09	121,69	-	-	28,19	1,30
<b>43135</b>	R	<b>109,52</b>	147,90 ±0,08	27,99 ±0,61	112,27	13,31	130,18	-	-	25,45	1,07
<b>43150</b>	R	<b>109,52</b>	152,40 ±0,08	33,53 ±1,02	112,27	15,88	131,39	-	-	27,69	1,30
<b>46975</b>	R	<b>119,08</b>	162,56 ±0,08	38,74 ±1,27	121,79	18,34	141,81	-	-	31,85	1,19
<b>50655</b>	R	<b>128,57</b>	171,45 ±0,08	32,51 ±1,02	131,32	15,37	151,77	-	-	29,21	1,45
<b>54000</b>	R	<b>137,16</b>	177,55 ±0,08	33,27 ±0,76	142,88	15,88	168,28	-	-	30,02	1,45
<b>56170</b>	R	<b>142,88</b>	184,15 ±0,08	34,70 ±0,79	147,96	16,51	164,74	156,82	0,81	33,02	1,45
<b>58775</b>	R	<b>149,23</b>	194,08 ±0,08	38,35 ±0,79	152,40	18,39	174,45	166,32	1,42	37,85	1,85
<b>63796</b>	R	<b>161,93</b>	206,25 ±0,08	32,13 ±1,02	166,88	15,19	191,90	190,63	3,18	34,29	1,07
<b>67560</b>	R	<b>171,45</b>	218,95 ±0,10	34,93 ±0,76	175,77	16,66	196,85	-	-	32,00	1,07
<b>74310</b>	R	<b>188,93</b>	238,76 ±0,10	42,06 ±1,02	191,52	20,14	214,15	-	-	34,14	1,85
<b>78020</b>	R	<b>198,12</b>	254,00 ±0,10	44,45 ±1,27	201,68	21,21	226,31	-	-	38,10	1,47

## Metal face seals – HDDF – inch and metric dimensions

$d_1$  8.250 – 29.000 in.

$d_1$  209,55 – 736,60 mm



Designation	Lip material	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 $d_1$ max	Bore diameter $D$				$D_1$ max	min			
–	–	in.									
<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
<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	Lip material	Metric dimensions		Operating width B <sub>1</sub>	Seal inside diameter d <sub>3</sub> min	Bore depth B	Recommended shoulder diameter		Undercut B <sub>2</sub> min	Sealing ring width b max	Radius r max
		Shaft diameter d <sub>1</sub> max	Bore diameter D				D <sub>1</sub> max	min			
–	–	mm									
<b>82540</b>	R	<b>209,55</b>	255,57 ±0,10	39,62 ±1,02	212,29	18,92	235,71	234,19	1,80	39,67	1,47
<b>86850</b>	R	<b>220,68</b>	277,14 ±0,13	48,87 ±0,76	223,27	23,67	247,75	–	–	41,71	1,47
<b>93115</b>	R	<b>236,52</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

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# 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.

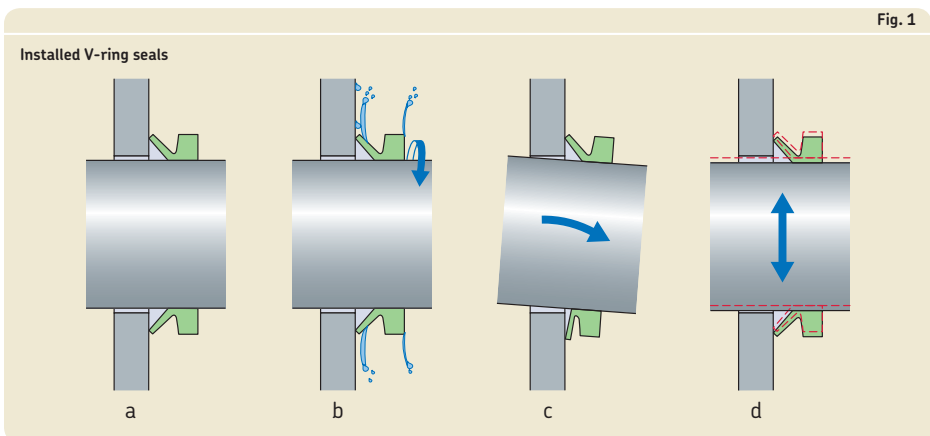
## Features

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

Fig. 1





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 as speed increases. This means that friction losses and heat are kept to a minimum, resulting in improved wear resistance and extended service life.

## Materials

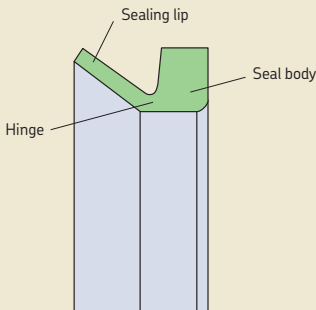
V-rings are normally made of nitrile rubber that features good chemical resistance, resistance to wear and can be used in applications with temperatures ranging from  $-40$  to  $+100$  °C ( $-40$  to  $+210$  °F). For applications with higher temperatures or where aggressive media are present, V-rings 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 395**. 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 gearboxes, 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**). 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.

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.)				
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

## 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.

Fig. 3

V-ring used as an excluder



Fig. 4

V-ring used as a grease valve



Fig. 5

Two opposing V-rings

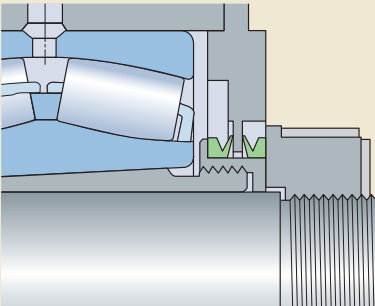
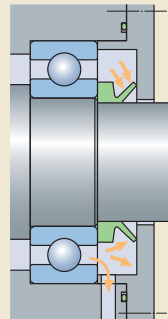


Fig. 6

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 and they can be used to enhance the efficiency of labyrinth seals (→ **fig. 8**).

Fig. 7

V-ring used as a secondary seal

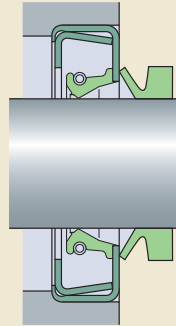
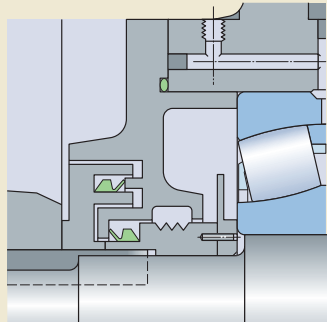


Fig. 8

V-rings in a labyrinth seal



# Sliding velocities

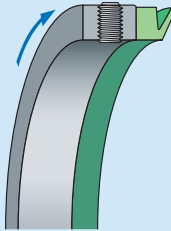
V-rings can operate under the conditions listed in **table 2**. In the speed range 15 to 20 m/s (2 900 to 3 900 ft/min), the sealing lip lifts from the counterface and the V-ring only acts as a gap-type seal.

Table 2

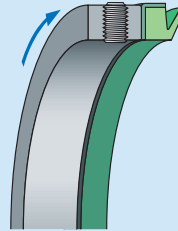
## Permissible operating conditions



1  
normal



2  
located axially<sup>1)</sup>



3  
axial and radial support<sup>1)</sup>

Operating conditions	Guideline values for V-rings of	
	nitrile rubber	fluoro rubber
<b>Temperature, °C (°F)</b>	-40 to +100 (-40 to +210)	-20 to +150 (-4 to +300)
<b>Circumferential speed, m/s (ft/min)</b>		
normal (1)	up to 8 (1 575)	up to 6,5 (1 280)
located axially (2)	8 to 12 (1 575 to 2 360)	6,5 to 10 (1 280 to 1 970)
axial and radial support (3)	>12 (2 360)	>10 (1 970)
<b>Pressure acting on seal, MPa (psi)</b>		
static sealing or very low speed operation	up to 0,03 (4.35)	up to 0,03 (4.35)

<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**.

## Misalignment

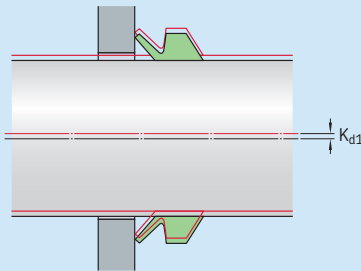
V-rings can tolerate misalignment between the shaft and housing, i.e. deviations from the perpendicularity between the shaft and counterface of the housing. Guideline values for the maximum permissible angular misalignment are provided in **diagram 1**. These values apply to the V-ring designs VA/VR1 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.

Table 3

### Coaxiality and runout tolerances



Shaft diameter nominal

Total tolerance for coaxiality deviation and runout

$d_1$ over		incl.		$K_{d_1}$ max	
mm		in.		mm	
<b>V-rings, VA/VR1 and VS/VR2 designs</b>					
9,5			0.374	0,4	0.016
9,5	19,5	0.374	0.768	0,6	0.024
19,5	38	0.768	1.496	0,9	0.034
38	68	1.496	2.677	1,1	0.043
68	105	2.677	4.134	1,4	0.055
105	155	4.134	6.102	1,6	0.063
155	210	6.102	8.628	1,9	0.075
210	2 020	8.628	79.527	3,6	0.142
<b>V-rings, VL/VR3 designs</b>					
135	630	5.315	24.803	1,5	0.059
<b>V-rings, VE/VR4 designs</b>					
450	2 010	17.716	79.134	6	0.236

# Counterface

A fine-turned counterface is adequate for V-rings. The appropriate surface roughness values vary depending on the circumferential speed (→ **table 4** on **page 398**). 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 from 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

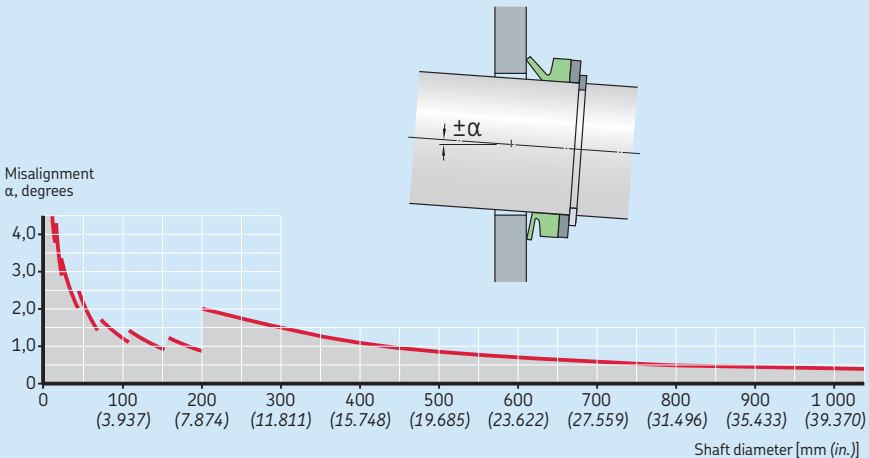


Table 4

Recommended counterface surface finish

Circumferential speed		Surface finish	
m/	ft/min.	R <sub>a</sub> μm	R <sub>a</sub> μin.
> 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<sub>a</sub> 0,05 μm (2 μin.).

## 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.

Fig. 9

Dimensions		Shaft diameter range $d_1$ over	incl.	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
mm	mm											
851	861	824		32,5	65	30						
		824		32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$		R	
861	871	833		32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$		R	860 VE R
		833		32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$		R	860 VRME R
871	882	843		32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$		R	870 VE R
		843		32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$		R	870 VRME R
912	922	880		32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$		R	880 VE R
		880		32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$		R	880 VRME R
925	975	865		6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$		R	920 VE R
		865		6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$		R	920 VRME R
920	965	865		14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$		R	950 VL R
		865		14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$		V	950 VL V
922	933	890		32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$		R	950 VA R
		890		32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$		V	950 VA V
933	944	900		32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$		R	930 VE R
		900		32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$		R	930 VRME R
944	955	911		32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$		R	940 VE R
		911		32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$		R	940 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 (→ **fig. 10**). When several V-rings are to be installed, a simple tool (→ **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

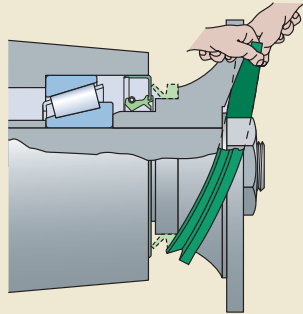
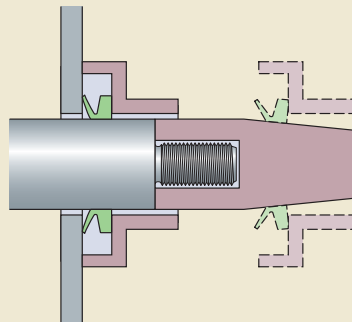
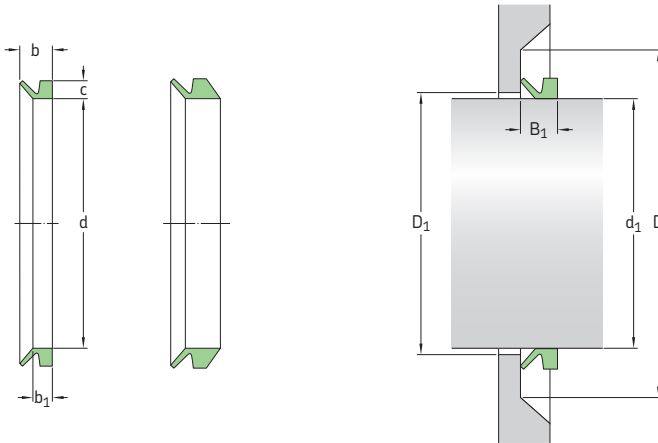


Fig. 11

Installation tool



**V-ring seals – metric dimensions, globally valid outside North American market**  
 $d_1$  2,7 – 53 mm



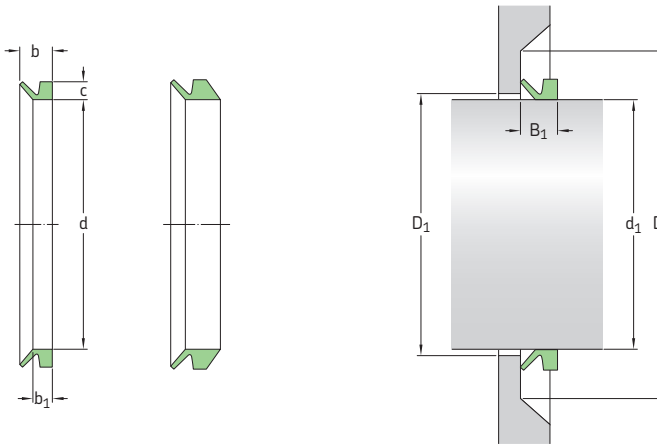
Dimensions		Seal inside diameter, free state d	Seal seat width $b_1$	Nominal seal width b	Nominal seal height c	Clearance $D_1$ max	Counterface D min	Seal fitted width $B_1$	Lip code	Designation
Shaft diameter range $d_1$ over	incl.									
mm										
2,7	3,5	2,5	2,1	3	1,5	$d_1 + 1$	$d_1 + 4$	$2,5 \pm 0,3$	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

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										
13,5 cont.	15,5	12,5	5,6	7,7	3	d <sub>1</sub> +1	d1+9	6,7 ± 0,6	R	14 VS R
		12,5	5,6	7,7	3	d <sub>1</sub> +1	d1+9	6,7 ± 0,6	V	14 VS V
15,5	17	14	3,4	5,5	3	d <sub>1</sub> +1	d1+9	4,5 ± 0,6	R	16 VA R
		14	3,4	5,5	3	d <sub>1</sub> +1	d1+9	4,5 ± 0,6	V	16 VA V
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 VA V
		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 VA V
		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 VA V
		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 VA V
		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 VA V
		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 VA V
		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 VA V
		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 VA V
		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 VA V
		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 VA V
		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 VA V
		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 VA V
		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



# V-ring seals – metric dimensions, globally valid outside North American market

$d_1$  53 – 195 mm

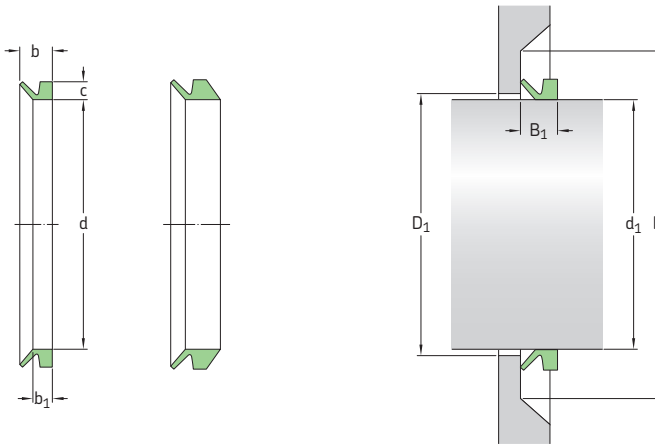


Dimensions		Seal inside diameter, free state d	Seal seat width $b_1$	Nominal seal width b	Nominal seal height c	Clearance $D_1$ max	Counterface D min	Seal fitted width $B_1$	Lip code	Designation
Shaft diameter range $d_1$ over	incl.									
mm										
53	58	49	5,5	9	5	$d_1 + 2$	$d_1 + 15$	$7 \pm 1$	R	55 VA R
		49	5,5	9	5	$d_1 + 2$	$d_1 + 15$	$7 \pm 1$	V	55 VA V
		49	9,5	13	5	$d_1 + 2$	$d_1 + 15$	$11 \pm 1$	R	55 VS R
		49	9,5	13	5	$d_1 + 2$	$d_1 + 15$	$11 \pm 1$	V	55 VS V
58	63	54	5,5	9	5	$d_1 + 2$	$d_1 + 15$	$7 \pm 1$	R	60 VA R
		54	5,5	9	5	$d_1 + 2$	$d_1 + 15$	$7 \pm 1$	V	60 VA V
		54	9,5	13	5	$d_1 + 2$	$d_1 + 15$	$11 \pm 1$	R	60 VS R
		54	9,5	13	5	$d_1 + 2$	$d_1 + 15$	$11 \pm 1$	V	60 VS V
63	68	58	5,5	9	5	$d_1 + 2$	$d_1 + 15$	$7 \pm 1$	R	65 VA R
		58	5,5	9	5	$d_1 + 2$	$d_1 + 15$	$7 \pm 1$	V	65 VA V
		58	9,5	13	5	$d_1 + 2$	$d_1 + 15$	$11 \pm 1$	R	65 VS R
		58	9,5	13	5	$d_1 + 2$	$d_1 + 15$	$11 \pm 1$	V	65 VS V
68	73	63	6,8	11	6	$d_1 + 3$	$d_1 + 18$	$9 \pm 1,2$	R	70 VA R
		63	6,8	11	6	$d_1 + 3$	$d_1 + 18$	$9 \pm 1,2$	V	70 VA V
		63	11,3	15,5	6	$d_1 + 3$	$d_1 + 18$	$13,5 \pm 1,2$	R	70 VS R
		63	11,3	15,5	6	$d_1 + 3$	$d_1 + 18$	$13,5 \pm 1,2$	V	70 VS V
73	78	67	6,8	11	6	$d_1 + 3$	$d_1 + 18$	$9 \pm 1,2$	R	75 VA R
		67	6,8	11	6	$d_1 + 3$	$d_1 + 18$	$13,5 \pm 1,2$	R	75 VS R
		67	11,3	15,5	6	$d_1 + 3$	$d_1 + 18$	$13,5 \pm 1,2$	V	75 VS V
78	83	72	6,8	11	6	$d_1 + 3$	$d_1 + 18$	$9 \pm 1,2$	R	80 VA R
		72	6,8	11	6	$d_1 + 3$	$d_1 + 18$	$9 \pm 1,2$	V	80 VA V
		72	11,3	15,5	6	$d_1 + 3$	$d_1 + 18$	$13,5 \pm 1,2$	R	80 VS R
		72	11,3	15,5	6	$d_1 + 3$	$d_1 + 18$	$13,5 \pm 1,2$	V	80 VS V
83	88	76	6,8	11	6	$d_1 + 3$	$d_1 + 18$	$9 \pm 1,2$	R	85 VA R
		76	6,8	11	6	$d_1 + 3$	$d_1 + 18$	$9 \pm 1,2$	V	85 VA V
		76	11,3	15,5	6	$d_1 + 3$	$d_1 + 18$	$13,5 \pm 1,2$	R	85 VS R
		76	11,3	15,5	6	$d_1 + 3$	$d_1 + 18$	$13,5 \pm 1,2$	V	85 VS V
88	93	81	6,8	11	6	$d_1 + 3$	$d_1 + 18$	$9 \pm 1,2$	R	90 VA R
		81	6,8	11	6	$d_1 + 3$	$d_1 + 18$	$9 \pm 1,2$	V	90 VA V
		81	11,3	15,5	6	$d_1 + 3$	$d_1 + 18$	$13,5 \pm 1,2$	R	90 VS R
		81	11,3	15,5	6	$d_1 + 3$	$d_1 + 18$	$13,5 \pm 1,2$	V	90 VS V
93	98	85	6,8	11	6	$d_1 + 3$	$d_1 + 18$	$9 \pm 1,2$	R	95 VA R
		85	6,8	11	6	$d_1 + 3$	$d_1 + 18$	$9 \pm 1,2$	V	95 VA V
		85	11,3	15,5	6	$d_1 + 3$	$d_1 + 18$	$13,5 \pm 1,2$	R	95 VS R
		85	11,3	15,5	6	$d_1 + 3$	$d_1 + 18$	$13,5 \pm 1,2$	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										
<b>98</b>	<b>105</b>	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
<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	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
<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	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
<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	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
<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	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
<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	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
<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	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
<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	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
<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	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
<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	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

# V-ring seals – metric dimensions, globally valid outside North American market

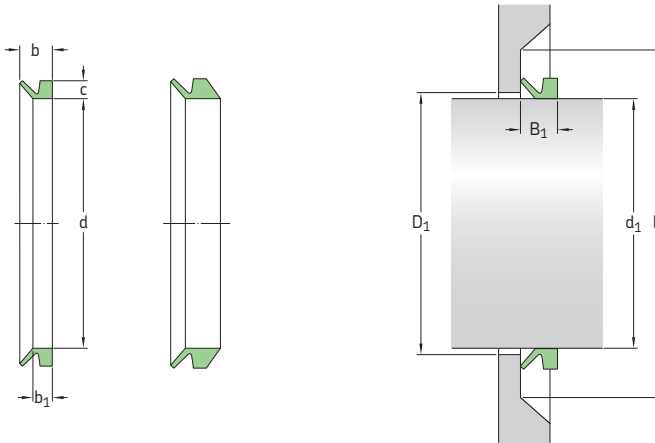
$d_1$  190 – 395 mm



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										
195	210	182	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	R	200 VL R
		182	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	V	200 VL V
		180	9	14,5	8	$d_1 + 4$	$d_1 + 24$	$12 \pm 1,8$	R	199 VA R
		180	9	14,5	8	$d_1 + 4$	$d_1 + 24$	$12 \pm 1,8$	V	199 VA V
		180	15	20,5	8	$d_1 + 4$	$d_1 + 24$	$18 \pm 1,8$	R	199 VS R
		180	15	20,5	8	$d_1 + 4$	$d_1 + 24$	$18 \pm 1,8$	V	199 VS V
190	210	180	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	R	200 VA R
		180	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	V	200 VA V
210	233	198	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	R	220 VL R
		198	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	V	220 VL V
		198	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	R	220 VA R
		198	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	V	220 VA V
233	260	225	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	R	250 VL R
		225	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	V	250 VL V
235	265	225	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	R	250 VA R
		225	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	V	250 VA V
260	285	247	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	R	275 VL R
		247	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	V	275 VL V
265	290	247	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	R	275 VA R
		247	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	V	275 VA V
285	310	270	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	R	300 VL R
		270	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	V	300 VL V
290	310	270	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	R	300 VA R
		270	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	V	300 VA V
300	305	294	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	300 VE R
		294	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	300 VRME R
305	310	299	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	305 VE R
		299	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	305 VRME R
310	335	292	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	R	325 VL R
		292	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	V	325 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										
310 cont.	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
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

**V-ring seals – metric dimensions, globally valid outside North American market**  
 $d_1$  395 – 540 mm



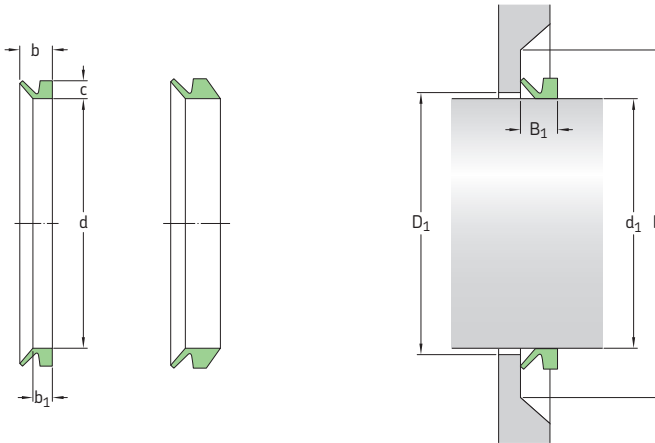
Dimensions		Seal inside diameter, free state d	Seal seat width $b_1$	Nominal seal width b	Nominal seal height c	Clearance $D_1$ max	Counterface D min	Seal fitted width $B_1$	Lip code	Designation
Shaft diameter range $d_1$ over	incl.									
mm										
395	400	386	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	395 VE R 395 VRME R
		386	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	
400	405	391	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	400 VE R 400 VRME R
		391	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	
405	410	396	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	405 VE R 405 VRME R
		396	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	
410	415	401	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	410 VE R 410 VRME R
		401	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	
415	420	405	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	415 VE R 415 VRME R
		405	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	
420	425	410	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	420 VE R 420 VRME R
		410	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	
425	430	415	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	425 VE R 425 VRME R
		415	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	
410	440	382	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	R	425 VL R 425 VL V
		382	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	V	
440	475	405	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	R	450 VL R 450 VL V
		405	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	V	
430	480	405	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	R	450 VA R 450 VA V
		405	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	V	
430	435	420	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	430 VE R 430 VRME R
		420	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	
435	440	425	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	435 VE R 435 VRME R
		425	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	
440	445	429	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	440 VE R 440 VRME R
		429	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	
445	450	434	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	445 VE R 445 VRME R
		434	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	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										
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
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 VA V
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 VA V
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

# V-ring seals – metric dimensions, globally valid outside North American market

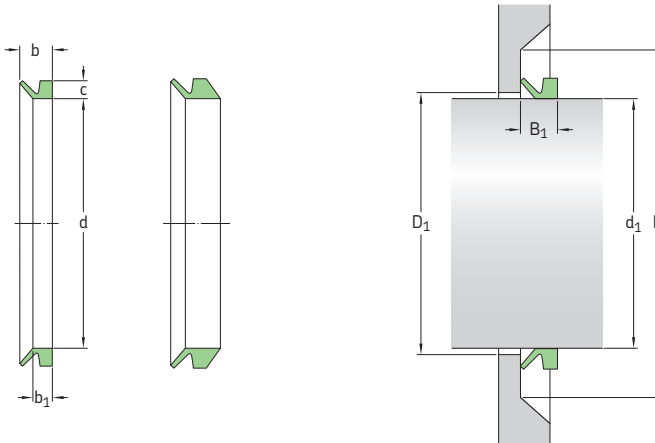
$d_1$  540 – 758 mm



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										
540	545	526	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	540 VE R
		526	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	540 VRME R
545	550	531	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	545 VE R
		531	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	545 VRME R
550	555	536	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	550 VE R
		536	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	550 VRME R
555	560	541	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	555 VE R
		541	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	555 VRME R
560	565	546	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	560 VE R
		546	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	560 VRME R
565	570	550	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	565 VE R
		550	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	565 VRME R
570	575	555	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	570 VE R
		555	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	570 VRME R
575	580	560	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	575 VE R
		560	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	575 VRME R
575	625	540	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	R	600 VL R
		540	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	V	600 VL V
580	630	540	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	R	600 VA R
		540	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	V	600 VA V
580	585	565	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	580 VE R
		565	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	580 VRME R
585	590	570	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	585 VE R
		570	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	585 VRME R
590	600	575	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	590 VE R
		575	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	590 VRME R
600	610	582	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	600 VE R
		582	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	R	600 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										
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
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 VA V
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 VA V
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 VA V
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 VA V
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

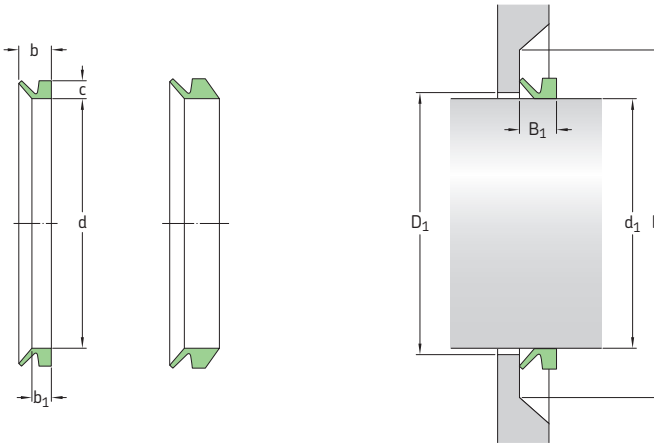
**V-ring seals – metric dimensions, globally valid outside North American market**  
**d<sub>1</sub> 758 – 1 065 mm**



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										
<b>758</b>	<b>766</b>	735	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	<b>760 VE R</b> <b>760 VRME R</b>
		735	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	
<b>766</b>	<b>774</b>	743	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	<b>770 VE R</b> <b>770 VRME R</b>
		743	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	
<b>774</b>	<b>783</b>	751	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	<b>780 VE R</b> <b>780 VRME R</b>
		751	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	
<b>783</b>	<b>792</b>	759	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	<b>790 VE R</b> <b>790 VRME R</b>
		759	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	
<b>775</b>	<b>825</b>	745	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	<b>800 VL R</b> <b>800 VL V</b>
		745	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	
<b>785</b>	<b>830</b>	745	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	<b>800 VA R</b> <b>800 VA V</b>
		745	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	V	
<b>792</b>	<b>801</b>	768	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	<b>800 VE R</b> <b>800 VRME R</b>
		768	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	
<b>801</b>	<b>810</b>	777	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	<b>810 VE R</b> <b>810 VRME R</b>
		777	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	
<b>810</b>	<b>821</b>	786	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	<b>820 VE R</b> <b>820 VRME R</b>
		786	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	
<b>821</b>	<b>831</b>	796	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	<b>830 VE R</b> <b>830 VRME R</b>
		796	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	
<b>825</b>	<b>875</b>	785	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	<b>850 VL R</b> <b>850 VL V</b>
		785	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	
<b>830</b>	<b>875</b>	785	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	<b>850 VA R</b> <b>850 VA V</b>
		785	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	V	
<b>831</b>	<b>841</b>	805	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	<b>840 VE R</b> <b>840 VRME R</b>
		805	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	
<b>841</b>	<b>851</b>	814	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	<b>850 VE R</b> <b>850 VRME R</b>
		814	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	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										
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
882	892	853	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	890 VE R
		853	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	890 VRME R
892	912	871	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	900 VE R
		871	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	900 VRME R
912	922	880	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	920 VE R
		880	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	920 VRME 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
		865	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	950 VL V
920	965	865	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	950 VA R
		865	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	V	950 VA V
922	933	890	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	930 VE R
		890	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	930 VRME R
933	944	900	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	940 VE R
		900	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	940 VRME R
944	955	911	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	950 VE R
		911	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	950 VRME R
955	966	921	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	960 VE R
		921	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	960 VRME R
975	1025	910	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	1000 VL R
		910	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	1000 VL V
965	1015	910	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	1000 VA R
		910	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	V	1000 VA V
966	977	932	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	970 VE R
		932	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	970 VRME R
977	988	942	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	980 VE R
		942	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	980 VRME R
988	999	953	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	990 VE R
		953	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	990 VRME 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
		963	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1000 VRME 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
		973	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1020 VRME 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
		955	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	1050 VL 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

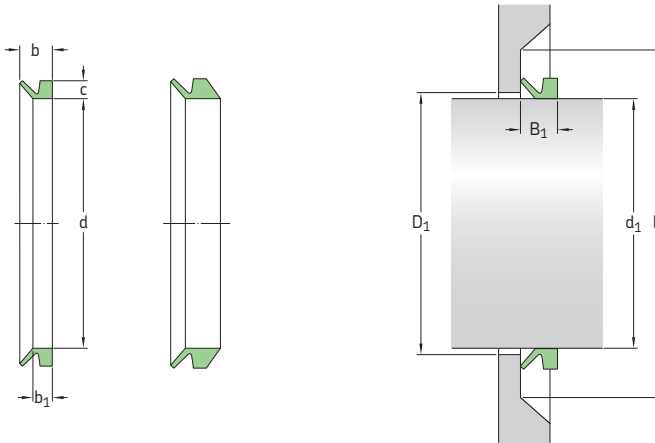
**V-ring seals – metric dimensions, globally valid outside North American market**  
**d<sub>1</sub> 1 025 – 1 515 mm**



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										
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
		990	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1040 VRME 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
		1 008	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1060 VRME 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
		1 000	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	1100 VL 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
		1 027	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1080 VRME 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
		1 045	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1100 VRME R
1 105	1 125	1 065	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1120 VE R
		1 065	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1120 VRME R
1 125	1 175	1 045	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	1150 VL R
		1 045	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	1150 VL V
1 115	1 165	1 045	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	1150 VA R
1 125	1 145	1 084	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1140 VE R
		1 084	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1140 VRME R
1 145	1 165	1 103	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1160 VE R
		1 103	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1160 VRME R
1 175	1 225	1 090	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	1200 VL R
		1 090	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	1200 VL V
1 165	1 215	1 090	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	1200 VA R
1 165	1 185	1 121	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1180 VE R
		1 121	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1180 VRME R
1 185	1 205	1 139	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1200 VE R
		1 139	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1200 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										
1 205	1 225	1 157 1 157	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	1220 VE R 1220 VRME R
1 225	1 275	1 135 1 135	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	1250 VL R 1250 VL V
1 215	1 270	1 135	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	1250 VA R
1 225	1 245	1 176 1 176	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	1240 VE R 1240 VRME R
1 245	1 270	1 195 1 195	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	1260 VE R 1260 VRME R
1 270	1 295	1 218 1 218	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	1280 VE R 1280 VRME R
1 275	1 325	1 180 1 180	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	1300 VL R 1300 VL V
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

**V-ring seals – metric dimensions, globally valid outside North American market**  
**d<sub>1</sub> 1 515 – 2 020 mm**

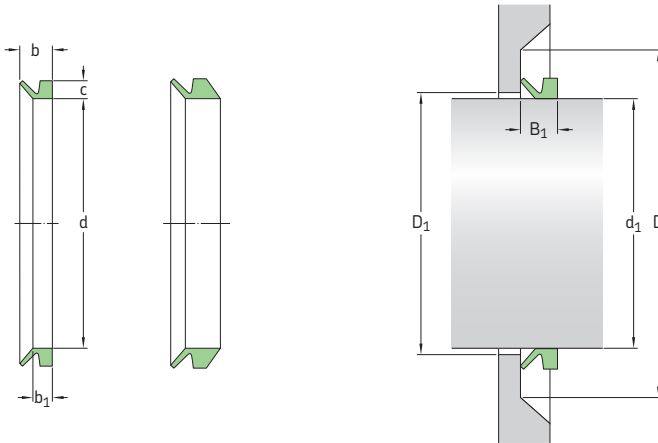


Dimensions		Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max	Counterface D min	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
mm										
1 515	1 540	1 443	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1525 VE R
		1 443	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1525 VRME R
1 525	1 575	1 405	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	1550 VL R
		1 405	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	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	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1550 VE R
		1 467	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1550 VRME R
1 570	1 600	1 495	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1575 VE R
		1 495	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1575 VRME R
1 575	1 625	1 450	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	1600 VL R
		1 450	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	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	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1600 VE R
		1 524	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1600 VRME R
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
1 680	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



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										
1 720	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
1 870	1 920	1 720	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	1900 VA R
1 905	1 955	1 794	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1950 VE R
		1 794	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	1950 VRME R
1 925	1 975	1 765	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	1950 VL R
		1 765	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	1950 VL V
1 920	1 970	1 765	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	1950 VA R
1 955	2 010	1 844	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	2000 VE R
		1 844	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	R	2000 VRME R
1 975	2 025	1 810	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	R	2000 VL R
		1 810	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	V	2000 VL V
1 970	2 020	1 810	14,3	25	15	d <sub>1</sub> + 10	d <sub>1</sub> + 45	20 ± 4	R	2000 VA R

**V-ring seals – inch dimensions, globally valid outside North American market**  
**d<sub>1</sub> 0.11 – 2.09 in.**

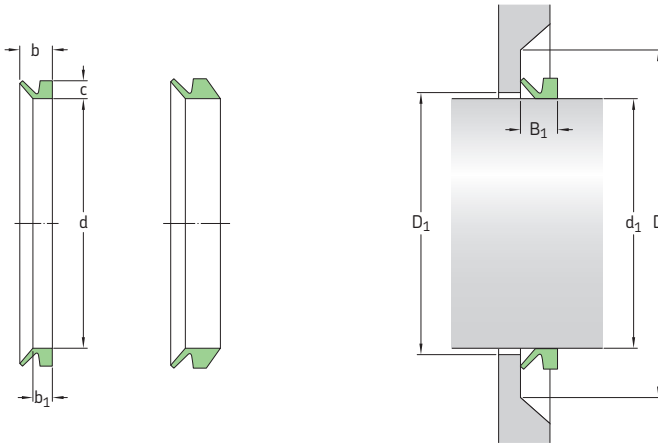


Dimensions		Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> (= d <sub>1</sub> +) max	Counter-face D (= d <sub>1</sub> +) min	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> 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	R	<b>3 VA R</b>
		0.10	0.06	0.08	0.12	0.04	0.16	0.10 ± 0.012	V	<b>3 VA V</b>
<b>0.14</b>	<b>0.18</b>	0.13	0.08	0.09	0.15	0.04	0.24	0.12 ± 0.016	R	<b>4 VA R</b>
		0.13	0.08	0.09	0.15	0.04	0.24	0.12 ± 0.016	V	<b>4 VA V</b>
<b>0.18</b>	<b>0.22</b>	0.16	0.08	0.09	0.15	0.04	0.24	0.12 ± 0.016	R	<b>5 VA R</b>
		0.16	0.08	0.09	0.15	0.04	0.24	0.12 ± 0.016	V	<b>5 VA V</b>
		0.16	0.08	0.15	0.20	0.04	0.24	0.18 ± 0.016	R	<b>5 VS R</b>
		0.16	0.08	0.15	0.20	0.04	0.24	0.18 ± 0.016	V	<b>5 VS V</b>
<b>0.22</b>	<b>0.26</b>	0.20	0.08	0.09	0.15	0.04	0.24	0.12 ± 0.016	R	<b>6 VA R</b>
		0.20	0.08	0.09	0.15	0.04	0.24	0.12 ± 0.016	V	<b>6 VA V</b>
		0.20	0.08	0.15	0.20	0.04	0.24	0.18 ± 0.016	R	<b>6 VS R</b>
		0.20	0.08	0.15	0.20	0.04	0.24	0.18 ± 0.016	V	<b>6 VS V</b>
<b>0.26</b>	<b>0.31</b>	0.24	0.08	0.09	0.15	0.04	0.24	0.12 ± 0.016	R	<b>7 VA R</b>
		0.24	0.08	0.09	0.15	0.04	0.24	0.12 ± 0.016	V	<b>7 VA V</b>
		0.24	0.08	0.15	0.20	0.04	0.24	0.18 ± 0.016	R	<b>7 VS R</b>
		0.24	0.08	0.15	0.20	0.04	0.24	0.18 ± 0.016	V	<b>7 VS V</b>
<b>0.31</b>	<b>0.37</b>	0.28	0.08	0.09	0.15	0.04	0.24	0.12 ± 0.016	R	<b>8 VA R</b>
		0.28	0.08	0.09	0.15	0.04	0.24	0.12 ± 0.016	V	<b>8 VA V</b>
		0.28	0.08	0.15	0.20	0.04	0.24	0.18 ± 0.016	R	<b>8 VS R</b>
		0.28	0.08	0.15	0.20	0.04	0.24	0.18 ± 0.016	V	<b>8 VS V</b>
<b>0.37</b>	<b>0.45</b>	0.35	0.12	0.13	0.22	0.04	0.35	0.18 ± 0.02	R	<b>10 VA R</b>
		0.35	0.12	0.13	0.22	0.04	0.35	0.18 ± 0.02	V	<b>10 VA V</b>
		0.35	0.12	0.22	0.30	0.04	0.35	0.26 ± 0.02	R	<b>10 VS R</b>
		0.35	0.12	0.22	0.30	0.04	0.35	0.26 ± 0.02	V	<b>10 VS V</b>
<b>0.45</b>	<b>0.49</b>	0.41	0.12	0.13	0.22	0.04	0.35	0.18 ± 0.02	R	<b>12 VA R</b>
		0.41	0.12	0.13	0.22	0.04	0.35	0.18 ± 0.02	V	<b>12 VA V</b>
<b>0.45</b>	<b>0.53</b>	0.41	0.12	0.22	0.30	0.04	0.35	0.26 ± 0.02	R	<b>12 VS R</b>
		0.41	0.12	0.22	0.30	0.04	0.35	0.26 ± 0.02	V	<b>12 VS V</b>
<b>0.49</b>	<b>0.53</b>	0.46	0.12	0.13	0.22	0.04	0.35	0.18 ± 0.02	R	<b>13 VA R</b>
		0.46	0.12	0.13	0.22	0.04	0.35	0.18 ± 0.02	V	<b>13 VA V</b>
<b>0.53</b>	<b>0.61</b>	0.49	0.12	0.13	0.22	0.04	0.35	0.18 ± 0.02	R	<b>14 VA R</b>
		0.49	0.12	0.13	0.22	0.04	0.35	0.18 ± 0.02	V	<b>14 VA 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> (= d <sub>1</sub> +) max	Counter-face D (= d <sub>1</sub> +) min	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
in.		in.								
<b>0.53</b> cont.	<b>0.61</b>	0.49	0.12	0.22	0.30	0.04	0.35	0.26 ± 0.02	R	<b>14 VS R</b>
		0.49	0.12	0.22	0.30	0.04	0.35	0.26 ± 0.02	V	<b>14 VS V</b>
<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>

# V-ring seals – inch dimensions, globally valid outside North American market

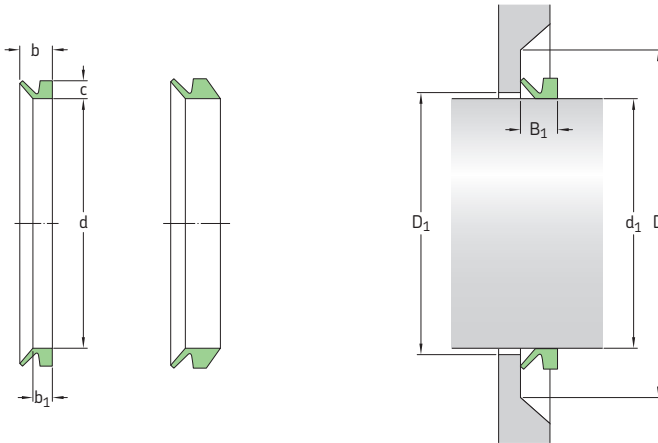
$d_1$  2.09 – 7.68 in.



Dimensions		Seal inside diameter, free state $d$	Nominal seal height $c$	Seal seat width $b_1$	Nominal seal width $b$	Clearance $D_1 (= d_1 +)$ max	Counter-face $D (= d_1 +)$ min	Seal fitted width $B_1$	Lip code	Designation
Shaft diameter range $d_1$ over	incl.									
in.		in.							-	-
2.09	2.28	1.93	0.20	0.22	0.35	0.08	0.59	$0.28 \pm 0.04$	R	55 VA R
		1.93	0.20	0.22	0.35	0.08	0.59	$0.28 \pm 0.04$	V	55 VA V
		1.93	0.20	0.37	0.51	0.08	0.59	$0.43 \pm 0.04$	R	55 VS R
		1.93	0.20	0.37	0.51	0.08	0.59	$0.43 \pm 0.04$	V	55 VS V
2.28	2.48	2.13	0.20	0.22	0.35	0.08	0.59	$0.28 \pm 0.04$	R	60 VA R
		2.13	0.20	0.22	0.35	0.08	0.59	$0.28 \pm 0.04$	V	60 VA V
		2.13	0.20	0.37	0.51	0.08	0.59	$0.43 \pm 0.04$	R	60 VS R
		2.13	0.20	0.37	0.51	0.08	0.59	$0.43 \pm 0.04$	V	60 VS V
2.48	2.68	2.28	0.20	0.22	0.35	0.08	0.59	$0.28 \pm 0.04$	R	65 VA R
		2.28	0.20	0.22	0.35	0.08	0.59	$0.28 \pm 0.04$	V	65 VA V
		2.28	0.20	0.37	0.51	0.08	0.59	$0.43 \pm 0.04$	R	65 VS R
		2.28	0.20	0.37	0.51	0.08	0.59	$0.43 \pm 0.04$	V	65 VS V
2.68	2.87	2.48	0.24	0.27	0.43	0.12	0.71	$0.35 \pm 0.05$	R	70 VA R
		2.48	0.24	0.27	0.43	0.12	0.71	$0.35 \pm 0.05$	V	70 VA V
		2.48	0.24	0.44	0.61	0.12	0.71	$0.53 \pm 0.05$	R	70 VS R
		2.48	0.24	0.44	0.61	0.12	0.71	$0.53 \pm 0.05$	V	70 VS V
2.87	3.07	2.64	0.24	0.27	0.43	0.12	0.71	$0.35 \pm 0.05$	R	75 VA R
		2.64	0.24	0.27	0.43	0.12	0.71	$0.35 \pm 0.05$	V	75 VA V
		2.64	0.24	0.44	0.61	0.12	0.71	$0.53 \pm 0.05$	R	75 VS R
		2.64	0.24	0.44	0.61	0.12	0.71	$0.53 \pm 0.05$	V	75 VS V
3.07	3.27	2.83	0.24	0.27	0.43	0.12	0.71	$0.35 \pm 0.05$	R	80 VA R
		2.83	0.24	0.27	0.43	0.12	0.71	$0.35 \pm 0.05$	V	80 VA V
		2.83	0.24	0.44	0.61	0.12	0.71	$0.53 \pm 0.05$	R	80 VS R
		2.83	0.24	0.44	0.61	0.12	0.71	$0.53 \pm 0.05$	V	80 VS V
3.27	3.46	2.99	0.24	0.27	0.43	0.12	0.71	$0.35 \pm 0.05$	R	85 VA R
		2.99	0.24	0.27	0.43	0.12	0.71	$0.35 \pm 0.05$	V	85 VA V
		2.99	0.24	0.44	0.61	0.12	0.71	$0.53 \pm 0.05$	R	85 VS R
		2.99	0.24	0.44	0.61	0.12	0.71	$0.53 \pm 0.05$	V	85 VS V
3.46	3.66	3.19	0.24	0.27	0.43	0.12	0.71	$0.35 \pm 0.05$	R	90 VA R
		3.19	0.24	0.27	0.43	0.12	0.71	$0.35 \pm 0.05$	V	90 VA V
		3.19	0.24	0.44	0.61	0.12	0.71	$0.53 \pm 0.05$	R	90 VS R
		3.19	0.24	0.44	0.61	0.12	0.71	$0.53 \pm 0.05$	V	90 VS V
3.66	3.86	3.35	0.24	0.27	0.43	0.12	0.71	$0.35 \pm 0.05$	R	95 VA R
		3.35	0.24	0.27	0.43	0.12	0.71	$0.35 \pm 0.05$	V	95 VA V
		3.35	0.24	0.44	0.61	0.12	0.71	$0.53 \pm 0.05$	R	95 VS R
		3.35	0.24	0.44	0.61	0.12	0.71	$0.53 \pm 0.05$	V	95 VS V

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> +) max	Counter-face D (= d <sub>1</sub> +) min	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
in.		in.								
<b>3.86</b>	<b>4.13</b>	3.54	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	R	<b>100 VA R</b>
		3.54	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	V	<b>100 VA V</b>
		3.54	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	R	<b>100 VS R</b>
		3.54	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	V	<b>100 VS V</b>
<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>

**V-ring seals – inch dimensions, globally valid outside North American market**  
**d<sub>1</sub> 7.48 – 15.55 in.**

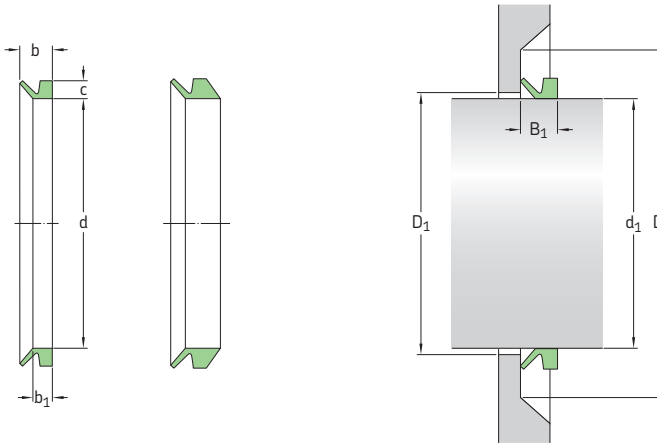


Dimensions		Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> (= d <sub>1</sub> +) max	Counter-face D (= d <sub>1</sub> +) min	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
in.		in.								
<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>
<b>7.48</b>	<b>8.27</b>	7.09	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	<b>200 VA R</b>
		7.09	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	V	<b>200 VA V</b>
<b>8.27</b>	<b>9.17</b>	7.80	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	<b>220 VL R</b>
		7.80	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	<b>220 VL V</b>
		7.80	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	<b>220 VA R</b>
		7.80	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	V	<b>220 VA V</b>
<b>9.17</b>	<b>10.24</b>	8.86	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	<b>250 VL R</b>
		8.86	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	<b>250 VL V</b>
<b>9.25</b>	<b>10.43</b>	8.86	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	<b>250 VA R</b>
		8.86	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	V	<b>250 VA V</b>
<b>10.24</b>	<b>11.22</b>	9.72	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	<b>275 VL R</b>
		9.72	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	<b>275 VL V</b>
<b>10.43</b>	<b>11.42</b>	9.72	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	<b>275 VA R</b>
		9.72	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	V	<b>275 VA V</b>
<b>11.22</b>	<b>12.20</b>	10.63	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	<b>300 VL R</b>
		10.63	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	<b>300 VL V</b>
<b>11.42</b>	<b>12.20</b>	10.63	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	<b>300 VA R</b>
		10.63	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	V	<b>300 VA V</b>
<b>11.81</b>	<b>12.01</b>	11.57	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>300 VE R</b>
		11.57	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>300 VRME R</b>
<b>12.01</b>	<b>12.20</b>	11.77	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>305 VE R</b>
		11.77	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>305 VRME R</b>
<b>12.20</b>	<b>13.19</b>	11.50	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	<b>325 VL R</b>
		11.50	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	<b>325 VL V</b>
		11.50	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	<b>325 VA R</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> +) max	Counter-face D (= d <sub>1</sub> +) min	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
in.		in.							-	-
<b>12.20</b> cont.	<b>13.19</b>	11.50	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	V	<b>325 VA V</b>
		11.97	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>310 VE R</b>
		11.97	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>310 VRME R</b>
<b>12.40</b>	<b>12.60</b>	12.17	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>315 VE R</b>
		12.17	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>315 VRME R</b>
<b>12.60</b>	<b>12.80</b>	12.36	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>320 VE R</b>
		12.36	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>320 VRME R</b>
<b>12.80</b>	<b>12.99</b>	12.56	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>325 VE R</b>
		12.56	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>325 VRME R</b>
<b>12.99</b>	<b>13.19</b>	12.72	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>330 VE R</b>
		12.72	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>330 VRME R</b>
<b>13.19</b>	<b>14.37</b>	12.40	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	<b>350 VL R</b>
		12.40	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	<b>350 VL V</b>
		12.40	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	<b>350 VA R</b>
		12.40	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	V	<b>350 VA V</b>
<b>13.19</b>	<b>13.39</b>	12.91	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>335 VE R</b>
		12.91	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>335 VRME R</b>
<b>13.39</b>	<b>13.58</b>	13.11	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>340 VE R</b>
		12.91	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>340 VRME R</b>
<b>13.58</b>	<b>13.78</b>	13.31	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>345 VE R</b>
		13.31	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>345 VRME R</b>
<b>13.78</b>	<b>13.98</b>	13.50	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>350 VE R</b>
		13.50	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>350 VRME R</b>
<b>13.98</b>	<b>14.17</b>	13.66	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>355 VE R</b>
		13.66	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>355 VRME R</b>
<b>14.17</b>	<b>14.37</b>	13.86	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>360 VE R</b>
		14.06	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>360 VRME R</b>
<b>14.37</b>	<b>15.16</b>	13.27	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	<b>375 VL R</b>
		13.27	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	<b>375 VL V</b>
<b>14.37</b>	<b>15.35</b>	13.27	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	<b>375 VA R</b>
		13.27	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	V	<b>375 VA V</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	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>370 VE R</b>
		14.25	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>370 VRME R</b>
<b>14.76</b>	<b>14.96</b>	14.45	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>375 VE R</b>
		14.45	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>375 VRME R</b>
<b>14.96</b>	<b>15.16</b>	14.61	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>380 VE R</b>
		14.61	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>380 VRME R</b>
<b>15.16</b>	<b>16.14</b>	14.17	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	<b>400 VL R</b>
		14.17	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	<b>400 VL V</b>
<b>15.35</b>	<b>16.93</b>	14.17	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	<b>400 VA R</b>
		14.17	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	V	<b>400 VA V</b>
<b>15.16</b>	<b>15.35</b>	14.80	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>385 VE R</b>
		14.80	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>385 VRME R</b>
<b>15.35</b>	<b>15.55</b>	15.00	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>390 VE R</b>
		15.00	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	<b>390 VRME R</b>

# V-ring seals – inch dimensions, globally valid outside North American market

$d_1$  15.55 – 21.26 in.



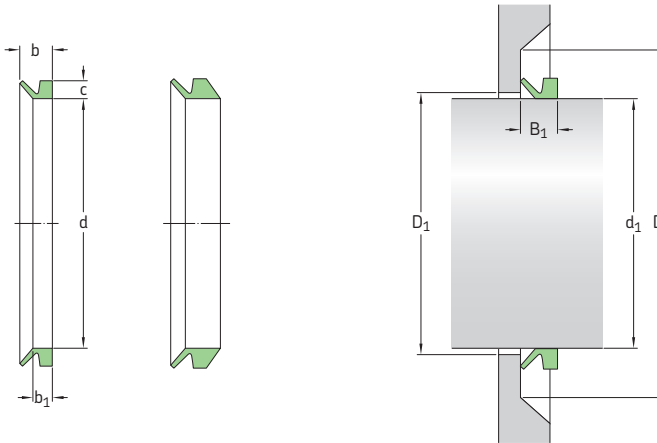
Dimensions		Seal inside diameter, free state d	Nominal seal height c	Seal seat width $b_1$	Nominal seal width b	Clearance $D_1 (= d_1 +)$ max	Counter-face $D (= d_1 +)$ min	Seal fitted width $B_1$	Lip code	Designation
Shaft diameter range $d_1$ over	incl.									
in.		in.								
15.55	15.75	15.20	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	395 VE R
		15.20	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	395 VRME R
15.75	15.94	15.39	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	400 VE R
		15.39	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	400 VRME R
15.94	16.14	15.59	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	405 VE R
		15.59	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	405 VRME R
16.14	16.34	15.79	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	410 VE R
		15.79	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	410 VRME R
16.34	16.54	15.94	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	415 VE R
		15.94	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	415 VRME R
16.54	16.73	16.14	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	420 VE R
		16.14	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	420 VRME R
16.73	16.93	16.34	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	425 VE R
		16.34	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	425 VRME R
16.14	17.32	15.04	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	425 VL R
		15.04	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	425 VL V
17.32	18.70	15.94	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	450 VL R
		15.94	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	450 VL V
16.93	18.90	15.94	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	450 VA R
		15.94	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	V	450 VA V
16.93	17.13	16.54	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	430 VE R
		16.54	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	430 VRME R
17.13	17.32	16.73	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	435 VE R
		16.73	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	435 VRME R
17.32	17.52	16.89	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	440 VE R
		16.89	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	440 VRME R
17.52	17.72	17.09	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	445 VE R
		17.09	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	445 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> (= d <sub>1</sub> +) max	Counter-face D (= d <sub>1</sub> +) min	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
in.		in.							-	-
<b>17.72</b>	<b>17.91</b>	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	<b>450 VE R</b> <b>450 VRME R</b>
<b>17.91</b>	<b>18.11</b>	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	<b>455 VE R</b> <b>455 VRME R</b>
<b>18.11</b>	<b>18.31</b>	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	<b>460 VE R</b> <b>460 VRME R</b>
<b>18.31</b>	<b>18.50</b>	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	<b>465 VE R</b> <b>465 VRME R</b>
<b>18.50</b>	<b>18.70</b>	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	<b>470 VE R</b> <b>470 VRME R</b>
<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 VA V</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 VA V</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>

# V-ring seals – inch dimensions, globally valid outside North American market

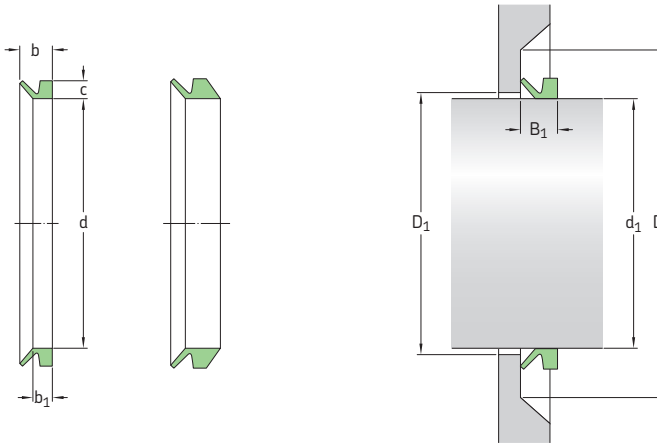
$d_1$  21.26 – 29.84 in.



Dimensions		Seal inside diameter, free state d	Nominal seal height c	Seal seat width $b_1$	Nominal seal width b	Clearance $D_1 (= d_1 +)$ max	Counter-face $D (= d_1 +)$ min	Seal fitted width $B_1$	Lip code	Designation
Shaft diameter range $d_1$ over	incl.									
in.		in.								
21.26	21.46	20.71	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	540 VE R
		20.71	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	540 VRME R
21.46	21.65	20.91	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	545 VE R
		20.91	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	545 VRME R
21.65	21.85	21.10	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	550 VE R
		21.10	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	550 VRME R
21.85	22.05	21.30	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	555 VE R
		21.30	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	555 VRME R
22.05	22.24	21.50	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	560 VE R
		21.50	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	560 VRME R
22.24	22.44	21.65	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	565 VE R
		21.65	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	565 VRME R
22.44	22.64	21.85	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	570 VE R
		21.85	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	570 VRME R
22.64	22.83	22.05	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	575 VE R
		22.05	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	575 VRME R
22.64	24.61	21.26	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	600 VL R
		21.26	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	600 VL V
22.83	24.80	21.26	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	600 VA R
		21.26	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	V	600 VA V
22.83	23.03	22.24	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	580 VE R
		22.24	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	580 VRME R
23.03	23.23	22.44	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	585 VE R
		22.44	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	585 VRME R
23.23	23.62	22.64	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	590 VE R
		22.64	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	590 VRME R
23.62	24.02	22.91	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	600 VE R
		22.91	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	600 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> (= d <sub>1</sub> +) max	Counter-face D (= d <sub>1</sub> +) min	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
in.		in.							-	-
24.02	24.41	23.31	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	610 VE R
		23.31	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	610 VRME R
24.41	24.80	23.70	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	620 VE R
		23.70	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	620 VRME R
24.21	26.57	23.62	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	650 VL R
		23.62	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	650 VL V
24.80	26.18	23.62	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	650 VA R
		23.62	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	V	650 VA V
24.80	25.20	24.09	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	630 VE R
		24.09	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	630 VRME R
25.20	25.59	24.45	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	640 VE R
		24.45	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	640 VRME R
25.59	25.98	24.84	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	650 VE R
		24.84	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	650 VRME R
25.98	26.38	25.20	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	660 VE R
		25.20	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	660 VRME R
26.57	27.95	24.80	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	700 VL R
		24.80	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	700 VL V
26.18	27.76	24.80	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	700 VA R
		24.80	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	V	700 VA V
26.38	26.77	25.59	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	670 VE R
		25.59	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	670 VRME R
26.77	27.17	25.98	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	680 VE R
		25.98	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	680 VRME R
27.17	27.56	26.38	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	690 VE R
		26.38	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	690 VRME R
27.56	27.95	26.77	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	700 VE R
		26.77	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	700 VRME R
27.95	29.13	26.38	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	725 VL R
		26.38	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	725 VL V
27.76	29.33	26.38	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	725 VA R
		26.38	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	V	725 VA V
27.95	28.35	27.13	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	710 VE R
		27.13	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	710 VRME R
28.35	28.74	27.52	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	720 VE R
		27.52	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	720 VRME R
28.74	29.13	27.91	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	730 VE R
		27.91	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	730 VRME R
29.13	29.53	28.27	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	740 VE R
		28.27	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	740 VRME R
29.13	30.51	27.76	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	750 VL R
		27.76	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	750 VL V
29.33	30.91	27.76	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	750 VA R
		27.76	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	V	750 VA V
29.53	29.84	28.66	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	750 VE R
		28.66	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	750 VRME R

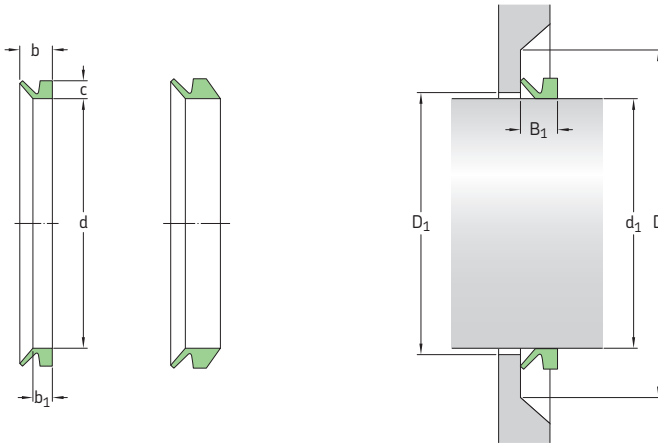
**V-ring seals – inch dimensions, globally valid outside North American market**  
**d<sub>1</sub> 29.84 – 41.93 in.**



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> +) max	Counter-face D (= d <sub>1</sub> +) min	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
in.		in.								
29.84	30.16	28.94	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	760 VE R
		28.94	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	760 VRME R
30.16	30.47	29.25	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	770 VE R
		29.25	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	770 VRME R
30.47	30.83	29.57	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	780 VE R
		29.57	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	780 VRME R
30.83	31.18	29.88	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	790 VE R
		29.88	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	790 VRME R
30.51	32.48	29.33	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	800 VL R
		29.33	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	800 VL V
30.91	32.68	29.33	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	800 VA R
		29.33	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	V	800 VA V
31.18	31.54	30.24	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	800 VE R
		30.24	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	800 VRME R
31.54	31.89	30.59	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	810 VE R
		30.59	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	810 VRME R
31.89	32.32	30.94	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	820 VE R
		30.94	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	820 VRME R
32.32	32.72	31.34	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	830 VE R
		31.34	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	830 VRME R
32.48	34.45	30.91	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	850 VL R
		30.91	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	850 VL V
32.68	34.45	30.91	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	850 VA R
		30.91	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	V	850 VA V
32.72	33.11	31.69	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	840 VE R
		31.69	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	840 VRME R
33.11	33.50	32.05	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	850 VE R
		32.05	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	850 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> (= d <sub>1</sub> +) max	Counter-face D (= d <sub>1</sub> +) min	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
in.		in.							-	-
<b>33.50</b>	<b>33.90</b>	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	<b>860 VE R</b> <b>860 VRME R</b>
<b>33.90</b>	<b>34.29</b>	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	<b>870 VE R</b> <b>870 VRME R</b>
<b>34.29</b>	<b>34.72</b>	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	<b>880 VE R</b> <b>880 VRME R</b>
<b>34.45</b>	<b>36.42</b>	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	<b>900 VL R</b> <b>900 VL V</b>
<b>34.45</b>	<b>36.22</b>	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	<b>900 VA R</b> <b>900 VA V</b>
<b>34.72</b>	<b>35.12</b>	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	<b>890 VE R</b> <b>890 VRME R</b>
<b>35.12</b>	<b>35.91</b>	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	<b>900 VE R</b> <b>900 VRME R</b>
<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 VA V</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 VA V</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>

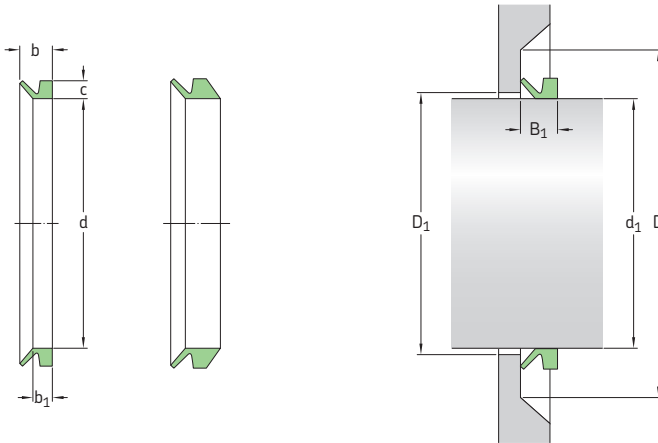
**V-ring seals – inch dimensions, globally valid outside North American market**  
**d<sub>1</sub> 40.35 – 59.65 in.**



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> +) max	Counter-face D (= d <sub>1</sub> +) min	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
in.		in.							-	-
<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>
<b>43.90</b>	<b>45.87</b>	41.14	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	<b>1150 VA R</b>
<b>44.29</b>	<b>45.08</b>	42.68 42.68	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>1140 VE R</b> <b>1140 VRME R</b>
<b>45.08</b>	<b>45.87</b>	43.43 43.43	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>1160 VE R</b> <b>1160 VRME R</b>
<b>46.26</b>	<b>48.23</b>	42.91 42.91	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	<b>1200 VL R</b> <b>1200 VL V</b>
<b>45.87</b>	<b>47.83</b>	42.91	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	<b>1200 VA R</b>
<b>45.87</b>	<b>46.65</b>	44.13 44.13	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>1180 VE R</b> <b>1180 VRME R</b>
<b>46.65</b>	<b>47.44</b>	44.84 44.84	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>1200 VE R</b> <b>1200 VRME R</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> +) max	Counter-face D (= d <sub>1</sub> +) min	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
in.		in.								
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
51.77	52.76	49.57	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1325 VE R
		49.57	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1325 VRME R
52.17	54.13	48.23	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	1350 VL R
		48.23	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	1350 VL V
51.97	53.94	48.23	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	1350 VA R
52.76	53.74	50.43	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1350 VE R
		50.43	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1350 VRME R
53.74	54.72	51.38	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1375 VE R
		51.38	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1375 VRME R
54.13	56.10	50.00	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	1400 VL R
		50.00	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	1400 VL V
53.94	55.91	50.00	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	1400 VA R
54.72	55.71	52.28	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1400 VE R
		52.28	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1400 VRME R
55.71	56.69	53.15	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1425 VE R
		53.15	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1425 VRME R
56.10	58.07	51.77	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	1450 VL R
		51.77	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	1450 VL V
55.91	57.87	51.77	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	1450 VA R
56.69	57.68	54.09	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1450 VE R
		54.09	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1450 VRME R
57.68	58.66	55.00	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1475 VE R
		55.00	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1475 VRME R
58.07	60.04	53.54	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	R	1500 VL R
		53.54	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	V	1500 VL V
57.87	59.84	53.54	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	1500 VA R
58.66	59.65	55.87	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1500 VE R
		55.87	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	R	1500 VRME R

**V-ring seals – inch dimensions, globally valid outside North American market**  
**d<sub>1</sub> 59.65 – 79.53 in.**



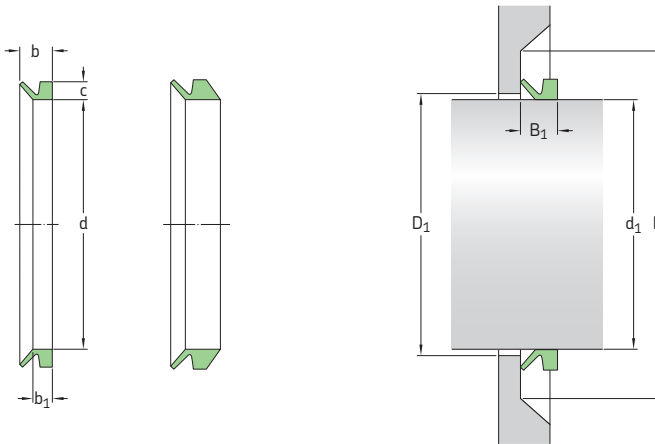
Dimensions		Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> (= d <sub>1</sub> +) max	Counter-face D (= d <sub>1</sub> +) min	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
in.		in.								
<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>
<b>63.78</b>	<b>65.75</b>	58.86	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	<b>1650 VA R</b>
<b>64.57</b>	<b>66.14</b>	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	<b>1650 VE R</b> <b>1650 VRME R</b>
<b>65.94</b>	<b>67.91</b>	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	<b>1700 VL R</b> <b>1700 VL V</b>
<b>65.75</b>	<b>67.72</b>	60.63	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	<b>1700 VA R</b>
<b>66.14</b>	<b>67.72</b>	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	<b>1700 VE R</b> <b>1700 VRME R</b>
<b>67.91</b>	<b>69.88</b>	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	<b>1750 VL R</b> <b>1750 VL 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> (= d <sub>1</sub> +) max	Counter-face D (= d <sub>1</sub> +) min	Seal fitted width B <sub>1</sub>	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.									
in.		in.							-	-
<b>67.72</b>	<b>69.69</b>	62.40	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	<b>1750 VA R</b>
<b>67.72</b>	<b>69.49</b>	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	<b>1750 VE R</b> <b>1750 VRME R</b>
<b>69.49</b>	<b>71.26</b>	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	<b>1800 VE R</b> <b>1800 VRME R</b>
<b>69.88</b>	<b>71.85</b>	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	<b>1800 VL R</b> <b>1800 VL V</b>
<b>69.69</b>	<b>71.65</b>	64.17	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	<b>1800 VA R</b>
<b>71.26</b>	<b>73.03</b>	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	<b>1850 VE R</b> <b>1850 VRME R</b>
<b>71.85</b>	<b>73.82</b>	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	<b>1850 VL R</b> <b>1850 VL V</b>
<b>71.65</b>	<b>73.62</b>	65.94	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	<b>1850 VA R</b>
<b>73.03</b>	<b>75.00</b>	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	<b>1900 VE R</b> <b>1900 VRME R</b>
<b>73.82</b>	<b>75.79</b>	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	<b>1900 VL R</b> <b>1900 VL V</b>
<b>73.62</b>	<b>75.59</b>	67.72	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	R	<b>1900 VA R</b>
<b>75.00</b>	<b>76.97</b>	70.63 70.63	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>1950 VE R</b> <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 69.49	0.26 0.59	0.24 0.56	0.41 0.98	0.20 0.39	0.79 1.77	0.31 ± 0.06 0.79 ± 0.16	V R	<b>1950 VL V</b> <b>1950 VA R</b>
<b>76.97</b>	<b>79.13</b>	72.60 72.60	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>2000 VE R</b> <b>2000 VRME R</b>
<b>77.76</b>	<b>79.72</b>	71.26 71.26	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	<b>2000 VL R</b> <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>

# V-ring seals – metric dimensions, for North American market

$d_1$  2,7 – 53 mm

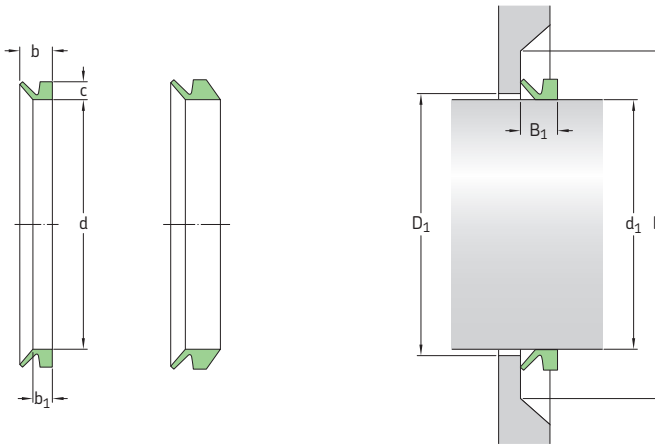


Dimensions		Seal inside diameter, free state $d$	Seal seat width $b_1$	Nominal seal width $b$	Nominal seal height $c$	Clearance $D_1$ max	Counterface $D$ min	Seal fitted width $B_1$	Design	Lip code	Designation code
Shaft diameter range $d_1$ over	incl.										
mm											
2,7	3,5	2,5	2,1	3	1,5	$d_1 + 1$	$d_1 + 4$	$2,5 \pm 0,3$	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

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>13,5</b> cont.	<b>15,5</b>	12,5	5,6	7,7	3	d <sub>1</sub> +1	d <sub>1</sub> +9	6,7 ± 0,6	VR2	R	<b>400141</b>
		12,5	5,6	7,7	3	d <sub>1</sub> +1	d <sub>1</sub> +9	6,7 ± 0,6	VR2	V	<b>400145</b>
<b>15,5</b>	<b>17</b>	14	3,4	5,5	3	d <sub>1</sub> +1	d <sub>1</sub> +9	4,5 ± 0,6	VR1	R	<b>400160</b>
		14	3,4	5,5	3	d <sub>1</sub> +1	d <sub>1</sub> +9	4,5 ± 0,6	VR1	V	<b>400164</b>
<b>15,5</b>	<b>17,5</b>	14	5,6	7,7	3	d <sub>1</sub> +1	d <sub>1</sub> +9	6,7 ± 0,6	VR2	R	<b>400161</b>
		14	5,6	7,7	3	d <sub>1</sub> +1	d <sub>1</sub> +9	6,7 ± 0,6	VR2	V	<b>400165</b>
<b>17,5</b>	<b>19</b>	16	3,4	5,5	3	d <sub>1</sub> +1	d <sub>1</sub> +9	4,5 ± 0,6	VR1	R	<b>400180</b>
		16	3,4	5,5	3	d <sub>1</sub> +1	d <sub>1</sub> +9	4,5 ± 0,6	VR1	V	<b>400184</b>
		16	5,6	7,7	3	d <sub>1</sub> +1	d <sub>1</sub> +9	6,7 ± 0,6	VR2	R	<b>400181</b>
		16	5,6	7,7	3	d <sub>1</sub> +1	d <sub>1</sub> +9	6,7 ± 0,6	VR2	V	<b>400185</b>
<b>19</b>	<b>21</b>	18	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	R	<b>400200</b>
		18	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	V	<b>400204</b>
		18	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	R	<b>400201</b>
		18	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	V	<b>400205</b>
<b>21</b>	<b>24</b>	20	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	R	<b>400220</b>
		20	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	V	<b>400224</b>
		20	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	R	<b>400221</b>
		20	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	V	<b>400225</b>
<b>24</b>	<b>27</b>	22	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	R	<b>400250</b>
		22	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	V	<b>400254</b>
		22	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	R	<b>400251</b>
		22	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	V	<b>400255</b>
<b>27</b>	<b>29</b>	25	4,7	7,5	4	d <sub>1</sub> +2	12	6 ± 0,8	VR1	R	<b>400280</b>
		25	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	V	<b>400284</b>
		25	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	R	<b>400281</b>
		25	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	V	<b>400285</b>
<b>29</b>	<b>31</b>	27	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	R	<b>400300</b>
		27	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	V	<b>400304</b>
		27	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	R	<b>400301</b>
		27	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	V	<b>400305</b>
<b>31</b>	<b>33</b>	29	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	R	<b>400320</b>
		29	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	V	<b>400324</b>
		29	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	R	<b>400321</b>
		29	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	V	<b>400325</b>
<b>33</b>	<b>36</b>	31	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	R	<b>400350</b>
		31	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	V	<b>400354</b>
		31	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	R	<b>400351</b>
		31	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	V	<b>400355</b>
<b>36</b>	<b>38</b>	34	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	R	<b>400380</b>
		34	4,7	7,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	6 ± 0,8	VR1	V	<b>400384</b>
		34	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	R	<b>400381</b>
		34	7,9	10,5	4	d <sub>1</sub> +2	d <sub>1</sub> +12	9 ± 0,8	VR2	V	<b>400385</b>
<b>38</b>	<b>43</b>	36	5,5	9	5	d <sub>1</sub> +2	d <sub>1</sub> +15	7 ± 1	VR1	R	<b>400400</b>
		36	5,5	9	5	d <sub>1</sub> +2	d <sub>1</sub> +15	7 ± 1	VR1	V	<b>400404</b>
		36	9,5	13	5	d <sub>1</sub> +2	d <sub>1</sub> +15	11 ± 1	VR2	R	<b>400401</b>
		36	9,5	13	5	d <sub>1</sub> +2	d <sub>1</sub> +15	11 ± 1	VR2	V	<b>400405</b>
<b>43</b>	<b>48</b>	40	5,5	9	5	d <sub>1</sub> +2	d <sub>1</sub> +15	7 ± 1	VR1	R	<b>400450</b>
		40	5,5	9	5	d <sub>1</sub> +2	d <sub>1</sub> +15	7 ± 1	VR1	V	<b>400454</b>
		40	9,5	13	5	d <sub>1</sub> +2	d <sub>1</sub> +15	11 ± 1	VR2	R	<b>400451</b>
		40	9,5	13	5	d <sub>1</sub> +2	d <sub>1</sub> +15	11 ± 1	VR2	V	<b>400455</b>
<b>48</b>	<b>53</b>	45	5,5	9	5	d <sub>1</sub> +2	d <sub>1</sub> +15	7 ± 1	VR1	R	<b>400500</b>
		45	5,5	9	5	d <sub>1</sub> +2	d <sub>1</sub> +15	7 ± 1	VR1	V	<b>400504</b>
		45	9,5	13	5	d <sub>1</sub> +2	d <sub>1</sub> +15	11 ± 1	VR2	R	<b>400501</b>
		45	9,5	13	5	d <sub>1</sub> +2	d <sub>1</sub> +15	11 ± 1	VR2	V	<b>400505</b>

# V-ring seals – metric dimensions, for North American market

$d_1$  53 – 195 mm

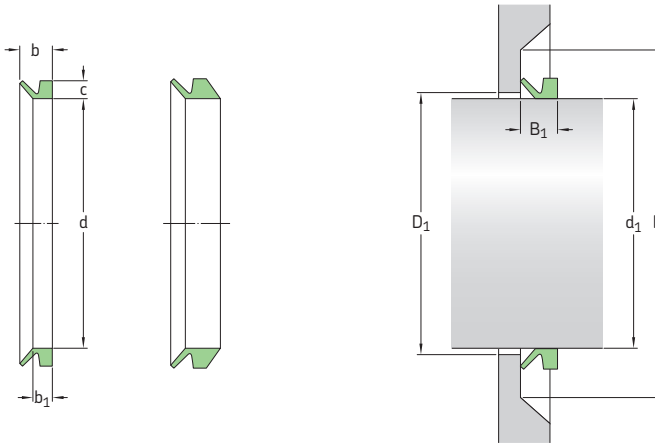


Dimensions		Seal inside diameter, free state $d$	Seal seat width $b_1$	Nominal seal width $b$	Nominal seal height $c$	Clearance $D_1$ max	Counterface $D$ min	Seal fitted width $B_1$	Design	Lip code	Designation
Shaft diameter range $d_1$ over	incl.										
mm											
53	58	49	5,5	9	5	$d_1 + 2$	$d_1 + 15$	$7 \pm 1$	VR1	R	400550
		49	5,5	9	5	$d_1 + 2$	$d_1 + 15$	$7 \pm 1$	VR1	V	400554
		49	9,5	13	5	$d_1 + 2$	$d_1 + 15$	$11 \pm 1$	VR2	R	400551
		49	9,5	13	5	$d_1 + 2$	$d_1 + 15$	$11 \pm 1$	VR2	V	400555
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

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>98</b>	<b>105</b>	90	6,8	11	6	d <sub>1</sub> +3	d <sub>1</sub> +18	9 ± 1,2	VR1	R	401000
		90	6,8	11	6	d <sub>1</sub> +3	d <sub>1</sub> +18	9 ± 1,2	VR1	V	401004
		90	11,3	15,5	6	d <sub>1</sub> +3	d <sub>1</sub> +18	13,5 ± 1,2	VR2	R	401001
		90	11,3	15,5	6	d <sub>1</sub> +3	d <sub>1</sub> +18	13,5 ± 1,2	VR2	V	401005
<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	401102
		99	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	401106
		99	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	VR1	R	401100
		99	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	VR1	V	401104
		99	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	VR2	R	401101
		99	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	VR2	V	401105
<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	401202
		108	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	401206
		108	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	VR1	R	401200
		108	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	VR1	V	401204
		108	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	VR2	R	401201
		108	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	VR2	V	401205
<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	401302
		117	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	401306
		117	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	VR1	R	401300
		117	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	VR1	V	401304
		117	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	VR2	R	401301
		117	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	VR2	V	401305
<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	401402
		126	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	401406
		126	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	VR1	R	401400
		126	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	VR1	V	401404
		126	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	VR2	R	401401
		126	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	VR2	V	401405
<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	401502
		135	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	401506
		135	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	VR1	R	401500
		135	7,9	12,8	7	d <sub>1</sub> +4	d <sub>1</sub> +21	10,5 ± 1,5	VR1	V	401504
		135	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	VR2	R	401501
		135	13,1	18	7	d <sub>1</sub> +4	d <sub>1</sub> +21	15,5 ± 1,5	VR2	V	401505
<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	401602
		144	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	401606
		144	9	14,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	12 ± 1,8	VR1	R	401600
		144	9	14,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	12 ± 1,8	VR1	V	401604
		144	15	20,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	18 ± 1,8	VR2	R	401601
		144	15	20,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	18 ± 1,8	VR2	V	401605
<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	401702
		153	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	401706
		153	9	14,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	12 ± 1,8	VR1	R	401700
		153	9	14,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	12 ± 1,8	VR1	V	401704
		153	15	20,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	18 ± 1,8	VR2	R	401701
		153	15	20,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	18 ± 1,8	VR2	V	401705
<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	401802
		162	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	401806
		162	9	14,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	12 ± 1,8	VR1	R	401800
		162	9	14,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	12 ± 1,8	VR1	V	401804
		162	15	20,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	18 ± 1,8	VR2	R	401801
		162	15	20,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	18 ± 1,8	VR2	V	401805
<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	401902
		171	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	401906
		171	9	14,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	12 ± 1,8	VR1	R	401900
		171	9	14,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	12 ± 1,8	VR1	V	401904
		171	15	20,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	18 ± 1,8	VR2	R	401901
		171	15	20,5	8	d <sub>1</sub> +4	d <sub>1</sub> +24	18 ± 1,8	VR2	V	401905

# V-ring seals – metric dimensions, for North American market

d<sub>1</sub> 190 – 395 mm

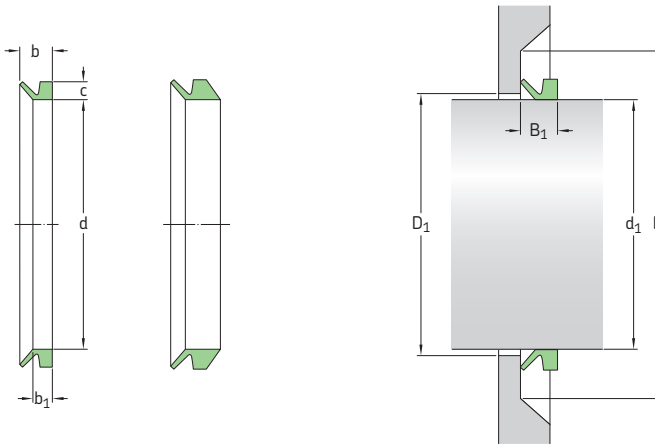


Dimensions		Seal inside diameter, free state d	Seal seat width b <sub>1</sub>	Nominal seal width b	Nominal seal height c	Clearance D <sub>1</sub> max	Counterface D min	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
mm											
195	210	182	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	VR3	R	402002
		182	6	10,5	6,5	d <sub>1</sub> + 5	d <sub>1</sub> + 20	8 ± 1,5	VR3	V	402006
		180	9	14,5	8	d <sub>1</sub> + 4	d <sub>1</sub> + 24	12 ± 1,8	VR1	R	401990
		180	9	14,5	8	d <sub>1</sub> + 4	d <sub>1</sub> + 24	12 ± 1,8	VR1	V	401994
		180	15	20,5	8	d <sub>1</sub> + 4	d <sub>1</sub> + 24	18 ± 1,8	VR2	R	401991
		180	15	20,5	8	d <sub>1</sub> + 4	d <sub>1</sub> + 24	18 ± 1,8	VR2	V	401995
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	403001
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	403006
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

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>310</b> cont.	<b>335</b>	292	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	<b>403250</b>
		292	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	V	<b>403254</b>
<b>310</b>	<b>315</b>	304	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>403103</b>
		304	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470311</b>
<b>315</b>	<b>320</b>	309	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>403153</b>
		309	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470316</b>
<b>320</b>	<b>325</b>	314	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>403203</b>
		314	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470321</b>
<b>325</b>	<b>330</b>	319	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>403253</b>
		319	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470326</b>
<b>330</b>	<b>335</b>	323	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>403303</b>
		323	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470331</b>
<b>335</b>	<b>365</b>	315	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	<b>403502</b>
		315	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	<b>403506</b>
		315	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	<b>403500</b>
		315	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	V	<b>403504</b>
<b>335</b>	<b>340</b>	328	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>403353</b>
		328	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470336</b>
<b>340</b>	<b>345</b>	333	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>403403</b>
		328	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470341</b>
<b>345</b>	<b>350</b>	338	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>403453</b>
		338	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470346</b>
<b>350</b>	<b>355</b>	343	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>403503</b>
		343	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470351</b>
<b>355</b>	<b>360</b>	347	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>403553</b>
		347	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470356</b>
<b>360</b>	<b>365</b>	352	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>403603</b>
		357	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470361</b>
<b>365</b>	<b>385</b>	337	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	<b>403752</b>
		337	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	<b>403756</b>
<b>365</b>	<b>390</b>	337	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	<b>403750</b>
		337	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	V	<b>403754</b>
		357	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>403653</b>
<b>370</b>	<b>375</b>	362	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>403703</b>
		362	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470371</b>
<b>375</b>	<b>380</b>	367	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>403753</b>
		367	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470376</b>
<b>380</b>	<b>385</b>	371	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>403803</b>
		371	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470381</b>
<b>385</b>	<b>410</b>	360	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	<b>404002</b>
		360	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	<b>404006</b>
<b>390</b>	<b>430</b>	360	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	<b>404000</b>
		360	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	V	<b>404004</b>
<b>385</b>	<b>390</b>	376	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>403853</b>
		376	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470386</b>
<b>390</b>	<b>395</b>	381	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>403903</b>
		381	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470391</b>

# V-ring seals – metric dimensions, for North American market

$d_1$  395 – 540 mm

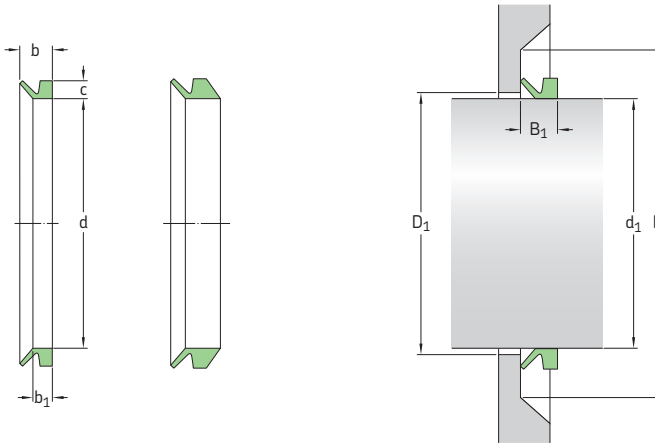


Dimensions		Seal inside diameter, free state $d$	Seal seat width $b_1$	Nominal seal width $b$	Nominal seal height $c$	Clearance $D_1$ max	Counterface $D$ min	Seal fitted width $B_1$	Design	Lip code	Designation
Shaft diameter range $d_1$ over	incl.										
mm											
395	400	386	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	403953
		386	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	470396
400	405	391	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	404003
		391	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	470401
405	410	396	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	404053
		396	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	470406
410	415	401	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	404103
		401	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	470411
415	420	405	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	404153
		405	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	470416
420	425	410	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	404203
		410	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	470421
425	430	415	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	404253
		415	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	470426
410	440	382	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	VR3	R	404252
		382	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	VR3	V	404256
440	475	405	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	VR3	R	404502
		405	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	VR3	V	404506
430	480	405	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	VR1	R	404500
		405	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	VR1	V	404504
430	435	420	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	404303
		420	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	470431
435	440	425	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	404353
		425	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	470436
440	445	429	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	404403
		429	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	470441
445	450	434	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	404453
		434	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	470446



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 d <sub>1</sub> over	incl.										
mm											
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	404603
		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
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	405006
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

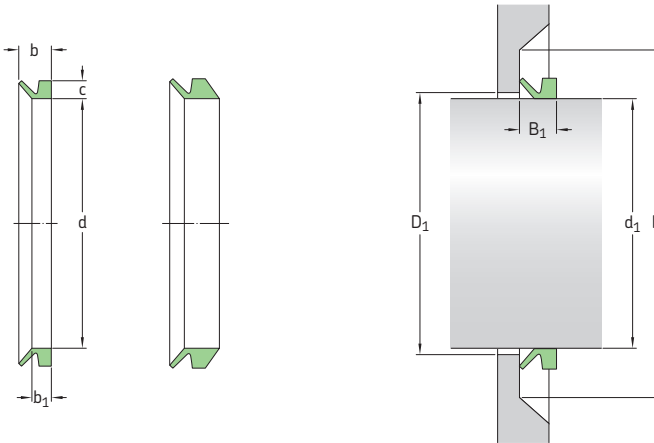
**V-ring seals – metric dimensions, for North American market**  
 $d_1$  540 – 758 mm



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											
540	545	526	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	405403
		526	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	470541
545	550	531	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	405453
		531	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	470546
550	555	536	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	405503
		536	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	470551
555	560	541	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	405553
		541	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	470556
560	565	546	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	405603
		546	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	470561
565	570	550	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	405653
		550	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	470566
570	575	555	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	405703
		555	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	470571
575	580	560	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	405753
		560	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	470576
575	625	540	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	VR3	R	406002
		540	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	VR3	V	406006
580	630	540	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	VR1	R	406000
		540	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	VR1	V	406004
580	585	565	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	405803
		565	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	470581
585	590	570	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	405853
		570	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	470586
590	600	575	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	405903
		575	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	470591
600	610	582	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	406003
		582	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	470601

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 d <sub>1</sub> over	incl.										
mm											
610	620	592	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	406103
		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	406203
		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	406303
		612	32,5	65	21	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR6	R	470631
640	650	621	32,5	65	30	d <sub>1</sub> + 24	d <sub>1</sub> + 115	50 ± 12	VR4	R	406403
		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	406603
		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	407303
		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

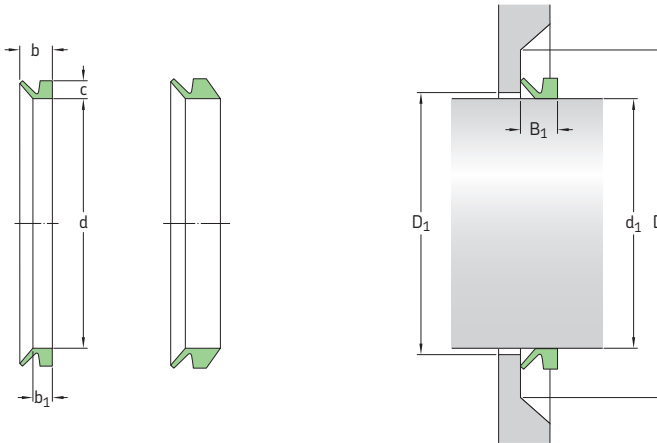
**V-ring seals – metric dimensions, for North American market**  
 $d_1$  758 – 1 045 mm



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											
758	766	735	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	407603
		735		65							
766	774	743	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	407703
		743		65							
774	783	751	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	407803
		751		65							
783	792	759	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	407903
		759		65							
775	825	745	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	VR3	R	408002
		745		6							
785	830	745	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	VR1	R	408000
		745		14,3							
792	801	768	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	408003
		768		65							
801	810	777	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	408103
		777		65							
810	821	786	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	408203
		786		65							
821	831	796	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	408303
		796		65							
825	875	785	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	VR3	R	408502
		785		6							
830	875	785	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	VR1	R	408500
		785		14,3							
831	841	805	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	408403
		805		65							
841	851	814	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	408503
		814		65							

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>851</b>	<b>861</b>	824	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>408603</b>
		824	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470861</b>
<b>861</b>	<b>871</b>	833	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>408703</b>
		833	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470871</b>
<b>871</b>	<b>882</b>	843	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>408803</b>
		843	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470881</b>
<b>875</b>	<b>925</b>	825	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	<b>409002</b>
		825	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	<b>409006</b>
<b>875</b>	<b>920</b>	825	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	<b>409000</b>
		825	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	V	<b>409004</b>
<b>882</b>	<b>892</b>	853	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>408903</b>
		853	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470891</b>
<b>892</b>	<b>912</b>	871	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>409003</b>
		871	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470901</b>
<b>912</b>	<b>922</b>	880	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>409203</b>
		880	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470921</b>
<b>925</b>	<b>975</b>	865	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	<b>409502</b>
		865	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	<b>409506</b>
<b>920</b>	<b>965</b>	865	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	<b>409500</b>
		865	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	V	<b>409504</b>
<b>922</b>	<b>933</b>	890	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>409303</b>
		890	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470931</b>
<b>933</b>	<b>944</b>	900	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>409403</b>
		900	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470941</b>
<b>944</b>	<b>955</b>	911	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>409503</b>
		911	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470951</b>
<b>955</b>	<b>966</b>	921	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>409603</b>
		921	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470961</b>
<b>975</b>	<b>1025</b>	910	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	<b>410002</b>
		910	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	<b>410006</b>
<b>965</b>	<b>1015</b>	910	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	<b>410000</b>
		910	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	V	<b>410004</b>
<b>966</b>	<b>977</b>	932	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>409703</b>
		932	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470971</b>
<b>977</b>	<b>988</b>	942	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>409803</b>
		942	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470981</b>
<b>988</b>	<b>999</b>	953	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>409903</b>
		953	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>470991</b>
<b>999</b>	<b>1010</b>	963	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>410003</b>
		963	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>471001</b>
<b>1010</b>	<b>1025</b>	973	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>410203</b>
		973	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>471021</b>
<b>1025</b>	<b>1075</b>	955	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	<b>410502</b>
		955	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	<b>410506</b>
<b>1015</b>	<b>1065</b>	955	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	<b>410500</b>
<b>1025</b>	<b>1045</b>	990	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>410403</b>
		990	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>471041</b>

**V-ring seals – metric dimensions, for North American market**  
 $d_1$  1 045 – 1 540 mm

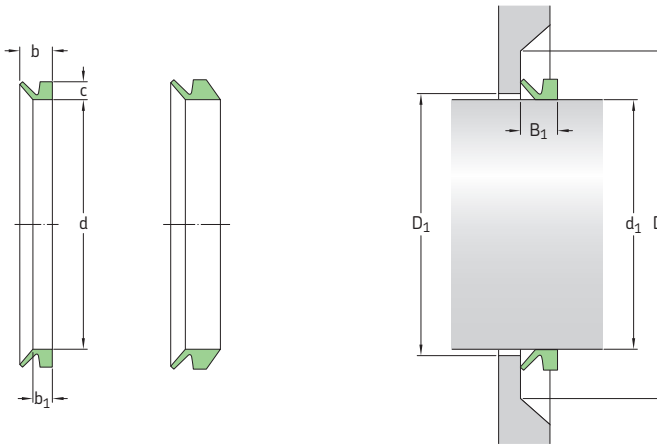


Dimensions		Seal inside diameter, free state $d$	Seal seat width $b_1$	Nominal seal width $b$	Nominal seal height $c$	Clearance $D_1$ max	Counterface $D$ min	Seal fitted width $B_1$	Design	Lip code	Designation
Shaft diameter range $d_1$ over	incl.										
mm											
1 045	1 065	1 008	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	4110603
		1 008	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	471061
1 075	1 125	1 000	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	VR3	R	411002
		1 000	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	VR3	V	411006
1 065	1 115	1 000	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	VR1	R	411000
		1 027	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	410803
		1 027	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	471081
1 085	1 105	1 045	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	411003
		1 045	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	471101
1 105	1 125	1 065	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	411203
		1 065	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	471121
1 125	1 175	1 045	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	VR3	R	411502
		1 045	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	VR3	V	411506
1 115	1 165	1 045	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	VR1	R	411500
1 125	1 145	1 084	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	411403
		1 084	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	471141
1 145	1 165	1 103	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	411603
		1 103	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	471161
1 175	1 225	1 090	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	VR3	R	412002
		1 090	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	VR3	V	412006
1 165	1 215	1 090	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	VR1	R	412000
1 165	1 185	1 121	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	411803
		1 121	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	471181
1 185	1 205	1 139	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	412003
		1 139	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	471201
1 205	1 225	1 157	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	412203
		1 157	32,5	65	21	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR6	R	471221

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>1 225 1 275</b>	1 135	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R		<b>412502</b>
	1 135										6
<b>1 215 1 270</b>	1 135	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R		<b>412500</b>
<b>1 225 1 245</b>	1 176	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R		<b>412403</b>
	1 176										32,5
<b>1 245 1 270</b>	1 195	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R		<b>412603</b>
	1 195										32,5
<b>1 270 1 295</b>	1 218	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R		<b>412803</b>
	1 218										32,5
<b>1 275 1 325</b>	1 180	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R		<b>413002</b>
	1 180										6
<b>1 270 1 320</b>	1 180	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R		<b>413000</b>
<b>1 295 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
<b>1 315 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
<b>1 325 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
<b>1 320 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 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
<b>1 365 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
<b>1 375 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
<b>1 370 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 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
<b>1 415 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
<b>1 425 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
<b>1 420 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 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
<b>1 465 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
<b>1 475 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
<b>1 470 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 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
<b>1 515 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

# V-ring seals – metric dimensions, for North American market

$d_1$  1 525 – 2 020 mm



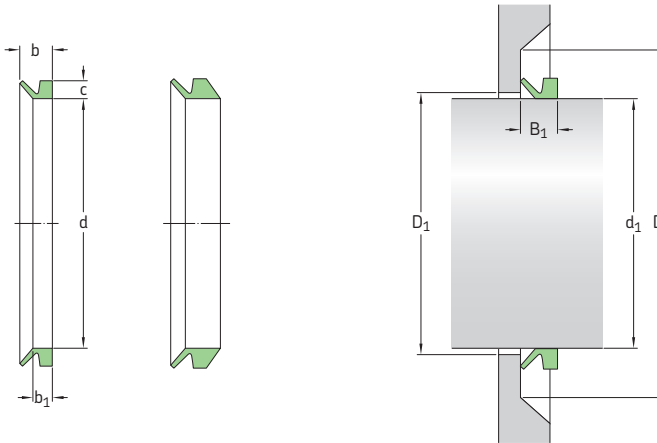
Dimensions		Seal inside diameter, free state $d$	Seal seat width $b_1$	Nominal seal width $b$	Nominal seal height $c$	Clearance $D_1$ max	Counterface $D$ min	Seal fitted width $B_1$	Design	Lip code	Designation
Shaft diameter range $d_1$ over	incl.										
mm											
1 525	1 575	1 405	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	VR3	R	415502
		1 405									
1 520	1 570	1 405	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	VR1	R	415500
1 540	1 570	1 467	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	415503
		1 467									
1 570	1 600	1 495	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	415753
		1 495									
1 575	1 625	1 450	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	VR3	R	416002
		1 450									
1 570	1 620	1 450	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	VR1	R	416000
1 600	1 640	1 524	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	416003
		1 524									
1 625	1 675	1 495	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	VR3	R	416502
		1 495									
1 620	1 670	1 495	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	VR1	R	416500
1 640	1 680	1 559	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	416503
		1 559									
1 675	1 725	1 540	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	VR3	R	417002
		1 540									
1 670	1 720	1 540	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	VR1	R	417000
1 680	1 720	1 596	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	417003
		1 596									
1 725	1 775	1 585	6	10,5	6,5	$d_1 + 5$	$d_1 + 20$	$8 \pm 1,5$	VR3	R	417502
		1 585									
1 720	1 770	1 585	14,3	25	15	$d_1 + 10$	$d_1 + 45$	$20 \pm 4$	VR1	R	417500
1 720	1 765	1 632	32,5	65	30	$d_1 + 24$	$d_1 + 115$	$50 \pm 12$	VR4	R	417503
		1 632									



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>1765 1810</b>	1671	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>418003</b>	
	1671	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>471801</b>	
<b>1775 1825</b>	1630	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	<b>418002</b>	
	1630	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	<b>418006</b>	
<b>1770 1820</b>	1630	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	<b>418000</b>	
<b>1810 1855</b>	1714	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>418503</b>	
	1714	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>471851</b>	
<b>1825 1875</b>	1675	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	<b>418502</b>	
	1675	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	<b>418506</b>	
<b>1820 1870</b>	1675	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	<b>418500</b>	
<b>1855 1905</b>	1753	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>419003</b>	
	1753	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>471901</b>	
<b>1875 1925</b>	1720	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	<b>419002</b>	
	1720	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	<b>419006</b>	
<b>1870 1920</b>	1720	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	<b>419000</b>	
<b>1905 1955</b>	1794	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>419503</b>	
	1794	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>471951</b>	
<b>1925 1975</b>	1765	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	<b>419502</b>	
	1765	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	<b>419506</b>	
<b>1920 1970</b>	1765	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	<b>419500</b>	
<b>1955 2010</b>	1844	32,5	65	30	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR4	R	<b>420003</b>	
	1844	32,5	65	21	d <sub>1</sub> +24	d <sub>1</sub> +115	50 ± 12	VR6	R	<b>472001</b>	
<b>1975 2025</b>	1810	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	R	<b>420002</b>	
	1810	6	10,5	6,5	d <sub>1</sub> +5	d <sub>1</sub> +20	8 ± 1,5	VR3	V	<b>420006</b>	
<b>1970 2020</b>	1810	14,3	25	15	d <sub>1</sub> +10	d <sub>1</sub> +45	20 ± 4	VR1	R	<b>420000</b>	

# V-ring seals – inch dimensions, for North American market

$d_1$  0.11 – 2.09 in.

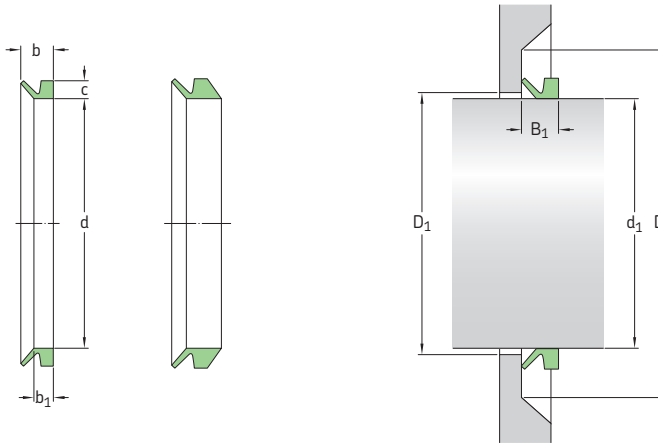


Dimensions		Seal inside diameter, free state $d$	Nominal seal height $c$	Seal seat width $b_1$	Nominal seal width $b$	Clearance $D_1 (=d_1 +)$ max	Counter-face $D (=d_1 +)$ min	Seal fitted width $B_1$	Design	Lip code	Designation
Shaft diameter range $d_1$ over	incl.										
in.		in.							-	-	-
0.11	0.14	0.10	0.06	0.08	0.12	0.04	0.16	$0.10 \pm 0.012$	VR1	R	400030
		0.10	0.06	0.08	0.12	0.04	0.16	$0.10 \pm 0.012$	VR1	V	400034
0.14	0.18	0.13	0.08	0.09	0.15	0.04	0.24	$0.12 \pm 0.016$	VR1	R	400040
		0.13	0.08	0.09	0.15	0.04	0.24	$0.12 \pm 0.016$	VR1	V	400044
0.18	0.22	0.16	0.08	0.09	0.15	0.04	0.24	$0.12 \pm 0.016$	VR1	R	400050
		0.16	0.08	0.09	0.15	0.04	0.24	$0.12 \pm 0.016$	VR1	V	400054
		0.16	0.08	0.15	0.20	0.04	0.24	$0.18 \pm 0.016$	VR2	R	400051
		0.16	0.08	0.15	0.20	0.04	0.24	$0.18 \pm 0.016$	VR2	V	400055
0.22	0.26	0.20	0.08	0.09	0.15	0.04	0.24	$0.12 \pm 0.016$	VR1	R	400060
		0.20	0.08	0.09	0.15	0.04	0.24	$0.12 \pm 0.016$	VR1	V	400064
		0.20	0.08	0.15	0.20	0.04	0.24	$0.18 \pm 0.016$	VR2	R	400061
		0.20	0.08	0.15	0.20	0.04	0.24	$0.18 \pm 0.016$	VR2	V	400065
0.26	0.31	0.24	0.08	0.09	0.15	0.04	0.24	$0.12 \pm 0.016$	VR1	R	400070
		0.24	0.08	0.09	0.15	0.04	0.24	$0.12 \pm 0.016$	VR1	V	400074
		0.24	0.08	0.15	0.20	0.04	0.24	$0.18 \pm 0.016$	VR2	R	400071
		0.24	0.08	0.15	0.20	0.04	0.24	$0.18 \pm 0.016$	VR2	V	400075
0.31	0.37	0.28	0.08	0.09	0.15	0.04	0.24	$0.12 \pm 0.016$	VR1	R	400080
		0.28	0.08	0.09	0.15	0.04	0.24	$0.12 \pm 0.016$	VR1	V	400084
		0.28	0.08	0.15	0.20	0.04	0.24	$0.18 \pm 0.016$	VR2	R	400081
		0.28	0.08	0.15	0.20	0.04	0.24	$0.18 \pm 0.016$	VR2	V	400085
0.37	0.45	0.35	0.12	0.13	0.22	0.04	0.35	$0.18 \pm 0.02$	VR1	R	400100
		0.35	0.12	0.13	0.22	0.04	0.35	$0.18 \pm 0.02$	VR1	V	400104
		0.35	0.12	0.22	0.30	0.04	0.35	$0.26 \pm 0.02$	VR2	R	400101
		0.35	0.12	0.22	0.30	0.04	0.35	$0.26 \pm 0.02$	VR2	V	400105
0.45	0.49	0.41	0.12	0.13	0.22	0.04	0.35	$0.18 \pm 0.02$	VR1	R	400120
		0.41	0.12	0.13	0.22	0.04	0.35	$0.18 \pm 0.02$	VR1	V	400124
		0.41	0.12	0.22	0.30	0.04	0.35	$0.26 \pm 0.02$	VR2	R	400121
		0.41	0.12	0.22	0.30	0.04	0.35	$0.26 \pm 0.02$	VR2	V	400125
0.49	0.53	0.46	0.12	0.13	0.22	0.04	0.35	$0.18 \pm 0.02$	VR1	R	400130
		0.46	0.12	0.13	0.22	0.04	0.35	$0.18 \pm 0.02$	VR1	V	400134
0.53	0.61	0.49	0.12	0.13	0.22	0.04	0.35	$0.18 \pm 0.02$	VR1	R	400140
		0.49	0.12	0.13	0.22	0.04	0.35	$0.18 \pm 0.02$	VR1	V	400144

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> +) max	Counter-face D(-d <sub>1</sub> +) min	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
in.		in.							-	-	-
<b>0.53</b> cont.	<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>
<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>400404</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>

# V-ring seals – inch dimensions, for North American market

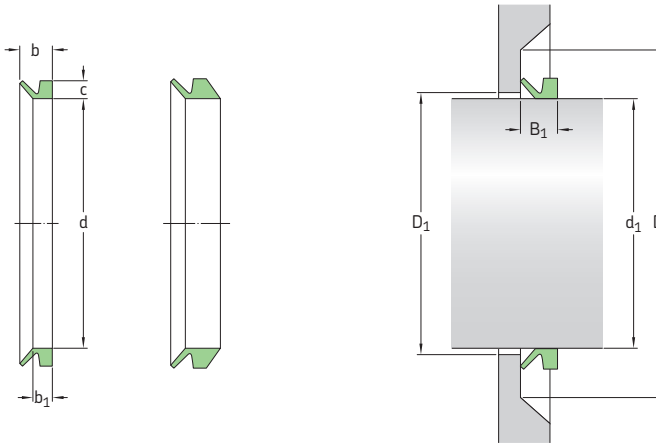
$d_1$  2.09 – 7.68 in.



Dimensions		Seal inside diameter, free state $d$	Nominal seal height $c$	Seal seat width $b_1$	Nominal seal width $b$	Clearance $D_1 (= d_1 +)$ max	Counter-face $D (= d_1 +)$ min	Seal fitted width $B_1$	Design	Lip code	Designation
Shaft diameter range $d_1$ over	incl.										
in.		in.							-	-	-
2.09	2.28	1.93	0.20	0.22	0.35	0.08	0.59	$0.28 \pm 0.04$	VR1	R	400550
		1.93	0.20	0.22	0.35	0.08	0.59	$0.28 \pm 0.04$	VR1	V	400554
		1.93	0.20	0.37	0.51	0.08	0.59	$0.43 \pm 0.04$	VR2	R	400551
		1.93	0.20	0.37	0.51	0.08	0.59	$0.43 \pm 0.04$	VR2	V	400555
2.28	2.48	2.13	0.20	0.22	0.35	0.08	0.59	$0.28 \pm 0.04$	VR1	R	400600
		2.13	0.20	0.22	0.35	0.08	0.59	$0.28 \pm 0.04$	VR1	V	400604
		2.13	0.20	0.37	0.51	0.08	0.59	$0.43 \pm 0.04$	VR2	R	400601
		2.13	0.20	0.37	0.51	0.08	0.59	$0.43 \pm 0.04$	VR2	V	400605
2.48	2.68	2.28	0.20	0.22	0.35	0.08	0.59	$0.28 \pm 0.04$	VR1	R	400650
		2.28	0.20	0.22	0.35	0.08	0.59	$0.28 \pm 0.04$	VR1	V	400654
		2.28	0.20	0.37	0.51	0.08	0.59	$0.43 \pm 0.04$	VR2	R	400651
		2.28	0.20	0.37	0.51	0.08	0.59	$0.43 \pm 0.04$	VR2	V	400655
2.68	2.87	2.48	0.24	0.27	0.43	0.12	0.71	$0.35 \pm 0.05$	VR1	R	400700
		2.48	0.24	0.27	0.43	0.12	0.71	$0.35 \pm 0.05$	VR1	V	400704
		2.48	0.24	0.44	0.61	0.12	0.71	$0.53 \pm 0.05$	VR2	R	400701
		2.48	0.24	0.44	0.61	0.12	0.71	$0.53 \pm 0.05$	VR2	V	400705
2.87	3.07	2.64	0.24	0.27	0.43	0.12	0.71	$0.35 \pm 0.05$	VR1	R	400750
		2.64	0.24	0.27	0.43	0.12	0.71	$0.53 \pm 0.05$	VR2	R	400751
		2.64	0.24	0.44	0.61	0.12	0.71	$0.53 \pm 0.05$	VR2	V	400755
3.07	3.27	2.83	0.24	0.27	0.43	0.12	0.71	$0.35 \pm 0.05$	VR1	R	400800
		2.83	0.24	0.27	0.43	0.12	0.71	$0.35 \pm 0.05$	VR1	V	400804
		2.83	0.24	0.44	0.61	0.12	0.71	$0.53 \pm 0.05$	VR2	R	400801
		2.83	0.24	0.44	0.61	0.12	0.71	$0.53 \pm 0.05$	VR2	V	400805
3.27	3.46	2.99	0.24	0.27	0.43	0.12	0.71	$0.35 \pm 0.05$	VR1	R	400850
		2.99	0.24	0.27	0.43	0.12	0.71	$0.35 \pm 0.05$	VR1	V	400854
		2.99	0.24	0.44	0.61	0.12	0.71	$0.53 \pm 0.05$	VR2	R	400851
		2.99	0.24	0.44	0.61	0.12	0.71	$0.53 \pm 0.05$	VR2	V	400855
3.46	3.66	3.19	0.24	0.27	0.43	0.12	0.71	$0.35 \pm 0.05$	VR1	R	400900
		3.19	0.24	0.27	0.43	0.12	0.71	$0.35 \pm 0.05$	VR1	V	400904
		3.19	0.24	0.44	0.61	0.12	0.71	$0.53 \pm 0.05$	VR2	R	400901
		3.19	0.24	0.44	0.61	0.12	0.71	$0.53 \pm 0.05$	VR2	V	400905
3.66	3.86	3.35	0.24	0.27	0.43	0.12	0.71	$0.35 \pm 0.05$	VR1	R	400950
		3.35	0.24	0.27	0.43	0.12	0.71	$0.35 \pm 0.05$	VR1	V	400954
		3.35	0.24	0.44	0.61	0.12	0.71	$0.53 \pm 0.05$	VR2	R	400951
		3.35	0.24	0.44	0.61	0.12	0.71	$0.53 \pm 0.05$	VR2	V	400955

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> +) max	Counter-face D (= d <sub>1</sub> +) min	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
in.		in.							-	-	-
<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	401000
		3.54	0.24	0.27	0.43	0.12	0.71	0.35 ± 0.05	VR1	V	401004
		3.54	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	VR2	R	401001
		3.54	0.24	0.44	0.61	0.12	0.71	0.53 ± 0.05	VR2	V	401005
<b>4.13</b>	<b>4.53</b>	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
<b>4.53</b>	<b>4.92</b>	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
<b>4.92</b>	<b>5.31</b>	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
<b>5.31</b>	<b>5.71</b>	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
<b>5.71</b>	<b>6.10</b>	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
<b>6.10</b>	<b>6.50</b>	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
<b>6.50</b>	<b>6.89</b>	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
<b>6.89</b>	<b>7.28</b>	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
<b>7.28</b>	<b>7.68</b>	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

**V-ring seals – inch dimensions, for North American market**  
 $d_1$  7.48 – 15.35 in.

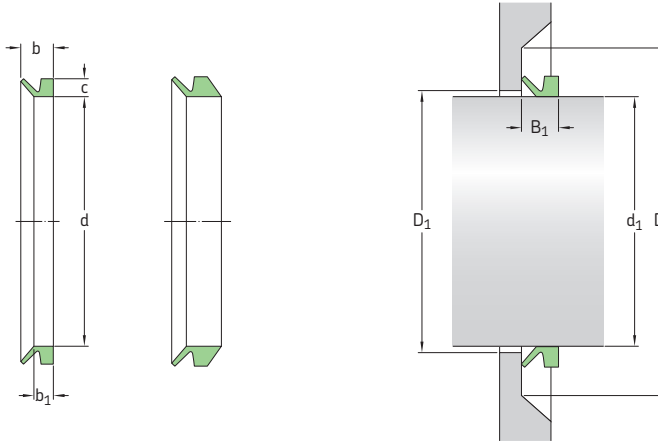


Dimensions		Seal inside diameter, free state d	Nominal seal height c	Seal seat width $b_1$	Nominal seal width b	Clearance $D_1 (= d_1 +)$ max	Counter-face $D (= d_1 +)$ min	Seal fitted width $B_1$	Design	Lip code	Designation
Shaft diameter range $d_1$ over	incl.										
in.	in.										
7.68	8.27	7.17	0.26	0.24	0.41	0.20	0.79	$0.31 \pm 0.06$	VR3	R	402002
		7.17	0.26	0.24	0.41	0.20	0.79	$0.31 \pm 0.06$	VR3	V	402006
		7.09	0.31	0.35	0.57	0.16	0.94	$0.47 \pm 0.07$	VR1	R	401990
		7.09	0.31	0.35	0.57	0.16	0.94	$0.47 \pm 0.07$	VR1	V	401994
		7.09	0.31	0.59	0.81	0.16	0.94	$0.71 \pm 0.07$	VR2	R	401991
		7.09	0.31	0.59	0.81	0.16	0.94	$0.71 \pm 0.07$	VR2	V	401995
7.48	8.27	7.09	0.59	0.56	0.98	0.39	1.77	$0.79 \pm 0.16$	VR1	R	402000
		7.09	0.59	0.56	0.98	0.39	1.77	$0.79 \pm 0.16$	VR1	V	402004
8.27	9.17	7.80	0.26	0.24	0.41	0.20	0.79	$0.31 \pm 0.06$	VR3	R	402202
		7.80	0.26	0.24	0.41	0.20	0.79	$0.31 \pm 0.06$	VR3	V	402206
		7.80	0.59	0.56	0.98	0.39	1.77	$0.79 \pm 0.16$	VR1	R	402200
		7.80	0.59	0.56	0.98	0.39	1.77	$0.79 \pm 0.16$	VR1	V	402204
9.17	10.24	8.86	0.26	0.24	0.41	0.20	0.79	$0.31 \pm 0.06$	VR3	R	402502
		8.86	0.26	0.24	0.41	0.20	0.79	$0.31 \pm 0.06$	VR3	V	402506
9.25	10.43	8.86	0.59	0.56	0.98	0.39	1.77	$0.79 \pm 0.16$	VR1	R	402500
		8.86	0.59	0.56	0.98	0.39	1.77	$0.79 \pm 0.16$	VR1	V	402504
10.24	11.22	9.72	0.26	0.24	0.41	0.20	0.79	$0.31 \pm 0.06$	VR3	R	402752
		9.72	0.26	0.24	0.41	0.20	0.79	$0.31 \pm 0.06$	VR3	V	402756
10.43	11.42	9.72	0.59	0.56	0.98	0.39	1.77	$0.79 \pm 0.16$	VR1	R	402750
		9.72	0.59	0.56	0.98	0.39	1.77	$0.79 \pm 0.16$	VR1	V	402754
11.22	12.20	10.63	0.26	0.24	0.41	0.20	0.79	$0.31 \pm 0.06$	VR3	R	403002
		10.63	0.26	0.24	0.41	0.20	0.79	$0.31 \pm 0.06$	VR3	V	403006
11.42	12.20	10.63	0.59	0.56	0.98	0.39	1.77	$0.79 \pm 0.16$	VR1	R	403000
		10.63	0.59	0.56	0.98	0.39	1.77	$0.79 \pm 0.16$	VR1	V	403004
11.81	12.01	11.57	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	403003
		11.57	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470301
12.01	12.20	11.77	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	403053
		11.77	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470306
12.20	13.19	11.50	0.26	0.24	0.41	0.20	0.79	$0.31 \pm 0.06$	VR3	R	403252
		11.50	0.26	0.24	0.41	0.20	0.79	$0.31 \pm 0.06$	VR3	V	403256

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> +) max	Counter-face D(= d <sub>1</sub> +) min	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
in.		in.							-	-	-
<b>12.20</b> cont.	<b>13.19</b>	11.50 11.50	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 VR1	R V	<b>403250</b> <b>403254</b>
<b>12.20</b>	<b>12.40</b>	11.97 11.97	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 VR6	R R	<b>403103</b> <b>470311</b>
<b>12.40</b>	<b>12.60</b>	12.17 12.17	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 VR6	R R	<b>403153</b> <b>470316</b>
<b>12.60</b>	<b>12.80</b>	12.36 12.36	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 VR6	R R	<b>403203</b> <b>470321</b>
<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	VR4 VR6	R R	<b>403253</b> <b>470326</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	VR4 VR6	R R	<b>403303</b> <b>470331</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	VR3 VR3 VR1 VR1	R V R V	<b>403502</b> <b>403506</b> <b>403500</b> <b>403504</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	VR4 VR6	R R	<b>403353</b> <b>470336</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	VR4 VR6	R R	<b>403403</b> <b>470341</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	VR4 VR6	R R	<b>403453</b> <b>470346</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	VR4 VR6	R R	<b>403503</b> <b>470351</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	VR4 VR6	R R	<b>403553</b> <b>470356</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	VR4 VR6	R R	<b>403603</b> <b>470361</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	VR3 VR3	R V	<b>403752</b> <b>403756</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	VR1 VR1	R V	<b>403750</b> <b>403754</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	VR4	R	<b>403653</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	VR4 VR6	R R	<b>403703</b> <b>470371</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	VR4 VR6	R R	<b>403753</b> <b>470376</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	VR4 VR6	R R	<b>403803</b> <b>470381</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	VR3 VR3	R V	<b>404002</b> <b>404006</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	VR1 VR1	R V	<b>404000</b> <b>404004</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	VR4 VR6	R R	<b>403853</b> <b>470386</b>

# V-ring seals – inch dimensions, for North American market

$d_1$  15.35 – 22.64 in.



Dimensions		Seal inside diameter, free state d	Nominal seal height c	Seal seat width $b_1$	Nominal seal width b	Clearance $D_1 (= d_1 +)$ max	Counter-face $D (= d_1 +)$ min	Seal fitted width $B_1$	Design	Lip code	Designation
Shaft diameter range $d_1$ over	incl.										
in.	in.								-	-	-
15.35	15.55	15.00	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	403903
		15.00	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470391
15.55	15.75	15.20	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	403953
		15.20	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470396
15.75	15.94	15.39	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	404003
		15.39	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470401
15.94	16.14	15.59	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	404053
		15.59	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470406
16.14	16.34	15.79	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	404103
		15.79	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470411
16.34	16.54	15.94	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	404153
		15.94	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470416
16.54	16.73	16.14	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	404203
		16.14	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470421
16.73	16.93	16.34	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	404253
		16.34	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470426
16.14	17.32	15.04	0.26	0.24	0.41	0.20	0.79	$0.31 \pm 0.06$	VR3	R	404252
		15.04	0.26	0.24	0.41	0.20	0.79	$0.31 \pm 0.06$	VR3	V	404256
17.32	18.70	15.94	0.26	0.24	0.41	0.20	0.79	$0.31 \pm 0.06$	VR3	R	404502
		15.94	0.26	0.24	0.41	0.20	0.79	$0.31 \pm 0.06$	VR3	V	404506
16.93	18.90	15.94	0.59	0.56	0.98	0.39	1.77	$0.79 \pm 0.16$	VR1	R	404500
		15.94	0.59	0.56	0.98	0.39	1.77	$0.79 \pm 0.16$	VR1	V	404504
16.93	17.13	16.54	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	404303
		16.54	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470431
17.13	17.32	16.73	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	404353
		16.73	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470436

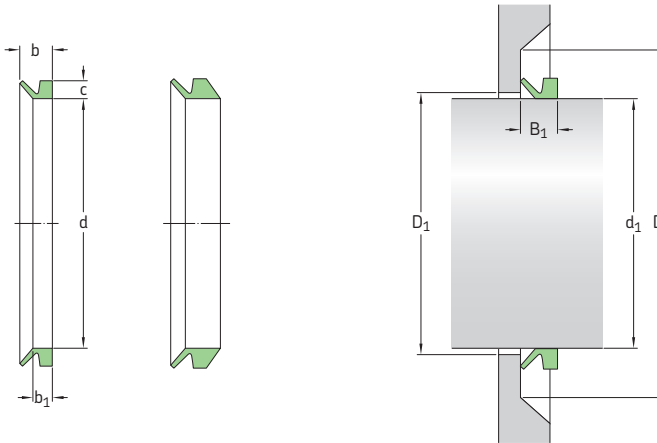


Dimensions		Seal inside diameter, free state d	Nominal seal height c	Seal seat width b <sub>1</sub>	Nominal seal width b	Clearance D <sub>1</sub> (= d <sub>1</sub> +) max	Counter-face D <sub>1</sub> (= d <sub>1</sub> +) min	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
in.		in.							-	-	-
<b>17.32</b>	<b>17.52</b>	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	VR4 VR6	R R	<b>404403</b> <b>470441</b>
<b>17.52</b>	<b>17.72</b>	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	VR4 VR6	R R	<b>404453</b> <b>470446</b>
<b>17.72</b>	<b>17.91</b>	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	VR4 VR6	R R	<b>404503</b> <b>470451</b>
<b>17.91</b>	<b>18.11</b>	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	VR4 VR6	R R	<b>404553</b> <b>470456</b>
<b>18.11</b>	<b>18.31</b>	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	VR4 VR6	R R	<b>404603</b> <b>470461</b>
<b>18.31</b>	<b>18.50</b>	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	VR4 VR6	R R	<b>404653</b> <b>470466</b>
<b>18.50</b>	<b>18.70</b>	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	VR4 VR6	R R	<b>404703</b> <b>470471</b>
<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	VR4 VR6	R R	<b>404753</b> <b>470476</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	VR3 VR3	R V	<b>405002</b> <b>405006</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	VR3 VR3	R V	<b>405252</b> <b>405256</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	VR1 VR1	R V	<b>405000</b> <b>405004</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	VR4 VR6	R R	<b>404803</b> <b>470481</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	VR4 VR6	R R	<b>404853</b> <b>470486</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	VR4 VR6	R R	<b>404903</b> <b>470491</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	VR4 VR6	R R	<b>404953</b> <b>470496</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	VR4 VR6	R R	<b>405003</b> <b>470501</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	VR4 VR6	R R	<b>405053</b> <b>470506</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	VR4 VR6	R R	<b>405103</b> <b>470511</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	VR4 VR6	R R	<b>405153</b> <b>470516</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	VR4 VR6	R R	<b>405203</b> <b>470521</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	VR4 VR6	R R	<b>405253</b> <b>470526</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	VR3 VR3	R V	<b>405502</b> <b>405506</b>

7.2

## V-ring seals – inch dimensions, for North American market

$d_1$  20.87 – 28.74 in.



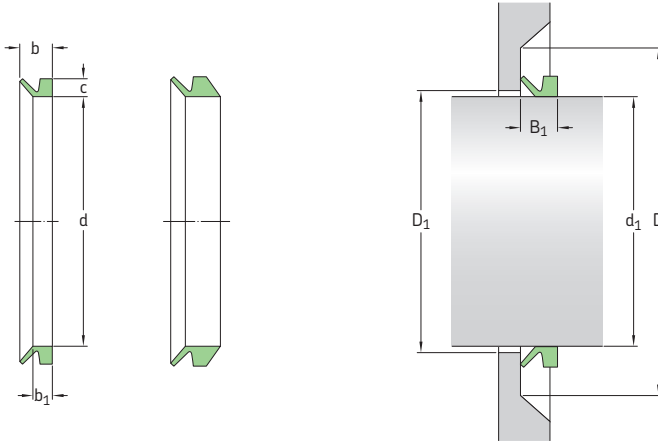
Dimensions		Seal inside diameter, free state $d$	Nominal seal height $c$	Seal seat width $b_1$	Nominal seal width $b$	Clearance $D_1 (= d_1 +)$ max	Counter-face $D (= d_1 +)$ min	Seal fitted width $B_1$	Design	Lip code	Designation
Shaft diameter range $d_1$ over	incl.										
in.	in.										
20.87	22.83	19.49	0.59	0.56	0.98	0.39	1.77	$0.79 \pm 0.16$	VR1	R	405500
		19.49	0.59	0.56	0.98	0.39	1.77	$0.79 \pm 0.16$	VR1	V	405504
20.87	21.06	20.35	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	405303
		20.35	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470531
21.06	21.26	20.51	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	405353
		20.51	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470536
21.26	21.46	20.71	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	405403
		20.71	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470541
21.46	21.65	20.91	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	405453
		20.91	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470546
21.65	21.85	21.10	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	405503
		21.10	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470551
21.85	22.05	21.30	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	405553
		21.30	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470556
22.05	22.24	21.50	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	405603
		21.50	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470561
22.24	22.44	21.65	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	405653
		21.65	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470566
22.44	22.64	21.85	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	405703
		21.85	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470571
22.64	22.83	22.05	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	405753
		22.05	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470576
22.64	24.61	21.26	0.26	0.24	0.41	0.20	0.79	$0.31 \pm 0.06$	VR3	R	406002
		21.26	0.26	0.24	0.41	0.20	0.79	$0.31 \pm 0.06$	VR3	V	406006
22.83	24.80	21.26	0.59	0.56	0.98	0.39	1.77	$0.79 \pm 0.16$	VR1	R	406000
		21.26	0.59	0.56	0.98	0.39	1.77	$0.79 \pm 0.16$	VR1	V	406004

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> +) max	Counter-face D (= d <sub>1</sub> +) min	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
in.		in.							-	-	-
<b>22.83</b>	<b>23.03</b>	22.24	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	<b>405803</b>
		22.24	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	<b>470581</b>
<b>23.03</b>	<b>23.23</b>	22.44	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	<b>405853</b>
		22.44	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	<b>470586</b>
<b>23.23</b>	<b>23.62</b>	22.64	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	<b>405903</b>
		22.64	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	<b>470591</b>
<b>23.62</b>	<b>24.02</b>	22.91	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	<b>406003</b>
		22.91	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	<b>470601</b>
<b>24.02</b>	<b>24.41</b>	23.31	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	<b>406103</b>
		23.31	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	<b>470611</b>
<b>24.41</b>	<b>24.80</b>	23.70	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	<b>406203</b>
		23.70	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	<b>470621</b>
<b>24.21</b>	<b>26.57</b>	23.62	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	<b>406502</b>
		23.62	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	<b>406506</b>
<b>24.80</b>	<b>26.18</b>	23.62	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	<b>406500</b>
		23.62	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	V	<b>406504</b>
<b>24.80</b>	<b>25.20</b>	24.09	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	<b>406303</b>
		24.09	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	<b>470631</b>
<b>25.20</b>	<b>25.59</b>	24.45	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	<b>406403</b>
		24.45	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	<b>470641</b>
<b>25.59</b>	<b>25.98</b>	24.84	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	<b>406503</b>
		24.84	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	<b>470651</b>
<b>25.98</b>	<b>26.38</b>	25.20	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	<b>406603</b>
		25.20	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	<b>470661</b>
<b>26.57</b>	<b>27.95</b>	24.80	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	<b>407002</b>
		24.80	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	<b>407006</b>
<b>26.18</b>	<b>27.76</b>	24.80	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	<b>407000</b>
		24.80	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	V	<b>407004</b>
<b>26.38</b>	<b>26.77</b>	25.59	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	<b>406703</b>
		25.59	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	<b>470671</b>
<b>26.77</b>	<b>27.17</b>	25.98	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	<b>406803</b>
		25.98	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	<b>470681</b>
<b>27.17</b>	<b>27.56</b>	26.38	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	<b>406903</b>
		26.38	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	<b>470691</b>
<b>27.56</b>	<b>27.95</b>	26.77	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	<b>407003</b>
		26.77	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	<b>470701</b>
<b>27.95</b>	<b>29.13</b>	26.38	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	R	<b>407252</b>
		26.38	0.26	0.24	0.41	0.20	0.79	0.31 ± 0.06	VR3	V	<b>407256</b>
<b>27.76</b>	<b>29.33</b>	26.38	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	<b>407250</b>
		26.38	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	V	<b>407254</b>
<b>27.95</b>	<b>28.35</b>	27.13	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	<b>407103</b>
		27.13	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	<b>470711</b>
<b>28.35</b>	<b>28.74</b>	27.52	1.18	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR4	R	<b>407203</b>
		27.52	0.83	1.28	2.56	0.94	4.53	1.97 ± 0.47	VR6	R	<b>470721</b>

7.2

# V-ring seals – inch dimensions, for North American market

$d_1$  28.74 – 39.96 in.

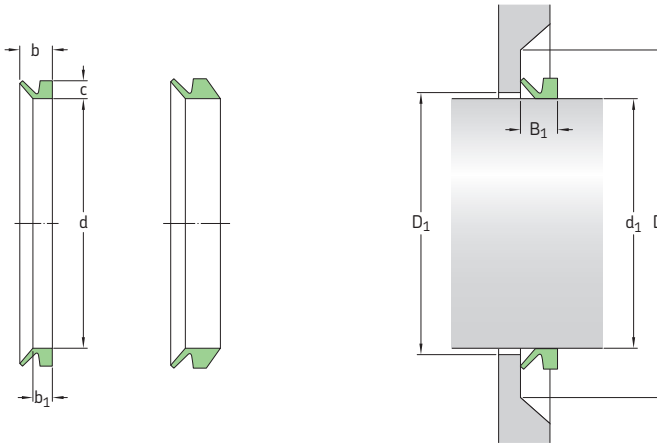


Dimensions		Seal inside diameter, free state $d$	Nominal seal height $c$	Seal seat width $b_1$	Nominal seal width $b$	Clearance $D_1 (= d_1 +)$ max	Counter-face $D (= d_1 +)$ min	Seal fitted width $B_1$	Design	Lip code	Designation
Shaft diameter range $d_1$	incl.										
in.	in.										
28.74	29.13	27.91	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	407303
		27.91	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470731
29.13	29.53	28.27	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	407403
		28.27	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470741
29.13	30.51	27.76	0.26	0.24	0.41	0.20	0.79	$0.31 \pm 0.06$	VR3	R	407502
		27.76	0.26	0.24	0.41	0.20	0.79	$0.31 \pm 0.06$	VR3	V	407506
29.33	30.91	27.76	0.59	0.56	0.98	0.39	1.77	$0.79 \pm 0.16$	VR1	R	407500
		27.76	0.59	0.56	0.98	0.39	1.77	$0.79 \pm 0.16$	VR1	V	407504
29.53	29.84	28.66	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	407503
		28.66	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470751
29.84	30.16	28.94	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	407603
		28.94	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470761
30.16	30.47	29.25	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	407703
		29.25	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470771
30.47	30.83	29.57	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	407803
		29.57	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470781
30.83	31.18	29.88	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	407903
		29.88	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470791
30.51	32.48	29.33	0.26	0.24	0.41	0.20	0.79	$0.31 \pm 0.06$	VR3	R	408002
		29.33	0.26	0.24	0.41	0.20	0.79	$0.31 \pm 0.06$	VR3	V	408006
30.91	32.68	29.33	0.59	0.56	0.98	0.39	1.77	$0.79 \pm 0.16$	VR1	R	408000
		29.33	0.59	0.56	0.98	0.39	1.77	$0.79 \pm 0.16$	VR1	V	408004
31.18	31.54	30.24	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	408003
		30.24	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470801
31.54	31.89	30.59	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	408103
		30.59	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470811

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> +) max	Counter-face D (= d <sub>1</sub> +) min	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
in.		in.							-	-	-
<b>31.89</b>	<b>32.32</b>	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	VR4 VR6	R R	<b>408203</b> <b>470821</b>
<b>32.32</b>	<b>32.72</b>	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	VR4 VR6	R R	<b>408303</b> <b>470831</b>
<b>32.48</b>	<b>34.45</b>	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	VR3 VR3	R V	<b>408502</b> <b>408506</b>
<b>32.68</b>	<b>34.45</b>	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	VR1 VR1	R V	<b>408500</b> <b>408504</b>
<b>32.72</b>	<b>33.11</b>	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	VR4 VR6	R R	<b>408403</b> <b>470841</b>
<b>33.11</b>	<b>33.50</b>	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	VR4 VR6	R R	<b>408503</b> <b>470851</b>
<b>33.50</b>	<b>33.90</b>	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	VR4 VR6	R R	<b>408603</b> <b>470861</b>
<b>33.90</b>	<b>34.29</b>	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	VR4 VR6	R R	<b>408703</b> <b>470871</b>
<b>34.29</b>	<b>34.72</b>	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	VR4 VR6	R R	<b>408803</b> <b>470881</b>
<b>34.45</b>	<b>36.42</b>	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	VR3 VR3	R V	<b>409002</b> <b>409006</b>
<b>34.45</b>	<b>36.22</b>	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	VR1 VR1	R V	<b>409000</b> <b>409004</b>
<b>34.72</b>	<b>35.12</b>	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	VR4 VR6	R R	<b>408903</b> <b>470891</b>
<b>35.12</b>	<b>35.91</b>	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	VR4 VR6	R R	<b>409003</b> <b>470901</b>
<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	VR4 VR6	R R	<b>409203</b> <b>470921</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	VR3 VR3	R V	<b>409502</b> <b>409506</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	VR1 VR1	R V	<b>409500</b> <b>409504</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	VR4 VR6	R R	<b>409303</b> <b>470931</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	VR4 VR6	R R	<b>409403</b> <b>470941</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	VR4 VR6	R R	<b>409503</b> <b>470951</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	VR4 VR6	R R	<b>409603</b> <b>470961</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	VR3 VR3	R V	<b>410002</b> <b>410006</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	VR1 VR1	R V	<b>410000</b> <b>410004</b>

# V-ring seals – inch dimensions, for North American market

$d_1$  38.03 – 56.69 in.

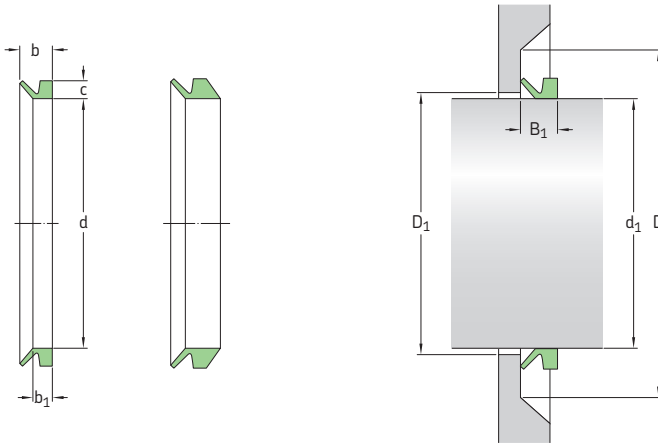


Dimensions		Seal inside diameter, free state $d$	Nominal seal height $c$	Seal seat width $b_1$	Nominal seal width $b$	Clearance $D_1 (= d_1 +)$ max	Counter-face $D (= d_1 +)$ min	Seal fitted width $B_1$	Design	Lip code	Designation
Shaft diameter range $d_1$ over	incl.										
in.	in.								-	-	-
38.03	38.46	36.69	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	409703
		36.69	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470971
38.46	38.90	37.09	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	409803
		37.09	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470981
38.90	39.33	37.52	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	409903
		37.52	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	470991
39.33	39.76	37.91	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	410003
		37.91	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	471001
39.76	40.35	38.31	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	410203
		38.31	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	471021
40.35	42.32	37.60	0.26	0.24	0.41	0.20	0.79	$0.31 \pm 0.06$	VR3	R	410502
		37.60	0.26	0.24	0.41	0.20	0.79	$0.31 \pm 0.06$	VR3	V	410506
39.96	41.93	37.60	0.59	0.56	0.98	0.39	1.77	$0.79 \pm 0.16$	VR1	R	410500
40.35	41.14	38.98	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	410403
		38.98	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	471041
41.14	41.93	39.69	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	410603
		39.69	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	471061
42.32	44.29	39.37	0.26	0.24	0.41	0.20	0.79	$0.31 \pm 0.06$	VR3	R	411002
		39.37	0.26	0.24	0.41	0.20	0.79	$0.31 \pm 0.06$	VR3	V	411006
41.93	43.90	39.37	0.59	0.56	0.98	0.39	1.77	$0.79 \pm 0.16$	VR1	R	411000
41.93	42.72	40.43	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	410803
		40.43	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	471081
42.72	43.50	41.14	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	411003
		41.14	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	471101
43.50	44.29	41.93	1.18	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR4	R	411203
		41.93	0.83	1.28	2.56	0.94	4.53	$1.97 \pm 0.47$	VR6	R	471121
44.29	46.26	41.14	0.26	0.24	0.41	0.20	0.79	$0.31 \pm 0.06$	VR3	R	411502
		41.14	0.26	0.24	0.41	0.20	0.79	$0.31 \pm 0.06$	VR3	V	411506

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> ) max	Counter-face D(= d <sub>1+</sub> ) min	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
in.		in.							-	-	-
<b>43.90</b>	<b>45.87</b>	41.14	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	<b>411500</b>
<b>44.29</b>	<b>45.08</b>	42.68 42.68	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 VR6	R R	<b>411403</b> <b>471141</b>
<b>45.08</b>	<b>45.87</b>	43.43 43.43	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	VR4 VR6	R R	<b>411603</b> <b>471161</b>
<b>46.26</b>	<b>48.23</b>	42.91 42.91	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	VR3 VR3	R V	<b>412002</b> <b>412006</b>
<b>45.87</b>	<b>47.83</b>	42.91	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	<b>412000</b>
<b>45.87</b>	<b>46.65</b>	44.13 44.13	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	VR4 VR6	R R	<b>411803</b> <b>471181</b>
<b>46.65</b>	<b>47.44</b>	44.84 44.84	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	VR4 VR6	R R	<b>412003</b> <b>471201</b>
<b>47.44</b>	<b>48.23</b>	45.55 45.55	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 VR6	R R	<b>412203</b> <b>471221</b>
<b>48.23</b>	<b>50.20</b>	44.69 44.69	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 VR3	R V	<b>412502</b> <b>412506</b>
<b>47.83</b>	<b>50.00</b>	44.69	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	<b>412500</b>
<b>48.23</b>	<b>49.02</b>	46.30 46.30	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	VR4 VR6	R R	<b>412403</b> <b>471241</b>
<b>49.02</b>	<b>50.00</b>	47.05 47.05	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 VR6	R R	<b>412603</b> <b>471261</b>
<b>50.00</b>	<b>50.98</b>	47.95 47.95	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 VR6	R R	<b>412803</b> <b>471281</b>
<b>50.20</b>	<b>52.17</b>	46.46 46.46	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 VR3	R V	<b>413002</b> <b>413006</b>
<b>50.00</b>	<b>51.97</b>	46.46	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	<b>413000</b>
<b>50.98</b>	<b>51.77</b>	48.82 48.82	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	VR4 VR6	R R	<b>413003</b> <b>471301</b>
<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	VR4 VR6	R R	<b>413253</b> <b>471326</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	VR3 VR3	R V	<b>413502</b> <b>413506</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	VR1	R	<b>413500</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	VR4 VR6	R R	<b>413503</b> <b>471351</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	VR4 VR6	R R	<b>413753</b> <b>471376</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	VR3 VR3	R V	<b>414002</b> <b>414006</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	VR1	R	<b>414000</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	VR4 VR6	R R	<b>414003</b> <b>471401</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	VR4 VR6	R R	<b>414253</b> <b>471426</b>

# V-ring seals – inch dimensions, for North American market

d<sub>1</sub> 56.10 – 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> +) max	Counter-face D(= d <sub>1</sub> +) min	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
in.	in.								-	-	-
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



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> ) max	Counter-face D(= d <sub>1+</sub> ) min	Seal fitted width B <sub>1</sub>	Design	Lip code	Designation
Shaft diameter range d <sub>1</sub> over	incl.										
in.		in.							-	-	-
<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	VR3 VR3	R V	<b>416502</b> <b>416506</b>
<b>63.78</b>	<b>65.75</b>	58.86	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	<b>416500</b>
<b>64.57</b>	<b>66.14</b>	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	VR4 VR6	R R	<b>416503</b> <b>471651</b>
<b>65.94</b>	<b>67.91</b>	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	VR3 VR3	R V	<b>417002</b> <b>417006</b>
<b>65.75</b>	<b>67.72</b>	60.63	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	<b>417000</b>
<b>66.14</b>	<b>67.72</b>	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	VR4 VR6	R R	<b>417003</b> <b>471701</b>
<b>67.91</b>	<b>69.88</b>	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	VR3 VR3	R V	<b>417502</b> <b>417506</b>
<b>67.72</b>	<b>69.69</b>	62.40	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	<b>417500</b>
<b>67.72</b>	<b>69.49</b>	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	VR4 VR6	R R	<b>417503</b> <b>471751</b>
<b>69.49</b>	<b>71.26</b>	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	VR4 VR6	R R	<b>418003</b> <b>471801</b>
<b>69.88</b>	<b>71.85</b>	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	VR3 VR3	R V	<b>418002</b> <b>418006</b>
<b>69.69</b>	<b>71.65</b>	64.17	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	<b>418000</b>
<b>71.26</b>	<b>73.03</b>	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	VR4 VR6	R R	<b>418503</b> <b>471851</b>
<b>71.85</b>	<b>73.82</b>	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	VR3 VR3	R V	<b>418502</b> <b>418506</b>
<b>71.65</b>	<b>73.62</b>	65.94	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	<b>418500</b>
<b>73.03</b>	<b>75.00</b>	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	VR4 VR6	R R	<b>419003</b> <b>471901</b>
<b>73.82</b>	<b>75.79</b>	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	VR3 VR3	R V	<b>419002</b> <b>419006</b>
<b>73.62</b>	<b>75.59</b>	67.72	0.59	0.56	0.98	0.39	1.77	0.79 ± 0.16	VR1	R	<b>419000</b>
<b>75.00</b>	<b>76.97</b>	70.63 70.63	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 VR6	R R	<b>419503</b> <b>471951</b>
<b>75.79</b>	<b>77.76</b>	69.49 69.49	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	VR3 VR3	R V	<b>419502</b> <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 72.60	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 VR6	R R	<b>420003</b> <b>472001</b>
<b>77.76</b>	<b>79.72</b>	71.26 71.26	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 VR3	R V	<b>420002</b> <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>

# MVR axial shaft seals

## General

For added protection in extremely contaminated applications, SKF also offers MVR seals. Like V-ring seals, MVR seals also seal axially and function by combining lip contact with centrifugal "flinging" action. MVR seals are, however, different from V-rings in that their rubber element is stretch fit into a metal case. The metal case is then press fit onto the shaft. The case provides excellent protection from heavy debris and enables the seal to accommodate high rotational speeds without requiring auxiliary clamping devices.

MVR seals are used in rotating shaft applications such as gearboxes, speed reducers, saws, lathes, motors, mixers, where high levels of contaminants reduce the service life of radial shaft seals and bearings. MVR seals can also serve as primary seals to retain high-viscosity lubricants or exclude contaminants in dry-running applications.

## Advantages and user benefits

- The metal case serves as a support and deflector, protecting the rubber body and lip from damage and displacement by external debris like rocks and aggressive media.
- The case also often functions as a holder that keeps the rubber lip in position in high-speed applications. No additional axial retention is required.
- Narrow installation widths are possible thanks to the compact design.
- Frictional heat build-up and torque drag are very low compared to those of contacting radial shaft seals. As rotational speed increases, the MVR sealing lip lifts off the counterface surface starting at about 12 m/s (2 360 ft/min) and drops to zero contact by 20 m/s (3 900 ft/min). The high rotational speed helps exclude contaminants while minimizing power loss.
- The service life of MVR seals is considerably higher than that of radial shaft seals in contaminated environments and can extend to thousands of hours.

## Design and material

The MVR seals are made of a nitrile rubber material with very good wear resistance. Other elastomers are also available on request.

The standard metal element is zinc-plated cold-rolled carbon steel. Acid-resistant steel, similar to SAE 316, is available on request.

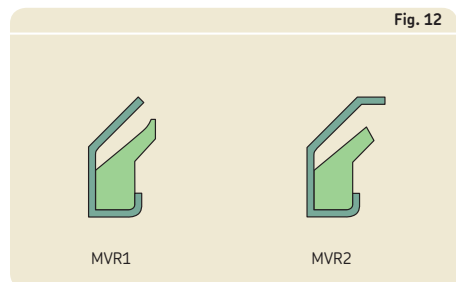
There are two different MVR seal designs: the basic MVR1 seal and the MVR2 seal with case extension (→ fig. 12).

## Temperature range

The permissible operating temperature range is between  $-30$  and  $+100$  °C ( $-20$  and  $+210$  °F).

## Sizes

MVR seals are available for shaft diameters ranging from 10 to 200 mm (0.394 to 7.874 in.). Contact your SKF sales representative for comprehensive information on available sizes.



## Installation

The inside diameter of MVR seals is machined for a press fit on the shaft (→ **figs. 13** and **14**). As with radial shaft seals, do not hit the metal case with a hammer.

The sealing lip face should be lightly greased prior to installation, but no grease should be applied between the lip and case. A shaft finish of  $R_a\ 4\ \mu\text{m}$  ( $160\ \mu\text{in.}$ ) is sufficient.

A lead-in chamfer should be provided. No splines or keyways are allowed.

Counterface surfaces for MVR seals should be prepared the same way as for V-rings. Avoid aluminium or soft metals in applications where there will be abrasive contaminants. Sharp peaks on turned surfaces should be removed.

Fig. 13

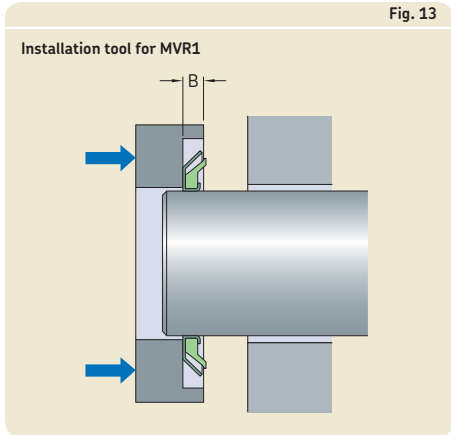
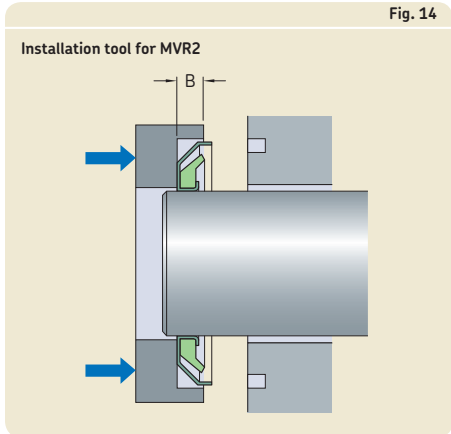
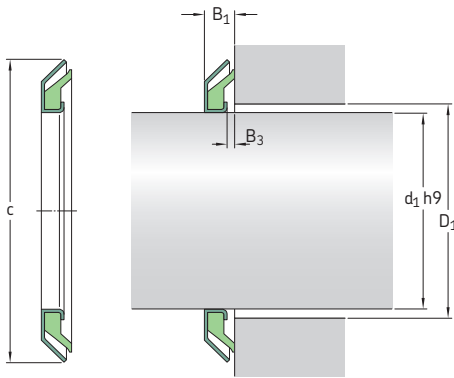


Fig. 14



## Metal-cased V-ring seals – MVR1 – metric dimensions

$d_1$  10 – 135 mm



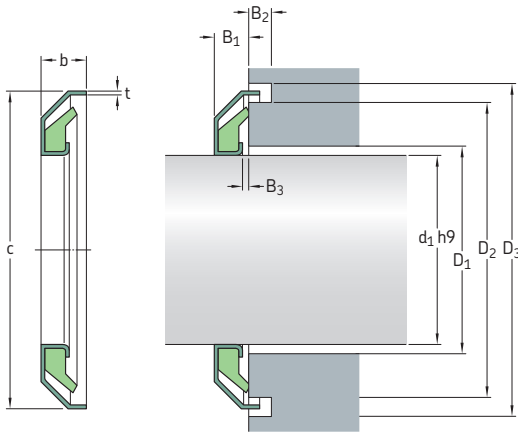
Dimensions					Designation
Shaft diameter $d_1$	Case outside diameter $c$	Seal fitted width $B_1$	Gap width $B_3$	Max. counterface hole diameter $D_1$	
mm					–
10	24	3,5	1,0	15	MVR1-10
12	26	3,5	1,0	17	MVR1-12
15	30	4,0	1,0	21	MVR1-15
16	32	4,0	1,0	23	MVR1-16
17	32	4,0	1,0	23	MVR1-17
18	33	4,0	1,0	24	MVR1-18
20	35	4,0	1,0	26	MVR1-20
22	40	4,0	1,0	28	MVR1-22
24	40	4,0	1,0	30	MVR1-24
25	40	4,0	1,0	31	MVR1-25
26	40	4,0	1,0	32	MVR1-26
28	43	4,0	1,0	34	MVR1-28
30	47	4,5	1,0	37	MVR1-30
32	49	4,5	1,0	39	MVR1-32
35	52	4,5	1,0	42	MVR1-35
40	57	4,5	1,0	47	MVR1-40
45	62	4,5	1,0	52	MVR1-45
48	65	4,5	1,0	55	MVR1-48
50	70	5,5	1,0	58	MVR1-50
52	72	5,5	1,0	60	MVR1-52
53	73	5,5	1,0	61	MVR1-53
55	75	5,5	1,0	63	MVR1-55
58	78	5,5	1,0	66	MVR1-58
60	80	5,5	1,0	68	MVR1-60
62	82	5,5	1,0	70	MVR1-62
65	85	5,5	1,0	73	MVR1-65
68	88	5,5	1,0	76	MVR1-68
70	90	5,5	1,0	78	MVR1-70
72	92	5,5	1,0	80	MVR1-72
75	95	5,5	1,0	83	MVR1-75

Special designs are available and new sizes are added gradually.

Dimensions					Designation
Shaft diameter $d_1$	Case outside diameter $c$	Seal fitted width $B_1$	Gap width $B_3$	Max. counterface hole diameter $D_1$	
mm					–
<b>78</b>	98	5,5	1,0	86	<b>MVR1-78</b>
<b>80</b>	100	5,5	1,0	88	<b>MVR1-80</b>
<b>85</b>	105	5,5	1,0	93	<b>MVR1-85</b>
<b>90</b>	110	5,5	1,0	98	<b>MVR1-90</b>
<b>95</b>	115	5,5	1,0	103	<b>MVR1-95</b>
<b>100</b>	120	5,5	1,0	108	<b>MVR1-100</b>
<b>105</b>	125	5,5	1,0	113	<b>MVR1-105</b>
<b>125</b>	148	6,5	1,0	133	<b>MVR1-125</b>
<b>135</b>	159	6,5	1,0	145	<b>MVR1-135</b>

## Metal-cased V-ring seals – MVR2 – metric dimensions

$d_1$  15 – 100 mm



### Dimensions

Shaft diameter $d_1$	Case outside diameter $c$	Seal fitted width $B_1$	Gap width $B_3$	Total seal case width $b$	Case groove width $B_2$	Seal counter-face hole $D_1$ max	Case groove diameter inside $D_2$	Case groove diameter outside $D_3$	Metal case thickness $t$	Designation
mm										
15	32	4,0	1,0	6,0	3	21	29	34	0,5	MVR2-15
17	34	4,0	1,0	6,0	3	23	31	36	0,5	MVR2-17
20	37	4,0	1,0	6,0	3	26	34	39	0,5	MVR2-20
25	42	4,0	1,0	6,0	3	31	39	44	0,5	MVR2-25
30	48	4,5	1,0	6,5	3	37	45	50	0,5	MVR2-30
35	53	4,5	1,0	6,5	3	42	50	55	0,5	MVR2-35
40	58	4,5	1,0	6,5	3	47	55	60	0,5	MVR2-40
45	63	4,5	1,0	6,5	3	52	60	65	0,5	MVR2-45
50	72	5,5	1,0	7,5	3	58	68,5	74	0,75	MVR2-50
55	77	5,5	1,0	7,5	3	63	73,5	79	0,75	MVR2-55
60	82	5,5	1,0	7,5	3	68	78,5	84	0,75	MVR2-60
65	87	5,5	1,0	7,5	3	73	83,5	89	0,75	MVR2-65
70	92	5,5	1,0	7,5	3	78	88,5	94	0,75	MVR2-70
75	95	5,5	1,0	7,5	3	83	93,5	99	0,75	MVR2-75
80	102	5,5	1,0	7,5	3	88	98,5	104	0,75	MVR2-80
85	107	5,5	1,0	7,5	3	93	103,5	109	0,75	MVR2-85
90	112	5,5	1,0	7,5	3	98	108,5	114	0,75	MVR2-90
95	117	5,5	1,0	7,5	3	103	113,5	119	0,75	MVR2-95
100	122	5,5	1,0	7,5	3	108	118,5	124	0,75	MVR2-100







# Axial clamp seals

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# 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.

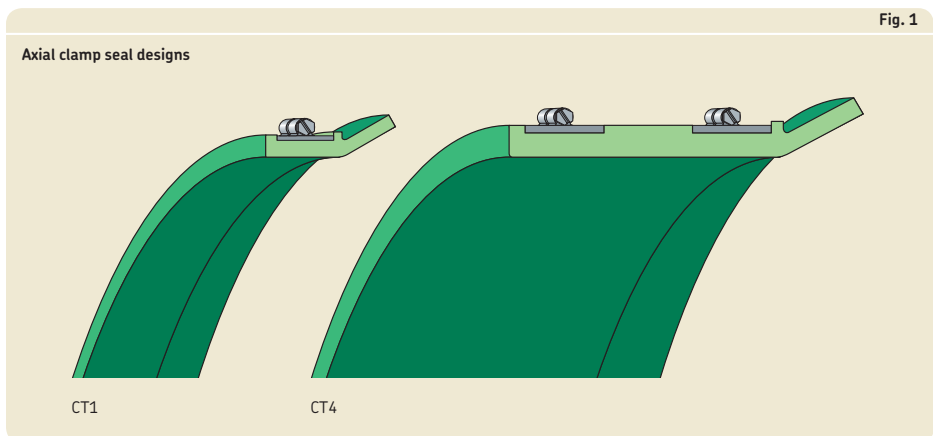
SKF axial clamp seals are made of profiled strips of non-reinforced nitrile rubber and are held firmly in position by stainless steel band clamps. They are available for shaft diameters ranging from 150 to 4 600 mm (5.9 to 181 in.).

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.

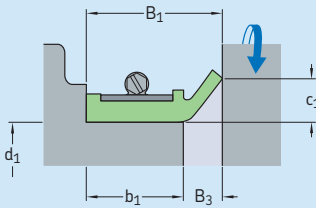
Finely turned counterfaces are adequate for axial clamp seals. The appropriate surface roughness values are  $R_a$  2,5  $\mu\text{m}$  (115  $\mu\text{in.}$ ) and  $R_t$  12  $\mu\text{m}$  (480  $\mu\text{in.}$ ).

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 ( $\rightarrow$  **fig. 2** on **page 474**) to facilitate installation and drainage of contaminants.

Butt-joint seals are also available for certain applications.

Table 1

### Application tolerances



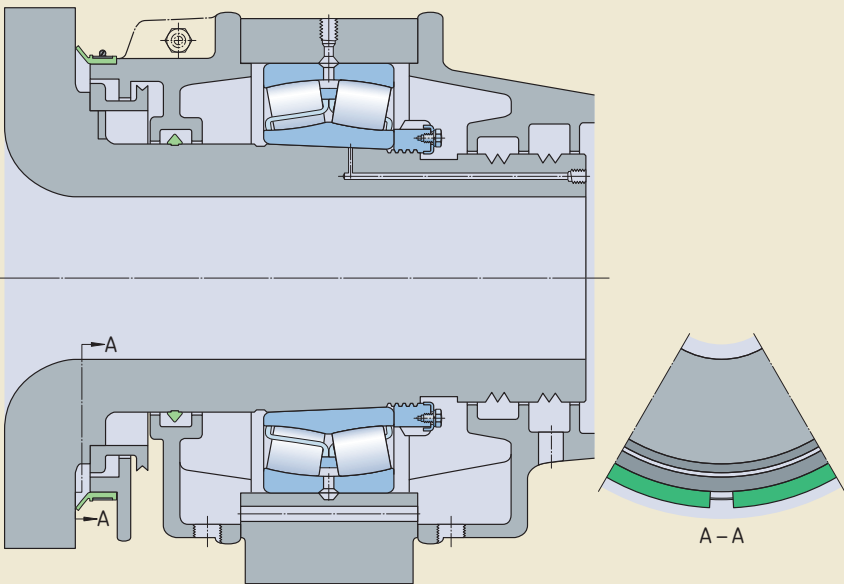
Dimension	Tolerance	Axial clamp seals	
		CT1	CT4
Seal seat diameter, $d_1$	mm $\pm 1,6$ in. $\pm 0.063$	152,40 – 4 572 6.000 – 180.000	304,80 – 1 143 12.000 – 45.000
Seal fitted width, $B_1$	mm $\pm 0,8$ in. $\pm 0.031$	28,60 – 38,10 1.125 – 1.500	38,10 – 92,20 1.500 – 3.750
Seal seat width, $b_1$	mm $\pm 3,2$ in. $\pm 0.125$	17,50 – 27 0.688 – 1.063	27 – 84 1.063 – 3.313
Lip height, $c_1$	mm $\pm 0,8$ in. $\pm 0.031$	12,70 0.500	12,70 0.500
Gap width, $B_3$ (max)	mm in.	11,10 0.437	11,10 0.437

## 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.

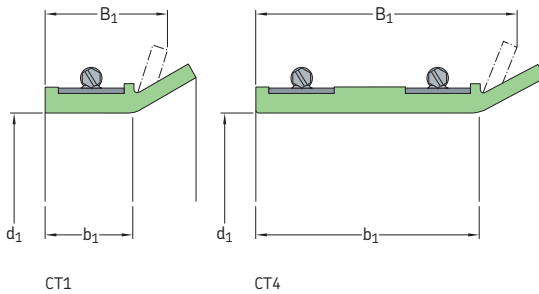
Fig. 2

Sealing arrangement and installation





**Axial clamp seals – CT1 and CT4 – metric dimensions (converted from inch dimensions)**  
**d<sub>1</sub> 168 – 1 080 mm**

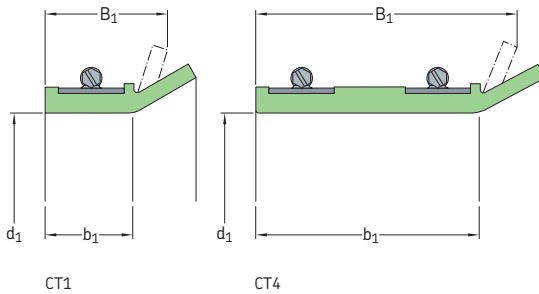


See table 1, page 473 for ap

Dimensions			Design	Designation	Dimensions			Design	Designation
Seal diameter d <sub>1</sub>	Seal width B <sub>1</sub>	Seal 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	381	28,60	17,50	CT1	594025
168,30	28,60	17,50	CT1	529489	387	28,60	17,50	CT1	594954
178	38,10	27	CT1	523586	410	23,80	12,70	CT1	595110
185	30	18,90	CT1	593637	413	88,90	77,80	CT4	592934
209,60	28,60	17,50	CT1	527820	425	31,80 33,40	20,70 22,30	CT1 CT1	523826 524815
219	28,60	17,50	CT1	529490	432	38,10	27	CT1	528535
227	28,60	17,50	CT1	531635	444,50	34,90	23,80	CT1	525737
228,60	28,60 28,60	17,50 17,50	CT1 CT1	524204 527819	445	31,80 34,90	20,70 23,80	CT1 CT1	522679 523547
229	29	17,90	CT1	528631	449,30	95,30	84,20	CT4	528070
254	28,60 28,60	17,50 17,50	CT1 CT1	524205 527806	470	28,60 31,80	17,50 20,70	CT1 CT1	525708 526192
273	28,60	17,50	CT1	594369	495	28,60	17,50	CT1	594181
280	28,60 31,80	17,50 20,70	CT1 CT1	524206 524928	508	31,80	20,70	CT1	524587
298,40	28,60	17,50	CT1	593629	533	32	20,90	CT1	594241
305	31,80 38,10	20,70 27	CT1 CT1	524208 525582	546	31,80 95,30	20,70 84,20	CT1 CT4	524599 526741
330	28,60 38,10	17,50 27	CT1 CT1	524209 523587	554	31,80	20,70	CT1	524210
350,80	38,10	27	CT1	594110	557	28,60	17,50	CT1	524211
355,60	38,10 34,90	27 23,80	CT1 CT1	530733 593037	559	31,80	20,70	CT1	524347
380	38,10	27	CT1	593171	571,50	31,80	20,70	CT1	524212
					578	34,90	23,80	CT1	524657

Dimensions		Seal fitted width B <sub>1</sub>	Seal seat width b <sub>1</sub>	Design	Designation	Dimensions		Seal fitted width B <sub>1</sub>	Seal seat width b <sub>1</sub>	Design	Designation
Seal seat diameter d <sub>1</sub>	mm					Seal seat diameter d <sub>1</sub>	mm				
	mm			-	-		mm			-	-
<b>594</b>	34,90	23,80	CT1	<b>525627</b>	<b>876</b>	38,10	27	CT1	<b>523063</b>		
<b>595</b>	28,60	17,50	CT1	<b>525031</b>	<b>889</b>	31,80	20,70	CT1	<b>524220</b>		
<b>597</b>	34,90	23,80	CT1	<b>524364</b>	<b>900</b>	31,80	20,70	CT1	<b>524221</b>		
<b>600</b>	30	18,90	CT1	<b>594431</b>	<b>902</b>	38,10	27	CT1	<b>524222</b>		
<b>603</b>	31,80 34,90 46	20,70 23,80 34,90	CT1 CT1 CT4	<b>524365</b> <b>523184</b> <b>528651</b>	<b>914</b>	28,60 30,20 38,10	17,50 19,10 27	CT1 CT1 CT1	<b>528416</b> <b>524223</b> <b>524224</b>		
<b>603,30</b>	34,90 46	23,80 34,90	CT1 CT4	<b>525637</b> <b>528267</b>	<b>914,40</b>	28,60 31,80	17,50 20,70	CT1 CT1	<b>593606</b> <b>530466</b>		
<b>616</b>	47,60	36,50	CT4	<b>529276</b>	<b>929</b>	28,60 75,20	17,50 64,10	CT1 CT4	<b>593285</b> <b>594202</b>		
<b>629</b>	31,80	20,70	CT1	<b>524213</b>	<b>937</b>	34,90	23,80	CT1	<b>523154</b>		
<b>638</b>	34,90	23,80	CT1	<b>524214</b>	<b>940</b>	38,10	27	CT1	<b>525320</b>		
<b>655</b>	40	28,90	CT4	<b>594784</b>	<b>943</b>	31,80	20,70	CT1	<b>524768</b>		
<b>660</b>	34,90	23,80	CT1	<b>524591</b>	<b>946</b>	31,80	20,70	CT1	<b>524368</b>		
<b>684</b>	28,60 73	17,50 61,90	CT1 CT4	<b>524215</b> <b>593604</b>	<b>949</b>	31,80	20,70	CT1	<b>526246</b>		
<b>692</b>	34,90	23,80	CT1	<b>524592</b>	<b>952</b>	31,80	20,70	CT1	<b>526582</b>		
<b>705</b>	34,90 60,30	23,80 49,20	CT1 CT4	<b>524216</b> <b>528268</b>	<b>962</b>	31,80	20,70	CT1	<b>524225</b>		
<b>711</b>	31,80	20,70	CT1	<b>527232</b>	<b>965</b>	31,80	20,70	CT1	<b>524226</b>		
<b>732</b>	28,60	17,50	CT1	<b>525032</b>	<b>1 003</b>	28,60 31,80	17,50 20,70	CT1 CT1	<b>529452</b> <b>526806</b>		
<b>737</b>	38,10 44,50	27 33,40	CT1 CT4	<b>524940</b> <b>528269</b>	<b>1 013</b>	34,90 36,50	23,80 25,40	CT1 CT1	<b>523584</b> <b>529379</b>		
<b>746</b>	38,10 39,70	27 28,60	CT1 CT4	<b>524853</b> <b>528270</b>	<b>1 016</b>	36,50 38,10	25,40 27	CT1 CT1	<b>525035</b> <b>527903</b>		
<b>755</b>	34,90 38,10	23,80 27	CT1 CT1	<b>524217</b> <b>524218</b>	<b>1 018</b>	54,80	43,70	CT4	<b>530396</b>		
<b>755,70</b>	38,10	27	CT1	<b>524973</b>	<b>1 022</b>	31,80	20,70	CT1	<b>525426</b>		
<b>764</b>	28,60	17,50	CT1	<b>525033</b>	<b>1 029</b>	38,10	27	CT1	<b>528532</b>		
<b>787</b>	31,80	20,70	CT1	<b>525212</b>	<b>1 038</b>	38,10	27	CT1	<b>525633</b>		
<b>800</b>	31,80	20,70	CT1	<b>528210</b>	<b>1 041</b>	38,10	27	CT1	<b>524227</b>		
<b>806</b>	31,80	20,70	CT1	<b>526715</b>	<b>1 045</b>	38,10	27	CT1	<b>525036</b>		
<b>818</b>	31,80	20,70	CT1	<b>525034</b>	<b>1 051</b>	33,40	22,30	CT1	<b>530448</b>		
<b>819,20</b>	31,80	20,70	CT1	<b>524294</b>	<b>1 054</b>	31,80 38,10	20,70 27	CT1 CT1	<b>527474</b> <b>524228</b>		
<b>822,30</b>	31,80	20,70	CT1	<b>593949</b>	<b>1 064</b>	41,30	30,20	CT4	<b>528272</b>		
<b>825</b>	28,60 31,80	17,50 20,70	CT1 CT1	<b>594785</b> <b>524367</b>	<b>1 066</b>	63,50	52,40	CT4	<b>528271</b>		
<b>840</b>	31,80	20,70	CT1	<b>526867</b>	<b>1 066,90</b>	38,10	27	CT4	<b>594494</b>		
<b>856</b>	31,80	20,70	CT1	<b>524219</b>	<b>1 080</b>	28,60	17,50	CT1	<b>523133</b>		

**Axial clamp seals – CT1 and CT4 – metric dimensions** (converted from inch dimensions)  
 $d_1$  **1 101,70 – 4 142 mm**

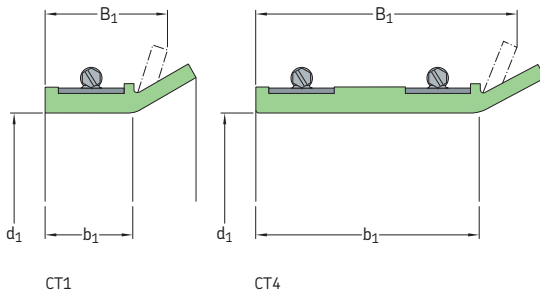


See **table 1, page 473** for application tolerances.

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 $b_1$		
mm			-	-	mm			-	-
<b>1 101,70</b>	31,80	20,70	CT1	<b>524909</b>	<b>1 321</b>	38,10	27	CT1	<b>528927</b>
<b>1 105</b>	38,10	27	CT1	<b>524369</b>	<b>1 346</b>	31,80	20,70	CT1	<b>528526</b>
<b>1 118</b>	31,80	20,70	CT1	<b>524370</b>	<b>1 397</b>	31,80	20,70	CT1	<b>526807</b>
	34,90	23,80	CT1	<b>528415</b>					
	38,10	27	CT1	<b>524229</b>					
	38,10	27	CT1	<b>593180</b>					
	44,50	33,40	CT4	<b>528002</b>					
	44,50	33,40	CT4	<b>528273</b>	<b>1 448</b>	31,80	20,70	CT1	<b>528525</b>
<b>1 140</b>	38,10	27	CT1	<b>522676</b>	<b>1 497,60</b>	41,30	30,20	CT4	<b>594163</b>
					<b>1 613</b>	31,80	20,70	CT1	<b>526808</b>
<b>1 181</b>	31,80	20,70	CT1	<b>529086</b>	<b>1 721</b>	31,80	20,70	CT1	<b>528975</b>
<b>1 193,80</b>	38,10	27	CT1	<b>527211</b>	<b>1 778</b>	31,80	20,70	CT1	<b>526809</b>
					<b>1 803</b>	31,80	20,70	CT1	<b>524373</b>
<b>1 206</b>	31,80	27	CT1	<b>525091</b>	<b>1 854</b>	38,10	27	CT1	<b>531456</b>
	34,90	23,80	CT1	<b>526021</b>	<b>1 924</b>	31,80	20,70	CT1	<b>525092</b>
	38,10	27	CT1	<b>524230</b>					
<b>1 206,50</b>	30,20	19,10	CT1	<b>530606</b>	<b>1 968</b>	31,80	20,70	CT1	<b>529517</b>
<b>1 210</b>	38,10	27	CT1	<b>522677</b>	<b>2 540</b>	38,10	27	CT1	<b>522856</b>
<b>1 225</b>	38,10	27	CT1	<b>524231</b>	<b>2 616</b>	31,80	20,70	CT1	<b>594083</b>
<b>1 241</b>	38,10	27	CT1	<b>524371</b>	<b>4 142</b>	31,80	20,70	CT1	<b>594682</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>					



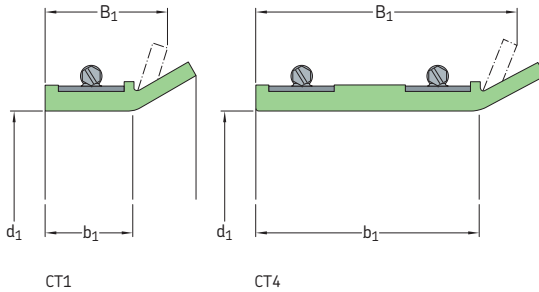
**Axial clamp seals – CT1 and CT4 – inch dimensions**  
 $d_1$  6.614 – 29.016 in.



See table 1, page 473 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.			–	–
<b>6.614</b>	1.126	0.689	CT1	<b>594334</b>	<b>18.504</b>	1.126	0.689	CT1	<b>525708</b>
<b>6.626</b>	1.126	0.689	CT1	<b>529489</b>	<b>18.504</b>	1.252	0.815	CT1	<b>526192</b>
<b>7.008</b>	1.500	1.063	CT1	<b>523586</b>	<b>19.488</b>	1.126	0.689	CT1	<b>594181</b>
<b>7.284</b>	1.181	0.744	CT1	<b>593637</b>	<b>20.000</b>	1.252	0.815	CT1	<b>524587</b>
<b>8.252</b>	1.126	0.689	CT1	<b>527820</b>	<b>20.984</b>	1.260	0.823	CT1	<b>594241</b>
<b>8.622</b>	1.126	0.689	CT1	<b>529490</b>	<b>21.496</b>	1.252	0.815	CT1	<b>524599</b>
<b>8.937</b>	1.126	0.689	CT1	<b>531635</b>	<b>21.496</b>	3.752	3.315	CT4	<b>526741</b>
<b>9.000</b>	1.126	0.689	CT1	<b>524204</b>	<b>21.811</b>	1.252	0.815	CT1	<b>524210</b>
<b>9.000</b>	1.126	0.689	CT1	<b>527819</b>	<b>21.929</b>	1.126	0.689	CT1	<b>524211</b>
<b>9.016</b>	1.142	0.705	CT1	<b>528631</b>	<b>22.008</b>	1.252	0.815	CT1	<b>524347</b>
<b>10.000</b>	1.126	0.689	CT1	<b>524205</b>	<b>22.500</b>	1.252	0.815	CT1	<b>524212</b>
<b>10.000</b>	1.126	0.689	CT1	<b>527806</b>	<b>22.756</b>	1.374	0.937	CT1	<b>524657</b>
<b>10.748</b>	1.126	0.689	CT1	<b>594369</b>	<b>23.386</b>	1.374	0.937	CT1	<b>525627</b>
<b>11.024</b>	1.126	0.689	CT1	<b>524206</b>	<b>23.426</b>	1.126	0.689	CT1	<b>525031</b>
<b>11.024</b>	1.252	0.815	CT1	<b>524928</b>	<b>23.504</b>	1.374	0.937	CT1	<b>524364</b>
<b>11.748</b>	1.126	0.689	CT1	<b>593629</b>	<b>23.622</b>	1.181	0.744	CT1	<b>594431</b>
<b>12.008</b>	1.252	0.815	CT1	<b>524208</b>	<b>23.740</b>	1.252	0.815	CT1	<b>524365</b>
<b>12.008</b>	1.500	1.063	CT1	<b>525582</b>	<b>23.740</b>	1.374	0.937	CT1	<b>523184</b>
<b>12.992</b>	1.126	0.689	CT1	<b>524209</b>	<b>23.740</b>	1.811	1.374	CT4	<b>528651</b>
<b>12.992</b>	1.500	1.063	CT1	<b>523587</b>	<b>23.752</b>	1.374	0.937	CT1	<b>525637</b>
<b>13.811</b>	1.500	1.063	CT1	<b>594110</b>	<b>23.752</b>	1.811	1.374	CT4	<b>528267</b>
<b>14.000</b>	1.500	1.063	CT1	<b>530733</b>	<b>24.252</b>	1.874	1.437	CT4	<b>529276</b>
<b>14.000</b>	1.374	0.937	CT1	<b>593037</b>	<b>24.764</b>	1.252	0.815	CT1	<b>524213</b>
<b>14.961</b>	1.500	1.063	CT1	<b>593171</b>	<b>25.118</b>	1.374	0.937	CT1	<b>524214</b>
<b>15.000</b>	1.126	0.689	CT1	<b>594025</b>	<b>25.787</b>	1.575	1.138	CT4	<b>594784</b>
<b>15.236</b>	1.126	0.689	CT1	<b>594954</b>	<b>25.984</b>	1.374	0.937	CT1	<b>524591</b>
<b>16.142</b>	0.937	0.500	CT1	<b>595110</b>	<b>26.929</b>	1.126	0.689	CT1	<b>524215</b>
<b>16.260</b>	3.500	3.063	CT4	<b>592934</b>	<b>26.929</b>	2.874	2.437	CT4	<b>593604</b>
<b>16.732</b>	1.252	0.815	CT1	<b>523826</b>	<b>27.244</b>	1.374	0.937	CT1	<b>524592</b>
<b>16.732</b>	1.315	0.878	CT1	<b>524815</b>	<b>27.756</b>	1.374	0.937	CT1	<b>524216</b>
<b>17.008</b>	1.500	1.063	CT1	<b>528535</b>	<b>27.756</b>	2.374	1.937	CT4	<b>528268</b>
<b>17.500</b>	1.374	0.937	CT1	<b>525737</b>	<b>27.992</b>	1.252	0.815	CT1	<b>527232</b>
<b>17.520</b>	1.252	0.815	CT1	<b>526799</b>	<b>28.819</b>	1.126	0.689	CT1	<b>525032</b>
<b>17.520</b>	1.374	0.937	CT1	<b>523547</b>	<b>29.016</b>	1.500	1.063	CT1	<b>524940</b>
<b>17.689</b>	3.752	3.315	CT4	<b>528070</b>	<b>29.016</b>	1.752	1.315	CT4	<b>528269</b>

**Axial clamp seals – CT1 and CT4 – inch dimensions**  
**d<sub>1</sub> 29.370 – 163.071 in.**



See table 1, page 473 for application tolerances.

Dimensions				Design		Dimensions			
Seal seat diameter d <sub>1</sub>	Seal fitted width B <sub>1</sub>	Seal seat width b <sub>1</sub>	Design	Designation	Seal seat diameter d <sub>1</sub>	Seal fitted width B <sub>1</sub>	Seal seat width b <sub>1</sub>	Design	Designation
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>
<b>163.071</b>	1.252	0.815	CT1	<b>594082</b>

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