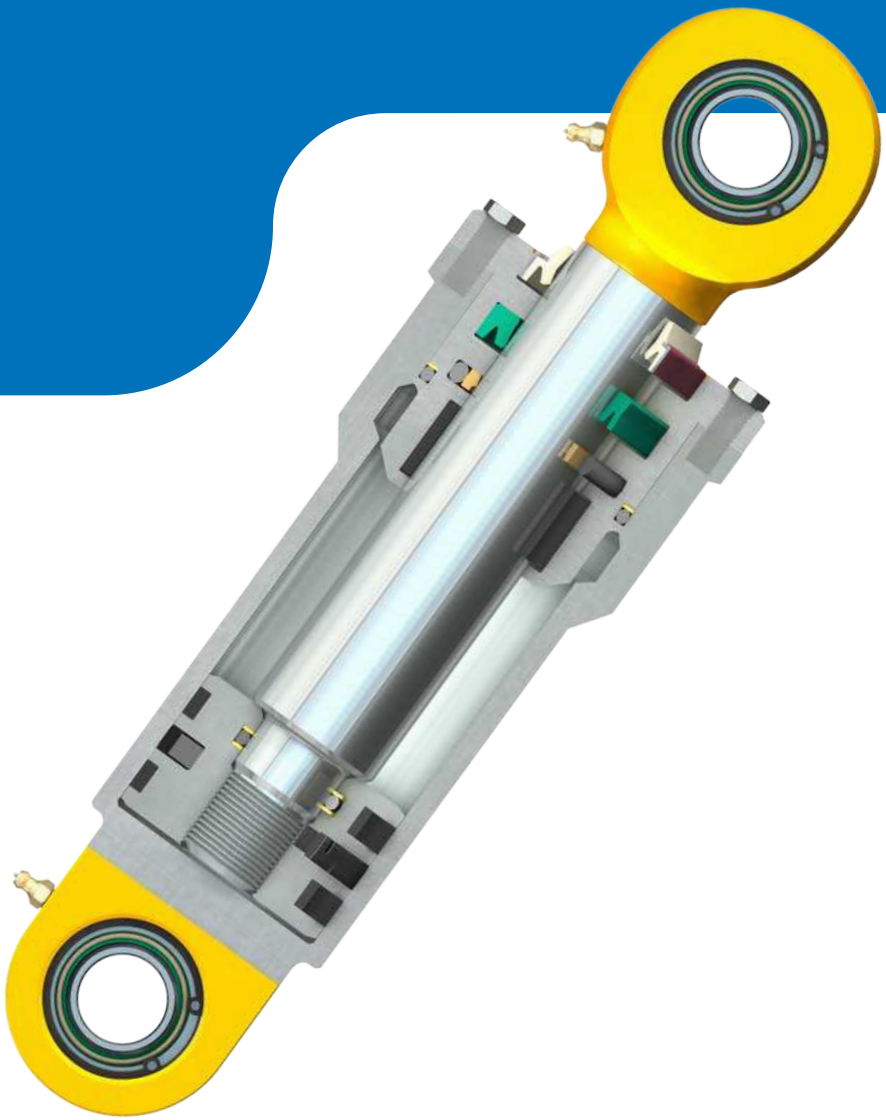
Hydraulic seals



SKF mobile apps

SKF mobile apps are available from both Apple App Store and Google Play. These apps provide useful information and allow you to make critical calculations, providing SKF Knowledge Engineering at your fingertips.

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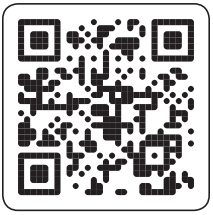

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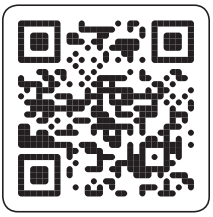

Google Play

PUB SE/P1 12393/2 EN · August 2014

This publication supersedes publication 5397.

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Content

Unit conversions

Unit conversions

Quantity	Unit	Conversion			
Length	inch	1 mm	0.03937 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 mi.	1 mi.	1,609 km
Speed, velocity	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 mph	1 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	$6{,}8948 \times 10^3$ Pa
		1 N/mm^2	145 psi		
		1 bar	14.5 psi	1 psi	0,068948 bar
Temperature	degree	Celsius	$t_C = 0.555\ (t_F - 32)$	Fahrenheit	$t_F = 1{,}8\ t_C + 32$

Foreword

This catalogue contains the standard assortment of SKF hydraulic seals and guides typically used in hydraulic cylinders. To provide the highest levels of quality and customer service, these products are available worldwide through SKF sales channels. For information about lead times and deliveries, contact your local SKF representative or SKF Authorized Distributor.

This catalogue reflects SKF's state-of-the-art technology and production capabilities as of 2014. The data contained within may differ from that shown in earlier catalogues because of redesign, technological developments, or revised calculation methods. SKF reserves the right to continuously improve its products with respect to materials, design and manufacturing methods, some of which are driven by technological developments.

Getting started

Introduction to fluid power provides an overview over hydraulic cylinder types and classification, a reference to SKF customized solutions and standard assortment of hydraulic seals and guides. The first chapter contains general technical information. Seal counter-surface finish properties, materials, fluid media and gap extrusion are discussed in detail. Furthermore, product storage and installation information is included.

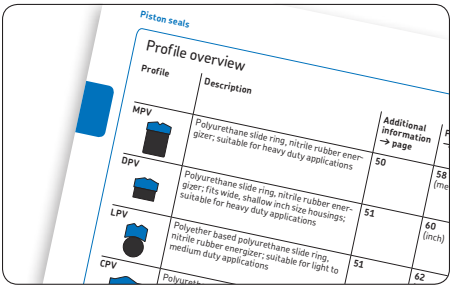
Guidance values

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.

How best to use this catalogue

The catalogue follows an easy principle:

- *Introduction to fluid power* (→ **pages 12** to **18**) provides basic information about hydraulic seals.
- Chapter 1 (→ **pages 21** to **43**) provides general technical information, such as counter-surface finish properties, materials, fluid media.
- Chapters 2 to 6 provide product type specific information. If applicable, a profile overview at the beginning shows the different profiles with a brief description and reference to more information inside the chapter. Product type and profile characteristics are discussed in detail. The profile data tables provide product specifications per profile followed by the relevant product tables with dimensions per item. At the end of the chapter more profiles of the specific type are outlined, including examples of the machined seal profiles manufactured with the SKF SEAL JET technology.
- Chapter 7 (→ **pages 347** to **351**) provides some information on other types of fluid power seals used both in hydraulic cylinders and other applications.
- Chapter 8 contains the product index (→ **page 352**) sorted by the profiles.



Profile overview

Numbered product table

Find product details quickly

Blue tabs on each right hand page show the chapter or product table number.

A quick way to access detailed product data is via the product table numbers. They are listed in the full table of contents at the front of the catalogue, in the table of contents of each product chapter and in the product index.

Colour coding for material

The product illustrations in this catalogue use a colour coding system to indicate the material group, but they do not match the actual material colours. For information about the actual material colours, refer to *Materials* (→ **page 26**).

Consistent colour coding for material groups

- Thermoplastic polyurethane elastomers (TPU), moulded articles
- Thermoplastic polyurethane elastomers (TPU), machined articles
- Rubbers
- Rigid thermoplastics
- Unfilled PTFE and other engineered plastics
- Filled PTFE
- Phenolic resins
- Thermoplastic polyester elastomers (TPC)
- Metals

Units of measurement

This catalogue is for global use. Therefore, the predominant units of measurement are in accordance with ISO 80000-1. Imperial units are used whenever necessary. Unit conversions can be made using the conversion table (→ **page 4**).

For easier use, some values are provided in both metric and imperial values. Values are typically rounded. Therefore, the two values do not always match according to the conversion formula.

This is SKF

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.

Res

We have hands-on experience in over forty industries based on our employees' knowledge of real life conditions. In addition, our world-leading experts and university partners pioneer advanced theoretical research and development in areas including tribology, condition monitoring, asset management and bearing life theory. Our ongoing commitment to research and development helps us keep our customers at the forefront of their industries.

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

Meeting the toughest challenges

Our network of knowledge and experience, along with our understanding of how our core technologies can be combined, helps us create innovative solutions that meet the toughest of challenges. We work closely with our customers throughout the asset life cycle, helping them to profitably and responsibly grow their businesses.

Working for a sustainable future

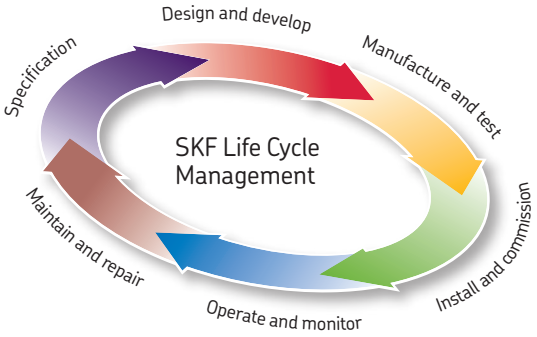
Since 2005, SKF has worked to reduce the negative environmental impact from our operations and those of our suppliers. Our continuing technology development resulted in the introduction of the SKF BeyondZero portfolio of products and services which improve efficiency and reduce energy losses, as well as enable new technologies harnessing wind, solar and ocean power. This combined approach helps reduce the environmental impact both in our operations and our customers' operations.

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.

Innovative solutions

Whether the application is linear or rotary or a combination, 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 each other.

Design optimization and verification

SKF can work with you to optimize current or new designs with proprietary 3-D modelling software that can also be used as a virtual test rig to confirm the integrity of the design.

Bearings
SKF is the world leader in the design, development and manufacture of high performance rolling bearings, plain bearings, bearing units and housings.

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

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

Mechatronics
SKF fly-by-wire systems for aircraft and drive-by-wire systems for off-road, agricultural and forklift applications replace heavy, grease or oil consuming mechanical and hydraulic systems.

Lubrication solutions
From specialized lubricants to state-of-the-art lubrication systems and lubrication management services, lubrication solutions from SKF can help to reduce lubrication related downtime and lubricant consumption.

Actuation and motion control
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.

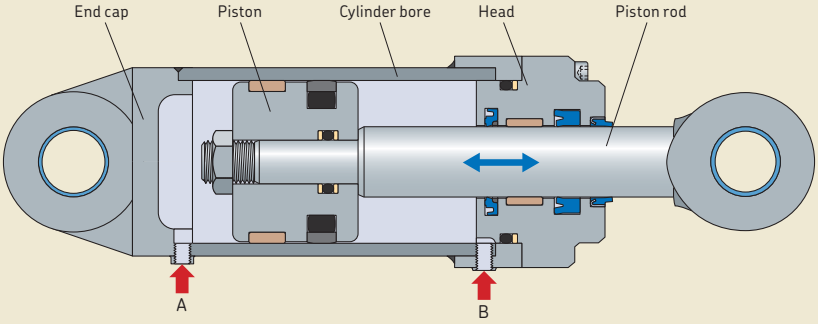
Introduction to fluid power

Fluid power systems transfer and utilize mechanical power through a working fluid. Energy is transmitted, stored and used through the transfer and pressure of fluids. There are two main types of fluid power system:

- hydraulic – using liquid, such as oil, for the working fluid
- pneumatic – using gas, such as air, for the working fluid

Fig. 1

Double-acting hydraulic cylinder



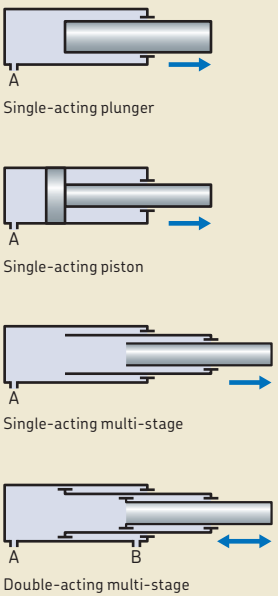
Hydraulic cylinders

A hydraulic cylinder is a linear actuator used to push or pull a load, or to selectively resist motion under load, by means of fluid pressure. Double-acting cylinders, the most common type, are able to push and pull (→ **fig. 1**). High pressure fluid pumped into the extend chamber (port "A") acts on the piston to push the piston rod out, thereby extending the length of the cylinder. Inversely, to retract the piston rod and reduce the length of the assembly, high pressure fluid is pumped into the retract chamber (port "B") and acts on the opposite side of the piston.

Other cylinder types are shown in **figure 2**. A cylinder which can only push but not pull is referred to as a single-acting cylinder. High pressure fluid is pumped into the extend chamber (port "A") and acts on the piston to push the piston rod out. An external force is required to return the cylinder to the retracted position. A typical application for a single-acting cylinder is a lift truck, where the load of the fork pushes the cylinder back. Multi-stage cylinders (also referred to as telescoping cylinders) have two or more piston rods in a coaxial arrangement to achieve greater extended length compared to the retracted length.

Fig. 2

Cylinder types



Cylinder classification

The type of cylinder and the application in which it is used are two of the main criteria when selecting the appropriate seals and guides. Applications are referred to as light duty, medium duty or heavy duty applications. These classifications are somewhat subjective but the duty levels are typically characterized by the following criteria.

Light duty cylinders

Light duty cylinders, e.g. cylinders used for stationary equipment indoor in a factory environment, may be characterized by:

- system pressures up to 160 bar *(2 300 psi)*
- temperatures up to 70 °C *(160 °F)*
- rare pressure peaks in excess of system pressure
- minimal side loads acting on guides
- environment with moderate temperature fluctuations and relatively free of contaminants

Medium duty cylinders

Medium duty cylinders, e.g. cylinders in agriculture off-highway equipment, may be characterized by:

- system pressures up to 250 bar *(3 625 psi)*
- temperatures up to 90 °C *(195 °F)*
- moderate pressure peaks in excess of system pressure
- moderate side loads acting on guides
- environment with temperature fluctuations and typical external contaminants such as dust and moisture

Heavy duty cylinders

Heavy duty cylinders, e.g. cylinders in off-highway earthmoving or forestry equipment, may be characterized by:

- system pressures of 400 bar *(5 800 psi)* or more
- temperatures exceeding 90 °C *(195 °F)* with peaks in excess of 110 °C *(230 °F)*
- regular pressure peaks in excess of system pressure
- heavy side loads acting on guides, usually due to heavy components and/or high accelerations
- tough environment with wide temperature fluctuations and typical harsh external contaminants

Hydraulic seals and guides

Hydraulic cylinder seals are used to seal the opening between various components in the hydraulic cylinder. **Figure 3** shows an example of the seal and guide components of a heavy duty cylinder. There are two main types of hydraulic seals in the system:

- Dynamic seals
  They seal between components in relative motion. In a hydraulic cylinder the rod sealing system seals dynamic reciprocating motion between the piston rod and head, while the piston sealing system seals dynamic reciprocating motion between the piston and cylinder bore.
- Static seals
  They seal between components fixed together without relative motion. Hydraulic cylinders use static seals in various locations depending on the design and construction. The most common are static seals between the piston and piston rod and between the head and cylinder bore tube.

Each dynamic seal in a hydraulic cylinder has a special function to contribute to the performance of the system:

Piston seal functions

- act as pressure barrier and prevent fluid passing the piston – important for controlling the cylinder motion or maintaining the position when at rest

Rod seal functions

- act as pressure barrier and keep the operating fluid inside the cylinder
- regulate the fluid film which extends with the surface of the piston rod – important to inhibit rod corrosion and to lubricate the wiper seal and the rod seal itself
- accept the lubrication film back into the cylinder when the rod retracts

Buffer seal functions

- protect the rod seal from fluid pressure peaks in excess of system pressure
- attenuate the fluctuations in system pressure, thereby improving rod seal performance by allowing the rod seal to deal with more constant or gradually changing pressure
- act as an internal excluder to keep system contaminants, such as metal particles, from damaging the rod seal

Wiper seal functions

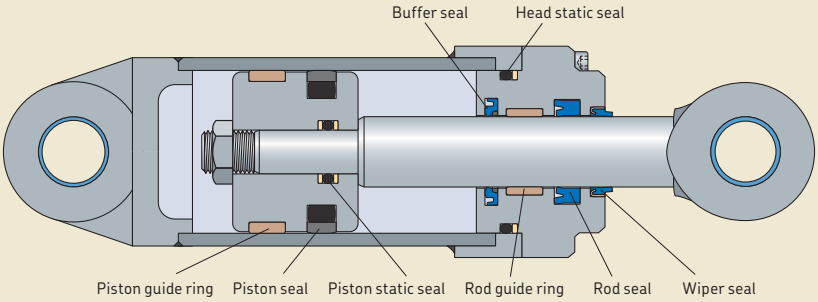
- exclude external contaminants from entering the cylinder assembly and the hydraulic system
- accept the lubrication film back into the cylinder when the rod retracts

Guide rings (rod and piston) functions

- prevent metal-to-metal contact between components
- react the radial load caused by side loads on the cylinder assembly
- keep the piston rod and piston accurately centred in the cylinder assembly – important for performance of the rod sealing system and piston sealing system

The subsequent chapters contain additional information regarding the function of each seal or guide in the system and the selection of them.

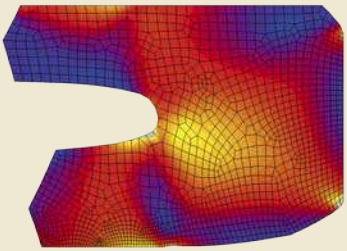
Fig. 3



SKF hydraulic seals and guides capabilities

The SKF assortment of hydraulic seals comprises hundreds of different designs and material combinations. The products shown in this catalogue are the more commonly used seal profiles and sizes for hydraulic cylinders. The flexible SKF manufacturing systems and processes, combined with the industry's most agile and comprehensive design and engineering capability, allow additional profiles and sizes to be added on a daily basis. If application requirements are not served by the common profiles or sizes in this catalogue, contact SKF to provide a specific offer.

Fig. 4



Customized sealing solutions

In addition to the standard assortment of series-produced seals and sizes listed in this catalogue, SKF designs and manufactures hydraulic seals customized for virtually any requirements.

The design and development of high performance materials combined with testing and failure analysis are vital elements for successful seal development. SKF combines these elements with its extensive application knowledge, to offer solutions that are based on an understanding of sealing systems under various real conditions. SKF continuously develops new customized materials and designs and operates its own testing facilities around the world to provide optimized sealing solutions that meet the sophisticated demands of many industries.

Finite element analysis (FEA)

FEA is used to simulate the impact of operating conditions, material selection and seal design on seal behaviour (→ **fig. 4**).

SKF SEAL JET system

With the innovative production system SKF SEAL JET virtually any kind of seal for any conceivable application can be manufactured in any dimension and design. SKF operates more than 200 machining centres worldwide and aims to be located as close to the customer as possible. This reduces manufacturing and dispatch time to a minimum. With local and global application engineering teams supported by research and development centres, machined seals (→ **fig. 5**) produced with SKF SEAL JET machines (→ **fig. 6**) can be customized to meet the most stringent sealing requirements of many industries. Key factors of the SKF SEAL JET systems (→ **fig. 7**) are:

- partnership with customers from the design phase to serial production with customized solutions
- prompt manufacturing of seals and components up to 4 000 mm *(157 in.)* in diameter as one piece and larger with short delivery times
- diameters up to 10 000 mm *(395 in.)* and larger by using a special welding technique
- virtually unlimited seal designs
- extensive range of sealing materials including materials certified to or complying with a broad range of industry standards and regulations (FDA, NSF, KTW, NORSOK, NACE, etc.)

Fig. 5

Machined seals

Fig. 6

SKF SEAL JET machine

Fig. 7

SKF SEAL JET system

Criteria for seal selection

The selection of the right seal profile and material for a given application requires consideration of many factors. This catalogue supports the selection of the right seal for typical hydraulic seal applications and existing cylinder designs. For any application factors outside of the ordinary, or to specify sealing systems in new hydraulic cylinder designs, a certain amount of expertise, beyond the content of this catalogue, may be required. The hydraulic seal experts at SKF can assist in selecting the right sealing system for new cylinder designs.

Before seals can be selected certain application parameters and information should be collected. The following most common application considerations are nearly always required when selecting hydraulic seals:

- fluid pressure range,
  the range of operating fluid system pressure, as well as frequency and severity of pressure peaks
- temperature range,
  the range of the fluid and cylinder assembly, both when operating and at rest
- speed,
  the stroking speed of the reciprocating piston rod
- fluid media,
  the type and viscosity of fluid used in the system
- hardware dimensions,
  the rod and bore diameters, seal groove dimensions and gaps (if already specified), cylinder overall length and stroke length as well as surface finish specifications (if already specified)
- application of the cylinder,
  the type of equipment the cylinder will be used on and how the cylinder will operate in the equipment as well as installation, duty cycles and environmental factors (external temperature, contaminants)

SKF hydraulic seals – general technical information

Specifications for effective sealing systems

Designing hydraulic rod and piston sealing systems requires careful attention to the dynamic seal interaction and the principles of tribology to ensure long service life, proper seal function, minimal wear, low friction and smooth operation. Tribology is the study of the design, friction, wear and lubrication of interacting surfaces in relative motion. The most important considerations for tribological properties of a dynamic sealing system are:

- the seal material
- the seal profile design
- the counter-surface material and finish properties
- the hydraulic fluid, which is the lubrication for the dynamic sealing surfaces

For information about seal profile design, see the relevant product chapter.

Counter-surface finish properties

The surface properties of the cylinder bore and the piston rod have a great influence on the function and service life of the seal. Parameters for specifying a surface finish are defined by ISO 4287. The most common surface roughness parameter specified is R_a (in units µm or µin.), i.e. the arithmetic mean deviation of the surface profile. This value does not, however, completely describe how the surface can be expected to affect the seal. The reason for this is that two surfaces with the same values of R_a but with different surface profile characteristics can lead to different lubrication film thickness, resulting in varying seal performance and level of wear.

The material ratio curve (Abbott-Firestone curve) provides more information about the surface profile characteristics. It describes the ratio of the material-filled length to the evaluation length at a given cutting depth expressed in percent (**→ fig. 1**). The slope at the beginning of the curve represents the peaks in the profile, which are causing initial wear on the seal. The slope at the end of the curve represents the valleys in the profile, which serve as lubricant reservoirs.

Fig. 1

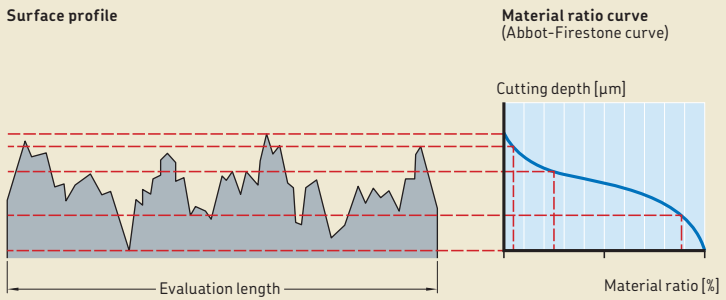


Table 1 shows some surface profiles. To ensure a surface finish with a suitable profile and characteristics for effective dynamic sealing, SKF recommends a defined combination of the following surface parameters:

- R_a – arithmetic mean roughness
- R_z – mean peak-to-valley height
- R_{max} – maximum peak-to-valley height
- R_{mr} – material ratio at a given depth

SKF recommends evaluating R_{mr} at a cutting depth of 0,5 R_z based on c_{ref} = 0% (→ **diagram 1**).

Diagram 1

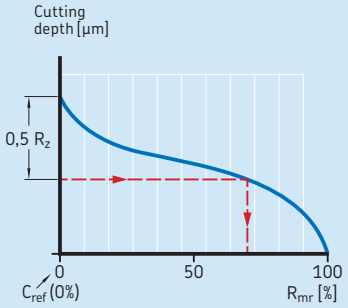


Table 1

Seal counter-surface examples

Surface profile	R_a	R_z	R_{max}	R_{mr}	Material ratio curve
–	µm	µm	µm	%	–
Eroded surface	2,4	7,3	10,4	≈ 40	
Machined surface	2,5	9,5	10,2	≈ 20 ... 25	
Ground and polished surface	0,09	1,2	1,8	≈ 90	

Recommendations for dynamic sealing surfaces

The dynamic sealing surfaces on the piston rod and in the cylinder bore (→ **fig. 2**) require similar, but somewhat different surface finishing.

Piston rod

The recommendations for the piston rod sealing surface (→ **table 2**) assume that typical materials and processes are used to manufacture the piston rod by induction hardening a carbon steel rod, grinding, hard-chromium plating and then polishing it to achieve the specified diameter and finish.

For alternative rod materials and coatings, other surface specifications, finishing methods, seal materials and designs may be required. Examples of such alternative rod coatings include:

- various hard metals applied by high velocity oxygen fuel (HVOF)
- ceramic coatings of various compositions and finishes
- stainless steel
- iron nitride

For recommendations for sealing systems with alternative rod materials and coatings, contact SKF.

Table 2

Recommendations for the dynamic sealing surface on piston rods
(induction hardened and chrome plated rods)

	Thermoplastics and rubbers	PTFE materials
R_a	0,05 to 0,3 µm *(2 to 12 µin.)*	0,05 to 0,2 µm *(2 to 8 µin.)*
R_z	0,4 to 2,5 µm *(15 to 100 µin.)*	0,4 to 2 µm *(15 to 80 µin.)*
R_{max}	0,4 to 2,5 µm *(15 to 100 µin.)*	
R_{mr}	50 to 95% (cutting depth 0,5 R_z based on c_{ref} = 0%)	
Hardness	≥ 50 HRC	
Hardening depth	~1,2 to 2,5 mm *(~0.05 to 0.1 in.)*	
Chromium layer thickness	~20 to 30 µm *(~800 to 1 200 µin.)*	

Fig. 2

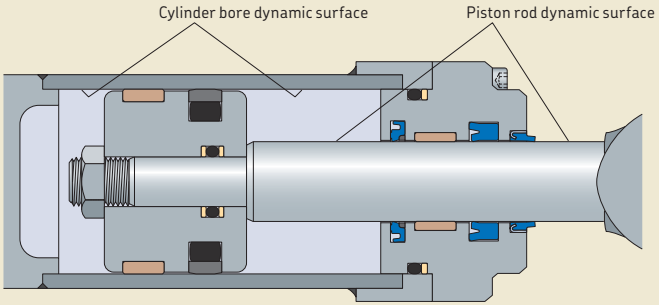


Table 3

Recommendations for the dynamic sealing surface on cylinder bores
(honed or roller burnished tubes)

	Thermoplastics, rubbers and PTFE materials
R_a	0,05 to 0,2 µm *(2 to 8 µin.)*
R_z	0,4 to 2 µm *(15 to 80 µin.)*
R_{max}	0,4 to 2,5 µm *(15 to 100 µin.)*
R_{mr}	50 to 95% (cutting depth 0,5 R_z based on c_{ref} = 0%)

Cylinder bore

The recommendations for the cylinder bore surface (→ **table 3**) assume that typical materials and processes are used to machine the bore by either honing or roller burnishing to achieve the specified diameter and finish.

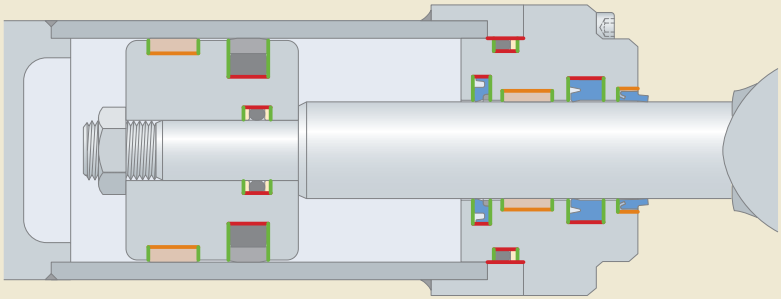
Recommendations for static sealing surfaces

Static sealing surfaces must also have a proper surface finish to enable the desired sealing performance (→ **fig. 3**).

The counter-surfaces of static seals exposed to pressure, including the static side of dynamic rod and piston seals, should have a roughness $R_a \leq 0,8$ µm *(30 µin.)*.

Seat diameters of guide rings and wiper seals should have a roughness of $R_a \leq 1,6$ µm *(63 µin.)*. Axial faces of all grooves should have a roughness of $R_a \leq 3,2$ µm *(125 µin.)*.

Fig. 3



Counter-surfaces of static seals exposed to pressure
$R_a \leq 0,8$ µm *(30 µin.)*

Seat diameters of guide rings and wiper seals
$R_a \leq 1,6$ µm *(63 µin.)*

Axial faces of all grooves
$R_a \leq 3,2$ µm *(125 µin.)*

Materials

Materials play a major role in the performance and lifetime of seals. Generally, hydraulic seals are exposed to a variety of application and working conditions, such as a wide temperature range, contact with various hydraulic fluids and the outside environment as well as high pressures and contact forces. The appropriate seal materials have to be selected to achieve a reasonable service life and service intervals. A wide variety of seal materials from four major polymeric material groups is available:

- thermoplastic elastomers, such as polyurethane (TPU) and thermoplastic polyester elastomers (TPC)
- rubbers, such as nitrile rubber (NBR) and hydrogenated nitrile rubber (HNBR), fluorocarbon rubbers (FKM, FPM)
- polytetrafluoroethylene (PTFE) and its compounds
- rigid thermoplastics and thermosets and their composites

Many different material properties should be considered to support and maintain the sealing function over the expected seal service life, for example:

- good elasticity over a wide temperature range, especially at low temperatures
- excellent compression set and stress relaxation behaviour to keep the sealing force for the requested operating period
- adequate hardness and flexibility to avoid leakage and allow easy installation
- superior gap extrusion resistance to cover the increased pressures of fluid power equipment
- adequate working temperature range
- good chemical compatibility to cover a wide assortment of hydraulic fluids such as mineral and synthetic oils, biodegradable and water-based fluids or fire-resistant fluids
- excellent tribological properties, i.e. low friction values and high wear resistance to achieve a high efficiency and avoid early failures especially when sealing against rough counter-surfaces

In addition to these considerations, the structure and morphology of polymeric materials make selection and specification of seal materials much more complicated than the standard materials used in mechanical engineering (e.g. aluminium or steel). Mechanical properties of polymeric materials are strongly influenced by time, temperature, load and rate of motion. Highly complex intermolecular processes affect the stress relaxation and retardation phenomena. Furthermore, the tribology conditions of the system (e.g. friction and wear) has a strong influence on the seal material behaviour and vice versa. Therefore, state-of-the-art sealing systems can only be developed by close cooperation between material experts and product designers, supported by advanced design tools like non-linear FEA and extensive seal testing capabilities.

SKF has a global material development organization that closely cooperates with the product development and testing functions. SKF is uniquely suited to develop, simulate, test and manufacture tailor-made materials for specific customer needs.

The following tables list the most common materials used by SKF for serial production of hydraulic seals. A wide variety of additional seal materials are available for special hydraulic seals or other seal applications.

Thermoplastic elastomers

SKF has a long history in developing and supplying special polyurethane grades for sealing purposes. SKF manufactures the well-known ECOPUR family of polyurethanes including H-ECOPUR for outstanding chemical and hydrolysis resistance, X-ECOPUR for extrusion resistance or S-ECOPUR for low friction and resistance to wear.

Polyurethanes combine the elastic properties of elastomers with the processability of thermoplastic materials. Seals made of polyurethanes provide excellent wear and pressure resistance and avoid leakage. Due to their elasticity and flexibility, they are easy to install. Special sealing polyurethane grades have a superior compression set and relaxation performance as well as temperature stability compared to commodity industrial grades.

Table 4 (→ **page 28**) lists common thermoplastic elastomers.

Rubbers

Rubbers are widely used in the seals industry for rotary shaft seals, static sealing elements such as O-rings and energizers, as well as dynamic seals in the fluid power industry. Depending on the chemical composition, rubbers can cover a wide temperature range up to 200 °C *(390 °F)* and more and withstand a wide variety of hydraulic fluids. NBR elastomers in a hardness range from 70 to 90 Shore A (shA) are the most commonly used rubbers in the fluid power industry. For higher temperatures and more aggressive hydraulic fluids, SKF recommends HNBR or FKM elastomers.

Table 5 (→ **page 29**) lists common rubbers.

PTFE

PTFE is a polymer with very unique properties. Due to its chemical composition, it is the plastic material with the highest chemical resistance and the lowest coefficient of friction, however, it has some restrictions in terms of mechanical properties and wear. Therefore, PTFE is very often modified by adding various organic and/or inorganic fillers to improve specific properties such as wear or extrusion resistance.

One of the most important characteristics of PTFE is the low coefficient of friction that provides outstanding start-up behaviour as well as minimized stick-slip phenomenon. Therefore, PTFE is the preferred material in applications that require accurate positioning of hydraulic cylinders. Due to the increased modulus of elasticity compared to rubbers and polyurethanes, PTFE seals can usually not be installed by simple snap-in procedures and require special tools and procedures for installation.

Table 6 (→ **page 29**) lists common PTFE materials.

Rigid thermoplastics and thermosets

Rigid thermoplastics and thermosets and their composites are characterized by much higher hardness and stiffness as well as reduced elasticity compared to polyurethanes, rubbers or PTFE. Therefore, they are used for components where mechanical strength is more important than flexibility, such as guide rings, anti-extrusion rings or special piston seal arrangements for heavy duty applications.

SKF offers rigid thermoplastics and composites in a wide variety of homogenous (unfilled or "virgin") grades (e.g. polyacetal or polyamide), filled grades (e.g. glass fibre reinforced PA) and fabric-reinforced composites (e.g. phenolic resin with cotton fabric, PF). For extreme conditions, SKF can provide high performance materials such as PEEK (polyetheretherketone).

Table 7 (→ **page 30**) lists common rigid thermoplastic and thermosets.

WARNING

At temperatures above 300 °C *(570 °F)* all fluoro elastomers and PTFE compounds give off dangerous fumes. If there is contact with your skin or if the vapours are inhaled, seek medical advice immediately.

Table 4

Thermoplastic elastomers (TPU and TPC)

Material code	Material description	Hardness Shore A (shA)	Hardness Shore D (shD)	Colour[1]	Example uses
LUBRITHANE U-1003	TPU	95		black	Rod seals, piston seals, wiper seals
LUBRITHANE U-1004	TPU		55	black	Wiper seals
LUBRITHANE U-1023	TPU	93		blue	Rod seals, buffer seals, piston seals, wiper seals
LUBRITHANE U-1029	TPU	94		light blue	Rod seals, buffer seals, piston seals, wiper seals
PU54/199	TPU	97	54	blue	Piston seal slide rings
W93	TPU	93		white	Press-in wiper seals
Y95A	TPU	95		yellow	Back-up rings for O-rings
395A	TPU	98		black	Back-up rings for O-rings
B93	TPU	93		dark blue	Rod seals
ECOPUR	TPU	95	48	green	Premium U-cup seals, wiper seals and chevron packings
X-ECOPUR	TPU with increased hardness and extrusion resistance	97	57	dark green	Rod and buffer seals
X-ECOPUR PS	TPU with increased hardness and extrusion resistance	98	60	green	Piston seals for heavy duty hydraulic applications
H-ECOPUR	TPU with increased chemical resistance against biodegradeable and water based fluids	95	48	red	Rod and piston seals for applications requiring hydrolysis resistance, increased chemical resistance or conformance with FDA regulations
XH-ECOPUR	TPU with increased chemical resistance and higher hardness	97	60	dark red	Rod and piston seals for applications requiring hydrolysis resistance, increased chemical resistance or conformance with FDA regulations
S-ECOPUR	TPU with improved tribological characteristics	95	48	dark grey	Rod and piston seals for water hydraulics, non-lubricated pneumatics or dry-running conditions
FLUOROTREL F-1504	TPC		55	turquoise	Energized rod seals, piston seals, anti-extrusion rings
TPC-ET72/075	TPC		72	black	Piston seal support rings

[1] The colour examples may deviate from the actual colour of the material.

Table 5

Rubbers

Material code	Material description	Hardness Shore A	Colour [1]	Example uses
A-8501	NBR	70	black	Rod seals, piston seals, energizers
A-8504	NBR-LT (low-temperature grade)	70	black	Rod seals, piston seals, energizers
A-8526	NBR	90	black	Piston seal energizers
C-7021	HNBR	70	black	Rod seals, piston seals, energizers
C-7022	HNBR	80	black	Rod seals, piston seals, energizers
V-7501	FKM	70	black	Piston seals
V-7503	FKM	90	black	Rod seals, piston seals, energizers
N70/015	NBR	70	black	Piston seal energizers
N70/6052	NBR	70	black	O-rings and energizers
N80/047	NBR	80	black	Piston seals
N80/198	NBR	80	black	Energizers for heavy duty applications
SKF Ecorubber-1	NBR	85	black	U-cup seals, chevron packings, machined seals
SKF Ecorubber-2	FKM	85	brown	U-cup seals, machined seals, chevron packings, wiper seals
SKF Ecorubber-H	HNBR	85	black	U-cup seals, chevron packings, machined seals

[1] The colour examples may deviate from the actual colour of the material.

Table 6

PTFE materials

Material code	Material description	Hardness Shore D	Colour [1]	Example uses
292	PTFE + 40 % bronze + MoS_2	62	brown-grey	Piston seal slide rings, guide strips
SKF Ecoflon 1, 100	PTFE unfilled	57	white	Anti-extrusion rings, chevron sets, O-rings, food-compatible products (FDA certificate)
SKF Ecoflon 2, 702	PTFE + 15% glass fibres + 5% MoS_2	60	grey	Anti-extrusion rings, chevron sets, O-rings
SKF Ecoflon 3, 741	PTFE + 40% bronze	65	brown	Anti-extrusion rings, chevron sets, O-rings
SKF Ecoflon 4	PTFE + 23% hard carbon + 2% graphite	65	black	Anti-extrusion rings, chevron sets, O-rings

[1] The colour examples may deviate from the actual colour of the material.

Table 7

Rigid thermoplastics and thermosets

Material code	Material description	Colour [1]	Example uses
707	PA 6	black	Anti-extrusion rings
P-2501	PA 6.6 + 30% glass fibres	black	Split piston seal slide rings
P-2506	PA 6.12	black	Anti-extrusion rings
P-2518	POM	black	Anti-extrusion rings
P-2551	PA 6 + 40% glass fibres	dark grey	Guide rings and split piston seal slide rings
P-2552	PA 6 + 40% glass fibres + PTFE	black	Guide rings
PA66/011	PA 6.6 + 20% glass fibres	black	Split piston seal slide rings
POM/076	POM	red	Guide rings in compact sets (light and medium duty cylinders)
PF	Phenolic resin with cotton fabric	brown	Guide rings
SKF Ecomid	PA 6	black	Anti-extrusion rings, guide rings
SKF Ecotal, 728	POM	black	Anti-extrusion rings, guide rings and scraping wiper seals
SKF Ecopaek	PEEK	beige	Anti-extrusion rings, guide rings
SKF Ecowear 1000	UHMWPE (ultra-high-molecular-weight polyethylene)	white	Anti-extrusion rings, guide rings
SKF Ecotex	Polyester resin with polyester fabric and graphite filler	light orange	Guide rings

[1] The colour examples may deviate from the actual colour of the material.

Hydraulic fluids

Fluids used in hydraulic systems serve multiple functions for the system performance:

- transfer power by flow under pressure acting on moveable parts
- lubricate surfaces in contact and relative motion – hydraulic cylinder components and seals, as well as other system components such as pumps and valves
- prevent corrosion of components
- cool the system, by carrying heat from areas of high load, motion or turbulence and spread it to the entire volume of the system including reservoir tanks and cooling equipment
- clean the system by carrying contaminants and wear particles to filter bodies or settling areas

The fluids used in hydraulic systems come in various chemical compositions and viscosity grades as suited to specific applications.

Viscosity is a measurement of the thickness of a fluid or the resistance to flow. Seal performance is affected by the viscosity of the fluid and changes to the viscosity during use. Most typical hydraulic fluids exhibit decreased viscosity with increasing temperature and increased viscosity with increasing pressure.

The most commonly used media in hydraulic systems are mineral oil based fluids with various additives. However, a variety of alternative fluids may be encountered in special applications. For example, biodegradable fluids such as synthetic (HEES) or natural esters (HETG) and polyalphaolefines (PAO) may be used to reduce environmental impact in the event of accidental spills. Flame retardant fluids based on water or synthetic esters may be safely used in confined spaces or where the hydraulic system is used in close proximity to ignition sources. The data, specifications and recommendations in this catalogue are for common mineral oil fluids. For guidance on specifications of sealing systems for alternative fluids, contact SKF.

The chemical composition of hydraulic fluids can impact the seal life and performance depending on compatibility with the seal material(s). Absorption and reaction of the seal material(s) with non-compatible fluids can cause, for example:

- changes in seal material volume – increased "swelling" or decreased "shrinking" and their respective impacts on seal contact force and friction
- hardening and embrittlement of the seal material
- softening, loss of strength or dissolving of the seal material
- degradation of the polymer chains or cross-linking, causing the material to fatigue or lose resilience
- discoloration of the seal material

Generally, these changes are accelerated by higher temperature. To avoid these changes and the resulting damage to seal function and life, careful consideration should be taken to ensure compatibility between the fluid and all seal materials, as well as the temperature and mechanical loads on the seal material. SKF has a long history and extensive database of test results concerning compatibility of various seal materials and fluids, as well as unparalleled expertise in developing materials to meet customers' needs for chemical resistance of seal materials.

Table 8 (→ **page 32**) summarizes the compatibility rating for the most important fluids and materials used in the fluid power industry. For materials not listed, contact SKF. **Table 8** provides general guidelines for new, clean fluids. Fluids vary by manufacturer, additives and contaminant levels. Materials vary by specific compound. The guidelines cannot substitute for testing the compatibility of a seal in the actual fluid and under actual operating conditions. Temperatures higher than specified in **table 8** can lead to degradation of the basic fluid or its additives. This can cause deterioration of the seal material. For applications where higher temperatures are required, contact SKF.

In addition to the specified hydraulic fluid, seal materials can be attacked by exposure to other fluids from other parts of the machinery (e.g. greases, fuels, coatings), environmental factors (e.g. humidity or radiation) and degradation and reaction with the fluids, additives and contaminants in the system producing additional chemicals.

Hydraulic fluids and seal material compatibility

Fluids	Thermoplastic elastomers							
	ECOPUR, LUBRITHANE		H-ECOPUR, XH-ECOPUR		Ether-based TPU		TPC (≥ 95 shA)	
	Temperature							
	Normal	High	Normal	High	Normal	High	Normal	High
Hydraulic fluids	≤ 60 °C (≤ 140 °F)	≤ 100 °C (≤ 210 °F)	≤ 60 °C (≤ 140 °F)	≤ 100 °C (≤ 210 °F)	≤ 60 °C (≤ 140 °F)	≤ 100 °C (≤ 210 °F)	≤ 60 °C (≤ 140 °F)	≤ 100 °C (≤ 210 °F)
Mineral oils HL, HLP, HVLP	A	B	A	A	A	B/C	A	A/B
ATF (automatic transmission fluids)	A	B	A	A	A	B/C	A	B
HETG (triglycerides, rape seed oil)	A	B/C	A	A	A	C	A	B/C
HEES (synthetic esters)	A	B/C	A	A	A	C	A	B/C
HEPG (polyalcylene glycols)	B	D	A	C	B/C	D	C	D
HEPR (polyalphaolefines)	A	B	A	A	A	B/C	A	B
Fire resistant fluids, water-based	≤ 40 °C (≤ 105 °F)	≤ 60 °C (≤ 140 °F)	≤ 40 °C (≤ 105 °F)	≤ 60 °C (≤ 140 °F)	≤ 40 °C (≤ 105 °F)	≤ 60 °C (≤ 140 °F)	≤ 40 °C (≤ 105 °F)	≤ 60 °C (≤ 140 °F)
Water	B	D	A	A	A	B	A	B
HFA-fluids (oil in water)	B	D	A	A	B	B/C	A	B
HFB-fluids (water in oil)	B	D	A	A	B	D	A	B
HFC-fluids (water-glycol)	C	D	A	B/C	B	B/C	C	D
Fire resistant fluids, water-free	≤ 60 °C (≤ 140 °F)	≤ 100 °C (≤ 210 °F)	≤ 60 °C (≤ 140 °F)	≤ 100 °C (≤ 210 °F)	≤ 60 °C (≤ 140 °F)	≤ 100 °C (≤ 210 °F)	≤ 60 °C (≤ 140 °F)	≤ 100 °C (≤ 210 °F)
HFD-R fluids	D	D	D	D	D	D	D	D
HFD-U fluids (polyol and carboxylic esters)	B	D	A	A	B	D	A	B/C
Mineral greases	A	B	A	A	A	B	A	A

A	Excellent
B	Good
C	Limited
D	Not recommended

1) Ethylene-propylene rubber for reference only – not common for hydraulic cylinders
2) For filled PTFE, compatibility of filler must be considered separately (e.g. bronze not recommended for water-based fluids).
3) Exposure to water-based fluids or moisture causes swelling.
4) Contact SKF

Table 8

Rubbers NBR, HNBR		FKM		EPDM[1]	**Thermoplastics and thermosets** PA, PF	POM	PEEK	**PTFE**[2]
Temperature Normal	High	Normal	High	All	Temperature All	All	All	All
≤ 60 °C (≤ 140 °F)	≤ 100 °C (≤ 210 °F)	≤ 60 °C (≤ 140 °F)	≤ 100 °C (≤ 210 °F)					
A	A	A	A	D	A	A	A	A
A	A	A	A	D	A	A	A	A
A/B	A/B	A	A	D	A	A	A	A
A/B	A/B	A	A	D	A	A	A	A
A	A/B	A/B	C/D	A	A	A	A	A
A/B	A/B	A	A	D	A	A	A	A
≤ 40 °C (≤ 105 °F)	≤ 60 °C (≤ 140 °F)	≤ 40 °C (≤ 105 °F)	≤ 60 °C (≤ 140 °F)					
A	A	A	A	A	C[3]	A	A	A
A	A	A	B	D	C[3]	A	A	A
A	A	A	A	D	C[3]	A	A	A
A	A	A/B	B/C	A	C[3]	A	A	A
≤ 60 °C (≤ 140 °F)	≤ 100 °C (≤ 210 °F)	≤ 60 °C (≤ 140 °F)	≤ 100 °C (≤ 210 °F)					
D	D	A/C[4]	A/C[4]	A	A	A	A	A
A/B	C	A	A	D	A	A	A	A
A	A	A	A	D	A	A	A	A

Gap extrusion

The process by which seal material is forced into the clearances between components is called gap extrusion. The dimension of this clearance gap is referred to as the extrusion gap, or "e-gap" (→ **fig. 4**).

The resistance of a given seal component to gap extrusion is mainly determined by the material composition and quality. Materials of greater hardness and stiffness typically also have improved resistance to extrusion. Therefore, full-face anti-extrusion or back-up rings of materials harder than the seal material may be used to prevent seal extrusion into the e-gap (→ **fig. 5**).

Pressure is the main driver of extrusion, but the e-gap size and application temperature are also major factors. **Diagram 2** shows the pressure resistance of different materials as a function of temperature. The values were measured on an SKF test rig. The tests were carried out with a rectangular sample, dimensions 38,7 x 49 x 5 mm under static pressure and an extrusion gap of 0,3 mm. The pressure values were taken at an extrusion length of 0,5 mm (→ **fig. 4**). While these sample values illustrate the differences in extrusion resistance for standard grades of typical seal materials, there are many variations of each basic composition that impact the extrusion resistance of seals. In addition, the profile design and the seal friction affect extrusion. For maximum allowable pressure, temperature and e-gap of each seal profile, refer to the profile data for each profile in the relevant chapters.

The maximum e-gap in a hydraulic cylinder occurs when the cylinder components are at the maximum radial misalignment of components. This misalignment is affected by:

- external forces acting upon the cylinder assembly (e.g. acceleration forces, frictional moments from rotation of cylinder end connections)
- the weight of the cylinder components (especially when used horizontally)
- deformation of cylinder components (rod flexing, guide ring radial deformation under force)
- the tolerance stack up of multiple cylinder components

Fig. 4

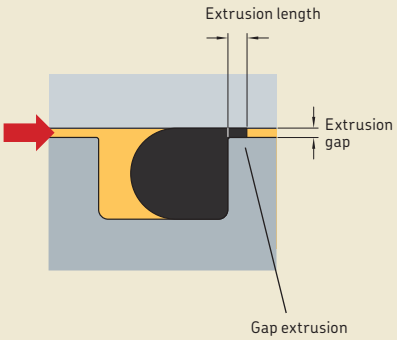


Fig. 5

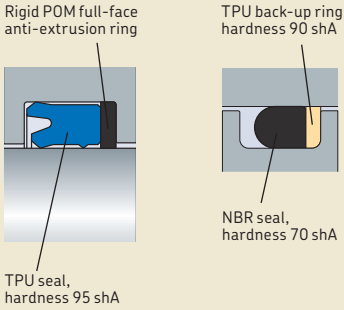
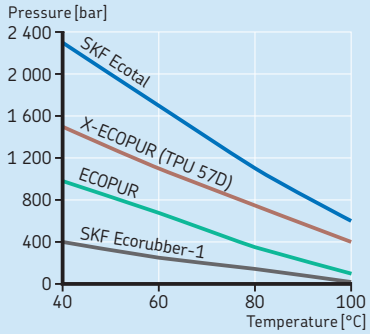


Diagram 2



Therefore, it is necessary to calculate the e-gap at the maximum misalignment at minimum material conditions of the cylinder and guide components.

For rod seals, the maximum e-gap should be calculated with the following conditions (→ **fig. 6**):

- guide ring groove at maximum diameter D
- rod at minimum diameter d
- guide ring cross section at minimum thickness t (considering tolerances and any radial deformation of the guide ring under load)
- rod seal housing throat at maximum diameter h

For piston seals, the maximum e-gap should be calculated with the following conditions (→ **fig. 7**):

- bore at maximum diameter D
- guide ring groove at minimum diameter d
- guide ring cross section at minimum thickness t (considering tolerances and any radial deformation of the guide ring under load)
- piston seal housing at minimum outside diameter OD

The maximum allowable e-gap is provided in the profile data for each rod seal and piston seal profile in the relevant chapter. The e-gap can be kept within these limits by specifying and controlling the tolerances of dimensions described above and shown in **figs. 6** and **7**.

Fig. 6

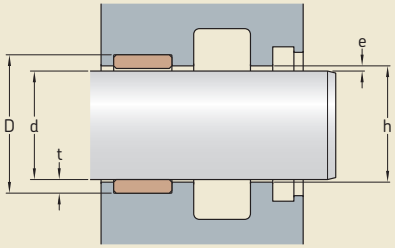
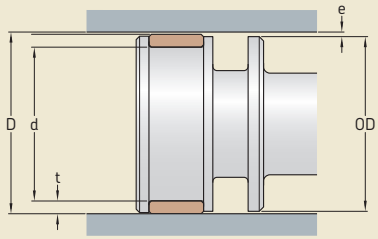


Fig. 7



Storage

During storage, the properties of elastomer products can be damaged either by chemical reactions or by physical processes. Chemical reactions are basically caused by the influence of heat, light, oxygen, ozone or contamination by chemicals. The physical processes, which are called physical ageing, are either due to the influence of external stresses leading to cracks and permanent deformation, or due to the migration of plasticizers, which makes the material more brittle and can lead to deformation of the parts.

Therefore, elastomer products only maintain their characteristics for several years without major changes, if they are properly stored. The ageing behaviour of elastomer products and their reaction on storage conditions depend considerably on their chemical structure. Unsaturated elastomers (e.g. nitrile rubber) age more quickly under improper storage conditions than saturated elastomers (e.g. fluorocarbon rubber).

Storage conditions

Elastomer products should be stored in accordance with the following recommendations, which are in line with the recommendations provided in ISO 2230 or DIN 7716.

- Rubber and plastic products should be stored in a cool and dry room. The relative humidity should be < 65%. Storage temperature should be around 15 °C *(60 °F)* and not exceed 25 °C *(75 °F)*. If the storage temperature is below 15 °C *(60 °F)*, care should be taken during handling of stored products because they may have stiffened. They should be warmed up slowly at ambient temperature.
- The storage room must not contain any ozone-producing devices, such as electric motors or high-voltage devices.
- Rubber and plastic products should not be exposed to direct sunlight or artificial light with a high UV content (bulbs are preferred to neon lamps).
- Rubber products should not be exposed to drafts. They should be stored in airtight packaging. The package material must not contain plasticizers. Polyethylene is the most suitable package material.
- Contact between rubber products of different compositions should be avoided.
- Contact between rubber and plastic products and chemicals or dangerous metals (e.g. copper, manganese) should be avoided.
- Rubber and plastic products should be stored as tension-free as possible, i.e. the parts should not be subject to tension, pressure or bending. Rubber products, especially seals, must not be hung on nails or tightly folded or rolled for reasons of space.

Shelf life

When stored under the conditions mentioned above, elastomer products retain their typical properties for several years (→ **table 9**).

The typical shelf life may be prolonged based on the actual product conditions at the end of the typical shelf life. Trained and experienced experts can approve a prolonged storage period based on a visual inspection of representative samples. The samples should not reveal any permanent distortion, mechanical damage or surface cracking. The material should not show any signs of hardening or softening nor any kind of tackiness.

Table 9

Shelf life recommendations in years

Material	Typical shelf life	Possible prolongation
TPU (standard)	5	2
ECOPUR, LUBRITHANE	5	2
H-ECOPUR, XH-ECOPUR	10	2
TPC	5	2
NBR	6	3
HNBR	8	4
FKM, FPM	10	4
EPDM	8	4
MVQ (silicone)	10	5
PTFE	15	5
PA, POM, PF	8	4
PEEK	15	5
UHMWPE	10	5

Installation and assembly

Seal housing grooves

The type of seal housing determines the method of installation, required equipment and the degree of difficulty. There are four main types of seal housings.

Closed housing grooves

Closed housing grooves are the most common seal housings (→ **fig. 8**). They require the most planning and effort to ensure that the seal is installed properly without damage. Not all seal cross section sizes and material combinations can be installed into this type of seal housing.

Open housing grooves

Open housing grooves allow the seal to be pressed in with minimal deformation and are therefore a good choice when the seal design, material or size prevent installation into a closed or stepped housing. Some seals, such as press-in wiper seals, have a metal sleeve that retains the seal in an open groove by press forces (→ **fig. 9**), whereas other seals may require a snap ring (→ **fig. 10**). Plastic snap rings, such as RI for rods or RR for piston, are available from SKF on request. Open housing grooves require specified edge radii or chamfers to prevent seal damage when the seal enters the housing groove or passes the snap ring groove.

Fig. 8

Closed housing groove

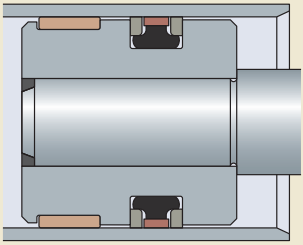


Fig. 9

Open housing groove

Fig. 10

Open housing groove with snap ring

Split two-piece closed grooves

These grooves incorporate two separable machine components to provide an open groove when the seal is installed and a closed groove when the machine is fully assembled (→ **fig. 11**).

Stepped grooves

Stepped grooves allow seals to be installed with less deformation (→ **fig. 12**). Snap-in wiper seals are a common example in hydraulic cylinder applications.

Corner radii

The corner radii inside the groove should be sized to avoid inadvertent contact with with the adjacent portion of the seal. Static side corner radius recommendations are provided in the product tables of the relevant chapter.

Groove edge radii

All outside groove edges and any other edges that may come into contact with the seal during installation or use should be broken with a small radius. Otherwise, the sharp edge may damage the seal. Unless otherwise specified, all outside groove edges should have a radius of approximately 0,2 mm *(0.008 in.)*.

Fig. 11

Split two-piece closed housing groove

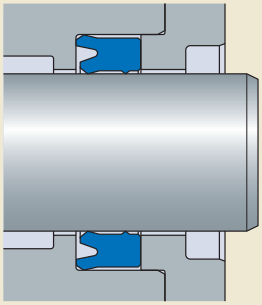


Fig. 12

Stepped housing groove

Installation chamfers

Installation chamfers should be designed into the cylinder bore and onto the assembly end of the piston rod to ensure that the seal can easily transition from its free state diameter into its installed diameter. The installation chamfer should also be blended into the cylinder bore or piston rod diameter with a generous radius. The chamfer angle and minimum length recommendations are provided in the product tables of the relevant chapter.

Installing rod seals

The method of installation and the possible groove types for rod seals depend on the materials, seal design and ratio between the diameter and cross-sectional height. **Table 10** provides general recommendations for profiles made of rubber or TPU with a hardness ≤ 95 shA. PTFE or other harder materials may require a smaller radial depth S or even open grooves. The recommendations in **table 10** are not a substitute for careful installation tests in the particular application.

Installing rod seals in closed grooves

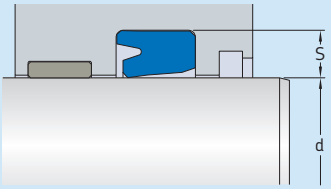
Rod seals can often be installed into closed grooves through carefully bending the profile similar to a kidney shape and then inserting it into the groove. It is very important to avoid sharp bending.

Thin and flexible profiles can be installed by hand (→ **figs. 13 a** and **b**). Installation tools for TPU rod seals help to install profiles of greater section thickness (→ **figs. 14 a** to **f**). After installation, the seal may need to be reshaped to a round form using a cone-shaped tool.

For PTFE seals, small diameter seals or for serial assembly, special assembly tools (→ **fig. 15**, **page 42**) may be required to save time or avoid seal damage. For additional information about such special installation tools, contact SKF.

Table 10

General recommendations for selecting the type of installation for rubber and TPU materials
(hardness ≤ 95 shA)



Diameter/radial depth ratio	Type of installation
d/S ≤ 6	Open groove
6 < d/S ≤ 10	Closed groove, installation with tool
d/S > 10	Closed groove, installation by hand

Fig. 13 a

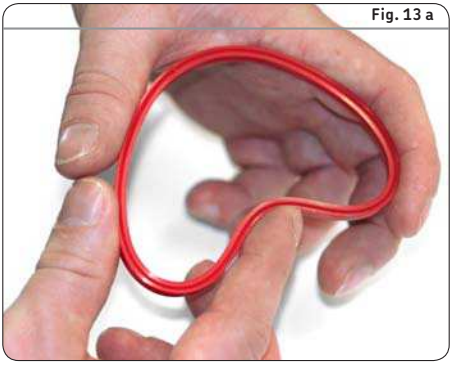


Fig. 13 b

Fig. 14a

Tool, rod seal and housing

Fig. 14b

Tool positioned for grasping the seal

Fig. 14c

Seal properly folded

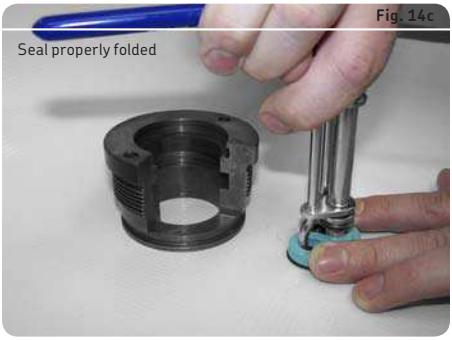


Fig. 14d

Inserting the seal into the housing

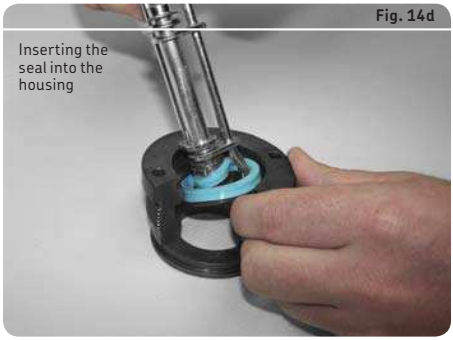


Fig. 14e

Seal positioned for installation

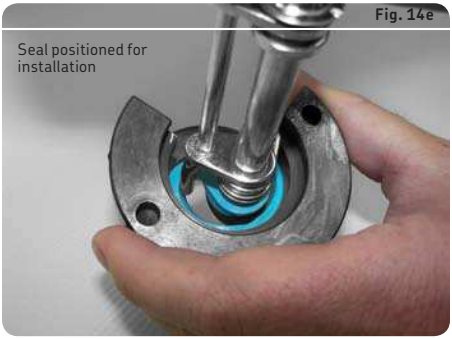
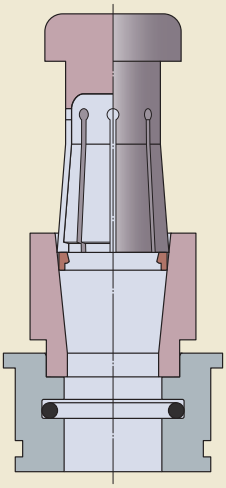


Fig. 14f

Seal properly installed

Fig. 15



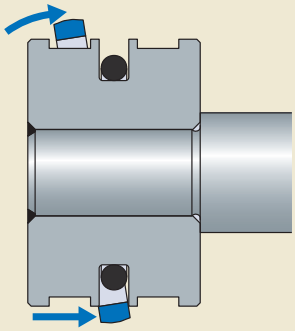
Installing piston seals

Piston seals installed in closed grooves must be expanded or stretched into position. Seals with step cut slide rings such as CUT or SCP (→ *Piston seals with rigid split slide rings*, **page 54**) are relatively easy to expand into position. Non-split profiles should not be expanded to a material deformation of more than 20% for TPU or 30% for rubbers. Otherwise, the permanent deformation would be too large. Heating the seal, e.g. in an oil bath, decreases the required expansion force, but cannot increase the maximum material deformation.

Piston seals with a TPU slide ring can usually be installed by hand or with simple tools (→ **fig. 16**). PTFE seals or those with thicker radial sections may require special assembly tools to save time or avoid seal damage (→ **fig. 17**). For additional information about such special installation tools, contact SKF.

The recommendations cannot substitute for careful installation tests in the particular application.

Fig. 16



Installing wiper seals

Snap-in wiper seals, which are installed in stepped grooves (→ **fig. 12**, **page 39**), are typically of a small radial section per diameter and close to the end of the cylinder head component. Therefore, installation by hand is usually possible.

Press-in wiper seals require special equipment and careful planning for ease of installation without damaging the wiper seal or housing. Assembly tools adapted for each press-in wiper seal size should be used in conjunction with appropriate steady force in a hand operated press. Installation by impact (e.g. striking the assembly tool with a hammer) is not advised. The press assembly tool should be configured to stop when the wiper seal has been pressed flush with the groove edge (→ **fig. 18**). Pressing beyond flush can damage the wiper seal.

Fig. 17

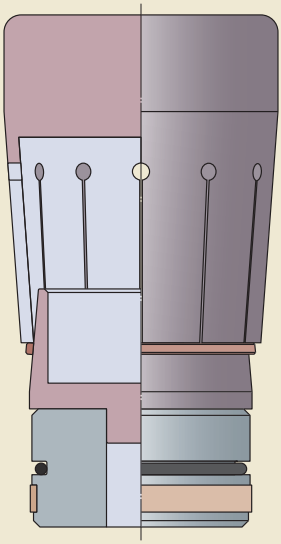
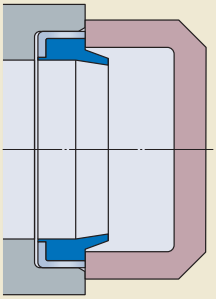
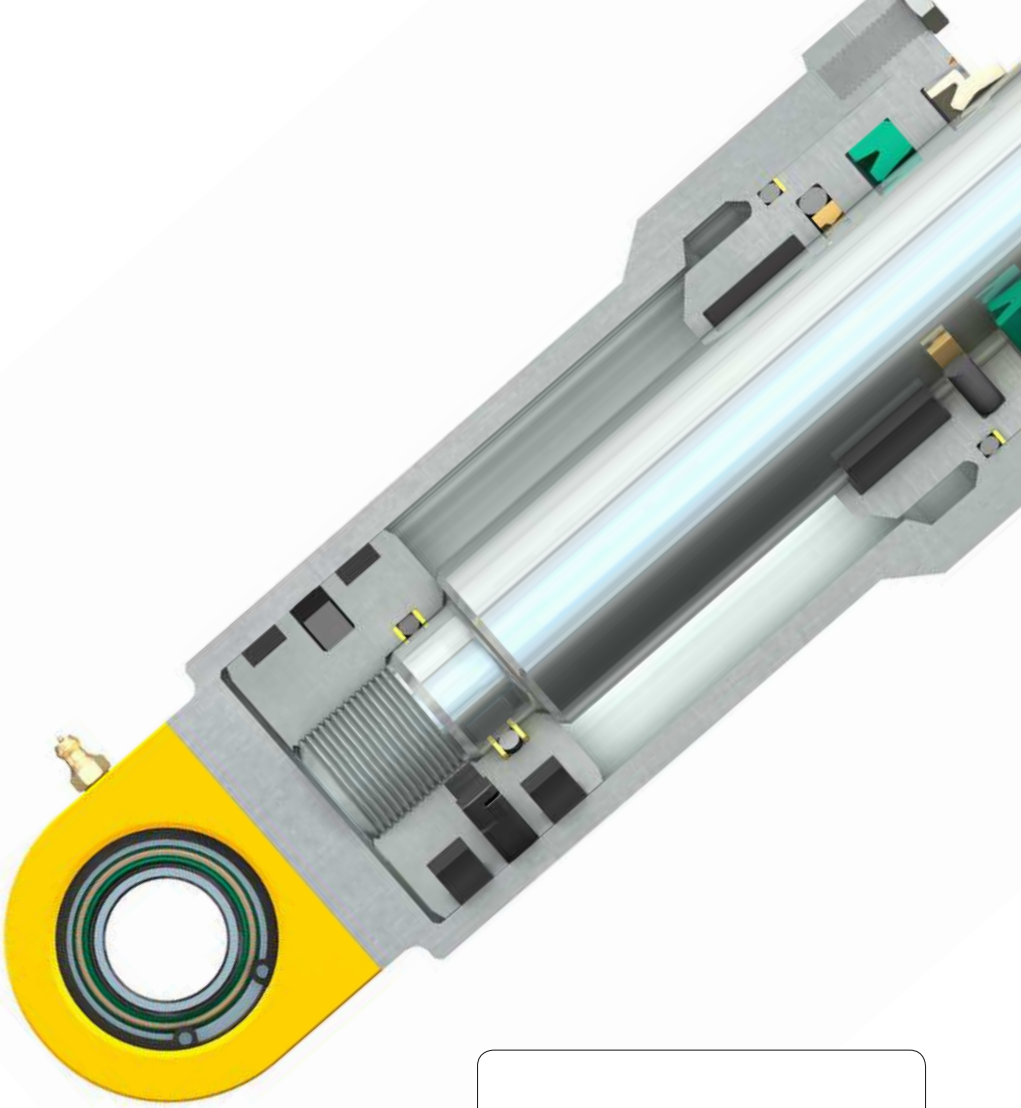
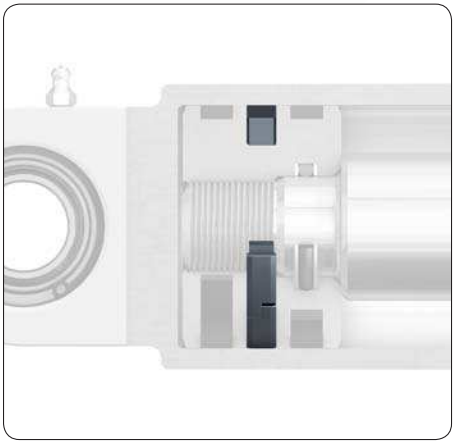


Fig. 18



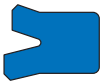




Piston seals

Profile overview

Profile	Description	Additional information → page	Profile data → page
MPV 	Polyurethane slide ring, nitrile rubber energizer; suitable for medium to heavy duty applications	**50**	**58** (metric)
DPV 	Polyurethane slide ring, nitrile rubber energizer; fits O-ring dash-number housings; suitable for medium to heavy duty applications	**51**	**60** (inch)
LPV 	Polyether-based polyurethane slide ring, nitrile rubber energizer; suitable for light to medium duty applications	**51**	**62** (metric)
CPV 	Polyurethane slide ring, nitrile rubber energizer; fits O-ring dash-number housings; suitable for light to medium duty applications	**51**	**64** (inch)
GH 	PTFE slide ring, nitrile rubber energizer; low breakaway friction; suitable for medium duty applications	**52**	**66** (metric and inch)
APR 	PTFE slide ring with incorporated nitrile rubber X-ring for improved sealing performance, nitrile rubber energizer; suitable for medium to heavy duty applications	**52**	**76** (metric and inch)
LCP 	PTFE slide ring supported by polyamide anti-extrusion rings, nitrile rubber energizer; very good gap extrusion resistance; suitable for heavy duty applications and high pressures	**53**	**82** (metric and inch)
LTP 	Sealing ring made of nitrile rubber, supported by polyamide anti-extrusion rings; good gap extrusion resistance; fits O-ring dash-number housings; suitable for medium to heavy duty applications and high pressures	**53**	**86** (inch)

Profile	Description	Additional information → page	Profile data → page
CUT 	Step cut polyamide slide ring, nitrile rubber energizer; suitable for heavy duty applications and high pressures	**54**	**90** (metric)
SCP 	Step cut polyamide slide ring, oval nitrile rubber energizer; fits wide, shallow inch size housings; suitable for heavy duty applications and high pressures	**54**	**94** (inch)
MD-L 	Five-piece compact set consisting of a nitrile rubber sealing ring, integrated polyester elastomer anti-extrusion rings and polyacetal guide rings; suitable for medium duty applications	**55**	**98** (metric)
UNP 	Polyurethane U-cup profile; single-acting; may be used in double-acting cylinders when using two seals in back-to-back arrangement; suitable for medium duty applications	**56**	**102** (metric and inch)

Rod seals that can be used as piston seals

PTB 	These rod seal profiles are designed with similar inside and outside sealing geometry. Therefore, they can also be used as piston seals (→ *Rod seals used as single-acting piston seals*, **page 56**).	→ *Rod and buffer seals*, **page 111**	**138** (metric and inch)
STD 			**164** (inch)
DZ 			**178** (metric and inch)

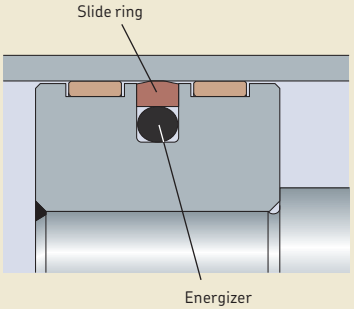
Basics

Piston seals (→ **fig. 1**) maintain sealing contact between the piston and the cylinder bore. Differential pressures acting on the piston to extend or retract the piston rod can be in excess of 400 bar *(5 800 psi)*. The pressure acting on the piston seal increases contact forces between the piston seal and cylinder surface. Therefore, the surface properties of the sealing surfaces are critical to proper seal performance (→ *Counter-surface finish properties*, **page 22**).

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

Fig. 1

Typical piston seal arrangement for double-acting cylinders



Materials

Depending on the profile and the required characteristics of its components, a piston seal can consist of one or several materials. Common materials used for piston seals are thermoplastic polyurethane (TPU), polytetrafluoroethylene (PTFE), polyamide (PA), and nitrile rubber (NBR). The standard materials used for a specific profile are provided in the *Profile overview* (→ **page 46**) and in the relevant profile sections below.

For additional information, refer to *Materials* (→ **page 26**).

Gap extrusion

External forces acting on the piston rod, reacted by the fluid inside the cylinder, can result in abrupt pressure peaks. These peaks can be far in excess of the system operating pressure and may press a piston seal into the gap between the piston and bore, thereby causing damage to the seal and adversely affecting seal performance and cylinder operation. Seal materials must be carefully chosen to avoid gap extrusion (→ *Gap extrusion*, **page 34**). This risk of gap extrusion can also be minimized by using seals with anti-extrusion rings (→ *Piston seals incorporating anti-extrusion rings*, **page 53**).

Piston guidance

Guide rings avoid sliding metal-to-metal contact between the piston and cylinder bore and accommodate the radial loads of forces acting on the cylinder assembly. Although piston seals are designed to accommodate slight radial motion between the piston and bore, effective guide ring function to accurately centre the piston within the bore is important for piston seal performance. For additional information about piston guidance, refer to *Guide rings and guide strips* (→ **page 249**).

More information

Piston drift

When the piston rod is at rest and held in position by fluid, any amount of flow passing the piston can result in an unintended movement of the piston rod and cause drift. Although piston seal leakage is a possible source of drift, internal valve leakage, external system leakage and flow between the piston and rod static connections should also be carefully checked. In some applications, a minimal amount of flow passing the piston seal within specified limits is permitted. This accepted flow allows the use of piston seals of low friction designs and materials or split slide rings for easy installation.

Sealing between piston and rod

The piston can be welded to the rod (→ **fig. 2**) if the disassembly of the cylinder can be done by removing the rod end attachment. The piston can also be fixed to the rod end by a lock nut (→ **fig. 3**), which enables removing the piston from the rod during complete disassembly of the cylinder. When using a lock nut, static sealing (→ *O-rings and back-up rings*, **page 291**) is required between the piston and the rod end.

Fig. 2

Piston welded to the rod end tap

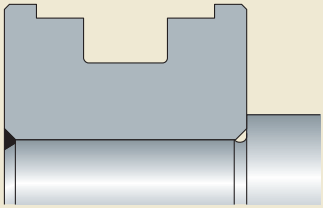
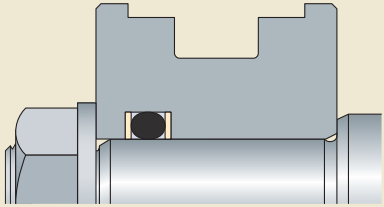


Fig. 3

Piston fixed to the rod by a lock nut and with a static seal and two back-up rings between piston and rod end



Double-acting piston seals

Double-acting cylinders are the most widely used cylinder types. They operate with pressure on both sides and, therefore, require double-acting seal arrangements (→ **fig. 1**, **page 48**).

Double-acting piston seals have a symmetrical profile (cross section) and identical sealing functions in both directions. Typically, double-acting piston seals consist of a slide ring and an energizer. The deformation of the elastomeric energizer when installed provides adequate force to keep the slide ring in dynamic sealing contact with the cylinder bore, while sealing statically against the seal housing groove.

A double-acting cylinder typically has the same fluid on both sides of the piston. Therefore, a relatively thick lubrication film can be permitted between the piston seal and the cylinder bore to minimize friction and wear. The transportation of fluid occurring during dynamic operation is, however, small and insignificant in most applications.

In some older cylinder designs, O-rings were used as piston seals. To allow easy replacement of O-rings with the equivalent piston seals, the housing dimensions for some double-acting piston seals are the same as those for dash-number O-rings. Therefore, these housings are also called O-ring dash-number housings.

SKF supplies double-acting piston seals in many different profiles and in a wide range of series and sizes, which make them appropriate for a wide variety of operating conditions and applications.

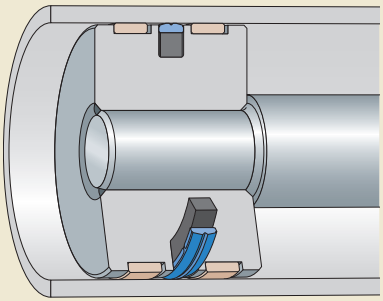
Piston seals with polyurethane slide rings

Piston seals with thermoplastic polyurethane (TPU) slide rings have a nitrile rubber (NBR) energizer. The wear-resistant slide ring has a profiled dynamic sealing surface. Its geometry is optimized to reduce friction and resist gap extrusion. Notches in the slide ring edges ensure rapid pressurization of the seal to react to abrupt changes in pressure. These profiles can usually be installed without special equipment and are resistant to damage during installation and cylinder assembly.

MPV profiles

MPV profiles (→ **fig. 4**) have slide rings made of X-ECOPUR PS (TPU) developed for pressures up to 400 bar (*5 800 psi*). They are suitable for high fluid temperatures and in medium to heavy duty applications, such as earthmoving equipment. MPV profiles are available in metric sizes and some fit seal housings in accordance with ISO 7425-1.

Fig. 4



MPV

DPV profiles

DPV profiles (→ **fig. 5**) have slide rings made of X-ECOPUR PS (TPU) developed for pressures up to 400 bar *(5 800 psi)*. They are suitable for high fluid temperatures and for medium to heavy duty applications such as earthmoving equipment. DPV profiles are available in inch sizes where O-ring dash-number housings are used.

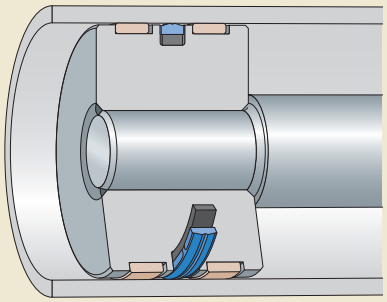
LPV profiles

LPV profiles (→ **fig. 6**) have a polyether-based polyurethane (EU) slide ring that provides resistance to hydrolysis (attack from moisture) and good low temperature flexibility. The O-ring energizer provides a cost-effective sealing solution. These profiles are developed for pressures up to 250 bar *(3 625 psi)* and suitable for light to medium duty applications, such as agriculture and material handling applications. They are available in metric sizes and some fit seal housings in accordance with ISO 7425-1.

CPV profiles

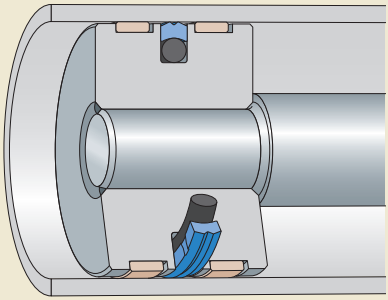
CPV profiles (→ **fig. 7**) have a polyester-based polyurethane (AU) slide ring. These profiles are developed for pressures up to 345 bar *(5 000 psi)* and suitable for light to medium duty applications. They are available in inch sizes where O-ring dash-number housings are used.

Fig. 5



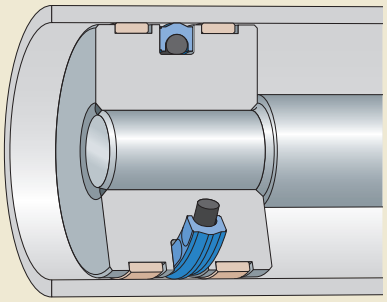
DPV

Fig. 6



LPV

Fig. 7



CPV

Piston seals with PTFE slide rings

PTFE slide rings may be preferred in applications with demands for low breakaway friction and when it comes to chemical and thermal resistance. Notches in the slide ring edges ensure rapid pressurization of the seal to react to abrupt changes in pressure. PTFE is hard and non-elastic when compared with polyurethane and rubber materials. For additional information about piston seal materials, refer to *Materials* (→ **page 48**).

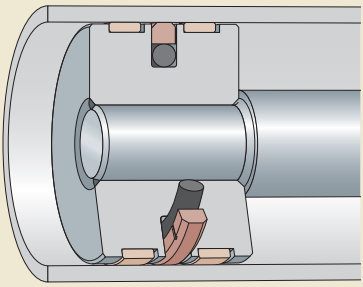
GH profiles

GH profiles (→ **fig. 8**) have a nitrile rubber (NBR) energizer, which is an O-ring as standard. Rectangular energizers are available on request. These profiles are suitable for pressures up to 400 bar *(5 800 psi)* in medium to heavy duty applications. GH profiles are available in metric and inch sizes and some metric sizes fit seal housings in accordance with ISO 7425-1.

APR profiles

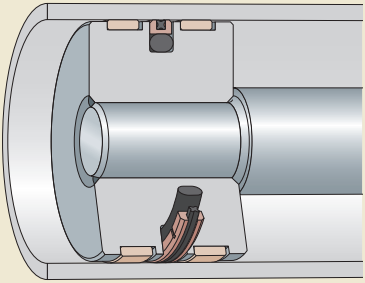
APR profiles (→ **fig. 9**) have a nitrile rubber (NBR) O-ring energizer. The PTFE slide ring incorporates an NBR X-ring to improve sealing performance. They are suitable for pressures up to 350 bar *(5 075 psi)* in medium to heavy duty applications. APR profiles are available in metric and inch sizes and some metric sizes fit seal housings in accordance with ISO 7425-1.

Fig. 8



GH

Fig. 9



APR

Piston seals incorporating anti-extrusion rings

These SKF piston seals incorporate patented locking anti-extrusion rings made of polyamide (PA). They are split for easy installation. Their snap-in design makes it easy to identify the correct installation direction (→ **fig. 10**), holds them in place when installed and prevents damage during assembly.

Piston seals incorporating anti-extrusion rings have an improved high pressure performance and minimize the risk of gap extrusion at abrupt pressure peaks (→ *Gap extrusion*, **page 48**).

LCP profiles

LCP (→ **fig. 11**) profiles have a PTFE slide ring supported by harder PA anti-extrusion rings (→ **fig. 10**) and a T-shaped nitrile rubber (NBR) energizer. These capped T-seals are suitable for pressures up to 690 bar *(10 000 psi)* and available in metric and inch sizes. Some metric sizes fit seal housings in accordance with ISO 5597.

LTP profiles

LTP profiles (→ **fig. 12**) have a nitrile rubber (NBR) sealing ring supported by harder PA anti-extrusion rings on both sides. These T-seals are suitable for pressures up to 345 bar *(5 000 psi)* in medium to heavy duty applications and are available in inch sizes where O-ring dash-number housings are used.

Fig. 10

Patented locking anti-extrusion rings

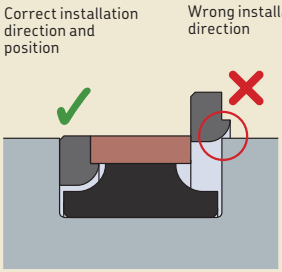
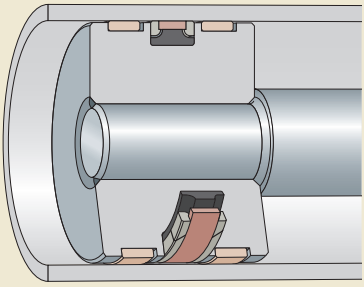
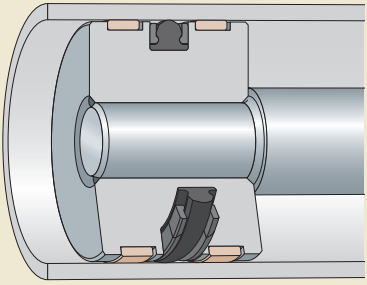


Fig. 11



LCP

Fig. 12



LTP

Piston seals with rigid split slide rings

These SKF piston seals have a rigid split slide ring made of glass fibre reinforced polyamide and a nitrile rubber (NBR) energizer. The rigid slide ring has high resistance to wear and gap extrusion. The slide ring also provides low friction, even at high pressures. The split slide ring design facilitates the installation process into a closed housing.

CUT profiles

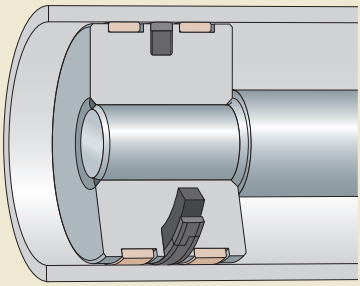
CUT profiles (→ **fig. 13**) have a step cut slide ring and a rectangular energizer. They are suitable for pressures up to 500 bar *(7 250 psi)* in heavy duty applications. CUT profiles are available in metric sizes and some fit seal housings in accordance with ISO 7425-1.

They can be used for short pressure pulses and shock loads with proper system design. For additional information, contact SKF.

SCP profiles

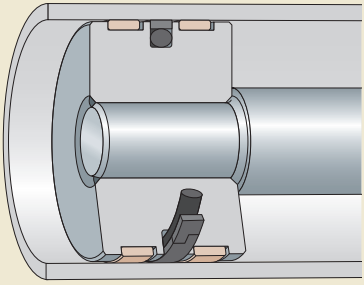
SCP profiles (→ **fig. 14**) have a step cut slide ring and an oval energizer. They are suitable for pressures up to 690 bar *(10 000 psi)* in heavy duty applications and are available in inch sizes.

Fig. 13



CUT

Fig. 14



SCP

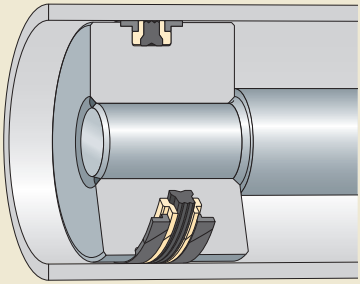
Piston seals with integrated guide rings

These seals are designed as compact sets that incorporate the piston seal and guide rings into one assembly. Typically, they are applied as an all-in-one piston seal solution.

MD–L profiles

MD-L profiles (→ **fig. 15**) have a nitrile rubber (NBR) sealing ring with thermoplastic polyester elastomer (TPC) anti-extrusion rings on both sides, which incorporate the polyacetal (POM) guide rings. The guide and anti-extrusion rings are split for easy installation. MD-L profiles are suitable for pressures up to 250 bar *(3 625 psi)* in medium duty applications and are available in metric sizes. Some sizes fit seal housings in accordance with ISO 6547.

Fig. 15



MD-L

Single-acting piston seals

A single-acting piston seal is designed for cylinders where pressure is applied from one side only. The piston in single-acting cylinders may have oil on the pressure side only, while the opposite side is open to atmosphere. Therefore, the piston seal must leave a minimum of oil film when passing along the cylinder bore since the transportation of oil otherwise would result in a leakage to the exterior.

In single-acting cylinders, the open end may push air out and draw air in as the piston reciprocates. This air may carry moisture and contaminants into the cylinder, which can lead to seal damage. Vent filters may be fitted to the open side of the cylinder to reduce contaminants entering the inside of the cylinder. The cylinder bore may be hard chromium plated to prevent corrosion.

In addition, to prevent damage to the cylinder bore or piston seals, SKF can supply special piston wiper seals on request. For additional information, contact SKF.

UNP profiles

UNP profiles (→ **fig. 16**) are single-acting U-cup seals made of thermoplastic polyurethane (TPU). They are suitable for pressures up to 350 bar *(5 075 psi)* and are available in metric and inch sizes. In case of higher pressures, SKF provides full-face anti-extrusion rings on request. For additional information, contact SKF.

Single-acting piston seals in double-acting cylinders

Two single-acting U-cup profile seals, facing in opposite directions, can be used in a double-acting cylinder. It is important to select seal designs which can relieve reverse pressure for such arrangements to prevent build-up of pressure between the two seals. UNP profiles are suitable for such double-acting arrangements because the dynamic seal lip can flex to relieve reverse pressure.

Rod seals used as single-acting piston seals

Some rod seal profiles are designed with similar inside and outside sealing geometry and, therefore, can also be used as single-acting piston seals in single- or double-acting cylinders (→ **fig. 17**). PTB, STD and DZ rod seal profiles (→ *Rod and buffer seals*, **page 111**) can be used for those applications.

Rod seals with loaded-lip U-cup profiles may not relieve reverse pressure, but it is possible to remove their energizer (X-ring) from one of the seals to allow reverse pressure relief (→ **fig. 17**).

Fig. 16

UNP profile piston seal with a wiper seal

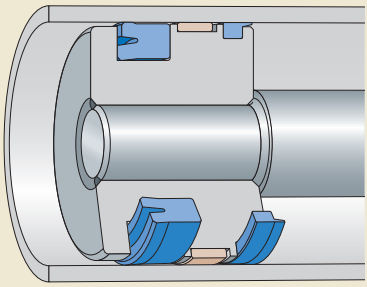
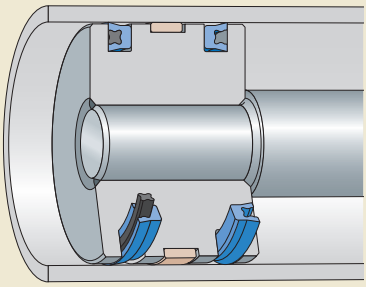


Fig. 17

STD profiles used as piston seals (in a double-acting arrangement)



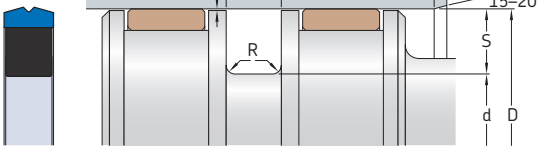
MPV profile data

Material codes	Slide ring: X-ECOPUR PS Energizer: N80/198 For additional information → **page 26**
Pressure	Up to 400 bar *(5 800 psi)*
Speed	Up to 1 m/s *(3.2 ft/s)*
Temperature range	 For temperature limits depending on fluid compatibility → **table 8, page 32** Extreme low temperature range: may be intermittently exposed (e.g. cold start-up) without seal damage, but seal performance may be compromised while in this range Temperatures below the recommended operating range: seal performance depends on system design (precision guiding arrangement recommended) **Recommended operating temperature range for this profile and material** Temperatures above the recommended operating range: acceptable only with reduced pressure, speed, and/or e-gap Extreme high temperature range: only occasional short-term exposure (e.g. cylinder in curing oven of a powder coating process)
Dimension standards	Some sizes fit seal housings in accordance with ISO 7425-1.
Counter-surface	→ **page 22**

Maximum values of application parameters (e.g. pressure, speed, temperature, e-gap) should not be applied continuously nor simultaneously.

2.1 MPV profile piston seals, metric sizes

D **50 – 200** mm



Maximum extrusion gap e

Radial depth S	e_{max} at 80 °C (175 °F) for pressures 160 bar	250 bar	400 bar
mm	mm		
3,75	0,4	0,4	–
5,5	0,5	0,4	0,3
7,75	0,6	0,45	0,3
10,5	0,7	0,55	0,4

For additional information → **page 34**

Dimensions						Designation
D H9	d h9	L +0,2	S	R max.	C min.	
mm						–
50	34,5	6,3	7,75	1,3	5	• **MPV-50x34.5x6.3**
55	39,5	6,3	7,75	1,3	5	**MPV-55x39.5x6.3**
60	44,5	6,3	7,75	1,3	5	**MPV-60x44.5x6.3**
63	47,5	6,3	7,75	1,3	5	• **MPV-63x47.5x6.3**
65	49,5	6,3	7,75	1,3	5	**MPV-65x49.5X6.3**
70	54,5	6,3	7,75	1,3	5	**MPV-70x54.5X6.3**
	59	4,2	5,5	1,3	5	**MPV-70x59X4.2**
75	59,5	6,3	7,75	1,3	5	**MPV-75x59.5x6.3**
80	59	8,1	10,5	1,8	6	**MPV-80x59x8.1**
	64,5	6,3	7,75	1,8	6	• **MPV-80x64.5x6.3**
85	64	8,1	10,5	1,8	6	**MPV-85x64x8.1**
90	69	8,1	10,5	1,8	6	**MPV-90x69x8.1**
100	79	8,1	10,5	1,8	6	**MPV-100x79x8.1**
110	89	8,1	10,5	1,8	6	**MPV-110x89x8.1**
120	99	8,1	10,5	1,8	6	**MPV-120x99x8.1**
125	104	8,1	10,5	1,8	6	**MPV-125x104x8.1**
130	109	8,1	10,5	1,8	6	**MPV-130x109x8.1**
150	129	8,1	10,5	1,8	6	**MPV-150x129x8.1**
160	139	8,1	10,5	1,8	6	• **MPV-160x139x8.1**
180	159	8,1	10,5	1,8	6	**MPV-180x159x8.1**
200	179	8,1	10,5	1,8	6	• **MPV-200x179x8.1**

Other sizes are available on request

• Seal housing dimensions in accordance with ISO 7425-1

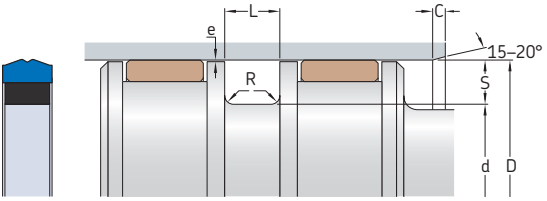
DPV profile data

Material codes	Slide ring: X-ECOPUR PS Energizer: A-8501 For additional information → **page 26**
Pressure	Up to 400 bar *(5 800 psi)*
Speed	Up to 1 m/s *(3.2 ft/s)*
Temperature range	 For temperature limits depending on fluid compatibility → **table 8, page 32** Extreme low temperature range: may be intermittently exposed (e.g. cold start-up) without seal damage, but seal performance may be compromised while in this range Temperatures below the recommended operating range: seal performance depends on system design (precision guiding arrangement recommended) **Recommended operating temperature range for this profile and material** Temperatures above the recommended operating range: acceptable only with reduced pressure, speed, and/or e-gap Extreme high temperature range: only occasional short-term exposure (e.g. cylinder in curing oven of a powder coating process)
Counter-surface	→ **page 22**

Maximum values of application parameters (e.g. pressure, speed, temperature, e-gap) should not be applied continuously nor simultaneously.

2.2 DPV profile piston seals, inch sizes

D **1 – 6.002** in.



Maximum extrusion gap e

Radial depth S	Series	e_{max} at 80 °C *(175 °F)* for pressures 2 300 psi	3 600 psi	5 800 psi
in.	–	in.		
0.125	2	0.012	0.008	–
0.187	3	0.018	0.012	0.008
0.25	4	0.022	0.016	0.01

For additional information → **page 34**

Dimensions							Designation
D +0.002	d	Tolerance	L +0.005	S	R max.	C min.	
in.							–
1	0.758	–0.002	0.187	0.125	0.02	0.125	**DPV-210-K0M**
1.5	1.258	–0.002	0.187	0.125	0.02	0.125	**DPV-218-K0M**
1.75	1.508	–0.002	0.187	0.125	0.02	0.125	**DPV-222-K0M**
2	1.63	–0.002	0.281	0.187	0.025	0.156	**DPV-326-K0M**
2.25	1.88	–0.002	0.281	0.187	0.025	0.156	**DPV-328-K0M**
2.5	2.13	–0.002	0.281	0.187	0.025	0.156	**DPV-330-K0M**
2.75	2.38	–0.002	0.281	0.187	0.025	0.156	**DPV-332-K0M**
3	2.63	–0.002	0.281	0.187	0.025	0.156	**DPV-334-K0M**
3.5	3.13	–0.002	0.281	0.187	0.025	0.156	**DPV-338-K0M**
3.75	3.38	–0.002	0.281	0.187	0.025	0.156	**DPV-340-K0M**
4	3.63	–0.002	0.281	0.187	0.025	0.156	**DPV-342-K0M**
4.5	4.13	–0.002	0.281	0.187	0.025	0.156	**DPV-346-K0M**
5	4.63	–0.002	0.281	0.187	0.025	0.156	**DPV-350-K0M**
5.502	5.028	–0.004	0.375	0.25	0.032	0.187	**DPV-429-K0M**
6.002	5.528	–0.004	0.375	0.25	0.032	0.187	**DPV-433-K0M**

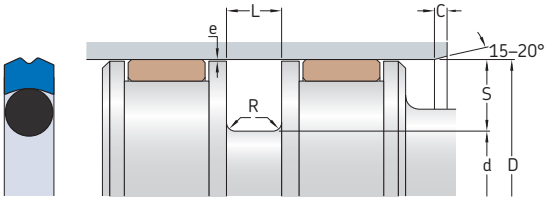
Other sizes are available on request

LPV profile data

Material codes	Slide ring: PU54/199 Energizer: N70/6052 For additional information → **page 26**
Pressure	Up to 250 bar *(3 625 psi)*
Speed	Up to 0,5 m/s *(1.6 ft/s)*
Temperature range	 For temperature limits depending on fluid compatibility → **table 8, page 32** Extreme low temperature range: may be intermittently exposed (e.g. cold start-up) without seal damage, but seal performance may be compromised while in this range Temperatures below the recommended operating range: seal performance depends on system design (precision guiding arrangement recommended) **Recommended operating temperature range for this profile and material** Temperatures above the recommended operating range: acceptable only with reduced pressure, speed, and/or e-gap Extreme high temperature range: only occasional short-term exposure (e.g. cylinder in curing oven of a powder coating process)
Dimension standards	Some sizes fit seal housings in accordance with ISO 7425-1.
Counter-surface	→ **page 22**

Maximum values of application parameters (e.g. pressure, speed, temperature, e-gap) should not be applied continuously nor simultaneously.

2.3 LPV profile piston seals, metric sizes
D **25 – 100** mm



Maximum extrusion gap e

Radial depth S	e_{max} **at 80 °C (175 °F) for pressures** 160 bar	250 bar
mm	mm	
3,75	0,3	0,2
5,5	0,4	0,25
7,75	0,4	0,3
10,5	0,5	0,4

For additional information → **page 34**

Dimensions						**Designation**
D H9	d h9	L +0,2	S	R max.	C min.	
mm						–
25	17,5	3,2	3,75	0,5	2	• **LPV 25x17.5x3.2**
30	22,5	3,2	3,75	0,5	2	**LPV 30x22.5x3.2**
32	24,5	3,2	3,75	0,5	2	• **LPV 32x24.5x3.2**
35	24	4,2	5,5	0,5	2,5	**LPV 35x24x4.2**
40	29	4,2	5,5	0,5	2,5	• **LPV 40x29x4.2**
50	39	4,2	5,5	0,5	2,5	• **LPV 50x39x4.2**
55	44	4,2	5,5	0,5	2,5	**LPV 55x44x4.2**
60	49	4,2	5,5	0,5	2,5	**LPV 60x49x4.2**
63	52	4,2	5,5	0,5	2,5	• **LPV 63x52x4.2**
65	54	4,2	5,5	0,9	2,5	**LPV 65x54x4.2**
70	59	4,2	5,5	0,9	2,5	**LPV 70X59X4.2**
80	64,5	6,3	7,75	0,9	4	• **LPV 80x64.5x6.3**
90	74,5	6,3	7,75	0,9	4	**LPV 90x74.5x6.3**
100	84,5	6,3	7,75	0,9	4	• **LPV 100x84.5x6.3**

Other sizes are available on request

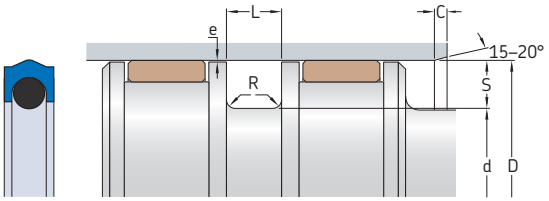
• Dimensions in accordance with ISO 7425-1

CPV profile data

Material codes	Slide ring: U-1003 Energizer: A-8501 For additional information → **page 26**
Pressure	Up to 345 bar *(5 000 psi)*
Speed	Pressure ≤ 250 bar *(3 625 psi)* → up to 1 m/s *(3.2 ft/s)* Pressure > 250 bar *(3 625 psi)* → up to 0,5 m/s *(1.6 ft/s)*
Temperature range	 For temperature limits depending on fluid compatibility → **table 8, page 32** Extreme low temperature range: may be intermittently exposed (e.g. cold start-up) without seal damage, but seal performance may be compromised while in this range Temperatures below the recommended operating range: seal performance depends on system design (precision guiding arrangement recommended) **Recommended operating temperature range for this profile and material** Temperatures above the recommended operating range: acceptable only with reduced pressure, speed, and/or e-gap Extreme high temperature range: only occasional short-term exposure (e.g. cylinder in curing oven of a powder coating process)
Counter-surface	→ **page 22**

Maximum values of application parameters (e.g. pressure, speed, temperature, e-gap) should not be applied continuously nor simultaneously.

2.4 CPV profile piston seals, inch sizes
D **1.5 – 9.002** in.



Maximum extrusion gap e

Radial depth S	Series	e_{max} at 80 °C *(175 °F)* for pressures 2 300 psi	3 600 psi	5 000 psi
in.	–	in.		
0.121	2	0.008	0.006	–
0.185	3	0.012	0.008	0.004
0.237	4	0.014	0.01	0.006

For additional information → **page 34**

Dimensions							Designation
D +0.002	d	Tolerance	L +0.005	S	R max.	C min.	
in.							–
1.5	1.258	–0.002	0.187	0.121	0.02	0.125	**CPV-218-J1S**
1.75	1.508	–0.002	0.187	0.121	0.02	0.125	**CPV-222-J1S**
2	1.63	–0.002	0.281	0.185	0.025	0.156	**CPV-326-J1S**
2.25	1.88	–0.002	0.281	0.185	0.025	0.156	**CPV-328-J1S**
2.5	2.13	–0.002	0.281	0.185	0.025	0.156	**CPV-330-J1S**
2.75	2.38	–0.002	0.281	0.185	0.025	0.156	**CPV-332-J1S**
3	2.63	–0.002	0.281	0.185	0.025	0.156	**CPV-334-J1S**
3.125	2.755	–0.002	0.281	0.185	0.025	0.156	**CPV-335-J1S**
3.25	2.88	–0.002	0.281	0.185	0.025	0.156	**CPV-336-J1S**
3.5	3.13	–0.002	0.281	0.185	0.025	0.156	**CPV-338-J1S**
4	3.63	–0.002	0.281	0.185	0.025	0.156	**CPV-342-J1S**
4.5	4.13	–0.002	0.281	0.185	0.025	0.156	**CPV-346-J1S**
5	4.63	–0.002	0.281	0.185	0.025	0.156	**CPV-350-J1S**
5.502	5.028	–0.004	0.375	0.237	0.032	0.187	**CPV-429-J1S**
6.002	5.528	–0.004	0.375	0.237	0.032	0.187	**CPV-433-J1S**
6.502	6.028	–0.004	0.375	0.237	0.032	0.187	**CPV-437-J1S**
7.002	6.528	–0.004	0.375	0.237	0.032	0.187	**CPV-439-J1S**
7.252	6.778	–0.004	0.375	0.237	0.032	0.187	**CPV-440-J1S**
8.002	7.528	–0.004	0.375	0.237	0.032	0.187	**CPV-443-J1S**
9.002	8.528	–0.004	0.375	0.237	0.032	0.187	**CPV-446-J1S**

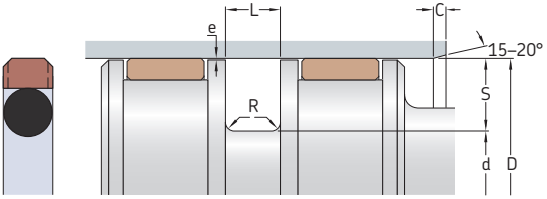
Other sizes are available on request

GH profile data

Material codes	Slide ring: metric sizes → 292 inch sizes → 741 Energizer: metric sizes → N70/6052 inch sizes → A-8501 For additional information → **page 26**
Pressure	Up to 400 bar *(5 800 psi)*
Speed	Up to 1 m/s *(3.2 ft/s)*
Temperature range	 For temperature limits depending on fluid compatibility → **table 8, page 32** Extreme low temperature range: may be intermittently exposed (e.g. cold start-up) without seal damage, but seal performance may be compromised while in this range Temperatures below the recommended operating range: seal performance depends on system design (precision guiding arrangement recommended) **Recommended operating temperature range for this profile and material** Temperatures above the recommended operating range: acceptable only with reduced pressure, speed, and/or e-gap Extreme high temperature range: only occasional short-term exposure (e.g. cylinder in curing oven of a powder coating process)
Dimension standards	Some metric sizes fit seal housings in accordance with ISO 7425-1.
Counter-surface	→ **page 22**

Maximum values of application parameters (e.g. pressure, speed, temperature, e-gap) should not be applied continuously nor simultaneously.

2.5 GH profile piston seals, metric sizes
D **14 – 70** mm



Maximum extrusion gap e

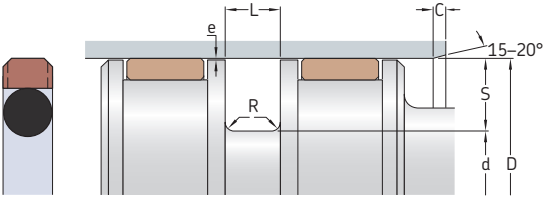
Radial depth S	e_{max} at 80 °C (175 °F) for pressures 160 bar	250 bar	400 bar
mm	mm		
2,45	0,35	0,25	0,15
3,75	0,35	0,25	0,15
5,5	0,4	0,3	0,2
7,75	0,5	0,35	0,25
10,5	0,6	0,45	0,35

For additional information → **page 34**

Dimensions						Designation
D H9	d h9	L +0,2	S	R max.	C min.	
mm						–
14	9,1	2,2	2,45	0,5	3	**GH 14x9.1x2.2-AD1**
18	10,5	3,2	3,75	0,5	5	**GH 18x10.5x3.2-AD1**
20	12,5	3,2	3,75	0,5	5	• **GH 20x12.5x3.2-AD1**
	15,1	2,2	2,45	0,5	3	**GH 20x15,1x2.2-AD1**
22	14,5	3,2	3,75	0,5	5	**GH 22x14.5x3.2-AD1**
25	17,5	3,2	3,75	0,5	5	• **GH 25x17.5x3.2-AD1**
28	20,5	3,2	3,75	0,5	5	**GH 28x20.5x3.2-AD1**
30	22,5	3,2	3,75	0,5	5	**GH 30x22.5x3.2-AD1**
32	24,5	3,2	3,75	0,5	5	• **GH 32x24.5x3.2-AD1**
35	27,5	3,2	3,75	0,5	5	**GH 35x27.5x3.2-AD1**
36	28,5	3,2	3,75	0,5	5	**GH 36x28.5x3.2-AD1**
40	29	4,2	5,5	0,5	7	• **GH 40x29x4.2-AD1**
	32,5	3,2	3,75	0,5	5	• **GH 40x32.5x3.2-AD1**
45	34	4,2	5,5	0,5	7	**GH 45x34x4.2-AD1**
	37,5	3,2	3,75	0,5	5	**GH 45x37.5x3.2-AD1**
50	34,5	6,3	7,75	0,5	10	• **GH 50x34.5x6.3-AD1**
	39	4,2	5,5	0,5	7	• **GH 50x39x4.2-AD1**
60	49	4,2	5,5	0,5	7	**GH 60x49x4.2-AD1**
63	52	4,2	5,5	0,5	7	• **GH 63x52x4.2-AD1**
65	54	4,2	5,5	0,9	7	**GH 65x54x4.2-AD1**
70	59	4,2	5,5	0,9	7	**GH 70x59x4.2-AD1**

• Seal housing dimensions in accordance with ISO 7425-1

2.5 GH profile piston seals, metric sizes
D **75 – 200** mm



Maximum extrusion gap e

Radial depth S	e_{max} at 80 °C (175 °F) for pressures 160 bar	250 bar	400 bar
mm	mm		
2,45	0,35	0,25	0,15
3,75	0,35	0,25	0,15
5,5	0,4	0,3	0,2
7,75	0,5	0,35	0,25
10,5	0,6	0,45	0,35

For additional information → **page 34**

Dimensions						Designation
D H9	d h9	L +0,2	S	R max.	C min.	
mm						–
75	59,5	6,3	7,75	0,9	10	**GH 75x59.5x6.3-AD1**
	64	4,2	5,5	0,9	7	**GH 75x64x4.2-AD1**
80	64,5	6,3	7,75	0,9	10	• **GH 80x64.5x6.3-AD1**
	69	4,2	5,5	0,9	7	• **GH 80x69x4.2-AD1**
85	69,5	6,3	7,75	0,9	10	**GH 85x69.5x6.3-AD1**
	74	4,2	5,5	0,9	7	**GH 85x74x4.2-AD1**
90	74,5	6,3	7,75	0,9	10	**GH 90x74.5x6.3-AD1**
	79	4,2	5,5	0,9	7	**GH 90x79x4.2-AD1**
95	79,5	6,3	7,75	0,9	10	**GH 95x79.5x6.3-AD1**
	84	4,2	5,5	0,9	7	**GH 95x84x4.2-AD1**
100	79	8,1	10,5	0,9	12	**GH 100x79x8.1-AD1**
	84,5	6,3	7,75	0,9	10	• **GH 100x84.5x6.3-AD1**
105	89,5	6,3	7,75	0,9	10	**GH 105x89.5x6.3-AD1**
110	94,5	6,3	7,75	0,9	10	**GH 110x94.5x6.3-AD1**
115	99,5	6,3	7,75	0,9	10	**GH 115x99.5x6.3-AD1**
120	104,5	6,3	7,75	0,9	10	**GH 120x104.5x6.3-AD1**
125	104	8,1	10,5	0,9	12	• **GH 125x104x8.1-AD1**
	109,5	6,3	7,75	0,9	10	• **GH 125x109.5x6.3-AD1**
130	109	8,1	10,5	0,9	12	**GH 130x109x8.1-AD1**
	114,5	6,3	7,75	0,9	10	**GH 130x114.5x6.3-AD1**
140	119	8,1	10,5	0,9	12	**GH 140x119x8.1-AD1**
	124,5	6,3	7,75	0,9	10	**GH 140x124.5x6.3-AD1**
150	129	8,1	10,5	0,9	12	**GH 150x129x8.1-AD1**
	134,5	6,3	7,75	0,9	10	**GH 150x134.5x6.3-AD1**

• Seal housing dimensions in accordance with ISO 7425-1

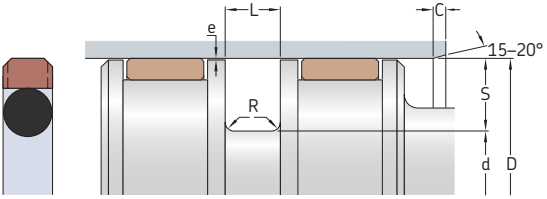
Dimensions						Designation
D H9	d h9	L +0,2	S	R max.	C min.	
mm						–
160	139	8,1	10,5	0,9	12	• **GH 160x139x8.1-AD1**
	144,5	6,3	7,75	0,9	10	• **GH 160x144.5x6.3-AD1**
170	149	8,1	10,5	0,9	12	**GH 170x149x8.1-AD1**
180	159	8,1	10,5	0,9	12	**GH 180x159x8.1-AD1**
190	169	8,1	10,5	0,9	12	**GH 190x169x8.1-AD1**
200	179	8,1	10,5	0,9	12	• **GH 200x179x8.1-AD1**

Other sizes are available on request

• Seal housing dimensions in accordance with ISO 7425-1

2.5 GH profile piston seals, inch sizes

D **0.5 – 2.375** in.



Maximum extrusion gap e

Radial depth S	Series	e_{max} at 80 °C (175 °F) for pressures 2 300 psi	3 600 psi	5 800 psi
in.	–	in.		
0.087	0A	0.014	0.01	0.006
0.13	0D	0.014	0.01	0.006
0.149	1A	0.014	0.01	0.006
0.196	1D	0.015	0.011	0.007
0.212	2A	0.016	0.012	0.008
0.259	2D	0.018	0.013	0.009
0.308	3A	0.02	0.014	0.01
0.415	4A	0.024	0.018	0.014

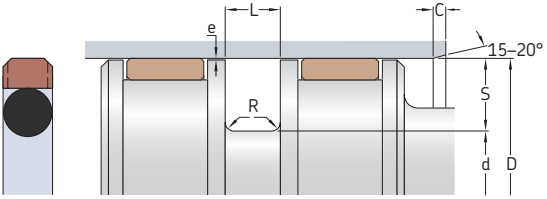
For additional information → **page 34**

Dimensions								Designation
D	Tolerance	d	Tolerance	L ±0.002	S	R max.	C min.	
in.								–
0.5	+0.002	0.24	±0.002	0.083	0.13	0.015	0.1	**GH0D-500-AD1**
	+0.002	0.326	±0.001	0.083	0.087	0.015	0.08	**GH0A-500-AD1**
0.562	+0.002	0.302	±0.002	0.083	0.13	0.015	0.1	**GH0D-562-AD1**
	+0.002	0.388	±0.001	0.083	0.087	0.015	0.08	**GH0A-562-AD1**
0.625	+0.002	0.365	±0.002	0.083	0.13	0.015	0.1	**GH0D-625-AD1**
	+0.002	0.451	±0.001	0.083	0.087	0.015	0.08	**GH0A-625-AD1**
0.687	+0.002	0.389	±0.001	0.128	0.149	0.015	0.125	**GH1A-687-AD1**
	+0.002	0.427	±0.002	0.083	0.13	0.015	0.1	**GH0D-687-AD1**
	+0.002	0.513	±0.001	0.083	0.087	0.015	0.08	**GH0A-687-AD1**
0.75	+0.002	0.452	±0.001	0.128	0.149	0.015	0.125	**GH1A-750-AD1**
	+0.002	0.49	±0.002	0.083	0.13	0.015	0.1	**GH0D-750-AD1**
	+0.002	0.576	±0.001	0.083	0.087	0.015	0.08	**GH0A-750-AD1**
0.812	+0.002	0.514	±0.001	0.128	0.149	0.015	0.125	**GH1A-812-AD1**
	+0.002	0.552	±0.002	0.083	0.13	0.015	0.1	**GH0D-812-AD1**
	+0.002	0.638	±0.001	0.083	0.087	0.015	0.08	**GH0A-812-AD1**
0.875	+0.002	0.577	±0.001	0.128	0.149	0.015	0.125	**GH1A-875-AD1**
	+0.002	0.615	±0.002	0.083	0.13	0.015	0.1	**GH0D-875-AD1**
	+0.002	0.701	±0.001	0.083	0.087	0.015	0.08	**GH0A-875-AD1**
0.937	+0.002	0.639	±0.001	0.128	0.149	0.015	0.125	**GH1A-937-AD1**
	+0.002	0.677	±0.002	0.083	0.13	0.015	0.1	**GH0D-937-AD1**
	+0.002	0.763	±0.001	0.083	0.087	0.015	0.08	**GH0A-937-AD1**
1	+0.002	0.702	±0.001	0.128	0.149	0.015	0.125	**GH1A-1000-AD1**
	+0.002	0.74	±0.002	0.083	0.13	0.015	0.1	**GH0D-1000-AD1**
	+0.002	0.826	±0.001	0.083	0.087	0.015	0.08	**GH0A-1000-AD1**
1.062	+0.002	0.764	±0.001	0.128	0.149	0.015	0.125	**GH1A-1062-AD1**
	+0.002	0.802	±0.002	0.083	0.13	0.015	0.1	**GH0D-1062-AD1**
	+0.002	0.888	±0.001	0.083	0.087	0.015	0.08	**GH0A-1062-AD1**
1.125	+0.002	0.827	±0.001	0.128	0.149	0.015	0.125	**GH1A-1125-AD1**
	+0.002	0.865	±0.002	0.083	0.13	0.015	0.1	**GH0D-1125-AD1**
	+0.002	0.951	±0.001	0.083	0.087	0.015	0.08	**GH0A-1125-AD1**

Dimensions								Designation
D	Tolerance	d	Tolerance	L ±0.002	S	R max.	C min.	
in.								–
1.187	+0.002	0.889	±0.001	0.128	0.149	0.015	0.125	**GH1A-1187-AD1**
	+0.002	0.927	±0.002	0.083	0.13	0.015	0.1	**GH0D-1187-AD1**
	+0.002	1.013	±0.001	0.083	0.087	0.015	0.08	**GH0A-1187-AD1**
1.25	+0.002	0.952	±0.001	0.128	0.149	0.015	0.125	**GH1A-1250-AD1**
	+0.002	0.99	±0.002	0.083	0.13	0.015	0.1	**GH0D-1250-AD1**
	+0.002	1.076	±0.001	0.083	0.087	0.015	0.08	**GH0A-1250-AD1**
1.312	+0.002	1.014	±0.001	0.128	0.149	0.015	0.125	**GH1A-1312-AD1**
	+0.002	1.052	±0.002	0.083	0.13	0.015	0.1	**GH0D-1312-AD1**
	+0.002	1.138	±0.001	0.083	0.087	0.015	0.08	**GH0A-1312-AD1**
1.375	+0.002	1.077	±0.001	0.128	0.149	0.015	0.125	**GH1A-1375-AD1**
	+0.002	1.115	±0.002	0.083	0.13	0.015	0.1	**GH0D-1375-AD1**
	+0.002	1.201	±0.001	0.083	0.087	0.015	0.08	**GH0A-1375-AD1**
1.437	+0.002	1.139	±0.001	0.128	0.149	0.015	0.125	**GH1A-1437-AD1**
	+0.002	1.177	±0.002	0.083	0.13	0.015	0.1	**GH0D-1437-AD1**
	+0.002	1.263	±0.001	0.083	0.087	0.015	0.08	**GH0A-1437-AD1**
1.5	+0.002	1.202	±0.001	0.128	0.149	0.015	0.125	**GH1A-1500-AD1**
	+0.002	1.24	±0.002	0.083	0.13	0.015	0.1	**GH0D-1500-AD1**
	+0.002	1.326	±0.001	0.083	0.087	0.015	0.08	**GH0A-1500-AD1**
1.562	+0.002	1.138	±0.002	0.168	0.212	0.015	0.14	**GH2A-1562-AD1**
	+0.002	1.17	±0.002	0.122	0.196	0.015	0.125	**GH1D-1562-AD1**
	+0.002	1.264	±0.001	0.128	0.149	0.015	0.125	**GH1A-1562-AD1**
1.625	+0.002	1.201	±0.002	0.168	0.212	0.015	0.14	**GH2A-1625-AD1**
	+0.002	1.233	±0.002	0.122	0.196	0.015	0.125	**GH1D-1625-AD1**
	+0.002	1.327	±0.001	0.128	0.149	0.015	0.125	**GH1A-1625-AD1**
1.687	+0.002	1.263	±0.002	0.168	0.212	0.015	0.14	**GH2A-1687-AD1**
	+0.002	1.295	±0.002	0.122	0.196	0.015	0.125	**GH1D-1687-AD1**
	+0.002	1.389	±0.001	0.128	0.149	0.015	0.125	**GH1A-1687-AD1**
1.75	+0.002	1.326	±0.002	0.168	0.212	0.015	0.14	**GH2A-1750-AD1**
	+0.002	1.358	±0.002	0.122	0.196	0.015	0.125	**GH1D-1750-AD1**
	+0.002	1.452	±0.001	0.128	0.149	0.015	0.125	**GH1A-1750-AD1**
1.812	+0.002	1.388	±0.002	0.168	0.212	0.015	0.14	**GH2A-1812-AD1**
	+0.002	1.42	±0.002	0.122	0.196	0.015	0.125	**GH1D-1812-AD1**
	+0.002	1.514	±0.001	0.128	0.149	0.015	0.125	**GH1A-1812-AD1**
1.875	+0.002	1.451	±0.002	0.168	0.212	0.015	0.14	**GH2A-1875-AD1**
	+0.002	1.483	±0.002	0.122	0.196	0.015	0.125	**GH1D-1875-AD1**
	+0.002	1.577	±0.001	0.128	0.149	0.015	0.125	**GH1A-1875-AD1**
1.937	+0.002	1.513	±0.002	0.168	0.212	0.015	0.14	**GH2A-1937-AD1**
	+0.002	1.545	±0.002	0.122	0.196	0.015	0.125	**GH1D-1937-AD1**
	+0.002	1.639	±0.001	0.128	0.149	0.015	0.125	**GH1A-1937-AD1**
2	+0.002	1.576	±0.002	0.168	0.212	0.015	0.14	**GH2A-2000-AD1**
	+0.002	1.608	±0.002	0.129	0.196	0.015	0.125	**GH1D-2000-AD1**
	+0.002	1.702	±0.001	0.128	0.149	0.015	0.125	**GH1A-2000-AD1**
2.125	+0.002	1.701	±0.002	0.168	0.212	0.015	0.14	**GH2A-2125-AD1**
	+0.002	1.733	±0.002	0.129	0.196	0.015	0.125	**GH1D-2125-AD1**
	+0.002	1.827	±0.001	0.128	0.149	0.015	0.125	**GH1A-2125-AD1**
2.25	+0.002	1.826	±0.002	0.168	0.212	0.015	0.14	**GH2A-2250-AD1**
	+0.002	1.858	±0.002	0.129	0.196	0.015	0.125	**GH1D-2250-AD1**
	+0.002	1.952	±0.001	0.128	0.149	0.015	0.125	**GH1A-2250-AD1**
2.375	+0.002	1.951	±0.002	0.168	0.212	0.015	0.14	**GH2A-2375-AD1**
	+0.002	1.983	±0.002	0.129	0.196	0.015	0.125	**GH1D-2375-AD1**
	+0.002	2.077	±0.001	0.128	0.149	0.015	0.125	**GH1A-2375-AD1**

2.5 GH profile piston seals, inch sizes

D **2.5 – 5.625** in.



Maximum extrusion gap e

Radial depth S	Series	e_{max} at 80 °C (175 °F) for pressures 2 300 psi	3 600 psi	5 800 psi
in.	–	in.		
0.087	0A	0.014	0.01	0.006
0.13	0D	0.014	0.01	0.006
0.149	1A	0.014	0.01	0.006
0.196	1D	0.015	0.011	0.007
0.212	2A	0.016	0.012	0.008
0.259	2D	0.018	0.013	0.009
0.308	3A	0.02	0.014	0.01
0.415	4A	0.024	0.018	0.014

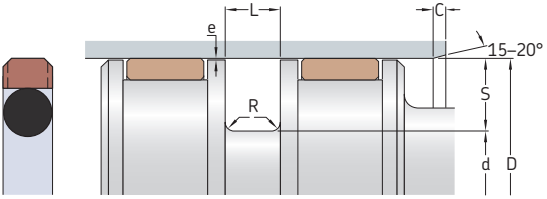
For additional information → **page 34**

Dimensions								Designation
D	Tolerance	d	Tolerance	L ±0.002	S	R max.	C min.	
in.								–
2.5	+0.002	2.076	±0.002	0.168	0.212	0.015	0.14	**GH2A-2500-AD1**
	+0.002	2.108	±0.002	0.129	0.196	0.015	0.125	**GH1D-2500-AD1**
	+0.002	2.202	±0.001	0.128	0.149	0.015	0.125	**GH1A-2500-AD1**
2.625	+0.002	2.201	±0.002	0.168	0.212	0.015	0.14	**GH2A-2625-AD1**
	+0.002	2.233	±0.002	0.129	0.196	0.015	0.125	**GH1D-2625-AD1**
	+0.002	2.327	±0.001	0.128	0.149	0.015	0.125	**GH1A-2625-AD1**
2.75	+0.002	2.326	±0.002	0.168	0.212	0.015	0.14	**GH2A-2750-AD1**
	+0.002	2.358	±0.002	0.129	0.196	0.015	0.125	**GH1D-2750-AD1**
	+0.002	2.452	±0.001	0.128	0.149	0.015	0.125	**GH1A-2750-AD1**
2.875	+0.002	2.451	±0.002	0.168	0.212	0.015	0.14	**GH2A-2875-AD1**
	+0.002	2.483	±0.002	0.129	0.196	0.015	0.125	**GH1D-2875-AD1**
	+0.002	2.577	±0.001	0.128	0.149	0.015	0.125	**GH1A-2875-AD1**
3	+0.002	2.576	±0.002	0.168	0.212	0.015	0.14	**GH2A-3000-AD1**
	+0.002	2.608	±0.002	0.129	0.196	0.015	0.125	**GH1D-3000-AD1**
	+0.002	2.702	±0.001	0.128	0.149	0.015	0.125	**GH1A-3000-AD1**
3.125	+0.002	2.509	±0.003	0.249	0.308	0.025	0.2	**GH3A-3125-AD1**
	+0.002	2.701	±0.002	0.168	0.212	0.015	0.14	**GH2A-3125-AD1**
	+0.003	2.733	±0.002	0.129	0.196	0.015	0.125	**GH1D-3125-AD1**
3.25	+0.002	2.634	±0.003	0.249	0.308	0.025	0.2	**GH3A-3250-AD1**
	+0.002	2.826	±0.002	0.168	0.212	0.015	0.14	**GH2A-3250-AD1**
	+0.003	2.858	±0.002	0.129	0.196	0.015	0.125	**GH1D-3250-AD1**
3.375	+0.002	2.759	±0.003	0.249	0.308	0.025	0.2	**GH3A-3375-AD1**
	+0.002	2.951	±0.002	0.168	0.212	0.015	0.14	**GH2A-3375-AD1**
	+0.003	2.983	±0.002	0.129	0.196	0.015	0.125	**GH1D-3375-AD1**
3.5	+0.002	2.884	±0.003	0.249	0.308	0.025	0.2	**GH3A-3500-AD1**
	+0.002	3.076	±0.002	0.168	0.212	0.015	0.14	**GH2A-3500-AD1**
	+0.003	3.108	±0.002	0.129	0.196	0.015	0.125	**GH1D-3500-AD1**
3.625	+0.002	3.009	±0.003	0.249	0.308	0.025	0.2	**GH3A-3625-AD1**
	+0.002	3.201	±0.002	0.168	0.212	0.015	0.14	**GH2A-3625-AD1**
	+0.003	3.233	±0.002	0.129	0.196	0.015	0.125	**GH1D-3625-AD1**

Dimensions								Designation
D	Tolerance	d	Tolerance	L ±0.002	S	R max.	C min.	
in.								–
3.75	+0.002	3.134	±0.003	0.249	0.308	0.025	0.2	**GH3A-3750-AD1**
	+0.002	3.326	±0.002	0.168	0.212	0.015	0.14	**GH2A-3750-AD1**
	+0.003	3.358	±0.002	0.129	0.196	0.015	0.125	**GH1D-3750-AD1**
3.875	+0.002	3.259	±0.003	0.249	0.308	0.025	0.2	**GH3A-3875-AD1**
	+0.002	3.451	±0.002	0.168	0.212	0.015	0.14	**GH2A-3875-AD1**
	+0.003	3.483	±0.002	0.129	0.196	0.015	0.125	**GH1D-3875-AD1**
4	+0.002	3.384	±0.003	0.249	0.308	0.025	0.2	**GH3A-4000-AD1**
	+0.002	3.576	±0.002	0.168	0.212	0.015	0.14	**GH2A-4000-AD1**
	+0.003	3.608	±0.002	0.129	0.196	0.015	0.125	**GH1D-4000-AD1**
4.125	+0.002	3.509	±0.003	0.249	0.308	0.025	0.2	**GH3A-4125-AD1**
	+0.002	3.701	±0.002	0.168	0.212	0.015	0.14	**GH2A-4125-AD1**
	+0.003	3.733	±0.002	0.129	0.196	0.015	0.125	**GH1D-4125-AD1**
4.25	+0.002	3.634	±0.003	0.249	0.308	0.025	0.2	**GH3A-4250-AD1**
	+0.002	3.826	±0.002	0.168	0.212	0.015	0.14	**GH2A-4250-AD1**
	+0.003	3.858	±0.002	0.129	0.196	0.015	0.125	**GH1D-4250-AD1**
4.375	+0.002	3.759	±0.003	0.249	0.308	0.025	0.2	**GH3A-4375-AD1**
	+0.002	3.951	±0.002	0.168	0.212	0.015	0.14	**GH2A-4375-AD1**
	+0.003	3.983	±0.002	0.129	0.196	0.015	0.125	**GH1D-4375-AD1**
4.5	+0.002	3.884	±0.003	0.249	0.308	0.025	0.2	**GH3A-4500-AD1**
	+0.002	4.076	±0.002	0.168	0.212	0.015	0.14	**GH2A-4500-AD1**
	+0.003	4.108	±0.002	0.129	0.196	0.015	0.125	**GH1D-4500-AD1**
4.625	+0.002	4.009	±0.003	0.249	0.308	0.025	0.2	**GH3A-4625-AD1**
	+0.002	4.201	±0.002	0.168	0.212	0.015	0.14	**GH2A-4625-AD1**
	+0.003	4.233	±0.002	0.129	0.196	0.015	0.125	**GH1D-4625-AD1**
4.75	+0.002	4.134	±0.003	0.249	0.308	0.025	0.2	**GH3A-4750-AD1**
	+0.002	4.326	±0.002	0.168	0.212	0.015	0.14	**GH2A-4750-AD1**
	+0.003	4.358	±0.002	0.129	0.196	0.015	0.125	**GH1D-4750-AD1**
4.875	+0.002	4.259	±0.003	0.249	0.308	0.025	0.2	**GH3A-4875-AD1**
	+0.002	4.451	±0.002	0.168	0.212	0.015	0.14	**GH2A-4875-AD1**
	+0.003	4.483	±0.002	0.129	0.196	0.015	0.125	**GH1D-4875-AD1**
5	+0.002	4.384	±0.003	0.249	0.308	0.025	0.2	**GH3A-5000-AD1**
	+0.002	4.576	±0.002	0.168	0.212	0.015	0.14	**GH2A-5000-AD1**
	+0.003	4.608	±0.002	0.129	0.196	0.015	0.125	**GH1D-5000-AD1**
5.125	+0.002	4.509	±0.003	0.249	0.308	0.025	0.2	**GH3A-5125-AD1**
	+0.002	4.701	±0.002	0.168	0.212	0.015	0.14	**GH2A-5125-AD1**
	+0.003	4.733	±0.002	0.129	0.196	0.015	0.125	**GH1D-5125-AD1**
5.25	+0.002	4.42	±0.004	0.322	0.415	0.035	0.25	**GH4A-5250-AD1**
	+0.002	4.634	±0.003	0.249	0.308	0.025	0.2	**GH3A-5250-AD1**
	+0.003	4.826	±0.002	0.168	0.212	0.015	0.14	**GH2A-5250-AD1**
	+0.003	4.858	±0.002	0.129	0.196	0.015	0.125	**GH1D-5250-AD1**
5.375	+0.002	4.545	±0.004	0.322	0.415	0.035	0.25	**GH4A-5375-AD1**
	+0.002	4.759	±0.003	0.249	0.308	0.025	0.2	**GH3A-5375-AD1**
	+0.003	4.951	±0.002	0.168	0.212	0.015	0.14	**GH2A-5375-AD1**
	+0.004	4.983	±0.002	0.129	0.196	0.015	0.125	**GH1D-5375-AD1**
5.5	+0.002	4.67	±0.004	0.322	0.415	0.035	0.25	**GH4A-5500-AD1**
	+0.002	4.884	±0.003	0.249	0.308	0.025	0.2	**GH3A-5500-AD1**
	+0.003	5.076	±0.002	0.168	0.212	0.015	0.14	**GH2A-5500-AD1**
	+0.004	5.108	±0.002	0.129	0.196	0.015	0.125	**GH1D-5500-AD1**
5.625	+0.003	4.795	±0.004	0.322	0.415	0.035	0.25	**GH4A-5625-AD1**
	+0.003	5.009	±0.003	0.249	0.308	0.025	0.2	**GH3A-5625-AD1**
	+0.004	5.107	±0.004	0.159	0.259	0.015	0.14	**GH2D-5625-AD1**

2.5 GH profile piston seals, inch sizes

D **5.75 – 16** in.



Maximum extrusion gap e

Radial depth S	Series	e_{max} at 80 °C *(175 °F)* for pressures 2 300 psi	3 600 psi	5 800 psi
in.	–	in.		
0.087	0A	0.014	0.01	0.006
0.13	0D	0.014	0.01	0.006
0.149	1A	0.014	0.01	0.006
0.196	1D	0.015	0.011	0.007
0.212	2A	0.016	0.012	0.008
0.259	2D	0.018	0.013	0.009
0.308	3A	0.02	0.014	0.01
0.415	4A	0.024	0.018	0.014

For additional information → **page 34**

Dimensions								Designation
D	Tolerance	d	Tolerance	L ±0.002	S	R max.	C min.	
in.								–
5.75	+0.003	4.92	±0.004	0.322	0.415	0.035	0.25	**GH4A-5750-AD1**
	+0.003	5.134	±0.003	0.249	0.308	0.025	0.2	**GH3A-5750-AD1**
	+0.004	5.232	±0.004	0.159	0.259	0.015	0.14	**GH2D-5750-AD1**
5.875	+0.003	5.045	±0.004	0.322	0.415	0.035	0.25	**GH4A-5875-AD1**
	+0.003	5.259	±0.003	0.249	0.308	0.025	0.2	**GH3A-5875-AD1**
	+0.004	5.357	±0.004	0.159	0.259	0.015	0.14	**GH2D-5875-AD1**
6	+0.003	5.17	±0.004	0.322	0.415	0.035	0.25	**GH4A-6000-AD1**
	+0.003	5.384	±0.003	0.249	0.308	0.025	0.2	**GH3A-6000-AD1**
	+0.004	5.482	±0.004	0.159	0.259	0.015	0.14	**GH2D-6000-AD1**
6.125	+0.003	5.295	±0.004	0.322	0.415	0.035	0.25	**GH4A-6125-AD1**
	+0.003	5.509	±0.003	0.249	0.308	0.025	0.2	**GH3A-6125-AD1**
	+0.004	5.607	±0.004	0.159	0.259	0.015	0.14	**GH2D-6125-AD1**
6.25	+0.003	5.42	±0.004	0.322	0.415	0.035	0.25	**GH4A-6250-AD1**
	+0.003	5.634	±0.003	0.249	0.308	0.025	0.2	**GH3A-6250-AD1**
	+0.004	5.732	±0.004	0.159	0.259	0.015	0.14	**GH2D-6250-AD1**
6.375	+0.003	5.545	±0.004	0.322	0.415	0.035	0.25	**GH4A-6375-AD1**
	+0.003	5.759	±0.003	0.249	0.308	0.025	0.2	**GH3A-6375-AD1**
	+0.004	5.857	±0.004	0.159	0.259	0.015	0.14	**GH2D-6375-AD1**
6.5	+0.003	5.67	±0.004	0.322	0.415	0.035	0.25	**GH4A-6500-AD1**
	+0.003	5.884	±0.003	0.249	0.308	0.025	0.2	**GH3A-6500-AD1**
	+0.004	5.982	±0.004	0.159	0.259	0.015	0.14	**GH2D-6500-AD1**
6.75	+0.003	5.92	±0.004	0.322	0.415	0.035	0.25	**GH4A-6750-AD1**
	+0.003	6.134	±0.003	0.249	0.308	0.025	0.2	**GH3A-6750-AD1**
	+0.004	6.232	±0.004	0.159	0.259	0.015	0.14	**GH2D-6750-AD1**
7	+0.003	6.17	±0.004	0.322	0.415	0.035	0.25	**GH4A-7000-AD1**
	+0.003	6.384	±0.003	0.249	0.308	0.025	0.2	**GH3A-7000-AD1**
	+0.004	6.482	±0.004	0.159	0.259	0.015	0.14	**GH2D-7000-AD1**
7.25	+0.003	6.42	±0.004	0.322	0.415	0.035	0.25	**GH4A-7250-AD1**
	+0.003	6.634	±0.003	0.249	0.308	0.025	0.2	**GH3A-7250-AD1**
	+0.004	6.732	±0.004	0.159	0.259	0.015	0.14	**GH2D-7250-AD1**

Dimensions								Designation
D	Tolerance	d	Tolerance	L ±0.002	S	R max.	C min.	
in.								–
7.5	+0.003	6.67	±0.004	0.322	0.415	0.035	0.25	**GH4A-7500-AD1**
	+0.003	6.884	±0.003	0.249	0.308	0.025	0.2	**GH3A-7500-AD1**
	+0.004	6.982	±0.004	0.159	0.259	0.015	0.14	**GH2D-7500-AD1**
7.75	+0.003	6.92	±0.004	0.322	0.415	0.035	0.25	**GH4A-7750-AD1**
	+0.003	7.134	±0.003	0.249	0.308	0.025	0.2	**GH3A-7750-AD1**
	+0.004	7.232	±0.004	0.159	0.259	0.015	0.14	**GH2D-7750-AD1**
8	+0.003	7.17	±0.004	0.322	0.415	0.035	0.25	**GH4A-8000-AD1**
	+0.003	7.384	±0.003	0.249	0.308	0.025	0.2	**GH3A-8000-AD1**
	+0.004	7.482	±0.004	0.159	0.259	0.015	0.14	**GH2D-8000-AD1**
8.25	+0.003	7.42	±0.004	0.322	0.415	0.035	0.25	**GH4A-8250-AD1**
	+0.003	7.634	±0.003	0.249	0.308	0.025	0.2	**GH3A-8250-AD1**
	+0.004	7.732	±0.004	0.159	0.259	0.015	0.14	**GH2D-8250-AD1**
8.5	+0.003	7.67	±0.004	0.322	0.415	0.035	0.25	**GH4A-8500-AD1**
	+0.003	7.884	±0.003	0.249	0.308	0.025	0.2	**GH3A-8500-AD1**
	+0.004	7.982	±0.004	0.159	0.259	0.015	0.14	**GH2D-8500-AD1**
8.75	+0.004	7.92	±0.004	0.322	0.415	0.035	0.25	**GH4A-8750-AD1**
9	+0.003	8.17	±0.004	0.322	0.415	0.035	0.25	**GH4A-9000-AD1**
	+0.003	8.384	±0.003	0.249	0.308	0.025	0.2	**GH3A-9000-AD1**
	+0.004	8.482	±0.004	0.159	0.259	0.015	0.14	**GH2D-9000-AD1**
9.5	+0.003	8.67	±0.004	0.322	0.415	0.035	0.25	**GH4A-9500-AD1**
	+0.003	8.884	±0.003	0.249	0.308	0.025	0.2	**GH3A-9500-AD1**
	+0.004	8.982	±0.004	0.159	0.259	0.015	0.14	**GH2D-9500-AD1**
9.75	+0.004	8.92	±0.004	0.322	0.415	0.035	0.25	**GH4A-9750-AD1**
10	+0.003	9.17	±0.004	0.322	0.415	0.035	0.25	**GH4A-10000-AD1**
	+0.003	9.384	±0.003	0.249	0.308	0.025	0.2	**GH3A-10000-AD1**
	+0.004	9.482	±0.004	0.159	0.259	0.015	0.14	**GH2D-10000-AD1**
10.5	+0.003	9.67	±0.004	0.322	0.415	0.035	0.25	**GH4A-10500-AD1**
	+0.003	9.884	±0.003	0.249	0.308	0.025	0.2	**GH3A-10500-AD1**
	+0.004	9.982	±0.004	0.159	0.259	0.015	0.14	**GH2D-10500-AD1**
11	+0.003	10.17	±0.004	0.322	0.415	0.035	0.25	**GH4A-11000-AD1**
	+0.003	10.384	±0.003	0.249	0.308	0.025	0.2	**GH3A-11000-AD1**
	+0.004	10.482	±0.004	0.159	0.259	0.015	0.14	**GH2D-11000-AD1**
11.5	+0.003	10.67	±0.004	0.322	0.415	0.035	0.25	**GH4A-11500-AD1**
	+0.003	10.884	±0.003	0.249	0.308	0.025	0.2	**GH3A-11500-AD1**
	+0.004	10.982	±0.004	0.159	0.259	0.015	0.14	**GH2D-11500-AD1**
12	+0.003	11.17	±0.004	0.322	0.415	0.035	0.25	**GH4A-12000-AD1**
	+0.003	11.384	±0.003	0.249	0.308	0.025	0.2	**GH3A-12000-AD1**
	+0.004	11.482	±0.004	0.159	0.259	0.015	0.14	**GH2D-12000-AD1**
12.5	+0.004	11.67	±0.004	0.322	0.415	0.035	0.25	**GH4A-12500-AD1**
13	+0.004	12.17	±0.004	0.322	0.415	0.035	0.25	**GH4A-13000-AD1**
13.5	+0.004	12.67	±0.004	0.322	0.415	0.035	0.25	**GH4A-13500-AD1**
14	+0.004	13.17	±0.004	0.322	0.415	0.035	0.25	**GH4A-14000-AD1**
14.5	+0.004	13.67	±0.004	0.322	0.415	0.035	0.25	**GH4A-14500-AD1**
15	+0.004	14.17	±0.004	0.322	0.415	0.035	0.25	**GH4A-15000-AD1**
15.5	+0.004	14.67	±0.004	0.322	0.415	0.035	0.25	**GH4A-15500-AD1**
16	+0.003	15.17	±0.004	0.322	0.415	0.035	0.25	**GH4A-16000-AD1**

Other sizes are available on request

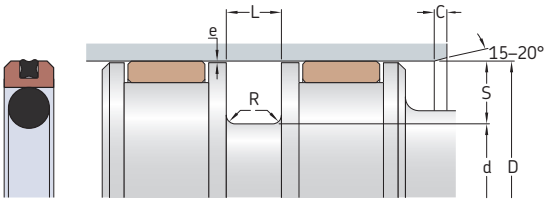
APR profile data

Material codes	Slide ring: 741 X-ring and energizer: A-8501 For additional information → **page 26**
Pressure	Up to 350 bar *(5 075 psi)*
Speed	Up to 1 m/s *(3.2 ft/s)*
Temperature range	 For temperature limits depending on fluid compatibility → **table 8, page 32** Extreme low temperature range: may be intermittently exposed (e.g. cold start-up) without seal damage, but seal performance may be compromised while in this range Temperatures below the recommended operating range: seal performance depends on system design (precision guiding arrangement recommended) **Recommended operating temperature range for this profile and material** Temperatures above the recommended operating range: acceptable only with reduced pressure, speed, and/or e-gap Extreme high temperature range: only occasional short-term exposure (e.g. cylinder in curing oven of a powder coating process)
Dimension standards	Some metric sizes fit seal housings in accordance with ISO 7425-1.
Counter-surface	→ **page 22**

Maximum values of application parameters (e.g. pressure, speed, temperature, e-gap) should not be applied continuously nor simultaneously.

2.6 APR profile piston seals, metric sizes

D **20 – 90** mm



Maximum extrusion gap e

Radial depth S	e_{max} at 80 °C (175 °F) for pressures 70 bar	200 bar	350 bar
mm	mm		
5,5	0,46	0,15	0,1
7,75	0,6	0,2	0,13
10,5	0,76	0,25	0,15

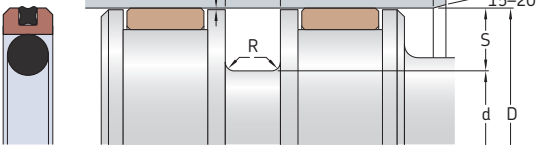
For additional information → **page 34**

Dimensions						Designation
D H9	d h9	L +0,2	S	R max.	C min.	
mm						–
20	9	4,2	5,5	0,4	3	**APR-20x9x4.2-AD1**
22	11	4,2	5,5	0,4	3	**APR-22x11x4.2-AD1**
25	14	4,2	5,5	0,4	3	• **APR-25x14x4.2-AD1**
28	17	4,2	5,5	0,4	3	**APR-28x17x4.2-AD1**
30	19	4,2	5,5	0,4	3	**APR-30x19x4.2-AD1**
35	24	4,2	5,5	0,4	3	**APR-35x24x4.2-AD1**
40	29	4,2	5,5	0,4	3	• **APR-40x29x4.2-AD1**
42	31	4,2	5,5	0,4	3	**APR-42x31x4.2-AD1**
45	34	4,2	5,5	0,4	3	**APR-45x34x4.2-AD1**
50	39	4,2	5,5	0,4	3	• **APR-50x39x4.2-AD1**
55	44	4,2	5,5	0,4	3	**APR-55x44x4.2-AD1**
60	49	4,2	5,5	0,4	3	**APR-60x49x4.2-AD1**
63	52	4,2	5,5	0,4	3	• **APR-63x52x4.2-AD1**
65	54	4,2	5,5	0,4	3	**APR-65x54x4.2-AD1**
70	59	4,2	5,5	0,4	3	**APR-70x59x4.2-AD1**
75	64	4,2	5,5	0,4	3	**APR-75x64x4.2-AD1**
80	69	4,2	5,5	0,4	3	• **APR-80x69x4.2-AD1**
85	69,5	6,3	7,75	0,6	4	**APR-85x69.5x6.3-AD1**
90	74,5	6,3	7,75	0,6	4	**APR-90x74.5x6.3-AD1**

• Seal housing dimensions in accordance with ISO 7425-1

2.6 APR profile piston seals, metric sizes

D **95 – 190** mm



Maximum extrusion gap e

Radial depth S	e_{max} at 80 °C (175 °F) for pressures 70 bar	200 bar	350 bar
mm	mm		
5,5	0,46	0,15	0,1
7,75	0,6	0,2	0,13
10,5	0,76	0,25	0,15

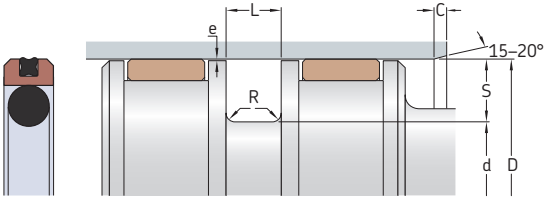
For additional information → **page 34**

Dimensions						Designation
D H9	d h9	L +0,2	S	R max.	C min.	
mm						–
95	79,5	6,3	7,75	0,6	4	**APR-95x79.5x6.3-AD1**
100	84,5	6,3	7,75	0,6	4	• **APR-100x84.5x6.3-AD1**
105	89,5	6,3	7,75	0,6	4	**APR-105x89.5x6.3-AD1**
110	94,5	6,3	7,75	0,6	4	**APR-110x94.5x6.3-AD1**
115	99,5	6,3	7,75	0,6	4	**APR-115x99.5x6.3-AD1**
120	104,5	6,3	7,75	0,6	4	**APR-120x104.5x6.3-AD1**
125	109,5	6,3	7,75	0,6	4	• **APR-125x109.5x6.3-AD1**
130	114,5	6,3	7,75	0,6	4	**APR-130x114.5x6.3-AD1**
132	116,5	6,3	7,75	0,6	4	**APR-132x116.5x6.3-AD1**
135	119,5	6,3	7,75	0,6	4	**APR-135x119.5x6.3-AD1**
140	124,5	6,3	7,75	0,6	4	**APR-140x124.5x6.3-AD1**
145	129,5	6,3	7,75	0,6	4	**APR-145x129.5x6.3-AD1**
150	134,5	6,3	7,75	0,6	4	**APR-150x134.5x6.3-AD1**
155	139,5	6,3	7,75	0,6	4	**APR-155x139.5x6.3-AD1**
160	139	8,1	10,5	0,75	4	• **APR-160x139x8.1-AD1**
165	144	8,1	10,5	0,75	4	**APR-165x144x8.1-AD1**
170	149	8,1	10,5	0,75	4	**APR-170x149x8.1-AD1**
175	154	8,1	10,5	0,75	4	**APR-175x154x8.1-AD1**
180	159	8,1	10,5	0,75	4	**APR-180x159x8.1-AD1**
190	169	8,1	10,5	0,75	4	**APR-190x169x8.1-AD1**
	Other sizes are available on request					

• Seal housing dimensions in accordance with ISO 7425-1

2.6 APR profile piston seals, inch sizes

D **1 – 6** in.



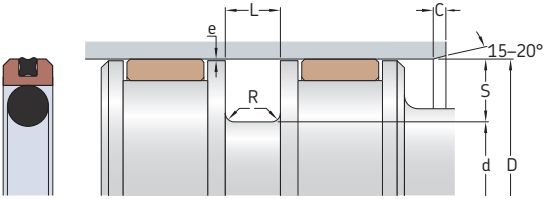
Maximum extrusion gap e

Radial depth S	Series	e_{max} at 80 °C *(175 °F)* for pressures 1 000 psi	3 000 psi	5 075 psi
in.	–	in.		
0.212	APR2	0.018	0.006	0.004
0.308	APR3	0.024	0.008	0.005
0.42	APR4	0.03	0.01	0.006
0.46	APR5	0.03	0.01	0.006

For additional information → **page 34**

Dimensions								Designation
D	Tolerance	d	Tolerance	L +0.005	S	R max.	C min.	
in.								–
1	+0.003	0.576	–0.003	0.21	0.212	0.015	0.156	**APR2-1000-AD1**
1.25	+0.003	0.826	–0.003	0.21	0.212	0.015	0.156	**APR2-1250-AD1**
1.5	+0.003	1.076	–0.003	0.21	0.212	0.015	0.156	**APR2-1500-AD1**
1.75	+0.003	1.326	–0.003	0.21	0.212	0.015	0.156	**APR2-1750-AD1**
2	+0.003	1.576	–0.003	0.21	0.212	0.015	0.156	**APR2-2000-AD1**
2.25	+0.004	1.634	–0.004	0.288	0.308	0.025	0.187	**APR3-2250-AD1**
2.5	+0.004	1.884	–0.004	0.288	0.308	0.025	0.187	**APR3-2500-AD1**
2.75	+0.004	2.134	–0.004	0.288	0.308	0.025	0.187	**APR3-2750-AD1**
3	+0.004	2.384	–0.004	0.288	0.308	0.025	0.187	**APR3-3000-AD1**
3.25	+0.004	2.634	–0.004	0.288	0.308	0.025	0.187	**APR3-3250-AD1**
3.5	+0.004	2.884	–0.004	0.288	0.308	0.025	0.187	**APR3-3500-AD1**
3.75	+0.004	3.134	–0.004	0.288	0.308	0.025	0.187	**APR3-3750-AD1**
4	+0.004	3.384	–0.004	0.288	0.308	0.025	0.187	**APR3-4000-AD1**
4.25	+0.004	3.634	–0.004	0.288	0.308	0.025	0.187	**APR3-4250-AD1**
4.5	+0.004	3.884	–0.004	0.288	0.308	0.025	0.187	**APR3-4500-AD1**
4.75	+0.004	4.134	–0.004	0.288	0.308	0.025	0.187	**APR3-4750-AD1**
5	+0.004	4.384	–0.004	0.288	0.308	0.025	0.187	**APR3-5000-AD1**
5.25	+0.004	4.634	–0.004	0.288	0.308	0.025	0.187	**APR3-5250-AD1**
5.5	+0.005	4.66	–0.005	0.375	0.42	0.035	0.25	**APR4-5500-AD1**
5.75	+0.005	4.91	–0.005	0.375	0.42	0.035	0.25	**APR4-5750-AD1**
6	+0.005	5.16	–0.005	0.375	0.42	0.035	0.25	**APR4-6000-AD1**

2.6 APR profile piston seals, inch sizes
D **6.25 – 14** in.



Maximum extrusion gap e

Radial depth S	Series	e_{max} at 80 °C (175 °F) for pressures 1 000 psi	3 000 psi	5 075 psi
in.	–	in.		
0.212	APR2	0.018	0.006	0.004
0.308	APR3	0.024	0.008	0.005
0.42	APR4	0.03	0.01	0.006
0.46	APR5	0.03	0.01	0.006

For additional information → **page 34**

Dimensions								Designation
D	Tolerance	d	Tolerance	L +0.005	S	R max.	C min.	
in.								–
6.25	+0.005	5.41	–0.005	0.375	0.42	0.035	0.25	**APR4-6250-AD1**
6.5	+0.005	5.66	–0.005	0.375	0.42	0.035	0.25	**APR4-6500-AD1**
6.75	+0.005	5.91	–0.005	0.375	0.42	0.035	0.25	**APR4-6750-AD1**
7	+0.005	6.16	–0.005	0.375	0.42	0.035	0.25	**APR4-7000-AD1**
7.25	+0.005	6.41	–0.005	0.375	0.42	0.035	0.25	**APR4-7250-AD1**
7.5	+0.005	6.66	–0.005	0.375	0.42	0.035	0.25	**APR4-7500-AD1**
7.75	+0.005	6.91	–0.005	0.375	0.42	0.035	0.25	**APR4-7750-AD1**
8	+0.006	7.16	–0.006	0.375	0.42	0.035	0.25	**APR4-8000-AD1**
8.5	+0.006	7.66	–0.006	0.375	0.42	0.035	0.25	**APR4-8500-AD1**
9	+0.006	8.16	–0.006	0.375	0.42	0.035	0.25	**APR4-9000-AD1**
9.5	+0.006	8.66	–0.006	0.375	0.42	0.035	0.25	**APR4-9500-AD1**
10	+0.006	9.16	–0.006	0.375	0.42	0.035	0.25	**APR4-10000-AD1**
10.5	+0.008	9.58	–0.008	0.375	0.46	0.035	0.25	**APR5-10500-AD1**
11	+0.008	10.08	–0.008	0.375	0.46	0.035	0.25	**APR5-11000-AD1**
11.5	+0.008	10.58	–0.008	0.375	0.46	0.035	0.25	**APR5-11500-AD1**
12	+0.008	11.08	–0.008	0.375	0.46	0.035	0.25	**APR5-12000-AD1**
12.5	+0.008	11.58	–0.008	0.375	0.46	0.035	0.25	**APR5-12500-AD1**
13	+0.008	12.08	–0.008	0.375	0.46	0.035	0.25	**APR5-13000-AD1**
13.5	+0.008	12.58	–0.008	0.375	0.46	0.035	0.25	**APR5-13500-AD1**
14	+0.008	13.08	–0.008	0.375	0.46	0.035	0.25	**APR5-14000-AD1**

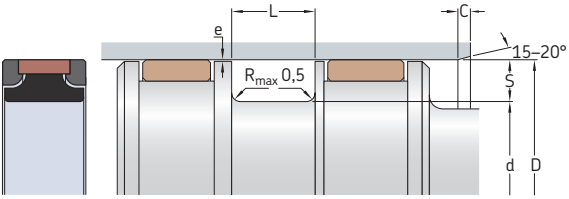
Other sizes are available on request

LCP profile data

Material codes	Slide ring: 741 Energizer: A-8501 Anti-extrusion rings: P-2506 For additional information → **page 26**
Pressure	Up to 690 bar *(10 000 psi)*
Speed	Up to 1,5 m/s *(4.9 ft/s)*
Temperature range	 For temperature limits depending on fluid compatibility → **table 8, page 32** Extreme low temperature range: may be intermittently exposed (e.g. cold start-up) without seal damage, but seal performance may be compromised while in this range Temperatures below the recommended operating range: seal performance depends on system design (precision guiding arrangement recommended) **Recommended operating temperature range for this profile and material** Temperatures above the recommended operating range: acceptable only with reduced pressure and/or speed Extreme high temperature range: only occasional short-term exposure
Dimension standards	Some metric sizes fit seal housings in accordance with ISO 5597.
Counter-surface	→ **page 22**

Maximum values of application parameters (e.g. pressure, speed, temperature, e-gap) should not be applied continuously nor simultaneously.

2.7 LCP profile piston seals, metric sizes
D **25 – 200** mm



Maximum extrusion gap e

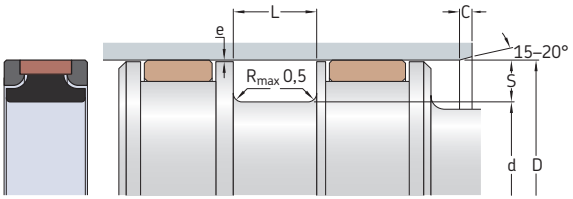
Radial depth S	e_{max} at 80 °C (175 °F) for pressures 160 bar	250 bar	400 bar	690 bar
mm	mm			
5	0,7	0,45	0,25	0,15
6,15	0,7	0,45	0,25	0,15
7,5	1	0,65	0,4	0,2
9,25	1,4	0,9	0,55	0,25
10	1,4	0,9	0,55	0,25

For additional information → **page 34**

Dimensions					Designation
D H9	d h9	L +0,2	S	C min.	
mm					–
25	15	8	5	4	• **LCP-25x15x8-ND1**
32	22	8	5	4	• **LCP-32x22x8-ND1**
40	30	8	5	4	• **LCP-40x30x8-ND1**
50	40	8	5	4	• **LCP-50x40x8-ND1**
60	50	8	5	4	**LCP-60x50x8-ND1**
80	65	12,5	7,5	5	• **LCP-80x65x12.5-ND1**
90	75	12,5	7,5	5	**LCP-90x75x12.5-ND1**
100	85	12,5	7,5	5	• **LCP-100x85x12.5-ND1**
110	95	12,5	7,5	5	**LCP-110x95x12.5-ND1**
	97,7	14,7	6,15	5	**LCP-110x97.7x14.7-ND1**
120	105	12,5	7,5	6,5	**LCP-120x105x12.5-ND1**
125	110	12,5	7,5	6,5	**LCP-125x110x12.5-ND1**
140	121,5	19	9,25	6,5	**LCP-140x121.5x19-ND1**
	125	12,5	7,5	6,5	**LCP-140x125x12.5-ND1**
150	135	12,5	7,5	6,5	**LCP-150x135x12.5-ND1**
160	141,5	19	9,25	6,5	**LCP-160x141.5x19-ND1**
	145	12,5	7,5	6,5	**LCP-160x145x12.5-ND1**
170	155	12,5	7,5	6,5	**LCP-170x155x12.5-ND1**
180	165	12,5	7,5	6,5	**LCP-180x165x12.5-ND1**
200	180	16	10	6,5	**LCP-200x180x16-ND1**
	181,5	19	9,25	6,5	**LCP-200x181.5x19-ND1**

• Seal housing dimensions in accordance with ISO 5597

2.7 LCP profile piston seals, metric sizes
D **250 – 290** mm



Maximum extrusion gap e

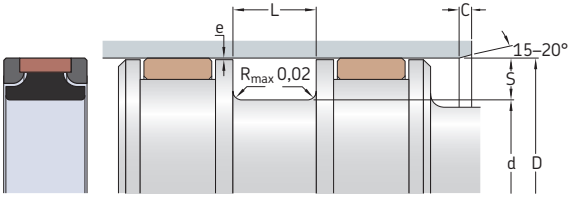
Radial depth S	**e_{max} at 80 °C (*175 °F*) for pressures** 160 bar	250 bar	400 bar	690 bar
mm	mm			
5	0,7	0,45	0,25	0,15
6,15	0,7	0,45	0,25	0,15
7,5	1	0,65	0,4	0,2
9,25	1,4	0,9	0,55	0,25
10	1,4	0,9	0,55	0,25

For additional information → **page 34**

Dimensions					**Designation**
D H9	d h9	L +0,2	S	C min.	
mm					–
250	230	16	10	6,5	**LCP-250x230x16-ND1**
290	270	16	10	7,5	**LCP-290x270x16-ND1**

Other sizes are available on request

2.7 LCP profile piston seals, inch sizes
D **3 – 16** in.



Maximum extrusion gap e

Radial depth S	Series	e_{max} at 80 °C (175 °F) for pressures 2 300 psi	3 600 psi	5 800 psi	10 000 psi
in.	–	in.			
0.187	LCP3	0.026	0.017	0.01	0.006
0.24	LCP4	0.04	0.025	0.016	0.009
0.365	LCP6	0.053	0.034	0.021	0.012
0.42	LCP8	0.067	0.043	0.027	0.015

For additional information → **page 34**

Dimensions							Designation
D	Tolerance	d	Tolerance	L +0.01	S	C min.	
in.							–
3	+0.003	2.52	–0.003	0.579	0.24	0.2	**LCP4-3000-ND1**
4	+0.003	3.52	–0.003	0.579	0.24	0.2	**LCP4-4000-ND1**
4.5	+0.003	4.02	–0.003	0.579	0.24	0.2	**LCP4-4500-ND1**
5	+0.004	4.27	–0.004	0.75	0.365	0.25	**LCP6-5000-ND1**
5.5	+0.004	4.77	–0.004	0.75	0.365	0.25	**LCP6-5500-ND1**
6	+0.004	5.27	–0.004	0.75	0.365	0.25	**LCP6-6000-ND1**
7	+0.004	6.27	–0.004	0.75	0.365	0.25	**LCP6-7000-ND1**
8	+0.004	7.27	–0.004	0.75	0.365	0.25	**LCP6-8000-ND1**
9	+0.004	8.27	–0.004	0.75	0.365	0.25	**LCP6-9000-ND1**
10	+0.004	9.27	–0.004	0.75	0.365	0.25	**LCP6-10000-ND1**
13	+0.004	12.27	–0.004	0.75	0.365	0.25	**LCP6-13000-ND1**
14	+0.004	13.27	–0.004	0.75	0.365	0.25	**LCP6-14000-ND1**
16	+0.004	15.27	–0.004	0.75	0.365	0.25	**LCP6-16000-ND1**

Other sizes are available on request

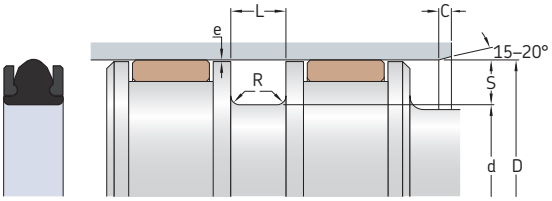
LTP profile data

Material codes	Sealing ring: A-8501 Anti-extrusion rings: P-2506 For additional information → **page 26**
Pressure	Up to 345 bar (*5 000 psi*)
Speed	Pressure ≤ 250 bar (*3 625 psi*) → up to 1 m/s (*3.2 ft/s*) Pressure > 250 bar (*3 625 psi*) → up to 0,5 m/s (*1.6 ft/s*)
Temperature range	 For temperature limits depending on fluid compatibility → **table 8**, **page 32** Extreme low temperature range: may be intermittently exposed (e.g. cold start-up) without seal damage, but seal performance may be compromised while in this range Temperatures below the recommended operating range: seal performance depends on system design (precision guiding arrangement recommended) **Recommended operating temperature range for this profile and material** Temperatures above the recommended operating range: acceptable only with reduced pressure, speed, and/or e-gap Extreme high temperature range: only occasional short-term exposure (e.g. cylinder in curing oven of a powder coating process)
Counter-surface	→ **page 22**

Maximum values of application parameters (e.g. pressure, speed, temperature, e-gap) should not be applied continuously nor simultaneously.

2.8 LTP profile piston seals, inch sizes

D **0.625 – 2.875** in.



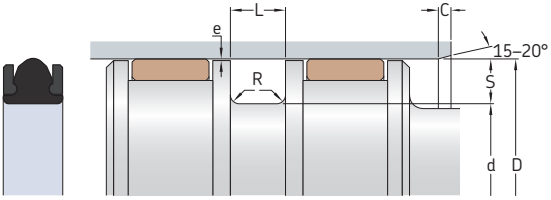
Maximum extrusion gap e

Radial depth S	Series	e_{max} at 80 °C *(175 °F)* for pressures 1 000 psi	3 000 psi	5 000 psi
in.	–	in.		
0.125	2	0.025	0.008	0.005
0.187	3	0.03	0.012	0.007
0.25	4	0.035	0.017	0.01

For additional information → **page 34**

Dimensions							Designation
D +0.002	d	Tolerance	L +0.005	S	R max.	C min.	
in.							–
0.625	0.383	–0.002	0.187	0.125	0.02	0.125	**LTP-204-E3R**
0.75	0.508	–0.002	0.187	0.125	0.02	0.125	**LTP-206-E3R**
0.875	0.633	–0.002	0.187	0.125	0.02	0.125	**LTP-208-E3R**
0.937	0.695	–0.002	0.187	0.125	0.02	0.125	**LTP-209-E3R**
1	0.758	–0.002	0.187	0.125	0.02	0.125	**LTP-210-E3R**
1.062	0.82	–0.002	0.187	0.125	0.02	0.125	**LTP-211-E3R**
1.125	0.883	–0.002	0.187	0.125	0.02	0.125	**LTP-212-E3R**
1.25	1.008	–0.002	0.187	0.125	0.02	0.125	**LTP-214-E3R**
1.375	1.133	–0.002	0.187	0.125	0.02	0.125	**LTP-216-E3R**
1.5	1.258	–0.002	0.187	0.125	0.02	0.125	**LTP-218-E3R**
1.625	1.383	–0.002	0.187	0.125	0.02	0.125	**LTP-220-E3R**
1.75	1.508	–0.002	0.187	0.125	0.02	0.125	**LTP-222-E3R**
1.875	1.505	–0.002	0.281	0.187	0.025	0.125	**LTP-325-E3R**
2	1.63	–0.002	0.281	0.187	0.025	0.125	**LTP-326-E3R**
2.125	1.755	–0.002	0.281	0.187	0.025	0.125	**LTP-327-E3R**
2.25	1.88	–0.002	0.281	0.187	0.025	0.125	**LTP-328-E3R**
2.375	2.005	–0.002	0.281	0.187	0.025	0.125	**LTP-329-E3R**
2.5	2.13	–0.002	0.281	0.187	0.025	0.125	**LTP-330-E3R**
2.625	2.255	–0.002	0.281	0.187	0.025	0.125	**LTP-331-E3R**
2.75	2.38	–0.002	0.281	0.187	0.025	0.125	**LTP-332-E3R**
2.875	2.505	–0.002	0.281	0.187	0.025	0.125	**LTP-333-E3R**

2.8 LTP profile piston seals, inch sizes
D **3 – 12.002** in.



Maximum extrusion gap e

Radial depth S	Series	e_{max} at 80 °C *(175 °F)* for pressures 1 000 psi	3 000 psi	5 000 psi
in.	–	in.		
0.125	2	0.025	0.008	0.005
0.187	3	0.03	0.012	0.007
0.25	4	0.035	0.017	0.01

For additional information → **page 34**

Dimensions							Designation
D +0.002	d	Tolerance	L +0.005	S	R max.	C min.	
in.							–
3	2.63	–0.002	0.281	0.187	0.025	0.125	**LTP-334-E3R**
3.125	2.755	–0.002	0.281	0.187	0.025	0.125	**LTP-335-E3R**
3.25	2.88	–0.002	0.281	0.187	0.025	0.125	**LTP-336-E3R**
3.5	3.13	–0.002	0.281	0.187	0.025	0.125	**LTP-338-E3R**
3.75	3.38	–0.002	0.281	0.187	0.025	0.125	**LTP-340-E3R**
3.875	3.505	–0.002	0.281	0.187	0.025	0.125	**LTP-341-E3R**
4	3.63	–0.002	0.281	0.187	0.025	0.125	**LTP-342-E3R**
4.125	3.755	–0.002	0.281	0.187	0.025	0.125	**LTP-343-E3R**
4.25	3.88	–0.002	0.281	0.187	0.025	0.125	**LTP-344-E3R**
4.5	4.13	–0.002	0.281	0.187	0.025	0.125	**LTP-346-E3R**
4.75	4.38	–0.002	0.281	0.187	0.025	0.125	**LTP-348-E3R**
4.875	4.505	–0.002	0.281	0.187	0.025	0.125	**LTP-349-E3R**
5	4.63	–0.002	0.281	0.187	0.025	0.125	**LTP-350-E3R**
5.252	4.778	–0.004	0.375	0.25	0.032	0.187	**LTP-427-E3R**
5.377	4.903	–0.004	0.375	0.25	0.032	0.187	**LTP-428-E3R**
5.502	5.028	–0.004	0.375	0.25	0.032	0.187	**LTP-429-E3R**
5.627	5.153	–0.004	0.375	0.25	0.032	0.187	**LTP-430-E3R**
5.752	5.278	–0.004	0.375	0.25	0.032	0.187	**LTP-431-E3R**
6.002	5.528	–0.004	0.375	0.25	0.032	0.187	**LTP-433-E3R**
6.377	6.028	–0.004	0.375	0.25	0.032	0.187	**LTP-437-E3R**
7.002	6.528	–0.004	0.375	0.25	0.032	0.187	**LTP-439-E3R**

Dimensions							Designation
D +0.002	d	Tolerance	L +0.005	S	R max.	C min.	
in.							–
7.752	7.278	–0.004	0.375	0.25	0.032	0.187	**LTP-442-E3R**
9.502	9.028	–0.004	0.375	0.25	0.032	0.187	**LTP-447-E3R**
10.002	9.528	–0.004	0.375	0.25	0.032	0.187	**LTP-448-E3R**
12.002	11.528	–0.004	0.375	0.25	0.032	0.187	**LTP-452-E3R**

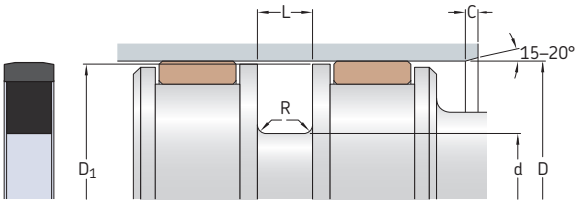
Other sizes are available on request

CUT profile data

Material codes	Slide ring: PA66/011 Energizer: N70/015 For additional information → **page 26**
Pressure	Up to 500 bar *(7 250 psi)*
Speed	Up to 1 m/s *(3.2 ft/s)*
Temperature range	 For temperature limits depending on fluid compatibility → **table 8, page 32** Extreme low temperature range: may be intermittently exposed (e.g. cold start-up) without seal damage, but seal performance may be compromised while in this range Temperatures below the recommended operating range: seal performance depends on system design (precision guiding arrangement recommended) **Recommended operating temperature range for this profile and material** Temperatures above the recommended operating range: acceptable only with reduced pressure and/or speed Extreme high temperature range: only occasional short-term exposure
Dimension standards	Some sizes fit seal housings in accordance with ISO 7425-1.
Counter-surface	→ **page 22**

Maximum values of application parameters (e.g. pressure, speed, temperature) should not be applied continuously nor simultaneously.

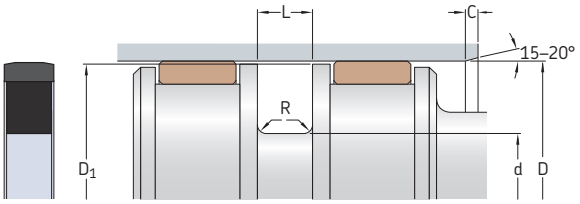
2.9 CUT profile piston seals, metric sizes
D **40 – 140** mm



Dimensions						Designation
D H9	d h9	L +0,2	D_1	R max.	C min.	
mm						–
40	29	4,2	39,2	0,3	7	• **CUT 40x29x4.2**
50	34,5	6,3	49	0,5	10	• **CUT 50x34.5x6.3**
	39	4,2	49,2	0,3	7	• **CUT 50x39x4.2**
60	41,7	7,0	59	0,5	10	**CUT 60x41.7x7.0**
63	44,7	7,0	62	0,5	10	**CUT 63x44.7x7**
	47,5	6,3	62	0,5	10	• **CUT 63x47.5x6.3**
65	49,5	6,3	64	0,5	10	**CUT 65x49.5x6.3**
70	51,7	7,0	69	0,5	10	**CUT 70x51.7x7**
75	54	8,1	73,8	0,9	12	**CUT 75x54x8.1**
	59,5	6,3	74	0,5	10	**CUT 75x59.5x6.3**
80	59	8,1	78,8	0,9	12	**CUT 80x59x8.1**
	64,5	6,3	79	0,5	10	• **CUT 80x64.5x6.3**
90	69	8,1	88,8	0,9	12	**CUT 90x69x8.1**
	74,5	6,3	89	0,5	10	**CUT 90x74.5x6.3**
100	79	8,1	98,8	0,9	12	**CUT 100x79x8.1**
	84,5	6,3	99	0,5	10	• **CUT 100x84.5x6.3**
110	89	8,1	108,8	0,9	12	**CUT 110x89x8.1**
115	94	8,1	113,8	0,9	12	**CUT 115x94x8.1**
120	99	8,1	118,8	0,9	12	**CUT 120x99x8.1**
125	104	8,1	123,8	0,9	12	• **CUT 125x104x8.1**
	109,5	6,3	124	0,5	10	• **CUT 125x109.5x6.3**
130	109	8,1	128,8	0,9	12	**CUT 130x109x8.1**
140	119	8,1	138,8	0,9	12	**CUT 140x119x8.1**

• Seal housing dimensions in accordance with ISO 7425-1

2.9 CUT profile piston seals, metric sizes
D **150 – 320** mm



Dimensions						Designation
D H9	d h9	L +0,2	D_1	R max.	C min.	
mm						–
150	129	8,1	148,8	0,9	12	**CUT 150x129x8.1**
160	139	8,1	158,8	0,9	12	• **CUT 160x139x8.1**
170	149	8,1	168,8	0,9	12	**CUT 170x149x8.1**
180	159	8,1	178,8	0,9	12	**CUT 180x159x8.1**
190	169	8,1	188,8	0,9	12	**CUT 190x169x8.1**
200	179	8,1	198,8	0,9	12	• **CUT 200x179x8.1**
210	189	8,1	198,8	0,9	12	**CUT 210x189x8.1**
220	199	8,1	218,8	0,9	12	**CUT 220x199x8.1**
230	209	8,1	228,8	0,9	12	**CUT 230x209x8.1**
240	219	8,1	238,8	0,9	12	**CUT 240x219x8.1**
	225	8,1	239	0,9	12	**CUT 240x225x8.1**
250	229	8,1	248,8	0,9	12	• **CUT 250x229x8.1**
260	239	8,1	258,8	0,9	12	**CUT 260x239x8.1**
280	255,5	8,1	278,8	0,9	12	**CUT 280x255.5x8.1**
320	292	9,5	318,4	0,9	15	**CUT 320x292x9.5**

Other sizes are available on request

• Seal housing dimensions in accordance with ISO 7425-1

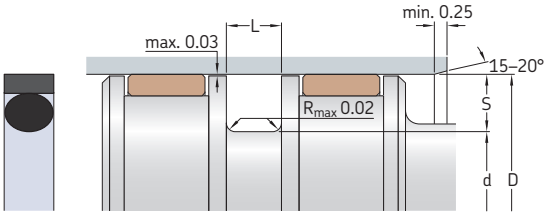
SCP profile data

Material codes	Slide ring: suffix E5E → P-2501 suffix E5D → P-2551 Energizer: A-8526 For additional information → **page 26**
Pressure	Up to 690 bar *(10 000 psi)*
Speed	Up to 1 m/s *(3.2 ft/s)*
Temperature range	 For temperature limits depending on fluid compatibility → **table 8, page 32** Extreme low temperature range: may be intermittently exposed (e.g. cold start-up) without seal damage, but seal performance may be compromised while in this range Temperatures below the recommended operating range: seal performance depends on system design (precision guiding arrangement recommended) **Recommended operating temperature range for this profile and material** Temperatures above the recommended operating range: acceptable only with reduced pressure and/or speed Extreme high temperature range: only occasional short-term exposure
Counter-surface	→ **page 22**

Maximum values of application parameters (e.g. pressure, speed, temperature) should not be applied continuously nor simultaneously.

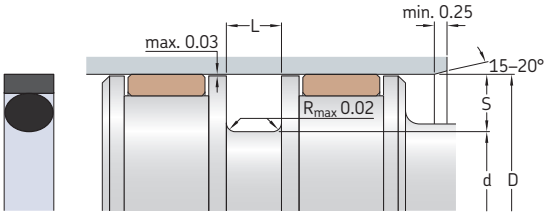
2.10 SCP profile piston seals, inch sizes

D **2 – 5.025** in.



Dimensions						Designation
D	Tolerance	d	Tolerance	L +0.005	S	
in.						–
2	+0.002	1.462	–0.002	0.282	0.269	**SCP1-2000-E5E**
2.25	+0.002	1.712	–0.002	0.282	0.269	**SCP1-2250-E5E**
2.5	+0.003	1.908	–0.002	0.312	0.296	**SCP5-2500-E5E**
	+0.003	1.962	–0.002	0.282	0.269	**SCP1-2500-E5E**
2.75	+0.003	2.212	–0.002	0.282	0.269	**SCP1-2750-E5D**
3	+0.003	2.408	–0.002	0.312	0.296	**SCP5-3000-E5E**
	+0.003	2.442	–0.003	0.282	0.279	**SCP2-3000-E5E**
3.25	+0.003	2.692	–0.003	0.282	0.279	**SCP2-3250-E5E**
3.5	+0.003	2.908	–0.003	0.312	0.296	**SCP5-3500-E5E**
	+0.003	2.942	–0.003	0.282	0.279	**SCP2-3500-E5E**
3.75	+0.003	3.192	–0.003	0.282	0.279	**SCP2-3750-E5D**
4	+0.003	3.408	–0.003	0.312	0.296	**SCP5-4000-E5E**
	+0.003	3.442	–0.003	0.282	0.279	**SCP2-4000-E5E**
4.025	+0.003	3.467	–0.003	0.282	0.279	**SCP2-4025-E5D**
4.25	+0.003	3.692	–0.003	0.282	0.279	**SCP2-4250-E5D**
4.265	+0.003	3.707	–0.003	0.282	0.279	**SCP2-4265-E5D**
4.5	+0.003	3.74	–0.003	0.377	0.38	**SCP3-4500-E5D**
	+0.003	3.908	–0.003	0.312	0.296	**SCP5-4500-E5E**
	+0.003	3.942	–0.003	0.282	0.279	**SCP2-4500-E5E**
4.525	+0.003	3.967	–0.003	0.282	0.279	**SCP2-4525-E5D**
4.75	+0.003	3.99	–0.004	0.377	0.38	**SCP3-4750-E5D**
	+0.003	4.192	–0.004	0.282	0.279	**SCP2-4750-E5E**
5	+0.004	4.24	–0.004	0.377	0.38	**SCP3-5000-E5E**
	+0.004	4.442	–0.004	0.282	0.279	**SCP2-5000-E5E**
5.025	+0.004	4.265	–0.004	0.377	0.38	**SCP3-5025-E5D**

2.10 SCP profile piston seals, inch sizes
D **5.25 – 12** in.



Dimensions						Designation
D	Tolerance	d	Tolerance	L +0.005	S	
in.						–
5.25	+0.004	4.49	–0.004	0.377	0.38	**SCP3-5250-E5D**
5.5	+0.004	4.74	–0.004	0.377	0.38	**SCP3-5500-E5E**
5.75	+0.004	4.99	–0.004	0.377	0.38	**SCP3-5750-E5D**
6	+0.004	5.24	–0.004	0.377	0.38	**SCP3-6000-E5E**
6.025	+0.004	5.265	–0.004	0.377	0.38	**SCP3-6025-E5D**
6.5	+0.004	5.74	–0.004	0.377	0.38	**SCP3-6500-E5D**
7	+0.004	6.24	–0.004	0.377	0.38	**SCP3-7000-E5E**
7.025	+0.004	6.265	–0.004	0.377	0.38	**SCP3-7025-E5D**
7.5	+0.004	6.74	–0.004	0.377	0.38	**SCP3-7500-E5D**
8	+0.004	7.24	–0.004	0.377	0.38	**SCP3-8000-E5D**
8.5	+0.004	7.74	–0.004	0.377	0.38	**SCP3-8500-E5D**
9	+0.004	8.124	–0.004	0.377	0.438	**SCP4-9000-E5D**
9.5	+0.004	8.624	–0.004	0.377	0.438	**SCP4-9500-E5D**
10	+0.004	9.124	–0.004	0.377	0.438	**SCP4-10000-E5D**
12	+0.004	11.124	–0.004	0.377	0.438	**SCP4-12000-E5D**

Other sizes are available on request

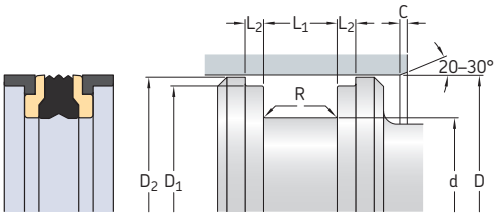
MD-L profile data

Material codes	Sealing ring: N80/047 Guide rings: POM/076 Support rings: TPC-ET72/075 For additional information → **page 26**
Pressure	Up to 250 bar *(3 625 psi)*
Speed	Up to 1 m/s *(3.2 ft/s)*
Temperature range	 For temperature limits depending on fluid compatibility → **table 8, page 32** Extreme low temperature range: may be intermittently exposed (e.g. cold start-up) without seal damage, but seal performance may be compromised while in this range Temperatures below the recommended operating range: seal performance depends on system design **Recommended operating temperature range for this profile and material** Temperatures above the recommended operating range: acceptable only with reduced pressure and/or speed Extreme high temperature range: only occasional short-term exposure (e.g. cylinder in curing oven of a powder coating process)
Dimension standards	Some sizes fit seal housings in accordance with ISO 6547.
Counter-surface	→ **page 22**

Maximum values of application parameters (e.g. pressure, speed, temperature) should not be applied continuously nor simultaneously.

2.11 MD-L profile piston seals, metric sizes

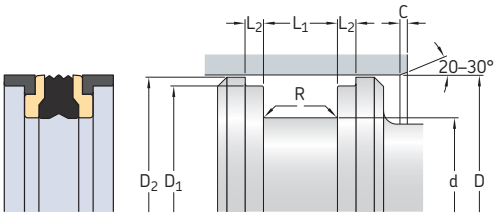
D **25 – 63** mm



Dimensions								Designation
D H9	d h9	L_1 +0,1/+0,35	L_2 +0,1	D_1 h9	D_2 h11	R max.	C min.	
mm								–
25	15	12,4	4	21	23	0,4	2,5	**MD 25x15x12.4-L**
30	21	13,5	2,1	27	29	0,4	2,5	**MD 30x21x13.5-L**
32	22	12,5	4	29	31	0,4	2,5	• **MD 32x22x12.5-L**
	24	10	4	29	31	0,4	2	• **MD 32x24x10-L**
	24	15,5	3,2	28	31,4	0,4	2	**MD 32x24x15.5-L**
35	25	15,5	2,6	31	34	0,4	2,5	**MD 35x25x15.5-L**
	25	16,4	6,4	31,4	33,5	0,4	2,5	**MD 35x25x16.4-L**
40	24	18,4	6,4	35,4	38,7	0,4	4	**MD 40x24x18.4-L**
	30	12,4	4	36	38	0,4	2,5	**MD 40x30x12.4-L**
	30	12,5	4	37	39	0,4	2,5	• **MD 40x30x12.5-L**
	30	16,4	6,4	35,4	38,7	0,4	2,5	**MD 40x30x16.4-L**
	32	15,5	3,2	36	39,4	0,4	2	**MD 40x32x15.5-L**
45	29	18,4	6,4	40,4	43,7	0,4	4	**MD 45x29x18.4-L**
	37	15,5	3,2	41,0	43,5	0,4	2	**MD 45x37x15.5-L**
50	34	18,4	6,4	45,4	48,7	0,4	4	**MD 50x34x18.4-L**
	35	20	5	46	48,5	0,4	4	• **MD 50x35x20-L**
	38	20,5	4,2	46	49,4	0,4	3	**MD 50x38x20.5-L**
	40	12,5	4	47	49	0,4	2,5	• **MD 50x40x12.5-L**
55	39	18,4	6,4	50,4	53,7	0,4	4	**MD 55x39x18.4-L**
	39	20,5	3,1	51	54	0,4	4	**MD 55x39x20.5-L**
	45	12,5	4	52	54	0,4	2,5	**MD 55x45x12.5-L**
60	44	18,4	6,4	55,4	58,7	0,4	4	**MD 60x44x18.4-L**
	48	20,5	4,2	56	59,4	0,4	3	**MD 60x48x20.5-L**
	50	17	4	56	59,4	0,4	2,5	**MD 60x50x17-L**
63	47	18,4	6,4	58,4	61,5	0,4	4	**MD 63x47x18.4-L**
	47	19,4	6,4	58,4	61,7	0,4	4	**MD 63x47x19.4-L**
	47	20,5	3,1	59	62	0,4	4	**MD 63x47x20.5-L**
	48	20	5,0	59	61,5	0,4	4	• **MD 63x48x20-L**
	51	20,5	4,2	59	62,4	0,4	3	**MD 63x51x20.5-L**
	53	12,5	4	60	62	0,4	2,5	• **MD 63x53x12.5-L**

• Dimensions in accordance with ISO 6547

2.11 MD-L profile piston seals, metric sizes
D **65 – 280** mm



Dimensions								Designation
D H9	d h9	L_1 +0,1/+0,35	L_2 +0,1	D_1 h9	D_2 h11	R max.	C min.	
mm								–
65	50	18,4	6,4	60,4	63,7	0,4	4	**MD 65x50x18.4-L**
70	50	22,4	6,4	64,2	68,3	0,8	5	**MD 70x50x22.4-L**
	54	20,5	3,1	66	69	0,4	4	**MD 70x54x20.5-L**
	55	20	5	66	68,5	0,4	4	**MD 70x55x20-L**
	58	20,5	4,2	66	69,4	0,4	3	**MD 70x58x20.5-L**
75	55	22,4	6,4	69,2	73,3	0,8	5	**MD 75x55x22.4-L**
80	60	22,4	6,4	74,2	78,3	0,8	5	**MD 80x60x22.4-L**
	60	25	6,3	75	78	0,8	5	• **MD 80x60x25-L**
	62	22,5	3,6	76	79	0,4	4,5	**MD 80x62x22.5-L**
	65	20	5	76	78,5	0,4	4	• **MD 80x65x20-L**
	66	22,5	5,2	76	79,4	0,4	3,5	**MD 80x66x22.5-L**
85	65	22,4	6,4	79,2	83,3	0,8	5	**MD 85x65x22.4-L**
90	70	22,4	6,4	84,2	88,3	0,8	5	**MD 90x70x22.4-L**
	72	22,5	3,6	86	89	0,4	4,5	**MD 90x72x22.5-L**
	75	20	5	86	88,5	0,4	4	**MD 90x75x20-L**
95	75	22,4	6,4	89	93,3	0,8	5	**MD 95x75x22.4-L**
100	75	22,4	6,4	93,2	98	0,8	6,5	**MD 100x75x22.4-L**
	80	25	6,3	95	98	0,8	5	• **MD 100x80x25-L**
	85	20	5	96	98,5	0,4	4	• **MD 100x85x20-L**
	86	22,5	5,2	96	99,4	0,4	3,5	**MD 100x86x22.5-L**
105	92,5	14,0	5,2	99,0	103,5	0,4	3,5	**MD 105x92.5x14-L**
110	85	22,4	6,4	103,1	108	0,8	6,5	**MD 110x85x22.4-L**
	85	25,4	6,4	103,1	108	0,8	6,5	**MD 110x85x25.4-L**
	95	20	5	106	108,5	0,4	4	**MD 110x95x20-L**
	96	22,5	5,2	106	109,4	0,4	3,5	**MD 110x96x22.5-L**
115	90	22,4	6,4	108,1	113	0,8	6,5	**MD 115x90x22.4-L**
120	95	22,4	6,4	113,1	118	0,8	6,5	**MD 120x95x22.4-L**

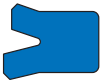
• Dimensions in accordance with ISO 6547

Dimensions								Designation
D H9	d h9	L_1 +0,1/+0,35	L_2 +0,1	D_1 h9	D_2 h11	R max.	C min.	
mm								–
125	100	25,4	6,4	118,1	123	0,8	6,5	**MD 125x100x25.4-L**
	100	32	10	119	123	0,8	6,5	• **MD 125x100x32-L**
	105	25	6,3	120	123	0,8	5	• **MD 125x105x25-L**
	105	25,4	6,4	119,1	123,3	0,8	5	**MD 125x105x25.4-L**
	108	26,5	7,2	121	124,4	0,4	4,5	**MD 125x108x26.5-L**
130	105	25,4	6,4	123,1	128	0,8	6,5	**MD 130x105x25.4-L**
	105	25,4	9,5	124,1	128,3	0,8	6,5	**MD 130x105x25.4x9.5-L**
140	115	25,4	6,4	133	138	0,8	6,5	**MD 140x115x25.4-L**
	115	25,4	9,5	132,6	137,5	0,8	6,5	**MD 140x115x25.4x9.5-L**
	120	25	6,3	135	138	0,8	5	**MD 140x120x25-L**
145	120	25,4	6,4	138,3	143	0,8	6,5	**MD 145x120x25.4-L**
150	125	25,4	6,4	143	148	0,8	6,5	**MD 150x125x25.4-L**
	125	25,4	9,5	142,6	147,5	0,8	6,5	**MD 150x125x25.4x9.5-L**
160	130	25,4	6,4	153	157,9	0,8	7,5	**MD 160x130x25.4-L**
	135	25,4	9,5	152,6	157,5	0,8	6,5	**MD 160x135x25.4x9.5-L**
	140	25	6,3	155	158	0,8	5	• **MD 160x140x25-L**
165	140	25,4	9,5	157,6	162,5	0,8	6,5	**MD 165x140x25.4x9.5-L**
170	145	25,4	12,7	161,7	167,1	0,8	6,5	**MD 170x145x25.4x12.7-L**
180	150	35,4	6,4	173	178	0,8	7,5	**MD 180x150x35.4-L**
	155	25,4	12,7	171,7	177,7	0,8	6,5	**MD 180x155x25.4x12.7-L**
190	165	25,4	12,7	181,7	187	0,8	6,5	**MD 190x165x25.4x12.7-L**
200	170	35,4	6,4	193	198	0,8	7,5	**MD 200x170x35.4-L**
	170	36	12,5	192	197	0,8	7,5	• **MD 200x170x36-L**
	175	25,4	12,7	192	197	0,8	6,5	**MD 200x175x25.4x12.7-L**
	180	31,5	9,2	196	199,4	0,8	5	**MD 200x180x31.5-L**
220	190	35,4	6,4	213	218	0,8	7,5	**MD 220x190x35.4-L**
	195	25,4	12,7	211,6	217	0,8	6,5	**MD 220x195x25.4x12.7-L**
230	205	25,4	12,7	221,6	227	0,8	6,5	**MD 230x205x25.4x12.7-L**
240	215	25,4	12,7	231,6	237	0,8	6,5	**MD 240x215x25.4x12.7-L**
250	220	35,4	6,4	243	248	0,8	7,5	**MD 250x220x35.4-L**
	225	25,4	12,7	241,6	247	0,8	6,5	**MD 250x225x25.4x12.7-L**
280	250	35,4	9,5	273	277	0,8	7,5	**MD 280x250x35.4x9.5-L**

Other sizes are available on request

• Dimensions in accordance with ISO 6547

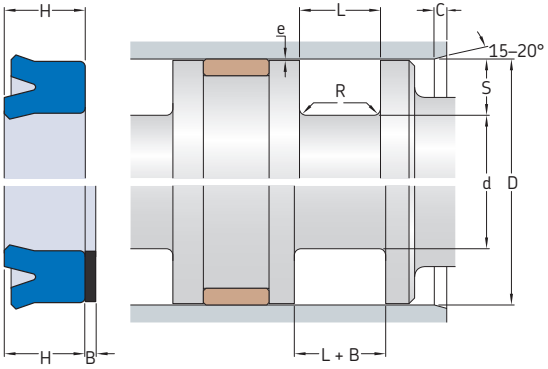
UNP profile data



Material codes	Metric sizes → U-1029 Inch sizes → U-1023 For additional information → **page 26**
Pressure	Up to 350 bar *(5 075 psi)*
Speed	Pressure ≤ 250 bar *(3 625 psi)* → up to 1 m/s *(3.2 ft/s)* Pressure > 250 bar *(3 625 psi)* → up to 0,5 m/s *(1.6 ft/s)*
Temperature range	 For temperature limits depending on fluid compatibility → **table 8, page 32** Extreme low temperature range: may be intermittently exposed (e.g. cold start-up) without seal damage, but seal performance may be compromised while in this range Temperatures below the recommended operating range: seal performance depends on system design (precision guiding arrangement recommended) **Recommended operating temperature range for this profile and material** Temperatures above the recommended operating range: acceptable only with reduced pressure, speed, e-gap and/or with the use of a full-face anti-extrusion ring Extreme high temperature range: only occasional short-term exposure (e.g. cylinder in curing oven of a powder coating process)
Counter-surface	→ **page 22**

Maximum values of application parameters (e.g. pressure, speed, temperature, e-gap) should not be applied continuously nor simultaneously.

2.12 UNP profile piston seals, metric sizes
D **45 – 250** mm



Maximum extrusion gap e

Radial depth S	e_{max} at 80 °C (175 °F) for pressures 160 bar	250 bar	350 bar
mm	mm		
5	0,45	0,25	0,1
7,5	0,5	0,3	0,15
10	0,55	0,3	0,15
12,5 to 15	0,6	0,3	0,2

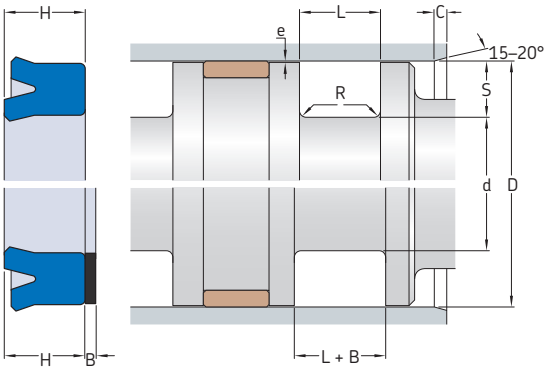
For additional information → **page 34**

With and without full-face anti-extrusion ring[1)]

Dimensions								Designation
D H9	d h9	L +0,2	L + B +0,2	H nom.	S	R max.	C min.	
mm								–
45	35	7	9	6	5	0,4	5	**UNP-45x35x7-E6W**
50	40	7	9	6	5	0,4	5	**UNP-50x40x7-E6W**
	40	8,3	10,3	7,3	5	0,4	5	**UNP-50x40x8.3-E6W**
63	48	11	13	10	7,5	0,5	7	**UNP-63x48x11-E6W**
	53	7	9	6	5	0,4	5	**UNP-63x53x7-E6W**
	53	8,3	10,3	7,3	5	0,4	5	**UNP-63x53x8.3-E6W**
75	65	7	9	6	5	0,4	5	**UNP-75x65x7-E6W**
130	115	10	12	9	7,5	0,5	7	**UNP-130x115x10-E6W**
140	120	16,5	18,5	15	10	0,75	7	**UNP-140x120x16.5-E6W**
150	135	10	12	9	7,5	0,6	7	**UNP-150x135x10-E6W**
160	140	16	18	14,5	10	0,75	7	**UNP-160x140x15.5-E6W**
170	150	13,2	15,2	12	10	0,75	7	**UNP-170x150x13-E6W**
	155	10	12	9	7,5	0,5	7	**UNP-170x155x10-E6W**
180	150	20	22	18	15	0,75	7	**UNP-180x150x19.5-E6W**
	165	10	12	9	7,5	0,5	7	**UNP-180x165x10-E6W**
190	175	10	12	9	7,5	0,5	7	**UNP-190x175x10-E6W**
200	175	20,2	22,2	18,2	12,5	0,75	12	**UNP-200x175x19.7-E6W**
210	190	13,2	15,2	12	10	0,75	7	**UNP-210x190x13-E6W**
220	200	16,5	18,5	15	10	0,75	7	**UNP-220x200x16.5-E6W**
230	205	22	24	20	12,5	0,75	12	**UNP-230x205x22-E6W**
240	220	13,2	15,2	12	10	0,75	7	**UNP-240x220x13-E6W**
250	230	16,5	18,5	15	10	0,75	7	**UNP-250x230x16.5-E6W**

[1)] In case of higher pressures, SKF provides full-face anti-extrusion rings on request. For additional information, contact SKF.

2.12 UNP profile piston seals, metric sizes
D **280 – 300** mm



Maximum extrusion gap e

Radial depth S	e_{max} **at 80 °C** ***(175 °F)*** **for pressures** 160 bar	250 bar	350 bar
mm	mm		
5	0,45	0,25	0,1
7,5	0,5	0,3	0,15
10	0,55	0,3	0,15
12,5 to 15	0,6	0,3	0,2

For additional information → **page 34**

With and without full-face anti-extrusion ring[1)]

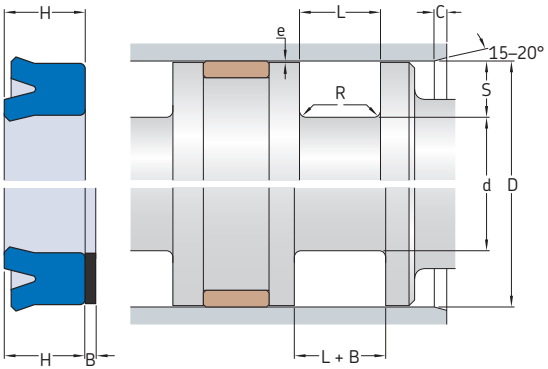
Dimensions								**Designation**
D H9	d h9	L +0,2	L + B +0,2	H nom.	S	R max.	C min.	
mm								–
280	255	21	23	19	12,5	0,75	12	**UNP-280x255x20.5-E6W**
290	265	21	23	19	12,5	0,75	12	**UNP-290x265x20.5-E6W**
300	275	17,6	19,6	16	12,5	0,75	12	**UNP-300x275x17.5-E6W**

Other sizes are available on request

[1)] In case of higher pressures, SKF provides full-face anti-extrusion rings on request. For additional information, contact SKF.

2.12 UNP profile piston seals, inch sizes

D **1.125 – 5** in.



Maximum extrusion gap e

Radial depth S	e_{max} at 80 °C *(175 °F)* for pressures 2 300 psi	3 600 psi	5 075 psi
in.	in.		
0.125	0.008	0.004	–
0.187	0.014	0.008	–
0.25	0.018	0.01	0.004
0.375	0.02	0.012	0.006
0.5	0.022	0.012	0.006

For additional information → **page 34**

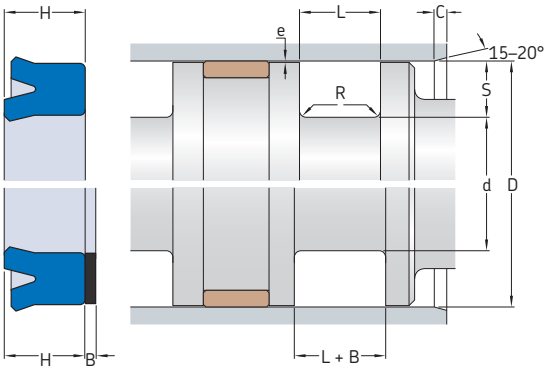
With and without full-face anti-extrusion ring[1)]

Dimensions										Designation
D	Tolerance	d	Tolerance	L +0.01	L+B +0.01	H nom.	S	R max.	C min.	
in.										–
1.125	+0.002	0.75	–0.002	0.343	0.437	0.312	0.187	0.015	0.25	**UNP187-750-312-H9J**
1.5	+0.002	1.125	–0.002	0.275	0.369	0.25	0.187	0.015	0.25	**UNP187-1125-250-H9J**
	+0.002	1.25	–0.002	0.275	0.338	0.25	0.125	0.01	0.25	**UNP125-1250-250-H9J**
1.75	+0.002	1.375	–0.002	0.275	0.369	0.25	0.187	0.015	0.25	**UNP187-1375-250-H9J**
2	+0.002	1.625	–0.002	0.206	0.299	0.187	0.187	0.015	0.25	**UNP187-1625-187-H9J**
	+0.002	1.625	–0.002	0.343	0.437	0.312	0.187	0.015	0.25	**UNP187-1625-312-H9J**
2.25	+0.002	1.875	–0.002	0.343	0.437	0.312	0.187	0.015	0.25	**UNP187-1875-312-H9J**
2.5	+0.003	2	–0.003	0.413	0.538	0.375	0.25	0.02	0.312	**UNP250-2000-375-H9J**
	+0.002	2.125	–0.002	0.275	0.369	0.25	0.187	0.015	0.25	**UNP187-2125-250-H9J**
	+0.002	2.125	–0.002	0.413	0.506	0.375	0.187	0.015	0.25	**UNP187-2125-375-H9J**
2.625	+0.002	2.25	–0.002	0.343	0.437	0.312	0.187	0.015	0.25	**UNP187-2250-312-H9J**
2.75	+0.003	2.25	–0.003	0.413	0.538	0.375	0.25	0.02	0.312	**UNP250-2250-375-H9J**
3	+0.002	2	–0.007	0.550	0.800	0.5	0.5	0.04	0.375	**UNP500-2000-500-H9J**
	+0.003	2.5	–0.003	0.343	0.468	0.312	0.25	0.02	0.312	**UNP250-2500-312-H9J**
	+0.003	2.5	–0.003	0.413	0.538	0.375	0.25	0.02	0.312	**UNP250-2500-375-H9J**
	+0.002	2.625	–0.002	0.413	0.506	0.375	0.187	0.015	0.25	**UNP187-2625-375-H9J**
3.25	+0.005	2.25	–0.007	0.550	0.800	0.5	0.5	0.04	0.375	**UNP500-2250-500-H9J**
	+0.002	2.875	–0.002	0.413	0.506	0.375	0.187	0.015	0.25	**UNP187-2875-375-H9J**
3.5	+0.004	2.75	–0.005	0.688	0.875	0.625	0.375	0.032	0.375	**UNP375-2750-625-H9J**
	+0.003	3	–0.003	0.413	0.538	0.375	0.25	0.02	0.312	**UNP250-3000-375-H9J**
4	+0.005	3	–0.007	0.550	0.800	0.5	0.5	0.04	0.375	**UNP500-3000-500-H9J**
	+0.003	3.5	–0.003	0.413	0.538	0.375	0.25	0.02	0.312	**UNP250-3500-375-H9J**
4.5	+0.004	3.75	–0.005	0.688	0.875	0.625	0.375	0.032	0.375	**UNP375-3750-625-H9J**
5	+0.004	4.25	–0.005	0.550	0.738	0.5	0.375	0.032	0.375	**UNP375-4250-500-H9J**
	+0.003	4.5	–0.003	0.413	0.538	0.375	0.25	0.02	0.312	**UNP250-4500-375-H9J**

[1)] In case of higher pressures, SKF provides full-face anti-extrusion rings on request. For additional information, contact SKF.

2.12 UNP profile piston seals, inch sizes

D **5.5 – 6.5** in.



Maximum extrusion gap e

Radial depth S	e_{max} **at 80 °C** ***(175 °F)*** **for pressures** 2 300 psi	3 600 psi	5 075 psi
in.	in.		
0.125	0.008	0.004	–
0.187	0.014	0.008	–
0.25	0.018	0.01	0.004
0.375	0.02	0.012	0.006
0.5	0.022	0.012	0.006

For additional information → **page 34**

With and without full-face anti-extrusion ring[1)]

Dimensions										**Designation**
D	Tolerance	d	Tolerance	L +0.01	L+B +0.01	H nom.	S	R max.	C min.	
in.										–
5.5	+0.004	4.75	–0.005	0.688	0.875	0.625	0.375	0.032	0.375	**UNP375-4750-625-H9J**
6	+0.004	5.25	–0.005	0.413	0.600	0.375	0.375	0.032	0.375	**UNP375-5250-375-H9J**
6.5	+0.004	5.75	–0.005	0.688	0.875	0.625	0.375	0.032	0.375	**UNP375-5750-625-H9J**

Other sizes are available on request

[1)] In case of higher pressures, SKF provides full-face anti-extrusion rings on request. For additional information, contact SKF.

More piston seals

The piston seals listed in this catalogue represent the preferred profiles in common sizes. SKF supplies many additional sizes and profiles. The following profiles are also manufactured in series production. SKF can provide customized sealing solutions also for the toughest application conditions. For additional information about these profiles or if the application requires a solution outside of what is provided in this catalogue, contact SKF.

More PTFE slide ring piston seals

Piston seals with PTFE slide rings are available in a wide variety of profiles and materials (→ **fig. 18**). For additional information about material options, contact SKF.

SPECTRASEAL

SPECTRASEAL is a PTFE seal that can be used as a single-acting piston seal (→ **fig. 19**). The metal spring energizer adds radial load to the seal lip contact areas. SPECTRASEAL is intended for extreme condition applications including high temperature or aggressive media. For additional information, contact SKF.

Customized machined seal profiles

SKF can manufacture a broad variety of piston seal profiles with different materials and sizes with its industry-leading SKF SEAL JET production system (→ **fig. 20**). For additional information about customized machined profiles, refer to publication *Customized machined seals – Product range* or contact SKF.

Fig. 18

PTFE slide ring piston seals, profile examples

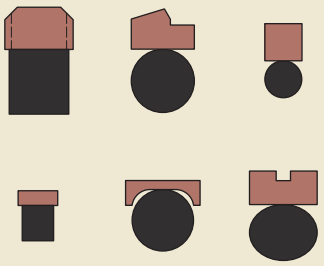


Fig. 19

SPECTRASEAL

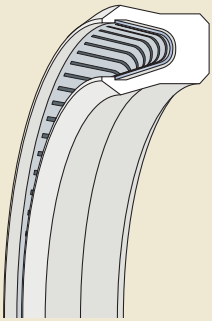
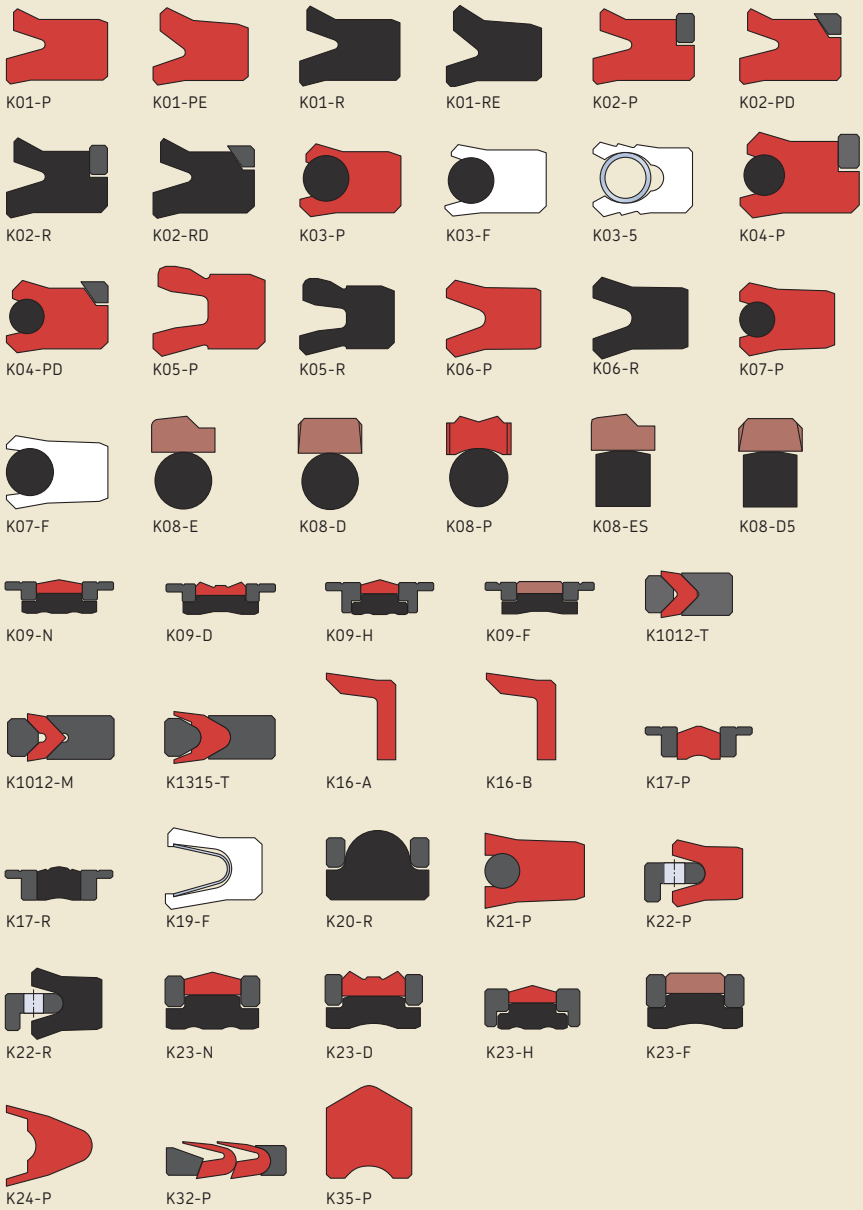
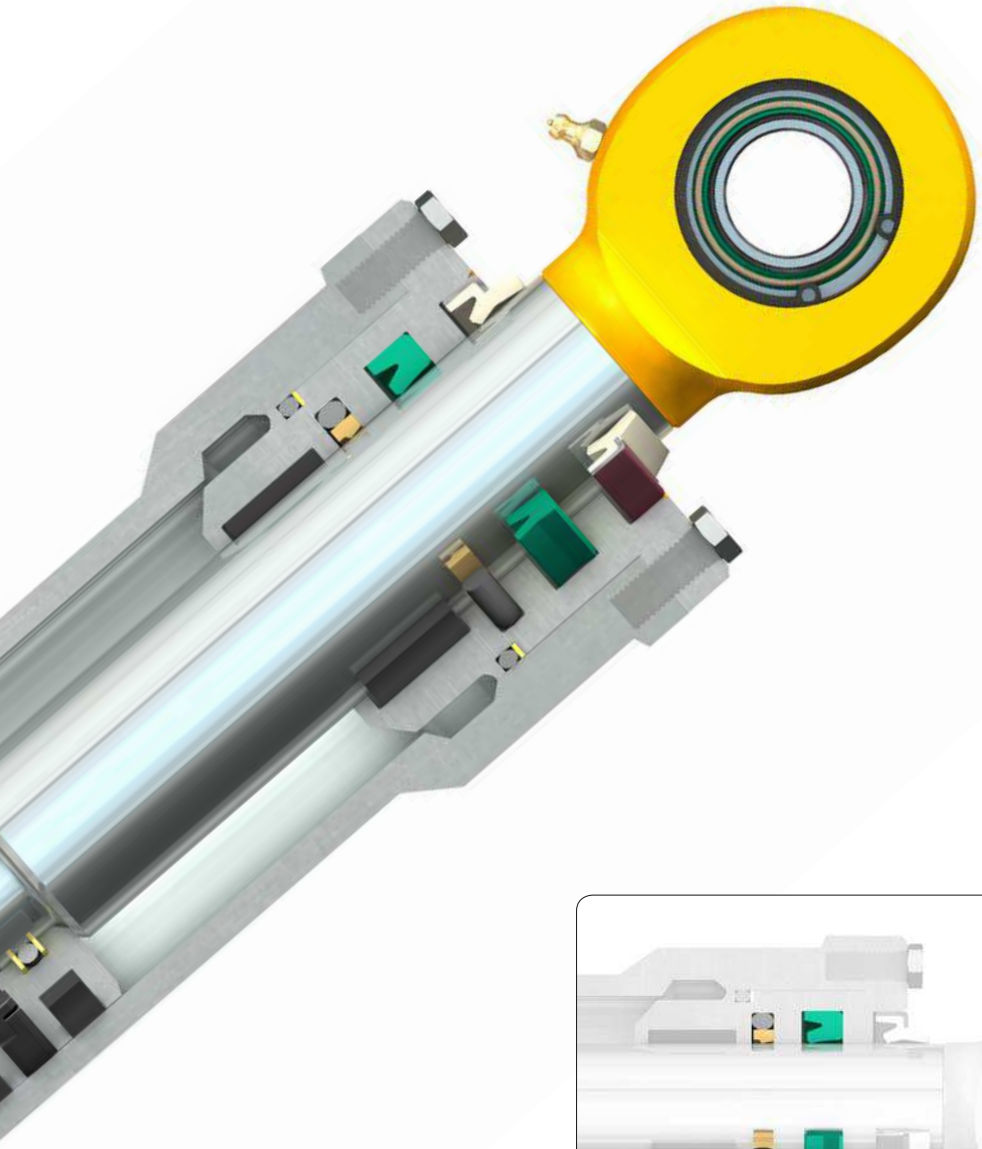
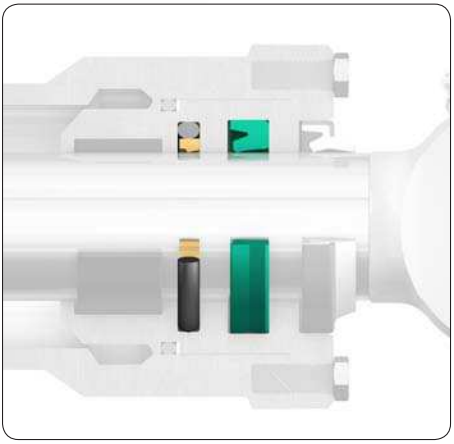


Fig. 20

SKF SEAL JET profile examples







Rod and buffer seals

Profile overview

Profile	Description	Additional information → page	Profile data → page
S1S 	Single-lip U-cup profile made of polyurethane; suitable for medium to heavy duty applications	**116**	**122** (metric)
ZBR 	Double-lip U-cup profile made of polyurethane; suitable for medium to heavy duty applications	**116**	**126** (metric and inch)
SIL 	Double-lip U-cup profile made of polyurethane; suitable for low temperatures and light to medium duty applications	**117**	**134** (metric)
PTB 	Polyurethane U-cup profile with incorporated nitrile rubber X-ring, which provides good performance even at low pressure and temperature; suitable for medium duty applications	**117**	**138** (metric and inch)
STD 	Polyurethane U-cup profile with incorporated nitrile rubber X-ring, which provides good performance even at low pressure and temperature; fits narrow housings; suitable for medium duty applications	**118**	**164** (inch)
DZ 	Nitrile rubber primary sealing ring, polyurethane secondary sealing ring; low friction; suitable for medium to heavy duty applications	**118**	**178** (metric and inch)
DZR 	Nitrile rubber primary sealing ring, polyurethane secondary sealing ring, integrated triangular polyamide anti-extrusion ring; improved gap extrusion resistance; suitable for heavy duty applications and extreme pressures	**119**	**184** (metric and inch)

Profile	Description	Additional information → page	Profile data → page
RBB 	Buffer seal with polyurethane sealing ring, integrated polyacetal or polyamide anti-extrusion ring; designed to vent pressure back to system side; improved gap extrusion resistance at abrupt pressure peaks; fits narrow housings; suitable for heavy duty applications	**120**	**188** (metric and inch)
S9B 	Buffer seal with nitrile rubber O-ring energizer, PTFE slide ring; also available with polyurethane slide ring to improve wear resistance and ease installation; suitable for medium to heavy duty applications	**120**	**192** (metric and inch)
RSB 	Buffer seal with PTFE slide ring, nitrile rubber energizer; patented and improved design to reduce pressure peaks acting on the rod seal and vent pressure back to system side; improved gap extrusion resistance at abrupt pressure peaks; suitable for medium to heavy duty applications	**121**	**198** (inch)

Basics

Rod sealing systems

Rod and buffer seals maintain sealing contact in sliding motion between the cylinder head and the piston rod. Depending on the application, a rod sealing system can consist of a rod seal and a buffer seal (→ **fig. 1**) or a rod seal only (→ **fig. 2**). Rod sealing systems for heavy duty applications typically consist of a combination of both seal types, whereas the buffer seal is arranged between the rod seal and the piston in the cylinder head. Rod seals determine the tolerance for the rod diameter d.

In addition to the sealing function, rod seals also provide a thin lubrication film on the piston rod that lubricates themselves and the wiper seals. The lubricant also inhibits corrosion of the piston rod surface. However, the lubrication film must be thin enough so that it returns to the cylinder during the return stroke.

Selecting profiles and materials for a rod sealing system is a complex task, considering all possible cylinder designs and application criteria. SKF supplies rod and buffer seals in many different profiles and in a wide range of materials, series and sizes, which make them appropriate for a wide variety of operating conditions and applications.

Fig. 1

Typical rod seal arrangement for heavy duty hydraulic applications

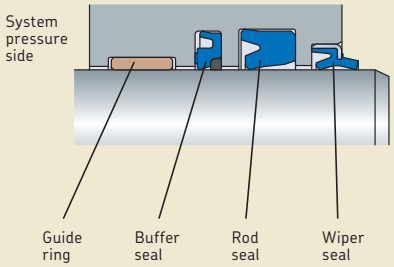
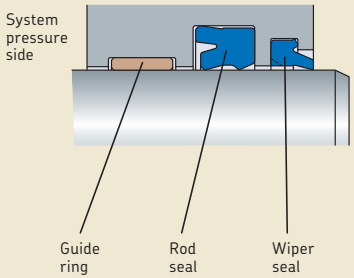


Fig. 2

Typical rod seal arrangement for light to medium duty hydraulic applications



Materials

Depending on the profile and the required characteristics of its components, rod and buffer seals can consist of one or several materials. Common materials used for the sealing and energizing elements of rod and buffer seals are thermoplastic polyurethane (TPU), polytetrafluoroethylene (PTFE) or nitrile rubber (NBR). Common materials used for rod seal anti-extrusion rings are polyamide (PA), polyacetal (POM) or PTFE. The materials used for a specific profile are provided in the *Profile overview* (→ **page 112**) and in the relevant profile sections below.

For additional information, refer to *Materials* (→ **page 26**).

More information

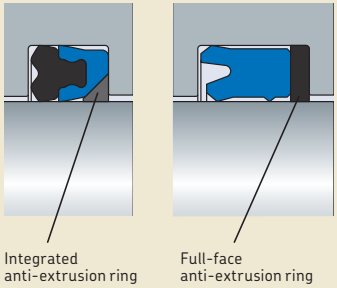
Anti-extrusion rings

External forces acting on the rod can cause pressure peaks. They can be far in excess of the system operating pressure and may press a rod seal into the gap between the piston rod and the cylinder head. This risk of gap extrusion can be avoided for rod and buffer seals by using anti-extrusion rings. These hard and temperature-resistant rings can be integrated in the seal or a separate full-face anti-extrusion ring can be used. This ring can be added to a rod seal by simply extending the housing length (→ **fig. 3**). Integrated anti-extrusion rings fit into a notch in the rod or buffer seal and do not need an extended housing length.

DZR (→ **fig. 10**, **page 119**) profile rod seals and RBB (→ **fig. 11**, **page 120**) profile buffer seals incorporate an anti-extrusion ring. Other U-cup and energized U-cup rod seals with an integrated anti-extrusion ring are available on request. For seals without an integrated anti-extrusion ring, SKF provides full-face anti-extrusion rings on request. For additional information, contact SKF.

Fig. 3

Integrated and full-face anti-extrusion rings



Rod guidance

Although rod sealing systems are designed to accommodate minor radial motion between the piston rod and cylinder head, effective rod guidance is important to ensure best rod seal performance. Guide rings accurately center the rod within the head, which reduces radial deflection and motion acting on the seals. Guide rings also accommodate the radial loads acting on the cylinder assembly and avoid direct metal-to-metal contact between the piston rod and cylinder head. For additional information about rod guidance, refer to *Guide rings and guide strips* (→ **page 249**).

Rod seals

Rod seals are typically single-acting seals, which means that fluid pressure acts from inside the cylinder on one seal side only. Pressures acting on the rod side of the piston can be in excess of 400 bar *(5 800 psi)*, pressure peaks can be even higher. The pressure acting on the rod seal increases contact forces between the rod seal and rod surfaces. Therefore, rod seal materials should be wear resistant and the rod surface needs to be manufactured to the recommended specifications (→ *Counter-surface finish properties*, **page 22**).

Polyurethane U-cup rod seals

U-cup seals, as their name implies, have a U-shaped profile, including an outside static sealing lip and an inside dynamic sealing lip. The unique combination of resilience and its resistance to gap extrusion and wear makes thermoplastic polyurethane (TPU) the most common material used for U-cup seals in hydraulic applications.

They are available with a single- or double-lip design.

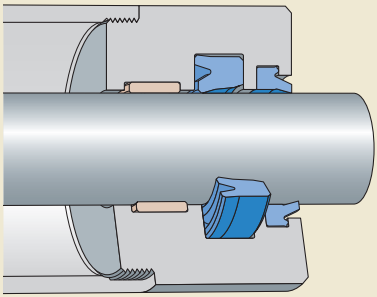
S1S profiles

S1S profiles (→ **fig. 4**) are made of ECOPUR (TPU) and have a single-lip design. The geometry has been optimized using FEA (Finite Element Analysis) to provide the longest possible maintenance-free service. They are suitable for pressures up to 400 bar *(5 800 psi)* in medium to heavy duty applications and are available in metric sizes. Some fit seal housings in accordance with ISO 5597.

ZBR profiles

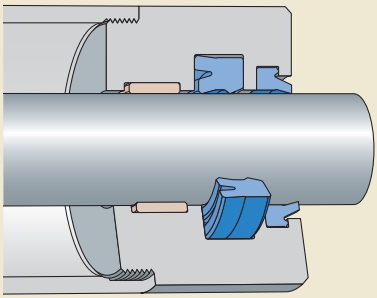
ZBR profiles (→ **fig. 5**) are made of LUBRITHANE (TPU) and have a double-lip design. They are suitable for pressures up to 400 bar *(5 800 psi)* in medium to heavy duty applications and are available in metric and inch sizes. Some metric sizes fit seal housings in accordance with ISO 5597.

Fig. 4



S1S

Fig. 5



ZBR

SIL profiles

SIL profiles (→ **fig. 6**) are made of ether-based TPU. They have a double-lip design and a secondary dynamic sealing lip. These seals provide good resistance to hydrolysis (attack from moisture) and good low temperature resilience. SIL profiles are suitable for pressures up to 350 bar *(5 075 psi)* in light to medium duty applications and are available in metric sizes. Some fit seal housings in accordance with ISO 5597.

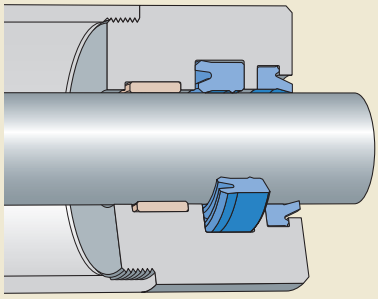
Energized U-cup rod seals

Energized U-cup rod seals incorporate a nitrile rubber (NBR) X-ring in their thermoplastic polyurethane (TPU) U-cup. The X-ring serves as energizer, provides additional sealing force and improves the long-term resilience of the sealing lips. This can be beneficial in applications with low operating pressure or low temperatures.

PTB profiles

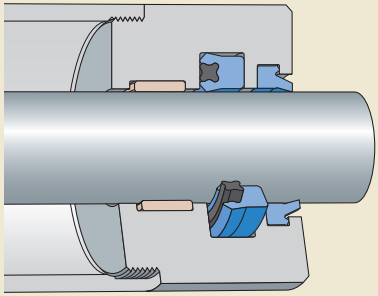
PTB profiles (→ **fig. 7**) are made of LUBRITHANE (TPU). They are suitable for pressures up to 400 bar *(5 800 psi)* in medium duty applications and are available in metric and inch sizes. Some metric sizes fit seal housings in accordance with ISO 5597.

Fig. 6



SIL

Fig. 7



PTB

STD profiles

STD profiles (→ **fig. 8**) are made of LUBRITHANE (TPU). They are suitable for pressures up to 400 bar *(5 800 psi)* in medium duty applications and can also be used as a heavy duty static seal or a snap-in wiper seal. These profiles are available in inch sizes where narrower seal housings are used. Metric sizes are available on request.

Hybrid rod seals

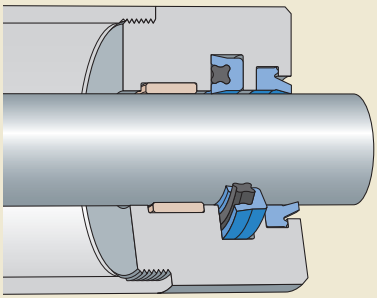
Hybrid rod seals incorporate dynamic sealing lips of different materials. These material combinations provide a hybrid with the functional benefit of each material and, therefore, a robust rod seal. An example is the sealing ability and resilience of nitrile rubber (NBR) combined with the extrusion and wear resistance of polyurethane (TPU).

DZ profiles

DZ profiles (→ **fig. 9**) combine an NBR primary sealing ring with a LUBRITHANE (TPU) secondary sealing ring into one seal. This combination provides a good low temperature resilience and is suitable for pressures up to 400 bar *(5 800 psi)* in medium to heavy duty applications. DZ profiles are available in metric and inch sizes. They are also available with an elastomer (FLUOROTREL/TPC) secondary sealing ring on request.

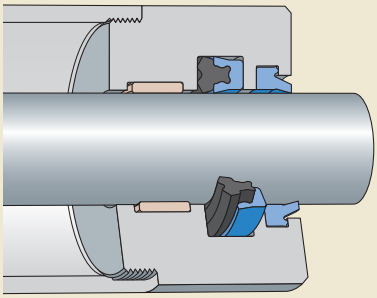
These SKF hybrid rod seals have been proven successful in low temperature applications. The NBR primary lips also provide improved long term sealing performance and a greater capability to track larger radial deflections between the rod and the head.

Fig. 8



STD

Fig. 9

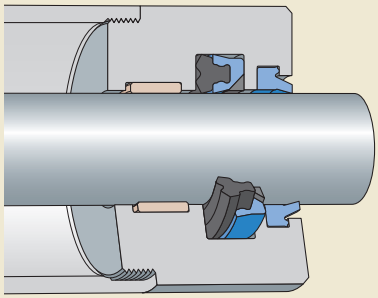


DZ

DZR profiles

DZR profiles (→ **fig. 10**) combine an NBR primary sealing ring, a LUBRITHANE (TPU) secondary sealing ring and a triangular polyamide (PA) anti-extrusion ring (→ *Anti-extrusion rings*, **page 115**) into one seal. These combinations provide good low temperature resilience, and improved resistance to deformation, wear, and gap extrusion. They are suitable for extreme pressures up to 690 bar *(10 000 psi)* in heavy duty applications. DZR profiles are available in metric and inch sizes.

Fig. 10



DZR

Buffer seals

Buffer seals protect the rod seals by reducing the magnitude of pressure peaks. Abrupt pressure peaks can occur by external forces acting on the piston rod, initiated by the fluid inside the cylinder. These pressure peaks can be far in excess of the system operating pressure. Buffer seals in combination with rod seals provide an effective rod sealing system for cylinders in heavy duty applications at high temperature and pressure.

Polyurethane U-cup buffer seals

RBB profiles

RBB profiles (→ **fig. 11**) have a LUBRITHANE (TPU) sealing ring that incorporates a polyamide (PA) or polyacetal (POM) anti-extrusion ring. The flexible outside static sealing lip and notches in the front face ensure that pressure can return to the system side of the buffer and prevent build-up of pressure between the rod and buffer seals. These profiles are suitable for extreme pressure peaks and demanding workloads in heavy duty applications up to 690 bar *(10 000 psi)*. They are available in metric and inch sizes, some metric sizes fit seal housings in accordance with ISO 7425-2.

Buffer seals incorporating slide rings

S9B profiles

S9B profiles (→ **fig. 12**) have a nitrile rubber (NBR) O-ring energizer and a PTFE slide ring as standard. Depending on the application, SKF can manufacture the slide rings from a variety of PTFE materials. On request, SKF can supply these profiles also with X-ECOPUR polyurethane (TPU) slide rings for improved wear resistance and ease of installation compared to PTFE. S9B profiles with a PTFE slide ring are suitable for pressures up to 400 bar *(5 800 psi)*, those with an X-ECOPUR slide ring up to 600 bar *(8 700 psi)*. These profiles are suitable for medium to heavy duty duty applications. Both material combinations are available in metric and inch sizes, some metric sizes fit seal housings in accordance with ISO 7425-2 or ISO 3320.

Fig. 11

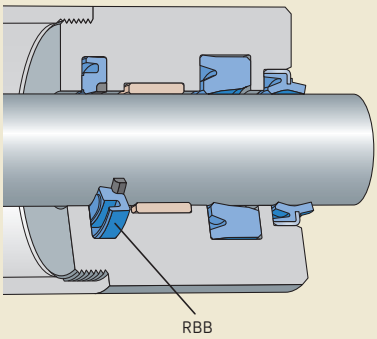
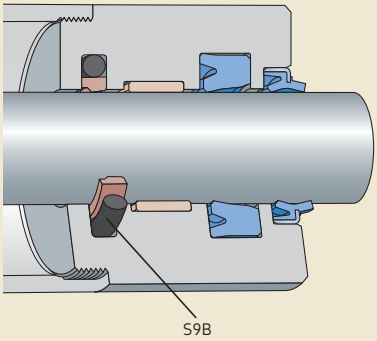


Fig. 12



RSB profiles

RSB profiles (→ **fig. 13**) have a nitrile rubber (NBR) energizer and a PTFE slide ring.

The energizer is designed to hold the slide ring in the proper and permanent sealing position against the rod seal side of the housing. Conventional buffer seal designs can shift axially within the groove and push fluid into the rod seal groove when subjected to abrupt pressure peaks. This ultimately causes rod seal failure. However, the patented design of RSB profiles prevents any axial shifting of the slide ring. Therefore, these profiles protect the rod seal in applications where conventional buffers are not sufficient. In combination with grooves in the energizer outside diameter and notches in the front face of the slide ring (→ **fig. 14**), the protrusions also ensure that pressure can return to the system side.

RSB profiles are suitable for pressures up to 400 bar *(5 800 psi)* in medium to heavy duty applications and are available in inch sizes.

On request, for the most demanding applications of large equipment, SKF can manufacture these profiles with polyamide (PA) slide rings for additional extrusion and wear resistance.

Fig. 13

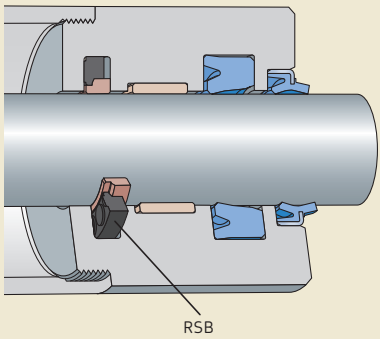
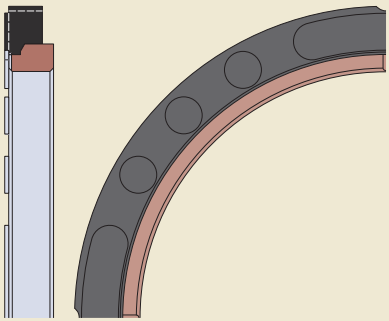


Fig. 14



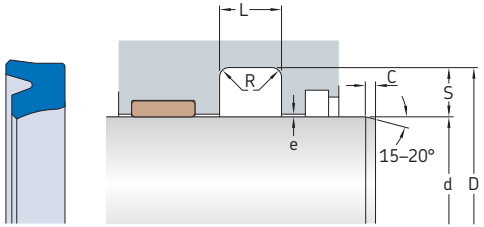
S1S profile data

Material code	ECOPUR For additional information → **page 26**
Pressure	Up to 400 bar *(5 800 psi)*
Speed	Up to 1 m/s *(3.2 ft/s)*
Temperature range	 Extreme low temperature range: may be intermittently exposed (e.g. cold start-up) without seal damage, but seal performance may be compromised while in this range Temperatures below the recommended operating range: seal performance depends on system design (precision guiding arrangement recommended) **Recommended operating temperature range for this profile and material** Temperatures above the recommended operating range: acceptable only with reduced pressure, speed, e-gap and/or with the use of a full-face anti-extrusion ring Extreme high temperature range: only occasional short-term exposure (e.g. cylinder in curing oven of a powder coating process)
Dimension standards	Some sizes fit seal housings in accordance with ISO 5597.
Counter-surface	→ **page 22**

Maximum values of application parameters (e.g. pressure, speed, temperature, e-gap) should not be applied continuously nor simultaneously.

3.1 S1S profile rod seals, metric sizes

d **18 – 110** mm



Maximum extrusion gap e

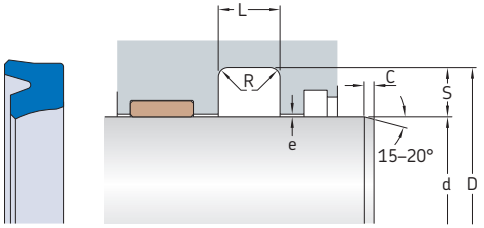
Radial depth S	e_{max} at 80 °C *(175 °F)* for pressures 160 bar	250 bar	400 bar
mm	mm		
4	0,4	0,3	0,15
5	0,5	0,4	0,2
7,5	0,55	0,45	0,25
10	0,6	0,5	0,3

For additional information → **page 34**

Dimensions						Designation
d f8 or h9	D H10	L +0,2	S	R max.	C min.	
mm						–
18	26	6,3	4	0,4	3,5	• **S1S-18x26x6.3**
20	28	6,3	4	0,4	3,5	**S1S-20x28x6.3**
25	33	6	4	0,4	3,5	**S1S-25x33x6**
	35	8	5	0,4	4	• **S1S-25x35x8**
28	38	8	5	0,4	4	• **S1S-28x38x8**
30	40	7	5	0,4	4	**S1S-30x40x7**
32	42	8	5	0,4	4	• **S1S-32x42x8**
35	45	7	5	0,4	4	**S1S-35x45x7**
36	46	8	5	0,4	4	• **S1S-36x46x8**
40	50	8	5	0,4	4	• **S1S-40x50x8**
45	55	8	5	0,4	4	• **S1S-45x55x8**
50	60	8	5	0,4	4	**S1S-50x60x8**
	65	10	7,5	0,4	5	• **S1S-50x65x10**
55	65	10	5	0,4	4	**S1S-55x65x10**
	70	10	7,5	0,4	5	**S1S-55x70x10**
63	78	10	7,5	0,4	5	• **S1S-63x78x10**
75	85	12,4	5	0,4	4	**S1S-75x85x12.4**
80	95	10	7,5	0,4	5	• **S1S-80x95x10**
	95	12,4	7,5	0,4	5	**S1S-80x95x12.4**
90	105	10	7,5	0,4	5	• **S1S-90x105x10**
100	115	10	7,5	0,4	5	• **S1S-100x115x10**
110	125	10	7,5	0,4	5	• **S1S-110x125x10**

• Dimensions in accordance with ISO 5597

3.1 S1S profile rod seals, metric sizes
d **125 – 240** mm



Maximum extrusion gap e

Radial depth S	e_{max} **at 80 °C (*175 °F*) for pressures** 160 bar	250 bar	400 bar
mm	mm		
4	0,4	0,3	0,15
5	0,5	0,4	0,2
7,5	0,55	0,45	0,25
10	0,6	0,5	0,3

For additional information → **page 34**

Dimensions						**Designation**
d f8 or h9	D H10	L +0,2	S	R max.	C min.	
mm						–
125	145	16	10	0,4	6	**S1S-125x145x16**
140	155	10	7,5	0,4	5	• **S1S-140x155x10**
160	180	16	10	0,4	6	**S1S-160x180x16**
180	200	14	10	0,4	6	• **S1S-180x200x14**
200	220	14	10	0,4	6	• **S1S-200x220x14**
240	260	16	10	0,4	6	**S1S-240x260x16**

Other sizes are available on request

• Dimensions in accordance with ISO 5597

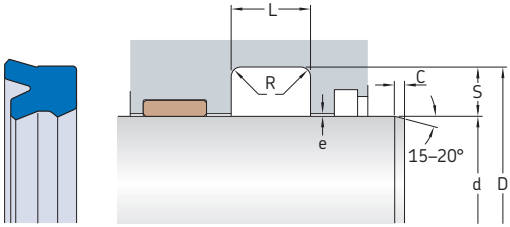
ZBR profile data

Material code	U-1029 For additional information → **page 26**
Pressure	Up to 400 bar *(5 800 psi)*
Speed	Up to 1 m/s *(3.2 ft/s)*
Temperature range	 Extreme low temperature range: may be intermittently exposed (e.g. cold start-up) without seal damage, but seal performance may be compromised while in this range Temperatures below the recommended operating range: seal performance depends on system design (precision guiding arrangement recommended) **Recommended operating temperature range for this profile and material** Temperatures above the recommended operating range: acceptable only with reduced pressure, speed, e-gap and/or with the use of a full-face anti-extrusion ring Extreme high temperature range: only occasional short-term exposure (e.g. cylinder in curing oven of a powder coating process)
Dimension standards	Some metric sizes fit seal housings in accordance with ISO 5597.
Counter-surface	→ **page 22**

Maximum values of application parameters (e.g. pressure, speed, temperature, e-gap) should not be applied continuously nor simultaneously.

3.2 ZBR profile rod seals, metric sizes

d **14 – 45** mm



Maximum extrusion gap e

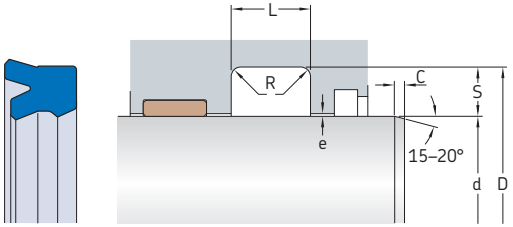
Radial depth S	e_{max} at 80 °C *(175 °F)* for pressures 160 bar	250 bar	400 bar
mm	mm		
3,5 to 4	0,35	0,2	–
5 to 6,5	0,45	0,25	0,1
7 to 7,5	0,5	0,3	0,15
10	0,55	0,3	0,15
12,5	0,6	0,3	0,2

For additional information → **page 34**

Dimensions						Designation
d f8 or h9	D H10	L +0,2	S	R max.	C min.	
mm						–
14	22	5,7	4	0,2	6	**ZBR-14x22x5.7-E6W**
16	24	5,7	4	0,2	6	**ZBR-16x24x5.7-E6W**
18	26	5,7	4	0,2	6	**ZBR-18x26x5.7-E6W**
20	28	5,7	4	0,2	6	**ZBR-20x28x5.7-E6W**
22	30	5,7	4	0,2	6	**ZBR-22x30x5.7-E6W**
22,4	30	5,7	3,8	0,2	6	**ZBR-22.4x30x5.7-E6W**
25	33	5,7	4	0,2	6	**ZBR-25x33x5.7-E6W**
	33	8	4	0,2	6	**ZBR-25x33x8-E6W**
28	35	5,7	3,5	0,2	6	**ZBR-28x35.5x5.7-E6W**
	36	6,4	4	0,2	6	**ZBR-28x36x6.4-E6W**
30	38	7,8	4	0,2	6	**ZBR-30x38x7.8-E6W**
	40	7	5	0,2	6	**ZBR-30x40x7-E6W**
32	40	6,4	4	0,2	6	**ZBR-32x40x6.4-E6W**
	42	8,3	5	0,2	6	**ZBR-32x42x8.3-E6W**
35	43	7,8	4	0,2	6	**ZBR-35x43x7.8-E6W**
	45	7	5	0,2	6	**ZBR-35x45x7-E6W**
	45	11	5	0,2	6	**ZBR-35x45x11-E6W**
40	50	7	5	0,2	6	**ZBR-40x50x7-E6W**
	50	7	5	0,2	6	**ZBR-40x50x7-E6W**
	50	11	5	0,2	6	**ZBR-40x50x11-E6W**
	55	11	7,5	0,5	8,5	**ZBR-40x55x11-E6W**
	55	12	7,5	0,5	8,5	**ZBR-40x55x12-E6W**
45	55	7	5	0,2	6	**ZBR-45x55x7-E6W**
	55	8,3	5	0,2	6	**ZBR-45x55x8.3-E6W**
	55	11	5	0,2	6	**ZBR-45x55x11-E6W**
	60	11	7,5	0,5	8,5	**ZBR-45x60x11-E6W**
	60	12	7,5	0,5	8,5	**ZBR-45x60x12-E6W**
	60	12,5	7,5	0,2	8,5	• **ZBR-45x60x12.5-E6W**

• Dimensions in accordance with ISO 5597

3.2 ZBR profile rod seals, metric sizes
d **50 – 150** mm



Maximum extrusion gap e

Radial depth S	e_{max} at 80 °C *(175 °F)* for pressures 160 bar	250 bar	400 bar
mm	mm		
3,5 to 4	0,35	0,2	–
5 to 6,5	0,45	0,25	0,1
7 to 7,5	0,5	0,3	0,15
10	0,55	0,3	0,15
12,5	0,6	0,3	0,2

For additional information → **page 34**

Dimensions						Designation
d f8 or h9	D H10	L +0,2	S	R max.	C min.	
mm						–
50	60	7	5	0,2	6	**ZBR-50x60x7-E6W**
	60	8,3	5	0,2	6	**ZBR-50x60x8.3-E6W**
	60	8,5	5	0,2	6	**ZBR-50x60x8.5-E6W**
	65	11	7,5	0,5	8,5	**ZBR-50x65x11-E6W**
	65	12,4	7,5	0,5	8,5	**ZBR-50x65x12.4-E6W**
53	63	7	5	0,2	6	**ZBR-53x63x7-E6W**
55	65	7	5	0,2	6	**ZBR-55x65x7-E6W**
	65	9	5	0,2	6	**ZBR-55x65x9-E6W**
	65	11	5	0,2	6	**ZBR-55x65x11-E6W**
	68	11	6,5	0,2	7,5	**ZBR-55x68x11-E6W**
	70	10	7,5	0,5	8,5	**ZBR-55x70x10-E6W**
	70	11	7,5	0,5	8,5	**ZBR-55x70x11-E6W**
	70	12,4	7,5	0,2	8,5	**ZBR-55x70x12.4-E6W**
	75	13	10	0,8	6	**ZBR-55x75x13-E6W**
56	71	12,4	7,5	0,5	8,5	• **ZBR-56x71x12.4-E6W**
60	68	9	4	0,2	6	**ZBR-60x68x9-E6W**
	70	7	5	0,2	6	**ZBR-60x70x7-E6W**
	70	11	5	0,2	6	**ZBR-60x70x11-E6W**
	73	11	6,5	0,2	7,5	**ZBR-60x73x11-E6W**
	75	10	7,5	0,5	8,5	**ZBR-60x75x10-E6W**
	80	13	10	0,8	11	**ZBR-60x80x13-E6W**
63	73	7	5	0,2	6	**ZBR-63x73x7-E6W**
	78	12,4	7,5	0,5	8,5	**ZBR-63x78x12.4-E6W**
	78	13,5	7,5	0,5	6	**ZBR-63x78x13.5-E6W**
65	75	7	5	0,2	6	**ZBR-65x75x7-E6W**
	78	11	6,5	0,2	7,5	**ZBR-65x78x11-E6W**
	80	10	7,5	0,5	8,5	**ZBR-65x80x10-E6W**
	80	13	7,5	0,5	8,5	**ZBR-65x80x13-E6W**
	85	13	10	0,8	11	**ZBR-65x85x13-E6W**

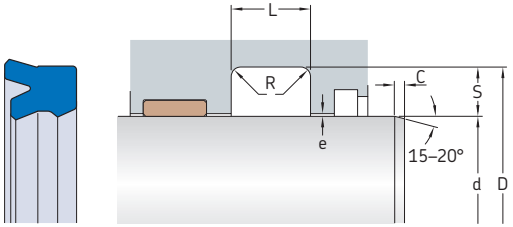
• Dimensions in accordance with ISO 5597

Dimensions						Designation
d f8 or h9	D H10	L +0,2	S	R max.	C min.	
mm						–
70	80	7	5	0,2	6	**ZBR-70x80x7-E6W**
	83	11	6,5	0,2	7,5	**ZBR-70x83x11-E6W**
	85	10	7,5	0,5	8,5	**ZBR-70x85x10-E6W**
	85	11	7,5	0,5	8,5	**ZBR-70x85x11-E6W**
	85	12,4	7,5	0,5	8,5	• **ZBR-70x85x12.4-E6W**
	90	13	10	0,8	11	**ZBR-70x90x13-E6W**
75	85	7	5	0,2	6	**ZBR-75x85x7-E6W**
	88	11	6,5	0,2	7,5	**ZBR-75x88x11-E6W**
	90	10	7,5	0,5	8,5	**ZBR-75x90x10-E6W**
	90	11	7,5	0,5	8,5	**ZBR-75x90x11-E6W**
	95	13	10	0,8	11	**ZBR-75x95x13-E6W**
80	90	7	5	0,2	6	**ZBR-80x90x7-E6W**
	93	11	6,5	0,2	7,5	**ZBR-80x93x11-E6W**
	95	10	7,5	0,5	8,5	**ZBR-80x95x10-E6W**
	95	12,4	7,5	0,5	8,5	• **ZBR-80x95x12.4-E6W**
	100	13	10	0,8	11	**ZBR-80x100x13-E6W**
85	100	10	7,5	0,5	8,5	**ZBR-85x100x10-E6W**
	100	11	7,5	0,5	8,5	**ZBR-85x100x11-E6W**
	100	13	7,5	0,5	8,5	**ZBR-85x100x13-E6W**
	105	13	10	0,8	11	**ZBR-85x105x13-E6W**
90	105	11	7,5	0,5	8,5	**ZBR-90x105x11-E6W**
	105	12,4	7,5	0,5	8,5	• **ZBR-90x105x12.4-E6W**
	110	13	10	0,8	11	**ZBR-90x110x13-E6W**
95	110	10	7,5	0,5	8,5	**ZBR-95x110x10-E6W**
	110	11	7,5	0,5	8,5	**ZBR-95x110x11-E6W**
	115	13	10	0,8	11	**ZBR-95x115x13-E6W**
100	112	15	6	0,2	7	**ZBR-100x112x15-E6W**
	115	10	7,5	0,5	8,5	**ZBR-100x115x10-E6W**
	115	11	7,5	0,5	8,5	**ZBR-100x115x11-E6W**
	115	12,5	7,5	0,5	8,5	**ZBR-100x115x12.5-E6W**
	120	13	10	0,8	11	**ZBR-100x120x13-E6W**
	120	15,5	10	0,8	11	**ZBR-100x120x15.5-E6W**
105	120	10	7,5	0,5	8,5	**ZBR-105x120x10-E6W**
	125	16,5	10	0,8	11	**ZBR-105x125x16.5-E6W**
110	125	11	7,5	0,5	8,5	**ZBR-110x125x11-E6W**
	130	16,5	10	0,8	11	**ZBR-110x130x16.5-E6W**
112	125	10	6,5	0,2	7,5	**ZBR-112x125x10-E6W**
118	133	10	7,5	0,5	8,5	**ZBR-118x133x10-E6W**
120	140	16,5	10	0,8	11	**ZBR-120x140x16.5-E6W**
125	140	10	7,5	0,5	8,5	**ZBR-125x140x10-E6W**
	145	16,5	10	0,8	11	**ZBR-125x145x16.5-E6W**
130	145	12	7,5	0,5	8,5	**ZBR-130x145x12-E6W**
	150	16,5	10	0,2	11	**ZBR-130x150x16.5-E6W**
136	150	10	7	0,5	8,5	**ZBR-136x150x10-E6W**
140	155	10	7,5	0,5	8,5	**ZBR-140x155x10-E6W**
	160	16,5	10	0,8	11	**ZBR-140x160x16.5-E6W**
145	160	10	7,5	0,5	8,5	**ZBR-145x160x10-E6W**
150	170	16,5	10	0,8	11	**ZBR-150x170x16.5-E6W**

• Dimensions in accordance with ISO 5597

3.2 ZBR profile rod seals, metric sizes

d **160 – 255** mm



Maximum extrusion gap e

Radial depth S	e_{max} **at 80 °C** ***(175 °F)*** **for pressures** 160 bar	250 bar	350 bar
mm	mm		
3,5 to 4	0,35	0,2	–
5 to 6,5	0,45	0,25	0,1
7 to 7,5	0,5	0,3	0,15
10	0,55	0,3	0,15
12,5	0,6	0,3	0,2

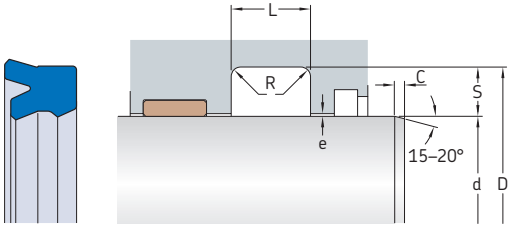
For additional information → **page 34**

Dimensions						**Designation**
d f8 or h9	D H10	L +0,2	S	R max.	C min.	
mm						–
160	180	16,5	10	0,8	11	**ZBR-160x180x16.5-E6W**
	185	19,7	12,5	0,8	13	**ZBR-160x185x19.7-E6W**
180	200	13,5	10	0,8	11	**ZBR-180x200x13.5-E6W**
200	220	13,5	10	0,8	11	**ZBR-200x220x13.5-E6W**
230	250	13,5	10	0,8	11	**ZBR-230x250x13.5-E6W**
240	260	16,5	10	0,8	11	**ZBR-240x260x16.5-E6W**
255	280	20,5	12,5	0,8	13	**ZBR-255x280x20.5-E6W**

Other sizes are available on request

3.2 ZBR profile rod seals, inch sizes

d **0.75 – 3** in.



Maximum extrusion gap e

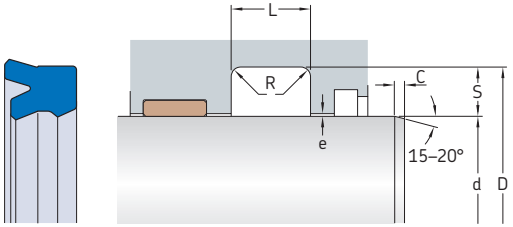
Radial depth S	e_{max} at 80 °C *(175 °F)* for pressures 2 300 psi	3 600 psi	5 800 psi
in.	in.		
0.125	0.008	0.004	–
0.187	0.014	0.008	–
0.250	0.018	0.01	0.004
0.312	0.020	0.012	0.006
0.375	0.020	0.012	0.006
0.5	0.024	0.012	0.008

For additional information → **page 34**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.010	S	R max.	C min.	
in.								–
0.75	–0.001	1	+0.002	0.275	0.125	0.015	0.25	**ZBR125-750-250-E6W**
1	–0.001	1.25	+0.002	0.275	0.125	0.015	0.25	**ZBR125-1000-250-E6W**
1.125	–0.001	1.375	+0.002	0.213	0.125	0.015	0.25	**ZBR125-1125-187-E6W**
	–0.001	1.375	+0.002	0.275	0.125	0.015	0.25	**ZBR125-1125-250-E6W**
	–0.002	1.5	+0.002	0.343	0.187	0.015	0.25	**ZBR187-1125-312-E6W**
1.25	–0.001	1.5	+0.002	0.213	0.125	0.015	0.25	**ZBR125-1250-187-E6W**
	–0.001	1.5	+0.002	0.223	0.125	0.015	0.25	**ZBR125-1250-197-E6W**
	–0.001	1.5	+0.002	0.275	0.125	0.015	0.25	**ZBR125-1250-250-E6W**
	–0.002	1.625	+0.002	0.275	0.187	0.015	0.25	**ZBR187-1250-250-E6W**
	–0.002	1.625	+0.002	0.343	0.187	0.015	0.25	**ZBR187-1250-312-E6W**
1.375	–0.001	1.625	+0.002	0.275	0.125	0.015	0.25	**ZBR125-1375-250-E6W**
1.5	–0.001	1.75	+0.002	0.275	0.125	0.015	0.25	**ZBR125-1500-250-E6W**
	–0.002	1.875	+0.002	0.343	0.187	0.015	0.25	**ZBR187-1500-312-E6W**
	–0.002	1.875	+0.002	0.413	0.187	0.015	0.25	**ZBR187-1500-375-E6W**
	–0.002	2	+0.003	0.413	0.250	0.02	0.312	**ZBR250-1500-375-E6W**
1.75	–0.002	2.125	+0.002	0.343	0.187	0.015	0.25	**ZBR187-1750-312-E6W**
	–0.002	2.125	+0.002	0.413	0.187	0.015	0.25	**ZBR187-1750-375-E6W**
	–0.002	2.25	+0.003	0.413	0.250	0.02	0.312	**ZBR250-1750-375-E6W**
1.875	–0.002	2.375	+0.003	0.413	0.250	0.02	0.312	**ZBR250-1875-375-E6W**
2	–0.002	2.375	+0.002	0.343	0.187	0.015	0.25	**ZBR187-2000-312-E6W**
	–0.002	2.375	+0.002	0.413	0.187	0.015	0.25	**ZBR187-2000-375-E6W**
	–0.002	2.5	+0.003	0.413	0.250	0.02	0.312	**ZBR250-2000-375-E6W**
2.25	–0.002	2.625	+0.002	0.3685	0.187	0.015	0.25	**ZBR187-2250-335-E6W**
	–0.002	2.75	+0.003	0.413	0.250	0.02	0.312	**ZBR250-2250-375-E6W**
2.5	–0.002	3	+0.003	0.413	0.250	0.02	0.312	**ZBR250-2500-375-E6W**
2.625	–0.002	3.125	+0.003	0.413	0.250	0.02	0.312	**ZBR250-2625-375-E6W**
2.875	–0.002	3.375	+0.003	0.413	0.250	0.02	0.312	**ZBR250-2875-375-E6W**
3	–0.002	3.5	+0.003	0.413	0.250	0.02	0.312	**ZBR250-3000-375-E6W**

3.2 ZBR profile rod seals, inch sizes

d **3.25 – 8** in.



Maximum extrusion gap e

Radial depth S	e_{max} at 80 °C *(175 °F)* **for pressures** 2 300 psi	3 600 psi	5 800 psi
in.	in.		
0.125	0.008	0.004	–
0.187	0.014	0.008	–
0.250	0.018	0.01	0.004
0.312	0.02	0.012	0.006
0.375	0.02	0.012	0.006
0.5	0.024	0.012	0.008

For additional information → **page 34**

Dimensions								**Designation**
d	Tolerance	D	Tolerance	L +0.010	S	R max.	C min.	
in.								–
3.25	–0.002	3.75	+0.003	0.413	0.250	0.02	0.312	**ZBR250-3250-375-E6W**
3.5	–0.002	4	+0.003	0.413	0.250	0.02	0.312	**ZBR250-3500-375-E6W**
3.75	–0.002	4.375	+0.004	0.55	0.312	0.02	0.375	**ZBR312-3750-500-E6W**
4	–0.002	4.5	+0.003	0.413	0.250	0.02	0.312	**ZBR250-4000-375-E6W**
4.75	–0.002	5.25	+0.003	0.688	0.250	0.02	0.312	**ZBR250-4750-625-E6W**
5	–0.002	5.5	+0.003	0.413	0.250	0.02	0.312	**ZBR250-5000-375-E6W**
	–0.002	5.5	+0.003	0.618	0.250	0.02	0.312	**ZBR250-5000-562-E6W**
5.25	–0.002	5.75	+0.003	0.618	0.250	0.02	0.312	**ZBR250-5250-562-E6W**
5.5	–0.002	6	+0.003	0.618	0.250	0.02	0.312	**ZBR250-5500-562-E6W**
	–0.002	6.25	+0.005	0.688	0.375	0.035	0.5	**ZBR375-5500-625-E6W**
6.5	–0.002	7.25	+0.005	0.688	0.375	0.035	0.5	**ZBR375-6500-625-E6W**
	–0.003	7.5	+0.007	0.825	0.500	0.035	0.625	**ZBR500-6500-750E6W**
7	–0.003	8	+0.007	0.825	0.500	0.035	0.625	**ZBR500-7000-750E6W**
7.75	–0.002	8.5	+0.005	0.688	0.375	0.035	0.5	**ZBR375-7750-625-E6W**
8	–0.002	8.75	+0.005	0.688	0.375	0.035	0.5	**ZBR375-8000-625-E6W**

Other sizes are available on request

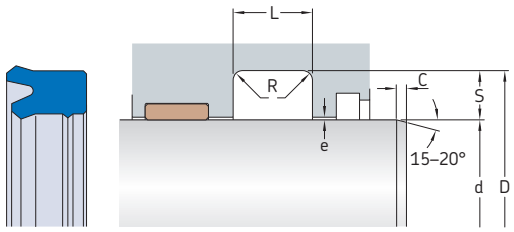
SIL profile data

Material code	B93 For additional information → **page 26**
Pressure	Up to 350 bar *(5 075 psi)*
Speed	Up to 0,5 m/s *(1.6 ft/s)*
Temperature range	 Extreme low temperature range: may be intermittently exposed (e.g. cold start-up) without seal damage, but seal performance may be compromised while in this range Temperatures below the recommended operating range: seal performance depends on system design (precision guiding arrangement recommended) **Recommended operating temperature range for this profile and material** Extreme high temperature range: only occasional short-term exposure (e.g. cylinder in curing oven of a powder coating process)
Dimension standards	Some sizes fit seal grooves in accordance with ISO 5597.
Counter-surface	→ **page 22**

Maximum values of application parameters (e.g. pressure, speed, temperature, e-gap) should not be applied continuously nor simultaneously.

3.3 SIL profile rod seals, metric sizes

d **10 – 30** mm



Maximum extrusion gap e

Radial depth S	e_{max} at 60 °C *(140 °F)* for pressures 160 bar	250 bar	350 bar
mm	mm		
3	0,2	0,1	–
4	0,35	0,2	–
5	0,45	0,25	0,1
7,5	0,5	0,3	0,15
10	0,55	0,3	0,15

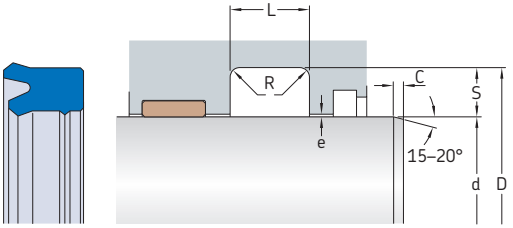
For additional information → **page 34**

Dimensions						Designation
d f8 or h9	D H10	L +0,2	S	R max.	C min.	
mm						–
10	18	6,3	4	0,3	2	• **SIL 10x18x6.3**
12	20	6,3	4	0,3	2	• **SIL 12x20x6.3**
	22	8	5	0,3	2,5	• **SIL 12x22x8**
14	22	6,3	4	0,3	2	• **SIL 14x22x6.3**
	24	8	5	0,3	2,5	• **SIL 14x24x8**
16	22	6	3	0,3	2	**SIL 16x22x6**
	24	6,3	4	0,3	2	• **SIL 16x24x6.3**
	24	7	4	0,3	2	**SIL 16x24x7**
18	24	5,2	3	0,3	2	**SIL 18x24x5.2**
	26	6,3	4	0,3	2	• **SIL 18x26x6.3**
20	26	5,5	3	0,3	2	**SIL 20x26x5.5**
	28	6,3	4	0,3	2	• **SIL 20x28x6.3**
	30	8	5	0,3	2,5	• **SIL 20x30x8**
	30	9	5	0,3	2,5	**SIL 20x30x9**
22	30	6,3	4	0,3	2	• **SIL 22x30x6.3**
	32	8	5	0,3	2,5	• **SIL 22x32x8**
25	33	6,3	4	0,3	2	• **SIL 25x33x6.3**
	33	7	4	0,3	2	**SIL 25x33x7**
	33	11	4	0,3	2	**SIL 25x33x11**
	35	8	5	0,3	2,5	• **SIL 25x35x8**
	35	9	5	0,3	2,5	**SIL 25x35x9**
	35	11	5	0,3	2,5	**SIL 25x35x11**
28	38	8	5	0,3	2,5	• **SIL 28x38x8**
	38	9	5	0,3	2,5	**SIL 28x38x9**
	43	12,5	7,5	0,4	4	• **SIL 28x43x12.5**
30	38	6,3	4	0,3	2	**SIL 30x38x6.3**
	40	8	5	0,3	2,5	**SIL 30x40x8**
	40	11	5	0,3	2,5	**SIL 30x40x11**
	45	11	7,5	0,4	4	**SIL 30x45x11**

• Dimensions in accordance with ISO 5597

3.3 SIL profile rod seals, metric sizes

d **32 – 150** mm



Maximum extrusion gap e

Radial depth S	e_{max} at 60 °C *(140 °F)* for pressures 160 bar	250 bar	350 bar
mm	mm		
3	0,2	0,1	–
4	0,35	0,2	–
5	0,45	0,25	0,1
7,5	0,5	0,3	0,15
10	0,55	0,3	0,15

For additional information → **page 34**

Dimensions						Designation
d f8 or h9	D H10	L +0,2	S	R max.	C min.	
mm						–
32	40	6,3	4	0,3	2	**SIL 32x40x6.3**
	40	9	4	0,3	2	**SIL 32x40x9**
	42	8	5	0,3	2,5	• **SIL 32x42x8**
	42	11	5	0,3	2,5	**SIL 32x42x11**
	47	12,5	7,5	0,4	4	• **SIL 32x47x12.5**
33	43	11	5	0,3	2,5	**SIL 33x43x11**
35	43	6,3	4	0,3	2	**SIL 35x43x6.3**
	45	8	5	0,3	2,5	**SIL 35x45x8**
	45	11	5	0,3	2,5	**SIL 35x45x11**
	50	11	7,5	0,4	4	**SIL 35x50x11**
36	46	8	5	0,3	2,5	• **SIL 36x46x8**
	51	12,5	7,5	0,4	4	• **SIL 36x51x12.5**
40	50	8	5	0,3	2,5	• **SIL 40x50x8**
	50	11	5	0,3	2,5	**SIL 40x50x11**
	55	11	7,5	0,4	4	**SIL 40x55x11**
	55	12,5	7,5	0,4	4	• **SIL 40x55x12.5**
	60	13	5	0,6	5	**SIL 40x60x13**
42	52	11	5	0,3	2,5	**SIL 42x52x11**
45	55	8	5	0,3	2,5	• **SIL 45x55x8**
	55	11	5	0,3	2,5	**SIL 45x55x11**
	60	11	7,5	0,4	4	**SIL 45x60x11**
	60	12,5	7,5	0,4	4	• **SIL 45x60x12.5**
46	56	11	5	0,3	2,5	**SIL 46x56x11**
50	60	8	5	0,3	2,5	• **SIL 50x60x8**
	60	11	5	0,3	2,5	**SIL 50x60x11**
	65	11	7,5	0,4	4	**SIL 50x65x11**
	65	12,5	7,5	0,4	4	• **SIL 50x65x12.5**
55	65	11	5	0,3	2,5	**SIL 55x65x11**
	70	12,5	7,5	0,4	4	**SIL 55x70x12.5**

• Dimensions in accordance with ISO 5597

SKF

Dimensions							Designation
d f8 or h9	D H10	L +0,2	S	R max.	C min.		
mm							–
56	66	11	5	0,3	2,5		**SIL 56x66x11**
	71	11	7,5	0,4	4		**SIL 56x71x11**
	71	12,5	7,5	0,4	4	•	**SIL 56x71x12.5**
	76	16	10	0,6	5	•	**SIL 56x76x16**
60	70	11	5	0,3	2,5		**SIL 60x70x11**
	70	13	5	0,3	2,5		**SIL 60x70x13**
	75	11	7,5	0,4	4		**SIL 60x75x11**
	75	13	7,5	0,4	4		**SIL 60x75x13**
63	73	13	5	0,3	2,5		**SIL 63x73x13**
	78	11	7,5	0,4	4		**SIL 63x78x11**
	78	12,5	7,5	0,4	4	•	**SIL 63x78x12.5**
	83	13	10	0,6	5		**SIL 63x83x13**
	83	16	10	0,6	5	•	**SIL 63x83x16**
65	75	13	5	0,3	2,5		**SIL 65x75x13**
70	80	9	5	0,3	2,5		**SIL 70x80x9**
	80	12,5	5	0,3	2,5		**SIL 70x80x12.5**
	85	11	7,5	0,4	4		**SIL 70x85x11**
	85	12,5	7,5	0,4	4	•	**SIL 70x85x12.5**
	90	13	10	0,6	5		**SIL 70x90x13**
	90	16	10	0,6	5	•	**SIL 70x90x16**
75	85	12,5	5	0,3	2,5		**SIL 75x85x12.5**
	90	12,5	7,5	0,4	4		**SIL 75x90x12.5**
80	90	11	5	0,3	2,5		**SIL 80x90x11**
	90	13	5	0,3	2,5		**SIL 80x90x13**
	95	11	7,5	0,4	4		**SIL 80x95x11**
	95	12,5	7,5	0,4	4	•	**SIL 80x95x12.5**
	100	13	10	0,6	5		**SIL 80x100x13**
	100	16	10	0,6	5	•	**SIL 80x100x16**
85	100	12,5	7,5	0,4	4		**SIL 85x100x12.5**
	105	13	10	0,6	5		**SIL 85x105x13**
90	105	12,5	7,5	0,4	4	•	**SIL 90x105x12.5**
	110	13	10	0,6	5		**SIL 90x110x13**
	110	16	10	0,6	5	•	**SIL 90x110x16**
95	110	12,5	7,5	0,4	4		**SIL 95x110x12.5**
	115	13	10	0,6	5		**SIL 95x115x13**
100	115	13	7,5	0,4	4		**SIL 100x115x13**
	120	13	10	0,6	5		**SIL 100x120x13**
	120	16	10	0,6	5	•	**SIL 100x120x16**
105	115	11	5	0,3	2,5		**SIL 105x115x11**
	125	13	10	0,6	5		**SIL 105x125x13**
110	130	16	10	0,6	5	•	**SIL 110x130x16**
120	140	13	10	0,6	5		**SIL 120x140x13**
	140	16	10	0,6	5		**SIL 120x140x16**
125	145	13	10	0,6	5		**SIL 125x145x13**
	145	16	10	0,6	5	•	**SIL 125x145x16**
130	150	16	10	0,6	5		**SIL 130x150x16**
140	160	16	10	0,6	5	•	**SIL 140x160x16**
150	170	13	10	0,6	5		**SIL 150x170x13**
	170	16	10	0,6	5		**SIL 150x170x16**
	Other sizes are available on request						

• Dimensions in accordance with ISO 5597

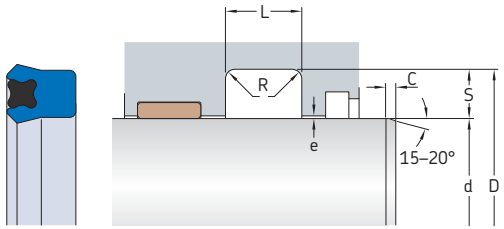
PTB profile data

Material codes	Sealing ring: U-1003 X-ring: A-8501 For additional information → **page 26**
Pressure	Up to 400 bar *(5 800 psi)*
Speed	Up to 1 m/s *(3.2 ft/s)*
Temperature range	 Extreme low temperature range: may be intermittently exposed (e.g. cold start-up) without seal damage, but seal performance may be compromised while in this range Temperatures below the recommended operating range: seal performance depends on system design (precision guiding arrangement recommended) **Recommended operating temperature range for this profile and material** Temperatures above the recommended operating range: acceptable only with reduced pressure, speed, e-gap and/or with the use of a full-face anti-extrusion ring Extreme high temperature range: only occasional short-term exposure (e.g. cylinder in curing oven of a powder coating process)
Dimension standards	Some metric sizes fit seal housings in accordance with ISO 5597.
Counter-surface	→ **page 22**

Maximum values of application parameters (e.g. pressure, speed, temperature, e-gap) should not be applied continuously nor simultaneously.

3.4 PTB profile rod seals, metric sizes

d **8 – 17** mm



Maximum extrusion gap e

Radial depth S	e_{max} at 60 °C *(140 °F)* for pressures 160 bar	250 bar	400 bar
mm	mm		
3	0,2	0,1	–
3,5 to 4	0,35	0,2	–
4,5 to 6,5	0,45	0,25	0,1
7 to 8	0,5	0,3	0,15
9 to 11,5	0,55	0,3	0,15
12,5	0,6	0,3	0,2
15	0,6	0,3	0,2

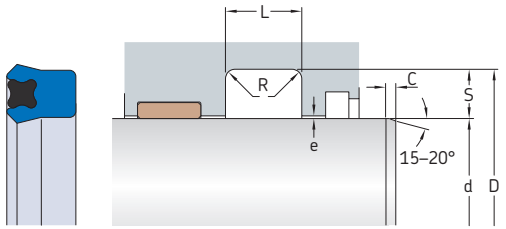
For additional information → **page 34**

Dimensions						Designation
d f8 or h9	D H10	L +0,2	S	R max.	C min.	
mm						–
8	16	6,3	4	0,2	6	• **PTB-8x16x6.3-J1S**
9	17	6,3	4	0,2	6	**PTB-9x17x6.3-J1S**
	19	8,8	5	0,2	6	**PTB-9x19x8.8-J1S**
10	16	6,6	3	0,2	6	**PTB-10x16x6.6-J1S**
	18	6,3	4	0,2	6	• **PTB-10x18x6.3-J1S**
	18	8,8	4	0,2	6	**PTB-10x18x8.8-J1S**
	20	8,3	5	0,2	6	**PTB-10x20x8.3-J1S**
	20	8,8	5	0,2	6	**PTB-10x20x8.8-J1S**
11,2	19,2	5,5	4	0,2	6	**PTB-11.2x19.2x5.5-J1S**
12	18	6,6	3	0,2	6	**PTB-12x18x6.6-J1S**
	19	5,1	3,5	0,2	6	**PTB-12x19x5.1-J1S**
	20	5,5	4	0,2	6	**PTB-12x20x5.5-J1S**
	20	7	4	0,2	6	**PTB-12x20x7-J1S**
	22	6,6	5	0,2	6	**PTB-12x22x6.6-J1S**
	22	8	5	0,2	6	• **PTB-12x22x8-J1S**
	22	8,8	5	0,2	6	**PTB-12x22x8.8-J1S**
12,5	22,5	8,8	5	0,2	6	**PTB-12.5x22.5x8.8-J1S**
13	19	4,4	3	0,2	6	**PTB-13x19x4.4-J1S**
14	21	5,1	3,5	0,2	6	**PTB-14x21x5.1-J1S**
	22	5,5	4	0,2	6	**PTB-14x22x5.5-J1S**
	24	6,1	5	0,2	6	**PTB-14x24x6.1-J1S**
	24	8,8	5	0,2	6	**PTB-14x24x8.8-J1S**
15	22	5,5	3,5	0,2	6	**PTB-15x22x5.5-J1S**
	25	8,8	5	0,2	6	**PTB-15x25x8.8-J1S**
16	22	4,4	3	0,2	6	**PTB-16x22x4.4-J1S**
	24	5,5	4	0,2	6	**PTB-16x24x5.5-J1S**
	26	8,8	5	0,2	6	**PTB-16x26x8.8-J1S**
17	25	11	4	0,2	6	**PTB-17x25x11-J1S**

• Dimensions in accordance with ISO 5597

3.4 PTB profile rod seals, metric sizes

d **18 – 35** mm



Maximum extrusion gap e

Radial depth S	e_{max} at 60 °C *(140 °F)* for pressures 160 bar	250 bar	400 bar
mm	mm		
3	0,2	0,1	–
3,5 to 4	0,35	0,2	–
4,5 to 6,5	0,45	0,25	0,1
7 to 8	0,5	0,3	0,15
9 to 11,5	0,55	0,3	0,15
12,5	0,6	0,3	0,2
15	0,6	0,3	0,2

For additional information → **page 34**

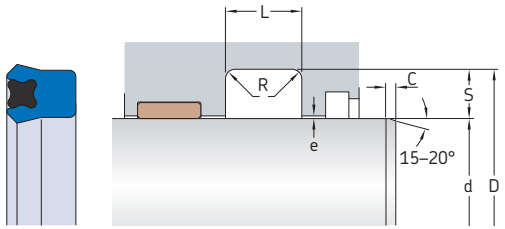
Dimensions						Designation
d f8 or h9	D H10	L +0,2	S	R max.	C min.	
mm						–
18	25	5,1	3,5	0,2	6	**PTB-18x25x5.1-J1S**
	26	5,5	4	0,2	6	**PTB-18x26x5.5-J1S**
	28	8,8	5	0,2	6	**PTB-18x28x8.8-J1S**
20	26	5,5	3	0,2	6	**PTB-20x26x5.5-J1S**
	27	6,6	3,5	0,2	6	**PTB-20x27x6.6-J1S**
	28	5,5	4	0,2	6	**PTB-20x28x5.5-J1S**
	28	6,3	4	0,2	6	• **PTB-20x28x6.3-J1S**
	28	7,9	4	0,2	6	**PTB-20x28x7.9-J1S**
	30	6,6	5	0,2	6	**PTB-20x30x6.6-J1S**
	30	7,9	5	0,2	6	**PTB-20x30x7.9-J1S**
	30	8,8	5	0,2	6	**PTB-20x30x8.8-J1S**
	32	6,6	6	0,2	7	**PTB-20x32x6.6-J1S**
	32	8,8	6	0,2	7	**PTB-20x32x8.8-J1S**
	35	11	7,5	0,5	8,5	**PTB-20x35x11-J1S**
	35	3,2	7,5	0,5	8,5	**PTB-20x35x13.2-J1S**
	40	3,2	10	0,8	11	**PTB-20x40x13.2-J1S**
22	29	5,1	3,5	0,2	6	**PTB-22x29x5.1-J1S**
	30	5,5	4	0,2	6	**PTB-22x30x5.5-J1S**
	30	6,3	4	0,2	6	• **PTB-22x30x6.3-J1S**
	30	6,6	4	0,2	6	**PTB-22x30x6.6-J1S**
	30	7,7	4	0,2	6	**PTB-22x30x7.7-J1S**
	30	8,8	4	0,2	6	**PTB-22x30x8.8-J1S**
	32	6,6	5	0,2	6	**PTB-22x32x6.6-J1S**
	32	8	5	0,2	6	• **PTB-22x32x8-J1S**
	32	8,8	5	0,2	6	**PTB-22x32x8.8-J1S**
	35	8,8	6,5	0,2	7,5	**PTB-22x35x8.8-J1S**
	35	11	6,5	0,2	7,5	**PTB-22x35x11-J1S**
	40	3,2	9	0,8	11	**PTB-22x40x13.2-J1S**
22,4	30	5,5	3,8	0,2	6	**PTB-22.4x30x5.5-J1S**
	32,4	8,8	5	0,2	6	**PTB-22.4x32.4x8.8-J1S**
23,5	31,5	5,5	4	0,2	6	**PTB-23.5x31.5x5.5-J1S**

• Dimensions in accordance with ISO 5597

Dimensions						Designation
d f8 or h9	D H10	L +0,2	S	R max.	C min.	
mm						–
25	33	5,5	4	0,2	6	**PTB-25x33x5.5-J1S**
	33	6,1	4	0,2	6	**PTB-25x33x6.1-J1S**
	33	6,3	4	0,2	6	**PTB-25x33x6.3-J1S**
	33	8,8	4	0,2	6	**PTB-25x33x8.8-J1S**
	33	11	4	0,2	6	**PTB-25x33x11-J1S**
	35	8	5	0,2	6	• **PTB-25x35x8-J1S**
	35	8,8	5	0,2	6	**PTB-25x35x8.8-J1S**
	35	11	5	0,2	6	**PTB-25x35x11-J1S**
	38	8,8	6,5	0,2	7,5	**PTB-25x38x8.8-J1S**
	38	11	6,5	0,2	7,5	**PTB-25x38x11-J1S**
	40	11	7,5	0,5	8,5	**PTB-25x40x11-J1S**
28	35	5,5	3,5	0,2	6	**PTB-28x35.5x5.5-J1S**
	36	5,8	4	0,2	6	**PTB-28x36x5.8-J1S**
	36	8,8	4	0,2	6	**PTB-28x36x8.8-J1S**
	37	8,6	4,5	0,2	6	**PTB-28x37.5x8.6-J1S**
	38	8	5	0,2	6	• **PTB-28x38x8-J1S**
	38	8,8	5	0,2	6	**PTB-28x38x8.8-J1S**
	38	11	5	0,2	6	**PTB-28x38x11-J1S**
	40	6,6	6	0,2	7	**PTB-28x40x6.6-J1S**
	40	11	6	0,2	7	**PTB-28x40x11-J1S**
	43	11,2	7,5	0,5	8,5	**PTB-28x43x11.2-J1S**
	48	13,2	10	0,8	11	**PTB-28x48x13.2-J1S**
30	37	6,6	3,5	0,2	6	**PTB-30x37x6.6-J1S**
	38	6,3	4	0,2	6	**PTB-30x38x6.3-J1S**
	38	6,9	4	0,2	6	**PTB-30x38x6.9-J1S**
	38	8,8	4	0,2	6	**PTB-30x38x8.8-J1S**
	40	6,6	5	0,2	6	**PTB-30x40x6.6-J1S**
	40	7,2	5	0,2	6	**PTB-30x40x7.2-J1S**
	40	8	5	0,2	6	**PTB-30x40x8-J1S**
	40	11	5	0,2	6	**PTB-30x40x11-J1S**
	42	9,9	6	0,2	7	**PTB-30x42x9.9-J1S**
	42	11	6	0,2	7	**PTB-30x42x11-J1S**
	45	9,9	7,5	0,5	8,5	**PTB-30x45x9.9-J1S**
	45	11	7,5	0,5	8,5	**PTB-30x45x11-J1S**
	50	11	10	0,8	11	**PTB-30x50x11-J1S**
31,5	41,5	6,6	5	0,2	6	**PTB-31.5x41.5x6.6-J1S**
32	40	6,3	4	0,2	6	**PTB-32x40x6.3-J1S**
	40	8,3	4	0,2	6	**PTB-32x40x8.3-J1S**
	40	8,8	4	0,2	6	**PTB-32x40x8.8-J1S**
	42	8	5	0,2	6	• **PTB-32x42x8-J1S**
	42	11	5	0,2	6	**PTB-32x42x11-J1S**
	44	6,1	6	0,2	7	**PTB-32x44x6.1-J1S**
	44	6,9	6	0,2	7	**PTB-32x44x6.9-J1S**
	45	11	6,5	0,2	7,5	**PTB-32x45x11-J1S**
	47	11	7,5	0,5	8,5	**PTB-32x47x11-J1S**
	48	11	8	0,5	8,5	**PTB-32x48x11-J1S**
33	40	8,8	3,5	0,2	6	**PTB-33x40x8.8-J1S**
	43	11	5	0,2	6	**PTB-33x43x11-J1S**
35	43	7	4	0,2	6	**PTB-35x43x7-J1S**
	43	8,8	4	0,2	6	**PTB-35x43x8.8-J1S**
	45	6,6	5	0,2	6	**PTB-35x45x6.6-J1S**
	45	8	5	0,2	6	**PTB-35x45x8-J1S**
	45	8,8	5	0,2	6	**PTB-35x45x8.8-J1S**
	45	11	5	0,2	6	**PTB-35x45x11-J1S**

• Dimensions in accordance with ISO 5597

3.4 PTB profile rod seals, metric sizes
d **35 – 60** mm



Maximum extrusion gap e

Radial depth S	e_{max} at 60 °C *(140 °F)* for pressures 160 bar	250 bar	400 bar
mm	mm		
3	0,2	0,1	–
3,5 to 4	0,35	0,2	–
4,5 to 6,5	0,45	0,25	0,1
7 to 8	0,5	0,3	0,15
9 to 11,5	0,55	0,3	0,15
12,5	0,6	0,3	0,2
15	0,6	0,3	0,2

For additional information → **page 34**

Dimensions						Designation
d f8 or h9	D H10	L +0,2	S	R max.	C min.	
mm						–
35	50	9,9	7,5	0,5	8,5	**PTB-35x50x9.9-J1S**
cont.	50	11	7,5	0,5	8,5	**PTB-35x50x11-J1S**
	50	2,5	7,5	0,5	8,5	**PTB-35x50x12.5-J1S**
	51	11	8	0,5	8,5	**PTB-35x51x11-J1S**
	55	11	10	0,8	11	**PTB-35x55x11-J1S**
35,5	45	6,6	4,75	0,2	6	**PTB-35.5x45x6.6-J1S**
36	44	5,8	4	0,2	6	**PTB-36x44x5.8-J1S**
	44	6,6	4	0,2	6	**PTB-36x44x6.6-J1S**
	44	8,8	4	0,2	6	**PTB-36x44x8.8-J1S**
	46	8,8	5	0,2	6	**PTB-36x46x8-J1S**
	46	11	5	0,2	6	**PTB-36x46x11-J1S**
	52	11	8	0,5	8,5	**PTB-36x52x11-J1S**
37	47	8,8	5	0,2	6	**PTB-37x47x8.8-J1S**
	47	5,5	5	0,2	6	**PTB-37x47x5.5-J1S**
40	48	5,5	4	0,2	6	**PTB-40x48x5.5-J1S**
	48	6,6	4	0,2	6	**PTB-40x48x6.6-J1S**
	48	8,8	4	0,2	6	**PTB-40x48x8.8-J1S**
	50	6,6	5	0,2	6	**PTB-40x50x6.6-J1S**
	50	7,2	5	0,2	6	**PTB-40x50x7.2-J1S**
	50	8	5	0,2	6	• **PTB-40x50x8-J1S**
	50	8,8	5	0,2	6	**PTB-40x50x8.8-J1S**
	50	11	5	0,2	6	**PTB-40x50x11-J1S**
	53	8,8	6,5	0,2	7,5	**PTB-40x53x8.8-J1S**
	55	9,9	7,5	0,5	8,5	**PTB-40x55x9.9-J1S**
	55	11	7,5	0,5	8,5	**PTB-40x55x11-J1S**
	56	11	8	0,5	8,5	**PTB-40x56x11-J1S**
	60	13,2	10	0,8	11	**PTB-40x60x13.2-J1S**
41,7	50,7	7,8	4,5	0,2	6	**PTB-41.7x50.7x7.8-J1S**
42	55	7,7	6,5	0,2	7,5	**PTB-42x55x7.7-J1S**

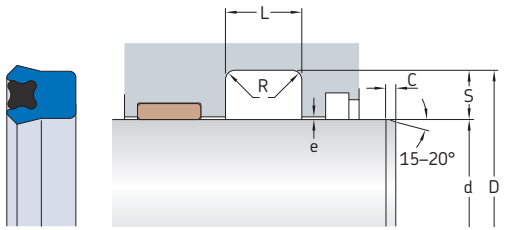
• Dimensions in accordance with ISO 5597

Dimensions						Designation
d f8 or h9	D H10	L +0,2	S	R max.	C min.	
mm						–
45	53	5,8	4	0,2	6	**PTB-45x53x5.8-J1S**
	53	8,8	4	0,2	6	**PTB-45x53x8.8-J1S**
	55	6,6	5	0,2	6	**PTB-45x55x6.6-J1S**
	55	8	5	0,2	6	• **PTB-45x55x8-J1S**
	55	11	5	0,2	6	**PTB-45x55x11-J1S**
	56	7,7	5,5	0,2	7	**PTB-45x56x7.7-J1S**
	60	9,9	7,5	0,5	8,5	**PTB-45x60x9.9-J1S**
	60	11	7,5	0,5	8,5	**PTB-45x60x11-J1S**
	60	12,7	7,5	0,5	8,5	**PTB-45x60x12.7-J1S**
	63	13,2	9	0,8	11	**PTB-45x63x13.2-J1S**
	65	13,2	10	0,8	11	**PTB-45x65x13.2-J1S**
	70	16,5	12,5	0,8	13	**PTB-45x70x16.5-J1S**
48	63	11,2	7,5	0,5	8,5	**PTB-48x63x11.2-J1S**
	68	13,2	10	0,8	11	**PTB-48x68x13.2-J1S**
50	58	8,8	4	0,2	6	**PTB-50x58x8.8-J1S**
	60	6,6	5	0,2	6	**PTB-50x60x6.6-J1S**
	60	8	5	0,2	6	• **PTB-50x60x8-J1S**
	60	8,8	5	0,2	6	**PTB-50x60x8.8-J1S**
	60	11	5	0,2	6	**PTB-50x60x11-J1S**
	60	13,2	5	0,2	6	**PTB-50x60x13.2-J1S**
	63	8,8	6,5	0,2	7,5	**PTB-50x63x8.8-J1S**
	63	11	6,5	0,2	7,5	**PTB-50x63x11-J1S**
	65	9,9	7,5	0,5	8,5	**PTB-50x65x9.9-J1S**
	65	11	7,5	0,5	8,5	**PTB-50x65x11-J1S**
	65	12,5	7,5	0,5	8,5	**PTB-50x65x12.5-J1S**
	70	11	10	0,8	11	**PTB-50x70x11-J1S**
	70	13,2	10	0,8	11	**PTB-50x70x13.2-J1S**
53	63	6,6	5	0,2	6	**PTB-53x63x6.6-J1S**
	63	11	5	0,2	6	**PTB-53x63x11-J1S**
55	65	6,6	5	0,2	6	**PTB-55x65x6.6-J1S**
	65	11	5	0,2	6	**PTB-55x65x11-J1S**
	65	13,2	5	0,2	6	**PTB-55x65x13.2-J1S**
	68	11	6,5	0,2	7,5	**PTB-55x68x11-J1S**
	70	9,9	7,5	0,5	8,5	**PTB-55x70x9.9-J1S**
	70	13,2	7,5	0,5	8,5	**PTB-55x70x13.2-J1S**
	75	13,2	10	0,8	11	**PTB-55x75x13.2-J1S**
	80	6,5	12,5	0,8	13	**PTB-55x80x16.5-J1S**
56	64	8,8	4	0,2	6	**PTB-56x64x8.8-J1S**
	66	6,6	5	0,2	6	**PTB-56x66x6.6-J1S**
	66	11	5	0,2	6	**PTB-56x66x11-J1S**
	71	2,5	7,5	0,5	8,5	**PTB-56x71x12.5-J1S**
57	70	9,9	6,5	0,2	7,5	**PTB-57x70x9.9-J1S**
60	68	8,8	4	0,2	6	**PTB-60x68x8.8-J1S**
	70	6,6	5	0,2	6	**PTB-60x70x6.6-J1S**
	70	8,8	5	0,2	6	**PTB-60x70x8.8-J1S**
	70	9,9	5	0,2	6	**PTB-60x70x9.9-J1S**
	70	11	5	0,2	6	**PTB-60x70x11-J1S**
	70	13,2	5	0,2	6	**PTB-60x70x13.2-J1S**

• Dimensions in accordance with ISO 5597

3.4 PTB profile rod seals, metric sizes

d **60 – 85** mm



Maximum extrusion gap e

Radial depth S	e_{max} at 60 °C *(140 °F)* for pressures 160 bar	250 bar	400 bar
mm	mm		
3	0,2	0,1	–
3,5 to 4	0,35	0,2	–
4,5 to 6,5	0,45	0,25	0,1
7 to 8	0,5	0,3	0,15
9 to 11,5	0,55	0,3	0,15
12,5	0,6	0,3	0,2
15	0,6	0,3	0,2

For additional information → **page 34**

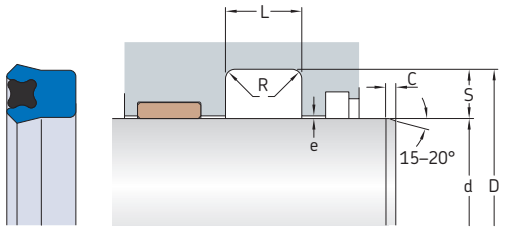
Dimensions						Designation
d f8 or h9	D H10	L +0,2	S	R max.	C min.	
mm						–
60	71	7,7	5,5	0,2	7	**PTB-60x71x7.7-J1S**
cont.	73	11	6,5	0,2	7,5	**PTB-60x73x11-J1S**
	75	9,9	7,5	0,5	8,5	**PTB-60x75x9.9-J1S**
	75	11	7,5	0,5	8,5	**PTB-60x75x11-J1S**
	75	12,1	7,5	0,5	8,5	**PTB-60x75x12.1-J1S**
	80	13,2	10	0,8	11	**PTB-60x80x13.2-J1S**
	80	16	10	0,8	11	**PTB-60x80x16-J1S**
62	72	13,2	5	0,2	6	**PTB-62x72x13.2-J1S**
63	71	8,8	4	0,2	6	**PTB-63x71x8.8-J1S**
	73	6,6	5	0,2	6	**PTB-63x73x6.6-J1S**
	73	13,2	5	0,2	6	**PTB-63x73x13.2-J1S**
	75	9,6	6	0,2	7	**PTB-63x75x9.6-J1S**
	78	9,9	7,5	0,5	8,5	**PTB-63x78x9.9-J1S**
	78	11	7,5	0,5	8,5	**PTB-63x78x11-J1S**
	78	11,7	7,5	0,5	8,5	**PTB-63x78x11.7-J1S**
	83	13,2	10	0,8	11	**PTB-63x83x13.2-J1S**
	83	16,5	10	0,8	11	**PTB-63x83x16.5-J1S**
64	80	13,2	8	0,5	8,5	**PTB-64x80x13.2-J1S**
65	73	8,8	4	0,2	6	**PTB-65x73x8.8-J1S**
	75	6,6	5	0,2	6	**PTB-65x75x6.6-J1S**
	75	8,8	5	0,2	6	**PTB-65x75x8.8-J1S**
	75	11	5	0,2	6	**PTB-65x75x11-J1S**
	75	13,2	5	0,2	6	**PTB-65x75x13.2-J1S**
	78	11	6,5	0,2	7,5	**PTB-65x78x11-J1S**
	80	9,9	7,5	0,5	8,5	**PTB-65x80x9.9-J1S**
	80	11	7,5	0,5	8,5	**PTB-65x80x11-J1S**
	80	13,2	7,5	0,5	8,5	**PTB-65x80x13.2-J1S**
	85	13,2	10	0,8	11	**PTB-65x85x13.2-J1S**
67	77	6,6	5	0,2	6	**PTB-67x77x6.6-J1S**

SKF

Dimensions						Designation
d f8 or h9	D H10	L +0,2	S	R max.	C min.	
mm						–
70	78	8,8	4	0,2	6	**PTB-70x78x8.8-J1S**
	80	6,6	5	0,2	6	**PTB-70x80x6.6-J1S**
	80	11	5	0,2	6	**PTB-70x80x11-J1S**
	80	13,2	5	0,2	6	**PTB-70x80x13.2-J1S**
	83	11	6,5	0,2	7,5	**PTB-70x83x11-J1S**
	85	9,9	7,5	0,5	8,5	**PTB-70x85x9.9-J1S**
	85	11	7,5	0,5	8,5	**PTB-70x85x11-J1S**
	85	12,5	7,5	0,5	8,5	• **PTB-70x85x12.5-J1S**
	85	13,2	7,5	0,5	8,5	**PTB-70x85x13.2-J1S**
	90	13,2	10	0,8	11	**PTB-70x90x13.2-J1S**
	90	16,5	10	0,8	11	**PTB-70x90x16.5-J1S**
71	80	6,6	4,5	0,2	6	**PTB-71x80x6.6-J1S**
	80	7,2	4,5	0,2	6	**PTB-71x80x7.2-J1S**
72	82	8,8	5	0,2	6	**PTB-72x82x8.8-J1S**
	87	9,9	7,5	0,5	8,5	**PTB-72x87x9.9-J1S**
75	83	6,6	4	0,2	6	**PTB-75x83x6.6-J1S**
	85	6,6	5	0,2	6	**PTB-75x85x6.6-J1S**
	85	8,8	5	0,2	6	**PTB-75x85x8.8-J1S**
	85	11	5	0,2	6	**PTB-75x85x11-J1S**
	85	13,2	5	0,2	6	**PTB-75x85x13.2-J1S**
	88	11	6,5	0,2	7,5	**PTB-75x88x11-J1S**
	90	6,6	7,5	0,5	8,5	**PTB-75x90x6.6-J1S**
	90	9,9	7,5	0,5	8,5	**PTB-75x90x9.9-J1S**
	90	11	7,5	0,5	8,5	**PTB-75x90x11-J1S**
	90	12,1	7,5	0,5	8,5	**PTB-75x90x12.1-J1S**
	90	12,5	7,5	0,5	8,5	**PTB-75x90x12.5-J1S**
	90	13,2	7,5	0,5	8,5	**PTB-75x90x13.2-J1S**
	95	13,2	10	0,8	11	**PTB-75x95x13.2-J1S**
	100	16,5	12,5	0,8	13	**PTB-75x100x16.5-J1S**
78	90	12,1	6	0,2	7	**PTB-78x90x12.1-J1S**
80	88	8,8	4	0,2	6	**PTB-80x88x8.8-J1S**
	90	6,6	5	0,2	6	**PTB-80x90x6.6-J1S**
	90	8,8	5	0,2	6	**PTB-80x90x8.8-J1S**
	90	11	5	0,2	6	**PTB-80x90x11-J1S**
	90	13,2	5	0,2	6	**PTB-80x90x13.2-J1S**
	92	10,5	6	0,2	7	**PTB-80x92x10.5-J1S**
	93	11	6,5	0,2	7,5	**PTB-80x93x11-J1S**
	95	9,9	7,5	0,5	8,5	**PTB-80x95x9.9-J1S**
	95	11	7,5	0,5	8,5	**PTB-80x95x11-J1S**
	95	12,1	7,5	0,5	8,5	**PTB-80x95x12.1-J1S**
	95	12,5	7,5	0,5	8,5	• **PTB-80x95x12.5-J1S**
	100	13,2	10	0,8	11	**PTB-80x100x13.2-J1S**
	100	16	10	0,8	11	• **PTB-80x100x16-J1S**
	100	16,5	10	0,8	11	**PTB-80x100x16.5-J1S**
82	92	11	5	0,2	6	**PTB-82x92x11-J1S**
84	98	13,2	7	0,5	8,5	**PTB-84x98x13.2-J1S**
85	95	6,6	5	0,2	6	**PTB-85x95x6.6-J1S**
	100	9,9	7,5	0,5	8,5	**PTB-85x100x9.9-J1S**
	100	11	7,5	0,5	8,5	**PTB-85x100x11-J1S**
	100	13,2	7,5	0,5	8,5	**PTB-85x100x13.2-J1S**
	105	13,2	10	0,8	11	**PTB-85x105x13.2-J1S**

• Dimensions in accordance with ISO 5597

3.4 PTB profile rod seals, metric sizes
d **87 – 150** mm



Maximum extrusion gap e

Radial depth S	e_{max} at 60 °C *(140 °F)* for pressures 160 bar	250 bar	400 bar
mm	mm		
3	0,2	0,1	–
3,5 to 4	0,35	0,2	–
4,5 to 6,5	0,45	0,25	0,1
7 to 8	0,5	0,3	0,15
9 to 11,5	0,55	0,3	0,15
12,5	0,6	0,3	0,2
15	0,6	0,3	0,2

For additional information → **page 34**

Dimensions						Designation
d f8 to h9	D H10	L +0,2	S	R max.	C min.	
mm						–
87	110	11	11,5	0,8	13	**PTB-87x110x11-J1S**
88	102	11,6	7	0,5	8,5	**PTB-88x102x11.6-J1S**
90	98	8,8	4	0,2	6	**PTB-90x98x8.8-J1S**
	100	6,6	5	0,2	6	**PTB-90x100x6.6-J1S**
	100	7,7	5	0,2	6	**PTB-90x100x7.7-J1S**
	105	9,9	7,5	0,5	8,5	**PTB-90x105x9.9-J1S**
	105	11	7,5	0,5	8,5	**PTB-90x105x11-J1S**
	105	12,5	7,5	0,5	8,5	• **PTB-90x105x12.5-J1S**
	105	13,2	7,5	0,5	8,5	**PTB-90x105x13.2-J1S**
	110	13,2	10	0,8	11	**PTB-90x110x13.2-J1S**
	110	16	10	0,8	11	• **PTB-90x110x16-J1S**
92	102	11	5	0,2	6	**PTB-92x102x11-J1S**
95	105	6,6	5	0,2	6	**PTB-95x105x6.6-J1S**
	110	9,9	7,5	0,5	8,5	**PTB-95x110x9.9-J1S**
	110	11	7,5	0,5	8,5	**PTB-95x110x11-J1S**
	110	13,2	7,5	0,5	8,5	**PTB-95x110x13.2-J1S**
	115	13,2	10	0,8	11	**PTB-95x115x13.2-J1S**
97	105	14,3	4	0,2	6	**PTB-97x105x14.3-J1S**
98	110	17,6	6	0,2	7	**PTB-98x110x17.6-J1S**
100	108	8,8	4	0,2	6	**PTB-100x108x8.8-J1S**
	115	9,9	7,5	0,5	8,5	**PTB-100x115x9.9-J1S**
	115	11	7,5	0,5	8,5	**PTB-100x115x11-J1S**
	115	13,2	7,5	0,5	8,5	**PTB-100x115x13.2-J1S**
	120	13,2	10	0,8	11	**PTB-100x120x13.2-J1S**
	120	16	10	0,8	11	• **PTB-100x120x16-J1S**
	125	13,6	12,5	0,8	13	**PTB-100x125x13.6-J1S**
	125	16,5	12,5	0,8	13	**PTB-100x125x16.5-J1S**
105	120	9,9	7,5	0,5	8,5	**PTB-105x120x9.9-J1S**

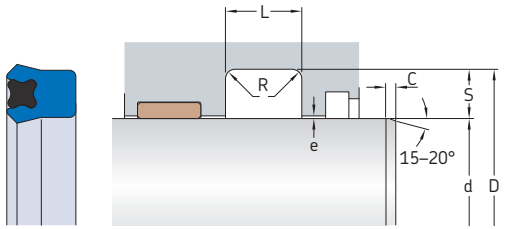
• Dimensions in accordance with ISO 5597

Dimensions						Designation
d f8 to h9	D H10	L +0,2	S	R max.	C min.	
mm						–
105	120	11	7,5	0,5	8,5	**PTB-105x120x11-J1S**
cont.	125	12,5	10	0,8	11	**PTB-105x125x12.5-J1S**
	125	13,2	10	0,8	11	**PTB-105x125x13.2-J1S**
	125	16,5	10	0,8	11	**PTB-105x125x16.5-J1S**
109	125	11,6	8	0,5	8,5	**PTB-109x125x11.6-J1S**
110	125	9,9	7,5	0,5	8,5	**PTB-110x125x9.9-J1S**
	125	10,1	7,5	0,5	8,5	**PTB-110x125x10.1-J1S**
	125	11	7,5	0,5	8,5	**PTB-110x125x11-J1S**
	125	13,2	7,5	0,5	8,5	**PTB-110x125x13.2-J1S**
	130	11	10	0,8	11	**PTB-110x130x11-J1S**
	130	13,2	10	0,8	11	**PTB-110x130x13.2-J1S**
	130	16	10	0,8	11	• **PTB-110x130x16-J1S**
	130	16,5	10	0,8	11	**PTB-110x130x16.5-J1S**
	135	19,8	12,5	0,8	13	• **PTB-110x135x19.8-J1S**
112	125	7,7	6,5	0,2	7,5	**PTB-112x125x7.7-J1S**
115	130	9,4	7,5	0,5	8,5	**PTB-115x130x9.4-J1S**
	130	9,9	7,5	0,5	8,5	**PTB-115x130x9.9-J1S**
	135	13,2	10	0,8	11	**PTB-115x135x13.2-J1S**
	140	19,8	12,5	0,8	13	**PTB-115x140x19.8-J1S**
118	133	9,9	7,5	0,5	8,5	**PTB-118x133x9.9-J1S**
120	130	16,5	5	0,2	6	**PTB-120x130x16.5-J1S**
	135	9,9	7,5	0,5	8,5	**PTB-120x135x9.9-J1S**
	140	11	10	0,8	11	**PTB-120x140x11-J1S**
	140	13,2	10	0,8	11	**PTB-120x140x13.2-J1S**
	140	16	10	0,8	11	**PTB-120x140x16-J1S**
	140	16,5	10	0,8	11	**PTB-120x140x16.5-J1S**
125	140	9,9	7,5	0,5	8,5	**PTB-125x140x9.9-J1S**
	140	16,5	7,5	0,5	8,5	**PTB-125x140x16.5-J1S**
	145	16	10	0,8	11	• **PTB-125x145x16-J1S**
	145	16,5	10	0,8	11	**PTB-125x145x16.5-J1S**
	150	19,8	12,5	0,8	13	• **PTB-125x150x19.8-J1S**
130	145	9,9	7,5	0,5	8,5	**PTB-130x145x9.9-J1S**
	150	13,2	10	0,8	11	**PTB-130x150x13.2-J1S**
	150	14,3	10	0,8	11	**PTB-130x150x14.3-J1S**
	150	16,5	10	0,8	11	**PTB-130x150x16.5-J1S**
	150	17,6	10	0,8	11	**PTB-130x150x17.6-J1S**
	160	18,7	15	0,8	14	**PTB-130x160x18.7-J1S**
135	150	9,9	7,5	0,5	8,5	**PTB-135x150x9.9-J1S**
	155	16,5	10	0,8	11	**PTB-135x155x16.5-J1S**
136	150	9,9	7	0,5	8,5	**PTB-136x150x9.9-J1S**
140	155	9,9	7,5	0,5	8,5	**PTB-140x155x9.9-J1S**
	160	13,2	10	0,8	11	**PTB-140x160x13.2-J1S**
	160	15,4	10	0,8	11	**PTB-140x160x15.4-J1S**
	160	16	10	0,8	11	• **PTB-140x160x16-J1S**
	160	16,5	10	0,8	11	**PTB-140x160x16.5-J1S**
145	160	7,7	7,5	0,5	8,5	**PTB-145x160x7.7-J1S**
	160	9,9	7,5	0,5	8,5	**PTB-145x160x9.9-J1S**
150	160	8,8	5	0,2	6	**PTB-150x160x8.8-J1S**
	165	9,9	7,5	0,5	8,5	**PTB-150x165x9.9-J1S**
	170	16,5	10	0,8	11	**PTB-150x170x16.5-J1S**
	170	17,6	10	0,8	11	**PTB-150x170x17.6-J1S**
	180	19,8	15	0,8	14	**PTB-150x180x19.8-J1S**

• Dimensions in accordance with ISO 5597

3.4 PTB profile rod seals, metric sizes

d **155 – 205** mm



Maximum extrusion gap e

Radial depth S	e_{max} at 60 °C *(140 °F)* for pressures 160 bar	250 bar	400 bar
mm	mm		
3	0,2	0,1	–
3,5 to 4	0,35	0,2	–
4,5 to 6,5	0,45	0,25	0,1
7 to 8	0,5	0,3	0,15
9 to 11,5	0,55	0,3	0,15
12,5	0,6	0,3	0,2
15	0,6	0,3	0,2

For additional information → **page 34**

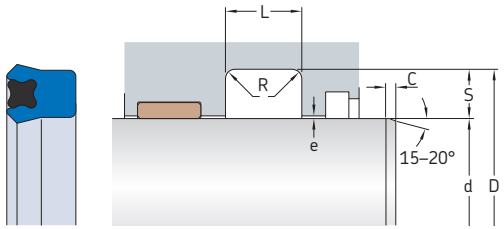
Dimensions						Designation
d f8 or h9	D H10	L +0,2	S	R max.	C min.	
mm						–
155	180	16,5	12,5	0,8	13	**PTB-155x180x16.5-J1S**
	180	17,6	12,5	0,8	13	**PTB-155x180x17.6-J1S**
160	175	9,9	7,5	0,5	8,5	**PTB-160x175x9.9-J1S**
	180	16,5	10	0,8	11	**PTB-160x180x16.5-J1S**
	185	17,6	12,5	0,8	13	**PTB-160x185x17.6-J1S**
	185	19,8	12,5	0,8	13	**PTB-160x185x19.8-J1S**
	190	25	15	0,8	14	**PTB-160x190x25-J1S**
165	180	10,5	7,5	0,5	8,5	**PTB-165x180x10.5-J1S**
	190	17,6	12,5	0,8	13	**PTB-165x190x17.6-J1S**
170	190	16,5	10	0,8	11	**PTB-170x190x16.5-J1S**
	195	17,6	12,5	0,8	13	**PTB-170x195x17.6-J1S**
	200	16,5	15	0,8	14	**PTB-170x200x16.5-J1S**
175	185	12,5	5	0,2	6	**PTB-175x185x12.5-J1S**
	200	16,5	12,5	0,8	13	**PTB-175x200x16.5-J1S**
	200	19,8	12,5	0,8	13	**PTB-175x200x19.8-J1S**
180	200	13,8	10	0,8	11	**PTB-180x200x13.8-J1S**
	205	16,5	12,5	0,8	13	**PTB-180x205x16.5-J1S**
	205	17,6	12,5	0,8	13	**PTB-180x205x17.6-J1S**
190	210	13,2	10	0,8	11	**PTB-190x210x13.2-J1S**
	210	16,5	10	0,8	11	**PTB-190x210x16.5-J1S**
	215	16,5	12,5	0,8	13	**PTB-190x215x16.5-J1S**
	215	17,6	12,5	0,8	13	**PTB-190x215x17.6-J1S**
199	224	17,6	12,5	0,8	13	**PTB-199x224x17.6-J1S**
200	220	13,8	10	0,8	11	**PTB-200x220x13.8-J1S**
	220	16,5	10	0,8	11	**PTB-200x220x16.5-J1S**
	225	16,5	12,5	0,8	13	**PTB-200x225x16.5-J1S**
	225	17,6	12,5	0,8	13	**PTB-200x225x17.6-J1S**
205	235	19,8	15	0,8	14	**PTB-205x235x19.8-J1S**

Other sizes are available on request

SKF

3.4 PTB profile rod seals, inch sizes

d **0.125 – 0.688** in.



Maximum extrusion gap e

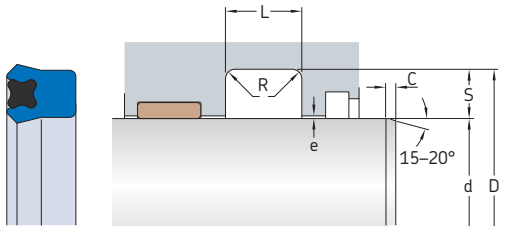
Radial depth	e_{max} at 60 °C *(140 °F)* for pressures		
S	2 300 psi	3 600 psi	5 800 psi
in.	in.		
0.125	0.008	0.004	–
0.156 to 0.187	0.014	0.008	–
0.218 to 0.25	0.018	0.010	0.004
0.281 to 0.437	0.020	0.012	0.006
0.5 to 0.562	0.024	0.012	0.008
0.625 to 0.75	0.024	0.012	0.008

For additional information → **page 34**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
0.125	–0.001	0.375	0.002	0.275	0.125	0.015	0.25	**PTB125-125-250-J1S**
0.187	–0.001	0.437	0.002	0.206	0.125	0.015	0.25	**PTB125-187-187-J1S**
	–0.001	0.437	0.002	0.275	0.125	0.015	0.25	**PTB125-187-250-J1S**
0.25	–0.001	0.5	0.002	0.275	0.125	0.015	0.25	**PTB125-250-250-J1S**
0.282	–0.001	0.532	0.002	0.275	0.125	0.015	0.25	**PTB125-282-250-J1S**
0.312	–0.001	0.562	0.002	0.275	0.125	0.015	0.25	**PTB125-312-250-J1S**
	–0.001	0.687	0.002	0.343	0.187	0.015	0.25	**PTB187-312-312-J1S**
0.375	–0.001	0.625	0.002	0.275	0.125	0.015	0.25	**PTB125-375-250-J1S**
	–0.001	0.75	0.002	0.343	0.187	0.015	0.25	**PTB187-375-312-J1S**
0.437	–0.001	0.687	0.002	0.275	0.125	0.015	0.25	**PTB125-437-250-J1S**
	–0.001	0.687	0.002	0.413	0.125	0.015	0.25	**PTB125-437-375-J1S**
	–0.002	0.937	0.003	0.413	0.25	0.02	0.312	**PTB250-437-375-J1S**
0.5	–0.001	0.75	0.002	0.193	0.125	0.015	0.25	**PTB125-500-175-J1S**
	–0.001	0.75	0.002	0.275	0.125	0.015	0.25	**PTB125-500-250-J1S**
	–0.001	0.875	0.002	0.343	0.187	0.015	0.25	**PTB187-500-312-J1S**
	–0.002	1	0.003	0.413	0.25	0.02	0.312	**PTB250-500-375-J1S**
0.54	–0.001	0.915	0.002	0.343	0.187	0.015	0.25	**PTB187-540-312-J1S**
0.562	–0.001	0.812	0.002	0.275	0.125	0.015	0.25	**PTB125-562-250-J1S**
	–0.001	0.937	0.002	0.343	0.187	0.015	0.25	**PTB187-562-312-J1S**
0.625	–0.001	0.875	0.002	0.196	0.125	0.015	0.25	**PTB125-625-178-J1S**
	–0.001	0.875	0.002	0.275	0.125	0.015	0.25	**PTB125-625-250-J1S**
	–0.001	1	0.002	0.343	0.187	0.015	0.25	**PTB187-625-312-J1S**
0.687	–0.001	0.937	0.002	0.275	0.125	0.015	0.25	**PTB125-687-250-J1S**
	–0.001	1.062	0.002	0.343	0.187	0.015	0.25	**PTB187-687-312-J1S**
	–0.002	1.187	0.003	0.413	0.25	0.02	0.312	**PTB250-687-375-J1S**
0.688	–0.001	0.938	0.002	0.196	0.125	0.015	0.25	**PTB125-688-178-J1S**

3.4 PTB profile rod seals, inch sizes

d **0.75 – 1.625** in.



Maximum extrusion gap e

Radial depth	e_{max} at 60 °C *(140 °F)* for pressures		
S	2 300 psi	3 600 psi	5 800 psi
in.	in.		
0.125	0.008	0.004	–
0.156 to 0.187	0.014	0.008	–
0.218 to 0.25	0.018	0.01	0.004
0.281 to 0.437	0.02	0.012	0.006
0.5 to 0.562	0.024	0.012	0.008
0.625 to 0.75	0.024	0.012	0.008

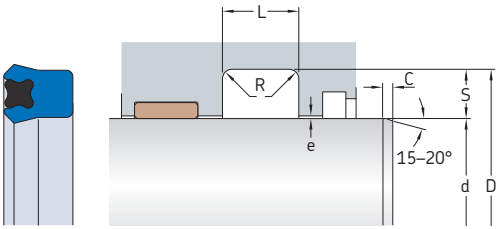
For additional information → **page 34**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
0.75	–0.001	1	0.002	0.196	0.125	0.015	0.25	**PTB125-750-178-J1S**
	–0.001	1	0.002	0.206	0.125	0.015	0.25	**PTB125-750-187-J1S**
	–0.001	1	0.002	0.275	0.125	0.015	0.25	**PTB125-750-250-J1S**
	–0.001	1.125	0.002	0.343	0.187	0.015	0.25	**PTB187-750-312-J1S**
	–0.002	1.25	0.003	0.413	0.25	0.02	0.312	**PTB250-750-375-J1S**
	–0.002	1.375	0.004	0.55	0.312	0.02	0.312	**PTB312-750-500-J1S**
0.812	–0.001	1.062	0.002	0.275	0.125	0.015	0.25	**PTB125-812-250-J1S**
	–0.001	1.187	0.002	0.343	0.187	0.015	0.25	**PTB187-812-312-J1S**
	–0.002	1.312	0.003	0.413	0.25	0.02	0.312	**PTB250-812-375-J1S**
0.875	–0.001	1.125	0.002	0.275	0.125	0.015	0.25	**PTB125-875-250-J1S**
	–0.001	1.25	0.002	0.343	0.187	0.015	0.25	**PTB187-875-312-J1S**
	–0.002	1.375	0.003	0.413	0.25	0.02	0.312	**PTB250-875-375-J1S**
0.937	–0.001	1.187	0.002	0.275	0.125	0.015	0.25	**PTB125-937-250-J1S**
	–0.001	1.312	0.002	0.343	0.187	0.015	0.25	**PTB187-937-312-J1S**
	–0.002	1.562	0.004	0.413	0.312	0.02	0.312	**PTB312-937-375-J1S**
1	–0.001	1.25	0.002	0.206	0.125	0.015	0.25	**PTB125-1000-187-J1S**
	–0.001	1.25	0.002	0.275	0.125	0.015	0.25	**PTB125-1000-250-J1S**
	–0.001	1.312	0.002	0.24	0.156	0.015	0.25	**PTB156-1000-218-J1S**
	–0.001	1.312	0.002	0.257	0.156	0.015	0.25	**PTB156-1000-234-J1S**
	–0.001	1.375	0.002	0.275	0.187	0.015	0.25	**PTB187-1000-250-J1S**
	–0.001	1.375	0.002	0.293	0.187	0.015	0.25	**PTB187-1000-266-J1S**
	–0.001	1.375	0.002	0.343	0.187	0.015	0.25	**PTB187-1000-312-J1S**
	–0.001	1.375	0.002	0.413	0.187	0.015	0.25	**PTB187-1000-375-J1S**
	–0.002	1.5	0.003	0.413	0.25	0.02	0.312	**PTB250-1000-375-J1S**
	–0.002	1.625	0.004	0.413	0.312	0.02	0.312	**PTB312-1000-375-J1S**
	–0.002	1.625	0.004	0.55	0.312	0.02	0.312	**PTB312-1000-500-J1S**
1.062	–0.001	1.312	0.002	0.275	0.125	0.015	0.25	**PTB125-1062-250-J1S**
	–0.001	1.437	0.002	0.343	0.187	0.015	0.25	**PTB187-1062-312-J1S**
1.125	–0.001	1.375	0.002	0.275	0.125	0.015	0.25	**PTB125-1125-250-J1S**
	–0.001	1.5	0.002	0.275	0.187	0.015	0.25	**PTB187-1125-250-J1S**
	–0.001	1.5	0.002	0.343	0.187	0.015	0.25	**PTB187-1125-312-J1S**
	–0.001	1.5	0.002	0.413	0.187	0.015	0.25	**PTB187-1125-375-J1S**
	–0.002	1.625	0.003	0.413	0.25	0.02	0.312	**PTB250-1125-375-J1S**
	–0.002	1.75	0.004	0.413	0.312	0.02	0.312	**PTB312-1125-375-J1S**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
1.187	–0.001	1.437	0.002	0.196	0.125	0.015	0.25	**PTB125-1187-178-J1S**
	–0.001	1.437	0.002	0.206	0.125	0.015	0.25	**PTB125-1187-187-J1S**
	–0.001	1.437	0.002	0.275	0.125	0.015	0.25	**PTB125-1187-250-J1S**
	–0.001	1.562	0.002	0.275	0.187	0.015	0.25	**PTB187-1187-250-J1S**
	–0.001	1.562	0.002	0.343	0.187	0.015	0.25	**PTB187-1187-312-J1S**
1.25	–0.001	1.5	0.002	0.206	0.125	0.015	0.25	**PTB125-1250-187-J1S**
	–0.001	1.5	0.002	0.275	0.125	0.015	0.25	**PTB125-1250-250-J1S**
	–0.001	1.625	0.002	0.275	0.187	0.015	0.25	**PTB187-1250-250-J1S**
	–0.001	1.625	0.002	0.293	0.187	0.015	0.25	**PTB187-1250-266-J1S**
	–0.001	1.625	0.002	0.343	0.187	0.015	0.25	**PTB187-1250-312-J1S**
	–0.001	1.625	0.002	0.413	0.187	0.015	0.25	**PTB187-1250-375-J1S**
	–0.002	1.75	0.003	0.413	0.25	0.02	0.312	**PTB250-1250-375-J1S**
	–0.002	1.875	0.004	0.413	0.312	0.02	0.312	**PTB312-1250-375-J1S**
	–0.002	1.875	0.004	0.55	0.312	0.02	0.312	**PTB312-1250-500-J1S**
	–0.003	2.25	0.007	0.825	0.5	0.03	0.625	**PTB500-1250-750-J1S**
1.312	–0.001	1.562	0.002	0.206	0.125	0.015	0.25	**PTB125-1312-187-J1S**
	–0.001	1.687	0.002	0.343	0.187	0.015	0.25	**PTB187-1312-312-J1S**
	–0.002	1.812	0.003	0.413	0.25	0.02	0.312	**PTB250-1312-375-J1S**
1.375	–0.001	1.625	0.002	0.275	0.125	0.015	0.25	**PTB125-1375-250-J1S**
	–0.001	1.687	0.002	0.24	0.156	0.015	0.25	**PTB156-1375-218-J1S**
	–0.001	1.75	0.002	0.275	0.187	0.015	0.25	**PTB187-1375-250-J1S**
	–0.001	1.75	0.002	0.293	0.187	0.015	0.25	**PTB187-1375-266-J1S**
	–0.001	1.75	0.002	0.343	0.187	0.015	0.25	**PTB187-1375-312-J1S**
	–0.001	1.75	0.002	0.413	0.187	0.015	0.25	**PTB187-1375-375-J1S**
	–0.002	1.875	0.003	0.413	0.25	0.02	0.312	**PTB250-1375-375-J1S**
	–0.002	2	0.004	0.413	0.312	0.02	0.312	**PTB312-1375-375-J1S**
	–0.002	2	0.004	0.55	0.312	0.02	0.312	**PTB312-1375-500-J1S**
1.437	–0.001	1.687	0.002	0.275	0.125	0.015	0.25	**PTB125-1437-250-J1S**
	–0.001	1.812	0.002	0.343	0.187	0.015	0.25	**PTB187-1437-312-J1S**
	–0.002	1.937	0.003	0.413	0.25	0.02	0.312	**PTB250-1437-375-J1S**
1.5	–0.001	1.75	0.002	0.206	0.125	0.015	0.25	**PTB125-1500-187-J1S**
	–0.001	1.75	0.002	0.275	0.125	0.015	0.25	**PTB125-1500-250-J1S**
	–0.001	1.812	0.002	0.343	0.156	0.015	0.25	**PTB156-1500-312-J1S**
	–0.001	1.875	0.002	0.275	0.187	0.015	0.25	**PTB187-1500-250-J1S**
	–0.001	1.875	0.002	0.286	0.187	0.015	0.25	**PTB187-1500-260-J1S**
	–0.001	1.875	0.002	0.293	0.187	0.015	0.25	**PTB187-1500-266-J1S**
	–0.001	1.875	0.002	0.343	0.187	0.015	0.25	**PTB187-1500-312-J1S**
	–0.001	1.875	0.002	0.413	0.187	0.015	0.25	**PTB187-1500-375-J1S**
	–0.002	2	0.003	0.343	0.25	0.02	0.312	**PTB250-1500-312-J1S**
	–0.002	2	0.003	0.413	0.25	0.02	0.312	**PTB250-1500-375-J1S**
	–0.002	2	0.003	0.55	0.25	0.02	0.312	**PTB250-1500-500-J1S**
	–0.002	2.125	0.004	0.481	0.312	0.02	0.312	**PTB312-1500-437-J1S**
	–0.002	2.125	0.004	0.55	0.312	0.02	0.312	**PTB312-1500-500-J1S**
	–0.002	2.25	0.005	0.55	0.375	0.03	0.5	**PTB375-1500-500-J1S**
	–0.002	2.25	0.005	0.688	0.375	0.03	0.5	**PTB375-1500-625-J1S**
1.562	–0.001	1.937	0.002	0.413	0.187	0.015	0.25	**PTB187-1562-375-J1S**
	–0.002	2	0.003	0.343	0.218	0.02	0.312	**PTB218-1562-312-J1S**
	–0.002	2.062	0.003	0.343	0.25	0.02	0.312	**PTB250-1562-312-J1S**
1.625	–0.001	2	0.002	0.275	0.187	0.015	0.25	**PTB187-1625-250-J1S**
	–0.001	2	0.002	0.293	0.187	0.015	0.25	**PTB187-1625-266-J1S**
	–0.001	2	0.002	0.343	0.187	0.015	0.25	**PTB187-1625-312-J1S**
	–0.001	2	0.002	0.413	0.187	0.015	0.25	**PTB187-1625-375-J1S**

3.4 PTB profile rod seals, inch sizes

d **1.625 – 2.5** in.



Maximum extrusion gap e

Radial depth	e_{max} at 60 °C *(140 °F)* for pressures		
S	2 300 psi	3 600 psi	5 800 psi
in.	in.		
0.125	0.008	0.004	–
0.156 to 0.187	0.014	0.008	–
0.218 to 0.25	0.018	0.01	0.004
0.281 to 0.437	0.02	0.012	0.006
0.5 to 0.562	0.024	0.012	0.008
0.625 to 0.75	0.024	0.012	0.008

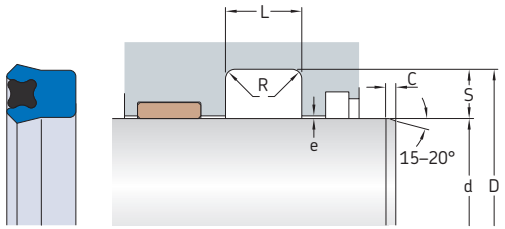
For additional information → **page 34**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
1.625	–0.002	2.125	0.003	0.413	0.25	0.02	0.312	**PTB250-1625-375-J1S**
cont.	–0.002	2.25	0.004	0.413	0.312	0.02	0.312	**PTB312-1625-375-J1S**
	–0.002	2.25	0.004	0.55	0.312	0.02	0.312	**PTB312-1625-500-J1S**
	–0.002	2.375	0.005	0.688	0.375	0.03	0.5	**PTB375-1625-625-J1S**
1.687	–0.002	2.312	0.004	0.55	0.312	0.02	0.312	**PTB312-1687-500-J1S**
1.75	–0.001	2	0.002	0.275	0.125	0.015	0.25	**PTB125-1750-250-J1S**
	–0.001	2.125	0.002	0.275	0.187	0.015	0.25	**PTB187-1750-250-J1S**
	–0.001	2.125	0.002	0.293	0.187	0.015	0.25	**PTB187-1750-266-J1S**
	–0.001	2.125	0.002	0.343	0.187	0.015	0.25	**PTB187-1750-312-J1S**
	–0.001	2.125	0.002	0.413	0.187	0.015	0.25	**PTB187-1750-375-J1S**
	–0.002	2.25	0.003	0.343	0.25	0.02	0.312	**PTB250-1750-312-J1S**
	–0.002	2.25	0.003	0.413	0.25	0.02	0.312	**PTB250-1750-375-J1S**
	–0.002	2.375	0.004	0.413	0.312	0.02	0.312	**PTB312-1750-375-J1S**
	–0.002	2.375	0.004	0.55	0.312	0.02	0.312	**PTB312-1750-500-J1S**
	–0.002	2.5	0.005	0.688	0.375	0.03	0.5	**PTB375-1750-625-J1S**
	–0.003	2.75	0.007	0.825	0.5	0.03	0.625	**PTB500-1750-750-J1S**
1.875	–0.001	2.25	0.002	0.293	0.187	0.015	0.25	**PTB187-1875-266-J1S**
	–0.001	2.25	0.002	0.343	0.187	0.015	0.25	**PTB187-1875-312-J1S**
	–0.001	2.25	0.002	0.413	0.187	0.015	0.25	**PTB187-1875-375-J1S**
	–0.002	2.375	0.003	0.413	0.25	0.02	0.312	**PTB250-1875-375-J1S**
	–0.002	2.5	0.004	0.413	0.312	0.02	0.312	**PTB312-1875-375-J1S**
	–0.002	2.5	0.004	0.55	0.312	0.02	0.312	**PTB312-1875-500-J1S**
	–0.003	2.875	0.007	0.688	0.5	0.03	0.625	**PTB500-1875-625-J1S**
2	–0.001	2.25	0.002	0.275	0.125	0.015	0.25	**PTB125-2000-250-J1S**
	–0.001	2.375	0.002	0.253	0.187	0.015	0.25	**PTB187-2000-230-J1S**
	–0.001	2.375	0.002	0.275	0.187	0.015	0.25	**PTB187-2000-250-J1S**
	–0.001	2.375	0.002	0.343	0.187	0.015	0.25	**PTB187-2000-312-J1S**
	–0.001	2.375	0.002	0.391	0.187	0.015	0.25	**PTB187-2000-355-J1S**
	–0.001	2.375	0.002	0.413	0.187	0.015	0.25	**PTB187-2000-375-J1S**
	–0.002	2.5	0.003	0.343	0.25	0.02	0.312	**PTB250-2000-312-J1S**
	–0.002	2.5	0.003	0.413	0.25	0.02	0.312	**PTB250-2000-375-J1S**
	–0.002	2.5	0.003	0.55	0.25	0.02	0.312	**PTB250-2000-500-J1S**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
2 cont.	–0.002	2.625	0.004	0.413	0.312	0.02	0.312	**PTB312-2000-375-J1S**
	–0.002	2.625	0.004	0.481	0.312	0.02	0.312	**PTB312-2000-437-J1S**
	–0.002	2.625	0.004	0.55	0.312	0.02	0.312	**PTB312-2000-500-J1S**
	–0.002	2.75	0.005	0.481	0.375	0.03	0.5	**PTB375-2000-437-J1S**
	–0.002	2.75	0.005	0.55	0.375	0.03	0.5	**PTB375-2000-500-J1S**
	–0.002	2.75	0.005	0.688	0.375	0.03	0.5	**PTB375-2000-625-J1S**
	–0.003	3	0.007	0.825	0.5	0.03	0.625	**PTB500-2000-750-J1S**
2.125	–0.001	2.5	0.002	0.275	0.187	0.015	0.25	**PTB187-2125-250-J1S**
	–0.001	2.5	0.002	0.293	0.187	0.015	0.25	**PTB187-2125-266-J1S**
	–0.001	2.5	0.002	0.343	0.187	0.015	0.25	**PTB187-2125-312-J1S**
	–0.001	2.5	0.002	0.413	0.187	0.015	0.25	**PTB187-2125-375-J1S**
	–0.002	2.625	0.003	0.413	0.25	0.02	0.312	**PTB250-2125-375-J1S**
	–0.002	2.75	0.004	0.413	0.312	0.02	0.312	**PTB312-2125-375-J1S**
	–0.002	2.75	0.004	0.55	0.312	0.02	0.312	**PTB312-2125-500-J1S**
	–0.002	2.875	0.005	0.688	0.375	0.03	0.5	**PTB375-2125-625-J1S**
2.187	–0.001	2.562	0.002	0.413	0.187	0.015	0.25	**PTB187-2187-375-J1S**
	–0.002	2.687	0.003	0.413	0.25	0.02	0.312	**PTB250-2187-375-J1S**
	–0.002	2.937	0.005	0.688	0.375	0.03	0.5	**PTB375-2187-625-J1S**
2.25	–0.001	2.625	0.002	0.343	0.187	0.015	0.25	**PTB187-2250-312-J1S**
	–0.001	2.625	0.002	0.413	0.187	0.015	0.25	**PTB187-2250-375-J1S**
	–0.002	2.75	0.003	0.413	0.25	0.02	0.312	**PTB250-2250-375-J1S**
	–0.002	2.875	0.004	0.413	0.312	0.02	0.312	**PTB312-2250-375-J1S**
	–0.002	2.875	0.004	0.55	0.312	0.02	0.312	**PTB312-2250-500-J1S**
	–0.002	3	0.005	0.55	0.375	0.03	0.5	**PTB375-2250-500-J1S**
	–0.002	3	0.005	0.688	0.375	0.03	0.5	**PTB375-2250-625-J1S**
2.375	–0.001	2.625	0.002	0.206	0.125	0.015	0.25	**PTB125-2375-187-J1S**
	–0.001	2.75	0.002	0.275	0.187	0.015	0.25	**PTB187-2375-250-J1S**
	–0.001	2.75	0.002	0.293	0.187	0.015	0.25	**PTB187-2375-266-J1S**
	–0.001	2.75	0.002	0.413	0.187	0.015	0.25	**PTB187-2375-375-J1S**
	–0.001	2.75	0.002	0.55	0.187	0.015	0.25	**PTB187-2375-500-J1S**
	–0.002	2.875	0.003	0.413	0.25	0.02	0.312	**PTB250-2375-375-J1S**
	–0.002	3	0.004	0.55	0.312	0.02	0.312	**PTB312-2375-500-J1S**
	–0.002	3.125	0.005	0.55	0.375	0.03	0.5	**PTB375-2375-500-J1S**
	–0.002	3.125	0.005	0.688	0.375	0.03	0.5	**PTB375-2375-625-J1S**
2.437	–0.002	3	0.003	0.413	0.281	0.02	0.312	**PTB281-2437-375-J1S**
2.5	–0.001	2.75	0.002	0.275	0.125	0.015	0.25	**PTB125-2500-250-J1S**
	–0.001	2.875	0.002	0.275	0.187	0.015	0.25	**PTB187-2500-250-J1S**
	–0.001	2.875	0.002	0.293	0.187	0.015	0.25	**PTB187-2500-266-J1S**
	–0.001	2.875	0.002	0.343	0.187	0.015	0.25	**PTB187-2500-312-J1S**
	–0.001	2.875	0.002	0.413	0.187	0.015	0.25	**PTB187-2500-375-J1S**
	–0.002	2.937	0.003	0.309	0.218	0.02	0.312	**PTB218-2500-281-J1S**
	–0.002	3	0.003	0.343	0.25	0.02	0.312	**PTB250-2500-312-J1S**
	–0.002	3	0.003	0.413	0.25	0.02	0.312	**PTB250-2500-375-J1S**
	–0.002	3	0.003	0.55	0.25	0.02	0.312	**PTB250-2500-500-J1S**
	–0.002	3.125	0.004	0.413	0.312	0.02	0.312	**PTB312-2500-375-J1S**
	–0.002	3.125	0.004	0.55	0.312	0.02	0.312	**PTB312-2500-500-J1S**
	–0.002	3.25	0.005	0.55	0.375	0.03	0.5	**PTB375-2500-500-J1S**
	–0.002	3.25	0.005	0.688	0.375	0.03	0.5	**PTB375-2500-625-J1S**
	–0.003	3.5	0.007	0.825	0.5	0.03	0.5	**PTB500-2500-750-J1S**

3.4 PTB profile rod seals, inch sizes

d **2.625 – 3.75** in.



Maximum extrusion gap e

Radial depth	e_{max} at 60 °C *(140 °F)* for pressures		
S	2 300 psi	3 600 psi	5 800 psi
in.	in.		
0.125	0.008	0.004	–
0.156 to 0.187	0.014	0.008	–
0.218 to 0.25	0.018	0.01	0.004
0.281 to 0.437	0.02	0.012	0.006
0.5 to 0.562	0.024	0.012	0.008
0.625 to 0.75	0.024	0.012	0.008

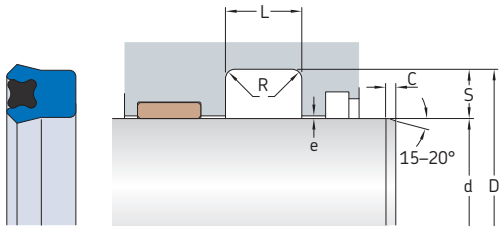
For additional information → **page 34**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
2.625	–0.001	3	0.002	0.275	0.187	0.015	0.25	**PTB187-2625-250-J1S**
	–0.001	3	0.002	0.293	0.187	0.015	0.25	**PTB187-2625-266-J1S**
	–0.001	3	0.002	0.309	0.187	0.015	0.25	**PTB187-2625-281-J1S**
	–0.001	3	0.002	0.413	0.187	0.015	0.25	**PTB187-2625-375-J1S**
	–0.002	3.125	0.003	0.413	0.25	0.02	0.312	**PTB250-2625-375-J1S**
	–0.002	3.375	0.005	0.688	0.375	0.03	0.5	**PTB375-2625-625-J1S**
2.75	–0.001	3	0.002	0.275	0.125	0.015	0.25	**PTB125-2750-250-J1S**
	–0.001	3	0.002	0.413	0.125	0.015	0.25	**PTB125-2750-375-J1S**
	–0.001	3.125	0.002	0.309	0.187	0.015	0.25	**PTB187-2750-281-J1S**
	–0.001	3.125	0.002	0.413	0.187	0.015	0.25	**PTB187-2750-375-J1S**
	–0.002	3.25	0.003	0.413	0.25	0.02	0.312	**PTB250-2750-375-J1S**
	–0.002	3.25	0.003	0.55	0.25	0.02	0.312	**PTB250-2750-500-J1S**
	–0.002	3.375	0.004	0.55	0.312	0.02	0.312	**PTB312-2750-500-J1S**
	–0.002	3.5	0.005	0.55	0.375	0.03	0.5	**PTB375-2750-500-J1S**
	–0.002	3.5	0.005	0.688	0.375	0.03	0.5	**PTB375-2750-625-J1S**
	–0.003	3.75	0.007	0.825	0.5	0.03	0.625	**PTB500-2750-750-J1S**
2.875	–0.001	3.25	0.002	0.275	0.187	0.015	0.25	**PTB187-2875-250-J1S**
	–0.001	3.25	0.002	0.293	0.187	0.015	0.25	**PTB187-2875-266-J1S**
	–0.001	3.25	0.002	0.413	0.187	0.015	0.25	**PTB187-2875-375-J1S**
	–0.002	3.375	0.003	0.413	0.25	0.02	0.312	**PTB250-2875-375-J1S**
	–0.002	3.5	0.004	0.55	0.312	0.02	0.312	**PTB312-2875-500-J1S**
	–0.002	3.625	0.005	0.55	0.375	0.03	0.5	**PTB375-2875-500-J1S**
	–0.002	3.625	0.005	0.688	0.375	0.03	0.5	**PTB375-2875-625-J1S**
3	–0.001	3.25	0.002	0.413	0.125	0.015	0.25	**PTB125-3000-375-J1S**
	–0.001	3.375	0.002	0.343	0.187	0.015	0.25	**PTB187-3000-312-J1S**
	–0.001	3.375	0.002	0.413	0.187	0.015	0.25	**PTB187-3000-375-J1S**
	–0.002	3.5	0.003	0.413	0.25	0.02	0.312	**PTB250-3000-375-J1S**
	–0.002	3.5	0.003	0.55	0.25	0.02	0.312	**PTB250-3000-500-J1S**
	–0.002	3.625	0.004	0.413	0.312	0.02	0.312	**PTB312-3000-375-J1S**
	–0.002	3.625	0.004	0.55	0.312	0.02	0.312	**PTB312-3000-500-J1S**
	–0.002	3.75	0.005	0.55	0.375	0.03	0.5	**PTB375-3000-500-J1S**
	–0.002	3.75	0.005	0.688	0.375	0.03	0.5	**PTB375-3000-625-J1S**
	–0.002	3.875	0.004	0.759	0.437	0.03	0.5	**PTB437-3000-690-J1S**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
3	–0.003	4	0.007	0.688	0.5	0.03	0.625	**PTB500-3000-625-J1S**
cont.	–0.003	4	0.007	0.825	0.5	0.03	0.625	**PTB500-3000-750-J1S**
3.125	–0.001	3.5	0.002	0.275	0.187	0.015	0.25	**PTB187-3125-250-J1S**
	–0.001	3.5	0.002	0.343	0.187	0.015	0.25	**PTB187-3125-312-J1S**
	–0.001	3.5	0.002	0.413	0.187	0.015	0.25	**PTB187-3125-375-J1S**
	–0.002	3.625	0.003	0.413	0.25	0.02	0.312	**PTB250-3125-375-J1S**
	–0.002	3.75	0.004	0.55	0.312	0.02	0.312	**PTB312-3125-500-J1S**
	–0.002	3.875	0.005	0.688	0.375	0.03	0.5	**PTB375-3125-625-J1S**
3.187	–0.002	3.75	0.003	0.55	0.281	0.02	0.312	**PTB281-3187-500-J1S**
3.25	–0.001	3.625	0.002	0.413	0.187	0.015	0.25	**PTB187-3250-375-J1S**
	–0.002	3.75	0.003	0.413	0.25	0.02	0.312	**PTB250-3250-375-J1S**
	–0.002	3.75	0.003	0.55	0.25	0.02	0.312	**PTB250-3250-500-J1S**
	–0.002	3.875	0.004	0.55	0.312	0.02	0.312	**PTB312-3250-500-J1S**
	–0.002	4	0.005	0.55	0.375	0.03	0.5	**PTB375-3250-500-J1S**
	–0.002	4	0.005	0.618	0.375	0.03	0.5	**PTB375-3250-562-J1S**
	–0.002	4	0.005	0.688	0.375	0.03	0.5	**PTB375-3250-625-J1S**
	–0.003	4.25	0.007	0.825	0.5	0.03	0.625	**PTB500-3250-750-J1S**
	–0.003	4.5	0.009	1.1	0.625	0.045	0.875	**PTB625-3250-1000-J1S**
3.375	–0.001	3.75	0.002	0.275	0.187	0.015	0.25	**PTB187-3375-250-J1S**
	–0.001	3.75	0.002	0.413	0.187	0.015	0.25	**PTB187-3375-375-J1S**
	–0.002	3.875	0.003	0.413	0.25	0.02	0.312	**PTB250-3375-375-J1S**
	–0.002	4	0.004	0.55	0.312	0.02	0.312	**PTB312-3375-500-J1S**
	–0.002	4	0.004	0.688	0.312	0.02	0.312	**PTB312-3375-625-J1S**
	–0.002	4.125	0.005	0.688	0.375	0.03	0.5	**PTB375-3375-625-J1S**
	–0.003	4.375	0.007	0.688	0.5	0.03	0.625	**PTB500-3375-625-J1S**
3.437	–0.002	4	0.003	0.55	0.281	0.02	0.312	**PTB281-3437-500-J1S**
3.5	–0.002	4	0.003	0.413	0.25	0.02	0.312	**PTB250-3500-375-J1S**
	–0.002	4	0.003	0.55	0.25	0.02	0.312	**PTB250-3500-500-J1S**
	–0.002	4.125	0.004	0.55	0.312	0.02	0.312	**PTB312-3500-500-J1S**
	–0.002	4.25	0.005	0.688	0.375	0.03	0.5	**PTB375-3500-625-J1S**
	–0.003	4.5	0.007	0.825	0.5	0.03	0.625	**PTB500-3500-750-J1S**
3.625	–0.001	3.875	0.002	0.206	0.125	0.015	0.25	**PTB125-3625-187-J1S**
	–0.001	4	0.002	0.275	0.187	0.015	0.25	**PTB187-3625-250-J1S**
	–0.001	4	0.002	0.413	0.187	0.015	0.25	**PTB187-3625-375-J1S**
	–0.002	4.125	0.003	0.413	0.25	0.02	0.312	**PTB250-3625-375-J1S**
	–0.002	4.25	0.004	0.413	0.312	0.02	0.312	**PTB312-3625-375-J1S**
	–0.002	4.25	0.004	0.55	0.312	0.02	0.312	**PTB312-3625-500-J1S**
	–0.002	4.375	0.005	0.55	0.375	0.03	0.5	**PTB375-3625-500-J1S**
	–0.002	4.375	0.005	0.688	0.375	0.03	0.5	**PTB375-3625-625-J1S**
3.75	–0.001	4	0.002	0.275	0.125	0.015	0.25	**PTB125-3750-250-J1S**
	–0.001	4.125	0.002	0.413	0.187	0.015	0.25	**PTB187-3750-375-J1S**
	–0.002	4.25	0.003	0.413	0.25	0.02	0.312	**PTB250-3750-375-J1S**
	–0.002	4.25	0.003	0.55	0.25	0.02	0.312	**PTB250-3750-500-J1S**
	–0.002	4.25	0.003	0.618	0.25	0.02	0.312	**PTB250-3750-562-J1S**
	–0.002	4.375	0.004	0.413	0.312	0.02	0.312	**PTB312-3750-375-J1S**
	–0.002	4.375	0.004	0.55	0.312	0.02	0.312	**PTB312-3750-500-J1S**
	–0.002	4.375	0.004	0.688	0.312	0.02	0.312	**PTB312-3750-625-J1S**
	–0.002	4.5	0.005	0.688	0.375	0.03	0.5	**PTB375-3750-625-J1S**
	–0.003	4.75	0.007	0.759	0.5	0.03	0.625	**PTB500-3750-690-J1S**
	–0.003	5	0.009	1.1	0.625	0.045	0.875	**PTB625-3750-1000-J1S**

3.4 PTB profile rod seals, inch sizes

d **3.875 – 5.25** in.



Maximum extrusion gap e

Radial depth	e_{max} at 60 °C *(140 °F)* for pressures		
S	2 300 psi	3 600 psi	5 800 psi
in.	in.		
0.125	0.008	0.004	–
0.156 to 0.187	0.014	0.008	–
0.218 to 0.25	0.018	0.01	0.004
0.281 to 0.437	0.02	0.012	0.006
0.5 to 0.562	0.024	0.012	0.008
0.625 to 0.75	0.024	0.012	0.008

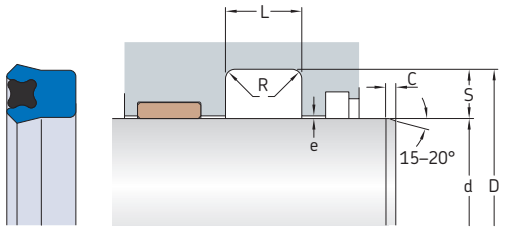
For additional information → **page 34**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
3.875	–0.001	4.25	0.002	0.413	0.187	0.015	0.25	**PTB187-3875-375-J1S**
	–0.002	4.375	0.003	0.413	0.25	0.02	0.312	**PTB250-3875-375-J1S**
	–0.002	4.5	0.004	0.55	0.312	0.02	0.312	**PTB312-3875-500-J1S**
	–0.002	4.625	0.005	0.688	0.375	0.03	0.5	**PTB375-3875-625-J1S**
	–0.002	4.75	0.004	0.825	0.437	0.03	0.5	**PTB437-3875-750-J1S**
4	–0.001	4.375	0.002	0.413	0.187	0.015	0.25	**PTB187-4000-375-J1S**
	–0.002	4.5	0.003	0.343	0.25	0.02	0.312	**PTB250-4000-312-J1S**
	–0.002	4.5	0.003	0.413	0.25	0.02	0.312	**PTB250-4000-375-J1S**
	–0.002	4.5	0.003	0.55	0.25	0.02	0.312	**PTB250-4000-500-J1S**
	–0.002	4.5	0.003	0.618	0.25	0.02	0.312	**PTB250-4000-562-J1S**
	–0.002	4.625	0.004	0.618	0.312	0.02	0.312	**PTB312-4000-562-J1S**
	–0.002	4.75	0.005	0.55	0.375	0.03	0.5	**PTB375-4000-500-J1S**
	–0.002	4.75	0.005	0.688	0.375	0.03	0.5	**PTB375-4000-625-J1S**
	–0.002	4.875	0.004	0.825	0.437	0.03	0.5	**PTB437-4000-750-J1S**
	–0.003	5	0.007	0.688	0.5	0.03	0.625	**PTB500-4000-625-J1S**
	–0.003	5	0.007	0.825	0.5	0.03	0.625	**PTB500-4000-750-J1S**
	–0.003	5.124	0.007	0.825	0.562	0.03	0.75	**PTB562-4000-750-J1S**
4.125	–0.001	4.5	0.002	0.413	0.187	0.015	0.25	**PTB187-4125-375-J1S**
	–0.002	4.625	0.003	0.413	0.25	0.02	0.312	**PTB250-4125-375-J1S**
	–0.002	4.625	0.003	0.618	0.25	0.02	0.312	**PTB250-4125-562-J1S**
	–0.002	4.75	0.004	0.55	0.312	0.02	0.312	**PTB312-4125-500-J1S**
	–0.002	4.75	0.004	0.618	0.312	0.02	0.312	**PTB312-4125-562-J1S**
4.25	–0.001	4.625	0.002	0.413	0.187	0.015	0.25	**PTB187-4250-375-J1S**
	–0.002	4.75	0.003	0.413	0.25	0.02	0.312	**PTB250-4250-375-J1S**
	–0.002	4.75	0.003	0.618	0.25	0.02	0.312	**PTB250-4250-562-J1S**
	–0.002	4.875	0.004	0.481	0.312	0.02	0.312	**PTB312-4250-437-J1S**
	–0.002	4.875	0.004	0.618	0.312	0.02	0.312	**PTB312-4250-562-J1S**
	–0.002	5	0.005	0.55	0.375	0.03	0.5	**PTB375-4250-500-J1S**
	–0.002	5	0.005	0.688	0.375	0.03	0.5	**PTB375-4250-625-J1S**
	–0.003	5.25	0.007	0.825	0.5	0.03	0.625	**PTB500-4250-750-J1S**
	–0.003	5.5	0.009	1.1	0.625	0.045	0.875	**PTB625-4250-1000-J1S**
	–0.003	5.5	0.009	0.825	0.625	0.045	0.875	**PTB625-4250-750-J1S**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
4.375	–0.001	4.75	0.002	0.413	0.187	0.015	0.25	**PTB187-4375-375-J1S**
	–0.002	4.875	0.003	0.618	0.25	0.02	0.312	**PTB250-4375-562-J1S**
	–0.002	5	0.004	0.55	0.312	0.02	0.312	**PTB312-4375-500-J1S**
	–0.002	5	0.004	0.618	0.312	0.02	0.312	**PTB312-4375-562-J1S**
	–0.002	5.125	0.005	0.55	0.375	0.03	0.5	**PTB375-4375-500-J1S**
	–0.002	5.125	0.005	0.688	0.375	0.03	0.5	**PTB375-4375-625-J1S**
	–0.003	5.375	0.007	0.825	0.5	0.03	0.625	**PTB500-4375-750-J1S**
4.5	–0.001	4.75	0.002	0.206	0.125	0.015	0.25	**PTB125-4500-187-J1S**
	–0.001	4.875	0.002	0.343	0.187	0.015	0.25	**PTB187-4500-312-J1S**
	–0.001	4.875	0.002	0.413	0.187	0.015	0.25	**PTB187-4500-375-J1S**
	–0.002	5	0.003	0.343	0.25	0.02	0.312	**PTB250-4500-312-J1S**
	–0.002	5	0.003	0.413	0.25	0.02	0.312	**PTB250-4500-375-J1S**
	–0.002	5	0.003	0.55	0.25	0.02	0.312	**PTB250-4500-500-J1S**
	–0.002	5	0.003	0.618	0.25	0.02	0.312	**PTB250-4500-562-J1S**
	–0.002	5	0.003	0.688	0.25	0.02	0.312	**PTB250-4500-625-J1S**
	–0.002	5.125	0.004	0.55	0.312	0.02	0.312	**PTB312-4500-500-J1S**
	–0.002	5.125	0.004	0.688	0.312	0.02	0.312	**PTB312-4500-625-J1S**
	–0.002	5.25	0.005	0.688	0.375	0.03	0.5	**PTB375-4500-625-J1S**
	–0.002	5.375	0.006	0.825	0.437	0.03	0.5	**PTB437-4500-750-J1S**
4.625	–0.002	5.125	0.003	0.618	0.25	0.02	0.312	**PTB250-4625-562-J1S**
	–0.002	5.25	0.004	0.688	0.312	0.02	0.312	**PTB312-4625-625-J1S**
	–0.002	5.375	0.005	0.688	0.375	0.03	0.5	**PTB375-4625-625-J1S**
4.75	–0.001	5	0.002	0.275	0.125	0.015	0.25	**PTB125-4750-250-J1S**
	–0.001	5.125	0.002	0.413	0.187	0.015	0.25	**PTB187-4750-375-J1S**
	–0.002	5.25	0.003	0.413	0.25	0.02	0.312	**PTB250-4750-375-J1S**
	–0.002	5.25	0.003	0.618	0.25	0.02	0.312	**PTB250-4750-562-J1S**
	–0.002	5.375	0.004	0.55	0.312	0.02	0.312	**PTB312-4750-500-J1S**
	–0.002	5.375	0.004	0.688	0.312	0.02	0.312	**PTB312-4750-625-J1S**
	–0.002	5.5	0.005	0.55	0.375	0.03	0.5	**PTB375-4750-500-J1S**
	–0.002	5.5	0.005	0.688	0.375	0.03	0.5	**PTB375-4750-625-J1S**
	–0.002	5.625	0.006	0.825	0.437	0.03	0.5	**PTB437-4750-750-J1S**
	–0.003	5.75	0.007	0.759	0.5	0.03	0.625	**PTB500-4750-690-J1S**
4.875	–0.002	5.375	0.003	0.618	0.25	0.02	0.312	**PTB250-4875-562-J1S**
	–0.002	5.375	0.003	0.688	0.25	0.02	0.312	**PTB250-4875-625-J1S**
	–0.002	5.625	0.005	0.688	0.375	0.03	0.5	**PTB375-4875-625-J1S**
5	–0.001	5.25	0.002	0.275	0.125	0.015	0.25	**PTB125-5000-250-J1S**
	–0.001	5.375	0.002	0.413	0.187	0.015	0.25	**PTB187-5000-375-J1S**
	–0.002	5.5	0.003	0.413	0.25	0.02	0.312	**PTB250-5000-375-J1S**
	–0.002	5.5	0.003	0.55	0.25	0.02	0.312	**PTB250-5000-500-J1S**
	–0.002	5.5	0.003	0.618	0.25	0.02	0.312	**PTB250-5000-562-J1S**
	–0.002	5.625	0.004	0.688	0.312	0.02	0.312	**PTB312-5000-625-J1S**
	–0.002	5.75	0.005	0.55	0.375	0.03	0.5	**PTB375-5000-500-J1S**
	–0.002	5.75	0.005	0.688	0.375	0.03	0.5	**PTB375-5000-625-J1S**
	–0.003	6	0.007	0.688	0.5	0.03	0.625	**PTB500-5000-625-J1S**
	–0.003	6	0.007	0.825	0.5	0.03	0.625	**PTB500-5000-750-J1S**
	–0.003	6.25	0.009	1.1	0.625	0.045	0.875	**PTB625-5000-1000-J1S**
5.125	–0.002	5.875	0.005	0.688	0.375	0.03	0.5	**PTB375-5125-625-J1S**
5.25	–0.001	5.625	0.002	0.413	0.187	0.015	0.25	**PTB187-5250-375-J1S**
	–0.002	5.75	0.003	0.413	0.25	0.02	0.312	**PTB250-5250-375-J1S**
	–0.002	5.75	0.003	0.618	0.25	0.02	0.312	**PTB250-5250-562-J1S**
	–0.002	5.875	0.004	0.688	0.312	0.02	0.312	**PTB312-5250-625-J1S**

3.4 PTB profile rod seals, inch sizes

d **5.25 – 7.5** in.



Maximum extrusion gap e

Radial depth	e_{max} at 60 °C *(140 °F)* for pressures		
S	2 300 psi	3 600 psi	5 800 psi
in.	in.		
0.125	0.008	0.004	–
0.156 to 0.187	0.014	0.008	–
0.218 to 0.25	0.018	0.01	0.004
0.281 to 0.437	0.02	0.012	0.006
0.5 to 0.562	0.024	0.012	0.008
0.625 to 0.75	0.024	0.012	0.008

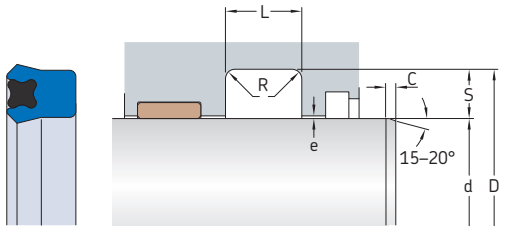
For additional information → **page 34**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
5.25 cont.	–0.002	6	0.005	0.55	0.375	0.03	0.5	**PTB375-5250-500-J1S**
	–0.002	6	0.005	0.688	0.375	0.03	0.5	**PTB375-5250-625-J1S**
	–0.003	6.25	0.007	0.825	0.5	0.03	0.625	**PTB500-5250-750-J1S**
	–0.003	6.5	0.009	1.1	0.625	0.045	0.875	**PTB625-5250-1000-J1S**
5.375	–0.002	5.875	0.003	0.618	0.25	0.02	0.312	**PTB250-5375-562-J1S**
	–0.002	6	0.004	0.688	0.312	0.02	0.312	**PTB312-5375-625-J1S**
	–0.002	6.125	0.005	0.688	0.375	0.03	0.5	**PTB375-5375-625-J1S**
	–0.003	6.375	0.007	0.825	0.5	0.03	0.625	**PTB500-5375-750-J1S**
5.437	–0.002	5.875	0.003	0.618	0.218	0.02	0.312	**PTB218-5437-562-J1S**
	–0.002	6	0.003	0.618	0.281	0.02	0.312	**PTB281-5437-562-J1S**
5.5	–0.001	5.875	0.002	0.413	0.187	0.015	0.25	**PTB187-5500-375-J1S**
	–0.002	6	0.003	0.413	0.25	0.02	0.312	**PTB250-5500-375-J1S**
	–0.002	6	0.003	0.618	0.25	0.02	0.312	**PTB250-5500-562-J1S**
	–0.002	6.125	0.004	0.413	0.312	0.02	0.312	**PTB312-5500-375-J1S**
	–0.002	6.125	0.004	0.688	0.312	0.02	0.312	**PTB312-5500-625-J1S**
	–0.002	6.25	0.005	0.55	0.375	0.03	0.5	**PTB375-5500-500-J1S**
	–0.002	6.25	0.005	0.688	0.375	0.03	0.5	**PTB375-5500-625-J1S**
	–0.002	6.375	0.006	0.55	0.437	0.03	0.5	**PTB437-5500-500-J1S**
	–0.003	6.5	0.007	0.688	0.5	0.03	0.625	**PTB500-5500-625-J1S**
	–0.003	6.5	0.007	0.825	0.5	0.03	0.625	**PTB500-5500-750-J1S**
5.625	–0.001	6	0.002	0.413	0.187	0.015	0.25	**PTB187-5625-375-J1S**
5.625	–0.002	6.25	0.004	0.688	0.312	0.02	0.312	**PTB312-5625-625-J1S**
5.75	–0.001	6.125	0.002	0.413	0.187	0.015	0.25	**PTB187-5750-375-J1S**
	–0.002	6.25	0.003	0.413	0.25	0.02	0.312	**PTB250-5750-375-J1S**
	–0.002	6.25	0.003	0.618	0.25	0.02	0.312	**PTB250-5750-562-J1S**
	–0.002	6.375	0.004	0.688	0.312	0.02	0.312	**PTB312-5750-625-J1S**
	–0.002	6.5	0.005	0.688	0.375	0.03	0.5	**PTB375-5750-625-J1S**
	–0.003	6.75	0.007	0.825	0.5	0.03	0.625	**PTB500-5750-750-J1S**
	–0.003	7	0.009	1.1	0.625	0.045	0.875	**PTB625-5750-1000-J1S**
5.875	–0.002	6.375	0.003	0.618	0.25	0.02	0.312	**PTB250-5875-562-J1S**
	–0.002	6.5	0.004	0.413	0.312	0.02	0.312	**PTB312-5875-375-J1S**
	–0.002	6.625	0.005	0.688	0.375	0.03	0.5	**PTB375-5875-625-J1S**
	–0.003	6.875	0.007	0.825	0.5	0.03	0.625	**PTB500-5875-750-J1S**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
6	–0.001	6.375	0.002	0.413	0.187	0.015	0.25	**PTB187-6000-375-J1S**
	–0.002	6.5	0.003	0.413	0.25	0.02	0.312	**PTB250-6000-375-J1S**
	–0.002	6.5	0.003	0.481	0.25	0.02	0.312	**PTB250-6000-437-J1S**
	–0.002	6.5	0.003	0.618	0.25	0.02	0.312	**PTB250-6000-562-J1S**
	–0.002	6.625	0.004	0.688	0.312	0.02	0.312	**PTB312-6000-625-J1S**
	–0.002	6.75	0.005	0.55	0.375	0.03	0.5	**PTB375-6000-500-J1S**
	–0.002	6.75	0.005	0.618	0.375	0.03	0.5	**PTB375-6000-562-J1S**
	–0.002	6.75	0.005	0.688	0.375	0.03	0.5	**PTB375-6000-625-J1S**
	–0.003	7	0.007	0.825	0.5	0.03	0.625	**PTB500-6000-750-J1S**
6.125	–0.002	6.625	0.003	0.413	0.25	0.02	0.312	**PTB250-6125-375-J1S**
6.25	–0.001	6.625	0.002	0.343	0.187	0.015	0.25	**PTB187-6250-312-J1S**
	–0.002	6.75	0.003	0.413	0.25	0.02	0.312	**PTB250-6250-375-J1S**
	–0.002	7	0.005	0.55	0.375	0.03	0.5	**PTB375-6250-500-J1S**
	–0.002	7	0.005	0.688	0.375	0.03	0.5	**PTB375-6250-625-J1S**
	–0.003	7.25	0.007	0.825	0.5	0.03	0.625	**PTB500-6250-750-J1S**
	–0.003	7.5	0.009	1.1	0.625	0.045	0.875	**PTB625-6250-1000-J1S**
6.375	–0.002	7	0.004	0.688	0.312	0.02	0.312	**PTB312-6375-625-J1S**
6.5	–0.002	7	0.003	0.413	0.25	0.02	0.312	**PTB250-6500-375-J1S**
	–0.002	7	0.003	0.618	0.25	0.02	0.312	**PTB250-6500-562-J1S**
	–0.002	7.125	0.004	0.688	0.312	0.02	0.312	**PTB312-6500-625-J1S**
	–0.002	7.25	0.005	0.55	0.375	0.03	0.5	**PTB375-6500-500-J1S**
	–0.002	7.25	0.005	0.688	0.375	0.03	0.5	**PTB375-6500-625-J1S**
	–0.003	7.5	0.007	0.825	0.5	0.03	0.625	**PTB500-6500-750-J1S**
6.625	–0.002	7.25	0.004	0.688	0.312	0.02	0.312	**PTB312-6625-625-J1S**
6.75	–0.002	7.25	0.003	0.413	0.25	0.02	0.312	**PTB250-6750-375-J1S**
	–0.002	7.25	0.003	0.618	0.25	0.02	0.312	**PTB250-6750-562-J1S**
	–0.002	7.5	0.005	0.55	0.375	0.03	0.5	**PTB375-6750-500-J1S**
	–0.002	7.5	0.005	0.688	0.375	0.03	0.5	**PTB375-6750-625-J1S**
	–0.003	7.75	0.007	0.825	0.5	0.03	0.625	**PTB500-6750-750-J1S**
6.875	–0.002	7.625	0.005	0.688	0.375	0.03	0.5	**PTB375-6875-625-J1S**
7	–0.002	7.5	0.003	0.413	0.25	0.02	0.312	**PTB250-7000-375-J1S**
	–0.002	7.5	0.003	0.618	0.25	0.02	0.312	**PTB250-7000-562-J1S**
	–0.002	7.625	0.004	0.688	0.312	0.02	0.312	**PTB312-7000-625-J1S**
	–0.002	7.75	0.005	0.55	0.375	0.03	0.5	**PTB375-7000-500-J1S**
	–0.002	7.75	0.005	0.688	0.375	0.03	0.5	**PTB375-7000-625-J1S**
	–0.003	8	0.007	0.825	0.5	0.03	0.625	**PTB500-7000-750-J1S**
	–0.003	8.25	0.009	1.1	0.625	0.045	0.875	**PTB625-7000-1000-J1S**
	–0.003	8.25	0.009	0.825	0.625	0.045	0.875	**PTB625-7000-750-J1S**
7.125	–0.002	7.625	0.003	0.618	0.25	0.02	0.312	**PTB250-7125-562-J1S**
7.25	–0.002	7.75	0.003	0.618	0.25	0.02	0.312	**PTB250-7250-562-J1S**
	–0.002	7.875	0.004	0.688	0.312	0.02	0.312	**PTB312-7250-625-J1S**
	–0.002	8	0.005	0.688	0.375	0.03	0.5	**PTB375-7250-625-J1S**
	–0.003	8.25	0.007	0.825	0.5	0.03	0.625	**PTB500-7250-750-J1S**
7.375	–0.002	8	0.004	0.688	0.312	0.02	0.312	**PTB312-7375-625-J1S**
7.5	–0.001	7.875	0.002	0.343	0.187	0.015	0.25	**PTB187-7500-312-J1S**
	–0.002	8	0.003	0.413	0.25	0.02	0.312	**PTB250-7500-375-J1S**
	–0.002	8	0.003	0.618	0.25	0.02	0.312	**PTB250-7500-562-J1S**
	–0.002	8.25	0.005	0.55	0.375	0.03	0.5	**PTB375-7500-500-J1S**
	–0.002	8.25	0.005	0.688	0.375	0.03	0.5	**PTB375-7500-625-J1S**
	–0.002	8.375	0.006	0.55	0.437	0.03	0.5	**PTB437-7500-500-J1S**
	–0.003	8.75	0.009	1.1	0.625	0.045	0.875	**PTB625-7500-1000-J1S**

3.4 PTB profile rod seals, inch sizes

d **7.75 – 14.375** in.



Maximum extrusion gap e

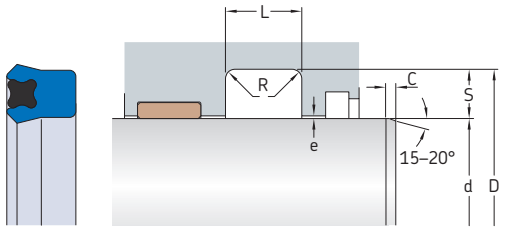
Radial depth	e_{max} at 60 °C *(140 °F)* for pressures		
S	2 300 psi	3 600 psi	5 800 psi
in.	in.		
0.125	0.008	0.004	–
0.156 to 0.187	0.014	0.008	–
0.218 to 0.25	0.018	0.01	0.004
0.281 to 0.437	0.02	0.012	0.006
0.5 to 0.562	0.024	0.012	0.008
0.625 to 0.75	0.024	0.012	0.008

For additional information → **page 34**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
7.75	–0.002	8.25	0.003	0.618	0.25	0.02	0.312	**PTB250-7750-562-J1S**
	–0.002	8.5	0.005	0.55	0.375	0.03	0.5	**PTB375-7750-500-J1S**
	–0.002	8.5	0.005	0.688	0.375	0.03	0.5	**PTB375-7750-625-J1S**
	–0.003	8.75	0.007	0.825	0.5	0.03	0.625	**PTB500-7750-750-J1S**
8	–0.002	8.5	0.003	0.618	0.25	0.02	0.312	**PTB250-8000-562-J1S**
	–0.002	8.625	0.004	0.688	0.312	0.02	0.312	**PTB312-8000-625-J1S**
	–0.002	8.75	0.005	0.688	0.375	0.03	0.5	**PTB375-8000-625-J1S**
	–0.003	9	0.007	0.825	0.5	0.03	0.625	**PTB500-8000-750-J1S**
	–0.003	9.5	0.011	1.375	0.75	0.045	1	**PTB750-8000-1250-J1S**
8.125	–0.002	8.625	0.003	0.618	0.25	0.02	0.312	**PTB250-8125-562-J1S**
8.25	–0.002	8.75	0.003	0.618	0.25	0.02	0.312	**PTB250-8250-562-J1S**
	–0.002	9	0.005	0.688	0.375	0.03	0.5	**PTB375-8250-625-J1S**
	–0.003	9.5	0.009	1.1	0.625	0.045	0.875	**PTB625-8250-1000-J1S**
8.375	–0.002	8.875	0.003	0.618	0.25	0.02	0.312	**PTB250-8375-562-J1S**
8.5	–0.002	9	0.003	0.618	0.25	0.02	0.312	**PTB250-8500-562-J1S**
	–0.002	9.25	0.005	0.55	0.375	0.03	0.5	**PTB375-8500-500-J1S**
	–0.002	9.25	0.005	0.688	0.375	0.03	0.5	**PTB375-8500-625-J1S**
	–0.002	9.312	0.005	0.55	0.406	0.03	0.5	**PTB406-8500-500-J1S**
	–0.003	9.5	0.007	0.825	0.5	0.03	0.625	**PTB500-8500-750-J1S**
	–0.003	9.75	0.009	1.1	0.625	0.045	0.875	**PTB625-8500-1000-J1S**
	–0.003	10	0.011	1.238	0.75	0.045	1	**PTB750-8500-1125-J1S**
8.75	–0.002	9.5	0.005	0.55	0.375	0.03	0.5	**PTB375-8750-500-J1S**
9	–0.002	9.5	0.003	0.618	0.25	0.02	0.312	**PTB250-9000-562-J1S**
	–0.002	9.75	0.005	0.688	0.375	0.03	0.5	**PTB375-9000-625-J1S**
	–0.003	10	0.007	0.825	0.5	0.03	0.625	**PTB500-9000-750-J1S**
	–0.003	10.5	0.011	1.375	0.75	0.045	1	**PTB750-9000-1250-J1S**
	–0.003	10.5	0.011	1.65	0.75	0.045	1	**PTB750-9000-1500-J1S**
9.25	–0.002	9.875	0.004	0.688	0.312	0.02	0.312	**PTB312-9250-625-J1S**
	–0.002	10	0.005	0.688	0.375	0.03	0.5	**PTB375-9250-625-J1S**
	–0.003	10.25	0.007	0.825	0.5	0.03	0.625	**PTB500-9250-750-J1S**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
9.5	–0.002	10	0.003	0.618	0.25	0.02	0.312	**PTB250-9500-562-J1S**
	–0.002	10.25	0.005	0.688	0.375	0.03	0.5	**PTB375-9500-625-J1S**
	–0.003	10.5	0.007	0.825	0.5	0.03	0.625	**PTB500-9500-750-J1S**
9.625	–0.002	10.125	0.003	0.413	0.25	0.02	0.312	**PTB250-9625-375-J1S**
9.75	–0.002	10.5	0.005	0.688	0.375	0.03	0.5	**PTB375-9750-625-J1S**
	–0.003	10.75	0.007	0.825	0.5	0.03	0.625	**PTB500-9750-750-J1S**
10	–0.002	10.5	0.003	0.618	0.25	0.02	0.312	**PTB250-10000-562-J1S**
	–0.002	10.75	0.005	0.688	0.375	0.03	0.5	**PTB375-10000-625-J1S**
	–0.003	11	0.007	0.825	0.5	0.03	0.625	**PTB500-10000-750-J1S**
	–0.003	11.25	0.009	1.1	0.625	0.045	0.875	**PTB625-10000-1000-J1S**
	–0.003	11.5	0.011	1.375	0.75	0.045	1	**PTB750-10000-1250-J1S**
10.25	–0.002	11	0.005	0.55	0.375	0.03	0.5	**PTB375-10250-500-J1S**
10.5	–0.002	11.25	0.005	0.688	0.375	0.03	0.5	**PTB375-10500-625-J1S**
	–0.003	11.5	0.007	1.1	0.5	0.03	0.625	**PTB500-10500-1000-J1S**
	–0.003	11.5	0.007	0.825	0.5	0.03	0.625	**PTB500-10500-750-J1S**
	–0.003	12	0.011	1.1	0.75	0.045	1	**PTB750-10500-1000-J1S**
10.625	–0.003	11.625	0.007	0.825	0.5	0.03	0.625	**PTB500-10625-750-J1S**
10.75	–0.002	11.5	0.005	0.688	0.375	0.03	0.5	**PTB375-10750-625-J1S**
	–0.003	11.75	0.007	0.825	0.5	0.03	0.625	**PTB500-10750-750-J1S**
11	–0.002	11.75	0.005	0.688	0.375	0.03	0.5	**PTB375-11000-625-J1S**
	–0.003	12	0.007	0.825	0.5	0.03	0.625	**PTB500-11000-750-J1S**
	–0.003	12.25	0.009	1.1	0.625	0.045	0.875	**PTB625-11000-1000-J1S**
11.25	–0.002	12	0.005	0.688	0.375	0.03	0.5	**PTB375-11250-625-J1S**
	–0.003	12.5	0.009	1.1	0.625	0.045	0.875	**PTB625-11250-1000-J1S**
11.5	–0.002	12	0.003	0.584	0.25	0.02	0.312	**PTB250-11500-531-J1S**
	–0.002	12.25	0.005	0.688	0.375	0.03	0.5	**PTB375-11500-625-J1S**
	–0.003	12.75	0.009	1.1	0.625	0.045	0.875	**PTB625-11500-1000-J1S**
11.75	–0.003	12.75	0.007	0.825	0.5	0.03	0.625	**PTB500-11750-750-J1S**
12	–0.002	12.5	0.003	0.618	0.25	0.02	0.312	**PTB250-12000-562-J1S**
	–0.003	13	0.007	0.825	0.5	0.03	0.625	**PTB500-12000-750-J1S**
	–0.003	13.5	0.011	1.375	0.75	0.045	1	**PTB750-12000-1250-J1S**
12.25	–0.003	13.5	0.009	1.1	0.625	0.045	0.875	**PTB625-12250-1000-J1S**
12.5	–0.002	13	0.003	0.584	0.25	0.02	0.312	**PTB250-12500-531-J1S**
	–0.003	13.5	0.007	0.825	0.5	0.03	0.625	**PTB500-12500-750-J1S**
12.75	–0.002	13.25	0.003	0.618	0.25	0.02	0.312	**PTB250-12750-562-J1S**
	–0.002	13.5	0.005	0.688	0.375	0.03	0.5	**PTB375-12750-625-J1S**
	–0.003	13.75	0.007	0.825	0.5	0.03	0.625	**PTB500-12750-750-J1S**
13	–0.003	14	0.007	0.825	0.5	0.03	0.625	**PTB500-13000-750-J1S**
13.5	–0.002	14	0.003	0.584	0.25	0.02	0.312	**PTB250-13500-531-J1S**
	–0.002	14	0.003	0.618	0.25	0.02	0.312	**PTB250-13500-562-J1S**
	–0.003	14.75	0.009	0.963	0.625	0.045	0.875	**PTB625-13500-875-J1S**
13.625	–0.002	14.375	0.005	0.688	0.375	0.03	0.5	**PTB375-13625-625-J1S**
14	–0.003	15	0.007	0.825	0.5	0.03	0.625	**PTB500-14000-750-J1S**
	–0.003	15.5	0.011	1.375	0.75	0.045	1	**PTB750-14000-1250-J1S**
14.25	–0.002	15	0.005	0.688	0.375	0.03	0.5	**PTB375-14250-625-J1S**
	–0.003	15.75	0.011	1.375	0.75	0.045	1	**PTB750-14250-1250-J1S**
14.375	–0.002	15.125	0.005	0.688	0.375	0.03	0.5	**PTB375-14375-625-J1S**

3.4 PTB profile rod seals, inch sizes
d **14.5 – 35** in.



Maximum extrusion gap e

Radial depth	e_{max} at 60 °C *(140 °F)* for pressures		
S	2 300 psi	3 600 psi	5 800 psi
in.	in.		
0.125	0.008	0.004	–
0.156 to 0.187	0.014	0.008	–
0.218 to 0.25	0.018	0.01	0.004
0.281 to 0.437	0.02	0.012	0.006
0.5 to 0.562	0.024	0.012	0.008
0.625 to 0.75	0.024	0.012	0.008

For additional information → **page 34**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
14.5	–0.003	16	0.011	1.238	0.75	0.045	1	**PTB750-14500-1125-J1S**
14.75	–0.002	15.5	0.005	0.688	0.375	0.03	0.5	**PTB375-14750-625-J1S**
	–0.003	16	0.009	1.1	0.625	0.045	0.875	**PTB625-14750-1000-J1S**
15	–0.003	16	0.007	0.825	0.5	0.03	0.625	**PTB500-15000-750-J1S**
15.25	–0.002	16	0.005	0.688	0.375	0.03	0.5	**PTB375-15250-625-J1S**
15.5	–0.003	16.75	0.009	1.1	0.625	0.045	0.875	**PTB625-15500-1000-J1S**
15.75	–0.003	16.75	0.007	0.825	0.5	0.03	0.625	**PTB500-15750-750-J1S**
16	–0.003	17	0.007	0.825	0.5	0.03	0.625	**PTB500-16000-750-J1S**
	–0.003	17.25	0.009	1.238	0.625	0.045	0.875	**PTB625-16000-1125-J1S**
	–0.003	17.5	0.011	1.375	0.75	0.045	1	**PTB750-16000-1250-J1S**
16.5	–0.003	17.5	0.007	0.825	0.5	0.03	0.625	**PTB500-16500-750-J1S**
17	–0.003	18	0.007	0.825	0.5	0.03	0.625	**PTB500-17000-750-J1S**
18	–0.003	19	0.007	0.825	0.5	0.03	0.625	**PTB500-18000-750-J1S**
	–0.003	19.25	0.009	1.1	0.625	0.045	0.875	**PTB625-18000-1000-J1S**
18.5	–0.003	20	0.011	1.375	0.75	0.045	1	**PTB750-18500-1250-J1S**
18.75	–0.003	20	0.009	1.1	0.625	0.045	0.875	**PTB625-18750-1000-J1S**
19	–0.003	20	0.007	0.825	0.5	0.03	0.625	**PTB500-19000-750-J1S**
20	–0.003	21.5	0.011	1.375	0.75	0.045	1	**PTB750-20000-1250-J1S**
21	–0.003	22	0.007	0.825	0.5	0.03	0.625	**PTB500-21000-750-J1S**
22.5	–0.003	24	0.011	1.1	0.75	0.045	1	**PTB750-22500-1000-J1S**
23	–0.003	24	0.007	0.825	0.5	0.03	0.625	**PTB500-23000-750-J1S**
24.5	–0.003	25.5	0.007	0.825	0.5	0.03	0.625	**PTB500-24500-750-J1S**
25.5	–0.003	26.5	0.007	0.825	0.5	0.03	0.625	**PTB500-25500-750-J1S**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
30.75	–0.003	32	0.009	1.1	0.625	0.045	0.875	**PTB625-30750-1000-J1S**
35	–0.002	35.75	0.005	0.688	0.375	0.03	0.5	**PTB375-35000-625-J1S**

Other sizes are available on request

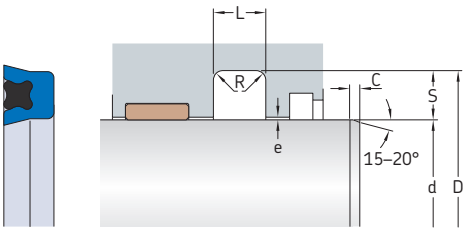
STD profile data

Material codes	Sealing ring: U-1003 X-ring: A-8501 For additional information → **page 26**
Pressure	Up to 400 bar *(5 800 psi)*
Speed	Up to 1 m/s *(3.2 ft/s)*
Temperature range	 Extreme low temperature range: may be intermittently exposed (e.g. cold start-up) without seal damage, but seal performance may be compromised while in this range Temperatures below the recommended operating range: seal performance depends on system design (precision guiding arrangement recommended) **Recommended operating temperature range for this profile and material** Temperatures above the recommended operating range: acceptable only with reduced pressure, speed, e-gap and/or with the use of a full-face anti-extrusion ring Extreme high temperature range: only occasional short-term exposure (e.g. cylinder in curing oven of a powder coating process)
Counter-surface	→ **page 22**

Maximum values of application parameters (e.g. pressure, speed, temperature, e-gap) should not be applied continuously nor simultaneously.

3.5 STD profile rod seals, inch sizes

d **0.125 – 0.562** in.



Maximum extrusion gap e

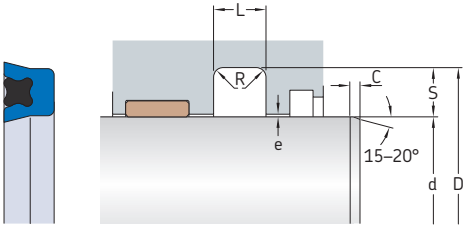
Radial depth	e_{max} at 60 °C *(140 °F)* for pressures		
S	2 300 psi	3 600 psi	5 800 psi
in.	in.		
0.125	0.008	0.004	–
0.156 to 0.187	0.014	0.008	–
0.218 to 0.25	0.018	0.01	0.004
0.281 to 0.437	0.02	0.012	0.006
0.5 to 0.562	0.024	0.012	0.008
0.625 to 0.75	0.024	0.012	0.008

For additional information → **page 34**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
0.125	–0.001	0.375	0.002	0.138	0.125	0.015	0.25	**STD125-125-125-J1S**
0.14	–0.001	0.39	0.002	0.138	0.125	0.015	0.25	**STD125-140-125-J1S**
0.156	–0.001	0.406	0.002	0.138	0.125	0.015	0.25	**STD125-156-125-J1S**
0.187	–0.001	0.437	0.002	0.138	0.125	0.015	0.25	**STD125-187-125-J1S**
	–0.001	0.561	0.002	0.206	0.187	0.015	0.25	**STD187-187-187-J1S**
0.25	–0.001	0.5	0.002	0.138	0.125	0.015	0.25	**STD125-250-125-J1S**
	–0.001	0.624	0.002	0.206	0.187	0.015	0.25	**STD187-250-187-J1S**
	–0.002	0.75	0.003	0.275	0.25	0.02	0.312	**STD250-250-250-J1S**
	–0.002	0.874	0.004	0.343	0.312	0.02	0.312	**STD312-250-312-J1S**
0.312	–0.001	0.562	0.002	0.138	0.125	0.015	0.25	**STD125-312-125-J1S**
	–0.001	0.686	0.002	0.206	0.187	0.015	0.25	**STD187-312-187-J1S**
	–0.002	0.748	0.003	0.24	0.218	0.015	0.25	**STD218-312-218-J1S**
	–0.002	0.812	0.003	0.275	0.25	0.02	0.312	**STD250-312-250-J1S**
0.375	–0.001	0.625	0.002	0.138	0.125	0.015	0.25	**STD125-375-125-J1S**
	–0.001	0.749	0.002	0.206	0.187	0.015	0.25	**STD187-375-187-J1S**
	–0.002	0.875	0.003	0.275	0.25	0.02	0.312	**STD250-375-250-J1S**
	–0.002	0.999	0.004	0.343	0.312	0.02	0.312	**STD312-375-312-J1S**
0.437	–0.001	0.687	0.002	0.138	0.125	0.015	0.25	**STD125-437-125-J1S**
	–0.001	0.811	0.002	0.206	0.187	0.015	0.25	**STD187-437-187-J1S**
	–0.002	0.937	0.003	0.275	0.25	0.02	0.312	**STD250-437-250-J1S**
	–0.002	1.061	0.004	0.343	0.312	0.02	0.312	**STD312-437-312-J1S**
0.5	–0.001	0.75	0.002	0.138	0.125	0.015	0.25	**STD125-500-125-J1S**
	–0.001	0.812	0.002	0.172	0.156	0.015	0.25	**STD156-500-156-J1S**
	–0.001	0.874	0.002	0.206	0.187	0.015	0.25	**STD187-500-187-J1S**
	–0.002	1	0.003	0.275	0.25	0.02	0.312	**STD250-500-250-J1S**
	–0.002	1.124	0.004	0.343	0.312	0.02	0.312	**STD312-500-312-J1S**
	–0.002	1.25	0.005	0.413	0.375	0.03	0.5	**STD375-500-375-J1S**
0.562	–0.001	0.812	0.002	0.138	0.125	0.015	0.25	**STD125-562-125-J1S**
	–0.001	0.936	0.002	0.206	0.187	0.015	0.25	**STD187-562-187-J1S**
	–0.002	1.062	0.003	0.275	0.25	0.02	0.312	**STD250-562-250-J1S**

3.5 STD profile rod seals, inch sizes

d **0.625 – 1.75** in.



Maximum extrusion gap e

Radial depth	e_{max} at 60 °C *(140 °F)* for pressures		
S	2 300 psi	3 600 psi	5 800 psi
in.	in.		
0.125	0.008	0.004	–
0.156 to 0.187	0.014	0.008	–
0.218 to 0.25	0.018	0.01	0.004
0.281 to 0.437	0.02	0.012	0.006
0.5 to 0.562	0.024	0.012	0.008
0.625 to 0.75	0.024	0.012	0.008

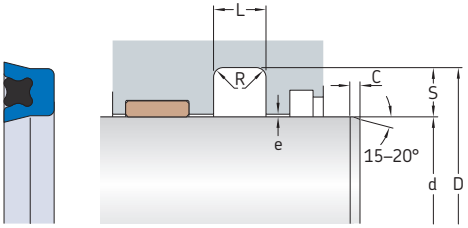
For additional information → **page 34**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
0.625	–0.001	0.875	0.002	0.138	0.125	0.015	0.25	**STD125-625-125-J1S**
	–0.001	0.937	0.002	0.172	0.156	0.015	0.25	**STD156-625-156-J1S**
	–0.001	0.999	0.002	0.206	0.187	0.015	0.25	**STD187-625-187-J1S**
	–0.002	1.125	0.003	0.275	0.25	0.02	0.312	**STD250-625-250-J1S**
	–0.002	1.249	0.004	0.343	0.312	0.02	0.312	**STD312-625-312-J1S**
	–0.002	1.375	0.005	0.413	0.375	0.03	0.5	**STD375-625-375-J1S**
	–0.003	1.625	0.007	0.55	0.5	0.03	0.625	**STD500-625-500-J1S**
0.687	–0.001	0.937	0.002	0.138	0.125	0.015	0.25	**STD125-687-125-J1S**
0.75	–0.001	1	0.002	0.138	0.125	0.015	0.25	**STD125-750-125-J1S**
	–0.001	1.062	0.002	0.172	0.156	0.015	0.25	**STD156-750-156-J1S**
	–0.001	1.124	0.002	0.206	0.187	0.015	0.25	**STD187-750-187-J1S**
	–0.002	1.25	0.003	0.275	0.25	0.02	0.312	**STD250-750-250-J1S**
	–0.002	1.374	0.004	0.343	0.312	0.02	0.312	**STD312-750-312-J1S**
	–0.002	1.5	0.005	0.413	0.375	0.03	0.5	**STD375-750-375-J1S**
0.812	–0.001	1.062	0.002	0.138	0.125	0.015	0.25	**STD125-812-125-J1S**
	–0.002	1.312	0.003	0.275	0.25	0.02	0.312	**STD250-812-250-J1S**
0.875	–0.001	1.125	0.002	0.138	0.125	0.015	0.25	**STD125-875-125-J1S**
	–0.001	1.249	0.002	0.206	0.187	0.015	0.25	**STD187-875-187-J1S**
	–0.002	1.375	0.003	0.275	0.25	0.02	0.312	**STD250-875-250-J1S**
	–0.002	1.499	0.004	0.343	0.312	0.02	0.312	**STD312-875-312-J1S**
	–0.002	1.625	0.005	0.413	0.375	0.03	0.5	**STD375-875-375-J1S**
0.937	–0.002	1.687	0.005	0.413	0.375	0.03	0.5	**STD375-937-375-J1S**
1	–0.001	1.25	0.002	0.138	0.125	0.015	0.25	**STD125-1000-125-J1S**
	–0.001	1.312	0.002	0.172	0.156	0.015	0.25	**STD156-1000-156-J1S**
	–0.001	1.374	0.002	0.206	0.187	0.015	0.25	**STD187-1000-187-J1S**
	–0.002	1.5	0.003	0.275	0.25	0.02	0.312	**STD250-1000-250-J1S**
	–0.002	1.562	0.003	0.309	0.281	0.02	0.312	**STD281-1000-281-J1S**
	–0.002	1.624	0.004	0.343	0.312	0.02	0.312	**STD312-1000-312-J1S**
	–0.002	1.75	0.005	0.413	0.375	0.03	0.5	**STD375-1000-375-J1S**
	–0.003	2	0.007	0.55	0.5	0.03	0.625	**STD500-1000-500-J1S**
1.062	–0.001	1.312	0.002	0.138	0.125	0.015	0.25	**STD125-1062-125-J1S**
	–0.001	1.436	0.002	0.206	0.187	0.015	0.25	**STD187-1062-187-J1S**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
1.125	–0.001	1.375	0.002	0.138	0.125	0.015	0.25	**STD125-1125-125-J1S**
	–0.001	1.437	0.002	0.172	0.156	0.015	0.25	**STD156-1125-156-J1S**
	–0.001	1.499	0.002	0.206	0.187	0.015	0.25	**STD187-1125-187-J1S**
	–0.002	1.625	0.003	0.275	0.25	0.02	0.312	**STD250-1125-250-J1S**
	–0.002	1.749	0.004	0.343	0.312	0.02	0.312	**STD312-1125-312-J1S**
	–0.002	1.875	0.005	0.413	0.375	0.03	0.5	**STD375-1125-375-J1S**
1.187	–0.001	1.499	0.002	0.172	0.156	0.015	0.25	**STD156-1187-156-J1S**
	–0.001	1.561	0.002	0.206	0.187	0.015	0.25	**STD187-1187-187-J1S**
	–0.002	1.687	0.003	0.275	0.25	0.02	0.312	**STD250-1187-250-J1S**
	–0.002	1.811	0.004	0.343	0.312	0.02	0.312	**STD312-1187-312-J1S**
1.25	–0.001	1.5	0.002	0.138	0.125	0.015	0.25	**STD125-1250-125-J1S**
	–0.001	1.562	0.002	0.172	0.156	0.015	0.25	**STD156-1250-156-J1S**
	–0.001	1.624	0.002	0.206	0.187	0.015	0.25	**STD187-1250-187-J1S**
	–0.002	1.75	0.003	0.275	0.25	0.02	0.312	**STD250-1250-250-J1S**
	–0.002	1.874	0.004	0.343	0.312	0.02	0.312	**STD312-1250-312-J1S**
	–0.002	2	0.005	0.413	0.375	0.03	0.5	**STD375-1250-375-J1S**
	–0.003	2.25	0.007	0.55	0.5	0.03	0.625	**STD500-1250-500-J1S**
	–0.003	2.5	0.009	0.688	0.625	0.045	0.875	**STD625-1250-625-J1S**
1.312	–0.001	1.562	0.002	0.138	0.125	0.015	0.25	**STD125-1312-125-J1S**
	–0.001	1.686	0.002	0.206	0.187	0.015	0.25	**STD187-1312-187-J1S**
	–0.002	1.812	0.003	0.275	0.25	0.02	0.312	**STD250-1312-250-J1S**
	–0.002	2.062	0.005	0.413	0.375	0.03	0.5	**STD375-1312-375-J1S**
1.375	–0.001	1.687	0.002	0.172	0.156	0.015	0.25	**STD156-1375-156-J1S**
	–0.001	1.749	0.002	0.206	0.187	0.015	0.25	**STD187-1375-187-J1S**
	–0.002	1.875	0.003	0.275	0.25	0.02	0.312	**STD250-1375-250-J1S**
	–0.002	1.999	0.004	0.343	0.312	0.02	0.312	**STD312-1375-312-J1S**
	–0.002	2.125	0.005	0.413	0.375	0.03	0.5	**STD375-1375-375-J1S**
1.437	–0.001	1.687	0.002	0.138	0.125	0.015	0.25	**STD125-1437-125-J1S**
	–0.001	1.811	0.002	0.206	0.187	0.015	0.25	**STD187-1437-187-J1S**
	–0.002	1.937	0.003	0.275	0.25	0.02	0.312	**STD250-1437-250-J1S**
	–0.002	2.061	0.004	0.343	0.312	0.02	0.312	**STD312-1437-312-J1S**
1.5	–0.001	1.75	0.002	0.138	0.125	0.015	0.25	**STD125-1500-125-J1S**
	–0.001	1.874	0.002	0.206	0.187	0.015	0.25	**STD187-1500-187-J1S**
	–0.002	2	0.003	0.275	0.25	0.02	0.312	**STD250-1500-250-J1S**
	–0.002	2.124	0.004	0.343	0.312	0.02	0.312	**STD312-1500-312-J1S**
	–0.002	2.25	0.005	0.413	0.375	0.03	0.5	**STD375-1500-375-J1S**
	–0.002	2.374	0.006	0.481	0.437	0.03	0.5	**STD437-1500-437-J1S**
	–0.003	2.5	0.007	0.55	0.5	0.03	0.625	**STD500-1500-500-J1S**
1.562	–0.001	1.812	0.002	0.138	0.125	0.015	0.25	**STD125-1562-125-J1S**
	–0.001	1.936	0.002	0.206	0.187	0.015	0.25	**STD187-1562-187-J1S**
	–0.002	2.312	0.005	0.413	0.375	0.03	0.5	**STD375-1562-375-J1S**
1.593	–0.002	2.093	0.003	0.275	0.25	0.02	0.312	**STD250-1593-250-J1S**
1.625	–0.001	1.875	0.002	0.138	0.125	0.015	0.25	**STD125-1625-125-J1S**
	–0.001	1.999	0.002	0.206	0.187	0.015	0.25	**STD187-1625-187-J1S**
	–0.002	2.125	0.003	0.275	0.25	0.02	0.312	**STD250-1625-250-J1S**
	–0.002	2.249	0.004	0.343	0.312	0.02	0.312	**STD312-1625-312-J1S**
	–0.002	2.375	0.005	0.413	0.375	0.03	0.5	**STD375-1625-375-J1S**
	–0.003	2.625	0.007	0.55	0.5	0.03	0.625	**STD500-1625-500-J1S**
1.687	–0.001	2.061	0.002	0.206	0.187	0.015	0.25	**STD187-1687-187-J1S**
	–0.002	2.311	0.004	0.343	0.312	0.02	0.312	**STD312-1687-312-J1S**
1.75	–0.001	2	0.002	0.138	0.125	0.015	0.25	**STD125-1750-125-J1S**
	–0.001	2.124	0.002	0.206	0.187	0.015	0.25	**STD187-1750-187-J1S**
	–0.002	2.25	0.003	0.275	0.25	0.02	0.312	**STD250-1750-250-J1S**
	–0.002	2.374	0.004	0.343	0.312	0.02	0.312	**STD312-1750-312-J1S**

3.5 STD profile rod seals, inch sizes

d **1.75 – 3.25** in.



Maximum extrusion gap e

Radial depth	e_{max} at 60 °C *(140 °F)* for pressures		
S	2 300 psi	3 600 psi	5 800 psi
in.	in.		
0.125	0.008	0.004	–
0.156 to 0.187	0.014	0.008	–
0.218 to 0.25	0.018	0.01	0.004
0.281 to 0.437	0.02	0.012	0.006
0.5 to 0.562	0.024	0.012	0.008
0.625 to 0.75	0.024	0.012	0.008

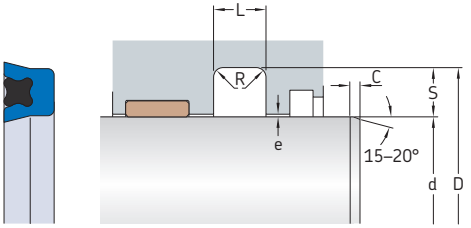
For additional information → **page 34**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
1.75 cont.	–0.002	2.5	0.005	0.413	0.375	0.03	0.5	**STD375-1750-375-J1S**
	–0.003	2.75	0.007	0.55	0.5	0.03	0.625	**STD500-1750-500-J1S**
	–0.003	3	0.009	0.688	0.625	0.045	0.875	**STD625-1750-625-J1S**
1.875	–0.001	2.125	0.002	0.138	0.125	0.015	0.25	**STD125-1875-125-J1S**
	–0.001	2.249	0.002	0.206	0.187	0.015	0.25	**STD187-1875-187-J1S**
	–0.002	2.375	0.003	0.275	0.25	0.02	0.312	**STD250-1875-250-J1S**
	–0.002	2.499	0.004	0.343	0.312	0.02	0.312	**STD312-1875-312-J1S**
	–0.002	2.625	0.005	0.413	0.375	0.03	0.5	**STD375-1875-375-J1S**
	–0.002	2.749	0.006	0.481	0.437	0.03	0.5	**STD437-1875-437-J1S**
1.937	–0.002	2.561	0.004	0.343	0.312	0.02	0.312	**STD312-1937-312-J1S**
2	–0.001	2.374	0.002	0.206	0.187	0.015	0.25	**STD187-2000-187-J1S**
	–0.002	2.5	0.003	0.275	0.25	0.02	0.312	**STD250-2000-250-J1S**
	–0.002	2.624	0.004	0.343	0.312	0.02	0.312	**STD312-2000-312-J1S**
	–0.002	2.75	0.005	0.413	0.375	0.03	0.5	**STD375-2000-375-J1S**
	–0.003	3	0.007	0.55	0.5	0.03	0.625	**STD500-2000-500-J1S**
	–0.003	3.25	0.009	0.688	0.625	0.045	0.875	**STD625-2000-625-J1S**
2.125	–0.001	2.375	0.002	0.138	0.125	0.015	0.25	**STD125-2125-125-J1S**
	–0.001	2.499	0.002	0.206	0.187	0.015	0.25	**STD187-2125-187-J1S**
	–0.002	2.625	0.003	0.275	0.25	0.02	0.312	**STD250-2125-250-J1S**
	–0.002	2.749	0.004	0.343	0.312	0.02	0.312	**STD312-2125-312-J1S**
	–0.002	2.875	0.005	0.413	0.375	0.03	0.5	**STD375-2125-375-J1S**
2.25	–0.001	2.624	0.002	0.206	0.187	0.015	0.25	**STD187-2250-187-J1S**
	–0.002	2.75	0.003	0.275	0.25	0.02	0.312	**STD250-2250-250-J1S**
	–0.002	2.874	0.004	0.343	0.312	0.02	0.312	**STD312-2250-312-J1S**
	–0.002	3	0.005	0.413	0.375	0.03	0.5	**STD375-2250-375-J1S**
	–0.003	3.25	0.007	0.55	0.5	0.03	0.625	**STD500-2250-500-J1S**
	–0.003	3.5	0.009	0.688	0.625	0.045	0.875	**STD625-2250-625-J1S**
2.312	–0.002	2.874	0.003	0.309	0.281	0.02	0.312	**STD281-2312-281-J1S**
2.375	–0.001	2.625	0.002	0.138	0.125	0.015	0.25	**STD125-2375-125-J1S**
	–0.001	2.749	0.002	0.206	0.187	0.015	0.25	**STD187-2375-187-J1S**
	–0.002	2.875	0.003	0.275	0.25	0.02	0.312	**STD250-2375-250-J1S**
	–0.002	2.999	0.004	0.343	0.312	0.02	0.312	**STD312-2375-312-J1S**
	–0.002	3.125	0.005	0.413	0.375	0.03	0.5	**STD375-2375-375-J1S**
	–0.003	3.375	0.007	0.55	0.5	0.03	0.625	**STD500-2375-500-J1S**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
2.437	–0.002	2.937	0.003	0.275	0.25	0.02	0.312	**STD250-2437-250-J1S**
	–0.002	3.187	0.005	0.413	0.375	0.03	0.5	**STD375-2437-375-J1S**
2.5	–0.001	2.75	0.002	0.138	0.125	0.015	0.25	**STD125-2500-125-J1S**
	–0.001	2.874	0.002	0.206	0.187	0.015	0.25	**STD187-2500-187-J1S**
	–0.002	2.936	0.003	0.24	0.218	0.015	0.25	**STD218-2500-218-J1S**
	–0.002	3	0.003	0.275	0.25	0.02	0.312	**STD250-2500-250-J1S**
	–0.002	3.124	0.004	0.343	0.312	0.02	0.312	**STD312-2500-312-J1S**
	–0.002	3.25	0.005	0.413	0.375	0.03	0.5	**STD375-2500-375-J1S**
	–0.002	3.374	0.006	0.481	0.437	0.03	0.5	**STD437-2500-437-J1S**
	–0.003	3.5	0.007	0.55	0.5	0.03	0.625	**STD500-2500-500-J1S**
	–0.003	3.75	0.009	0.688	0.625	0.045	0.875	**STD625-2500-625-J1S**
2.562	–0.002	3.062	0.003	0.275	0.25	0.02	0.312	**STD250-2562-250-J1S**
	–0.002	3.186	0.004	0.343	0.312	0.02	0.312	**STD312-2562-312-J1S**
	–0.002	3.312	0.005	0.413	0.375	0.03	0.5	**STD375-2562-375-J1S**
2.625	–0.001	2.875	0.002	0.138	0.125	0.015	0.25	**STD125-2625-125-J1S**
	–0.001	2.999	0.002	0.206	0.187	0.015	0.25	**STD187-2625-187-J1S**
	–0.002	3.125	0.003	0.275	0.25	0.02	0.312	**STD250-2625-250-J1S**
	–0.002	3.249	0.004	0.343	0.312	0.02	0.312	**STD312-2625-312-J1S**
	–0.002	3.375	0.005	0.413	0.375	0.03	0.5	**STD375-2625-375-J1S**
2.75	–0.001	3.124	0.002	0.206	0.187	0.015	0.25	**STD187-2750-187-J1S**
	–0.002	3.25	0.003	0.275	0.25	0.02	0.312	**STD250-2750-250-J1S**
	–0.002	3.374	0.004	0.343	0.312	0.02	0.312	**STD312-2750-312-J1S**
	–0.002	3.5	0.005	0.413	0.375	0.03	0.5	**STD375-2750-375-J1S**
	–0.002	3.624	0.006	0.481	0.437	0.03	0.5	**STD437-2750-437-J1S**
	–0.003	3.75	0.007	0.55	0.5	0.03	0.625	**STD500-2750-500-J1S**
	–0.003	4	0.009	0.688	0.625	0.045	0.875	**STD625-2750-625-J1S**
2.812	–0.002	3.562	0.005	0.413	0.375	0.03	0.5	**STD375-2812-375-J1S**
2.875	–0.001	3.249	0.002	0.206	0.187	0.015	0.25	**STD187-2875-187-J1S**
	–0.002	3.375	0.003	0.275	0.25	0.02	0.312	**STD250-2875-250-J1S**
	–0.002	3.499	0.004	0.343	0.312	0.02	0.312	**STD312-2875-312-J1S**
	–0.002	3.625	0.005	0.413	0.375	0.03	0.5	**STD375-2875-375-J1S**
2.937	–0.002	3.687	0.005	0.413	0.375	0.03	0.5	**STD375-2937-375-J1S**
3	–0.001	3.25	0.002	0.138	0.125	0.015	0.25	**STD125-3000-125-J1S**
	–0.001	3.374	0.002	0.206	0.187	0.015	0.25	**STD187-3000-187-J1S**
	–0.002	3.436	0.003	0.24	0.218	0.015	0.25	**STD218-3000-218-J1S**
	–0.002	3.5	0.003	0.275	0.25	0.02	0.312	**STD250-3000-250-J1S**
	–0.002	3.624	0.004	0.343	0.312	0.02	0.312	**STD312-3000-312-J1S**
	–0.002	3.75	0.005	0.413	0.375	0.03	0.5	**STD375-3000-375-J1S**
	–0.003	4	0.007	0.55	0.5	0.03	0.625	**STD500-3000-500-J1S**
	–0.003	4.25	0.009	0.688	0.625	0.045	0.875	**STD625-3000-625-J1S**
3.125	–0.001	3.375	0.002	0.138	0.125	0.015	0.25	**STD125-3125-125-J1S**
	–0.001	3.499	0.002	0.206	0.187	0.015	0.25	**STD187-3125-187-J1S**
	–0.002	3.625	0.003	0.275	0.25	0.02	0.312	**STD250-3125-250-J1S**
	–0.002	3.749	0.004	0.343	0.312	0.02	0.312	**STD312-3125-312-J1S**
	–0.002	3.875	0.005	0.413	0.375	0.03	0.5	**STD375-3125-375-J1S**
	–0.002	3.999	0.006	0.481	0.437	0.03	0.5	**STD437-3125-437-J1S**
3.25	–0.001	3.5	0.002	0.138	0.125	0.015	0.25	**STD125-3250-125-J1S**
	–0.001	3.624	0.002	0.206	0.187	0.015	0.25	**STD187-3250-187-J1S**
	–0.002	3.75	0.003	0.275	0.25	0.02	0.312	**STD250-3250-250-J1S**
	–0.002	3.874	0.004	0.343	0.312	0.02	0.312	**STD312-3250-312-J1S**
	–0.002	4	0.005	0.413	0.375	0.03	0.5	**STD375-3250-375-J1S**
	–0.002	4.124	0.006	0.481	0.437	0.03	0.5	**STD437-3250-437-J1S**
	–0.003	4.25	0.007	0.55	0.5	0.03	0.625	**STD500-3250-500-J1S**
	–0.003	4.5	0.009	0.688	0.625	0.045	0.875	**STD625-3250-625-J1S**

3.5 STD profile rod seals, inch sizes

d **3.375 – 5.125** in.



Maximum extrusion gap e

Radial depth	e_{max} at 60 °C *(140 °F)* for pressures		
S	2 300 psi	3 600 psi	5 800 psi
in.	in.		
0.125	0.008	0.004	–
0.156 to 0.187	0.014	0.008	–
0.218 to 0.25	0.018	0.01	0.004
0.281 to 0.437	0.02	0.012	0.006
0.5 to 0.562	0.024	0.012	0.008
0.625 to 0.75	0.024	0.012	0.008

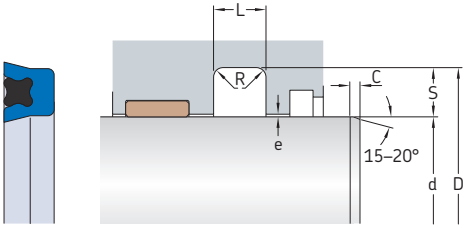
For additional information → **page 34**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
3.375	–0.001	3.749	0.002	0.206	0.187	0.015	0.25	**STD187-3375-187-J1S**
	–0.002	3.875	0.003	0.275	0.25	0.02	0.312	**STD250-3375-250-J1S**
	–0.002	4.125	0.005	0.413	0.375	0.03	0.5	**STD375-3375-375-J1S**
3.5	–0.001	3.75	0.002	0.138	0.125	0.015	0.25	**STD125-3500-125-J1S**
	–0.002	4	0.003	0.275	0.25	0.02	0.312	**STD250-3500-250-J1S**
	–0.002	4.124	0.004	0.343	0.312	0.02	0.312	**STD312-3500-312-J1S**
	–0.002	4.25	0.005	0.413	0.375	0.03	0.5	**STD375-3500-375-J1S**
	–0.003	4.5	0.007	0.55	0.5	0.03	0.625	**STD500-3500-500-J1S**
	–0.003	4.75	0.009	0.688	0.625	0.045	0.875	**STD625-3500-625-J1S**
	–0.003	5	0.011	0.825	0.75	0.045	1	**STD750-3500-750-J1S**
3.625	–0.001	3.999	0.002	0.206	0.187	0.015	0.25	**STD187-3625-187-J1S**
	–0.002	4.125	0.003	0.275	0.25	0.02	0.312	**STD250-3625-250-J1S**
	–0.002	4.249	0.004	0.343	0.312	0.02	0.312	**STD312-3625-312-J1S**
	–0.002	4.375	0.005	0.413	0.375	0.03	0.5	**STD375-3625-375-J1S**
3.75	–0.001	4	0.002	0.138	0.125	0.015	0.25	**STD125-3750-125-J1S**
	–0.001	4.124	0.002	0.206	0.187	0.015	0.25	**STD187-3750-187-J1S**
	–0.002	4.25	0.003	0.275	0.25	0.02	0.312	**STD250-3750-250-J1S**
	–0.002	4.374	0.004	0.343	0.312	0.02	0.312	**STD312-3750-312-J1S**
	–0.002	4.5	0.005	0.413	0.375	0.03	0.5	**STD375-3750-375-J1S**
	–0.003	4.75	0.007	0.55	0.5	0.03	0.625	**STD500-3750-500-J1S**
	–0.003	5	0.009	0.688	0.625	0.045	0.875	**STD625-3750-625-J1S**
3.875	–0.001	4.249	0.002	0.206	0.187	0.015	0.25	**STD187-3875-187-J1S**
	–0.002	4.375	0.003	0.275	0.25	0.02	0.312	**STD250-3875-250-J1S**
	–0.002	4.499	0.004	0.343	0.312	0.02	0.312	**STD312-3875-312-J1S**
	–0.002	4.625	0.005	0.413	0.375	0.03	0.5	**STD375-3875-375-J1S**
4	–0.001	4.25	0.002	0.138	0.125	0.015	0.25	**STD125-4000-125-J1S**
	–0.001	4.374	0.002	0.206	0.187	0.015	0.25	**STD187-4000-187-J1S**
	–0.002	4.5	0.003	0.275	0.25	0.02	0.312	**STD250-4000-250-J1S**
	–0.002	4.624	0.004	0.343	0.312	0.02	0.312	**STD312-4000-312-J1S**
	–0.002	4.75	0.005	0.413	0.375	0.03	0.5	**STD375-4000-375-J1S**
	–0.002	4.874	0.006	0.481	0.437	0.03	0.5	**STD437-4000-437-J1S**
	–0.003	5	0.007	0.55	0.5	0.03	0.625	**STD500-4000-500-J1S**
	–0.003	5.25	0.009	0.688	0.625	0.045	0.875	**STD625-4000-625-J1S**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
4.125	–0.001	4.499	0.002	0.206	0.187	0.015	0.25	**STD187-4125-187-J1S**
	–0.002	4.625	0.003	0.275	0.25	0.02	0.312	**STD250-4125-250-J1S**
	–0.002	4.749	0.004	0.343	0.312	0.02	0.312	**STD312-4125-312-J1S**
	–0.002	4.875	0.005	0.413	0.375	0.03	0.5	**STD375-4125-375-J1S**
	–0.002	4.999	0.006	0.481	0.437	0.03	0.5	**STD437-4125-437-J1S**
4.25	–0.001	4.5	0.002	0.138	0.125	0.015	0.25	**STD125-4250-125-J1S**
	–0.001	4.624	0.002	0.206	0.187	0.015	0.25	**STD187-4250-187-J1S**
	–0.002	4.75	0.003	0.275	0.25	0.02	0.312	**STD250-4250-250-J1S**
	–0.002	4.874	0.004	0.343	0.312	0.02	0.312	**STD312-4250-312-J1S**
	–0.002	5	0.005	0.413	0.375	0.03	0.5	**STD375-4250-375-J1S**
	–0.003	5.25	0.007	0.55	0.5	0.03	0.625	**STD500-4250-500-J1S**
	–0.003	5.5	0.009	0.688	0.625	0.045	0.875	**STD625-4250-625-J1S**
4.375	–0.001	4.625	0.002	0.138	0.125	0.015	0.25	**STD125-4375-125-J1S**
	–0.001	4.749	0.002	0.206	0.187	0.015	0.25	**STD187-4375-187-J1S**
	–0.002	4.875	0.003	0.275	0.25	0.02	0.312	**STD250-4375-250-J1S**
	–0.002	4.999	0.004	0.343	0.312	0.02	0.312	**STD312-4375-312-J1S**
	–0.002	5.125	0.005	0.413	0.375	0.03	0.5	**STD375-4375-375-J1S**
4.437	–0.002	4.999	0.003	0.309	0.281	0.02	0.312	**STD281-4437-281-J1S**
4.5	–0.001	4.75	0.002	0.138	0.125	0.015	0.25	**STD125-4500-125-J1S**
	–0.001	4.874	0.002	0.206	0.187	0.015	0.25	**STD187-4500-187-J1S**
	–0.002	5	0.003	0.275	0.25	0.02	0.312	**STD250-4500-250-J1S**
	–0.002	5.124	0.004	0.343	0.312	0.02	0.312	**STD312-4500-312-J1S**
	–0.002	5.25	0.005	0.413	0.375	0.03	0.5	**STD375-4500-375-J1S**
	–0.002	5.374	0.006	0.481	0.437	0.03	0.5	**STD437-4500-437-J1S**
	–0.003	5.5	0.007	0.55	0.5	0.03	0.625	**STD500-4500-500-J1S**
	–0.003	5.75	0.009	0.688	0.625	0.045	0.875	**STD625-4500-625-J1S**
	–0.003	6	0.011	0.825	0.75	0.045	1	**STD750-4500-750-J1S**
4.625	–0.001	4.999	0.002	0.206	0.187	0.015	0.25	**STD187-4625-187-J1S**
	–0.002	5.125	0.003	0.275	0.25	0.02	0.312	**STD250-4625-250-J1S**
	–0.002	5.375	0.005	0.413	0.375	0.03	0.5	**STD375-4625-375-J1S**
4.75	–0.001	5	0.002	0.138	0.125	0.015	0.25	**STD125-4750-125-J1S**
	–0.001	5.124	0.002	0.206	0.187	0.015	0.25	**STD187-4750-187-J1S**
	–0.002	5.25	0.003	0.275	0.25	0.02	0.312	**STD250-4750-250-J1S**
	–0.002	5.374	0.004	0.343	0.312	0.02	0.312	**STD312-4750-312-J1S**
	–0.002	5.5	0.005	0.413	0.375	0.03	0.5	**STD375-4750-375-J1S**
	–0.002	5.624	0.006	0.481	0.437	0.03	0.5	**STD437-4750-437-J1S**
	–0.003	5.75	0.007	0.55	0.5	0.03	0.625	**STD500-4750-500-J1S**
	–0.003	6	0.009	0.688	0.625	0.045	0.875	**STD625-4750-625-J1S**
4.875	–0.001	5.249	0.002	0.206	0.187	0.015	0.25	**STD187-4875-187-J1S**
	–0.002	5.375	0.003	0.275	0.25	0.02	0.312	**STD250-4875-250-J1S**
	–0.002	5.499	0.004	0.343	0.312	0.02	0.312	**STD312-4875-312-J1S**
	–0.002	5.625	0.005	0.413	0.375	0.03	0.5	**STD375-4875-375-J1S**
5	–0.001	5.374	0.002	0.206	0.187	0.015	0.25	**STD187-5000-187-J1S**
	–0.002	5.5	0.003	0.275	0.25	0.02	0.312	**STD250-5000-250-J1S**
	–0.002	5.562	0.003	0.309	0.281	0.02	0.312	**STD281-5000-281-J1S**
	–0.002	5.624	0.004	0.343	0.312	0.02	0.312	**STD312-5000-312-J1S**
	–0.002	5.75	0.005	0.413	0.375	0.03	0.5	**STD375-5000-375-J1S**
	–0.003	6	0.007	0.55	0.5	0.03	0.625	**STD500-5000-500-J1S**
	–0.003	6.25	0.009	0.688	0.625	0.045	0.875	**STD625-5000-625-J1S**
	–0.003	6.5	0.011	0.825	0.75	0.045	1	**STD750-5000-750-J1S**
5.125	–0.002	5.625	0.003	0.275	0.25	0.02	0.312	**STD250-5125-250-J1S**
	–0.002	5.749	0.004	0.343	0.312	0.02	0.312	**STD312-5125-312-J1S**
	–0.002	5.875	0.005	0.413	0.375	0.03	0.5	**STD375-5125-375-J1S**
	–0.002	5.999	0.006	0.481	0.437	0.03	0.5	**STD437-5125-437-J1S**

3.5 STD profile rod seals, inch sizes

d **5.25 – 8.125** in.



Maximum extrusion gap e

Radial depth	e_{max} at 60 °C *(140 °F)* for pressures		
S	2 300 psi	3 600 psi	5 800 psi
in.	in.		
0.125	0.008	0.004	–
0.156 to 0.187	0.014	0.008	–
0.218 to 0.25	0.018	0.01	0.004
0.281 to 0.437	0.02	0.012	0.006
0.5 to 0.562	0.024	0.012	0.008
0.625 to 0.75	0.024	0.012	0.008

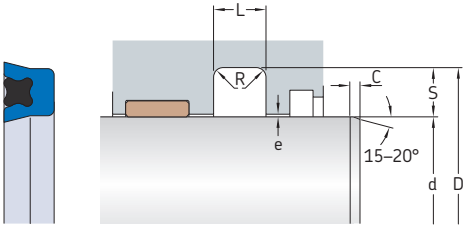
For additional information → **page 34**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
5.25	–0.002	5.75	0.003	0.275	0.25	0.02	0.312	**STD250-5250-250-J1S**
	–0.002	5.874	0.004	0.343	0.312	0.02	0.312	**STD312-5250-312-J1S**
	–0.002	6	0.005	0.413	0.375	0.03	0.5	**STD375-5250-375-J1S**
	–0.002	6.124	0.006	0.481	0.437	0.03	0.5	**STD437-5250-437-J1S**
	–0.003	6.25	0.007	0.55	0.5	0.03	0.625	**STD500-5250-500-J1S**
	–0.003	6.5	0.009	0.688	0.625	0.045	0.875	**STD625-5250-625-J1S**
5.375	–0.002	5.875	0.003	0.275	0.25	0.02	0.312	**STD250-5375-250-J1S**
	–0.002	5.999	0.004	0.343	0.312	0.02	0.312	**STD312-5375-312-J1S**
	–0.002	6.125	0.005	0.413	0.375	0.03	0.5	**STD375-5375-375-J1S**
5.437	–0.002	5.999	0.003	0.309	0.281	0.02	0.312	**STD281-5437-281-J1S**
	–0.003	6.437	0.007	0.55	0.5	0.03	0.625	**STD500-5437-500-J1S**
5.5	–0.001	5.874	0.002	0.206	0.187	0.015	0.25	**STD187-5500-187-J1S**
	–0.002	6	0.003	0.275	0.25	0.02	0.312	**STD250-5500-250-J1S**
	–0.002	6.124	0.004	0.343	0.312	0.02	0.312	**STD312-5500-312-J1S**
	–0.002	6.25	0.005	0.413	0.375	0.03	0.5	**STD375-5500-375-J1S**
	–0.003	6.5	0.007	0.55	0.5	0.03	0.625	**STD500-5500-500-J1S**
	–0.003	6.624	0.007	0.618	0.562	0.03	0.75	**STD562-5500-562-J1S**
	–0.003	6.75	0.009	0.688	0.625	0.045	0.875	**STD625-5500-625-J1S**
	–0.003	7	0.011	0.825	0.75	0.045	1	**STD750-5500-750-J1S**
5.625	–0.002	6.125	0.003	0.275	0.25	0.02	0.312	**STD250-5625-250-J1S**
	–0.002	6.249	0.004	0.343	0.312	0.02	0.312	**STD312-5625-312-J1S**
	–0.002	6.375	0.005	0.413	0.375	0.03	0.5	**STD375-5625-375-J1S**
5.75	–0.001	6	0.002	0.138	0.125	0.015	0.25	**STD125-5750-125-J1S**
	–0.002	6.25	0.003	0.275	0.25	0.02	0.312	**STD250-5750-250-J1S**
	–0.002	6.5	0.005	0.413	0.375	0.03	0.5	**STD375-5750-375-J1S**
	–0.003	6.75	0.007	0.55	0.5	0.03	0.625	**STD500-5750-500-J1S**
	–0.003	7	0.009	0.688	0.625	0.045	0.875	**STD625-5750-625-J1S**
5.875	–0.002	6.375	0.003	0.275	0.25	0.02	0.312	**STD250-5875-250-J1S**
	–0.002	6.499	0.004	0.343	0.312	0.02	0.312	**STD312-5875-312-J1S**
	–0.002	6.625	0.005	0.413	0.375	0.03	0.5	**STD375-5875-375-J1S**
6	–0.001	6.374	0.002	0.206	0.187	0.015	0.25	**STD187-6000-187-J1S**
	–0.002	6.5	0.003	0.275	0.25	0.02	0.312	**STD250-6000-250-J1S**
	–0.002	6.624	0.004	0.343	0.312	0.02	0.312	**STD312-6000-312-J1S**
	–0.002	6.75	0.005	0.413	0.375	0.03	0.5	**STD375-6000-375-J1S**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
6	–0.003	7	0.007	0.55	0.5	0.03	0.625	**STD500-6000-500-J1S**
cont.	–0.003	7.25	0.009	0.688	0.625	0.045	0.875	**STD625-6000-625-J1S**
	–0.003	7.5	0.011	0.825	0.75	0.045	1	**STD750-6000-750-J1S**
6.125	–0.002	6.749	0.004	0.343	0.312	0.02	0.312	**STD312-6125-312-J1S**
	–0.003	7.125	0.007	0.55	0.5	0.03	0.625	**STD500-6125-500-J1S**
6.25	–0.002	6.75	0.003	0.275	0.25	0.02	0.312	**STD250-6250-250-J1S**
	–0.002	6.874	0.004	0.343	0.312	0.02	0.312	**STD312-6250-312-J1S**
	–0.002	7	0.005	0.413	0.375	0.03	0.5	**STD375-6250-375-J1S**
	–0.003	7.25	0.007	0.55	0.5	0.03	0.625	**STD500-6250-500-J1S**
	–0.003	7.5	0.009	0.688	0.625	0.045	0.875	**STD625-6250-625-J1S**
6.375	–0.002	6.999	0.004	0.343	0.312	0.02	0.312	**STD312-6375-312-J1S**
	–0.002	7.125	0.005	0.413	0.375	0.03	0.5	**STD375-6375-375-J1S**
6.5	–0.002	7	0.003	0.275	0.25	0.02	0.312	**STD250-6500-250-J1S**
	–0.002	7.124	0.004	0.343	0.312	0.02	0.312	**STD312-6500-312-J1S**
	–0.002	7.25	0.005	0.413	0.375	0.03	0.5	**STD375-6500-375-J1S**
	–0.003	7.5	0.007	0.55	0.5	0.03	0.625	**STD500-6500-500-J1S**
	–0.003	8	0.011	0.825	0.75	0.045	1	**STD750-6500-750-J1S**
6.625	–0.002	7.249	0.004	0.343	0.312	0.02	0.312	**STD312-6625-312-J1S**
6.75	–0.002	7.25	0.003	0.275	0.25	0.02	0.312	**STD250-6750-250-J1S**
	–0.002	7.374	0.004	0.343	0.312	0.02	0.312	**STD312-6750-312-J1S**
	–0.002	7.5	0.005	0.413	0.375	0.03	0.5	**STD375-6750-375-J1S**
	–0.003	7.75	0.007	0.55	0.5	0.03	0.625	**STD500-6750-500-J1S**
	–0.003	8	0.009	0.688	0.625	0.045	0.875	**STD625-6750-625-J1S**
7	–0.002	7.5	0.003	0.275	0.25	0.02	0.312	**STD250-7000-250-J1S**
	–0.002	7.75	0.005	0.413	0.375	0.03	0.5	**STD375-7000-375-J1S**
	–0.003	8	0.007	0.55	0.5	0.03	0.625	**STD500-7000-500-J1S**
	–0.003	8.25	0.009	0.688	0.625	0.045	0.875	**STD625-7000-625-J1S**
	–0.003	8.5	0.011	0.825	0.75	0.045	1	**STD750-7000-750-J1S**
7.125	–0.003	8.125	0.007	0.55	0.5	0.03	0.625	**STD500-7125-500-J1S**
7.25	–0.002	7.75	0.003	0.275	0.25	0.02	0.312	**STD250-7250-250-J1S**
	–0.002	7.874	0.004	0.343	0.312	0.02	0.312	**STD312-7250-312-J1S**
	–0.002	8	0.005	0.413	0.375	0.03	0.5	**STD375-7250-375-J1S**
	–0.003	8.25	0.007	0.55	0.5	0.03	0.625	**STD500-7250-500-J1S**
	–0.003	8.5	0.009	0.688	0.625	0.045	0.875	**STD625-7250-625-J1S**
7.375	–0.002	7.999	0.004	0.343	0.312	0.02	0.312	**STD312-7375-312-J1S**
7.5	–0.002	8	0.003	0.275	0.25	0.02	0.312	**STD250-7500-250-J1S**
	–0.002	8.124	0.004	0.343	0.312	0.02	0.312	**STD312-7500-312-J1S**
	–0.002	8.25	0.005	0.413	0.375	0.03	0.5	**STD375-7500-375-J1S**
	–0.003	8.5	0.007	0.55	0.5	0.03	0.625	**STD500-7500-500-J1S**
	–0.003	9	0.011	0.825	0.75	0.045	1	**STD750-7500-750-J1S**
7.625	–0.002	8.375	0.005	0.413	0.375	0.03	0.5	**STD375-7625-375-J1S**
7.75	–0.002	8.25	0.003	0.275	0.25	0.02	0.312	**STD250-7750-250-J1S**
	–0.002	8.5	0.005	0.413	0.375	0.03	0.5	**STD375-7750-375-J1S**
	–0.003	8.75	0.007	0.55	0.5	0.03	0.625	**STD500-7750-500-J1S**
	–0.003	9	0.009	0.688	0.625	0.045	0.875	**STD625-7750-625-J1S**
8	–0.002	8.5	0.003	0.275	0.25	0.02	0.312	**STD250-8000-250-J1S**
	–0.002	8.75	0.005	0.413	0.375	0.03	0.5	**STD375-8000-375-J1S**
	–0.003	9	0.007	0.55	0.5	0.03	0.625	**STD500-8000-500-J1S**
	–0.003	9.25	0.009	0.688	0.625	0.045	0.875	**STD625-8000-625-J1S**
	–0.003	9.5	0.011	0.825	0.75	0.045	1	**STD750-8000-750-J1S**
8.125	–0.002	8.625	0.003	0.275	0.25	0.02	0.312	**STD250-8125-250-J1S**

3.5 STD profile rod seals, inch sizes

d **8.25 – 13.75** in.



Maximum extrusion gap e

Radial depth	e_{max} at 60 °C *(140 °F)* for pressures		
S	2 300 psi	3 600 psi	5 800 psi
in.	in.		
0.125	0.008	0.004	–
0.156 to 0.187	0.014	0.008	–
0.218 to 0.25	0.018	0.01	0.004
0.281 to 0.437	0.02	0.012	0.006
0.5 to 0.562	0.024	0.012	0.008
0.625 to 0.75	0.024	0.012	0.008

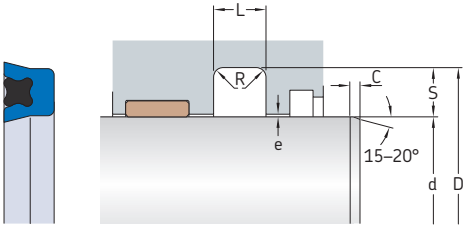
For additional information → **page 34**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
8.25	–0.002	8.75	0.003	0.275	0.25	0.02	0.312	**STD250-8250-250-J1S**
	–0.002	9	0.005	0.413	0.375	0.03	0.5	**STD375-8250-375-J1S**
	–0.003	9.25	0.007	0.55	0.5	0.03	0.625	**STD500-8250-500-J1S**
8.5	–0.002	9	0.003	0.275	0.25	0.02	0.312	**STD250-8500-250-J1S**
	–0.002	9.25	0.005	0.413	0.375	0.03	0.5	**STD375-8500-375-J1S**
	–0.003	9.5	0.007	0.55	0.5	0.03	0.625	**STD500-8500-500-J1S**
	–0.003	9.75	0.009	0.688	0.625	0.045	0.875	**STD625-8500-625-J1S**
	–0.003	10	0.011	0.825	0.75	0.045	1	**STD750-8500-750-J1S**
8.625	–0.002	9.375	0.005	0.413	0.375	0.03	0.5	**STD375-8625-375-J1S**
8.75	–0.002	9.25	0.003	0.275	0.25	0.02	0.312	**STD250-8750-250-J1S**
	–0.002	9.5	0.005	0.413	0.375	0.03	0.5	**STD375-8750-375-J1S**
	–0.003	9.75	0.007	0.55	0.5	0.03	0.625	**STD500-8750-500-J1S**
	–0.003	10	0.009	0.688	0.625	0.045	0.875	**STD625-8750-625-J1S**
8.875	–0.002	9.499	0.004	0.343	0.312	0.02	0.312	**STD312-8875-312-J1S**
9	–0.002	9.5	0.003	0.275	0.25	0.02	0.312	**STD250-9000-250-J1S**
	–0.002	9.75	0.005	0.413	0.375	0.03	0.5	**STD375-9000-375-J1S**
	–0.003	10	0.007	0.55	0.5	0.03	0.625	**STD500-9000-500-J1S**
	–0.003	10.25	0.009	0.688	0.625	0.045	0.875	**STD625-9000-625-J1S**
	–0.003	10.5	0.011	0.825	0.75	0.045	1	**STD750-9000-750-J1S**
9.25	–0.002	9.75	0.003	0.275	0.25	0.02	0.312	**STD250-9250-250-J1S**
	–0.003	10.5	0.009	0.688	0.625	0.045	0.875	**STD625-9250-625-J1S**
9.312	–0.002	9.998	0.004	0.377	0.343	0.02	0.312	**STD343-9312-343-J1S**
9.5	–0.002	10	0.003	0.275	0.25	0.02	0.312	**STD250-9500-250-J1S**
	–0.002	10.25	0.005	0.413	0.375	0.03	0.5	**STD375-9500-375-J1S**
	–0.003	10.5	0.007	0.55	0.5	0.03	0.625	**STD500-9500-500-J1S**
	–0.003	10.75	0.009	0.688	0.625	0.045	0.875	**STD625-9500-625-J1S**
	–0.003	11	0.011	0.825	0.75	0.045	1	**STD750-9500-750-J1S**
9.75	–0.002	10.25	0.003	0.275	0.25	0.02	0.312	**STD250-9750-250-J1S**
	–0.002	10.5	0.005	0.413	0.375	0.03	0.5	**STD375-9750-375-J1S**
	–0.003	10.75	0.007	0.55	0.5	0.03	0.625	**STD500-9750-500-J1S**
	–0.003	11	0.009	0.688	0.625	0.045	0.875	**STD625-9750-625-J1S**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
9.875	–0.002	10.625	0.005	0.413	0.375	0.03	0.5	**STD375-9875-375-J1S**
10	–0.002	10.5	0.003	0.275	0.25	0.02	0.312	**STD250-10000-250-J1S**
	–0.002	10.75	0.005	0.413	0.375	0.03	0.5	**STD375-10000-375-J1S**
	–0.003	11	0.007	0.55	0.5	0.03	0.625	**STD500-10000-500-J1S**
	–0.003	11.25	0.009	0.688	0.625	0.045	0.875	**STD625-10000-625-J1S**
	–0.003	11.5	0.011	0.825	0.75	0.045	1	**STD750-10000-750-J1S**
10.25	–0.002	10.75	0.003	0.275	0.25	0.02	0.312	**STD250-10250-250-J1S**
	–0.002	11	0.005	0.413	0.375	0.03	0.5	**STD375-10250-375-J1S**
	–0.003	11.5	0.009	0.688	0.625	0.045	0.875	**STD625-10250-625-J1S**
10.5	–0.002	11	0.003	0.275	0.25	0.02	0.312	**STD250-10500-250-J1S**
	–0.002	11.25	0.005	0.413	0.375	0.03	0.5	**STD375-10500-375-J1S**
	–0.003	11.5	0.007	0.55	0.5	0.03	0.625	**STD500-10500-500-J1S**
	–0.003	12	0.011	0.825	0.75	0.045	1	**STD750-10500-750-J1S**
10.75	–0.002	11.25	0.003	0.275	0.25	0.02	0.312	**STD250-10750-250-J1S**
	–0.002	11.5	0.005	0.413	0.375	0.03	0.5	**STD375-10750-375-J1S**
	–0.003	11.75	0.007	0.55	0.5	0.03	0.625	**STD500-10750-500-J1S**
	–0.003	12	0.009	0.688	0.625	0.045	0.875	**STD625-10750-625-J1S**
11	–0.002	11.75	0.005	0.413	0.375	0.03	0.5	**STD375-11000-375-J1S**
	–0.003	12	0.007	0.55	0.5	0.03	0.625	**STD500-11000-500-J1S**
	–0.003	12.25	0.009	0.688	0.625	0.045	0.875	**STD625-11000-625-J1S**
	–0.003	12.5	0.011	0.825	0.75	0.045	1	**STD750-11000-750-J1S**
11.25	–0.002	11.75	0.003	0.275	0.25	0.02	0.312	**STD250-11250-250-J1S**
	–0.002	12	0.005	0.413	0.375	0.03	0.5	**STD375-11250-375-J1S**
	–0.003	12.25	0.007	0.55	0.5	0.03	0.625	**STD500-11250-500-J1S**
11.5	–0.002	12	0.003	0.275	0.25	0.02	0.312	**STD250-11500-250-J1S**
	–0.003	12.5	0.007	0.55	0.5	0.03	0.625	**STD500-11500-500-J1S**
11.75	–0.002	12.25	0.003	0.275	0.25	0.02	0.312	**STD250-11750-250-J1S**
	–0.002	12.5	0.005	0.413	0.375	0.03	0.5	**STD375-11750-375-J1S**
	–0.003	13	0.009	0.688	0.625	0.045	0.875	**STD625-11750-625-J1S**
12	–0.002	12.5	0.003	0.275	0.25	0.02	0.312	**STD250-12000-250-J1S**
	–0.002	12.75	0.005	0.413	0.375	0.03	0.5	**STD375-12000-375-J1S**
	–0.003	13	0.007	0.55	0.5	0.03	0.625	**STD500-12000-500-J1S**
	–0.003	13.25	0.009	0.688	0.625	0.045	0.875	**STD625-12000-625-J1S**
12.25	–0.002	13	0.005	0.413	0.375	0.03	0.5	**STD375-12250-375-J1S**
12.5	–0.002	13	0.003	0.275	0.25	0.02	0.312	**STD250-12500-250-J1S**
	–0.003	13.5	0.007	0.55	0.5	0.03	0.625	**STD500-12500-500-J1S**
	–0.003	14	0.011	0.825	0.75	0.045	1	**STD750-12500-750-J1S**
12.75	–0.002	13.5	0.005	0.413	0.375	0.03	0.5	**STD375-12750-375-J1S**
	–0.003	14	0.009	0.688	0.625	0.045	0.875	**STD625-12750-625-J1S**
13	–0.002	13.75	0.005	0.413	0.375	0.03	0.5	**STD375-13000-375-J1S**
	–0.003	14	0.007	0.55	0.5	0.03	0.625	**STD500-13000-500-J1S**
	–0.003	14.25	0.009	0.688	0.625	0.045	0.875	**STD625-13000-625-J1S**
	–0.003	14.5	0.011	0.825	0.75	0.045	1	**STD750-13000-750-J1S**
13.25	–0.002	14	0.005	0.413	0.375	0.03	0.5	**STD375-13250-375-J1S**
	–0.003	14.25	0.007	0.55	0.5	0.03	0.625	**STD500-13250-500-J1S**
13.375	–0.002	14.125	0.005	0.413	0.375	0.03	0.5	**STD375-13375-375-J1S**
13.5	–0.002	14	0.003	0.275	0.25	0.02	0.312	**STD250-13500-250-J1S**
	–0.003	14.5	0.007	0.55	0.5	0.03	0.625	**STD500-13500-500-J1S**
	–0.003	15	0.011	0.825	0.75	0.045	1	**STD750-13500-750-J1S**
13.75	–0.002	14.5	0.005	0.413	0.375	0.03	0.5	**STD375-13750-375-J1S**

3.5 STD profile rod seals, inch sizes

d **14 – 45** in.



Maximum extrusion gap e

Radial depth	e_{max} at 60 °C *(140 °F)* for pressures		
S	2 300 psi	3 600 psi	5 800 psi
in.	in.		
0.125	0.008	0.004	–
0.156 to 0.187	0.014	0.008	–
0.218 to 0.25	0.018	0.01	0.004
0.281 to 0.437	0.02	0.012	0.006
0.5 to 0.562	0.024	0.012	0.008
0.625 to 0.75	0.024	0.012	0.008

For additional information → **page 34**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
14	–0.002	14.75	0.005	0.413	0.375	0.03	0.5	**STD375-14000-375-J1S**
	–0.003	15	0.007	0.55	0.5	0.03	0.625	**STD500-14000-500-J1S**
	–0.003	15.5	0.011	0.825	0.75	0.045	1	**STD750-14000-750-J1S**
14.25	–0.002	14.75	0.003	0.275	0.25	0.02	0.312	**STD250-14250-250-J1S**
14.375	–0.002	14.999	0.004	0.343	0.312	0.02	0.312	**STD312-14375-312-J1S**
14.5	–0.003	16	0.011	0.825	0.75	0.045	1	**STD750-14500-750-J1S**
15	–0.002	15.75	0.005	0.413	0.375	0.03	0.5	**STD375-15000-375-J1S**
	–0.003	16	0.007	0.55	0.5	0.03	0.625	**STD500-15000-500-J1S**
15.5	–0.002	16.25	0.005	0.413	0.375	0.03	0.5	**STD375-15500-375-J1S**
	–0.003	16.5	0.007	0.55	0.5	0.03	0.625	**STD500-15500-500-J1S**
16	–0.003	17	0.007	0.55	0.5	0.03	0.625	**STD500-16000-500-J1S**
	–0.003	17.5	0.011	0.825	0.75	0.045	1	**STD750-16000-750-J1S**
16.5	–0.003	17.5	0.007	0.55	0.5	0.03	0.625	**STD500-16500-500-J1S**
	–0.003	18	0.011	0.825	0.75	0.045	1	**STD750-16500-750-J1S**
16.75	–0.002	17.25	0.003	0.275	0.25	0.02	0.312	**STD250-16750-250-J1S**
16.875	–0.002	17.625	0.005	0.413	0.375	0.03	0.5	**STD375-16875-375-J1S**
17	–0.003	18	0.007	0.55	0.5	0.03	0.625	**STD500-17000-500-J1S**
17.25	–0.002	18	0.005	0.413	0.375	0.03	0.5	**STD375-17250-375-J1S**
	–0.003	18.5	0.009	0.688	0.625	0.045	0.875	**STD625-17250-625-J1S**
18	–0.003	19	0.007	0.55	0.5	0.03	0.625	**STD500-18000-500-J1S**
	–0.003	19.5	0.011	0.825	0.75	0.045	1	**STD750-18000-750-J1S**
18.375	–0.002	18.875	0.003	0.275	0.25	0.02	0.312	**STD250-18375-250-J1S**
19.5	–0.002	20.25	0.005	0.413	0.375	0.03	0.5	**STD375-19500-375-J1S**
20	–0.003	21	0.007	0.55	0.5	0.03	0.625	**STD500-20000-500-J1S**
20.5	–0.003	22	0.011	0.825	0.75	0.045	1	**STD750-20500-750-J1S**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
20.75	–0.002	21.25	0.003	0.275	0.25	0.02	0.312	**STD250-20750-250-J1S**
21	–0.003	22	0.007	0.55	0.5	0.03	0.625	**STD500-21000-500-J1S**
22	–0.003	23	0.007	0.55	0.5	0.03	0.625	**STD500-22000-500-J1S**
23	–0.002	23.5	0.003	0.275	0.25	0.02	0.312	**STD250-23000-250-J1S**
23.5	–0.003	24.5	0.007	0.55	0.5	0.03	0.625	**STD500-23500-500-J1S**
24	–0.003	25.25	0.009	0.688	0.625	0.045	0.875	**STD625-24000-625-J1S**
24.75	–0.003	26	0.009	0.688	0.625	0.045	0.875	**STD625-24750-625-J1S**
25	–0.003	26	0.007	0.55	0.5	0.03	0.625	**STD500-25000-500-J1S**
26.5	–0.003	27.5	0.007	0.55	0.5	0.03	0.625	**STD500-26500-500-J1S**
27	–0.003	28	0.007	0.55	0.5	0.03	0.625	**STD500-27000-500-J1S**
27.5	–0.003	28.5	0.007	0.55	0.5	0.03	0.625	**STD500-27500-500-J1S**
28.5	–0.003	29.5	0.007	0.55	0.5	0.03	0.625	**STD500-28500-500-J1S**
31	–0.003	32	0.007	0.55	0.5	0.03	0.625	**STD500-31000-500-J1S**
32	–0.003	33	0.007	0.55	0.5	0.03	0.625	**STD500-32000-500-J1S**
34.25	–0.003	35.75	0.011	0.825	0.75	0.045	1	**STD750-34250-750-J1S**
35.75	–0.003	36.75	0.007	0.55	0.5	0.03	0.625	**STD500-35750-500-J1S**
36	–0.003	37	0.007	0.55	0.5	0.03	0.625	**STD500-36000-500-J1S**
	–0.003	37.5	0.011	0.825	0.75	0.045	1	**STD750-36000-750-J1S**
36.75	–0.003	37.75	0.007	0.55	0.5	0.03	0.625	**STD500-36750-500-J1S**
37	–0.003	38	0.007	0.55	0.5	0.03	0.625	**STD500-37000-500-J1S**
38	–0.003	39	0.007	0.55	0.5	0.03	0.625	**STD500-38000-500-J1S**
39	–0.003	40	0.007	0.55	0.5	0.03	0.625	**STD500-39000-500-J1S**
40	–0.003	41	0.007	0.55	0.5	0.03	0.625	**STD500-40000-500-J1S**
40.25	–0.003	41.25	0.007	0.55	0.5	0.03	0.625	**STD500-40250-500-J1S**
41	–0.003	42	0.007	0.55	0.5	0.03	0.625	**STD500-41000-500-J1S**
42	–0.003	43	0.007	0.55	0.5	0.03	0.625	**STD500-42000-500-J1S**
42.75	–0.003	43.75	0.007	0.55	0.5	0.03	0.625	**STD500-42750-500-J1S**
43	–0.003	44	0.007	0.55	0.5	0.03	0.625	**STD500-43000-500-J1S**
44.5	–0.003	45.5	0.007	0.55	0.5	0.03	0.625	**STD500-44500-500-J1S**
45	–0.003	46	0.007	0.55	0.5	0.03	0.625	**STD500-45000-500-J1S**

Other sizes are available on request

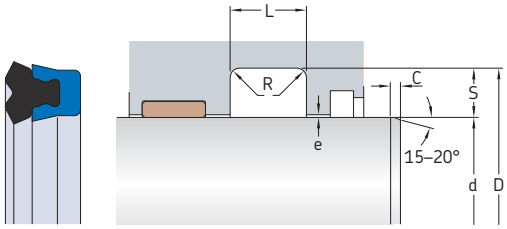
DZ profile data

Material codes	Primary sealing ring: A-8504 Secondary sealing ring: U-1003 For additional information → **page 26**
Pressure	Up to 400 bar *(5 800 psi)*
Speed	Up to 1 m/s *(3.2 ft/s)*
Temperature range	 Extreme low temperature range: seal performance depends on system design (precision guiding arrangement recommended) **Recommended operating temperature range for this profile and material** Temperatures above the recommended operating range: acceptable only with reduced pressure, speed, and/or e-gap Extreme high temperature range: only occasional short-term exposure (e.g. cylinder in curing oven of a powder coating process)
Counter-surface	→ **page 22**

Maximum values of application parameters (e.g. pressure, speed, temperature, e-gap) should not be applied continuously nor simultaneously.

3.6 DZ profile rod seals, metric sizes

d **25 – 105** mm



Maximum extrusion gap e

Radial depth S	e_{max} **at 60 °C** ***(140 °F)*** **for pressures** 160 bar	250 bar	400 bar
mm	mm		
4	0,35	0,2	–
5	0,45	0,25	0,1
7,5	0,5	0,3	0,15

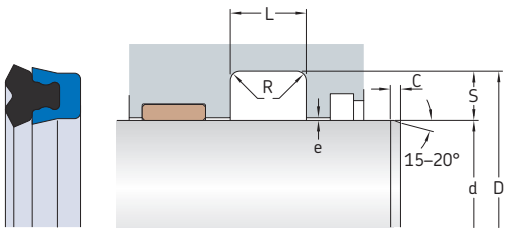
For additional information → **page 34**

Dimensions						**Designation**
d f8 or h9	D H10	L +0,2	S	R max.	C min.	
mm						–
25	33	7,2	4	0,2	6	**DZ-25x33x7.2-E2F**
30	40	9,9	5	0,2	6	**DZ-30x40x9.9-E2F**
35	45	9,9	5	0,2	6	**DZ-35x45x9.9-E2F**
40	50	8	5	0,2	6	**DZ-40x50x8-E2F**
	50	9,9	5	0,2	6	**DZ-40x50x9.9-E2F**
45	55	9,9	5	0,2	6	**DZ-45x55x9.9-E2F**
50	60	9,9	5	0,2	6	**DZ-50x60x9.9-E2F**
55	65	9,9	5	0,2	6	**DZ-55x65x9.9-E2F**
60	70	9,9	5	0,2	6	**DZ-60x70x9.9-E2F**
65	75	9,9	5	0,2	6	**DZ-65x75x9.9-E2F**
70	80	9,9	5	0,2	6	**DZ-70x80x9.9-E2F**
75	85	9,9	5	0,2	6	**DZ-75x85x9.9-E2F**
80	90	9,9	5	0,2	6	**DZ-80x90x9.9-E2F**
85	100	13,8	7,5	0,5	8,5	**DZ-85x100x13.8-E2F**
90	105	13,2	7,5	0,5	8,5	**DZ-90x105x13.2-E2F**
100	115	13,2	7,5	0,5	8,5	**DZ-100x115x13.2-E2F**
105	120	13,2	7,5	0,5	8,5	**DZ-105x120x13.2-E2F**

Other sizes are available on request

3.6 DZ profile rod seals, inch sizes

d **0.187 – 3.25** in.



Maximum extrusion gap e

Radial depth	e_{max} at 60 °C *(140 °F)* for pressures		
S	2 300 psi	3 600 psi	5 800 psi
in.	in.		
0.125	0.008	0.004	–
0.156 to 0.187	0.014	0.008	–
0.25	0.018	0.01	0.004
0.312 to 0.375	0.02	0.012	0.006
0.5	0.024	0.012	0.008

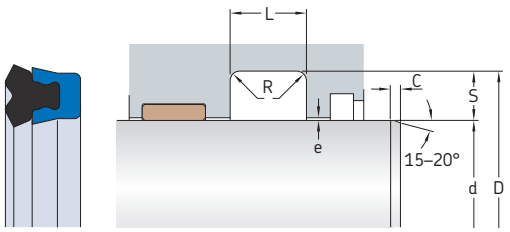
For additional information → **page 34**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
0.187	–0.001	0.437	+0.002	0.213	0.125	0.015	0.25	**DZ125-187-187-E2F**
	–0.001	0.437	+0.002	0.275	0.125	0.015	0.25	**DZ125-187-250-E2F**
0.375	–0.002	0.875	+0.003	0.413	0.25	0.02	0.312	**DZ250-375-375-E2F**
0.5	–0.001	0.75	+0.002	0.275	0.125	0.015	0.25	**DZ125-500-250-E2F**
	–0.002	0.875	+0.002	0.343	0.187	0.015	0.25	**DZ187-500-312-E2F**
0.625	–0.001	0.937	+0.002	0.275	0.156	0.015	0.25	**DZ156-625-250-E2F**
0.75	–0.001	1	+0.002	0.213	0.125	0.015	0.25	**DZ125-750-187-E2F**
	–0.001	1	+0.002	0.275	0.125	0.015	0.25	**DZ125-750-250-E2F**
	–0.002	1.125	+0.002	0.343	0.187	0.015	0.25	**DZ187-750-312-E2F**
0.875	–0.001	1.125	+0.002	0.275	0.125	0.015	0.25	**DZ125-875-250-E2F**
1	–0.001	1.25	+0.002	0.275	0.125	0.015	0.25	**DZ125-1000-250-E2F**
	–0.002	1.375	+0.002	0.343	0.187	0.015	0.25	**DZ187-1000-312-E2F**
1.125	–0.001	1.375	+0.002	0.275	0.125	0.015	0.25	**DZ125-1125-250-E2F**
	–0.002	1.5	+0.002	0.343	0.187	0.015	0.25	**DZ187-1125-312-E2F**
	–0.002	1.625	+0.003	0.413	0.25	0.02	0.312	**DZ250-1125-375-E2F**
1.187	–0.002	1.562	+0.002	0.343	0.187	0.015	0.25	**DZ187-1187-312-E2F**
1.25	–0.001	1.5	+0.002	0.275	0.125	0.015	0.25	**DZ125-1250-250-E2F**
	–0.002	1.625	+0.002	0.343	0.187	0.015	0.25	**DZ187-1250-312-E2F**
	–0.002	1.75	+0.003	0.413	0.25	0.02	0.312	**DZ250-1250-375-E2F**
	–0.002	1.75	+0.003	0.618	0.25	0.02	0.312	**DZ250-1250-562-E2F**
	–0.002	2	+0.005	0.688	0.375	0.03	0.5	**DZ375-1250-625-E2F**
1.375	–0.001	1.625	+0.002	0.343	0.125	0.015	0.25	**DZ125-1375-312-E2F**
	–0.002	1.75	+0.002	0.343	0.187	0.015	0.25	**DZ187-1375-312-E2F**
	–0.002	1.875	+0.003	0.413	0.25	0.02	0.312	**DZ250-1375-375-E2F**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
1.5	–0.001	1.75	+0.002	0.275	0.125	0.015	0.25	**DZ125-1500-250-E2F**
	–0.001	1.812	+0.002	0.343	0.156	0.015	0.25	**DZ156-1500-312-E2F**
	–0.002	1.875	+0.002	0.343	0.187	0.015	0.25	**DZ187-1500-312-E2F**
	–0.002	1.875	+0.002	0.413	0.187	0.015	0.25	**DZ187-1500-375-E2F**
	–0.002	2	+0.003	0.413	0.25	0.02	0.312	**DZ250-1500-375-E2F**
	–0.002	2	+0.003	0.618	0.25	0.02	0.312	**DZ250-1500-562-E2F**
1.625	–0.002	2	+0.002	0.343	0.187	0.015	0.25	**DZ187-1625-312-E2F**
	–0.002	2	+0.002	0.413	0.187	0.015	0.25	**DZ187-1625-375-E2F**
	–0.002	2.125	+0.003	0.413	0.25	0.02	0.312	**DZ250-1625-375-E2F**
1.75	–0.001	2	+0.002	0.275	0.125	0.015	0.25	**DZ125-1750-250-E2F**
	–0.002	2.125	+0.002	0.343	0.187	0.015	0.25	**DZ187-1750-312-E2F**
	–0.002	2.125	+0.002	0.413	0.187	0.015	0.25	**DZ187-1750-375-E2F**
	–0.002	2.25	+0.003	0.413	0.25	0.02	0.312	**DZ250-1750-375-E2F**
	–0.002	2.5	+0.005	0.413	0.375	0.03	0.5	**DZ375-1750-375-E2F**
	–0.002	2.5	+0.005	0.825	0.375	0.03	0.5	**DZ375-1750-750-E2F**
1.875	–0.002	2.25	+0.002	0.343	0.187	0.015	0.25	**DZ187-1875-312-E2F**
2	–0.002	2.375	+0.002	0.343	0.187	0.015	0.25	**DZ187-2000-312-E2F**
	–0.002	2.375	+0.002	0.413	0.187	0.015	0.25	**DZ187-2000-375-E2F**
	–0.002	2.5	+0.003	0.413	0.25	0.02	0.312	**DZ250-2000-375-E2F**
	–0.002	2.5	+0.003	0.618	0.25	0.02	0.312	**DZ250-2000-562-E2F**
2.25	–0.002	2.625	+0.002	0.343	0.187	0.015	0.25	**DZ187-2250-312-E2F**
	–0.002	2.625	+0.002	0.413	0.187	0.015	0.25	**DZ187-2250-375-E2F**
	–0.002	2.75	+0.003	0.413	0.25	0.02	0.312	**DZ250-2250-375-E2F**
2.375	–0.002	2.75	+0.002	0.343	0.187	0.015	0.25	**DZ187-2375-312-E2F**
	–0.002	2.875	+0.003	0.413	0.25	0.02	0.312	**DZ250-2375-375-E2F**
2.5	–0.002	2.875	+0.002	0.343	0.187	0.015	0.25	**DZ187-2500-312-E2F**
	–0.002	2.875	+0.002	0.413	0.187	0.015	0.25	**DZ187-2500-375-E2F**
	–0.002	3	+0.003	0.413	0.25	0.02	0.312	**DZ250-2500-375-E2F**
	–0.002	3.125	+0.004	0.55	0.312	0.02	0.312	**DZ312-2500-500-E2F**
	–0.002	3.25	+0.005	0.688	0.375	0.03	0.5	**DZ375-2500-625-E2F**
2.625	–0.002	3.125	+0.003	0.413	0.25	0.02	0.312	**DZ250-2625-375-E2F**
2.75	–0.002	3.125	+0.002	0.343	0.187	0.015	0.25	**DZ187-2750-312-E2F**
	–0.002	3.25	+0.003	0.413	0.25	0.02	0.312	**DZ250-2750-375-E2F**
	–0.002	3.5	+0.005	0.688	0.375	0.03	0.5	**DZ375-2750-625-E2F**
2.875	–0.002	3.375	+0.003	0.413	0.25	0.02	0.312	**DZ250-2875-375-E2F**
3	–0.002	3.375	+0.002	0.343	0.187	0.015	0.25	**DZ187-3000-312-E2F**
	–0.002	3.375	+0.002	0.413	0.187	0.015	0.25	**DZ187-3000-375-E2F**
	–0.002	3.5	+0.003	0.413	0.25	0.02	0.312	**DZ250-3000-375-E2F**
	–0.002	3.5	+0.003	0.618	0.25	0.02	0.312	**DZ250-3000-562-E2F**
	–0.002	3.625	+0.004	0.55	0.312	0.02	0.312	**DZ312-3000-500-E2F**
	–0.002	3.75	+0.005	0.688	0.375	0.03	0.5	**DZ375-3000-625-E2F**
	–0.002	3.75	+0.005	0.965	0.375	0.03	0.5	**DZ375-3000-875-E2F**
3.125	–0.002	3.625	+0.003	0.413	0.25	0.02	0.312	**DZ250-3125-375-E2F**
3.187	–0.002	3.562	+0.002	0.413	0.187	0.015	0.25	**DZ187-3187-375-E2F**
3.25	–0.002	3.625	+0.002	0.343	0.187	0.015	0.25	**DZ187-3250-312-E2F**
	–0.002	3.75	+0.003	0.413	0.25	0.02	0.312	**DZ250-3250-375-E2F**
	–0.002	3.875	+0.004	0.55	0.312	0.02	0.312	**DZ312-3250-500-E2F**
	–0.002	4	+0.005	0.688	0.375	0.03	0.5	**DZ375-3250-625-E2F**

3.6 DZ profile rod seals, inch sizes

d **3.375 – 12** in.



Maximum extrusion gap e

Radial depth	e_{max} at 60 °C *(140 °F)* for pressures		
S	2 300 psi	3 600 psi	5 800 psi
in.	in.		
0.125	0.008	0.004	–
0.156 to 0.187	0.014	0.008	–
0.25	0.018	0.01	0.004
0.312 to 0.375	0.02	0.012	0.006
0.5	0.024	0.012	0.008

For additional information → **page 34**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
3.375	–0.002	3.875	+0.003	0.413	0.25	0.02	0.312	**DZ250-3375-375-E2F**
	–0.002	4	+0.004	0.55	0.312	0.02	0.312	**DZ312-3375-500-E2F**
3.5	–0.002	4	+0.003	0.413	0.25	0.02	0.312	**DZ250-3500-375-E2F**
	–0.002	4.125	+0.004	0.55	0.312	0.02	0.312	**DZ312-3500-500-E2F**
	–0.002	4.25	+0.005	0.688	0.375	0.03	0.5	**DZ375-3500-625-E2F**
	–0.003	4.5	+0.007	0.825	0.5	0.03	0.625	**DZ500-3500-750-E2F**
3.625	–0.002	4.375	+0.005	0.688	0.375	0.03	0.5	**DZ375-3625-625-E2F**
	–0.002	4.375	+0.005	0.965	0.375	0.03	0.5	**DZ375-3625-875-E2F**
3.75	–0.002	4.25	+0.003	0.413	0.25	0.02	0.312	**DZ250-3750-375-E2F**
	–0.002	4.25	+0.003	0.618	0.25	0.02	0.312	**DZ250-3750-562-E2F**
	–0.002	4.375	+0.004	0.413	0.312	0.02	0.312	**DZ312-3750-375-E2F**
	–0.002	4.375	+0.004	0.55	0.312	0.02	0.312	**DZ312-3750-500-E2F**
	–0.002	4.5	+0.005	0.688	0.375	0.03	0.5	**DZ375-3750-625-E2F**
3.875	–0.002	4.375	+0.003	0.413	0.25	0.02	0.312	**DZ250-3875-375-E2F**
4	–0.002	4.375	+0.002	0.413	0.187	0.015	0.25	**DZ187-4000-375-E2F**
	–0.002	4.5	+0.003	0.413	0.25	0.02	0.312	**DZ250-4000-375-E2F**
	–0.002	4.5	+0.003	0.618	0.25	0.02	0.312	**DZ250-4000-562-E2F**
	–0.002	4.75	+0.005	0.688	0.375	0.03	0.5	**DZ375-4000-625-E2F**
	–0.002	4.75	+0.005	0.825	0.375	0.03	0.5	**DZ375-4000-750-E2F**
	–0.003	5	+0.007	0.825	0.5	0.03	0.625	**DZ500-4000-750-E2F**
4.25	–0.002	4.75	+0.003	0.413	0.25	0.02	0.312	**DZ250-4250-375-E2F**
	–0.002	4.875	+0.004	0.618	0.312	0.02	0.312	**DZ312-4250-562-E2F**
	–0.002	5	+0.005	0.688	0.375	0.03	0.5	**DZ375-4250-625-E2F**
4.5	–0.002	5	+0.003	0.413	0.25	0.02	0.312	**DZ250-4500-375-E2F**
	–0.002	5	+0.003	0.618	0.25	0.02	0.312	**DZ250-4500-562-E2F**
	–0.002	5.25	+0.005	0.688	0.375	0.03	0.5	**DZ375-4500-625-E2F**
	–0.002	5.25	+0.005	0.825	0.375	0.03	0.5	**DZ375-4500-750-E2F**
4.625	–0.002	5.125	+0.003	0.618	0.25	0.02	0.312	**DZ250-4625-562-E2F**
4.75	–0.002	5.125	+0.002	0.413	0.187	0.015	0.25	**DZ187-4750-375-E2F**
	–0.002	5.25	+0.003	0.618	0.25	0.02	0.312	**DZ250-4750-562-E2F**
	–0.002	5.5	+0.005	0.688	0.375	0.03	0.5	**DZ375-4750-625-E2F**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
5	–0.002	5.5	+0.003	0.413	0.25	0.02	0.312	**DZ250-5000-375-E2F**
	–0.002	5.5	+0.003	0.618	0.25	0.02	0.312	**DZ250-5000-562-E2F**
	–0.002	5.75	+0.005	0.688	0.375	0.03	0.5	**DZ375-5000-625-E2F**
5.25	–0.002	5.75	+0.003	0.618	0.25	0.02	0.312	**DZ250-5250-562-E2F**
5.375	–0.002	5.875	+0.003	0.413	0.25	0.02	0.312	**DZ250-5375-375-E2F**
5.5	–0.002	5.875	+0.002	0.413	0.187	0.015	0.25	**DZ187-5500-375-E2F**
	–0.002	6	+0.003	0.618	0.25	0.02	0.312	**DZ250-5500-562-E2F**
	–0.002	6.25	+0.005	0.688	0.375	0.03	0.5	**DZ375-5500-625-E2F**
5.75	–0.002	6.25	+0.003	0.413	0.25	0.02	0.312	**DZ250-5750-375-E2F**
	–0.002	6.5	+0.005	0.688	0.375	0.03	0.5	**DZ375-5750-625-E2F**
6	–0.002	6.5	+0.003	0.413	0.25	0.02	0.312	**DZ250-6000-375-E2F**
	–0.002	6.5	+0.003	0.618	0.25	0.02	0.312	**DZ250-6000-562-E2F**
	–0.002	6.75	+0.005	0.688	0.375	0.03	0.5	**DZ375-6000-625-E2F**
	–0.003	7	+0.007	0.825	0.5	0.03	0.625	**DZ500-6000-750-E2F**
6.375	–0.002	6.875	+0.003	0.55	0.25	0.02	0.312	**DZ250-6375-500-E2F**
6.5	–0.002	7	+0.003	0.413	0.25	0.02	0.312	**DZ250-6500-375-E2F**
	–0.002	7	+0.003	0.618	0.25	0.02	0.312	**DZ250-6500-562-E2F**
	–0.002	7.25	+0.005	0.688	0.375	0.03	0.5	**DZ375-6500-625-E2F**
6.75	–0.002	7.25	+0.003	0.618	0.25	0.02	0.312	**DZ250-6750-562-E2F**
7	–0.002	7.5	+0.003	0.413	0.25	0.02	0.312	**DZ250-7000-375-E2F**
	–0.002	7.75	+0.005	0.688	0.375	0.03	0.5	**DZ375-7000-625-E2F**
	–0.003	8	+0.007	0.825	0.5	0.03	0.625	**DZ500-7000-750-E2F**
7.25	–0.002	7.75	+0.003	0.55	0.25	0.02	0.312	**DZ250-7250-500-E2F**
7.5	–0.002	8.25	+0.005	0.688	0.375	0.03	0.5	**DZ375-7500-625-E2F**
7.75	–0.002	8.5	+0.005	0.55	0.375	0.03	0.5	**DZ375-7750-500-E2F**
8	–0.002	8.75	+0.005	0.688	0.375	0.03	0.5	**DZ375-8000-625-E2F**
	–0.003	9	+0.007	0.825	0.5	0.03	0.625	**DZ500-8000-750-E2F**
8.125	–0.002	8.625	+0.003	0.413	0.25	0.02	0.312	**DZ250-8125-375-E2F**
	–0.002	8.625	+0.003	0.55	0.25	0.02	0.312	**DZ250-8125-500-E2F**
	–0.002	8.625	+0.003	0.618	0.25	0.02	0.312	**DZ250-8125-562-E2F**
8.25	–0.002	9	+0.005	0.688	0.375	0.03	0.5	**DZ375-8250-625-E2F**
8.5	–0.003	9.5	+0.007	0.825	0.5	0.03	0.625	**DZ500-8500-750-E2F**
8.875	–0.002	9.5	+0.004	0.55	0.312	0.02	0.312	**DZ312-8875-500-E2F**
9	–0.002	9.75	+0.005	0.688	0.375	0.03	0.5	**DZ375-9000-625-E2F**
	–0.003	10	+0.007	0.825	0.5	0.03	0.625	**DZ500-9000-750-E2F**
9.25	–0.002	10	+0.005	0.618	0.375	0.03	0.5	**DZ375-9250-562-E2F**
10.5	–0.002	11.25	+0.005	0.688	0.375	0.03	0.5	**DZ375-10500-625-E2F**
10.75	–0.002	11.5	+0.005	0.688	0.375	0.03	0.5	**DZ375-10750-625-E2F**
11	–0.003	12	+0.007	0.825	0.5	0.03	0.625	**DZ500-11000-750-E2F**
12	–0.003	13	+0.007	0.825	0.5	0.03	0.625	**DZ500-12000-750-E2F**

Other sizes are available on request

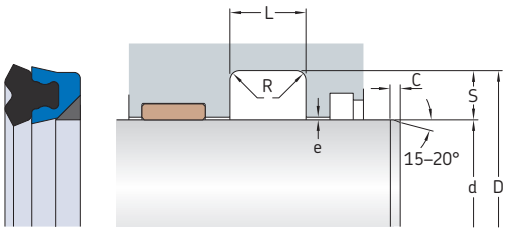
DZR profile data

Material codes	Primary sealing ring: A-8504 Secondary sealing ring: U-1003 Anti-extrusion ring: suffix E2E → P-2506 suffix E2D → 707 For additional information → **page 26**
Pressure	Up to 690 bar *(10 000 psi)*
Speed	Up to 1 m/s *(3.2 ft/s)*
Temperature range	 Extreme low temperature range: seal performance depends on system design (precision guiding arrangement recommended) **Recommended operating temperature range for this profile and material** Temperatures above the recommended operating range: acceptable only with reduced pressure and/or speed Extreme high temperature range: only occasional short-term exposure (e.g. cylinder in curing oven of a powder coating process)
Counter-surface	→ **page 22**

Maximum values of application parameters (e.g. pressure, speed, temperature, e-gap) should not be applied continuously nor simultaneously.

3.7 DZR profile rod seals, metric sizes

d **40 – 150** mm



Maximum extrusion gap e

Radial depth	e_{max} at 80 °C *(175 °F)* for pressures			
S	160 bar	250 bar	400 bar	690 bar
mm	mm			
5	0,55	0,35	0,2	0,1
7,5	0,8	0,5	0,3	0,15
10 to 11	1,1	0,75	0,45	0,2

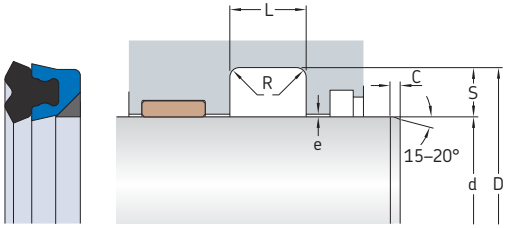
For additional information → **page 34**

Dimensions						Designation
d f8 or h9	D H10	L +0,2	S	R max.	C min.	
mm						–
40	50	8	5	0,2	6	**DZR-40x50x8-E2E**
50	60	8	5	0,2	6	**DZR-50x60x8-E2E**
56	71	11,7	7,5	0,5	8,5	**DZR-56x71x11.7-E2E**
63	78	11,7	7,5	0,5	8,5	**DZR-63x78x11.7-E2E**
75	95	16,5	10	0,8	11	**DZR-75x95x16.5-E2D**
85	100	13,8	7,5	0,5	8,5	**DZR-85x100x13.8-E2E**
110	125	12,5	7,5	0,5	8,5	**DZR-110x125x12.5-E2D**
150	172	16,5	11	0,8	13	**DZR-150x172x16.5-E2D**

Other sizes are available on request

3.7 DZR profile rod seals, inch sizes

d **1.25 – 12** in.



Maximum extrusion gap e

Radial depth S	e_{max} at 80 °C *(175 °F)* for pressures 2 300 psi	3 600 psi	5 800 psi	10 000 psi
in.	in.			
0.187	0.021	0.013	0.008	0.005
0.25	0.028	0.018	0.011	0.007
0.312	0.044	0.028	0.017	0.01
0.375	0.044	0.028	0.017	0.01
0.5	0.059	0.038	0.023	0.014

For additional information → **page 34**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
1.25	–0.002	1.625	+0.002	0.343	0.187	0.015	0.250	**DZR187-1250-312-E2E**
	–0.002	1.750	+0.003	0.413	0.25	0.02	0.312	**DZR250-1250-375-E2E**
1.5	–0.002	1.875	+0.002	0.343	0.187	0.015	0.250	**DZR187-1500-312-E2E**
	–0.002	2.000	+0.003	0.413	0.25	0.02	0.312	**DZR250-1500-375-E2E**
1.75	–0.002	2.250	+0.003	0.413	0.25	0.02	0.312	**DZR250-1750-375-E2E**
2	–0.002	2.500	+0.003	0.413	0.25	0.02	0.312	**DZR250-2000-375-E2E**
	–0.002	2.750	+0.005	0.688	0.375	0.03	0.500	**DZR375-2000-625-E2E**
2.25	–0.002	2.750	+0.003	0.413	0.25	0.02	0.312	**DZR250-2250-375-E2E**
2.375	–0.002	2.875	+0.003	0.413	0.25	0.02	0.312	**DZR250-2375-375-E2D**
2.5	–0.002	3.000	+0.003	0.413	0.25	0.02	0.312	**DZR250-2500-375-E2E**
2.625	–0.002	3.125	+0.003	0.413	0.25	0.02	0.312	**DZR250-2625-375-E2E**
2.75	–0.002	3.250	+0.003	0.413	0.25	0.02	0.312	**DZR250-2750-375-E2E**
3	–0.002	3.374	+0.003	0.413	0.187	0.015	0.250	**DZR187-3000-375-E2D**
	–0.002	3.500	+0.003	0.413	0.25	0.02	0.312	**DZR250-3000-375-E2E**
	–0.002	3.750	+0.005	0.688	0.375	0.03	0.500	**DZR375-3000-625-E2E**
3.5	–0.002	4.000	+0.003	0.413	0.25	0.02	0.312	**DZR250-3500-375-E2E**
	–0.002	4.250	+0.005	0.688	0.375	0.03	0.500	**DZR375-3500-625-E2E**
3.625	–0.002	4.125	+0.003	0.413	0.25	0.02	0.312	**DZR250-3625-375-E2E**
	–0.002	4.375	+0.005	0.688	0.375	0.03	0.500	**DZR375-3625-625-E2E**
3.75	–0.002	4.250	+0.003	0.413	0.25	0.02	0.312	**DZR250-3750-375-E2E**
3.875	–0.002	4.375	+0.003	0.413	0.25	0.02	0.312	**DZR250-3875-375-E2D**
4	–0.002	4.500	+0.003	0.413	0.25	0.02	0.312	**DZR250-4000-375-E2E**
	–0.002	4.500	+0.003	0.618	0.25	0.02	0.312	**DZR250-4000-562-E2E**
	–0.002	4.625	+0.004	0.550	0.312	0.02	0.312	**DZR312-4000-500-E2E**
	–0.002	4.625	+0.004	0.618	0.312	0.02	0.312	**DZR312-4000-562-E2E**
	–0.002	4.750	+0.005	0.688	0.375	0.03	0.500	**DZR375-4000-625-E2E**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
4.25	–0.002	5.000	+0.005	0.688	0.375	0.03	0.500	**DZR375-4250-625-E2E**
4.375	–0.002	4.875	+0.003	0.413	0.25	0.02	0.312	**DZR250-4375-375-E2D**
4.5	–0.002	5.000	+0.003	0.413	0.25	0.02	0.312	**DZR250-4500-375-E2E**
	–0.002	5.250	+0.005	0.688	0.375	0.03	0.500	**DZR375-4500-625-E2E**
4.875	–0.002	5.375	+0.003	0.413	0.25	0.02	0.312	**DZR250-4875-375-E2D**
5	–0.002	5.500	+0.003	0.413	0.25	0.02	0.312	**DZR250-5000-375-E2E**
	–0.002	5.500	+0.003	0.618	0.25	0.02	0.312	**DZR250-5000-562-E2E**
	–0.002	5.750	+0.005	0.688	0.375	0.03	0.500	**DZR375-5000-625-E2E**
5.25	–0.002	6.000	+0.005	0.688	0.375	0.03	0.500	**DZR375-5250-625-E2E**
5.5	–0.002	6.000	+0.003	0.413	0.25	0.02	0.312	**DZR250-5500-375-E2E**
	–0.002	6.250	+0.005	0.688	0.375	0.03	0.500	**DZR375-5500-625-E2E**
6	–0.002	6.750	+0.005	0.688	0.375	0.03	0.500	**DZR375-6000-625-E2E**
	–0.003	7.000	+0.007	0.825	0.5	0.03	0.625	**DZR500-6000-750-E2E**
6.5	–0.002	7.250	+0.005	0.688	0.375	0.03	0.500	**DZR375-6500-625-E2E**
	–0.003	7.500	+0.007	0.825	0.5	0.03	0.625	**DZR500-6500-750-E2E**
6.75	–0.002	7.500	+0.005	0.688	0.375	0.03	0.500	**DZR375-6750-625-E2E**
7	–0.002	7.750	+0.005	0.688	0.375	0.03	0.500	**DZR375-7000-625-E2E**
	–0.003	8.000	+0.007	0.825	0.5	0.03	0.625	**DZR500-7000-750-E2E**
7.25	–0.002	8.000	+0.005	0.688	0.375	0.03	0.500	**DZR375-7250-625-E2D**
7.5	–0.002	8.250	+0.005	0.688	0.375	0.03	0.500	**DZR375-7500-625-E2D**
7.75	–0.002	8.500	+0.005	0.688	0.375	0.03	0.500	**DZR375-7750-625-E2D**
7.875	–0.002	8.625	+0.005	0.688	0.375	0.03	0.500	**DZR375-7875-625-E2D**
8	–0.002	8.750	+0.005	0.688	0.375	0.03	0.500	**DZR375-8000-625-E2E**
	–0.003	9.000	+0.007	0.825	0.5	0.03	0.625	**DZR500-8000-750-E2E**
8.5	–0.003	9.500	+0.007	0.825	0.5	0.03	0.625	**DZR500-8500-750-E2E**
9	–0.002	9.750	+0.005	0.688	0.375	0.03	0.500	**DZR375-9000-625-E2D**
11	–0.002	11.750	+0.005	0.688	0.375	0.03	0.500	**DZR375-11000-625-E2D**
	–0.003	12.000	+0.007	0.825	0.5	0.03	0.625	**DZR500-11000-750-E2D**
12	–0.002	12.750	+0.005	0.688	0.375	0.03	0.500	**DZR375-12000-625-E2D**

Other sizes are available on request

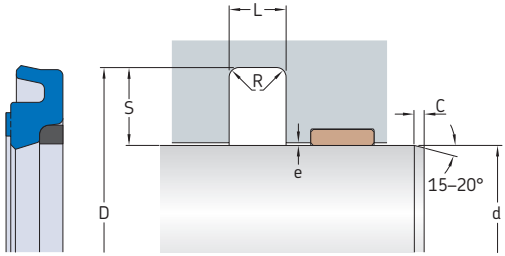
RBB profile data

Material codes	Sealing ring: metric sizes → U-1029 inch sizes → U-1023 Anti-extrusion ring: metric sizes → P-2518 inch sizes → 707 For additional information → **page 26**
Pressure	Up to 690 bar *(10 000 psi)*
Speed	Up to 1 m/s *(3.2 ft/s)*
Temperature range	 Extreme low temperature range: may be intermittently exposed (e.g. cold start-up) without seal damage, but seal performance may be compromised while in this range Temperatures below the recommended operating range: seal performance depends on system design (precision guiding arrangement recommended) **Recommended operating temperature range for this profile and material** Temperatures above the recommended operating range: acceptable only with reduced pressure and/or speed Extreme high temperature range: only occasional short-term exposure (e.g. cylinder in curing oven of a powder coating process)
Dimension standards	Some metric sizes fit seal housings in accordance with ISO 7425-2.
Counter-surface	→ **page 22**

Maximum values of application parameters (e.g. pressure, speed, temperature, e-gap) should not be applied continuously nor simultaneously.

3.8 RBB profile buffer seals, metric sizes

d **25 – 110** mm



Maximum extrusion gap e

Radial depth S	e_{max} at 80 °C (175 °F) for pressures 160 bar	250 bar	400 bar	690 bar
mm	mm			
5,35	0,6	0,4	0,25	0,1
7,55 to 7,75	0,8	0,55	0,35	0,15

For additional information → **page 34**

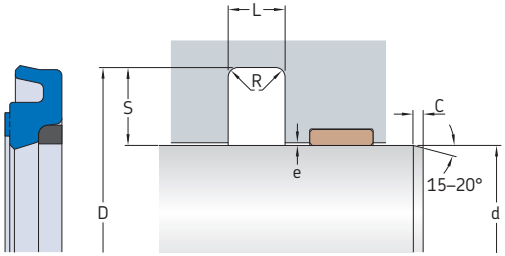
Dimensions						Designation
d[1]	D H9	L +0,2	S	R max.	C min.	
mm						–
25	35,7	4,2	5,35	0,55	6	**RBB-25x35.7x4.2-J0S**
30	40,7	4,2	5,35	0,55	6	**RBB-30x40.7x4.2-J0S**
35	45,7	4,2	5,35	0,55	6	**RBB-35x45.7x4.2-J0S**
40	55,1	6,3	7,55	0,7	8	**RBB-40x55.1x6.3-J0S**
50	65,1	6,3	7,55	0,7	8	**RBB-50x65.1x6.3-J0S**
55	70,1	6,3	7,55	0,7	8	**RBB-55x70.1x6.3-J0S**
	70,5	6,3	7,75	0,7	8	**RBB-55x70.5x6.3-J0S**
60	75,1	6,3	7,55	0,7	8	**RBB-60x75.1x6.3-J0S**
65	80,1	6,3	7,55	0,7	8	**RBB-65x80.1x6.3-J0S**
	80,5	6,3		0,7	8	**RBB-65x80.5x6.3-J0S**
70	85,1	6,3	7,55	0,7	8	**RBB-70x85.1x6.3-J0S**
	85,5	6,3	7,75	0,7	8	• **RBB-70x85.5x6.3-J0S**
75	90,1	6,3	7,55	0,7	8	**RBB-75x90.1x6.3-J0S**
	90,5	6,3	7,75	0,7	8	**RBB-75x90.5x6.3-J0S**
80	95,1	6,3	7,55	0,7	8	**RBB-80x95.1x6.3-J0S**
85	100,1	6,3	7,55	0,7	8	**RBB-85x100.1x6.3-J0S**
90	105,1	6,3	7,55	0,7	8	**RBB-90x105.1x6.3-J0S**
	105,5	6,3	7,75	0,7	8	• **RBB-90x105.5x6.3-J0S**
95	110,1	6,3	7,55	0,7	8	**RBB-95x110.1x6.3-J0S**
	110,5	6,3	7,75	0,7	8	**RBB-95x110.5x6.3-J0S**
100	115,1	6,3	7,55	0,7	8	**RBB-100x115.1x6.3-J0S**
105	120,1	6,3	7,55	0,7	8	**RBB-105x120.1x6.3-J0S**
110	125,1	6,3	7,55	0,7	8	**RBB-110x125.1x6.3-J0S**

[1] Tolerance is determined by the rod seal

• Seal housing dimensions in accordance with ISO 7425-2

3.8 RBB profile buffer seals, metric sizes

d **115 – 170** mm



Maximum extrusion gap e

Radial depth S	e_{max} at 80 °C *(175 °F)* **for pressures** 160 bar	250 bar	400 bar	690 bar
mm	mm			
5,35	0,6	0,4	0,25	0,1
7,55 to 7,75	0,8	0,55	0,35	0,15

For additional information → **page 34**

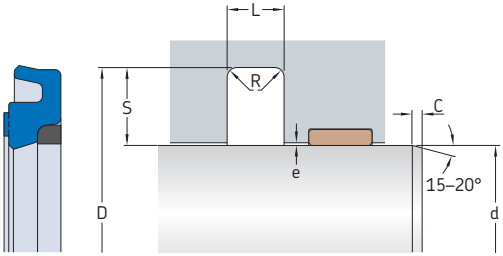
Dimensions						**Designation**
d[1)]	D H9	L +0,2	S	R max.	C min.	
mm						–
115	130,1	6,3	7,55	0,7	8	**RBB-115x130.1x6.3-J0S**
120	135,1	6,3	7,55	0,7	8	**RBB-120x135.1x6.3-J0S**
125	140,1	6,3	7,55	0,7	8	**RBB-125x140.1x6.3-J0S**
130	145,1	6,3	7,55	0,7	8	**RBB-130x145.1x6.3-J0S**
140	155,1	6,3	7,55	0,7	8	**RBB-140x155.1x6.3-J0S**
150	165,1	6,3	7,55	0,7	8	**RBB-150x165.1x6.3-J0S**
170	185,1	6,3	7,55	0,7	8	**RBB-170x185.1x6.3-J0S**

Other sizes are available on request

1) Tolerance is determined by the rod seal

3.8 RBB profile buffer seals, inch sizes

d **2 – 8** in.



Maximum extrusion gap e

Radial depth S	Series	e_{max} at 80 °C *(175 °F)* for pressures 2 300 psi	3 600 psi	5 800 psi	10 000 psi
in.	–	in.			
0.166 to 0.212	RBB2	0.019	0.012	0.008	0.004
0.247 to 0.308	RBB3	0.029	0.019	0.012	0.005
0.32 to 0.415	RBB4	0.037	0.024	0.015	0.007

For additional information → **page 34**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
2	–0.004	2.616	+0.005	0.247	0.308	0.028	0.312	**RBB3-2000-E6T**
2.25	–0.003	2.674	+0.004	0.166	0.212	0.022	0.25	**RBB2-2250-E6T**
2.5	–0.003	2.924	+0.004	0.166	0.212	0.022	0.25	**RBB2-2500-E6T**
	–0.004	3.116	+0.005	0.247	0.308	0.028	0.312	**RBB3-2500-E6T**
2.75	–0.004	3.366	+0.005	0.247	0.308	0.028	0.312	**RBB3-2750-E6T**
3	–0.004	3.616	+0.005	0.247	0.308	0.028	0.312	**RBB3-3000-E6T**
3.5	–0.004	4.116	+0.005	0.247	0.308	0.028	0.312	**RBB3-3500-E6T**
4	–0.004	4.616	+0.005	0.247	0.308	0.028	0.312	**RBB3-4000-E6T**
4.5	–0.004	5.116	+0.005	0.247	0.308	0.028	0.312	**RBB3-4500-E6T**
4.75	–0.004	5.366	+0.005	0.247	0.308	0.028	0.312	**RBB3-4750-E6T**
5	–0.004	5.616	+0.005	0.247	0.308	0.028	0.312	**RBB3-5000-E6T**
5.5	–0.004	6.116	+0.005	0.247	0.308	0.028	0.312	**RBB3-5500-E6T**
6	–0.004	6.616	+0.005	0.247	0.308	0.028	0.312	**RBB3-6000-E6T**
6.5	–0.004	7.116	+0.005	0.247	0.308	0.028	0.312	**RBB3-6500-E6T**
7	–0.004	7.616	+0.005	0.247	0.308	0.028	0.312	**RBB3-7000-E6T**
7.25	–0.004	7.866	+0.005	0.247	0.308	0.028	0.312	**RBB3-7250-E6T**
8	–0.004	8.616	+0.005	0.247	0.308	0.028	0.312	**RBB3-8000-E6T**

Other sizes are available on request

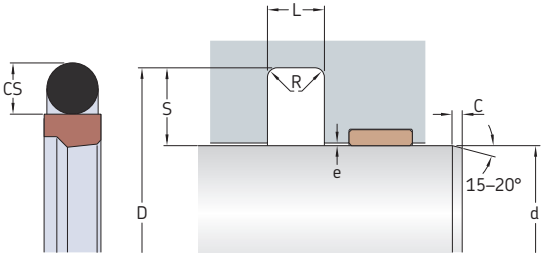
S9B profile data

Material codes	O-ring energizer: N70/6052 or A-8501 Slide ring: X-ECOPUR or 741 For additional information → **page 26**
Pressure	X-ECOPUR slide ring → up to 600 bar *(8 700 psi)* PTFE 741 slide ring → up to 400 bar *(5 800 psi)*
Speed	Up to 2 m/s *(6.5 ft/s)*
Temperature range	With X-ECOPUR slide ring:  With 741 slide ring:  Extreme low temperature range: may be intermittently exposed (e.g. cold start-up) without seal damage, but seal performance may be compromised while in this range Temperatures below the recommended operating range: seal performance depends on system design (precision guiding arrangement recommended) **Recommended operating temperature range for this profile and these materials** Temperatures above the recommended operating range: acceptable only with reduced pressure, speed, and/or e-gap Extreme high temperature range: only occasional short-term exposure (e.g. cylinder in curing oven of a powder coating process)
Dimension standards	Some metric sizes fit seal housings in accordance with ISO 7425-2 or ISO 3320.
Counter-surface	→ **page 22**

Maximum values of application parameters (e.g. pressure, speed, temperature, e-gap) should not be applied continuously nor simultaneously.

3.9 S9B profile buffer seals, metric sizes

d **6 – 18** mm



Maximum extrusion gap e with X-ECOPUR slide ring

Radial depth S	e_{max} at 80 °C *(175 °F)* for pressures 160 bar	250 bar	400 bar	600 bar
mm	mm			
2,45 to 2,5	0,3	0,25	0,2	0,1
3,5 to 3,75	0,4	0,3	0,2	0,1
5,35 to 5,5	0,5	0,4	0,3	0,2
7,55 to 7,75	0,5	0,4	0,3	0,2
10,25 to 12,25	0,7	0,5	0,4	0,2

For additional information → **page 34**

Maximum extrusion gap e with 741 slide ring

Radial depth S	e_{max} at 80 °C *(175 °F)* for pressures 160 bar	250 bar	400 bar
mm	mm		
2,45 to 2,5	0,25	0,2	0,15
3,5 to 3,75	0,35	0,25	0,15
5,35 to 5,5	0,4	0,3	0,2
7,55 to 7,75	0,5	0,35	0,25
10,25 to 12,25	0,6	0,45	0,35

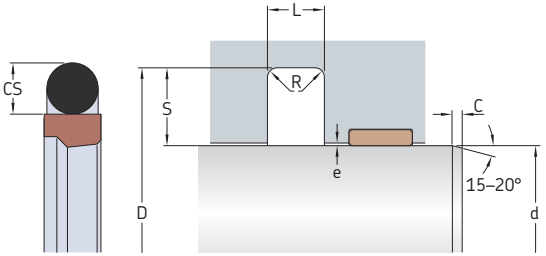
For additional information → **page 34**

Dimensions							Designations	
							With slide ring made of X-ECOPUR	741
d[1]	D H9	L +0,2	S	R max.	C min.	CS nom.		
mm							–	
6	11	2,2	2,5	0,5	3,5	1,78	• **S9B-6x11x2.2**	**S9B-6x11x2.2-AD1**
8	13	2,2	2,5	0,5	3,5	1,78	• **S9B-8x13x2.2**	**S9B-8x13x2.2-AD1**
	15,3	3,2	3,65	0,6	3,5	2,62	▲ **S9B-8x15.3x3.2**	**S9B-8x15.3x3.2-AD1**
10	15	2,2	2,5	0,5	3,5	1,78	• **S9B-10x15x2.2**	**S9B-10x15x2.2-AD1**
	17,3	3,2	3,65	0,6	3,5	2,62	▲ **S9B-10x17.3x3.2**	**S9B-10x17.3x3.2-AD1**
12	17	2,2	2,5	0,5	3,5	1,78	• **S9B-12x17x2.2**	**S9B-12x17x2.2-AD1**
	19,5	3,2	3,75	0,5	3,5	2,62	• **S9B-12x19.5x3.2**	**S9B-12x19.5x3.2-AD1**
14	19	2,2	2,5	0,5	3,5		• **S9B-14x19x2.2**	**S9B-14x19x2.2-AD1**
	21,3	3,2	3,65	0,6	3,5	2,62	▲ **S9B-14x21,3x3,2**	**S9B-14x21,3x3,2-AD1**
	21,5	3,2	3,75	0,5	3,5	2,62	• **S9B-14x21.5x3.2**	**S9B-14x21.5x3.2-AD1**
16	23,3	3,2	3,65	0,6	3,5	2,62	▲ **S9B-16x23.3x3.2**	**S9B-16x23.3x3.2-AD1**
	23,5	3,2	3,75	0,5	3,5	2,62	• **S9B-16x23.5x3.2**	**S9B-16x23.5x3.2-AD1**
18	25,3	3,2	3,65	0,6	3,5	2,62	▲ **S9B-18x25.3x3.2**	**S9B-18x25.3x3.2-AD1**
	25,5	3,2	3,75	0,5	3,5	2,62	• **S9B-18x25.5x3.2**	**S9B-18x25.5x3.2-AD1**

[1] Tolerance is determined by the rod seal
• Dimensions in accordance with ISO 7425-2
▲ Dimensions in accordance with ISO 3320

3.9 S9B profile buffer seals, metric sizes

d **20 – 360** mm



Maximum extrusion gap e with X-ECOPUR slide ring

Radial depth S	e_{max} at 80 °C *(175 °F)* for pressures 160 bar	250 bar	400 bar	600 bar
mm	mm			
2,45 to 2,5	0,3	0,25	0,2	0,1
3,5 to 3,75	0,4	0,3	0,2	0,1
5,35 to 5,5	0,5	0,4	0,3	0,2
7,55 to 7,75	0,5	0,4	0,3	0,2
10,25 to 12,25	0,7	0,5	0,4	0,2

For additional information → **page 34**

Maximum extrusion gap e with 741 slide ring

Radial depth S	e_{max} at 80 °C *(175 °F)* for pressures 160 bar	250 bar	400 bar
mm	mm		
2,45 to 2,5	0,25	0,2	0,15
3,5 to 3,75	0,35	0,25	0,15
5,35 to 5,5	0,4	0,3	0,2
7,55 to 7,75	0,5	0,35	0,25
10,25 to 12,25	0,6	0,45	0,35

For additional information → **page 34**

Dimensions							Designations	
							With slide ring made of X-ECOPUR	741
d[1]	D H9	L +0,2	S	R max.	C min.	CS nom.		
mm							–	
20	27,5	3,2	3,5	0,5	4,5	2,62	• **S9B-20x27.5x3.2**	**S9B-20x27.5x3.2-AD1**
	30,7	4,2	5,35	1	4,5	3,53	▲ **S9B-20x30.7x4.2**	**S9B-20x30.7x4.2-AD1**
	31	4,2	5,5	0,5	4,5	3,53	• **S9B-20x31x4.2**	**S9B-20x31x4.2-AD1**
22	29,5	3,2	3,75	0,5	4,5	2,62	• **S9B-22x29.5x3.2**	**S9B-22x29.5x3.2-AD1**
	33	4,2	5,5	0,5	4,5	3,53	• **S9B-22x33x4.2**	**S9B-22x33x4.2-AD1**
25	32,5	3,2	3,75	0,5	4,5	2,62	• **S9B-25x32.5x3.2**	**S9B-25x32.5x3.2-AD1**
	35,7	4,2	5,35	1	4,5	3,53	▲ **S9B-25x35.7x4.2**	**S9B-25x35.7x4.2-AD1**
	36	4,2	5,5	0,5	4,5	3,53	• **S9B-25x36x4.2**	**S9B-25x36x4.2-AD1**
28	38,7	4,2	5,35	1	4,5	3,53	▲ **S9B-28x38.7x4.2**	**S9B-28x38.7x4.2-AD1**
	39	4,2	5,5	0,5	4,5	3,53	• **S9B-28x39x4.2**	**S9B-28x39x4.2-AD1**
32	42,7	4,2	5,35	1	4,5	3,53	▲ **S9B-32x42.7x4.2**	**S9B-32x42.7x4.2-AD1**
	43	4,2	5,5	0,5	4,5	3,53	• **S9B-32x43x4.2**	**S9B-32x43x4.2-AD1**
35	45,7	4,2	5,35	1	4,5	3,53	**S9B-35x45.7x4.2**	**S9B-35x45.7x4.2-AD1**
36	46,7	4,2	5,35	1	4,5	3,53	▲ **S9B-36x46.7x4.2**	**S9B-36x46.7x4.2-AD1**
	47	4,2	5,5	0,5	4,5	3,53	• **S9B-36x47x4.2**	**S9B-36x47x4.2-AD1**

[1] Tolerance is determined by the rod seal
• Dimensions in accordance with ISO 7425-2
▲ Dimensions in accordance with ISO 3320

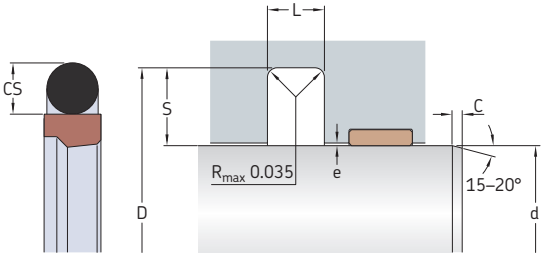
Dimensions								Designations	
								With slide ring made of X-ECOPUR	741
$d^{1)}$	D H9	L +0,2	S	R max.	C min.	CS nom.			
mm								–	
40	51	4,2	5,5	0,5	5	3,53	•	**S9B-40x51x4.2**	**S9B-40x51x4.2-AD1**
	55,1	6,3	7,55	1,3	5	5,33	▲	**S9B-40x55.1x6.3**	**S9B-40x55.1x6.3-AD1**
45	56	4,2	5,5	0,5	5	3,53	•	**S9B-45x56x4.2**	**S9B-45x56x4.2-AD1**
	60,1	6,3	7,55	1,3	5	5,33	▲	**S9B-45x60.1x6.3**	**S9B-45x60.1x6.3-AD1**
50	61	4,2	5,5	0,5	5	3,53	•	**S9B-50x61x4.2**	**S9B-50x61x4.2-AD1**
	65,1	6,3	7,55	1,3	5	5,33	▲	**S9B-50x65.1x6.3**	**S9B-50x65.1x6.3-AD1**
56	67	4,2	5,5	0,5	5	3,53	•	**S9B-56x67x4.2**	**S9B-56x67x4.2-AD1**
	71,5	6,3	7,75	0,9	5	5,33	•	**S9B-56x71.5x6.3**	**S9B-56x71.5x6.3-AD1**
55	70,1	6,3	7,55	1,3	5	5,33		**S9B-55x70.1x6.3**	**S9B-55x70.1x6.3-AD1**
63	74	4,2	5,5	0,5	5	3,53	•	**S9B-63x74x4.2**	**S9B-63x74x4.2-AD1**
	78,1	6,3	7,55	1,3	5	5,33	▲	**S9B-63x78.1x6.3**	**S9B-63x78.1x6.3-AD1**
	78,5	6,3	7,75	0,9	5	5,33	•	**S9B-63x78.5x6.3**	**S9B-63x78.5x6.3-AD1**
70	85,5	6,3	7,75	0,9	5	5,33	•	**S9B-70x85.5x6.3**	**S9B-70x85.5x6.3-AD1**
75	90,1	6,3	7,55	1,3	5	5,33		**S9B-75x90.1x6.3**	**S9B-75x90.1x6.3-AD1**
80	95,1	6,3	7,55	1,3	5	5,33	▲	**S9B-80x95.1x6.3**	**S9B-80x95.1x6.3-AD1**
	95,5	6,3	7,75	0,9	5	5,33	•	**S9B-80x95.5x6.3**	**S9B-80x95.5x6.3-AD1**
90	105,1	6,3	7,55	1,3	5	5,33	▲	**S9B-90x105.1x6.3**	**S9B-90x105.1x6.3-AD1**
	105,5	6,3	7,75	0,9	5	5,33	•	**S9B-90x105.5x6.3**	**S9B-90x105.5x6.3-AD1**
100	115,1	6,3	7,55	1,3	5	5,33	▲	**S9B-100x115.1x6.3**	**S9B-100x115.1x6.3-AD1**
	115,5	6,3	7,75	0,9	5	5,33	•	**S9B-100x115.5x6.3**	**S9B-100x115.5x6.3-AD1**
110	125,1	6,3	7,55	1,3	5	5,33	▲	**S9B-110x125.1x6.3**	**S9B-110x125.1x6.3-AD1**
	125,5	6,3	7,75	0,9	5	5,33	•	**S9B-110x125.5x6.3**	**S9B-110x125.5x6.3-AD1**
125	140,1	6,3	7,55	1,3	5	5,33	▲	**S9B-125x140.1x6.3**	**S9B-125x140.1x6.3-AD1**
	140,5	6,3	7,75	0,9	5	5,33	•	**S9B-125x140.5x6.3**	**S9B-125x140.5x6.3-AD1**
140	155,1	6,3	7,55	1,3	5	5,33	▲	**S9B-140x155.1x6.3**	**S9B-140x155.1x6.3-AD1**
	155,5	6,3	7,75	0,9	5	5,33	•	**S9B-140x155.5x6.3**	**S9B-140x155.5x6.3-AD1**
160	175,1	6,3	7,55	1,3	5	5,33	▲	**S9B-160x175.1x6.3**	**S9B-160x175.1x6.3-AD1**
	175,5	6,3	7,75	0,9	5	5,33	•	**S9B-160x175.5x6.3**	**S9B-160x175.5x6.3-AD1**
	181	8,1	10,5	0,9	5	7,0	•	**S9B-160x181x8.1**	**S9B-160x181x8.1-AD1**
180	195,1	6,3	7,55	1,3	5	5,33	▲	**S9B-180x195.1x6.3**	**S9B-180x195.1x6.3-AD1**
	195,5	6,3	7,75	0,9	5	5,33	•	**S9B-180x195.5x6.3**	**S9B-180x195.5x6.3-AD1**
	201	8,1	10,5	0,9	5	7,0	•	**S9B-180x201x8.1**	**S9B-180x201x8.1-AD1**
200	215,1	6,3	7,55	1,3	5	5,33		**S9B-200x215.1x6.3**	**S9B-200x215.1x6.3-AD1**
	221	8,1	10,5	0,9	5	7,0	•	**S9B-200x221x8.1**	**S9B-200x221x8.1-AD1**
220	241	8,1	10,5	0,9	6	7,0	•	**S9B-220x241x8.1**	**S9B-220x241x8.1-AD1**
240	260,5	8,1	10,25	1,8	6	7,0		**S9B-240x260.5x8.1**	**S9B-240x260.5x8.1-AD1**
250	271	8,1	10,5	0,9	6	7,0	•	**S9B-250x271x8.1**	**S9B-250x271x8.1-AD1**
280	304,5	8,1	12,25	0,9	6	7,0	•	**S9B-280x304.5x8.1**	**S9B-280x304.5x8.1-AD1**
320	344,5	8,1	12,25	0,9	6	7,0	•	**S9B-320x344.5x8.1**	**S9B-320x344.5x8.1-AD1**
360	384,5	8,1	12,25	0,9	6	7,0	•	**S9B-360x384.5x8.1**	**S9B-360x384.5x8.1-AD1**

Other sizes are available on request

[1)] Tolerance is determined by the rod seal
• Dimensions in accordance with ISO 7425-2
▲ Dimensions in accordance with ISO 3320

3.9 S9B profile buffer seals, inch sizes

d **1 – 10** in.



Maximum extrusion gap e with X-ECOPUR slide ring

Radial depth S	Series	e_{max} at 80 °C *(175 °F)* for pressures			
		2 300 psi	3 600 psi	5 800 psi	8 700 psi
in.	–	in.			
0.149	S9B1	0.016	0.012	0.008	0.004
0.212	S9B2	0.02	0.016	0.012	0.008
0.308	S9B3	0.02	0.016	0.012	0.008
0.415	S9B4	0.028	0.02	0.016	0.008

For additional information → **page 34**

Maximum extrusion gap e with 741 slide ring

Radial depth S	Series	e_{max} at 80 °C *(175 °F)* for pressures		
		2 300 psi	3 600 psi	5 800 psi
in.	–	in.		
0.149	S9B1	0.014	0.01	0.006
0.212	S9B2	0.016	0.012	0.008
0.308	S9B3	0.02	0.014	0.01
0.415	S9B4	0.024	0.018	0.014

For additional information → **page 34**

Dimensions								Designations	
								With slide ring made of	
d	Tolerance	D	Tolerance	L +0.01	S	C min.	CS nom.	X-ECOPUR	741
in.								–	
1	–0.002	1.298	+0.003	0.126	0.149	0.14	0.103	**S9B1-1000**	**S9B1-1000-AD1**
	–0.003	1.424	+0.004	0.166	0.212	0.18	0.139	**S9B2-1000**	**S9B2-1000-AD1**
1.125	–0.002	1.423	+0.003	0.126	0.149	0.14	0.103	**S9B1-1125**	**S9B1-1125-AD1**
1.25	–0.002	1.548	+0.003	0.126	0.149	0.14	0.103	**S9B1-1250**	**S9B1-1250-AD1**
	–0.003	1.674	+0.004	0.166	0.212	0.18	0.139	**S9B2-1250**	**S9B2-1250-AD1**
1.375	–0.003	1.799	+0.004	0.166	0.212	0.18	0.139	**S9B2-1375**	**S9B2-1375-AD1**
1.5	–0.002	1.798	+0.003	0.126	0.149	0.14	0.103	**S9B1-1500**	**S9B1-1500-AD1**
	–0.003	1.924	+0.004	0.166	0.212	0.18	0.139	**S9B2-1500**	**S9B2-1500-AD1**
	–0.004	2.116	+0.005	0.247	0.308	0.2	0.21	**S9B3-1500**	**S9B3-1500-AD1**
1.75	–0.002	2.048	+0.003	0.126	0.149	0.14	0.103	**S9B1-1750**	**S9B1-1750-AD1**
	–0.003	2.174	+0.004	0.166	0.212	0.18	0.139	**S9B2-1750**	**S9B2-1750-AD1**
	–0.004	2.366	+0.005	0.247	0.308	0.2	0.21	**S9B3-1750**	**S9B3-1750-AD1**
1.875	–0.003	2.299	+0.004	0.166	0.212	0.18	0.139	**S9B2-1875**	**S9B2-1875-AD1**
2	–0.003	2.424	+0.004	0.166	0.212	0.18	0.139	**S9B2-2000**	**S9B2-2000-AD1**
	–0.004	2.616	+0.005	0.247	0.308	0.2	0.21	**S9B3-2000**	**S9B3-2000-AD1**
2.25	–0.003	2.674	+0.004	0.166	0.212	0.18	0.139	**S9B2-2250**	**S9B2-2250-AD1**
	–0.004	2.866	+0.005	0.247	0.308	0.2	0.21	**S9B3-2250**	**S9B3-2250-AD1**
2.5	–0.003	2.924	+0.004	0.166	0.212	0.18	0.139	**S9B2-2500**	**S9B2-2500-AD1**
	–0.004	3.116	+0.005	0.247	0.308	0.2	0.21	**S9B3-2500**	**S9B3-2500-AD1**
2.625	–0.004	3.241	+0.005	0.247	0.308	0.2	0.21	**S9B3-2625**	**S9B3-2625-AD1**
	–0.003	3.049	+0.004	0.166	0.212	0.18	0.139	**S9B2-2750**	**S9B2-2750-AD1**
	–0.004	3.241	+0.005	0.247	0.308	0.2	0.21	**S9B3-2750**	**S9B3-2750-AD1**

Dimensions								Designations With slide ring made of X-ECOPUR 741	
d	Tolerance	D	Tolerance	L +0.01	S	C min.	CS nom.		
in.								–	
3	–0.003	3.424	+0.004	0.166	0.212	0.18	0.139	**S9B2-3000**	**S9B2-3000-AD1**
	–0.004	3.616	+0.005	0.247	0.308	0.2	0.21	**S9B3-3000**	**S9B3-3000-AD1**
3.25	–0.004	3.866	+0.005	0.247	0.308	0.2	0.21	**S9B3-3250**	**S9B3-3250-AD1**
3.5	–0.004	4.116	+0.005	0.247	0.308	0.2	0.21	**S9B3-3500**	**S9B3-3500-AD1**
3.75	–0.004	4.366	+0.005	0.247	0.308	0.2	0.21	**S9B3-3750**	**S9B3-3750-AD1**
4	–0.003	4.424	+0.004	0.166	0.212	0.18	0.139	**S9B2-4000**	**S9B2-4000-AD1**
	–0.004	4.616	+0.005	0.247	0.308	0.2	0.21	**S9B3-4000**	**S9B3-4000-AD1**
	–0.005	4.83	+0.006	0.32	0.415	0.25	0.275	**S9B4-4000**	**S9B4-4000-AD1**
4.25	–0.004	4.866	+0.005	0.247	0.308	0.2	0.21	**S9B3-4250**	**S9B3-4250-AD1**
	–0.005	5.08	+0.006	0.32	0.415	0.25	0.275	**S9B4-4250**	**S9B4-4250-AD1**
4.5	–0.004	5.116	+0.005	0.247	0.308	0.2	0.21	**S9B3-4500**	**S9B3-4500-AD1**
	–0.005	5.33	+0.006	0.32	0.415	0.25	0.275	**S9B4-4500**	**S9B4-4500-AD1**
4.75	–0.004	5.366	+0.005	0.247	0.308	0.2	0.21	**S9B3-4750**	**S9B3-4750-AD1**
	–0.005	5.58	+0.006	0.32	0.415	0.25	0.275	**S9B4-4750**	**S9B4-4750-AD1**
5	–0.004	5.616	+0.005	0.247	0.308	0.2	0.21	**S9B3-5000**	**S9B3-5000-AD1**
	–0.005	5.83	+0.006	0.32	0.415	0.25	0.275	**S9B4-5000**	**S9B4-5000-AD1**
5.25	–0.004	5.866	+0.005	0.247	0.308	0.2	0.21	**S9B3-5250**	**S9B3-5250-AD1**
	–0.005	6.08	+0.006	0.32	0.415	0.25	0.275	**S9B4-5250**	**S9B4-5250-AD1**
5.5	–0.004	6.116	+0.005	0.247	0.308	0.2	0.21	**S9B3-5500**	**S9B3-5500-AD1**
	–0.005	6.33	+0.006	0.32	0.415	0.25	0.275	**S9B4-5500**	**S9B4-5500-AD1**
5.75	–0.004	6.366	+0.005	0.247	0.308	0.2	0.21	**S9B3-5750**	**S9B3-5750-AD1**
	–0.005	6.58	+0.006	0.32	0.415	0.25	0.275	**S9B4-5750**	**S9B4-5750-AD1**
6	–0.004	6.616	+0.005	0.247	0.308	0.2	0.21	**S9B3-6000**	**S9B3-6000-AD1**
	–0.005	6.83	+0.006	0.32	0.415	0.25	0.275	**S9B4-6000**	**S9B4-6000-AD1**
6.25	–0.004	6.866	+0.005	0.247	0.308	0.2	0.21	**S9B3-6250**	**S9B3-6250-AD1**
	–0.005	7.08	+0.006	0.32	0.415	0.25	0.275	**S9B4-6250**	**S9B4-6250-AD1**
6.5	–0.004	7.116	+0.005	0.247	0.308	0.2	0.21	**S9B3-6500**	**S9B3-6500-AD1**
	–0.005	7.33	+0.006	0.32	0.415	0.25	0.275	**S9B4-6500**	**S9B4-6500-AD1**
6.75	–0.004	7.366	+0.005	0.247	0.308	0.2	0.21	**S9B3-6750**	**S9B3-6750-AD1**
	–0.005	7.58	+0.006	0.32	0.415	0.25	0.275	**S9B4-6750**	**S9B4-6750-AD1**
7	–0.004	7.616	+0.005	0.247	0.308	0.2	0.21	**S9B3-7000**	**S9B3-7000-AD1**
	–0.005	7.83	+0.006	0.32	0.415	0.25	0.275	**S9B4-7000**	**S9B4-7000-AD1**
7.25	–0.004	7.866	+0.005	0.247	0.308	0.2	0.21	**S9B3-7250**	**S9B3-7250-AD1**
	–0.005	8.08	+0.006	0.32	0.415	0.25	0.275	**S9B4-7250**	**S9B4-7250-AD1**
7.5	–0.004	8.116	+0.005	0.247	0.308	0.2	0.21	**S9B3-7500**	**S9B3-7500-AD1**
	–0.005	8.33	+0.006	0.32	0.415	0.25	0.275	**S9B4-7500**	**S9B4-7500-AD1**
7.75	–0.004	8.366	+0.005	0.247	0.308	0.2	0.21	**S9B3-7750**	**S9B3-7750-AD1**
	–0.005	8.58	+0.006	0.32	0.415	0.25	0.275	**S9B4-7750**	**S9B4-7750-AD1**
8	–0.004	8.616	+0.005	0.247	0.308	0.2	0.21	**S9B3-8000**	**S9B3-8000-AD1**
	–0.005	8.83	+0.006	0.32	0.415	0.25	0.275	**S9B4-8000**	**S9B4-8000-AD1**
8.5	–0.005	9.33	+0.006	0.32	0.415	0.25	0.275	**S9B4-8500**	**S9B4-8500-AD1**
9	–0.005	9.83	+0.006	0.32	0.415	0.25	0.275	**S9B4-9000**	**S9B4-9000-AD1**
9.5	–0.005	10.33	+0.006	0.32	0.415	0.25	0.275	**S9B4-9500**	**S9B4-9500-AD1**
10	–0.005	10.83	+0.006	0.32	0.415	0.25	0.275	**S9B4-10000**	**S9B4-10000-AD1**

Other sizes are available on request

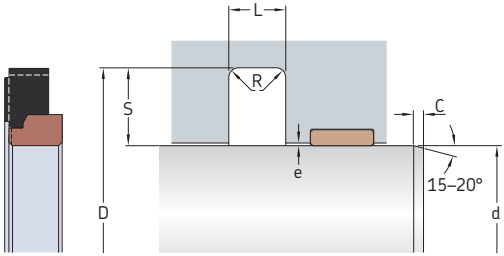
RSB profile data

Material codes	Slide ring: 741 Energizer: A-8501 For additional information → **page 26**
Pressure	Up to 400 bar *(5 800 psi)*
Speed	Up to 1 m/s *(3.2 ft/s)*
Temperature range	 Extreme low temperature range: may be intermittently exposed (e.g. cold start-up) without seal damage, but seal performance may be compromised while in this range Temperatures below the recommended operating range: seal performance depends on system design (precision guiding arrangement recommended) **Recommended operating temperature range for this profile and material** Extreme high temperature range: only occasional short-term exposure (e.g. cylinder in curing oven of a powder coating process)
Counter-surface	→ **page 22**

Maximum values of application parameters (e.g. pressure, speed, temperature, e-gap) should not be applied continuously nor simultaneously.

3.10 RSB profile buffer seals, inch sizes

d **1.25 – 6** in.



Maximum extrusion gap e

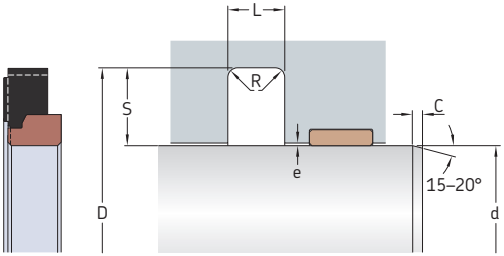
Radial depth S	Series	e_{max} at 80 °C (175 °F) for pressures 2 300 psi	3 600 psi	5 800 psi
in.	–	in.		
0.166 to 0.212	RSB2	0.014	0.01	0.008
0.247 to 0.308	RSB3	0.018	0.012	0.008
0.32 to 0.415	RSB4	0.02	0.014	0.01

For additional information → **page 34**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
1.25	–0.003	1.674	+0.004	0.166	0.212	0.022	0.25	**RSB2-1250-AD2**
1.5	–0.003	1.924	+0.004	0.166	0.212	0.022	0.25	**RSB2-1500-AD2**
	–0.004	2.116	+0.005	0.247	0.308	0.028	0.312	**RSB3-1500-AD2**
1.75	–0.003	2.174	+0.004	0.166	0.212	0.022	0.25	**RSB2-1750-AD2**
2	–0.004	2.616	+0.005	0.247	0.308	0.028	0.312	**RSB3-2000-AD2**
2.25	–0.003	2.674	+0.004	0.166	0.212	0.022	0.25	**RSB2-2250-AD2**
	–0.004	2.866	+0.005	0.247	0.308	0.028	0.312	**RSB3-2250-AD2**
2.375	–0.004	2.991	+0.005	0.247	0.308	0.028	0.312	**RSB3-2375-AD2**
2.5	–0.003	2.924	+0.004	0.166	0.212	0.022	0.25	**RSB2-2500-AD2**
	–0.004	3.116	+0.005	0.247	0.308	0.028	0.312	**RSB3-2500-AD2**
2.75	–0.004	3.366	+0.005	0.247	0.308	0.028	0.312	**RSB3-2750-AD2**
3	–0.004	3.616	+0.005	0.247	0.308	0.028	0.312	**RSB3-3000-AD2**
3.25	–0.004	3.866	+0.005	0.247	0.308	0.028	0.312	**RSB3-3250-AD2**
3.5	–0.004	4.116	+0.005	0.247	0.308	0.028	0.312	**RSB3-3500-AD2**
3.75	–0.004	4.366	+0.005	0.247	0.308	0.028	0.312	**RSB3-3750-AD2**
4	–0.004	4.616	+0.005	0.247	0.308	0.028	0.312	**RSB3-4000-AD2**
4.5	–0.004	5.116	+0.005	0.247	0.308	0.028	0.312	**RSB3-4500-AD2**
	–0.005	5.33	+0.006	0.32	0.415	0.035	0.312	**RSB4-4500-AD2**
5	–0.004	5.616	+0.005	0.247	0.308	0.028	0.312	**RSB3-5000-AD2**
	–0.005	5.83	+0.006	0.32	0.415	0.035	0.312	**RSB4-5000-AD2**
5.25	–0.004	5.866	+0.005	0.247	0.308	0.028	0.312	**RSB3-5250-AD2**
5.5	–0.004	6.116	+0.005	0.247	0.308	0.028	0.312	**RSB3-5500-AD2**
6	–0.004	6.616	+0.005	0.247	0.308	0.028	0.312	**RSB3-6000-AD2**
	–0.005	6.83	+0.006	0.32	0.415	0.035	0.312	**RSB4-6000-AD2**

3.10 RSB profile buffer seals, inch sizes

d **6.5 – 13** in.



Maximum extrusion gap e

Radial depth S	Series	e_{max} at 80 °C *(175 °F)* for pressures 2 300 psi	3 600 psi	5 800 psi
in.	–	in.		
0.166 to 0.212	RSB2	0.014	0.01	0.008
0.247 to 0.308	RSB3	0.018	0.012	0.008
0.32 to 0.415	RSB4	0.02	0.014	0.01

For additional information → **page 34**

Dimensions								Designation
d	Tolerance	D	Tolerance	L +0.01	S	R max.	C min.	
in.								–
6.5	–0.005	7.33	+0.006	0.32	0.415	0.035	0.312	**RSB4-6500-AD2**
7	–0.004	7.616	+0.005	0.247	0.308	0.028	0.312	**RSB3-7000-AD2**
	–0.005	7.83	+0.006	0.32	0.415	0.035	0.312	**RSB4-7000-AD2**
8	–0.004	8.616	+0.005	0.247	0.308	0.028	0.312	**RSB3-8000-AD2**
	–0.005	8.83	+0.006	0.32	0.415	0.035	0.312	**RSB4-8000-AD2**
8.5	–0.004	9.116	+0.005	0.247	0.308	0.028	0.312	**RSB3-8500-AD2**
9	–0.005	9.83	+0.006	0.32	0.415	0.035	0.312	**RSB4-9000-AD2**
10	–0.005	10.83	+0.006	0.32	0.415	0.035	0.312	**RSB4-10000-AD2**
10.5	–0.004	11.116	+0.005	0.247	0.308	0.028	0.312	**RSB3-10500-AD2**
11	–0.005	11.83	+0.006	0.32	0.415	0.035	0.312	**RSB4-11000-AD2**
13	–0.004	13.616	+0.005	0.247	0.308	0.028	0.312	**RSB3-13000-AD2**
	–0.005	13.83	+0.006	0.32	0.415	0.035	0.312	**RSB4-13000-AD2**

Other sizes are available on request

More rod and buffer seals

The rod and buffer seals listed in this catalogue represent the preferred profiles in common sizes. SKF supplies many additional sizes and profiles and provides customized solutions for the toughest application conditions. The following profiles are also manufactured in series production. For additional information about these profiles or if the application requires a solution not provided in this catalogue, contact SKF.

Rod locking T-seals

LTR profiles (→ **fig. 15**) have a T-shaped rubber sealing ring supported by patented locking anti-extrusion rings on both sides. Therefore, they can be used as double-acting rod seals for special applications. For example, in tandem cylinders that require a rod seal to take pressure from both sides. For additional information about materials and sizes, contact SKF.

TEFLATHANE seals

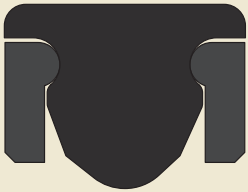
These rod seals of various designs and material combinations incorporate an anti-extrusion ring that is bonded into the body. They are suitable for high temperature and/or short-stroke applications. For example, U-cup seals made of special high-temperature polyurethane bonded to a PTFE anti-extrusion ring in rock hammer applications (→ **fig. 16**). For additional information about materials and sizes, contact SKF.

Chevron V-packing sets

These moulded or machined chevron sets (→ **fig. 17**) are available in a wide variety of materials and designs. They typically consist of a base ring, one or several chevron rings, and a header ring. These rings can be made of different materials to achieve their own specific functional benefits. For additional information about designs, materials and sizes, contact SKF.

Fig. 15

Rod locking T-seal



LTR

Fig. 16

TEFLATHANE seal example

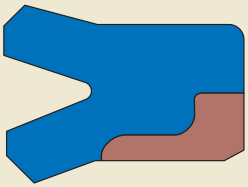
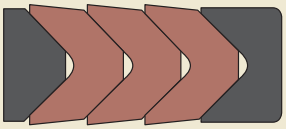


Fig. 17

Chevron set example

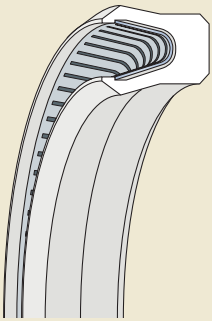


SPECTRASEAL

SPECTRASEAL is a PTFE seal that can be used as a single-acting rod seal (→ **fig. 18**). The metal spring energizer adds radial load to the seal lip contact areas. SPECTRASEAL is intended for extreme condition applications including high temperature or aggressive media. For additional information, contact SKF.

Fig. 18

SPECTRASEAL

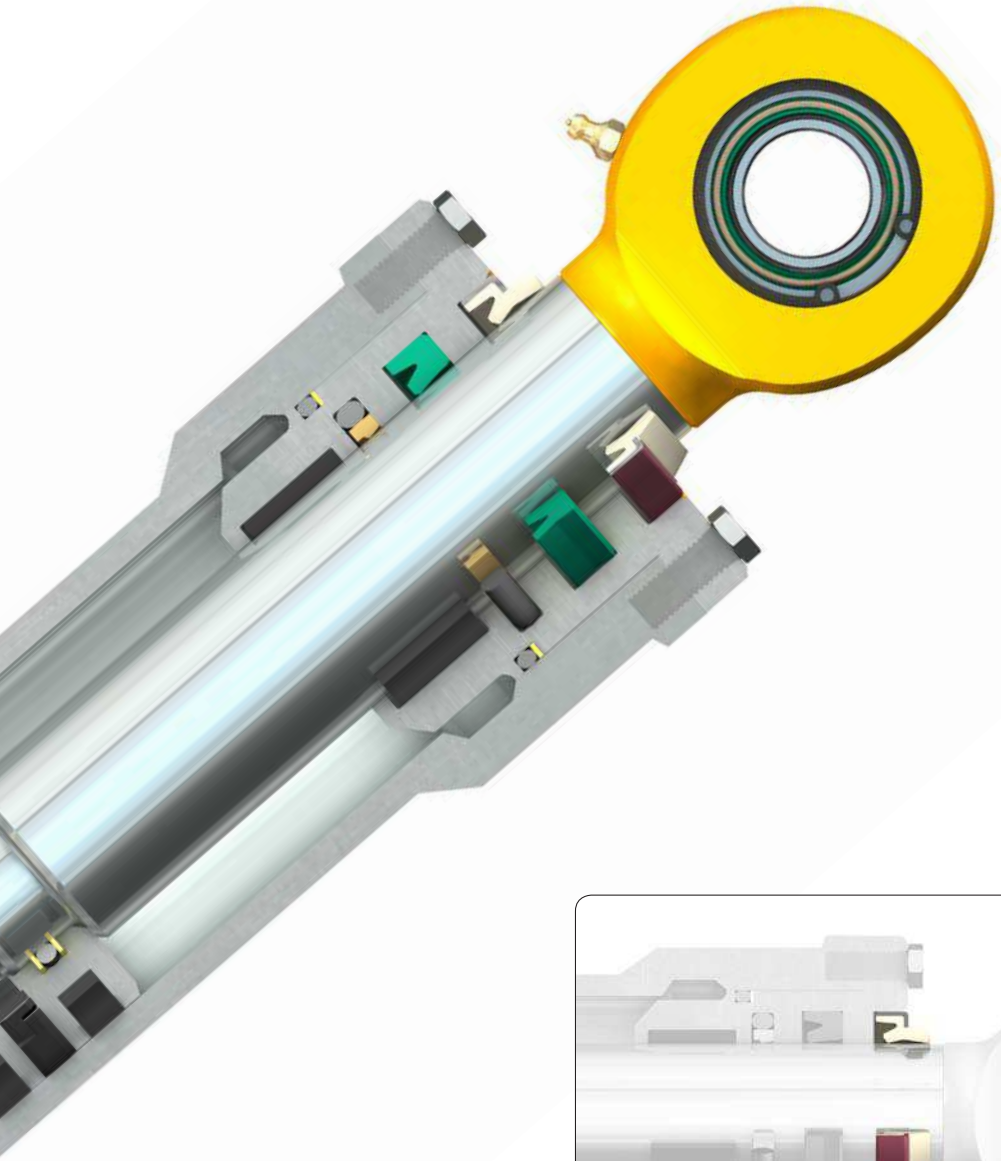


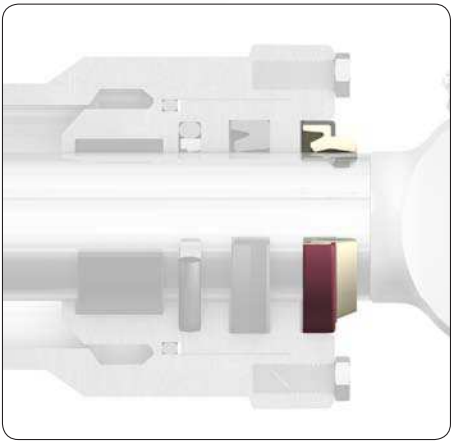
Customized machined seal profiles

SKF can manufacture a wide variety of rod seal profiles with different materials and sizes with its industry-leading SKF SEAL JET production system (→ **fig. 19**). For additional information about customized machined profiles, refer to publication *Customized machined seals – Product range* or contact SKF.

Fig. 19

SKF SEAL JET profile examples





Wiper seals

Profile overview

Profile	Description	Additional information → page	Profile data → page
PA 	Polyurethane press-in wiper seal; steel retaining ring; single-lip design; lip protrudes from head; small radial cross section	**211**	**216** (metric)
MCW 	Polyurethane press-in wiper seal; steel retaining ring; effective single lip design that sits flush with head; suitable for heavy duty applications	**216**	**220** (metric and inch)
PAD 	Polyurethane press-in wiper seal; steel retaining ring; double-lip design improves rod sealing system performance	**212**	**226** (metric)
PADV 	PAD design with a vent hole in the inside-facing lip	**212**	**226** (metric)
DTW 	Polyurethane snap-in wiper seal; single-lip design; static seal lips on the outside surface and outside face; notches on inside edge of heel	**214**	**228** (metric and inch)
DX 	Polyurethane snap-in wiper seal with nitrile rubber O-ring; single-lip design; patented profile for heavy duty applications; notches on inside edge of heel	**214**	**236** (inch)
HW 	Polyurethane snap-in wiper seal; double-lip design improves rod sealing system performance	**215**	**240** (metric and inch)

Basics

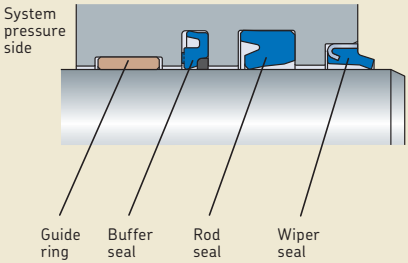
Hydraulic cylinders operate in a variety of applications and environmental conditions, including exposure to dust, debris or outside weather conditions. To prevent these contaminants from entering the cylinder assembly and hydraulic system, wiper seals (also known as scrapers, excluders or dust seals) are fitted on the external side of the cylinder head (→ **fig. 1**).

Wiper seals maintain sealing contact to the piston rod when the equipment is stationary (static, no reciprocating motion of rod) and in use (dynamic, reciprocating rod), whereas the tolerance for the rod diameter d is determined by the rod seal. Without a wiper seal, the retracting piston rod could transport contaminants into the cylinder.

The outside static sealing of the wiper seal within the housing is also important to avoid moisture or particles from entering around the outside of the wiper seal.

Fig. 1

Wiper seal in typical rod sealing system for medium duty hydraulic applications



Installation

Housings for wiper seals are typically designed either as open or stepped housings (→ **fig. 2**).

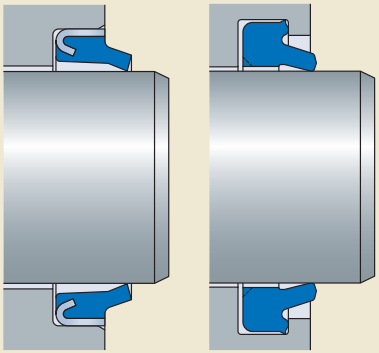
Wipers for open housings are bonded to a steel retaining ring and pressed into the housing. Therefore, they are called press-in wiper seals.

Wiper seals for stepped housings do not have metal components and can usually be deformed by hand for installation. They "snap" into the groove and, therefore, are called snap-in wiper seal.

For additional information about installation, refer to *Installing wiper seals* (→ **page 43**).

More information

Fig. 2



Open housing (press-in wiper seal)

Stepped housing (snap-in wiper seal)

Materials

Polyurethane (TPU) is the most common material for wiper seals in modern hydraulic seal applications. SKF wiper seals made of TPU are developed for wear resistance and flexibility as well as with the right physical properties to effectively remove contaminants. SKF can supply wiper seals in a wide variety of materials, including rubber elastomers and PTFE (→ *More wiper seals*, **page 246**).

For additional information, refer to *Materials* (→ **page 26**).

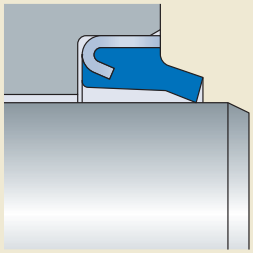
Press-in wiper seals

As their name implies, press-in wiper seals are pressed into the housing in the cylinder head. These seals are designed with a steel retaining ring that provides a robust static sealing on the outside surface. The polyurethane (TPU) wiper lip is bonded to the drawn sheet steel retaining ring and maintains a sealing force by tension as well as cantilever action (flexing) to the seal lips. This provides a robust preload of the wiper lips even under minor radial misalignments between the rod and head. Press-in wiper seals are available with a single-lip or double-lip design.

PA profiles

PA profiles (→ **fig. 3**) have an effective single wiping lip that protrudes from the head. This design allows small radial cross sections and reduces the risk of contaminant adherence on the wiper lip. PA profiles are available in metric sizes.

Fig. 3



PA

MCW profiles

MCW profiles (→ **fig. 4**) have an effective single wiping lip that does not protrude from the head. This allows compact arrangement when the cylinder is retracted. These profiles are available in metric and inch sizes.

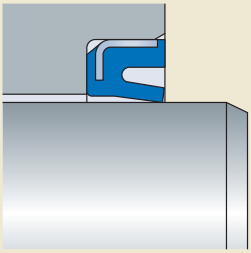
PAD and PADV profiles

PAD profiles (→ **fig. 5**) have a double-lip design with an internal-facing wiper lip that regulates the lubrication film on the rod. The internal lip wipes excess fluid film from the rod on extending stroke and allows this excess fluid to return under the rod seal on the retracting stroke. Double-acting wipers, therefore, improve the performance and extend the service life of rod sealing systems.

However, excess system pressure acting on the internal-facing lip, such as fluid passing a damaged rod seal, could overcome the press force between the housing and the steel retaining ring and push the wiper seal out of the housing. Therefore, SKF recommends using double-acting wiper seals in combination with U-cup rod seals with a single-lip design, such as S1S profile (→ *Rod seals*, **page 116**), to ensure pressurized fluid can return to the hydraulic system. A snap ring may also be required to retain the wiper seal in the housing (→ **fig. 6**) in case of pressure build up.

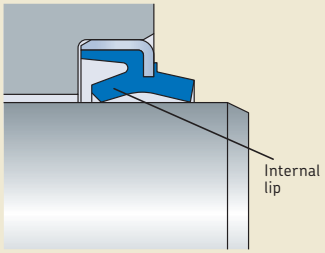
PAD profiles (→ **fig. 7**) are also available with a vent in the internal lip (designation PADV). They do not need extra snap rings in most applications. The vent prevents pressure build-up on the internal-facing lip. PAD and PADV profiles are available in the same metric sizes.

Fig. 4



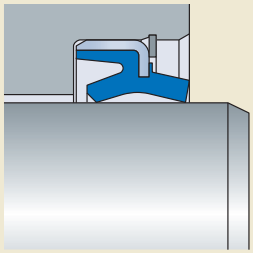
MCW

Fig. 5



PAD

Fig. 6



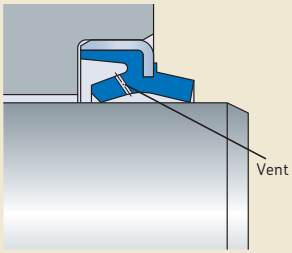
PAD with snap ring

Snap-in wiper seals

Snap-in wiper seals are designed without any metal component and are easy to install without any special equipment.

A common problem with snap-in wiper seals is that they become loose in the housing resulting in poor static sealing on the outside surface and reduced preload on the dynamic wiper seal lip (→ **fig. 8**). Furthermore, if the inside edge of the wiper seal could contact the rod, it may become an unintended sealing lip (→ **fig. 8**) and could trap pressure between the rod and wiper seal. Therefore, SKF snap-in wiper seals have special sealing and venting features to help ensure proper operation.

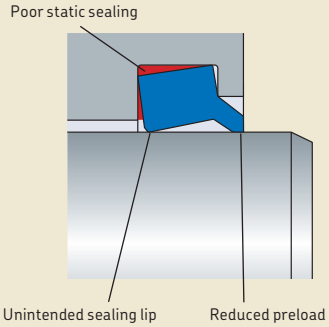
Fig. 7



PADV

Fig. 8

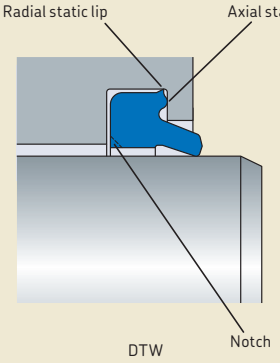
Snap-in wiper seal loose in the housing



DTW profiles

DTW profiles (→ **fig. 9**) have a single-lip design and a radial static seal lip on the outside surface that maintains a positive sealing contact. An axial static seal lip on the external side face keeps the wiper tight in the housing and also serves as an additional static seal. During operation the inside edge of the wiper seal could contact the rod, for example during rod extension. In this case and in the event the rod seal has become damaged or exceeded its service life, notches on the inside edge prevent the wiper seal trapping pressure or being pushed out by pressure. These profiles are available in metric and inch sizes.

Fig. 9



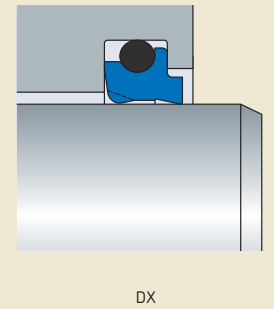
DX profiles

DX wiper seals (→ **fig. 10**) have a patented profile with a single external lip design and vented inside edge. These profiles incorporate a rubber O-ring that maintains a robust static sealing contact in the housing. The O-ring also serves as an energizer to provide consistent long term preload on the dynamic lip. In case of radial misalignment, the entire TPU wiper ring follows these radial movements ("floating" design) as the relatively soft and flexible rubber O-ring energizer deforms to compensate.

When the wiper lip encounters resistance from contaminants adhered to the retracting rod (e.g. tree sap or frozen rain), the profile reacts by twisting to increase the preload on the dynamic wiper lip.

Therefore, DX profiles include the functionality of press-in wiper seals as well as the convenience of snap-in wiper seals. These profiles are available in inch sizes.

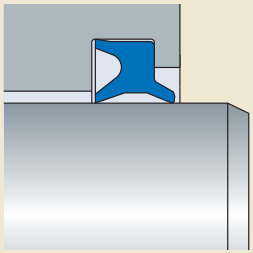
Fig. 10



HW profiles

HW profiles (→ **fig. 11**) have a double-lip design with an internal-facing wiper lip that regulates the lubrication film on the rod. The internal lip wipes any excess fluid film from the rod on the extending stroke and allow this excess fluid to return under the rod seal on the retracting stroke. Double-acting wipers, therefore, improve the performance and extend the service life of rod sealing systems. SKF recommends using double-acting wiper seals in combination with U-cup rod seals with a single-lip design, such as S1S profile (→ *Rod seals*, **page 116**), to ensure pressurized fluid can return to the hydraulic system.

Fig. 11



HW

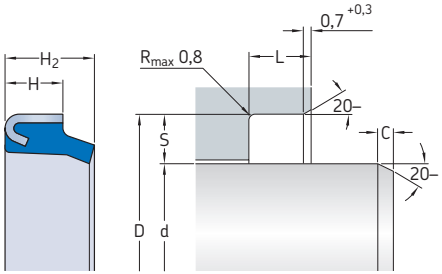
PA profile data

Material code	W93 For additional information → **page 26**
Speed	Up to 1 m/s *(3.2 ft/s)*
Temperature range	–40 to +110 °C *(–40 to +230 °F)*
Dimension standards	Some sizes fit seal housings in accordance with ISO 6195-B.
Counter-surface	→ **page 22**

Maximum values of application parameters (e.g. speed, temperature) should not be applied continuously nor simultaneously.

4.1 PA profile wiper seals, metric sizes

d **12 – 65** mm

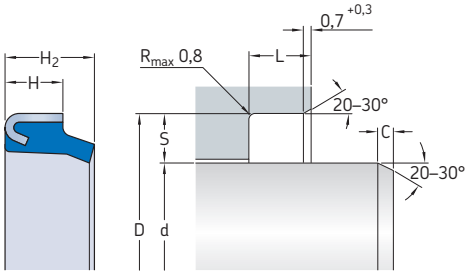


Dimensions							Designation
d[1]	D H8	L +0,5	S	C min.	H	H_2 +1	
mm							–
12	20	4,5	4	3	4	6	**PA 12x20x4x6**
20	30	7,5	5	4	7	10	• **PA 20x30x7x10**
25	35	7,5	5	4	7	10	• **PA 25x35x7x10**
28	38	7,5	5	4	7	10	• **PA 28x38x7x10**
30	40	7,5	5	4	7	10	**PA 30x40x7x10**
32	42	7,5	5	4	7	10	• **PA 32x42x7x10**
	45	7,5	6,5	5	7	10	**PA 32x45x7x10**
35	45	7,5	5	4	7	10	**PA 35x45x7x10**
36	45	7,5	4,5	4	7	10	**PA 36x45x7x10**
	46	7,5	5	4	7	10	• **PA 36x46x7x10**
40	50	7,5	5	4	7	10	• **PA 40x50x7x10**
45	55	7,5	5	4	7	10	• **PA 45x55x7x10**
	60	7,5	7,5	6	7	10	**PA 45x60x7x10**
50	60	7,5	5	4	7	10	• **PA 50x60x7x10**
	65	7,5	7,5	6	7	10	**PA 50x65x7x10**
55	65	7,5	5	4	7	10	**PA 55x65x7x10**
	70	7,5	7,5	6	7	10	**PA 55x70x7x10**
56	66	7,5	5	4	7	10	• **PA 56x66x7x10**
60	70	7,5	5	4	7	10	**PA 60x70x7x10**
63	73	7,5	5	4	7	10	• **PA 63x73x7x10**
	75	7,5	6	4	7	10	**PA 63x75x7x10**
	78	7,5	7,5	6	7	10	**PA 63x78x7x10**
65	75	7,5	5	4	7	10	**PA 65x75x7x10**

• Seal housing dimensions in accordance with ISO 6195-B

[1] Tolerance is determined by the rod seal

4.1 PA profile wiper seals, metric sizes
d **70 – 180** mm



Dimensions							Designation
d[1]	D H8	L +0,5	S	C min.	H	H_2 +1	
mm							–
70	80	7,5	5	4	7	10	• **PA 70x80x7x10**
75	85	7,5	5	4	7	10	**PA 75x85x7x10**
80	90	7,5	5	4	7	10	• **PA 80x90x7x10**
85	95	7,5	5	4	7	10	**PA 85x95x7x10**
90	100	7,5	5	4	7	10	• **PA 90x100x7x10**
100	110	7,5	5	4	7	10	**PA 100x110x7x10**
105	115	7,5	5	4	7	10	**PA 105x115x7x10**
110	120	7,5	5	4	7	10	**PA 110x120x7x10**
115	125	7,5	5	4	7	10	**PA 115x125x7x10**
120	130	7,5	5	4	7	10	**PA 120x130x7x10**
125	140	9,5	7,5	7	9	12	• **PA 125x140x9x12**
140	155	9,5	7,5	7	9	12	• **PA 140x155x9x12**
180	195	9,5	7,5	7	9	12	• **PA 180x195x9x12**

Other sizes are available on request

• Seal housing dimensions in accordance with ISO 6195-B
[1] Tolerance is determined by the rod seal

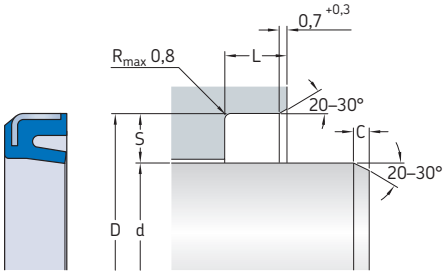
MCW profile data

Material codes	Metric sizes → U-1029 Inch sizes → U-1023 For additional information → **page 26**
Speed	Up to 1,5 m/s *(4.9 ft/s)*
Temperature range	–40 to +120 °C *(–40 to +250 °F)*
Dimension standards	Some metric sizes fit seal housings in accordance with ISO 6195-B.
Counter-surface	→ **page 22**

Maximum values of application parameters (e.g. speed, temperature) should not be applied continuously nor simultaneously.

4.2 MCW profile wiper seals, metric sizes

d **20 – 65** mm

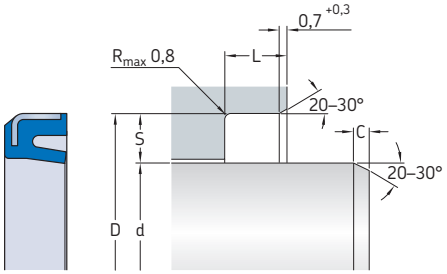


Dimensions					Designation
d[1]	D H8	L +0,5	S	C min.	
mm					–
20	30	7	5	5	• **MCW-20x30x7-E6Q**
25	35	7	5	5	• **MCW-25x35x7-E6Q**
30	40	7	5	5	• **MCW-30x40x7-E6Q**
32	42	7	5	5	• **MCW-32x42x7-E6Q**
35	50	9	7,5	7	**MCW-35x50x9-E6Q**
36	46	7	5	5	• **MCW-36x46x7-E6Q**
40	50	7	5	5	• **MCW-40x50x7-E6Q**
	55	9	7,5	7	**MCW-40x55x9-E6Q**
45	55	5	5	5	**MCW-45x55x5-E6Q**
	55	7	5	5	• **MCW-45x55x7-E6Q**
	60	9	7,5	7	**MCW-45x60x9-E6Q**
50	60	5	5	5	**MCW-50x60x5-E6Q**
	60	7	5	5	• **MCW-50x60x7-E6Q**
	65	9	7,5	7	**MCW-50x65x9-E6Q**
55	65	5	5	5	**MCW-55x65x5-E6Q**
56	66	7	5	5	• **MCW-56x66x7-E6Q**
	68	7	6	5	**MCW-56x68x7-E6Q**
	71	9	7,5	7	**MCW-56x71x9-E6Q**
60	70	5	5	5	**MCW-60x70x5-E6Q**
	74	8	7	7	**MCW-60x74x8-E6Q**
63	78	9	7,5	7	**MCW-63x78x9-E6Q**
65	75	5	5	5	**MCW-65x75x5-E6Q**
	79	8	7	7	**MCW-65x79x8-E6Q**

• Seal housing dimensions in accordance with ISO 6195-B

[1] Tolerance is determined by the rod seal

4.2 MCW profile wiper seals, metric sizes
d **70 – 130** mm



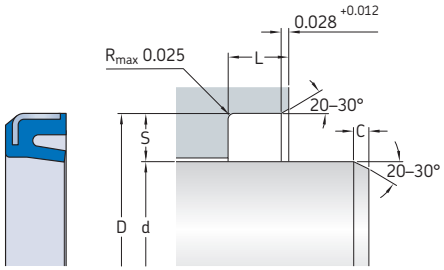
Dimensions						Designation
d[1]	D H8	L +0,5	S	C min.		
mm						–
70	80	5	5	5		**MCW-70x80x5-E6Q**
	80	7	5	5	•	**MCW-70x80x7-E6Q**
	84	8	7	7		**MCW-70x84x8-E6Q**
	85	7	7,5	7		**MCW-70x85x7-E6Q**
75	89	8	7	7		**MCW-75x89x8-E6Q**
	90	7,5	7,5	7		**MCW-75x90x7.5-E6Q**
80	90	7	5	5	•	**MCW-80x90x7-E6Q**
	94	8	7	7		**MCW-80x94x8-E6Q**
	100	7	10	7,5		**MCW-80x100x7-E6Q**
	100	10	10	7,5		**MCW-80x100x10-E6Q**
85	99	8	7	7		**MCW-85x99x8-E6Q**
90	104	8	7	7		**MCW-90x104x8-E6Q**
	105	7	7,5	7		**MCW-90x105x7-E6Q**
	106	8	8	7		**MCW-90x106x8-E6Q**
	110	7	10	7,5		**MCW-90x110x7-E6Q**
95	109	8	7	7		**MCW-95x109x8-E6Q**
100	110	7	5	5		**MCW-100x110x7-E6Q**
	114	8	7	7		**MCW-100x114x8-E6Q**
	116	8	8	7		**MCW-100x116x8-E6Q**
110	130	8	10	7,5		**MCW-110x130x8-E6Q**
	130	10	10	7,5		**MCW-110x130x10-E6Q**
120	136	9	8	7		**MCW-120x136x9-E6Q**
125	140	9	7,5	7		**MCW-125x140x9-E6Q**
130	150	10	10	7,5		**MCW-130x150x10-E6Q**

Other sizes are available on request

• Seal housing dimensions in accordance with ISO 6195-B
[1] Tolerance is determined by the rod seal

4.2 MCW profile wiper seals, inch sizes

d **0.5 – 2.125** in.

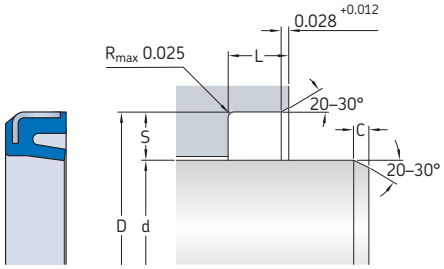


Dimensions					Designation
d[1]	D ±0.001	L +0.015	S	C min.	
in.					–
0.5	1	0.25	0.25	0.312	**MCW-500-H9B**
0.625	1.125	0.312	0.25	0.312	**MCW-625-H9B**
0.75	1.25	0.312	0.25	0.312	**MCW-750-H9B**
0.875	1.375	0.312	0.25	0.312	**MCW-875-H9B**
1	1.5	0.312	0.25	0.312	**MCW-1000-H9B**
1.125	1.625	0.312	0.25	0.312	**MCW-1125-H9B**
1.187	1.623	0.218	0.25	0.312	**MCW218-1187-250-H9B**
1.25	1.75	0.312	0.25	0.312	**MCW-1250-H9B**
1.375	1.875	0.312	0.25	0.312	**MCW-1375-H9B**
1.5	2	0.312	0.25	0.312	**MCW-1500-H9B**
	2.125	0.312	0.312	0.312	**MCW312-1500-312-H9B**
1.562	1.875	0.156	0.375	0.312	**MCW156-1562-375-H9B**
1.625	2.125	0.312	0.25	0.312	**MCW-1625-H9B**
1.75	2.25	0.312	0.25	0.312	**MCW-1750-H9B**
	2.5	0.375	0.375	0.312	**MCW375-1750-375-H9B**
1.875	2.375	0.312	0.25	0.312	**MCW-1875-H9B**
2	2.5	0.312	0.25	0.312	**MCW-2000-H9B**
	2.75	0.375	0.375	0.312	**MCW375-2000-375-H9B**
	2.875	0.438	0.25	0.312	**MCW438-2000-250-H9B**
2.125	2.625	0.312	0.25	0.312	**MCW-2125-H9B**
	2.875	0.375	0.375	0.312	**MCW375-2125-375-H9B**

[1] Tolerance is determined by the rod seal

4.2 MCW profile wiper seals, inch sizes

d **2.25 – 8.5** in.



Dimensions					Designation
d[1]	D ±0.001	L +0.015	S	C min.	
in.					–
2.25	2.75	0.312	0.25	0.312	**MCW-2250-H9B**
	3	0.375	0.25	0.312	**MCW375-2250-250-H9B**
2.375	2.875	0.312	0.25	0.312	**MCW-2375-H9B**
2.5	3	0.312	0.25	0.312	**MCW-2500-H9B**
	3.19	0.345	0.375	0.312	**MCW345-2500-375-H9B**
2.625	3.125	0.312	0.25	0.312	**MCW-2625-H9B**
	3.375	0.375	0.375	0.312	**MCW375-2625-375-H9B**
2.75	3.25	0.312	0.25	0.312	**MCW-2750-H9B**
	3.5	0.375	0.375	0.312	**MCW375-2750-375-H9B**
3	3.5	0.312	0.25	0.312	**MCW-3000-H9B**
	3.75	0.375	0.375	0.312	**MCW375-3000-375-H9B**
3.125	3.75	0.312	0.312	0.312	**MCW-3125-H9B**
3.25	3.875	0.312	0.312	0.312	**MCW-3250-H9B**
3.5	4.125	0.312	0.312	0.312	**MCW-3500-H9B**
	4.25	0.375	0.312	0.312	**MCW375-3500-312-H9B**
3.625	4.25	0.312	0.312	0.312	**MCW-3625-H9B**
3.75	4.375	0.312	0.312	0.312	**MCW-3750-H9B**
4	4.625	0.312	0.312	0.312	**MCW-4000-H9B**
4.25	4.875	0.312	0.312	0.312	**MCW-4250-H9B**
4.5	5.125	0.312	0.312	0.312	**MCW-4500-H9B**
5	5.625	0.312	0.312	0.312	**MCW-5000-H9B**

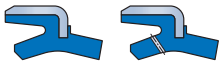
[1] Tolerance is determined by the rod seal

Dimensions					Designation
d[1]	D ±0.001	L +0.015	S	C min.	
in.					–
5.5	6.125	0.375	0.312	0.312	**MCW-5500-H9B**
	6.25	0.375	0.312	0.312	**MCW375-5500-312-H9B**
5.75	6.375	0.375	0.312	0.312	**MCW-5750-H9B**
	6.75	0.5	0.5	0.375	**MCW500-5750-500-H9B**
6	6.625	0.375	0.312	0.312	**MCW-6000-H9B**
6.5	7.125	0.312	0.312	0.312	**MCW312-6500-312-H9B**
6.75	7.375	0.312	0.312	0.312	**MCW312-6750-312-H9B**
	7.375	0.375	0.312	0.312	**MCW-6750-H9B**
7	7.75	0.375	0.312	0.312	**MCW375-7000-312-H9B**
8	8.75	0.375	0.375	0.312	**MCW375-8000-375-H9B**
8.5	9.125	0.375	0.312	0.312	**MCW-8500-H9B**

Other sizes are available on request

[1] Tolerance is determined by the rod seal

PAD and PADV profile data

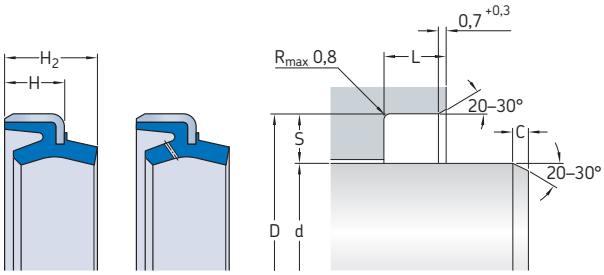


Material code	W93 For additional information → **page 26**
Speed	Up to 1 m/s *(3.2 ft/s)*
Temperature range	–40 to +110 °C *(–40 to +230 °F)*
Counter-surface	→ **page 22**

Maximum values of application parameters (e.g. speed, temperature) should not be applied continuously nor simultaneously.

4.3 PAD and PADV profile wiper seals, metric sizes

d **30 – 120** mm



PAD PADV

Dimensions							Designations	
d[1]	D H8	L +0,5	S	C min.	H	H_2 +1	PAD	PADV (with vent)
mm							–	
30	42	6,5	6	4	6	9	**PAD 30x42x6x9**	**PADV 30x42x6x9**
35	47	7,5	6	4	7	10	**PAD 35x47x7x10**	**PADV 35x47x7x10**
40	52	7,5	6	4	7	10	**PAD 40x52x7x10**	**PADV 40x52x7x10**
45	57	7,5	6	4	7	10	**PAD 45x57x7x10**	**PADV 45x57x7x10**
50	62	7,5	6	4	7	10	**PAD 50x62x7x10**	**PADV 50x62x7x10**
55	69	8,5	7	5	8	11	**PAD 55x69x8x11**	**PADV 55x69x8x11**
60	74	8,5	7	5	8	11	**PAD 60x74x8x11**	**PADV 60x74x8x11**
65	79	8,5	7	5	8	11	**PAD 65x79x8x11**	**PADV 65x79x8x11**
70	84	8,5	7	5	8	11	**PAD 70x84x8x11**	**PADV 70x84x8x11**
75	89	8,5	7	5	8	11	**PAD 75x89x8x11**	**PADV 75x89x8x11**
80	94	8,5	7	5	8	11	**PAD 80x94x8x11**	**PADV 80x94x8x11**
85	99	8,5	7	5	8	11	**PAD 85x99x8x11**	**PADV 85x99x8x11**
90	104	8,5	7	5	8	11	**PAD 90x104x8x11**	**PADV 90x104x8x11**
95	109	8,5	7	5	8	11	**PAD 95x109x8x11**	**PADV 95x109x8x11**
100	114	8,5	7	5	8	11	**PAD 100x114x8x11**	**PADV 100x114x8x11**
105	121	9,5	8	7	9	12	**PAD 105x121x9x12**	**PADV 105x121x9x12**
110	126	9,5	8	7	9	12	**PAD 110x126x9x12**	**PADV 110x126x9x12**
115	131	9,5	8	7	9	12	**PAD 115x131x9x12**	**PADV 115x131x9x12**
120	136	9,5	8	7	9	12	**PAD 120x136x9x12**	**PADV 120x136x9x12**

Other sizes are available on request

[1] Tolerance is determined by the rod seal

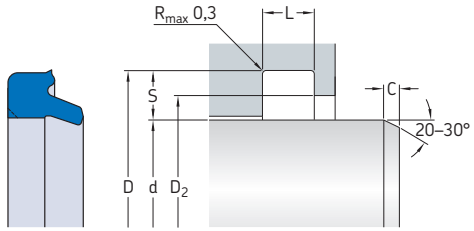
DTW profile data

Material code	U-1003 For additional information → **page 26**
Speed	Up to 0,75 m/s *(2.4 ft/s)*
Temperature range	–40 to +120 °C *(–40 to +250 °F)*
Counter-surface	→ **page 22**

Maximum values of application parameters (e.g. speed, temperature) should not be applied continuously nor simultaneously.

4.4 DTW profile wiper seals, metric sizes

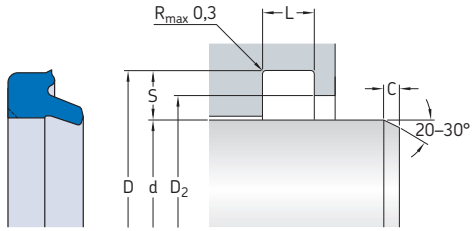
d **18 – 71** mm



Dimensions						Designation
$d^{1)}$	D H11	L +0,2	D_2 H11	S	C min.	
mm						–
18	26	5	22	4	4,5	**DTW-18x26x5-J2G**
20	28	5	24	4	4,5	**DTW-20x28x5-J2G**
25	33	5	29	4	4,5	**DTW-25x33x5-J2G**
28	36	5	32	4	4,5	**DTW-28x36x5-J2G**
30	38	6	34	4	4,5	**DTW-30x38x6-J2G**
32	40	5	36	4	4,5	**DTW-32x40x5-J2G**
	40	6	36	4	4,5	**DTW-32x40x6-J2G**
35	43	6	39	4	4,5	**DTW-35x43x6-J2G**
40	48	5	44	4	4,5	**DTW-40x48x5-J2G**
	48	6	44	4	4,5	**DTW-40x48x6-J2G**
45	53	6	49	4	4,5	**DTW-45x53x6-J2G**
50	58	5	54	4	4,5	**DTW-50x58x5-J2G**
	58	6	54	4	4,5	**DTW-50x58x6-J2G**
55	63	6	59	4	4,5	**DTW-55x63x6-J2G**
	65	7	60	5	5	**DTW-55x65x7-J2G**
56	64	6	60	4	4,5	**DTW-56x64x6-J2G**
60	68	6	64	4	4,5	**DTW-60x68x6-J2G**
	70	7	65	5	5	**DTW-60x70x7-J2G**
63	71	6	67	4	4,5	**DTW-63x71x6-J2G**
65	73	6	69	4	4,5	**DTW-65x73x6-J2G**
	75	7	70	5	5	**DTW-65x75x7-J2G**
70	80	7	75	5	5	**DTW-70x80x7-J2G**
71	81	7	76	5	5	**DTW-71x81x7-J2G**

1) Tolerance is determined by the rod seal

4.4 DTW profile wiper seals, metric sizes
d **75 – 230** mm



Dimensions						Designation
d[1]	D H11	L +0,2	D_2 H11	S	C min.	
mm						–
75	85	7	80	5	5	**DTW-75x85x7-J2G**
80	90	7	85	5	5	**DTW-80x90x7-J2G**
85	95	7	90	5	5	**DTW-85x95x7-J2G**
90	100	7	95	5	5	**DTW-90x100x7-J2G**
95	105	7	100	5	5	**DTW-95x105x7-J2G**
100	110	7	105	5	5	**DTW-100x110x7-J2G**
105	115	7	110	5	5	**DTW-105x115x7-J2G**
110	120	7	115	5	5	**DTW-110x120x7-J2G**
112	122	7	117	5	5	**DTW-112x122x7-J2G**
115	125	7	120	5	5	**DTW-115x125x7-J2G**
120	130	7	125	5	5	**DTW-120x130x7-J2G**
125	138	8	132	6,5	5,5	**DTW-125x138x8-J2G**
130	143	8	137	6,5	5,5	**DTW-130x143x8-J2G**
140	153	8	147	6,5	5,5	**DTW-140x153x8-J2G**
145	158	8	152	6,5	5,5	**DTW-145x158x8-J2G**
150	163	8	157	6,5	5,5	**DTW-150x163x8-J2G**
160	173	8	167	6,5	5,5	**DTW-160x173x8-J2G**
160	174	8	167	7	6	**DTW-160x174x8-J2G**

[1] Tolerance is determined by the rod seal

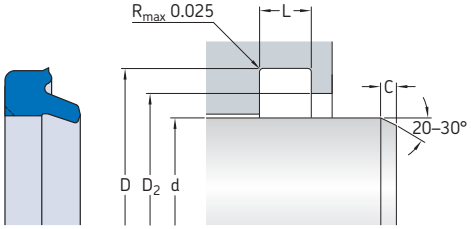
Dimensions						Designation
$d^{1)}$	D H11	L +0,2	D_2 H11	S	C min.	
mm						–
170	183	8	177	6,5	5,5	**DTW-170x183x8-J2G**
170	184	8	177	7	6	**DTW-170x184x8-J2G**
180	194	8	187	7	6	**DTW-180x194x8-J2G**
200	213	8	207	6,5	5,5	**DTW-200x213x8-J2G**
	214	8	207	7	6	**DTW-200x214x8-J2G**
230	244	8	237	7	6	**DTW-230x244x8-J2G**

Other sizes are available on request

1) Tolerance is determined by the rod seal

4.4 DTW profile wiper seals, inch sizes

d **0.25 – 6.5** in.



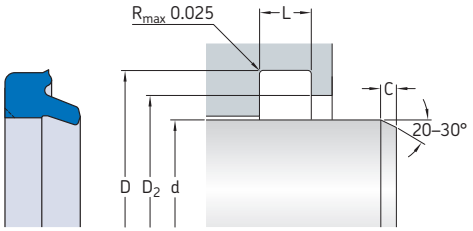
Dimensions					Designation
d[1]	D +0.006	L +0.004	D_2 +0.005	C min.	
in.					–
0.25	0.497	0.124	0.41	0.125	**DTW-250-J2G**
0.312	0.56	0.124	0.475	0.125	**DTW-312-J2G**
0.375	0.622	0.124	0.535	0.125	**DTW-375-J2G**
0.437	0.685	0.124	0.6	0.125	**DTW-437-J2G**
0.5	0.747	0.124	0.66	0.125	**DTW-500-J2G**
0.562	0.81	0.124	0.725	0.125	**DTW-562-J2G**
0.625	0.872	0.124	0.785	0.125	**DTW-625-J2G**
0.75	1.122	0.187	0.995	0.187	**DTW-750-J2G**
0.812	1.185	0.187	1.06	0.187	**DTW-812-J2G**
0.875	1.247	0.187	1.12	0.187	**DTW-875-J2G**
0.937	1.31	0.187	1.185	0.187	**DTW-937-J2G**
1	1.372	0.187	1.245	0.187	**DTW-1000-J2G**
1.125	1.497	0.187	1.37	0.187	**DTW-1125-J2G**
1.187	1.559	0.187	1.435	0.187	**DTW-1187-J2G**
1.25	1.622	0.187	1.495	0.187	**DTW-1250-J2G**
1.312	1.684	0.187	1.56	0.187	**DTW-1312-J2G**
1.375	1.747	0.187	1.62	0.187	**DTW-1375-J2G**
1.5	1.872	0.187	1.745	0.187	**DTW-1500-J2G**
1.562	1.935	0.187	1.81	0.187	**DTW-1562-J2G**
1.625	1.997	0.187	1.87	0.187	**DTW-1625-J2G**

[1] Tolerance is determined by the rod seal

Dimensions					Designation
$d^{1)}$	D +0.006	L +0.004	D_2 +0.005	C min.	
in.					–
1.75	2.122	0.187	1.995	0.187	**DTW-1750-J2G**
1.875	2.247	0.187	2.12	0.187	**DTW-1875-J2G**
1.937	2.31	0.187	2.185	0.187	**DTW-1937-J2G**
2	2.497	0.249	2.327	0.25	**DTW-2000-J2G**
2.125	2.622	0.249	2.452	0.25	**DTW-2125-J2G**
2.25	2.747	0.249	2.577	0.25	**DTW-2250-J2G**
2.375	2.872	0.249	2.702	0.25	**DTW-2375-J2G**
2.5	2.997	0.249	2.827	0.25	**DTW-2500-J2G**
2.625	3.122	0.249	2.952	0.25	**DTW-2625-J2G**
2.75	3.247	0.249	3.077	0.25	**DTW-2750-J2G**
2.875	3.372	0.249	3.202	0.25	**DTW-2875-J2G**
3	3.497	0.249	3.327	0.25	**DTW-3000-J2G**
3.125	3.622	0.249	3.452	0.25	**DTW-3125-J2G**
3.25	3.747	0.249	3.577	0.25	**DTW-3250-J2G**
3.375	3.872	0.249	3.702	0.25	**DTW-3375-J2G**
3.5	3.997	0.249	3.827	0.25	**DTW-3500-J2G**
3.625	4.122	0.249	3.952	0.25	**DTW-3625-J2G**
3.75	4.247	0.249	4.077	0.25	**DTW-3750-J2G**
3.875	4.372	0.249	4.202	0.25	**DTW-3875-J2G**
4	4.497	0.249	4.327	0.25	**DTW-4000-J2G**
4.125	4.622	0.249	4.452	0.25	**DTW-4125-J2G**
4.25	4.747	0.249	4.577	0.25	**DTW-4250-J2G**
4.375	4.872	0.249	4.702	0.25	**DTW-4375-J2G**
4.5	5.247	0.374	4.993	0.375	**DTW-4500-J2G**
4.75	5.497	0.374	5.243	0.375	**DTW-4750-J2G**
4.875	5.622	0.374	5.368	0.375	**DTW-4875-J2G**
5	5.747	0.374	5.493	0.375	**DTW-5000-J2G**
5.25	5.997	0.374	5.743	0.375	**DTW-5250-J2G**
5.5	6.247	0.374	5.993	0.375	**DTW-5500-J2G**
5.75	6.497	0.374	6.243	0.375	**DTW-5750-J2G**
6	6.747	0.374	6.493	0.375	**DTW-6000-J2G**
6.25	6.997	0.374	6.743	0.375	**DTW-6250-J2G**
6.5	7.247	0.374	6.993	0.375	**DTW-6500-J2G**

1) Tolerance is determined by the rod seal

4.4 DTW profile wiper seals, inch sizes
d **6.75 – 15.75** in.



Dimensions					Designation
d[1]	D +0.006	L +0.004	D_2 +0.005	C min.	
in.					–
6.75	7.497	0.374	7.243	0.375	**DTW-6750-J2G**
7	7.747	0.374	7.493	0.375	**DTW-7000-J2G**
7.25	7.997	0.374	7.743	0.375	**DTW-7250-J2G**
7.5	8.247	0.374	7.993	0.375	**DTW-7500-J2G**
7.75	8.497	0.374	8.243	0.375	**DTW-7750-J2G**
8	8.747	0.374	8.493	0.375	**DTW-8000-J2G**
8.25	8.997	0.374	8.743	0.375	**DTW-8250-J2G**
8.5	9.247	0.374	8.993	0.375	**DTW-8500-J2G**
8.75	9.497	0.374	9.243	0.375	**DTW-8750-J2G**
9	9.747	0.374	9.493	0.375	**DTW-9000-J2G**
9.5	10.247	0.374	9.993	0.375	**DTW-9500-J2G**
9.75	10.497	0.374	10.243	0.375	**DTW-9750-J2G**
10	10.997	0.499	10.659	0.5	**DTW-10000-J2G**
10.5	11.497	0.499	11.159	0.5	**DTW-10500-J2G**
11	11.997	0.499	11.659	0.5	**DTW-11000-J2G**
11.5	12.497	0.499	12.159	0.5	**DTW-11500-J2G**
12.5	13.497	0.499	13.159	0.5	**DTW-12500-J2G**
15.75	16.747	0.499	16.409	0.5	**DTW-15750-J2G**

Other sizes are available on request

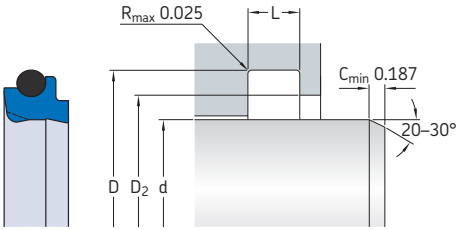
[1] Tolerance is determined by the rod seal

DX profile data

Material codes	Seal ring: suffix J1S → U-1003 suffix J2X → U-1004 Energizer: A-8501 For additional information → **page 26**
Speed	Up to 1 m/s *(3.2 ft/s)*
Temperature range	–40 to +120 °C *(–40 to +250 °F)*
Counter-surface	→ **page 22**

Maximum values of application parameters (e.g. speed, temperature) should not be applied continuously nor simultaneously.

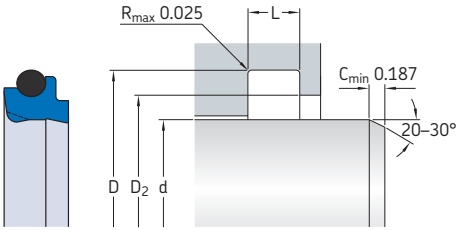
4.5 DX profile wiper seals, inch sizes
d **0.75 – 4.25** in.



Dimensions				Designation
d[1]	D +0.006	L +0.004	D_2 +0.005	
in.				–
0.75	1.122	0.187	0.995	**DX-750-J1S**
1	1.372	0.187	1.245	**DX-1000-J1S**
1.125	1.497	0.187	1.37	**DX-1125-J1S**
1.25	1.622	0.187	1.495	**DX-1250-J1S**
1.375	1.747	0.187	1.62	**DX-1375-J1S**
1.5	1.872	0.187	1.745	**DX-1500-J1S**
1.625	1.997	0.187	1.87	**DX-1625-J1S**
1.75	2.122	0.187	1.995	**DX-1750-J1S**
2	2.497	0.249	2.327	**DX-2000-J1S**
2.25	2.747	0.249	2.577	**DX-2250-J1S**
2.5	2.997	0.249	2.827	**DX-2500-J1S**
2.75	3.247	0.249	3.077	**DX-2750-J1S**
3	3.497	0.249	3.327	**DX-3000-J1S**
3.125	3.622	0.249	3.452	**DX-3125-J1S**
3.25	3.747	0.249	3.577	**DX-3250-J2X**
3.375	3.872	0.249	3.702	**DX-3375-J2X**
3.5	3.997	0.249	3.827	**DX-3500-J2X**
3.75	4.247	0.249	4.077	**DX-3750-J2X**
4	4.497	0.249	4.327	**DX-4000-J2X**
4.25	4.747	0.249	4.577	**DX-4250-J2X**

[1] Tolerance is determined by the rod seal

4.5 DX profile wiper seals, inch sizes
d **4.5 – 9** in.



Dimensions				Designation
d[1]	D +0.006	L +0.004	D_2 +0.005	
in.				–
4.5	5.247	0.374	4.993	**DX-4500-J2X**
4.625	5.372	0.374	5.118	**DX-4625-J2X**
4.75	5.497	0.374	5.243	**DX-4750-J2X**
5	5.747	0.374	5.493	**DX-5000-J2X**
5.5	6.247	0.374	5.993	**DX-5500-J2X**
5.75	6.497	0.374	6.243	**DX-5750-J2X**
6	6.747	0.374	6.493	**DX-6000-J2X**
6.5	7.247	0.374	6.993	**DX-6500-J2X**
7	7.747	0.374	7.493	**DX-7000-J2X**
7.25	7.997	0.374	7.743	**DX-7250-J2X**
8	8.747	0.374	8.493	**DX-8000-J2X**
8.5	9.247	0.374	8.993	**DX-8500-J2X**
9	9.747	0.374	9.493	**DX-9000-J2X**

Other sizes are available on request

[1] Tolerance is determined by the rod seal

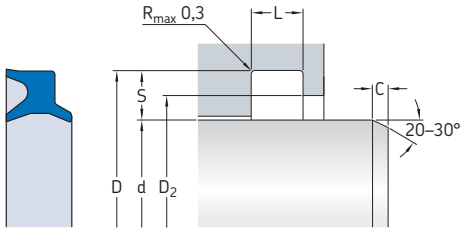
HW profile data

Material code	U-1003 For additional information → **page 26**
Speed	Up to 0,75 m/s *(2.4 ft/s)*
Temperature range	–40 to +100 °C *(–40 to +210 °F)*
Counter-surface	→ **page 22**

Maximum values of application parameters (e.g. speed, temperature) should not be applied continuously nor simultaneously.

4.6 HW profile wiper seals, metric sizes

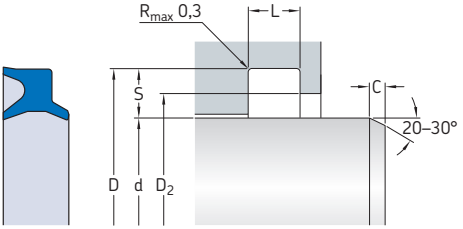
d **14 – 67** mm



Dimensions						Designation
$d^{1)}$	D H11	L +0,2	D_2 H11	S	C min.	
mm						–
14	22	5	18	4	3,5	**HW-14x22x5-J2G**
16	24	5	20	4	3,5	**HW-16x24x5-J2G**
18	26	5	22	4	3,5	**HW-18x26x5-J2G**
20	28	5	24	4	3,5	**HW-20x28x5-J2G**
22	30	5	26	4	3,5	**HW-22x30x5-J2G**
25	33	5	29	4	3,5	**HW-25x33x5-J2G**
28	36	5	32	4	3,5	**HW-28x36x5-J2G**
30	38	6	34	4	3,5	**HW-30x38x6-J2G**
32	40	6	36	4	3,5	**HW-32x40x6-J2G**
35	43	6	39	4	3,5	**HW-35x43x6-J2G**
36	44	6	40	4	3,5	**HW-36x44x6-J2G**
40	48	6	44	4	3,5	**HW-40x48x6-J2G**
45	53	6	49	4	3,5	**HW-45x53x6-J2G**
50	58	6	54	4	3,5	**HW-50x58x6-J2G**
55	63	6	59	4	3,5	**HW-55x63x6-J2G**
56	64	6	60	4	3,5	**HW-56x64x6-J2G**
60	68	6	64	4	3,5	**HW-60x68x6-J2G**
63	71	6	67	4	3,5	**HW-63x71x6-J2G**
65	73	6	69	4	3,5	**HW-65x73x6-J2G**
67	75	6	71	4	3,5	**HW-67x75x6-J2G**

1) Tolerance is determined by the rod seal

4.6 HW profile wiper seals, metric sizes
d **70 – 140** mm



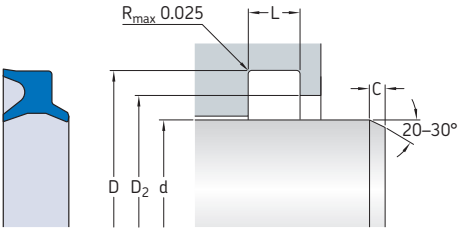
Dimensions						Designation
d[1]	D H11	L +0,2	D_2 H11	S	C min.	
mm						–
70	80	7	75	5	3,5	**HW-70x80x7-J2G**
75	85	7	80	5	3,5	**HW-75x85x7-J2G**
80	90	7	85	5	3,5	**HW-80x90x7-J2G**
85	95	7	90	5	3,5	**HW-85x95x7-J2G**
90	100	7	95	5	3,5	**HW-90x100x7-J2G**
95	105	7	100	5	3,5	**HW-95x105x7-J2G**
98	108	7	103	5	3,5	**HW-98x108x7-J2G**
100	110	7	105	5	3,5	**HW-100x110x7-J2G**
105	115	7	110	5	3,5	**HW-105x115x7-J2G**
112	122	7	117	5	3,5	**HW-112x122x7-J2G**
125	138	8	132	6,5	4,5	**HW-125x138x8-J2G**
140	153	8	147	6,5	4,5	**HW-140x153x8-J2G**

Other sizes are available on request

[1] Tolerance is determined by the rod seal

4.6 HW profile wiper seals, inch sizes

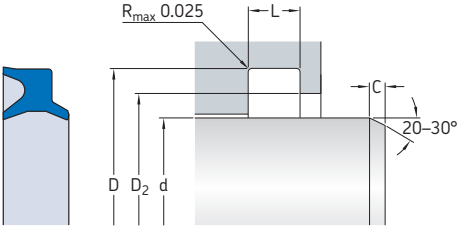
d **0.25 – 3.25** in.



Dimensions					Designation
d[1]	D +0.003	L +0.015	D_2 +0.003	C min.	
in.					–
0.25	0.552	0.203	0.37	0.187	**HW-250-J2G**
0.5	0.802	0.203	0.62	0.187	**HW-500-J2G**
0.625	0.927	0.203	0.745	0.187	**HW-625-J2G**
0.75	1.052	0.203	0.87	0.187	**HW-750-J2G**
0.937	1.302	0.218	1.072	0.187	**HW-937-J2G**
1	1.365	0.218	1.135	0.187	**HW-1000-J2G**
1.25	1.615	0.218	1.385	0.187	**HW-1250-J2G**
1.375	1.74	0.218	1.51	0.187	**HW-1375-J2G**
1.437	1.802	0.218	1.572	0.187	**HW-1437-J2G**
1.5	1.865	0.218	1.635	0.187	**HW-1500-J2G**
1.625	1.99	0.218	1.76	0.187	**HW-1625-J2G**
1.75	2.115	0.218	1.885	0.187	**HW-1750-J2G**
1.875	2.24	0.218	2.01	0.187	**HW-1875-J2G**
2	2.365	0.218	2.135	0.187	**HW-2000-J2G**
2.125	2.49	0.218	2.26	0.187	**HW-2125-J2G**
2.25	2.745	0.281	2.385	0.25	**HW-2250-J2G**
2.5	2.995	0.281	2.635	0.25	**HW-2500-J2G**
2.625	3.12	0.281	2.76	0.25	**HW-2625-J2G**
3	3.495	0.281	3.135	0.25	**HW-3000-J2G**
3.25	3.745	0.281	3.385	0.25	**HW-3250-J2G**

[1] Tolerance is determined by the rod seal

4.6 HW profile wiper seals, inch sizes
d **3.5 – 8** in.



Dimensions					Designation
d[1]	D +0.003	L +0.015	D_2 +0.003	C min.	
in.					–
3.5	3.995	0.281	3.635	0.25	**HW-3500-J2G**
3.75	4.245	0.281	3.885	0.25	**HW-3750-J2G**
4	4.495	0.281	4.135	0.25	**HW-4000-J2G**
4.25	4.745	0.281	4.385	0.25	**HW-4250-J2G**
4.5	4.995	0.281	4.635	0.25	**HW-4500-J2G**
4.75	5.245	0.281	4.885	0.25	**HW-4750-J2G**
5	5.495	0.281	5.135	0.25	**HW-5000-J2G**
5.125	5.62	0.281	5.26	0.25	**HW-5125-J2G**
5.25	5.745	0.281	5.385	0.25	**HW-5250-J2G**
7	7.495	0.281	7.135	0.25	**HW-7000-J2G**
8	8.495	0.281	8.135	0.25	**HW-8000-J2G**

Other sizes are available on request

[1] Tolerance is determined by the rod seal

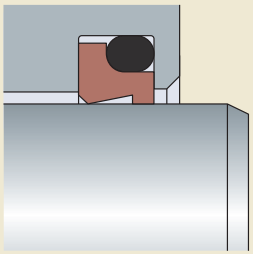
More wiper seals

PTFE wiper seals

SKF wiper seals made of PTFE (→ **fig. 12**) are intended for applications where there is a demand for low breakaway friction or good chemical resistance. SKF has material for PTFE wiper seals on stock and, therefore, can supply these seals in a wide variety of profiles and different sizes at short notice.

For additional information about PTFE wiper seals, contact SKF.

Fig. 12

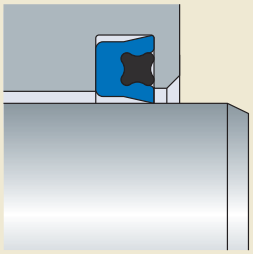


Rod seals used as wiper seals

STD rod seal profiles (→ *STD profiles*, **page 118**) can also be used as snap-in wiper seals (→ **fig. 13**).

For additional information about rod seals used as wiper seals, contact SKF.

Fig. 13



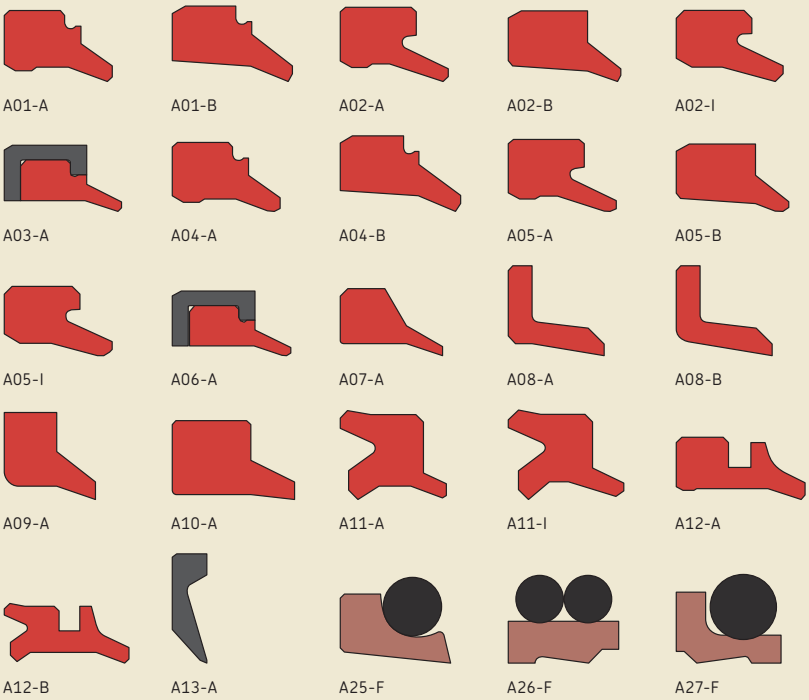
Customized machined seal profiles

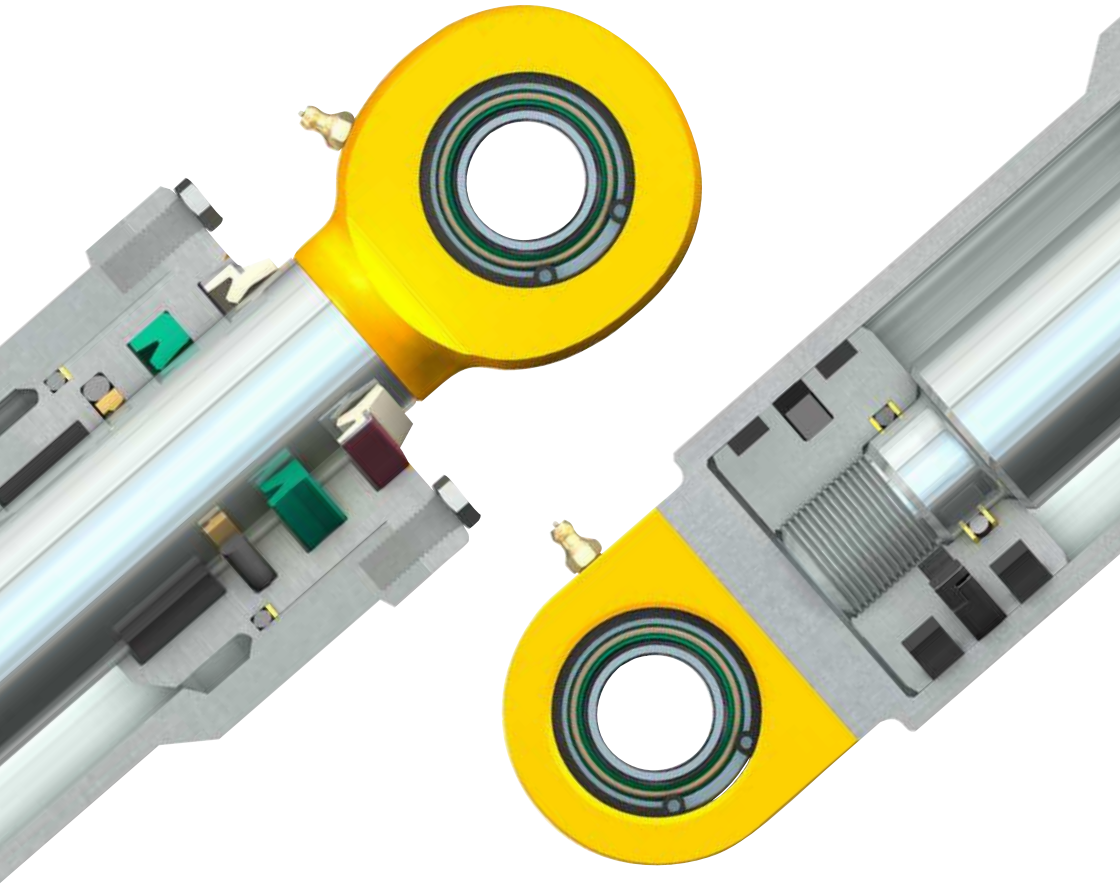
SKF can manufacture a wide variety of wiper seal profiles (→ **fig. 14**) with different materials and customized sizes with its industry-leading SKF SEAL JET production system. SKF can supply these customized machined wiper seals in close partnership with customers from the design phase to serial production

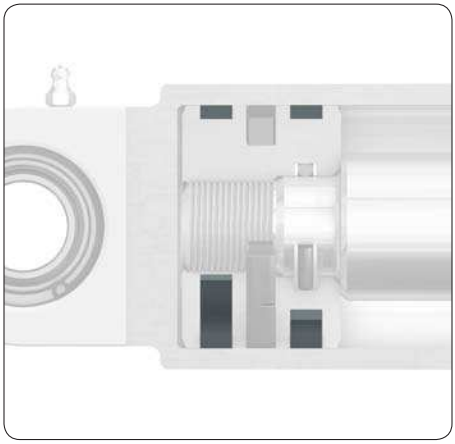
For additional information about customized machined profiles, refer to publication *Customized machined seals – Product range* or contact SKF.

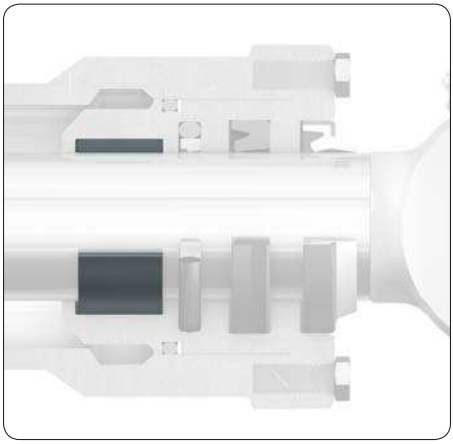
Fig. 14

SKF SEAL JET profile examples









Guide rings and guide strips

Basics

In hydraulic cylinders the most commonly used guides are guide rings and guide strips. They accommodate radial loads of forces acting on the cylinder assembly and guide the rod in the cylinder head as well as the piston in the cylinder bore (→ **fig. 1**).

Guides are made of polymer materials and prevent metal-to-metal contact between moving parts in a working hydraulic cylinder. Compared to metal guides, polymer guides provide the following advantages in hydraulic cylinders:

- significantly longer service life
- work more smoothly against the cylinder bore and the sealing surfaces
- avoid wear of cylinder surfaces despite the presence of contamination particles
- high resistance to insufficient lubrication at low speeds
- larger contact area (→ **fig. 2**, **page 251** and **fig. 4**, **page 254**) due to higher degree of elastic deformation distributes the load and reduces stress to counter-surface
- certain self-lubricating properties

SKF supplies different precision machined guide rings with different polymer materials and sizes, which make them appropriate for a wide variety of operating conditions and applications.

Guides of PTFE are also available for applications where start-up friction must be minimized. PTFE guides have limited load carrying capability and should only be used in applications with light loads.

Guide lubrication

The guide must receive ample lubrication at all times. Rod guides are typically placed inward of both the rod and buffer seal and should be lubricated on assembly with the same medium as used in the system. SKF recommends to place guides not outside of the rod seal, means between the wiper and rod seal. However, in certain conditions, PTFE guides may be used outside the rod seal due to their certain self-lubricating properties.

More information

Fig. 1

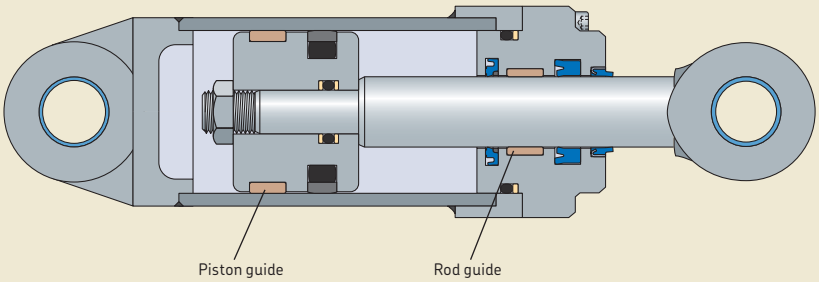
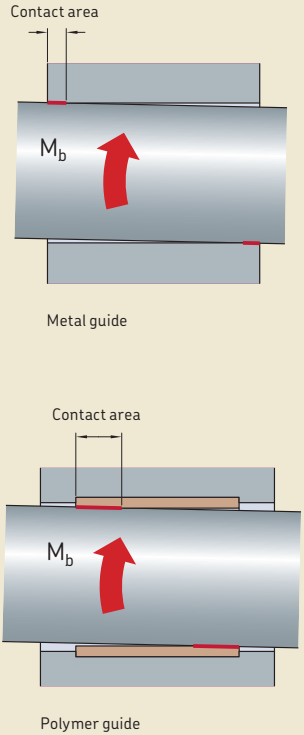


Fig. 2



Materials

The demands on reliability are continuously increasing. At the same time, the service conditions are getting tougher to match the development towards higher effectiveness of the hydraulic systems. Therefore, it is very important to be familiar with the operating conditions and parameters, such as operating temperature and pressure, load, speed, and fluid when choosing the most appropriate guide material. The most common materials for guides listed in this catalogue are:

- glass fibre reinforced polyamide
- fabric reinforced phenolic resin
- PTFE

Polyamide

Glass fibre reinforced polyamide guides are suitable for medium and heavy duty applications and are characterized by the following properties:

- wide temperature range
- wear resistant
- reduce vibrations
- protect seals from particles
- protect components from diesel effect
- easy to install
- tight tolerances
- withstand heavy side loads
- withstand high cycling speed
- prone to moisture swell before installation

P-2551 is the standard polyamide material for guide rings. Technical specifications are provided in **table 1** (→ **page 252**).

For additional information, refer to *Materials* (→ **page 26**).

Fabric reinforced composites

Fabric reinforced composites consist of cotton fabric bound with thermoset phenolic resin. Its structure and the ability of the fabric fibres to absorb a certain amount of oil make these phenolic guides almost self-lubricating. However, cotton reinforced phenolic guide rings should not be used at high stroke speeds over 0,5 m/s (*1.6 ft/s*). They are suitable for medium and heavy duty applications and are characterized by the following properties:

- wide temperature range
- wear resistant
- reduce vibrations
- protect seals from particles
- protect components from diesel effect
- low thermal expansion
- easy to install
- tight tolerances
- withstand heavy side loads

Phenolic resin with cotton fabric laminate (PF) is the standard fabric reinforced composite. Technical specifications are provided in **table 1**. SKF also supplies a variety of other thermoset resins and fabrics on request.

For additional information, refer to *Materials* (→ **page 26**).

PTFE

PTFE is typically used in guides where low friction and resistance to chemicals, heat or wear are essential. However, PTFE should only be used in applications with low surface pressure. To obtain optimal wear resistance, PTFE materials are available with different fillers, such as bronze or carbon powder. PTFE guides are characterized by the following properties:

- chemical resistance
- wide temperature range
- low friction
- anti-adhesive, low breakaway friction
- good wear resistance
- reduce vibrations
- protect seals from particles
- protect components from diesel effect
- tight tolerance machined guide rings available

292 is the standard PTFE material for guides and strips. Technical specifications are provided in **table 1**. SKF also can supply many other PTFE material compounds on request.

For additional information, refer to *Materials* (→ **page 26**).

Table 1

Guide ring material comparison

Material code	Ultimate compressive strength	Maximum recommended linear speed[1]	Maximum recommended operating temperature[1]	Maximum recommended bearing load pressure[1] at 20 °C (70 °F)	Maximum recommended bearing load pressure[1] at 80 °C (175 °F)
–	N/mm² (psi)	m/s (ft/s)	°C (°F)	N/mm² (psi)	N/mm² (psi)
P-2551	158 (22 915)	1 (3.3)	120 (250)	40 (5 800)	30 (4 350)
PF	240 (34 805)	0,5 (1.6)	120 (250)	50 (7 250)	30 (4 350)
292	[2] (depending on time and temperature)	5 (16.4) (depending on sealing system)	200 (390)	15 (2 175)	7,5 (1 085)

[1] Maximum values are for intermittent exposure and should not be applied simultaneously.
[2] PTFE is subject to creep under compression and, therefore, compressive strength depends on time and temperature.

Guide rings

SKF guide rings are precision machined according to tight tolerance specifications on the radial section of the guide. Therefore, they optimize guide load distribution and limit radial misalignment of components for best seal performance. SKF supplies the following guide rings:

- WAT rod or piston guide rings
- RGR rod guide rings
- PGR piston guide rings

All of these precision guide rings are split with an angle cut as standard (→ **fig. 8**, **page 285**). Other types and designs or angles of cut are available on request.

WAT rod or piston guide rings

These standard guide rings can operate dynamically either on their outside or inside surfaces and, therefore, can be used in piston or rod applications. WAT guide rings are made of glass fibre reinforced polyamide (P-2551) as standard. On request, SKF can supply WAT guide rings in a variety of materials, including P-2552 (self lubricated rings with PTFE fillers).

RGR rod guide rings

RGR guide rings are developed for guiding rods by operating dynamically on their inside surface. They are made of phenolic resin with cotton fabric laminate (PF) as standard. On request, SKF can supply RGR guide rings in a variety of materials.

They are manufactured and packaged to promote an open split before installation and, therefore, are clamped with their outside surface in the cylinder head. This makes it easier to assemble the cylinder later.

PGR piston guide rings

PGR guide rings are developed for guiding pistons by operating dynamically on their outside surface. They are made of phenolic resin with cotton fabric laminate (PF) as standard. On request, SKF can supply PGR guide rings in a variety of materials.

They are manufactured and packaged to promote a narrow split or even closed ring before installation and, therefore, are clamped with their inside surface on the piston. This makes it easier to assemble the cylinder later.

Design and calculation model

Concentric alignment of cylinder components

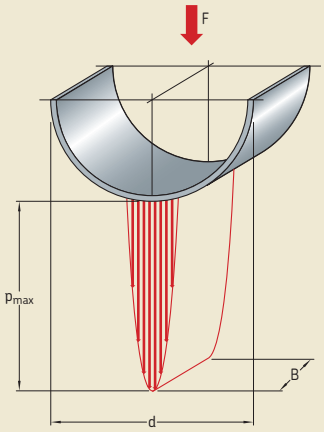
Hydraulic cylinders and all their components are designed to minimize radial movements at load or pressure changes. It is also important that the piston and rod remain in a concentric position during the entire stroke to maintain seal effectiveness, especially at low temperatures, and to minimize the buckling loads on the piston rod. This in turn depends on the combined tolerances of the cylinder bore, the rod, the radial thickness of the guide rings or strips, and the housing diameters.

Guide distance

The bending moment on the cylinder components and the load on guides at any point in the cylinder stroke are a function of the radial loads and the distance between the rod and piston guides. Therefore, the distance between guides should be considered when designing the cylinder and calculating the guide loads.

Fig. 3

Load distribution with metal guide



Load distribution model

With metal guides, the close machining tolerances would cause narrow contact area and high surface pressure (→ **fig. 3**). That could cause damage or wear to the contact surfaces.

The higher degree of elastic deformation of polymer materials provides larger contact surfaces and a better utilization of the guide width (→ **fig. 4**). While the guide ring load is realistically not an even distribution, the guide ring load and width requirements are estimated with the projected area of the full dynamic surface (inside diameter for rod guides or outside diameter for piston guides) assuming the load is carried evenly across the surface (→ **fig. 5**).

Fig. 4

Load distribution with polymer guides

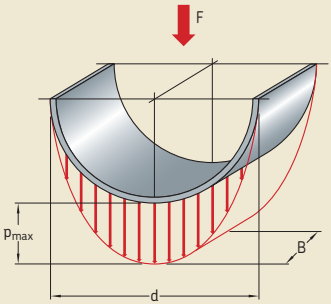
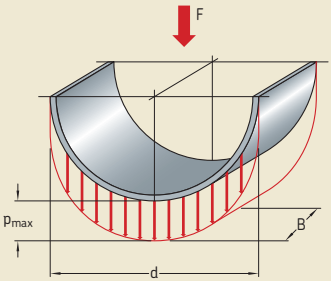


Fig. 5

Theoretical load distribution



Calculation considerations

When calculating the requisite guide housing width L, the above assumption should be taken into consideration by using a safety factor. SKF recommends using a safety factor f of at least 2 for operating temperatures up to 80 °C *(175 °F)*. For operating temperatures above 80 °C *(175 °F)*, the safety factor should be increased. However, at temperatures above 120 °C *(250 °F)*, the selection of guide materials is significantly restricted.

The reduced effective load carrying width B of the guide (→ **fig. 5**) also need to be considered. It is approx. 2 mm *(0.08 in.)* smaller than the housing groove width due to the manufacturing and installation tolerances and the reduction by the chamfers and radii.

Furthermore, dynamic forces, accelerating forces, vibrations and angular forces should be considered when calculating the transverse forces from the rod ends of the cylinders.

For additional information, contact SKF.

Calculating the guide width

The requisite guide width can be calculated for:

- piston guide housing width using

$$L = \frac{F\,f}{p\,D} + 2$$

- rod guide housing width using

$$L = \frac{F\,f}{p\,d} + 2$$

where
L = requisite guide housing width [mm]
D = cylinder bore diameter [mm]
d = rod diameter [mm]
F = radial load [N]
f = safety factor (→ *Calculation considerations*)
p = maximum recommended bearing load pressure [N/mm²] (→ **table 1**, **page 252**)

Calculation example

What is the required guide housing width L for a PGR piston guide ring made of phenolic resin with cotton fabric laminate (PF), a cylinder bore diameter of D = 100 mm, considering a radial load of 20 000 N and an operating temperature of 80 °C (normal conditions)?

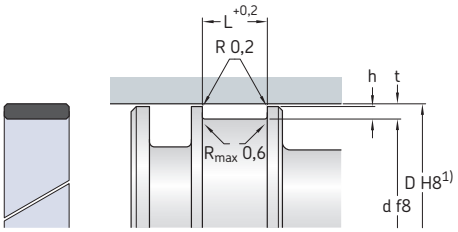
From **table 1** (→ **page 252**), the maximum recommended bearing load pressure p = 30 N/mm². The safety factor is chosen with 2. The requisite guide housing width L is

$$L = \frac{20\,000 \times 2}{30 \times 100} + 2 = 15{,}3 \text{ mm}$$

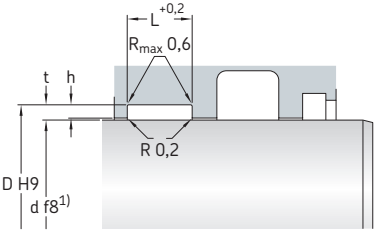
The requisite guide housing width is 15,3 mm. However, choose a 20 mm housing width, which is the nearest larger housing and guide width L, such as guide ring PGR 100x94x20-PF (→ **product table**, **page 281**).

5.1 WAT rod or piston guide rings, metric sizes

D **28 – 86** mm



Piston application
(dynamic on the outside surface)



Rod application
(dynamic on the inside surface)

$h \geq t/2$

Dimensions				Designation
D	d	L	t	
mm				–
28	25	5,6	1,5	**WAT-25x28x5.6-E8D**
28,1	25	4	1,55	**WAT-25x28.1x4-E8D**
30	25	5,6	2,5	**WAT-25x30x5.6-E8D**
	25	9,7	2,5	**WAT-25x30x9.7-E8D**
	26	8	2	**WAT-26x30x8-E8D**
	27	5,6	1,5	**WAT-27x30x5.6-E8D**
31	27	8	2	**WAT-27x31x8-E8D**
	28	5,6	1,5	**WAT-28x31x5.6-E8D**
31,1	28	4	1,55	**WAT-28x31.1x4-E8D**
32	27	5,6	2,5	**WAT-27x32x5.6-E8D**
	28	8	2	**WAT-28x32x8-E8D**
	28,9	4	1,55	**WAT-28.9x32x4-E8D**
	29	5,6	1,5	**WAT-29x32x5.6-E8D**
33	28	5,6	2,5	**WAT-28x33x5.6-E8D**
	29	10	2	**WAT-29x33x10-E8D**
	30	5,6	1,5	**WAT-30x33x5.6-E8D**
35	30	15,3	2,5	**WAT-30x35x15.3-E8D**
	31	8	2	**WAT-31x35x8-E8D**
	31	10	2	**WAT-31x35x10-E8D**
	32	5,6	1,5	**WAT-32x35x5.6-E8D**
36	33	5,6	1,5	**WAT-33x36x5.6-E8D**
37	32	5,6	2,5	**WAT-32x37x5.6-E8D**
	32	9,7	2,5	**WAT-32x37x9.7-E8D**
	32	15	2,5	**WAT-32x37x15-E8D**
38	34	10	2	**WAT-34x38x10-E8D**
	35	5,6	1,5	**WAT-35x38x5.6-E8D**
39	36	5,6	1,5	**WAT-36x39x5.6-E8D**

Dimensions				Designation
D	d	L	t	
mm				–
40	35	5,6	2,5	**WAT-35x40x5.6-E8D**
	35	10	2,5	**WAT-35x40x10-E8D**
	35	15	2,5	**WAT-35x40x15-E8D**
	36	8	2	**WAT-36x40x8-E8D**
	36	10	2	**WAT-36x40x10-E8D**
	36,9	4	1,55	**WAT-36.9x40x4-E8D**
	37	5,6	1,5	**WAT-37x40x5.6-E8D**
41	36	5,6	2,5	**WAT-36x41x5.6-E8D**
	36	9,7	2,5	**WAT-36x41x9.7-E8D**
	37	15	2	**WAT-37x41x15-E8D**
	37	15,3	2	**WAT-37x41x15.3-E8D**
	38	5,6	1,5	**WAT-38x41x5.6-E8D**
42	37	5,6	2,5	**WAT-37x42x5.6-E8D**
43	38	15	2,5	**WAT-38x43x15-E8D**
	38	15,3	2,5	**WAT-38x43x15.3-E8D**
	40	5,6	1,5	**WAT-40x43x5.6-E8D**
45	40	5,6	2,5	**WAT-40x45x5.6-E8D**
	40	8	2,5	**WAT-40x45x8-E8D**
	40	9,7	2,5	**WAT-40x45x9.7-E8D**
	40	15	2,5	**WAT-40x45x15-E8D**
	40	20	2,5	**WAT-40x45x20-E8D**
47	42	5,6	2,5	**WAT-42x47x5.6-E8D**
	42	15	2,5	**WAT-42x47x15-E8D**
50	44	10	3	**WAT-44x50x10-E8D**
	45	5,6	2,5	**WAT-45x50x5.6-E8D**
	45	8	2,5	**WAT-45x50x8-E8D**
	45	9,7	2,5	**WAT-45x50x9.7-E8D**
	45	15	2,5	**WAT-45x50x15-E8D**
	45	15,3	2,5	**WAT-45x50x15.3-E8D**
	46,9	4	1,55	**WAT-46.9x50x4-E8D**

1) Adjustments according to tolerances provided for rod or piston seals are possible, however, the maximum e-gap also need to be considered (→ *Gap extrusion*, **page 34**)

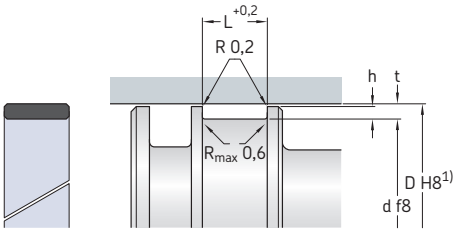
Dimensions				Designation
D	d	L	t	
mm				–
55	50	5,6	2,5	**WAT-50x55x5.6-E8D**
	50	5,8	2,5	**WAT-50x55x5.8-E8D**
	50	8	2,5	**WAT-50x55x8-E8D**
	50	9,7	2,5	**WAT-50x55x9.7-E8D**
	50	15	2,5	**WAT-50x55x15-E8D**
	50	15,3	2,5	**WAT-50x55x15.3-E8D**
56	51	5,6	2,5	**WAT-51x56x5.6-E8D**
	51	8	2,5	**WAT-51x56x8-E8D**
	51	15	2,5	**WAT-51x56x15-E8D**
	51	15,3	2,5	**WAT-51x56x15.3-E8D**
60	54	13	3	**WAT-54x60x13-E8D**
	55	5,6	2,5	**WAT-55x60x5.6-E8D**
	55	8	2,5	**WAT-55x60x8-E8D**
	55	9,7	2,5	**WAT-55x60x9.7-E8D**
	55	10	2,5	**WAT-55x60x10-E8D**
	55	13	2,5	**WAT-55x60x13-E8D**
	55	15	2,5	**WAT-55x60x15-E8D**
	55	15,3	2,5	**WAT-55x60x15.3-E8D**
61	50	5,6	5,5	**WAT-50x61x5.6-E8D**
	50	9,7	5,5	**WAT-50x61x9.7-E8D**
	56	5,6	2,5	**WAT-56x61x5.6-E8D**
	56	9,7	2,5	**WAT-56x61x9.7-E8D**
	56	15	2,5	**WAT-56x61x15-E8D**
63	58	5,6	2,5	**WAT-58x63x5.6-E8D**
	58	8	2,5	**WAT-58x63x8-E8D**
	58	9,7	2,5	**WAT-58x63x9.7-E8D**
	58	15	2,5	**WAT-58x63x15-E8D**
65	59	13	3	**WAT-59x65x13-E8D**
	60	5,6	2,5	**WAT-60x65x5.6-E8D**
	60	9,7	2,5	**WAT-60x65x9.7-E8D**
	60	10	2,5	**WAT-60x65x10-E8D**
	60	15	2,5	**WAT-60x65x15-E8D**
	60	15,3	2,5	**WAT-60x65x15.3-E8D**
	60	20	2,5	**WAT-60x65x20-E8D**
	60	20,3	2,5	**WAT-60x65x20.3-E8D**
	60	25	2,5	**WAT-60x65x25-E8D**
66	60	10	3	**WAT-60x66x10-E8D**
	60	13	3	**WAT-60x66x13-E8D**
	61	20	2,5	**WAT-61x66x20-E8D**
	61	20,3	2,5	**WAT-61x66x20.3-E8D**
68	63	5,6	2,5	**WAT-63x68x5.6-E8D**
	63	9,7	2,5	**WAT-63x68x9.7-E8D**
	63	10	2,5	**WAT-63x68x10-E8D**
	63	13	2,5	**WAT-63x68x13-E8D**
	63	15	2,5	**WAT-63x68x15-E8D**
	63	20	2,5	**WAT-63x68x20-E8D**
69	64	10	2,5	**WAT-64x69x10-E8D**
	64	20	2,5	**WAT-64x69x20-E8D**
	64	20,3	2,5	**WAT-64x69x20.3-E8D**

Dimensions				Designation
D	d	L	t	
mm				–
70	62	25	4	**WAT-62x70x25-E8D**
	64	13	3	**WAT-64x70x13-E8D**
	65	9,7	2,5	**WAT-65x70x9.7-E8D**
	65	10	2,5	**WAT-65x70x10-E8D**
	65	13	2,5	**WAT-65x70x13-E8D**
	65	15	2,5	**WAT-65x70x15-E8D**
	65	20	2,5	**WAT-65x70x20-E8D**
	65	20,3	2,5	**WAT-65x70x20.3-E8D**
71	66	10	2,5	**WAT-66x71x10-E8D**
	66	20	2,5	**WAT-66x71x20-E8D**
73	68	10	2,5	**WAT-68x73x10-E8D**
	68	13	2,5	**WAT-68x73x13-E8D**
75	69	10	3	**WAT-69x75x10-E8D**
	69	13	3	**WAT-69x75x13-E8D**
	70	5,6	2,5	**WAT-70x75x5.6-E8D**
	70	9,7	2,5	**WAT-70x75x9.7-E8D**
	70	10	2,5	**WAT-70x75x10-E8D**
	70	13	2,5	**WAT-70x75x13-E8D**
	70	15	2,5	**WAT-70x75x15-E8D**
	70	20	2,5	**WAT-70x75x20-E8D**
	70	20,3	2,5	**WAT-70x75x20.3-E8D**
76	70	13	3	**WAT-70x76x13-E8D**
	70	15,3	3	**WAT-70x76x15.3-E8D**
	70	19,5	3	**WAT-70x76x19.5-E8D**
	71	20	2,5	**WAT-71x76x20-E8D**
80	74	20,3	3	**WAT-74x80x20.3-E8D**
	74	25,5	3	**WAT-74x80x25.5-E8D**
	75	5,6	2,5	**WAT-75x80x5.6-E8D**
	75	9,7	2,5	**WAT-75x80x9.7-E8D**
	75	10	2,5	**WAT-75x80x10-E8D**
	75	15	2,5	**WAT-75x80x15-E8D**
	75	20	2,5	**WAT-75x80x20-E8D**
	75	20,3	2,5	**WAT-75x80x20.3-E8D**
	75	30,5	2,5	**WAT-75x80x30.5-E8D**
85	79	13	3	**WAT-79x85x13-E8D**
	79	15	3	**WAT-79x85x15-E8D**
	79	25	3	**WAT-79x85x25-E8D**
	80	9,7	2,5	**WAT-80x85x9.7-E8D**
	80	13	2,5	**WAT-80x85x13-E8D**
	80	15	2,5	**WAT-80x85x15-E8D**
	80	20	2,5	**WAT-80x85x20-E8D**
	80	25	2,5	**WAT-80x85x25-E8D**
86	80	13	3	**WAT-80x86x13-E8D**
	80	19,5	3	**WAT-80x86x19.5-E8D**

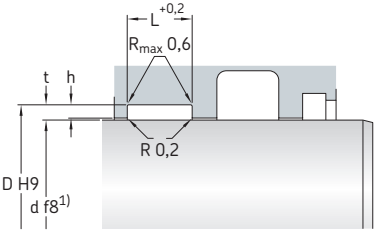
[1] Adjustments according to tolerances provided for rod or piston seals are possible, however, the maximum e-gap also need to be considered (→ *Gap extrusion*, **page 34**)

5.1 WAT rod or piston guide rings, metric sizes

D **90 – 165** mm



Piston application
(dynamic on the outside surface)



Rod application
(dynamic on the inside surface)

$h \geq t/2$

Dimensions				Designation
D	d	L	t	
mm				–
90	84	13	3	**WAT-84x90x13-E8D**
	84	15	3	**WAT-84x90x15-E8D**
	84	15,3	3	**WAT-84x90x15.3-E8D**
	84	25	3	**WAT-84x90x25-E8D**
	84	25,5	3	**WAT-84x90x25.5-E8D**
	85	9,7	2,5	**WAT-85x90x9.7-E8D**
	85	10	2,5	**WAT-85x90x10-E8D**
	85	15	2,5	**WAT-85x90x15-E8D**
	85	30	2,5	**WAT-85x90x30-E8D**
93	88	10	2,5	**WAT-88x93x10-E8D**
	88	13	2,5	**WAT-88x93x13-E8D**
95	89	13	3	**WAT-89x95x13-E8D**
	89	15	3	**WAT-89x95x15-E8D**
	90	9,7	2,5	**WAT-90x95x9.7-E8D**
	90	10	2,5	**WAT-90x95x10-E8D**
	90	13	2,5	**WAT-90x95x13-E8D**
	90	15	2,5	**WAT-90x95x15-E8D**
	90	20	2,5	**WAT-90x95x20-E8D**
96	90	10	3	**WAT-90x96x10-E8D**
	90	13	3	**WAT-90x96x13-E8D**
	90	19,5	3	**WAT-90x96x19.5-E8D**
100	94	15	3	**WAT-94x100x15-E8D**
	94	15,3	3	**WAT-94x100x15.3-E8D**
	94	25	3	**WAT-94x100x25-E8D**
	94	25,5	3	**WAT-94x100x25.5-E8D**
	94	30,5	3	**WAT-94x100x30.5-E8D**
	95	5,6	2,5	**WAT-95x100x5.6-E8D**
	95	9,7	2,5	**WAT-95x100x9.7-E8D**
	95	10	2,5	**WAT-95x100x10-E8D**
	95	13	2,5	**WAT-95x100x13-E8D**
	95	15	2,5	**WAT-95x100x15-E8D**
	95	15,3	2,5	**WAT-95x100x15.3-E8D**

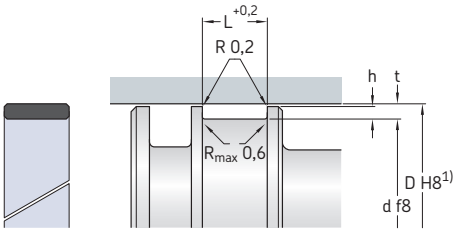
Dimensions				Designation
D	d	L	t	
mm				–
101	95	13	3	**WAT-95x101x13-E8D**
	95	19,5	3	**WAT-95x101x19.5-E8D**
105	99	10	3	**WAT-99x105x10-E8D**
	99	25	3	**WAT-99x105x25-E8D**
	100	9,7	2,5	**WAT-100x105x9.7-E8D**
	100	15	2,5	**WAT-100x105x15-E8D**
	100	25	2,5	**WAT-100x105x25-E8D**
	100	30,5	2,5	**WAT-100x105x30.5-E8D**
107	101	15	3	**WAT-101x107x15-E8D**
110	102	15	4	**WAT-102x110x15-E8D**
	102	25	4	**WAT-102x110x25-E8D**
	104	13	3	**WAT-104x110x13-E8D**
	104	15	3	**WAT-104x110x15-E8D**
	104	25	3	**WAT-104x110x25-E8D**
	104	25,5	3	**WAT-104x110x25.5-E8D**
	105	8	2,5	**WAT-105x110x8-E8D**
	105	9,7	2,5	**WAT-105x110x9.7-E8D**
	105	13	2,5	**WAT-105x110x13-E8D**
	105	15	2,5	**WAT-105x110x15-E8D**
112	106	15	3	**WAT-106x112x15-E8D**
	106	30	3	**WAT-106x112x30-E8D**
	107	10	2,5	**WAT-107x112x10-E8D**
	107	13	2,5	**WAT-107x112x13-E8D**
115	107	13	4	**WAT-107x115x13-E8D**
	109	19,5	3	**WAT-109x115x19.5-E8D**
	109	30	3	**WAT-109x115x30-E8D**
	110	9,7	2,5	**WAT-110x115x9.7-E8D**
	110	15	2,5	**WAT-110x115x15-E8D**
	110	20	2,5	**WAT-110x115x20-E8D**
	110	25	2,5	**WAT-110x115x25-E8D**
	110	30	2,5	**WAT-110x115x30-E8D**

1) Adjustments according to tolerances provided for rod or piston seals are possible, however, the maximum e-gap also need to be considered (→ *Gap extrusion*, **page 34**)

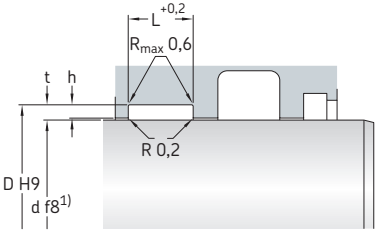
Dimensions				Designation
D	d	L	t	
mm				–
116	110	9,7	3	**WAT-110x116x9.7-E8D**
	110	25,5	3	**WAT-110x116x25.5-E8D**
120	112	25	4	**WAT-112x120x25-E8D**
	114	13	3	**WAT-114x120x13-E8D**
	114	15	3	**WAT-114x120x15-E8D**
	114	15,3	3	**WAT-114x120x15.3-E8D**
	114	20	3	**WAT-114x120x20-E8D**
	114	30	3	**WAT-114x120x30-E8D**
	114	30,5	3	**WAT-114x120x30.5-E8D**
	115	9,7	2,5	**WAT-115x120x9.7-E8D**
	115	13	2,5	**WAT-115x120x13-E8D**
	115	15	2,5	**WAT-115x120x15-E8D**
	115	25	2,5	**WAT-115x120x25-E8D**
121	115	20,3	3	**WAT-115x121x20.3-E8D**
	115	30,5	3	**WAT-115x121x30.5-E8D**
125	117	25	4	**WAT-117x125x25-E8D**
	119	15	3	**WAT-119x125x15-E8D**
	119	19,5	3	**WAT-119x125x19.5-E8D**
	119	25,5	3	**WAT-119x125x25.5-E8D**
	119	30	3	**WAT-119x125x30-E8D**
	119	30,5	3	**WAT-119x125x30.5-E8D**
	120	5,6	2,5	**WAT-120x125x5.6-E8D**
	120	8	2,5	**WAT-120x125x8-E8D**
	120	9,7	2,5	**WAT-120x125x9.7-E8D**
	120	15	2,5	**WAT-120x125x15-E8D**
	120	20	2,5	**WAT-120x125x20-E8D**
	120	25	2,5	**WAT-120x125x25-E8D**
126	120	10	3	**WAT-120x126x10-E8D**
	120	15,3	3	**WAT-120x126x15.3-E8D**
	120	20,3	3	**WAT-120x126x20.3-E8D**
130	123	15	3,5	**WAT-123x130x15-E8D**
	123	30	3,5	**WAT-123x130x30-E8D**
	124	10	3	**WAT-124x130x10-E8D**
	124	13	3	**WAT-124x130x13-E8D**
	124	30,5	3	**WAT-124x130x30.5-E8D**
	125	8	2,5	**WAT-125x130x8-E8D**
	125	9,7	2,5	**WAT-125x130x9.7-E8D**
	125	15	2,5	**WAT-125x130x15-E8D**
	125	15,3	2,5	**WAT-125x130x15.3-E8D**
	125	25,5	2,5	**WAT-125x130x25.5-E8D**
135	129	19,5	3	**WAT-129x135x19.5-E8D**
	130	9,7	2,5	**WAT-130x135x9.7-E8D**
	130	15	2,5	**WAT-130x135x15-E8D**
	130	20	2,5	**WAT-130x135x20-E8D**
	130	30	2,5	**WAT-130x135x30-E8D**
136	130	9,7	3	**WAT-130x136x9.7-E8D**
	130	15,3	3	**WAT-130x136x15.3-E8D**
	130	25,5	3	**WAT-130x136x25.5-E8D**

Dimensions				Designation
D	d	L	t	
mm				–
140	132	20	4	**WAT-132x140x20-E8D**
	132	25	4	**WAT-132x140x25-E8D**
	133	20	3,5	**WAT-133x140x20-E8D**
	134	13	3	**WAT-134x140x13-E8D**
	134	15,3	3	**WAT-134x140x15.3-E8D**
	134	20,3	3	**WAT-134x140x20.3-E8D**
	134	25,5	3	**WAT-134x140x25.5-E8D**
	135	9,7	2,5	**WAT-135x140x9.7-E8D**
	135	13	2,5	**WAT-135x140x13-E8D**
	135	15	2,5	**WAT-135x140x15-E8D**
	135	15,3	2,5	**WAT-135x140x15.3-E8D**
	135	20	2,5	**WAT-135x140x20-E8D**
145	139	13	3	**WAT-139x145x13-E8D**
	139	19,5	3	**WAT-139x145x19.5-E8D**
	139	30,5	3	**WAT-139x145x30.5-E8D**
	140	9,7	2,5	**WAT-140x145x9.7-E8D**
	140	15	2,5	**WAT-140x145x15-E8D**
	140	20	2,5	**WAT-140x145x20-E8D**
	140	25	2,5	**WAT-140x145x25-E8D**
	140	30	2,5	**WAT-140x145x30-E8D**
	140	30,5	2,5	**WAT-140x145x30.5-E8D**
146	140	13	3	**WAT-140x146x13-E8D**
	140	15,3	3	**WAT-140x146x15.3-E8D**
150	142	20	4	**WAT-142x150x20-E8D**
	142	25	4	**WAT-142x150x25-E8D**
	143	20	3,5	**WAT-143x150x20-E8D**
	144	13	3	**WAT-144x150x13-E8D**
	144	25,5	3	**WAT-144x150x25.5-E8D**
	145	9,7	2,5	**WAT-145x150x9.7-E8D**
	145	13	2,5	**WAT-145x150x13-E8D**
	145	15	2,5	**WAT-145x150x15-E8D**
	145	20	2,5	**WAT-145x150x20-E8D**
	145	25	2,5	**WAT-145x150x25-E8D**
155	150	15	2,5	**WAT-150x155x15-E8D**
	150	20	2,5	**WAT-150x155x20-E8D**
	150	30,5	2,5	**WAT-150x155x30.5-E8D**
157	150	40	3,5	**WAT-150x157x40-E8D**
160	152	15,3	4	**WAT-152x160x15.3-E8D**
	152	25	4	**WAT-152x160x25-E8D**
	153	20	3,5	**WAT-153x160x20-E8D**
	153	40	3,5	**WAT-153x160x40-E8D**
	154	19,5	3	**WAT-154x160x19.5-E8D**
	154	25,5	3	**WAT-154x160x25.5-E8D**
	155	9,7	2,5	**WAT-155x160x9.7-E8D**
	155	15	2,5	**WAT-155x160x15-E8D**
	155	15,3	2,5	**WAT-155x160x15.3-E8D**
	155	20	2,5	**WAT-155x160x20-E8D**
	155	25	2,5	**WAT-155x160x25-E8D**
	155	25,5	2,5	**WAT-155x160x25.5-E8D**
165	157	45	4	**WAT-157x165x45-E8D**
	159	19,5	3	**WAT-159x165x19.5-E8D**
	160	9,7	2,5	**WAT-160x165x9.7-E8D**
	160	15	2,5	**WAT-160x165x15-E8D**
	160	30,5	2,5	**WAT-160x165x30.5-E8D**

5.1 WAT rod or piston guide rings, metric sizes
D **170 – 260** mm



Piston application
(dynamic on the outside surface)



Rod application
(dynamic on the inside surface)

$h \geq t/2$

Dimensions				Designation
D	d	L	t	
mm				–
170	162	15	4	**WAT-162x170x15-E8D**
	162	25	4	**WAT-162x170x25-E8D**
	162	45	4	**WAT-162x170x45-E8D**
	164	9,7	3	**WAT-164x170x9.7-E8D**
	164	25,5	3	**WAT-164x170x25.5-E8D**
	165	9,7	2,5	**WAT-165x170x9.7-E8D**
	165	15	2,5	**WAT-165x170x15-E8D**
	165	15,3	2,5	**WAT-165x170x15.3-E8D**
	165	20	2,5	**WAT-165x170x20-E8D**
	165	20,3	2,5	**WAT-165x170x20.3-E8D**
175	170	15	2,5	**WAT-170x175x15-E8D**
	170	25	2,5	**WAT-170x175x25-E8D**
	170	30,5	2,5	**WAT-170x175x30.5-E8D**
180	172	15	4	**WAT-172x180x15-E8D**
	172	20	4	**WAT-172x180x20-E8D**
	172	25	4	**WAT-172x180x25-E8D**
	172	45	4	**WAT-172x180x45-E8D**
	174	19,5	3	**WAT-174x180x19.5-E8D**
	175	9,7	2,5	**WAT-175x180x9.7-E8D**
	175	15	2,5	**WAT-175x180x15-E8D**
	175	15,3	2,5	**WAT-175x180x15.3-E8D**
	175	20,3	2,5	**WAT-175x180x20.3-E8D**
185	177	45	4	**WAT-177x185x45-E8D**
	179	9,7	3	**WAT-179x185x9.7-E8D**
	180	9,7	2,5	**WAT-180x185x9.7-E8D**
	180	15	2,5	**WAT-180x185x15-E8D**
	180	25,5	2,5	**WAT-180x185x25.5-E8D**
186	180	15,3	3	**WAT-180x186x15.3-E8D**
188	180	25	4	**WAT-180x188x25-E8D**

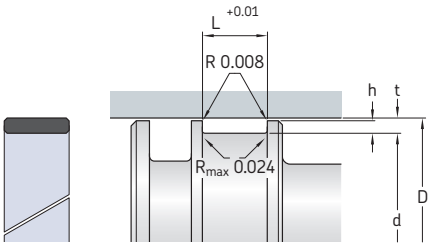
Dimensions				Designation
D	d	L	t	
mm				–
190	182	25	4	**WAT-182x190x25-E8D**
	182	45	4	**WAT-182x190x45-E8D**
	184	15	3	**WAT-184x190x15-E8D**
	185	15,3	2,5	**WAT-185x190x15.3-E8D**
	185	25,5	2,5	**WAT-185x190x25.5-E8D**
195	190	15	2,5	**WAT-190x195x15-E8D**
	190	25	2,5	**WAT-190x195x25-E8D**
200	192	25	4	**WAT-192x200x25-E8D**
	192	45	4	**WAT-192x200x45-E8D**
	194	15,3	3	**WAT-194x200x15.3-E8D**
	194	20,3	3	**WAT-194x200x20.3-E8D**
	195	9,7	2,5	**WAT-195x200x9.7-E8D**
	195	15	2,5	**WAT-195x200x15-E8D**
	195	15,3	2,5	**WAT-195x200x15.3-E8D**
	195	20	2,5	**WAT-195x200x20-E8D**
	195	25	2,5	**WAT-195x200x25-E8D**
	195	25,5	2,5	**WAT-195x200x25.5-E8D**
204	196	25	4	**WAT-196x204x25-E8D**
205	197	50	4	**WAT-197x205x50-E8D**
	200	15	2,5	**WAT-200x205x15-E8D**
	200	25	2,5	**WAT-200x205x25-E8D**
208	200	25	4	**WAT-200x208x25-E8D**
210	202	25	4	**WAT-202x210x25-E8D**
	202	50	4	**WAT-202x210x50-E8D**
	205	15	2,5	**WAT-205x210x15-E8D**
215	209	25,5	3	**WAT-209x215x25.5-E8D**
	210	15	2,5	**WAT-210x215x15-E8D**
	210	20,3	2,5	**WAT-210x215x20.3-E8D**

[1] Adjustments according to tolerances provided for rod or piston seals are possible, however, the maximum e-gap also need to be considered (→ *Gap extrusion*, **page 34**)

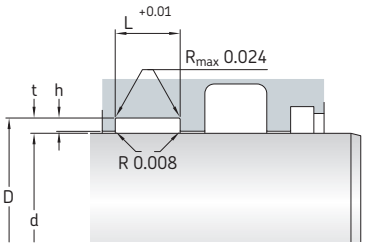
Dimensions				Designation
D	d	L	t	
mm				–
218	210	25	4	**WAT-210x218x25-E8D**
220	212	50	4	**WAT-212x220x50-E8D**
	215	9,7	2,5	**WAT-215x220x9.7-E8D**
	215	15	2,5	**WAT-215x220x15-E8D**
	215	15,3	2,5	**WAT-215x220x15.3-E8D**
224	216	25	4	**WAT-216x224x25-E8D**
	216	50	4	**WAT-216x224x50-E8D**
225	217	25	4	**WAT-217x225x25-E8D**
	217	50	4	**WAT-217x225x50-E8D**
	219	15,3	3	**WAT-219x225x15.3-E8D**
	220	15	2,5	**WAT-220x225x15-E8D**
	220	25	2,5	**WAT-220x225x25-E8D**
230	222	20	4	**WAT-222x230x20-E8D**
	222	30	4	**WAT-222x230x30-E8D**
	222	55	4	**WAT-222x230x55-E8D**
	225	20,3	2,5	**WAT-225x230x20.3-E8D**
235	229	25,5	3	**WAT-229x235x25.5-E8D**
240	232	30	4	**WAT-232x240x30-E8D**
	232	55	4	**WAT-232x240x55-E8D**
	235	20,3	2,5	**WAT-235x240x20.3-E8D**
	235	25,5	2,5	**WAT-235x240x25.5-E8D**
250	242	20,3	4	**WAT-242x250x20.3-E8D**
	242	30	4	**WAT-242x250x30-E8D**
	242	55	4	**WAT-242x250x55-E8D**
	244	15,3	3	**WAT-244x250x15.3-E8D**
	245	9,7	2,5	**WAT-245x250x9.7-E8D**
	245	15	2,5	**WAT-245x250x15-E8D**
255	250	15	2,5	**WAT-250x255x15-E8D**
	250	25	2,5	**WAT-250x255x25-E8D**
260	252	20,3	4	**WAT-252x260x20.3-E8D**
	252	30,5	4	**WAT-252x260x30.5-E8D**

5.2 WAT rod or piston guide rings, inch sizes

D **1 – 2.25** in.



h ≥ t/2



Diameter tolerances

Cylinder bore D	Tolerances[1] D	d
in.	in.	
1 to 4.875	+0.002	–0.002
5 to 7.75	+0.004	–0.003
8 to 10.5	+0.006	–0.004

Piston application
(dynamic on the outside surface)

Diameter tolerances

Housing groove D	Tolerances[1] D	d
in.	in.	
1 to 5.625	+0.002	–0.002
5.75 to 10.5	+0.003	–0.004

Rod application
(dynamic on the inside surface)

Dimensions				Designation
D	d	L	t	
in.				–
1	0.813	0.25	0.093	**WAT93-1000-250-E8D**
	0.813	0.312	0.093	**WAT93-1000-312-E8D**
	0.813	0.375	0.093	**WAT93-1000-375-E8D**
	0.813	0.5	0.093	**WAT93-1000-500-E8D**
	0.813	0.625	0.093	**WAT93-1000-625-E8D**
	0.875	0.25	0.062	**WAT62-1000-250-E8D**
	0.875	0.312	0.062	**WAT62-1000-312-E8D**
	0.875	0.375	0.062	**WAT62-1000-375-E8D**
	0.875	0.5	0.062	**WAT62-1000-500-E8D**
	0.875	0.625	0.062	**WAT62-1000-625-E8D**
1.125	0.938	0.25	0.093	**WAT93-1125-250-E8D**
	0.938	0.312	0.093	**WAT93-1125-312-E8D**
	0.938	0.375	0.093	**WAT93-1125-375-E8D**
	0.938	0.5	0.093	**WAT93-1125-500-E8D**
	0.938	0.625	0.093	**WAT93-1125-625-E8D**
	1	0.187	0.062	**WAT62-1125-187-E8D**
	1	0.25	0.062	**WAT62-1125-250-E8D**
	1	0.312	0.062	**WAT62-1125-312-E8D**
	1	0.375	0.062	**WAT62-1125-375-E8D**
	1	0.5	0.062	**WAT62-1125-500-E8D**
	1	0.625	0.062	**WAT62-1125-625-E8D**
1.25	1	0.187	0.125	**WAT125-1250-187-E8D**
	1	0.25	0.125	**WAT125-1250-250-E8D**
	1	0.312	0.125	**WAT125-1250-312-E8D**
	1	0.375	0.125	**WAT125-1250-375-E8D**
	1	0.5	0.125	**WAT125-1250-500-E8D**
	1	0.625	0.125	**WAT125-1250-625-E8D**
	1	0.75	0.125	**WAT125-1250-750-E8D**

Dimensions				Designation
D	d	L	t	
in.				–
1.25 cont.	1.063	0.25	0.093	**WAT93-1250-250-E8D**
	1.063	0.312	0.093	**WAT93-1250-312-E8D**
	1.063	0.375	0.093	**WAT93-1250-375-E8D**
	1.063	0.5	0.093	**WAT93-1250-500-E8D**
	1.063	0.625	0.093	**WAT93-1250-625-E8D**
	1.063	0.75	0.093	**WAT93-1250-750-E8D**
	1.125	0.187	0.062	**WAT62-1250-187-E8D**
	1.125	0.25	0.062	**WAT62-1250-250-E8D**
	1.125	0.312	0.062	**WAT62-1250-312-E8D**
	1.125	0.375	0.062	**WAT62-1250-375-E8D**
	1.125	0.5	0.062	**WAT62-1250-500-E8D**
	1.125	0.625	0.062	**WAT62-1250-625-E8D**
	1.125	0.75	0.062	**WAT62-1250-750-E8D**
1.5	1.25	0.187	0.125	**WAT125-1500-187-E8D**
	1.25	0.25	0.125	**WAT125-1500-250-E8D**
	1.25	0.312	0.125	**WAT125-1500-312-E8D**
	1.25	0.375	0.125	**WAT125-1500-375-E8D**
	1.25	0.5	0.125	**WAT125-1500-500-E8D**
	1.25	0.625	0.125	**WAT125-1500-625-E8D**
	1.25	0.75	0.125	**WAT125-1500-750-E8D**
	1.25	0.875	0.125	**WAT125-1500-875-E8D**
	1.25	1	0.125	**WAT125-1500-1000-E8D**
	1.313	0.25	0.093	**WAT93-1500-250-E8D**
	1.313	0.312	0.093	**WAT93-1500-312-E8D**
	1.313	0.375	0.093	**WAT93-1500-375-E8D**
	1.313	0.5	0.093	**WAT93-1500-500-E8D**

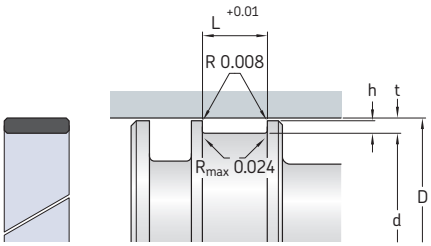
[1] Adjustments according to tolerances provided for rod or piston seals are possible, however, the maximum e-gap also need to be considered (→ *Gap extrusion*, **page 34**)

Dimensions				Designation
D	d	L	t	
in.				–
1.5	1.313	0.625	0.093	**WAT93-1500-625-E8D**
cont.	1.313	0.75	0.093	**WAT93-1500-750-E8D**
	1.313	0.875	0.093	**WAT93-1500-875-E8D**
	1.313	1	0.093	**WAT93-1500-1000-E8D**
	1.375	0.187	0.062	**WAT62-1500-187-E8D**
	1.375	0.25	0.062	**WAT62-1500-250-E8D**
	1.375	0.312	0.062	**WAT62-1500-312-E8D**
	1.375	0.375	0.062	**WAT62-1500-375-E8D**
	1.375	0.5	0.062	**WAT62-1500-500-E8D**
	1.375	0.625	0.062	**WAT62-1500-625-E8D**
	1.375	0.75	0.062	**WAT62-1500-750-E8D**
	1.375	0.875	0.062	**WAT62-1500-875-E8D**
	1.375	1	0.062	**WAT62-1500-1000-E8D**
1.75	1.5	0.25	0.125	**WAT125-1750-250-E8D**
	1.5	0.312	0.125	**WAT125-1750-312-E8D**
	1.5	0.375	0.125	**WAT125-1750-375-E8D**
	1.5	0.5	0.125	**WAT125-1750-500-E8D**
	1.5	0.625	0.125	**WAT125-1750-625-E8D**
	1.5	0.75	0.125	**WAT125-1750-750-E8D**
	1.5	0.875	0.125	**WAT125-1750-875-E8D**
	1.5	1	0.125	**WAT125-1750-1000-E8D**
	1.563	0.25	0.093	**WAT93-1750-250-E8D**
	1.563	0.312	0.093	**WAT93-1750-312-E8D**
	1.563	0.375	0.093	**WAT93-1750-375-E8D**
	1.563	0.5	0.093	**WAT93-1750-500-E8D**
	1.563	0.625	0.093	**WAT93-1750-625-E8D**
	1.563	0.75	0.093	**WAT93-1750-750-E8D**
	1.563	0.875	0.093	**WAT93-1750-875-E8D**
	1.563	1	0.093	**WAT93-1750-1000-E8D**
	1.625	0.25	0.062	**WAT62-1750-250-E8D**
	1.625	0.312	0.062	**WAT62-1750-312-E8D**
	1.625	0.375	0.062	**WAT62-1750-375-E8D**
	1.625	0.5	0.062	**WAT62-1750-500-E8D**
	1.625	0.625	0.062	**WAT62-1750-625-E8D**
	1.625	0.75	0.062	**WAT62-1750-750-E8D**
	1.625	0.875	0.062	**WAT62-1750-875-E8D**
	1.625	1	0.062	**WAT62-1750-1000-E8D**
2	1.625	0.25	0.187	**WAT187-2000-250-E8D**
	1.625	0.312	0.187	**WAT187-2000-312-E8D**
	1.625	0.375	0.187	**WAT187-2000-375-E8D**
	1.625	0.5	0.187	**WAT187-2000-500-E8D**
	1.625	0.625	0.187	**WAT187-2000-625-E8D**
	1.625	0.75	0.187	**WAT187-2000-750-E8D**
	1.625	0.875	0.187	**WAT187-2000-875-E8D**
	1.625	1	0.187	**WAT187-2000-1000-E8D**
	1.625	1.25	0.187	**WAT187-2000-1250-E8D**
	1.625	1.5	0.187	**WAT187-2000-1500-E8D**
	1.75	0.25	0.125	**WAT125-2000-250-E8D**
	1.75	0.312	0.125	**WAT125-2000-312-E8D**
	1.75	0.375	0.125	**WAT125-2000-375-E8D**
	1.75	0.5	0.125	**WAT125-2000-500-E8D**
	1.75	0.625	0.125	**WAT125-2000-625-E8D**

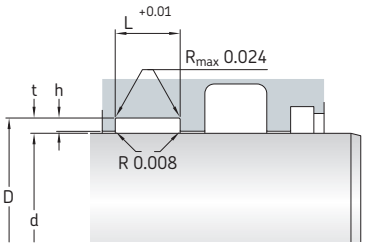
Dimensions				Designation
D	d	L	t	
in.				–
2	1.75	0.75	0.125	**WAT125-2000-750-E8D**
cont.	1.75	0.875	0.125	**WAT125-2000-875-E8D**
	1.75	1	0.125	**WAT125-2000-1000-E8D**
	1.75	1.25	0.125	**WAT125-2000-1250-E8D**
	1.75	1.5	0.125	**WAT125-2000-1500-E8D**
	1.813	0.25	0.093	**WAT93-2000-250-E8D**
	1.813	0.312	0.093	**WAT93-2000-312-E8D**
	1.813	0.375	0.093	**WAT93-2000-375-E8D**
	1.813	0.5	0.093	**WAT93-2000-500-E8D**
	1.813	0.625	0.093	**WAT93-2000-625-E8D**
	1.813	0.75	0.093	**WAT93-2000-750-E8D**
	1.813	0.875	0.093	**WAT93-2000-875-E8D**
	1.813	1	0.093	**WAT93-2000-1000-E8D**
	1.813	1.25	0.093	**WAT93-2000-1250-E8D**
	1.813	1.5	0.093	**WAT93-2000-1500-E8D**
	1.875	0.25	0.062	**WAT62-2000-250-E8D**
	1.875	0.312	0.062	**WAT62-2000-312-E8D**
	1.875	0.375	0.062	**WAT62-2000-375-E8D**
	1.875	0.5	0.062	**WAT62-2000-500-E8D**
	1.875	0.625	0.062	**WAT62-2000-625-E8D**
	1.875	0.75	0.062	**WAT62-2000-750-E8D**
	1.875	0.875	0.062	**WAT62-2000-875-E8D**
	1.875	1	0.062	**WAT62-2000-1000-E8D**
	1.875	1.25	0.062	**WAT62-2000-1250-E8D**
	1.875	1.5	0.062	**WAT62-2000-1500-E8D**
2.25	1.875	0.25	0.187	**WAT187-2250-250-E8D**
	1.875	0.312	0.187	**WAT187-2250-312-E8D**
	1.875	0.375	0.187	**WAT187-2250-375-E8D**
	1.875	0.5	0.187	**WAT187-2250-500-E8D**
	1.875	0.625	0.187	**WAT187-2250-625-E8D**
	1.875	0.75	0.187	**WAT187-2250-750-E8D**
	1.875	0.875	0.187	**WAT187-2250-875-E8D**
	1.875	1	0.187	**WAT187-2250-1000-E8D**
	1.875	1.25	0.187	**WAT187-2250-1250-E8D**
	1.875	1.5	0.187	**WAT187-2250-1500-E8D**
	2	0.25	0.125	**WAT125-2250-250-E8D**
	2	0.312	0.125	**WAT125-2250-312-E8D**
	2	0.375	0.125	**WAT125-2250-375-E8D**
	2	0.5	0.125	**WAT125-2250-500-E8D**
	2	0.625	0.125	**WAT125-2250-625-E8D**
	2	0.75	0.125	**WAT125-2250-750-E8D**
	2	0.875	0.125	**WAT125-2250-875-E8D**
	2	1	0.125	**WAT125-2250-1000-E8D**
	2	1.25	0.125	**WAT125-2250-1250-E8D**
	2	1.5	0.125	**WAT125-2250-1500-E8D**
	2.063	0.25	0.093	**WAT93-2250-250-E8D**
	2.063	0.312	0.093	**WAT93-2250-312-E8D**
	2.063	0.375	0.093	**WAT93-2250-375-E8D**
	2.063	0.5	0.093	**WAT93-2250-500-E8D**
	2.063	0.625	0.093	**WAT93-2250-625-E8D**
	2.063	0.75	0.093	**WAT93-2250-750-E8D**
	2.063	0.875	0.093	**WAT93-2250-875-E8D**
	2.063	1	0.093	**WAT93-2250-1000-E8D**
	2.063	1.25	0.093	**WAT93-2250-1250-E8D**
	2.063	1.5	0.093	**WAT93-2250-1500-E8D**

5.2 WAT rod or piston guide rings, inch sizes

D **2.25 – 3** in.



h ≥ t/2



Diameter tolerances

Cylinder bore D	Tolerances[1] D	d
in.	in.	
1 to 4.875	+0.002	–0.002
5 to 7.75	+0.004	–0.003
8 to 10.5	+0.006	–0.004

Piston application
(dynamic on the outside surface)

Diameter tolerances

Housing groove D	Tolerances[1] D	d
in.	in.	
1 to 5.625	+0.002	–0.002
5.75 to 10.5	+0.003	–0.004

Rod application
(dynamic on the inside surface)

Dimensions				Designation
D	d	L	t	
in.				–
2.25	2.125	0.25	0.062	**WAT62-2250-250-E8D**
cont.	2.125	0.312	0.062	**WAT62-2250-312-E8D**
	2.125	0.375	0.062	**WAT62-2250-375-E8D**
	2.125	0.5	0.062	**WAT62-2250-500-E8D**
	2.125	0.625	0.062	**WAT62-2250-625-E8D**
	2.125	0.75	0.062	**WAT62-2250-750-E8D**
	2.125	0.875	0.062	**WAT62-2250-875-E8D**
	2.125	1	0.062	**WAT62-2250-1000-E8D**
	2.125	1.25	0.062	**WAT62-2250-1250-E8D**
	2.125	1.5	0.062	**WAT62-2250-1500-E8D**
2.5	2.125	0.25	0.187	**WAT187-2500-250-E8D**
	2.125	0.312	0.187	**WAT187-2500-312-E8D**
	2.125	0.375	0.187	**WAT187-2500-375-E8D**
	2.125	0.5	0.187	**WAT187-2500-500-E8D**
	2.125	0.625	0.187	**WAT187-2500-625-E8D**
	2.125	0.75	0.187	**WAT187-2500-750-E8D**
	2.125	0.875	0.187	**WAT187-2500-875-E8D**
	2.125	1	0.187	**WAT187-2500-1000-E8D**
	2.125	1.25	0.187	**WAT187-2500-1250-E8D**
	2.125	1.5	0.187	**WAT187-2500-1500-E8D**
	2.125	1.75	0.187	**WAT187-2500-1750-E8D**
	2.25	0.25	0.125	**WAT125-2500-250-E8D**
	2.25	0.312	0.125	**WAT125-2500-312-E8D**
	2.25	0.375	0.125	**WAT125-2500-375-E8D**
	2.25	0.5	0.125	**WAT125-2500-500-E8D**
	2.25	0.625	0.125	**WAT125-2500-625-E8D**
	2.25	0.75	0.125	**WAT125-2500-750-E8D**

Dimensions				Designation
D	d	L	t	
in.				–
2.5	2.25	0.875	0.125	**WAT125-2500-875-E8D**
cont.	2.25	1	0.125	**WAT125-2500-1000-E8D**
	2.25	1.25	0.125	**WAT125-2500-1250-E8D**
	2.25	1.5	0.125	**WAT125-2500-1500-E8D**
	2.25	1.75	0.125	**WAT125-2500-1750-E8D**
	2.313	0.25	0.093	**WAT93-2500-250-E8D**
	2.313	0.312	0.093	**WAT93-2500-312-E8D**
	2.313	0.375	0.093	**WAT93-2500-375-E8D**
	2.313	0.5	0.093	**WAT93-2500-500-E8D**
	2.313	0.625	0.093	**WAT93-2500-625-E8D**
	2.313	0.75	0.093	**WAT93-2500-750-E8D**
	2.313	0.875	0.093	**WAT93-2500-875-E8D**
	2.313	1	0.093	**WAT93-2500-1000-E8D**
	2.313	1.25	0.093	**WAT93-2500-1250-E8D**
	2.313	1.5	0.093	**WAT93-2500-1500-E8D**
	2.313	1.75	0.093	**WAT93-2500-1750-E8D**
	2.375	0.25	0.062	**WAT62-2500-250-E8D**
	2.375	0.312	0.062	**WAT62-2500-312-E8D**
	2.375	0.375	0.062	**WAT62-2500-375-E8D**
	2.375	0.5	0.062	**WAT62-2500-500-E8D**
	2.375	0.625	0.062	**WAT62-2500-625-E8D**
	2.375	0.75	0.062	**WAT62-2500-750-E8D**
	2.375	0.875	0.062	**WAT62-2500-875-E8D**
	2.375	1	0.062	**WAT62-2500-1000-E8D**
	2.375	1.25	0.062	**WAT62-2500-1250-E8D**
	2.375	1.5	0.062	**WAT62-2500-1500-E8D**
	2.375	1.75	0.062	**WAT62-2500-1750-E8D**

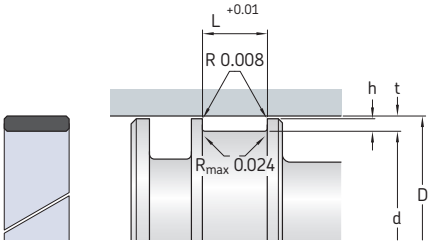
[1] Adjustments according to tolerances provided for rod or piston seals are possible, however, the maximum e-gap also need to be considered (→ *Gap extrusion*, **page 34**)

Dimensions				Designation
D	d	L	t	
in.				–
2.625	2.25	0.25	0.187	**WAT187-2625-250-E8D**
	2.25	0.312	0.187	**WAT187-2625-312-E8D**
	2.25	0.375	0.187	**WAT187-2625-375-E8D**
	2.25	0.5	0.187	**WAT187-2625-500-E8D**
	2.25	0.625	0.187	**WAT187-2625-625-E8D**
	2.25	0.75	0.187	**WAT187-2625-750-E8D**
	2.25	0.875	0.187	**WAT187-2625-875-E8D**
	2.25	1	0.187	**WAT187-2625-1000-E8D**
	2.25	1.25	0.187	**WAT187-2625-1250-E8D**
	2.25	1.5	0.187	**WAT187-2625-1500-E8D**
	2.25	1.75	0.187	**WAT187-2625-1750-E8D**
	2.375	0.25	0.125	**WAT125-2625-250-E8D**
	2.375	0.312	0.125	**WAT125-2625-312-E8D**
	2.375	0.375	0.125	**WAT125-2625-375-E8D**
	2.375	0.5	0.125	**WAT125-2625-500-E8D**
	2.375	0.625	0.125	**WAT125-2625-625-E8D**
	2.375	0.75	0.125	**WAT125-2625-750-E8D**
	2.375	0.875	0.125	**WAT125-2625-875-E8D**
	2.375	1	0.125	**WAT125-2625-1000-E8D**
	2.375	1.25	0.125	**WAT125-2625-1250-E8D**
	2.375	1.5	0.125	**WAT125-2625-1500-E8D**
	2.375	1.75	0.125	**WAT125-2625-1750-E8D**
	2.438	0.25	0.093	**WAT93-2625-250-E8D**
	2.438	0.312	0.093	**WAT93-2625-312-E8D**
	2.438	0.375	0.093	**WAT93-2625-375-E8D**
	2.438	0.5	0.093	**WAT93-2625-500-E8D**
	2.438	0.625	0.093	**WAT93-2625-625-E8D**
	2.438	0.75	0.093	**WAT93-2625-750-E8D**
	2.438	0.875	0.093	**WAT93-2625-875-E8D**
	2.438	1	0.093	**WAT93-2625-1000-E8D**
	2.438	1.25	0.093	**WAT93-2625-1250-E8D**
	2.438	1.5	0.093	**WAT93-2625-1500-E8D**
	2.438	1.75	0.093	**WAT93-2625-1750-E8D**
	2.5	0.25	0.062	**WAT62-2625-250-E8D**
	2.5	0.312	0.062	**WAT62-2625-312-E8D**
	2.5	0.375	0.062	**WAT62-2625-375-E8D**
	2.5	0.5	0.062	**WAT62-2625-500-E8D**
	2.5	0.625	0.062	**WAT62-2625-625-E8D**
	2.5	0.75	0.062	**WAT62-2625-750-E8D**
	2.5	0.875	0.062	**WAT62-2625-875-E8D**
	2.5	1	0.062	**WAT62-2625-1000-E8D**
	2.5	1.25	0.062	**WAT62-2625-1250-E8D**
	2.5	1.5	0.062	**WAT62-2625-1500-E8D**
	2.5	1.75	0.062	**WAT62-2625-1750-E8D**
2.75	2.375	0.25	0.187	**WAT187-2750-250-E8D**
	2.375	0.312	0.187	**WAT187-2750-312-E8D**
	2.375	0.375	0.187	**WAT187-2750-375-E8D**
	2.375	0.5	0.187	**WAT187-2750-500-E8D**
	2.375	0.625	0.187	**WAT187-2750-625-E8D**
	2.375	0.75	0.187	**WAT187-2750-750-E8D**
	2.375	0.875	0.187	**WAT187-2750-875-E8D**
	2.375	1	0.187	**WAT187-2750-1000-E8D**
	2.375	1.25	0.187	**WAT187-2750-1250-E8D**
	2.375	1.5	0.187	**WAT187-2750-1500-E8D**
	2.375	1.75	0.187	**WAT187-2750-1750-E8D**
	2.375	2	0.187	**WAT187-2750-2000-E8D**
	2.5	0.25	0.125	**WAT125-2750-250-E8D**
	2.5	0.312	0.125	**WAT125-2750-312-E8D**

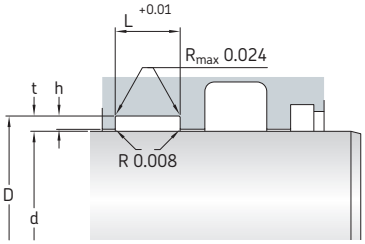
Dimensions				Designation
D	d	L	t	
in.				–
2.75 cont.	2.5	0.375	0.125	**WAT125-2750-375-E8D**
	2.5	0.5	0.125	**WAT125-2750-500-E8D**
	2.5	0.625	0.125	**WAT125-2750-625-E8D**
	2.5	0.75	0.125	**WAT125-2750-750-E8D**
	2.5	0.875	0.125	**WAT125-2750-875-E8D**
	2.5	1	0.125	**WAT125-2750-1000-E8D**
	2.5	1.25	0.125	**WAT125-2750-1250-E8D**
	2.5	1.5	0.125	**WAT125-2750-1500-E8D**
	2.5	1.75	0.125	**WAT125-2750-1750-E8D**
	2.5	2	0.125	**WAT125-2750-2000-E8D**
	2.563	0.25	0.093	**WAT93-2750-250-E8D**
	2.563	0.312	0.093	**WAT93-2750-312-E8D**
	2.563	0.375	0.093	**WAT93-2750-375-E8D**
	2.563	0.5	0.093	**WAT93-2750-500-E8D**
	2.563	0.625	0.093	**WAT93-2750-625-E8D**
	2.563	0.75	0.093	**WAT93-2750-750-E8D**
	2.563	0.875	0.093	**WAT93-2750-875-E8D**
	2.563	1	0.093	**WAT93-2750-1000-E8D**
	2.563	1.25	0.093	**WAT93-2750-1250-E8D**
	2.563	1.5	0.093	**WAT93-2750-1500-E8D**
	2.563	1.75	0.093	**WAT93-2750-1750-E8D**
	2.563	2	0.093	**WAT93-2750-2000-E8D**
	2.625	0.25	0.062	**WAT62-2750-250-E8D**
	2.625	0.312	0.062	**WAT62-2750-312-E8D**
	2.625	0.375	0.062	**WAT62-2750-375-E8D**
	2.625	0.5	0.062	**WAT62-2750-500-E8D**
	2.625	0.625	0.062	**WAT62-2750-625-E8D**
	2.625	0.75	0.062	**WAT62-2750-750-E8D**
	2.625	0.875	0.062	**WAT62-2750-875-E8D**
	2.625	1	0.062	**WAT62-2750-1000-E8D**
	2.625	1.25	0.062	**WAT62-2750-1250-E8D**
	2.625	1.5	0.062	**WAT62-2750-1500-E8D**
	2.625	1.75	0.062	**WAT62-2750-1750-E8D**
	2.625	2	0.062	**WAT62-2750-2000-E8D**
3	2.625	0.25	0.187	**WAT187-3000-250-E8D**
	2.625	0.312	0.187	**WAT187-3000-312-E8D**
	2.625	0.375	0.187	**WAT187-3000-375-E8D**
	2.625	0.5	0.187	**WAT187-3000-500-E8D**
	2.625	0.625	0.187	**WAT187-3000-625-E8D**
	2.625	0.75	0.187	**WAT187-3000-750-E8D**
	2.625	0.875	0.187	**WAT187-3000-875-E8D**
	2.625	1	0.187	**WAT187-3000-1000-E8D**
	2.625	1.25	0.187	**WAT187-3000-1250-E8D**
	2.625	1.5	0.187	**WAT187-3000-1500-E8D**
	2.625	1.75	0.187	**WAT187-3000-1750-E8D**
	2.625	2	0.187	**WAT187-3000-2000-E8D**
	2.75	0.25	0.125	**WAT125-3000-250-E8D**
	2.75	0.312	0.125	**WAT125-3000-312-E8D**
	2.75	0.375	0.125	**WAT125-3000-375-E8D**
	2.75	0.5	0.125	**WAT125-3000-500-E8D**
	2.75	0.625	0.125	**WAT125-3000-625-E8D**
	2.75	0.75	0.125	**WAT125-3000-750-E8D**
	2.75	0.875	0.125	**WAT125-3000-875-E8D**
	2.75	1	0.125	**WAT125-3000-1000-E8D**
	2.75	1.25	0.125	**WAT125-3000-1250-E8D**
	2.75	1.5	0.125	**WAT125-3000-1500-E8D**
	2.75	1.75	0.125	**WAT125-3000-1750-E8D**
	2.75	2	0.125	**WAT125-3000-2000-E8D**

5.2 WAT rod or piston guide rings, inch sizes

D **3 – 3.875** in.



h ≥ t/2



Diameter tolerances

Cylinder bore D	Tolerances[1] D	d
in.	in.	
1 to 4.875	+0.002	–0.002
5 to 7.75	+0.004	–0.003
8 to 10.5	+0.006	–0.004

Piston application
(dynamic on the outside surface)

Diameter tolerances

Housing groove D	Tolerances[1] D	d
in.	in.	
1 to 5.625	+0.002	–0.002
5.75 to 10.5	+0.003	–0.004

Rod application
(dynamic on the inside surface)

Dimensions				Designation
D	d	L	t	
in.				–
3	2.813	0.25	0.093	**WAT93-3000-250-E8D**
cont.	2.813	0.312	0.093	**WAT93-3000-312-E8D**
	2.813	0.375	0.093	**WAT93-3000-375-E8D**
	2.813	0.5	0.093	**WAT93-3000-500-E8D**
	2.813	0.625	0.093	**WAT93-3000-625-E8D**
	2.813	0.75	0.093	**WAT93-3000-750-E8D**
	2.813	0.875	0.093	**WAT93-3000-875-E8D**
	2.813	1	0.093	**WAT93-3000-1000-E8D**
	2.813	1.25	0.093	**WAT93-3000-1250-E8D**
	2.813	1.5	0.093	**WAT93-3000-1500-E8D**
	2.813	1.75	0.093	**WAT93-3000-1750-E8D**
	2.813	2	0.093	**WAT93-3000-2000-E8D**
	2.875	0.25	0.062	**WAT62-3000-250-E8D**
	2.875	0.312	0.062	**WAT62-3000-312-E8D**
	2.875	0.375	0.062	**WAT62-3000-375-E8D**
	2.875	0.5	0.062	**WAT62-3000-500-E8D**
	2.875	0.625	0.062	**WAT62-3000-625-E8D**
	2.875	0.75	0.062	**WAT62-3000-750-E8D**
	2.875	0.875	0.062	**WAT62-3000-875-E8D**
	2.875	1	0.062	**WAT62-3000-1000-E8D**
	2.875	1.25	0.062	**WAT62-3000-1250-E8D**
	2.875	1.5	0.062	**WAT62-3000-1500-E8D**
	2.875	1.75	0.062	**WAT62-3000-1750-E8D**
	2.875	2	0.062	**WAT62-3000-2000-E8D**
3.25	2.875	0.25	0.187	**WAT187-3250-250-E8D**
	2.875	0.312	0.187	**WAT187-3250-312-E8D**
	2.875	0.375	0.187	**WAT187-3250-375-E8D**

Dimensions				Designation
D	d	L	t	
in.				–
3.25	2.875	0.5	0.187	**WAT187-3250-500-E8D**
cont.	2.875	0.625	0.187	**WAT187-3250-625-E8D**
	2.875	0.75	0.187	**WAT187-3250-750-E8D**
	2.875	0.875	0.187	**WAT187-3250-875-E8D**
	2.875	1	0.187	**WAT187-3250-1000-E8D**
	2.875	1.25	0.187	**WAT187-3250-1250-E8D**
	2.875	1.5	0.187	**WAT187-3250-1500-E8D**
	2.875	1.75	0.187	**WAT187-3250-1750-E8D**
	2.875	2	0.187	**WAT187-3250-2000-E8D**
	3	0.25	0.125	**WAT125-3250-250-E8D**
	3	0.312	0.125	**WAT125-3250-312-E8D**
	3	0.375	0.125	**WAT125-3250-375-E8D**
	3	0.5	0.125	**WAT125-3250-500-E8D**
	3	0.625	0.125	**WAT125-3250-625-E8D**
	3	0.75	0.125	**WAT125-3250-750-E8D**
	3	0.875	0.125	**WAT125-3250-875-E8D**
	3	1	0.125	**WAT125-3250-1000-E8D**
	3	1.25	0.125	**WAT125-3250-1250-E8D**
	3	1.5	0.125	**WAT125-3250-1500-E8D**
	3	1.75	0.125	**WAT125-3250-1750-E8D**
	3	2	0.125	**WAT125-3250-2000-E8D**
	3.063	0.25	0.093	**WAT93-3250-250-E8D**
	3.063	0.312	0.093	**WAT93-3250-312-E8D**
	3.063	0.375	0.093	**WAT93-3250-375-E8D**
	3.063	0.5	0.093	**WAT93-3250-500-E8D**
	3.063	0.625	0.093	**WAT93-3250-625-E8D**
	3.063	0.75	0.093	**WAT93-3250-750-E8D**

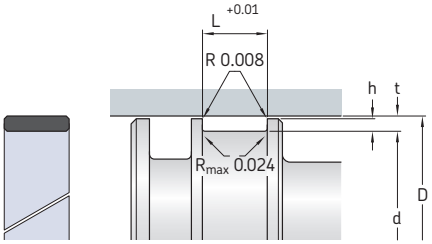
[1] Adjustments according to tolerances provided for rod or piston seals are possible, however, the maximum e-gap also need to be considered (→ *Gap extrusion*, **page 34**)

Dimensions				Designation
D	d	L	t	
in.				–
3.25	3.063	0.875	0.093	**WAT93-3250-875-E8D**
cont.	3.063	1	0.093	**WAT93-3250-1000-E8D**
	3.063	1.25	0.093	**WAT93-3250-1250-E8D**
	3.063	1.5	0.093	**WAT93-3250-1500-E8D**
	3.063	1.75	0.093	**WAT93-3250-1750-E8D**
	3.063	2	0.093	**WAT93-3250-2000-E8D**
	3.125	0.25	0.062	**WAT62-3250-250-E8D**
	3.125	0.312	0.062	**WAT62-3250-312-E8D**
	3.125	0.375	0.062	**WAT62-3250-375-E8D**
	3.125	0.5	0.062	**WAT62-3250-500-E8D**
	3.125	0.625	0.062	**WAT62-3250-625-E8D**
	3.125	0.75	0.062	**WAT62-3250-750-E8D**
	3.125	0.875	0.062	**WAT62-3250-875-E8D**
	3.125	1	0.062	**WAT62-3250-1000-E8D**
	3.125	1.25	0.062	**WAT62-3250-1250-E8D**
	3.125	1.5	0.062	**WAT62-3250-1500-E8D**
	3.125	1.75	0.062	**WAT62-3250-1750-E8D**
	3.125	2	0.062	**WAT62-3250-2000-E8D**
3.5	3.125	0.25	0.187	**WAT187-3500-250-E8D**
	3.125	0.312	0.187	**WAT187-3500-312-E8D**
	3.125	0.375	0.187	**WAT187-3500-375-E8D**
	3.125	0.5	0.187	**WAT187-3500-500-E8D**
	3.125	0.625	0.187	**WAT187-3500-625-E8D**
	3.125	0.75	0.187	**WAT187-3500-750-E8D**
	3.125	0.875	0.187	**WAT187-3500-875-E8D**
	3.125	1	0.187	**WAT187-3500-1000-E8D**
	3.125	1.25	0.187	**WAT187-3500-1250-E8D**
	3.125	1.5	0.187	**WAT187-3500-1500-E8D**
	3.125	1.75	0.187	**WAT187-3500-1750-E8D**
	3.125	2	0.187	**WAT187-3500-2000-E8D**
	3.25	0.25	0.125	**WAT125-3500-250-E8D**
	3.25	0.312	0.125	**WAT125-3500-312-E8D**
	3.25	0.375	0.125	**WAT125-3500-375-E8D**
	3.25	0.5	0.125	**WAT125-3500-500-E8D**
	3.25	0.625	0.125	**WAT125-3500-625-E8D**
	3.25	0.75	0.125	**WAT125-3500-750-E8D**
	3.25	0.875	0.125	**WAT125-3500-875-E8D**
	3.25	1	0.125	**WAT125-3500-1000-E8D**
	3.25	1.25	0.125	**WAT125-3500-1250-E8D**
	3.25	1.5	0.125	**WAT125-3500-1500-E8D**
	3.25	1.75	0.125	**WAT125-3500-1750-E8D**
	3.25	2	0.125	**WAT125-3500-2000-E8D**
	3.313	0.25	0.093	**WAT93-3500-250-E8D**
	3.313	0.312	0.093	**WAT93-3500-312-E8D**
	3.313	0.375	0.093	**WAT93-3500-375-E8D**
	3.313	0.5	0.093	**WAT93-3500-500-E8D**
	3.313	0.625	0.093	**WAT93-3500-625-E8D**
	3.313	0.75	0.093	**WAT93-3500-750-E8D**
	3.313	0.875	0.093	**WAT93-3500-875-E8D**
	3.313	1	0.093	**WAT93-3500-1000-E8D**
	3.313	1.25	0.093	**WAT93-3500-1250-E8D**
	3.313	1.5	0.093	**WAT93-3500-1500-E8D**
	3.313	1.75	0.093	**WAT93-3500-1750-E8D**
	3.313	2	0.093	**WAT93-3500-2000-E8D**
	3.375	0.25	0.062	**WAT62-3500-250-E8D**
	3.375	0.312	0.062	**WAT62-3500-312-E8D**
	3.375	0.375	0.062	**WAT62-3500-375-E8D**

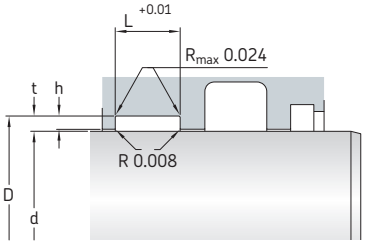
Dimensions				Designation
D	d	L	t	
in.				–
3.5	3.375	0.5	0.062	**WAT62-3500-500-E8D**
cont.	3.375	0.625	0.062	**WAT62-3500-625-E8D**
	3.375	0.75	0.062	**WAT62-3500-750-E8D**
	3.375	0.875	0.062	**WAT62-3500-875-E8D**
	3.375	1	0.062	**WAT62-3500-1000-E8D**
	3.375	1.25	0.062	**WAT62-3500-1250-E8D**
	3.375	1.5	0.062	**WAT62-3500-1500-E8D**
	3.375	1.75	0.062	**WAT62-3500-1750-E8D**
	3.375	2	0.062	**WAT62-3500-2000-E8D**
3.75	3.375	0.312	0.187	**WAT187-3750-312-E8D**
	3.375	0.375	0.187	**WAT187-3750-375-E8D**
	3.375	0.5	0.187	**WAT187-3750-500-E8D**
	3.375	0.625	0.187	**WAT187-3750-625-E8D**
	3.375	0.75	0.187	**WAT187-3750-750-E8D**
	3.375	0.875	0.187	**WAT187-3750-875-E8D**
	3.375	1	0.187	**WAT187-3750-1000-E8D**
	3.375	1.25	0.187	**WAT187-3750-1250-E8D**
	3.375	1.5	0.187	**WAT187-3750-1500-E8D**
	3.375	1.75	0.187	**WAT187-3750-1750-E8D**
	3.375	2	0.187	**WAT187-3750-2000-E8D**
	3.5	0.312	0.125	**WAT125-3750-312-E8D**
	3.5	0.375	0.125	**WAT125-3750-375-E8D**
	3.5	0.5	0.125	**WAT125-3750-500-E8D**
	3.5	0.625	0.125	**WAT125-3750-625-E8D**
	3.5	0.75	0.125	**WAT125-3750-750-E8D**
	3.5	0.875	0.125	**WAT125-3750-875-E8D**
	3.5	1	0.125	**WAT125-3750-1000-E8D**
	3.5	1.25	0.125	**WAT125-3750-1250-E8D**
	3.5	1.5	0.125	**WAT125-3750-1500-E8D**
	3.5	1.75	0.125	**WAT125-3750-1750-E8D**
	3.5	2	0.125	**WAT125-3750-2000-E8D**
	3.563	0.312	0.093	**WAT93-3750-312-E8D**
	3.563	0.375	0.093	**WAT93-3750-375-E8D**
	3.563	0.5	0.093	**WAT93-3750-500-E8D**
	3.563	0.625	0.093	**WAT93-3750-625-E8D**
	3.563	0.75	0.093	**WAT93-3750-750-E8D**
	3.563	0.875	0.093	**WAT93-3750-875-E8D**
	3.563	1	0.093	**WAT93-3750-1000-E8D**
	3.563	1.25	0.093	**WAT93-3750-1250-E8D**
	3.563	1.5	0.093	**WAT93-3750-1500-E8D**
	3.563	1.75	0.093	**WAT93-3750-1750-E8D**
	3.563	2	0.093	**WAT93-3750-2000-E8D**
	3.625	0.312	0.062	**WAT62-3750-312-E8D**
	3.625	0.375	0.062	**WAT62-3750-375-E8D**
	3.625	0.5	0.062	**WAT62-3750-500-E8D**
	3.625	0.625	0.062	**WAT62-3750-625-E8D**
	3.625	0.75	0.062	**WAT62-3750-750-E8D**
	3.625	0.875	0.062	**WAT62-3750-875-E8D**
	3.625	1	0.062	**WAT62-3750-1000-E8D**
	3.625	1.25	0.062	**WAT62-3750-1250-E8D**
	3.625	1.5	0.062	**WAT62-3750-1500-E8D**
	3.625	1.75	0.062	**WAT62-3750-1750-E8D**
	3.625	2	0.062	**WAT62-3750-2000-E8D**
3.875	3.5	0.312	0.187	**WAT187-3875-312-E8D**
	3.5	0.375	0.187	**WAT187-3875-375-E8D**
	3.5	0.5	0.187	**WAT187-3875-500-E8D**

5.2 WAT rod or piston guide rings, inch sizes

D **3.875 – 4.75** in.



h ≥ t/2



Diameter tolerances

Cylinder bore D	Tolerances[1] D	d
in.	in.	
1 to 4.875	+0.002	–0.002
5 to 7.75	+0.004	–0.003
8 to 10.5	+0.006	–0.004

Piston application
(dynamic on the outside surface)

Diameter tolerances

Housing groove D	Tolerances[1] D	d
in.	in.	
1 to 5.625	+0.002	–0.002
5.75 to 10.5	+0.003	–0.004

Rod application
(dynamic on the inside surface)

Dimensions				Designation
D	d	L	t	
in.				–
3.875 cont.	3.5	0.625	0.187	**WAT187-3875-625-E8D**
	3.5	0.75	0.187	**WAT187-3875-750-E8D**
	3.5	0.875	0.187	**WAT187-3875-875-E8D**
	3.5	1	0.187	**WAT187-3875-1000-E8D**
	3.5	1.25	0.187	**WAT187-3875-1250-E8D**
	3.5	1.5	0.187	**WAT187-3875-1500-E8D**
	3.5	1.75	0.187	**WAT187-3875-1750-E8D**
	3.5	2	0.187	**WAT187-3875-2000-E8D**
	3.625	0.312	0.125	**WAT125-3875-312-E8D**
	3.625	0.375	0.125	**WAT125-3875-375-E8D**
	3.625	0.5	0.125	**WAT125-3875-500-E8D**
	3.625	0.625	0.125	**WAT125-3875-625-E8D**
	3.625	0.75	0.125	**WAT125-3875-750-E8D**
	3.625	0.875	0.125	**WAT125-3875-875-E8D**
	3.625	1	0.125	**WAT125-3875-1000-E8D**
	3.625	1.25	0.125	**WAT125-3875-1250-E8D**
	3.625	1.5	0.125	**WAT125-3875-1500-E8D**
	3.625	1.75	0.125	**WAT125-3875-1750-E8D**
	3.625	2	0.125	**WAT125-3875-2000-E8D**
	3.688	0.312	0.093	**WAT93-3875-312-E8D**
	3.688	0.375	0.093	**WAT93-3875-375-E8D**
	3.688	0.5	0.093	**WAT93-3875-500-E8D**
	3.688	0.625	0.093	**WAT93-3875-625-E8D**
	3.688	0.75	0.093	**WAT93-3875-750-E8D**
	3.688	0.875	0.093	**WAT93-3875-875-E8D**
	3.688	1	0.093	**WAT93-3875-1000-E8D**

Dimensions				Designation
D	d	L	t	
in.				–
3.875 cont.	3.688	1.25	0.093	**WAT93-3875-1250-E8D**
	3.688	1.5	0.093	**WAT93-3875-1500-E8D**
	3.688	1.75	0.093	**WAT93-3875-1750-E8D**
	3.688	2	0.093	**WAT93-3875-2000-E8D**
	3.75	0.312	0.062	**WAT62-3875-312-E8D**
	3.75	0.375	0.062	**WAT62-3875-375-E8D**
	3.75	0.5	0.062	**WAT62-3875-500-E8D**
	3.75	0.625	0.062	**WAT62-3875-625-E8D**
	3.75	0.75	0.062	**WAT62-3875-750-E8D**
	3.75	0.875	0.062	**WAT62-3875-875-E8D**
	3.75	1	0.062	**WAT62-3875-1000-E8D**
	3.75	1.25	0.062	**WAT62-3875-1250-E8D**
	3.75	1.5	0.062	**WAT62-3875-1500-E8D**
	3.75	1.75	0.062	**WAT62-3875-1750-E8D**
	3.75	2	0.062	**WAT62-3875-2000-E8D**
4	3.625	0.312	0.187	**WAT187-4000-312-E8D**
	3.625	0.375	0.187	**WAT187-4000-375-E8D**
	3.625	0.5	0.187	**WAT187-4000-500-E8D**
	3.625	0.625	0.187	**WAT187-4000-625-E8D**
	3.625	0.75	0.187	**WAT187-4000-750-E8D**
	3.625	0.875	0.187	**WAT187-4000-875-E8D**
	3.625	1	0.187	**WAT187-4000-1000-E8D**
	3.625	1.25	0.187	**WAT187-4000-1250-E8D**
	3.625	1.5	0.187	**WAT187-4000-1500-E8D**
	3.625	1.75	0.187	**WAT187-4000-1750-E8D**
	3.625	2	0.187	**WAT187-4000-2000-E8D**

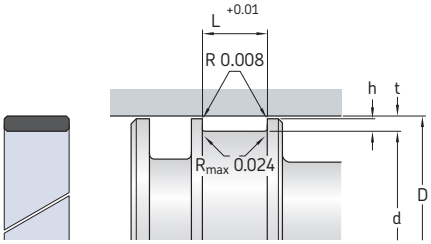
[1] Adjustments according to tolerances provided for rod or piston seals are possible, however, the maximum e-gap also need to be considered (→ *Gap extrusion*, **page 34**)

Dimensions				Designation
D	d	L	t	
in.				–
4 cont.	3.75	0.312	0.125	**WAT125-4000-312-E8D**
	3.75	0.375	0.125	**WAT125-4000-375-E8D**
	3.75	0.5	0.125	**WAT125-4000-500-E8D**
	3.75	0.625	0.125	**WAT125-4000-625-E8D**
	3.75	0.75	0.125	**WAT125-4000-750-E8D**
	3.75	0.875	0.125	**WAT125-4000-875-E8D**
	3.75	1	0.125	**WAT125-4000-1000-E8D**
	3.75	1.25	0.125	**WAT125-4000-1250-E8D**
	3.75	1.5	0.125	**WAT125-4000-1500-E8D**
	3.75	1.75	0.125	**WAT125-4000-1750-E8D**
	3.75	2	0.125	**WAT125-4000-2000-E8D**
	3.813	0.312	0.093	**WAT93-4000-312-E8D**
	3.813	0.375	0.093	**WAT93-4000-375-E8D**
	3.813	0.5	0.093	**WAT93-4000-500-E8D**
	3.813	0.625	0.093	**WAT93-4000-625-E8D**
	3.813	0.75	0.093	**WAT93-4000-750-E8D**
	3.813	0.875	0.093	**WAT93-4000-875-E8D**
	3.813	1	0.093	**WAT93-4000-1000-E8D**
	3.813	1.25	0.093	**WAT93-4000-1250-E8D**
	3.813	1.5	0.093	**WAT93-4000-1500-E8D**
	3.813	1.75	0.093	**WAT93-4000-1750-E8D**
	3.813	2	0.093	**WAT93-4000-2000-E8D**
4.25	3.875	0.375	0.187	**WAT187-4250-375-E8D**
	3.875	0.5	0.187	**WAT187-4250-500-E8D**
	3.875	0.625	0.187	**WAT187-4250-625-E8D**
	3.875	0.75	0.187	**WAT187-4250-750-E8D**
	3.875	0.875	0.187	**WAT187-4250-875-E8D**
	3.875	1	0.187	**WAT187-4250-1000-E8D**
	3.875	1.25	0.187	**WAT187-4250-1250-E8D**
	3.875	1.5	0.187	**WAT187-4250-1500-E8D**
	3.875	1.75	0.187	**WAT187-4250-1750-E8D**
	3.875	2	0.187	**WAT187-4250-2000-E8D**
	4	0.375	0.125	**WAT125-4250-375-E8D**
	4	0.5	0.125	**WAT125-4250-500-E8D**
	4	0.625	0.125	**WAT125-4250-625-E8D**
	4	0.75	0.125	**WAT125-4250-750-E8D**
	4	0.875	0.125	**WAT125-4250-875-E8D**
	4	1	0.125	**WAT125-4250-1000-E8D**
	4	1.25	0.125	**WAT125-4250-1250-E8D**
	4	1.5	0.125	**WAT125-4250-1500-E8D**
	4	1.75	0.125	**WAT125-4250-1750-E8D**
	4	2	0.125	**WAT125-4250-2000-E8D**
	4.063	0.375	0.093	**WAT93-4250-375-E8D**
	4.063	0.5	0.093	**WAT93-4250-500-E8D**
	4.063	0.625	0.093	**WAT93-4250-625-E8D**
	4.063	0.75	0.093	**WAT93-4250-750-E8D**
	4.063	0.875	0.093	**WAT93-4250-875-E8D**
	4.063	1	0.093	**WAT93-4250-1000-E8D**
	4.063	1.25	0.093	**WAT93-4250-1250-E8D**
	4.063	1.5	0.093	**WAT93-4250-1500-E8D**
	4.063	1.75	0.093	**WAT93-4250-1750-E8D**
	4.063	2	0.093	**WAT93-4250-2000-E8D**
4.5	4.125	0.375	0.187	**WAT187-4500-375-E8D**
	4.125	0.5	0.187	**WAT187-4500-500-E8D**
	4.125	0.625	0.187	**WAT187-4500-625-E8D**
	4.125	0.75	0.187	**WAT187-4500-750-E8D**
	4.125	0.875	0.187	**WAT187-4500-875-E8D**

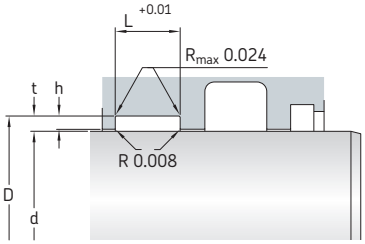
Dimensions				Designation
D	d	L	t	
in.				–
4.5 cont.	4.125	1	0.187	**WAT187-4500-1000-E8D**
	4.125	1.25	0.187	**WAT187-4500-1250-E8D**
	4.125	1.5	0.187	**WAT187-4500-1500-E8D**
	4.125	1.75	0.187	**WAT187-4500-1750-E8D**
	4.125	2	0.187	**WAT187-4500-2000-E8D**
	4.25	0.375	0.125	**WAT125-4500-375-E8D**
	4.25	0.5	0.125	**WAT125-4500-500-E8D**
	4.25	0.625	0.125	**WAT125-4500-625-E8D**
	4.25	0.75	0.125	**WAT125-4500-750-E8D**
	4.25	0.875	0.125	**WAT125-4500-875-E8D**
	4.25	1	0.125	**WAT125-4500-1000-E8D**
	4.25	1.25	0.125	**WAT125-4500-1250-E8D**
	4.25	1.5	0.125	**WAT125-4500-1500-E8D**
	4.25	1.75	0.125	**WAT125-4500-1750-E8D**
	4.25	2	0.125	**WAT125-4500-2000-E8D**
	4.313	0.375	0.093	**WAT93-4500-375-E8D**
	4.313	0.5	0.093	**WAT93-4500-500-E8D**
	4.313	0.625	0.093	**WAT93-4500-625-E8D**
	4.313	0.75	0.093	**WAT93-4500-750-E8D**
	4.313	0.875	0.093	**WAT93-4500-875-E8D**
	4.313	1	0.093	**WAT93-4500-1000-E8D**
	4.313	1.25	0.093	**WAT93-4500-1250-E8D**
	4.313	1.5	0.093	**WAT93-4500-1500-E8D**
	4.313	1.75	0.093	**WAT93-4500-1750-E8D**
	4.313	2	0.093	**WAT93-4500-2000-E8D**
4.75	4.375	0.375	0.187	**WAT187-4750-375-E8D**
	4.375	0.5	0.187	**WAT187-4750-500-E8D**
	4.375	0.625	0.187	**WAT187-4750-625-E8D**
	4.375	0.75	0.187	**WAT187-4750-750-E8D**
	4.375	0.875	0.187	**WAT187-4750-875-E8D**
	4.375	1	0.187	**WAT187-4750-1000-E8D**
	4.375	1.25	0.187	**WAT187-4750-1250-E8D**
	4.375	1.5	0.187	**WAT187-4750-1500-E8D**
	4.375	1.75	0.187	**WAT187-4750-1750-E8D**
	4.375	2	0.187	**WAT187-4750-2000-E8D**
	4.5	0.375	0.125	**WAT125-4750-375-E8D**
	4.5	0.5	0.125	**WAT125-4750-500-E8D**
	4.5	0.625	0.125	**WAT125-4750-625-E8D**
	4.5	0.75	0.125	**WAT125-4750-750-E8D**
	4.5	0.875	0.125	**WAT125-4750-875-E8D**
	4.5	1	0.125	**WAT125-4750-1000-E8D**
	4.5	1.25	0.125	**WAT125-4750-1250-E8D**
	4.5	1.5	0.125	**WAT125-4750-1500-E8D**
	4.5	1.75	0.125	**WAT125-4750-1750-E8D**
	4.5	2	0.125	**WAT125-4750-2000-E8D**
	4.563	0.375	0.093	**WAT93-4750-375-E8D**
	4.563	0.5	0.093	**WAT93-4750-500-E8D**
	4.563	0.625	0.093	**WAT93-4750-625-E8D**
	4.563	0.75	0.093	**WAT93-4750-750-E8D**
	4.563	0.875	0.093	**WAT93-4750-875-E8D**
	4.563	1	0.093	**WAT93-4750-1000-E8D**
	4.563	1.25	0.093	**WAT93-4750-1250-E8D**
	4.563	1.5	0.093	**WAT93-4750-1500-E8D**
	4.563	1.75	0.093	**WAT93-4750-1750-E8D**
	4.563	2	0.093	**WAT93-4750-2000-E8D**

5.2 WAT rod or piston guide rings, inch sizes

D **4.875 – 5.75** in.



h ≥ t/2



Diameter tolerances

Cylinder bore D	Tolerances[1] D	d
in.	in.	
1 to 4.875	+0.002	–0.002
5 to 7.75	+0.004	–0.003
8 to 10.5	+0.006	–0.004

Piston application
(dynamic on the outside surface)

Diameter tolerances

Housing groove D	Tolerances[1] D	d
in.	in.	
1 to 5.625	+0.002	–0.002
5.75 to 10.5	+0.003	–0.004

Rod application
(dynamic on the inside surface)

Dimensions				Designation
D	d	L	t	
in.				–
4.875	4.5	0.375	0.187	**WAT187-4875-375-E8D**
	4.5	0.5	0.187	**WAT187-4875-500-E8D**
	4.5	0.625	0.187	**WAT187-4875-625-E8D**
	4.5	0.75	0.187	**WAT187-4875-750-E8D**
	4.5	0.875	0.187	**WAT187-4875-875-E8D**
	4.5	1	0.187	**WAT187-4875-1000-E8D**
	4.5	1.25	0.187	**WAT187-4875-1250-E8D**
	4.5	1.5	0.187	**WAT187-4875-1500-E8D**
	4.5	1.75	0.187	**WAT187-4875-1750-E8D**
	4.5	2	0.187	**WAT187-4875-2000-E8D**
	4.625	0.375	0.125	**WAT125-4875-375-E8D**
	4.625	0.5	0.125	**WAT125-4875-500-E8D**
	4.625	0.625	0.125	**WAT125-4875-625-E8D**
	4.625	0.75	0.125	**WAT125-4875-750-E8D**
	4.625	0.875	0.125	**WAT125-4875-875-E8D**
	4.625	1	0.125	**WAT125-4875-1000-E8D**
	4.625	1.25	0.125	**WAT125-4875-1250-E8D**
	4.625	1.5	0.125	**WAT125-4875-1500-E8D**
	4.625	1.75	0.125	**WAT125-4875-1750-E8D**
	4.625	2	0.125	**WAT125-4875-2000-E8D**
	4.688	0.375	0.093	**WAT93-4875-375-E8D**
	4.688	0.5	0.093	**WAT93-4875-500-E8D**
	4.688	0.625	0.093	**WAT93-4875-625-E8D**
	4.688	0.75	0.093	**WAT93-4875-750-E8D**
	4.688	0.875	0.093	**WAT93-4875-875-E8D**
	4.688	1	0.093	**WAT93-4875-1000-E8D**
	4.688	1.25	0.093	**WAT93-4875-1250-E8D**

Dimensions				Designation
D	d	L	t	
in.				–
4.875 cont.	4.688	1.5	0.093	**WAT93-4875-1500-E8D**
	4.688	1.75	0.093	**WAT93-4875-1750-E8D**
	4.688	2	0.093	**WAT93-4875-2000-E8D**
5	4.625	0.375	0.187	**WAT187-5000-375-E8D**
	4.625	0.5	0.187	**WAT187-5000-500-E8D**
	4.625	0.625	0.187	**WAT187-5000-625-E8D**
	4.625	0.75	0.187	**WAT187-5000-750-E8D**
	4.625	0.875	0.187	**WAT187-5000-875-E8D**
	4.625	1	0.187	**WAT187-5000-1000-E8D**
	4.625	1.25	0.187	**WAT187-5000-1250-E8D**
	4.625	1.5	0.187	**WAT187-5000-1500-E8D**
	4.625	1.75	0.187	**WAT187-5000-1750-E8D**
	4.625	2	0.187	**WAT187-5000-2000-E8D**
	4.75	0.375	0.125	**WAT125-5000-375-E8D**
	4.75	0.5	0.125	**WAT125-5000-500-E8D**
	4.75	0.625	0.125	**WAT125-5000-625-E8D**
	4.75	0.75	0.125	**WAT125-5000-750-E8D**
	4.75	0.875	0.125	**WAT125-5000-875-E8D**
	4.75	1	0.125	**WAT125-5000-1000-E8D**
	4.75	1.25	0.125	**WAT125-5000-1250-E8D**
	4.75	1.5	0.125	**WAT125-5000-1500-E8D**
	4.75	1.75	0.125	**WAT125-5000-1750-E8D**
	4.75	2	0.125	**WAT125-5000-2000-E8D**
	4.813	0.375	0.093	**WAT93-5000-375-E8D**
	4.813	0.5	0.093	**WAT93-5000-500-E8D**
	4.813	0.625	0.093	**WAT93-5000-625-E8D**
	4.813	0.75	0.093	**WAT93-5000-750-E8D**

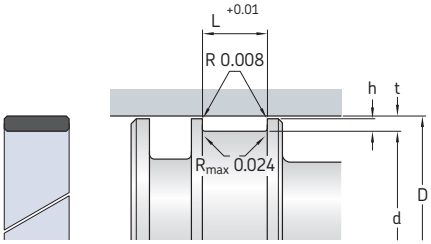
[1] Adjustments according to tolerances provided for rod or piston seals are possible, however, the maximum e-gap also need to be considered (→ *Gap extrusion*, **page 34**)

Dimensions				Designation
D	d	L	t	
in.				–
5 cont.	4.813	0.875	0.093	**WAT93-5000-875-E8D**
	4.813	1	0.093	**WAT93-5000-1000-E8D**
	4.813	1.25	0.093	**WAT93-5000-1250-E8D**
	4.813	1.5	0.093	**WAT93-5000-1500-E8D**
	4.813	1.75	0.093	**WAT93-5000-1750-E8D**
	4.813	2	0.093	**WAT93-5000-2000-E8D**
5.25	4.875	0.375	0.187	**WAT187-5250-375-E8D**
	4.875	0.5	0.187	**WAT187-5250-500-E8D**
	4.875	0.625	0.187	**WAT187-5250-625-E8D**
	4.875	0.75	0.187	**WAT187-5250-750-E8D**
	4.875	0.875	0.187	**WAT187-5250-875-E8D**
	4.875	1	0.187	**WAT187-5250-1000-E8D**
	4.875	1.25	0.187	**WAT187-5250-1250-E8D**
	4.875	1.5	0.187	**WAT187-5250-1500-E8D**
	4.875	1.75	0.187	**WAT187-5250-1750-E8D**
	4.875	2	0.187	**WAT187-5250-2000-E8D**
	4.875	2.25	0.187	**WAT187-5250-2250-E8D**
	4.875	2.5	0.187	**WAT187-5250-2500-E8D**
	5	0.375	0.125	**WAT125-5250-375-E8D**
	5	0.5	0.125	**WAT125-5250-500-E8D**
	5	0.625	0.125	**WAT125-5250-625-E8D**
	5	0.75	0.125	**WAT125-5250-750-E8D**
	5	0.875	0.125	**WAT125-5250-875-E8D**
	5	1	0.125	**WAT125-5250-1000-E8D**
	5	1.25	0.125	**WAT125-5250-1250-E8D**
	5	1.5	0.125	**WAT125-5250-1500-E8D**
	5	1.75	0.125	**WAT125-5250-1750-E8D**
	5	2	0.125	**WAT125-5250-2000-E8D**
	5	2.25	0.125	**WAT125-5250-2250-E8D**
	5	2.5	0.125	**WAT125-5250-2500-E8D**
	5.063	0.375	0.093	**WAT93-5250-375-E8D**
	5.063	0.5	0.093	**WAT93-5250-500-E8D**
	5.063	0.625	0.093	**WAT93-5250-625-E8D**
	5.063	0.75	0.093	**WAT93-5250-750-E8D**
	5.063	0.875	0.093	**WAT93-5250-875-E8D**
	5.063	1	0.093	**WAT93-5250-1000-E8D**
	5.063	1.25	0.093	**WAT93-5250-1250-E8D**
	5.063	1.5	0.093	**WAT93-5250-1500-E8D**
	5.063	1.75	0.093	**WAT93-5250-1750-E8D**
	5.063	2	0.093	**WAT93-5250-2000-E8D**
	5.063	2.25	0.093	**WAT93-5250-2250-E8D**
	5.063	2.5	0.093	**WAT93-5250-2500-E8D**
5.5	5.125	0.375	0.187	**WAT187-5500-375-E8D**
	5.125	0.5	0.187	**WAT187-5500-500-E8D**
	5.125	0.625	0.187	**WAT187-5500-625-E8D**
	5.125	0.75	0.187	**WAT187-5500-750-E8D**
	5.125	0.875	0.187	**WAT187-5500-875-E8D**
	5.125	1	0.187	**WAT187-5500-1000-E8D**
	5.125	1.25	0.187	**WAT187-5500-1250-E8D**
	5.125	1.5	0.187	**WAT187-5500-1500-E8D**
	5.125	1.75	0.187	**WAT187-5500-1750-E8D**
	5.125	2	0.187	**WAT187-5500-2000-E8D**
	5.25	0.375	0.125	**WAT125-5500-375-E8D**
	5.25	0.5	0.125	**WAT125-5500-500-E8D**
	5.25	0.625	0.125	**WAT125-5500-625-E8D**
	5.25	0.75	0.125	**WAT125-5500-750-E8D**
	5.25	0.875	0.125	**WAT125-5500-875-E8D**

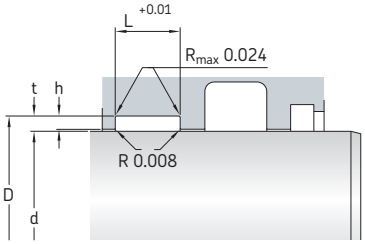
Dimensions				Designation
D	d	L	t	
in.				–
5.5 cont.	5.25	1	0.125	**WAT125-5500-1000-E8D**
	5.25	1.25	0.125	**WAT125-5500-1250-E8D**
	5.25	1.5	0.125	**WAT125-5500-1500-E8D**
	5.25	1.75	0.125	**WAT125-5500-1750-E8D**
	5.25	2	0.125	**WAT125-5500-2000-E8D**
	5.313	0.375	0.093	**WAT93-5500-375-E8D**
	5.313	0.5	0.093	**WAT93-5500-500-E8D**
	5.313	0.625	0.093	**WAT93-5500-625-E8D**
	5.313	0.75	0.093	**WAT93-5500-750-E8D**
	5.313	0.875	0.093	**WAT93-5500-875-E8D**
	5.313	1	0.093	**WAT93-5500-1000-E8D**
	5.313	1.25	0.093	**WAT93-5500-1250-E8D**
	5.313	1.5	0.093	**WAT93-5500-1500-E8D**
	5.313	1.75	0.093	**WAT93-5500-1750-E8D**
	5.313	2	0.093	**WAT93-5500-2000-E8D**
5.625	5.25	0.375	0.187	**WAT187-5625-375-E8D**
	5.25	0.5	0.187	**WAT187-5625-500-E8D**
	5.25	0.625	0.187	**WAT187-5625-625-E8D**
	5.25	0.75	0.187	**WAT187-5625-750-E8D**
	5.25	0.875	0.187	**WAT187-5625-875-E8D**
	5.25	1	0.187	**WAT187-5625-1000-E8D**
	5.25	1.25	0.187	**WAT187-5625-1250-E8D**
	5.25	1.5	0.187	**WAT187-5625-1500-E8D**
	5.25	1.75	0.187	**WAT187-5625-1750-E8D**
	5.25	2	0.187	**WAT187-5625-2000-E8D**
	5.375	0.375	0.125	**WAT125-5625-375-E8D**
	5.375	0.5	0.125	**WAT125-5625-500-E8D**
	5.375	0.625	0.125	**WAT125-5625-625-E8D**
	5.375	0.75	0.125	**WAT125-5625-750-E8D**
	5.375	0.875	0.125	**WAT125-5625-875-E8D**
	5.375	1	0.125	**WAT125-5625-1000-E8D**
	5.375	1.25	0.125	**WAT125-5625-1250-E8D**
	5.375	1.5	0.125	**WAT125-5625-1500-E8D**
	5.375	1.75	0.125	**WAT125-5625-1750-E8D**
	5.375	2	0.125	**WAT125-5625-2000-E8D**
	5.438	0.375	0.093	**WAT93-5625-375-E8D**
	5.438	0.5	0.093	**WAT93-5625-500-E8D**
	5.438	0.625	0.093	**WAT93-5625-625-E8D**
	5.438	0.75	0.093	**WAT93-5625-750-E8D**
	5.438	0.875	0.093	**WAT93-5625-875-E8D**
	5.438	1	0.093	**WAT93-5625-1000-E8D**
	5.438	1.25	0.093	**WAT93-5625-1250-E8D**
	5.438	1.5	0.093	**WAT93-5625-1500-E8D**
	5.438	1.75	0.093	**WAT93-5625-1750-E8D**
	5.438	2	0.093	**WAT93-5625-2000-E8D**
5.75	5.375	0.375	0.187	**WAT187-5750-375-E8D**
	5.375	0.5	0.187	**WAT187-5750-500-E8D**
	5.375	0.625	0.187	**WAT187-5750-625-E8D**
	5.375	0.75	0.187	**WAT187-5750-750-E8D**
	5.375	0.875	0.187	**WAT187-5750-875-E8D**
	5.375	1	0.187	**WAT187-5750-1000-E8D**
	5.375	1.25	0.187	**WAT187-5750-1250-E8D**
	5.375	1.5	0.187	**WAT187-5750-1500-E8D**
	5.375	1.75	0.187	**WAT187-5750-1750-E8D**
	5.375	2	0.187	**WAT187-5750-2000-E8D**

5.2 WAT rod or piston guide rings, inch sizes

D **5.75 – 7.75** in.



h ≥ t/2



Diameter tolerances

Cylinder bore D	Tolerances[1] D	d
in.	in.	
1 to 4.875	+0.002	–0.002
5 to 7.75	+0.004	–0.003
8 to 10.5	+0.006	–0.004

Piston application
(dynamic on the outside surface)

Diameter tolerances

Housing groove D	Tolerances[1] D	d
in.	in.	
1 to 5.625	+0.002	–0.002
5.75 to 10.5	+0.003	–0.004

Rod application
(dynamic on the inside surface)

Dimensions				Designation
D	d	L	t	
in.				–
5.75 cont.	5.5	0.375	0.125	**WAT125-5750-375-E8D**
	5.5	0.5	0.125	**WAT125-5750-500-E8D**
	5.5	0.625	0.125	**WAT125-5750-625-E8D**
	5.5	0.75	0.125	**WAT125-5750-750-E8D**
	5.5	0.875	0.125	**WAT125-5750-875-E8D**
	5.5	1	0.125	**WAT125-5750-1000-E8D**
	5.5	1.25	0.125	**WAT125-5750-1250-E8D**
	5.5	1.5	0.125	**WAT125-5750-1500-E8D**
	5.5	1.75	0.125	**WAT125-5750-1750-E8D**
	5.5	2	0.125	**WAT125-5750-2000-E8D**
	5.563	0.375	0.093	**WAT93-5750-375-E8D**
	5.563	0.5	0.093	**WAT93-5750-500-E8D**
	5.563	0.625	0.093	**WAT93-5750-625-E8D**
	5.563	0.75	0.093	**WAT93-5750-750-E8D**
	5.563	0.875	0.093	**WAT93-5750-875-E8D**
	5.563	1	0.093	**WAT93-5750-1000-E8D**
	5.563	1.25	0.093	**WAT93-5750-1250-E8D**
	5.563	1.5	0.093	**WAT93-5750-1500-E8D**
	5.563	1.75	0.093	**WAT93-5750-1750-E8D**
	5.563	2	0.093	**WAT93-5750-2000-E8D**
6	5.625	0.375	0.187	**WAT187-6000-375-E8D**
	5.625	0.5	0.187	**WAT187-6000-500-E8D**
	5.625	0.625	0.187	**WAT187-6000-625-E8D**
	5.625	0.75	0.187	**WAT187-6000-750-E8D**
	5.625	0.875	0.187	**WAT187-6000-875-E8D**
	5.625	1	0.187	**WAT187-6000-1000-E8D**
	5.625	1.25	0.187	**WAT187-6000-1250-E8D**

Dimensions				Designation
D	d	L	t	
in.				–
6 cont.	5.625	1.5	0.187	**WAT187-6000-1500-E8D**
	5.625	1.75	0.187	**WAT187-6000-1750-E8D**
	5.625	2	0.187	**WAT187-6000-2000-E8D**
	5.75	0.375	0.125	**WAT125-6000-375-E8D**
	5.75	0.5	0.125	**WAT125-6000-500-E8D**
	5.75	0.625	0.125	**WAT125-6000-625-E8D**
	5.75	0.75	0.125	**WAT125-6000-750-E8D**
	5.75	0.875	0.125	**WAT125-6000-875-E8D**
	5.75	1	0.125	**WAT125-6000-1000-E8D**
	5.75	1.25	0.125	**WAT125-6000-1250-E8D**
	5.75	1.5	0.125	**WAT125-6000-1500-E8D**
	5.75	1.75	0.125	**WAT125-6000-1750-E8D**
	5.75	2	0.125	**WAT125-6000-2000-E8D**
6.25	5.875	0.5	0.187	**WAT187-6250-500-E8D**
	5.875	0.625	0.187	**WAT187-6250-625-E8D**
	5.875	0.75	0.187	**WAT187-6250-750-E8D**
	5.875	0.875	0.187	**WAT187-6250-875-E8D**
	5.875	1	0.187	**WAT187-6250-1000-E8D**
	5.875	1.25	0.187	**WAT187-6250-1250-E8D**
	5.875	1.5	0.187	**WAT187-6250-1500-E8D**
	5.875	1.75	0.187	**WAT187-6250-1750-E8D**
	5.875	2	0.187	**WAT187-6250-2000-E8D**
	6	0.5	0.125	**WAT125-6250-500-E8D**
	6	0.625	0.125	**WAT125-6250-625-E8D**
	6	0.75	0.125	**WAT125-6250-750-E8D**
	6	0.875	0.125	**WAT125-6250-875-E8D**

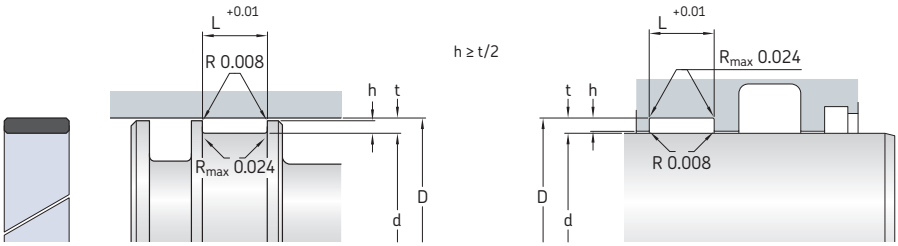
[1] Adjustments according to tolerances provided for rod or piston seals are possible, however, the maximum e-gap also need to be considered (→ *Gap extrusion*, **page 34**)

Dimensions				Designation
D	d	L	t	
in.				–
6.25	6	1	0.125	**WAT125-6250-1000-E8D**
cont.	6	1.25	0.125	**WAT125-6250-1250-E8D**
	6	1.5	0.125	**WAT125-6250-1500-E8D**
	6	1.75	0.125	**WAT125-6250-1750-E8D**
	6	2	0.125	**WAT125-6250-2000-E8D**
6.5	6.125	0.5	0.187	**WAT187-6500-500-E8D**
	6.125	0.625	0.187	**WAT187-6500-625-E8D**
	6.125	0.75	0.187	**WAT187-6500-750-E8D**
	6.125	0.875	0.187	**WAT187-6500-875-E8D**
	6.125	1	0.187	**WAT187-6500-1000-E8D**
	6.125	1.25	0.187	**WAT187-6500-1250-E8D**
	6.125	1.5	0.187	**WAT187-6500-1500-E8D**
	6.125	1.75	0.187	**WAT187-6500-1750-E8D**
	6.125	2	0.187	**WAT187-6500-2000-E8D**
	6.25	0.5	0.125	**WAT125-6500-500-E8D**
	6.25	0.625	0.125	**WAT125-6500-625-E8D**
	6.25	0.75	0.125	**WAT125-6500-750-E8D**
	6.25	0.875	0.125	**WAT125-6500-875-E8D**
	6.25	1	0.125	**WAT125-6500-1000-E8D**
	6.25	1.25	0.125	**WAT125-6500-1250-E8D**
	6.25	1.5	0.125	**WAT125-6500-1500-E8D**
	6.25	1.75	0.125	**WAT125-6500-1750-E8D**
	6.25	2	0.125	**WAT125-6500-2000-E8D**
6.75	6.375	0.5	0.187	**WAT187-6750-500-E8D**
	6.375	0.625	0.187	**WAT187-6750-625-E8D**
	6.375	0.75	0.187	**WAT187-6750-750-E8D**
	6.375	0.875	0.187	**WAT187-6750-875-E8D**
	6.375	1	0.187	**WAT187-6750-1000-E8D**
	6.375	1.25	0.187	**WAT187-6750-1250-E8D**
	6.375	1.5	0.187	**WAT187-6750-1500-E8D**
	6.375	1.75	0.187	**WAT187-6750-1750-E8D**
	6.375	2	0.187	**WAT187-6750-2000-E8D**
	6.5	0.5	0.125	**WAT125-6750-500-E8D**
	6.5	0.625	0.125	**WAT125-6750-625-E8D**
	6.5	0.75	0.125	**WAT125-6750-750-E8D**
	6.5	0.875	0.125	**WAT125-6750-875-E8D**
	6.5	1	0.125	**WAT125-6750-1000-E8D**
	6.5	1.25	0.125	**WAT125-6750-1250-E8D**
	6.5	1.5	0.125	**WAT125-6750-1500-E8D**
	6.5	1.75	0.125	**WAT125-6750-1750-E8D**
	6.5	2	0.125	**WAT125-6750-2000-E8D**
7	6.625	0.5	0.187	**WAT187-7000-500-E8D**
	6.625	0.625	0.187	**WAT187-7000-625-E8D**
	6.625	0.75	0.187	**WAT187-7000-750-E8D**
	6.625	0.875	0.187	**WAT187-7000-875-E8D**
	6.625	1	0.187	**WAT187-7000-1000-E8D**
	6.625	1.25	0.187	**WAT187-7000-1250-E8D**
	6.625	1.5	0.187	**WAT187-7000-1500-E8D**
	6.625	1.75	0.187	**WAT187-7000-1750-E8D**
	6.625	2	0.187	**WAT187-7000-2000-E8D**
	6.75	0.5	0.125	**WAT125-7000-500-E8D**
	6.75	0.625	0.125	**WAT125-7000-625-E8D**
	6.75	0.75	0.125	**WAT125-7000-750-E8D**
	6.75	0.875	0.125	**WAT125-7000-875-E8D**
	6.75	1	0.125	**WAT125-7000-1000-E8D**
	6.75	1.25	0.125	**WAT125-7000-1250-E8D**

Dimensions				Designation
D	d	L	t	
in.				–
7	6.75	1.5	0.125	**WAT125-7000-1500-E8D**
cont.	6.75	1.75	0.125	**WAT125-7000-1750-E8D**
	6.75	2	0.125	**WAT125-7000-2000-E8D**
7.25	6.875	0.5	0.187	**WAT187-7250-500-E8D**
	6.875	0.625	0.187	**WAT187-7250-625-E8D**
	6.875	0.75	0.187	**WAT187-7250-750-E8D**
	6.875	0.875	0.187	**WAT187-7250-875-E8D**
	6.875	1	0.187	**WAT187-7250-1000-E8D**
	6.875	1.25	0.187	**WAT187-7250-1250-E8D**
	6.875	1.5	0.187	**WAT187-7250-1500-E8D**
	6.875	1.75	0.187	**WAT187-7250-1750-E8D**
	6.875	2	0.187	**WAT187-7250-2000-E8D**
	7	0.5	0.125	**WAT125-7250-500-E8D**
	7	0.625	0.125	**WAT125-7250-625-E8D**
	7	0.75	0.125	**WAT125-7250-750-E8D**
	7	0.875	0.125	**WAT125-7250-875-E8D**
	7	1	0.125	**WAT125-7250-1000-E8D**
	7	1.25	0.125	**WAT125-7250-1250-E8D**
	7	1.5	0.125	**WAT125-7250-1500-E8D**
	7	1.75	0.125	**WAT125-7250-1750-E8D**
	7	2	0.125	**WAT125-7250-2000-E8D**
7.5	7.125	0.5	0.187	**WAT187-7500-500-E8D**
	7.125	0.625	0.187	**WAT187-7500-625-E8D**
	7.125	0.75	0.187	**WAT187-7500-750-E8D**
	7.125	0.875	0.187	**WAT187-7500-875-E8D**
	7.125	1	0.187	**WAT187-7500-1000-E8D**
	7.125	1.25	0.187	**WAT187-7500-1250-E8D**
	7.125	1.5	0.187	**WAT187-7500-1500-E8D**
	7.125	1.75	0.187	**WAT187-7500-1750-E8D**
	7.125	2	0.187	**WAT187-7500-2000-E8D**
	7.25	0.5	0.125	**WAT125-7500-500-E8D**
	7.25	0.625	0.125	**WAT125-7500-625-E8D**
	7.25	0.75	0.125	**WAT125-7500-750-E8D**
	7.25	0.875	0.125	**WAT125-7500-875-E8D**
	7.25	1	0.125	**WAT125-7500-1000-E8D**
	7.25	1.25	0.125	**WAT125-7500-1250-E8D**
	7.25	1.5	0.125	**WAT125-7500-1500-E8D**
	7.25	1.75	0.125	**WAT125-7500-1750-E8D**
	7.25	2	0.125	**WAT125-7500-2000-E8D**
7.75	7.375	0.625	0.187	**WAT187-7750-625-E8D**
	7.375	0.75	0.187	**WAT187-7750-750-E8D**
	7.375	0.875	0.187	**WAT187-7750-875-E8D**
	7.375	1	0.187	**WAT187-7750-1000-E8D**
	7.375	1.25	0.187	**WAT187-7750-1250-E8D**
	7.375	1.5	0.187	**WAT187-7750-1500-E8D**
	7.375	1.75	0.187	**WAT187-7750-1750-E8D**
	7.375	2	0.187	**WAT187-7750-2000-E8D**
	7.5	0.625	0.125	**WAT125-7750-625-E8D**
	7.5	0.75	0.125	**WAT125-7750-750-E8D**
	7.5	0.875	0.125	**WAT125-7750-875-E8D**
	7.5	1	0.125	**WAT125-7750-1000-E8D**
	7.5	1.25	0.125	**WAT125-7750-1250-E8D**
	7.5	1.5	0.125	**WAT125-7750-1500-E8D**
	7.5	1.75	0.125	**WAT125-7750-1750-E8D**
	7.5	2	0.125	**WAT125-7750-2000-E8D**

5.2 WAT rod or piston guide rings, inch sizes

D **8 – 10.5** in.



Diameter tolerances

Cylinder bore D	Tolerances[1] D	d
in.	in.	
1 to 4.875	+0.002	–0.002
5 to 7.75	+0.004	–0.003
8 to 10.5	+0.006	–0.004

Piston application
(dynamic on the outside surface)

Diameter tolerances

Housing groove D	Tolerances[1] D	d
in.	in.	
1 to 5.625	+0.002	–0.002
5.75 to 10.5	+0.003	–0.004

Rod application
(dynamic on the inside surface)

Dimensions				Designation
D	d	L	t	
in.				–
8	7.625	0.625	0.187	**WAT187-8000-625-E8D**
	7.625	0.75	0.187	**WAT187-8000-750-E8D**
	7.625	0.875	0.187	**WAT187-8000-875-E8D**
	7.625	1	0.187	**WAT187-8000-1000-E8D**
	7.625	1.25	0.187	**WAT187-8000-1250-E8D**
	7.625	1.5	0.187	**WAT187-8000-1500-E8D**
	7.625	1.75	0.187	**WAT187-8000-1750-E8D**
	7.625	2	0.187	**WAT187-8000-2000-E8D**
	7.75	0.625	0.125	**WAT125-8000-625-E8D**
	7.75	0.75	0.125	**WAT125-8000-750-E8D**
	7.75	0.875	0.125	**WAT125-8000-875-E8D**
	7.75	1	0.125	**WAT125-8000-1000-E8D**
	7.75	1.25	0.125	**WAT125-8000-1250-E8D**
	7.75	1.5	0.125	**WAT125-8000-1500-E8D**
	7.75	1.75	0.125	**WAT125-8000-1750-E8D**
	7.75	2	0.125	**WAT125-8000-2000-E8D**
8.25	7.875	0.625	0.187	**WAT187-8250-625-E8D**
	7.875	0.75	0.187	**WAT187-8250-750-E8D**
	7.875	0.875	0.187	**WAT187-8250-875-E8D**
	7.875	1	0.187	**WAT187-8250-1000-E8D**
	7.875	1.25	0.187	**WAT187-8250-1250-E8D**
	7.875	1.5	0.187	**WAT187-8250-1500-E8D**
	7.875	1.75	0.187	**WAT187-8250-1750-E8D**
	7.875	2	0.187	**WAT187-8250-2000-E8D**

Dimensions				Designation
D	d	L	t	
in.				–
8.25 cont.	8	0.625	0.125	**WAT125-8250-625-E8D**
	8	0.75	0.125	**WAT125-8250-750-E8D**
	8	0.875	0.125	**WAT125-8250-875-E8D**
	8	1	0.125	**WAT125-8250-1000-E8D**
	8	1.25	0.125	**WAT125-8250-1250-E8D**
	8	1.5	0.125	**WAT125-8250-1500-E8D**
	8	1.75	0.125	**WAT125-8250-1750-E8D**
	8	2	0.125	**WAT125-8250-2000-E8D**
8.5	8.125	0.625	0.187	**WAT187-8500-625-E8D**
	8.125	0.75	0.187	**WAT187-8500-750-E8D**
	8.125	0.875	0.187	**WAT187-8500-875-E8D**
	8.125	1	0.187	**WAT187-8500-1000-E8D**
	8.125	1.25	0.187	**WAT187-8500-1250-E8D**
	8.125	1.5	0.187	**WAT187-8500-1500-E8D**
	8.125	1.75	0.187	**WAT187-8500-1750-E8D**
	8.125	2	0.187	**WAT187-8500-2000-E8D**
	8.25	0.625	0.125	**WAT125-8500-625-E8D**
	8.25	0.75	0.125	**WAT125-8500-750-E8D**
	8.25	0.875	0.125	**WAT125-8500-875-E8D**
	8.25	1	0.125	**WAT125-8500-1000-E8D**
	8.25	1.25	0.125	**WAT125-8500-1250-E8D**
	8.25	1.5	0.125	**WAT125-8500-1500-E8D**
	8.25	1.75	0.125	**WAT125-8500-1750-E8D**
	8.25	2	0.125	**WAT125-8500-2000-E8D**

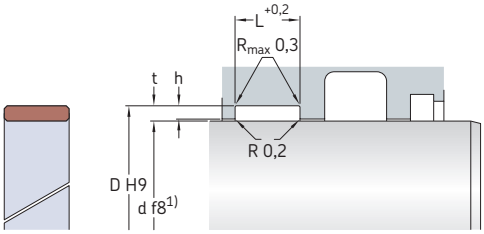
[1] Adjustments according to tolerances provided for rod or piston seals are possible, however, the maximum e-gap also need to be considered (→ *Gap extrusion*, **page 34**)

Dimensions				Designation
D	d	L	t	
in.				–
8.75	8.375	0.625	0.187	**WAT187-8750-625-E8D**
	8.375	0.75	0.187	**WAT187-8750-750-E8D**
	8.375	0.875	0.187	**WAT187-8750-875-E8D**
	8.375	1	0.187	**WAT187-8750-1000-E8D**
	8.375	1.25	0.187	**WAT187-8750-1250-E8D**
	8.375	1.5	0.187	**WAT187-8750-1500-E8D**
	8.375	1.75	0.187	**WAT187-8750-1750-E8D**
	8.375	2	0.187	**WAT187-8750-2000-E8D**
	8.5	0.625	0.125	**WAT125-8750-625-E8D**
	8.5	0.75	0.125	**WAT125-8750-750-E8D**
	8.5	0.875	0.125	**WAT125-8750-875-E8D**
	8.5	1	0.125	**WAT125-8750-1000-E8D**
	8.5	1.25	0.125	**WAT125-8750-1250-E8D**
	8.5	1.5	0.125	**WAT125-8750-1500-E8D**
	8.5	1.75	0.125	**WAT125-8750-1750-E8D**
	8.5	2	0.125	**WAT125-8750-2000-E8D**
9	8.625	0.625	0.187	**WAT187-9000-625-E8D**
	8.625	0.75	0.187	**WAT187-9000-750-E8D**
	8.625	0.875	0.187	**WAT187-9000-875-E8D**
	8.625	1	0.187	**WAT187-9000-1000-E8D**
	8.625	1.25	0.187	**WAT187-9000-1250-E8D**
	8.625	1.5	0.187	**WAT187-9000-1500-E8D**
	8.625	1.75	0.187	**WAT187-9000-1750-E8D**
	8.625	2	0.187	**WAT187-9000-2000-E8D**
	8.75	0.625	0.125	**WAT125-9000-625-E8D**
	8.75	0.75	0.125	**WAT125-9000-750-E8D**
	8.75	0.875	0.125	**WAT125-9000-875-E8D**
	8.75	1	0.125	**WAT125-9000-1000-E8D**
	8.75	1.25	0.125	**WAT125-9000-1250-E8D**
	8.75	1.5	0.125	**WAT125-9000-1500-E8D**
	8.75	1.75	0.125	**WAT125-9000-1750-E8D**
	8.75	2	0.125	**WAT125-9000-2000-E8D**
9.25	8.875	0.75	0.187	**WAT187-9250-750-E8D**
	8.875	0.875	0.187	**WAT187-9250-875-E8D**
	8.875	1	0.187	**WAT187-9250-1000-E8D**
	8.875	1.25	0.187	**WAT187-9250-1250-E8D**
	8.875	1.5	0.187	**WAT187-9250-1500-E8D**
	8.875	1.75	0.187	**WAT187-9250-1750-E8D**
	8.875	2	0.187	**WAT187-9250-2000-E8D**
	9	0.75	0.125	**WAT125-9250-750-E8D**
	9	0.875	0.125	**WAT125-9250-875-E8D**
	9	1	0.125	**WAT125-9250-1000-E8D**
	9	1.25	0.125	**WAT125-9250-1250-E8D**
	9	1.5	0.125	**WAT125-9250-1500-E8D**
	9	1.75	0.125	**WAT125-9250-1750-E8D**
	9	2	0.125	**WAT125-9250-2000-E8D**
9.5	9.125	0.75	0.187	**WAT187-9500-750-E8D**
	9.125	0.875	0.187	**WAT187-9500-875-E8D**
	9.125	1	0.187	**WAT187-9500-1000-E8D**
	9.125	1.25	0.187	**WAT187-9500-1250-E8D**
	9.125	1.5	0.187	**WAT187-9500-1500-E8D**
	9.125	1.75	0.187	**WAT187-9500-1750-E8D**
	9.125	2	0.187	**WAT187-9500-2000-E8D**

Dimensions				Designation
D	d	L	t	
in.				–
9.5 cont.	9.25	0.75	0.125	**WAT125-9500-750-E8D**
	9.25	0.875	0.125	**WAT125-9500-875-E8D**
	9.25	1	0.125	**WAT125-9500-1000-E8D**
	9.25	1.25	0.125	**WAT125-9500-1250-E8D**
	9.25	1.5	0.125	**WAT125-9500-1500-E8D**
	9.25	1.75	0.125	**WAT125-9500-1750-E8D**
	9.25	2	0.125	**WAT125-9500-2000-E8D**
9.75	9.375	0.75	0.187	**WAT187-9750-750-E8D**
	9.375	0.875	0.187	**WAT187-9750-875-E8D**
	9.375	1	0.187	**WAT187-9750-1000-E8D**
	9.375	1.25	0.187	**WAT187-9750-1250-E8D**
	9.375	1.5	0.187	**WAT187-9750-1500-E8D**
	9.375	1.75	0.187	**WAT187-9750-1750-E8D**
	9.375	2	0.187	**WAT187-9750-2000-E8D**
	9.5	0.75	0.125	**WAT125-9750-750-E8D**
	9.5	0.875	0.125	**WAT125-9750-875-E8D**
	9.5	1	0.125	**WAT125-9750-1000-E8D**
	9.5	1.25	0.125	**WAT125-9750-1250-E8D**
	9.5	1.5	0.125	**WAT125-9750-1500-E8D**
	9.5	1.75	0.125	**WAT125-9750-1750-E8D**
	9.5	2	0.125	**WAT125-9750-2000-E8D**
10	9.625	0.75	0.187	**WAT187-10000-750-E8D**
	9.625	0.875	0.187	**WAT187-10000-875-E8D**
	9.625	1	0.187	**WAT187-10000-1000-E8D**
	9.625	1.25	0.187	**WAT187-10000-1250-E8D**
	9.625	1.5	0.187	**WAT187-10000-1500-E8D**
	9.625	1.75	0.187	**WAT187-10000-1750-E8D**
	9.625	2	0.187	**WAT187-10000-2000-E8D**
	9.625	2.25	0.187	**WAT187-10000-2250-E8D**
	9.75	0.75	0.125	**WAT125-10000-750-E8D**
	9.75	0.875	0.125	**WAT125-10000-875-E8D**
	9.75	1	0.125	**WAT125-10000-1000-E8D**
	9.75	1.25	0.125	**WAT125-10000-1250-E8D**
	9.75	1.5	0.125	**WAT125-10000-1500-E8D**
	9.75	1.75	0.125	**WAT125-10000-1750-E8D**
	9.75	2	0.125	**WAT125-10000-2000-E8D**
	9.75	2.25	0.125	**WAT125-10000-2250-E8D**
10.5	10.125	0.75	0.187	**WAT187-10500-750-E8D**
	10.125	0.875	0.187	**WAT187-10500-875-E8D**
	10.125	1	0.187	**WAT187-10500-1000-E8D**
	10.125	1.25	0.187	**WAT187-10500-1250-E8D**
	10.125	1.5	0.187	**WAT187-10500-1500-E8D**
	10.125	1.75	0.187	**WAT187-10500-1750-E8D**
	10.13	2	0.187	**WAT187-10500-2000-E8D**
	10.25	0.75	0.125	**WAT125-10500-750-E8D**
	10.25	0.875	0.125	**WAT125-10500-875-E8D**
	10.25	1	0.125	**WAT125-10500-1000-E8D**
	10.25	1.25	0.125	**WAT125-10500-1250-E8D**
	10.25	1.5	0.125	**WAT125-10500-1500-E8D**
	10.25	1.75	0.125	**WAT125-10500-1750-E8D**
	10.25	2	0.125	**WAT125-10500-2000-E8D**

5.3 RGR rod guide rings, metric sizes

d **12 – 140** mm



h ≥ t/2

Dimensions				Designation
d	D	L	t	
mm				–
12	15	6,3	1,5	**RGR 12x15x6.3-PF**
	15,1	4	1,55	**RGR 12x15.1x4-PF**
14	17,1	4	1,55	**RGR 14x17.1x4-PF**
15	18,1	4	1,55	**RGR 15x18.1x4-PF**
16	19	6	1,5	**RGR 16x19x6-PF**
	19,1	4	1,55	**RGR 16x19.1x4-PF**
	20	10	2	**RGR 16x20x10-PF**
18	21,1	4	1,55	**RGR 18x21.1x4-PF**
20	23	10	1,5	**RGR 20x23x10-PF**
	23,1	4	1,55	**RGR 20x23.1x4-PF**
	24	5,6	2	**RGR 20x24x5.6-PF**
22	25	10	1,5	**RGR 22x25x10-PF**
	25,1	4	1,55	**RGR 22x25.1x4.0-PF**
	25,1	4	1,55	**RGR 22x25.1x4-PF**
25	28	6	1,5	**RGR 25x28x6-PF**
	28	10	1,5	**RGR 25x28x10-PF**
	28	20	1,5	**RGR 25x28x20-PF**
	28,1	4	1,55	**RGR 25x28.1x4-PF**
	28,1	4,2	1,55	**RGR 25x28.1x4.2-PF**
	29	5,6	2	**RGR 25x29x5.6-PF**
	29	10	2	**RGR 25x29x10-PF**
	29	20	2	**RGR 25x29x20-PF**
	30	5,6	2,5	**RGR 25x30x5.6-PF**
	31	10	3	**RGR 25x31x10-PF**
28	31,1	4	1,55	**RGR 28x31.1x4-PF**
	32	10	2	**RGR 28x32x10-PF**
	33	5,6	2,5	**RGR 28x33x5.6-PF**
	34	10	3	**RGR 28x34x10-PF**

Dimensions				Designation
d	D	L	t	
mm				–
30	33,1	4	1,55	**RGR 30x33.1x4-PF**
	34	10	2	**RGR 30x34x10-PF**
	35	5,6	2,5	**RGR 30x35x5.6-PF**
32	35	5,6	1,5	**RGR 32x35x5.6-PF**
	35,1	4,2	1,55	**RGR 32x35.1x4.2-PF**
	36	10	2	**RGR 32x36x10-PF**
	36	15	2	**RGR 32x36x15-PF**
	36	20	2	**RGR 32x36x20-PF**
	37	5,6	2,5	**RGR 32x37x5.6-PF**
	37	9,7	2,5	**RGR 32x37x9.7-PF**
	38	10	3	**RGR 32x38x10-PF**
35	38	10	1,5	**RGR 35x38x10-PF**
	39	20	2	**RGR 35x39x20-PF**
	40	5,6	2,5	**RGR 35x40x5.6-PF**
	40	9,7	2,5	**RGR 35x40x9.7-PF**
	41	10	3	**RGR 35x41x10-PF**
36	40	10	2	**RGR 36x40x10-PF**
	40	30	2	**RGR 36x40x30-PF**
	41	5,6	2,5	**RGR 36x41x5.6-PF**
	41	9,7	2,5	**RGR 36x41x9.7-PF**
	42	10	3	**RGR 36x42x10-PF**
40	43	5,6	1,5	**RGR 40x43x5.6-PF**
	44	10	2	**RGR 40x44x10-PF**
	44	20	2	**RGR 40x44x20-PF**
	44	25	2	**RGR 40x44x25-PF**
	45	5,6	2,5	**RGR 40x45x5.6-PF**
	45	9,7	2,5	**RGR 40x45x9.7-PF**
	46	10	3	**RGR 40x46x10-PF**
	46	15	3	**RGR 40x46x15-PF**
	46	20	3	**RGR 40x46x20-PF**
	46	25	3	**RGR 40x46x25-PF**

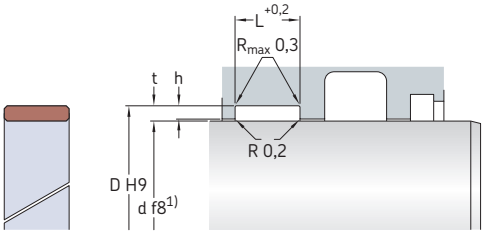
[1)] Adjustments according to tolerances provided for rod seal are possible, however, the maximum e-gap also need to be considered (→ *Gap extrusion*, **page 34**)

Dimensions				Designation
d	D	L	t	
mm				–
45	49	15	2	RGR 45x49x15-PF
	50	5,6	2,5	RGR 45x50x5.6-PF
	50	9,7	2,5	RGR 45x50x9.7-PF
	51	13	3	RGR 45x51x13-PF
	51	20	3	RGR 45x51x20-PF
	51	40	3	RGR 45x51x40-PF
50	55	5,6	2,5	RGR 50x55x5.6-PF
	55	9,7	2,5	RGR 50x55x9.7-PF
	55	15	2,5	RGR 50x55x15-PF
	56	13	3	RGR 50x56x13-PF
	56	20	3	RGR 50x56x20-PF
	56	30	3	RGR 50x56x30-PF
55	60	5,6	2,5	RGR 55x60x5.6-PF
	60	9,7	2,5	RGR 55x60x9.7-PF
56	61	5,6	2,5	RGR 56x61x5.6-PF
	61	9,7	2,5	RGR 56x61x9.7-PF
	62	13	3	RGR 56x62x13-PF
	62	16	3	RGR 56x62x16-PF
	62	30	3	RGR 56x62x30-PF
	62	40	3	RGR 56x62x40-PF
60	65	5,6	2,5	RGR 60x65x5.6-PF
	65	9,7	2,5	RGR 60x65x9.7-PF
	65	15	2,5	RGR 60x65x15-PF
	66	13	3	RGR 60x66x13-PF
	66	20	3	RGR 60x66x20-PF
	66	30	3	RGR 60x66x30-PF
63	68	5,6	2,5	RGR 63x68x5.6-PF
	68	9,7	2,5	RGR 63x68x9.7-PF
	68	15	2,5	RGR 63x68x15-PF
	69	13	3	RGR 63x69x13-PF
	69	20	3	RGR 63x69x20-PF
	69	30	3	RGR 63x69x30-PF
65	70	9,7	2,5	RGR 65x70x9.7-PF
	71	13	3	RGR 65x71x13-PF
	71	20	3	RGR 65x71x20-PF
	71	40	3	RGR 65x71x40-PF
70	75	9,7	2,5	RGR 70x75x9.7-PF
	76	13	3	RGR 70x76x13-PF
	76	20	3	RGR 70x76x20-PF
	76	30	3	RGR 70x76x30-PF
	76	40	3	RGR 70x76x40-PF
	76	50	3	RGR 70x76x50-PF
75	80	9,7	2,5	RGR 75x80x9.7-PF
	81	13	3	RGR 75x81x13-PF
	81	20	3	RGR 75x81x20-PF
	81	30	3	RGR 75x81x30-PF
	81	60	3	RGR 75x81x60-PF
80	85	9,7	2,5	RGR 80x85x9.7-PF
	85	15	2,5	RGR 80x85x15-PF
	86	13	3	RGR 80x86x13-PF
	86	20	3	RGR 80x86x20-PF
	86	25	3	RGR 80x86x25-PF
	86	30	3	RGR 80x86x30-PF
	86	40	3	RGR 80x86x40-PF
	86	50	3	RGR 80x86x50-PF

Dimensions				Designation
d	D	L	t	
mm				–
85	90	9,7	2,5	RGR 85x90x9.7-PF
	90	15	2,5	RGR 85x90x15-PF
	91	13	3	RGR 85x91x13-PF
	91	20	3	RGR 85x91x20-PF
	91	25	3	RGR 85x91x25-PF
90	95	9,7	2,5	RGR 90x95x9.7-PF
	95	15	2,5	RGR 90x95x15-PF
	96	13	3	RGR 90x96x13-PF
	96	20	3	RGR 90x96x20-PF
	96	30	3	RGR 90x96x30-PF
	96	40	3	RGR 90x96x40-PF
95	100	9,7	2,5	RGR 95x100x9.7-PF
	100	15	2,5	RGR 95x100x15-PF
100	105	9,7	2,5	RGR 100x105x9.7-PF
	105	15	2,5	RGR 100x105x15-PF
	106	13	3	RGR 100x106x13-PF
	106	20	3	RGR 100x106x20-PF
	106	25	3	RGR 100x106x25-PF
	106	30	3	RGR 100x106x30-PF
	106	40	3	RGR 100x106x40-PF
	106	50	3	RGR 100x106x50-PF
105	111	20	3	RGR 105x111x20-PF
110	115	9,7	2,5	RGR 110x115x9.7-PF
	115	15	2,5	RGR 110x115x15-PF
	116	13	3	RGR 110x116x13-PF
	116	20	3	RGR 110x116x20-PF
	116	30	3	RGR 110x116x30-PF
115	121	20	3	RGR 115x121x20-PF
120	125	9,7	2,5	RGR 120x125x9.7-PF
	125	15	2,5	RGR 120x125x15-PF
	126	40	3	RGR 120x126x40-PF
	126	50	3	RGR 120x126x50-PF
125	130	9,7	2,5	RGR 125x130x9.7-PF
	130	15	2,5	RGR 125x130x15-PF
	131	13	3	RGR 125x131x13-PF
	131	30	3	RGR 125x131x30-PF
	131	40	3	RGR 125x131x40-PF
	131	50	3	RGR 125x131x50-PF
	133	20	4	RGR 125x133x20-PF
	133	30	4	RGR 125x133x30-PF
	133	45	4	RGR 125x133x45-PF
	133	60	4	RGR 125x133x60-PF
127	133	13	3	RGR 127x133x13-PF
130	135	9,7	2,5	RGR 130x135x9.7-PF
	135	15	2,5	RGR 130x135x15-PF
135	141	90	3	RGR 135x141x90-PF
140	145	9,7	2,5	RGR 140x145x9.7-PF
	145	15	2,5	RGR 140x145x15-PF
	146	13	3	RGR 140x146x13-PF
	146	20	3	RGR 140x146x20-PF
	146	25	3	RGR 140x146x25-PF
	146	40	3	RGR 140x146x40-PF
	148	20	4	RGR 140x148x20-PF

5.3 RGR rod guide rings, metric sizes

d **150 – 365** mm



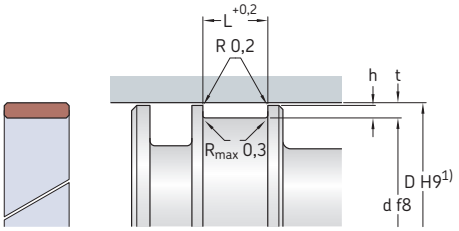
h ≥ t/2

Dimensions				Designation
d	D	L	t	
mm				–
150	155	9,7	2,5	**RGR 150x155x9.7-PF**
	155	15	2,5	**RGR 150x155x15-PF**
	156	19,5	3	**RGR 150x156x19.5-PF**
	156	30	3	**RGR 150x156x30-PF**
	158	20	4	**RGR 150x158x20-PF**
160	165	9,7	2,5	**RGR 160x165x9.7-PF**
	165	15	2,5	**RGR 160x165x15-PF**
	166	30	3	**RGR 160x166x30-PF**
	168	30	4	**RGR 160x168x30-PF**
	168	40	4	**RGR 160x168x40-PF**
180	185	9,7	2,5	**RGR 180x185x9.7-PF**
	185	15	2,5	**RGR 180x185x15-PF**
	186	19,5	3	**RGR 180x186x19.5-PF**
195	203	25	4	**RGR 195x203x25-PF**
200	205	15	2,5	**RGR 200x205x15-PF**
	205	25	2,5	**RGR 200x205x25-PF**
210	218	25	4	**RGR 210x218x25-PF**
220	225	15	2,5	**RGR 220x225x15-PF**
	225	25	2,5	**RGR 220x225x25-PF**
	228	25	4	**RGR 220x228x25-PF**
235	243	30	4	**RGR 235x243x30-PF**
250	255	15	2,5	**RGR 250x255x15-PF**
	255	25	2,5	**RGR 250x255x25-PF**
255	263	25	4	**RGR 255x263x25-PF**
264	272	24	4	**RGR 264x272x24-PF**
305	313	25	4	**RGR 305x313x25-PF**
365	373	35	4	**RGR 365x373x35-PF**

[1)] Adjustments according to tolerances provided for rod seal are possible, however, the maximum e-gap also need to be considered (→ *Gap extrusion*, **page 34**)

5.4 PGR piston guide rings, metric sizes

D **16 – 220** mm



h ≥ t/2

Dimensions				Designation
D	d	L	t	
mm				–
16	11	5,6	2,5	**PGR 16x11x5.6-PF**
	12,9	4	1,55	**PGR 16x12.9x4-PF**
18	13	5,6	2,5	**PGR 18x13x5.6-PF**
	14,9	4	1,55	**PGR 18x14.9x4-PF**
20	15	5,6	2,5	**PGR 20x15x5.6-PF**
	16,9	4	1,55	**PGR 20x16.9x4-PF**
25	20	5,6	2,5	**PGR 25x20x5.6-PF**
	21,9	4	1,55	**PGR 25x21.9x4-PF**
30	24	10	3	**PGR 30x24x10-PF**
	25	5,6	2,5	**PGR 30x25x5.6-PF**
	26,9	4	1,55	**PGR 30x26.9x4-PF**
32	27	5,6	2,5	**PGR 32x27x5.6-PF**
	28,9	4	1,55	**PGR 32x28.9x4-PF**
35	30	5,6	2,5	**PGR 35x30x5.6-PF**
	31,9	4	1,55	**PGR 35x31.9x4-PF**
40	34	10	3	**PGR 40x34x10-PF**
	35	5,6	2,5	**PGR 40x35x5.6-PF**
	35	9,7	2,5	**PGR 40x35x9.7-PF**
	36	10	2	**PGR 40x36x10-PF**
	36,9	4	1,55	**PGR 40x36.9x4-PF**
45	39	10	3	**PGR 45x39x10-PF**
	40	5,6	2,5	**PGR 45x40x5.6-PF**
	41	12	2	**PGR 45x41x12-PF**
	41,9	4	1,55	**PGR 45x41.9x4-PF**

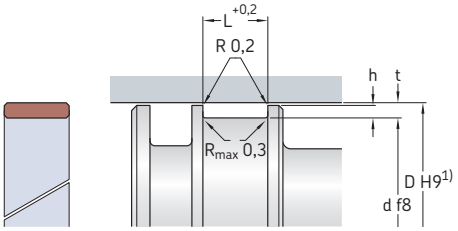
Dimensions				Designation
D	d	L	t	
mm				–
50	44	10	3	**PGR 50x44x10-PF**
	45	5,6	2,5	**PGR 50x45x5.6-PF**
	45	6,3	2,5	**PGR 50x45x6.3-PF**
	45	9,7	2,5	**PGR 50x45x9.7-PF**
	46	12	2	**PGR 50x46x12-PF**
	46,9	4	1,55	**PGR 50x46.9x4-PF**
55	50	4	2,5	**PGR 55x50x4-PF**
	50	5,6	2,5	**PGR 55x50x5.6-PF**
	50	9,7	2,5	**PGR 55x50x9.7-PF**
	50	25	2,5	**PGR 55x50x25-PF**
60	54	10	3	**PGR 60x54x10-PF**
	54	13	3	**PGR 60x54x13-PF**
	54	20	3	**PGR 60x54x20-PF**
	54	30	3	**PGR 60x54x30-PF**
	55	5,6	2,5	**PGR 60x55x5.6-PF**
	55	6,3	2,5	**PGR 60x55x6.3-PF**
	55	9,7	2,5	**PGR 60x55x9.7-PF**
63	57	13	3	**PGR 63x57x13-PF**
	57	20	3	**PGR 63x57x20-PF**
	58	5,6	2,5	**PGR 63x58x5.6-PF**
	58	6,3	2,5	**PGR 63x58x6.3-PF**
	58	9,7	2,5	**PGR 63x58x9.7-PF**
	58	10	2,5	**PGR 63x58x10-PF**
65	59	13	3	**PGR 65x59x13-PF**
	59	20	3	**PGR 65x59x20-PF**
	60	5,6	2,5	**PGR 65x60x5.6-PF**
	60	9,7	2,5	**PGR 65x60x9.7-PF**

1) Adjustments according to tolerance provided for piston seal are possible, however, the maximum e-gap also need to be considered (→ *Gap extrusion*, **page 34**)

Dimensions				Designation
D	d	L	t	
mm				–
70	64	13	3	PGR 70x64x13-PF
	64	20	3	PGR 70x64x20-PF
	65	5,6	2,5	PGR 70x65x5.6-PF
	65	9,7	2,5	PGR 70x65x9.7-PF
	65	20	2,5	PGR 70x65x20-PF
75	70	5,6	2,5	PGR 75x70x5.6-PF
	70	9,7	2,5	PGR 75x70x9.7-PF
80	72	12	4	PGR 80x72x12-PF
	74	13	3	PGR 80x74x13-PF
	74	20	3	PGR 80x74x20-PF
	74	25	3	PGR 80x74x25-PF
	75	5,6	2,5	PGR 80x75x5.6-PF
	75	9,7	2,5	PGR 80x75x9.7-PF
	75	15	2,5	PGR 80x75x15-PF
85	79	30	3	PGR 85x79x30-PF
	80	5,6	2,5	PGR 85x80x5.6-PF
	80	9,7	2,5	PGR 85x80x9.7-PF
90	84	13	3	PGR 90x84x13-PF
	84	20	3	PGR 90x84x20-PF
	85	5,6	2,5	PGR 90x85x5.6-PF
	85	9,7	2,5	PGR 90x85x9.7-PF
95	89	13	3	PGR 95x89x13-PF
	90	9,7	2,5	PGR 95x90x9.7-PF
100	94	13	3	PGR 100x94x13-PF
	94	20	3	PGR 100x94x20-PF
	94	25	3	PGR 100x94x25-PF
	94	30	3	PGR 100x94x30-PF
	95	9,7	2,5	PGR 100x95x9.7-PF
110	104	13	3	PGR 110x104x13-PF
	104	20	3	PGR 110x104x20-PF
	104	30	3	PGR 110x104x30-PF
	105	9,7	2,5	PGR 110x105x9.7-PF
	105	15	2,5	PGR 110x105x15-PF
115	109	13	3	PGR 115x109x13-PF
	110	9,7	2,5	PGR 115x110x9.7-PF
120	114	13	3	PGR 120x114x13-PF
	114	20	3	PGR 120x114x20-PF
	114	30	3	PGR 120x114x30-PF
	114	40	3	PGR 120x114x40-PF
	115	9,7	2,5	PGR 120x115x9.7-PF
125	119	13	3	PGR 125x119x13-PF
	119	15	3	PGR 125x119x15-PF
	119	20	3	PGR 125x119x20-PF
	119	25	3	PGR 125x119x25-PF
	119	30	3	PGR 125x119x30-PF
	120	9,7	2,5	PGR 125x120x9.7-PF
130	124	13	3	PGR 130x124x13-PF
	124	30	3	PGR 130x124x30-PF
	125	9,7	2,5	PGR 130x125x9.7-PF
135	129	13	3	PGR 135x129x13-PF

Dimensions				Designation
D	d	L	t	
mm				–
140	134	13	3	PGR 140x134x13-PF
	134	20	3	PGR 140x134x20-PF
	134	25	3	PGR 140x134x25-PF
	134	30	3	PGR 140x134x30-PF
	135	9,7	2,5	PGR 140x135x9.7-PF
	135	15	2,5	PGR 140x135x15-PF
145	139	30	3	PGR 145x139x30-PF
150	144	13	3	PGR 150x144x13-PF
	144	20	3	PGR 150x144x20-PF
	144	30	3	PGR 150x144x30-PF
	144	40	3	PGR 150x144x40-PF
	145	9,7	2,5	PGR 150x145x9.7-PF
	145	15	2,5	PGR 150x145x15-PF
155	149	13	3	PGR 155x149x13-PF
160	154	13	3	PGR 160x154x13-PF
	154	15	3	PGR 160x154x15-PF
	154	19,5	3	PGR 160x154x19.5-PF
	154	30	3	PGR 160x154x30-PF
	154	35	3	PGR 160x154x35-PF
	154	50	3	PGR 160x154x50-PF
	155	9,7	2,5	PGR 160x155x9.7-PF
	155	15	2,5	PGR 160x155x15-PF
170	160	20	5	PGR 170x160x20-PF
	164	19,5	3	PGR 170x164x19.5-PF
	164	20	3	PGR 170x164x20-PF
	164	30	3	PGR 170x164x30-PF
	165	9,7	2,5	PGR 170x165x9.7-PF
	165	15	2,5	PGR 170x165x15-PF
180	172	40	4	PGR 180x172x40-PF
	174	13	3	PGR 180x174x13-PF
	174	19,5	3	PGR 180x174x19.5-PF
	174	30	3	PGR 180x174x30-PF
	175	9,7	2,5	PGR 180x175x9.7-PF
	175	15	2,5	PGR 180x175x15-PF
190	184	25	3	PGR 190x184x25-PF
	184	30	3	PGR 190x184x30-PF
	185	9,7	2,5	PGR 190x185x9.7-PF
	185	15	2,5	PGR 190x185x15-PF
200	192	25	4	PGR 200x192x25-PF
	194	20	3	PGR 200x194x20-PF
	194	30	3	PGR 200x194x30-PF
	194	50	3	PGR 200x194x50-PF
	195	9,7	2,5	PGR 200x195x9.7-PF
	195	15	2,5	PGR 200x195x15-PF
	195	20	2,5	PGR 200x195x20-PF
210	205	9,7	2,5	PGR 210x205x9.7-PF
	205	15	2,5	PGR 210x205x15-PF
220	212	20	4	PGR 220x212x20-PF
	212	30	4	PGR 220x212x30-PF
	214	19,5	3	PGR 220x214x19.5-PF
	214	30	3	PGR 220x214x30-PF
	215	9,7	2,5	PGR 220x215x9.7-PF
	215	15	2,5	PGR 220x215x15-PF

5.4 PGR piston guide rings, metric sizes
D **230 – 400** mm



h ≥ t/2

Dimensions				Designation
D	d	L	t	
mm				–
230	225	15	2,5	**PGR 230x225x15-PF**
240	232	25	4	**PGR 240x232x25-PF**
	232	40	4	**PGR 240x232x40-PF**
	235	9,7	2,5	**PGR 240x235x9.7-PF**
	235	15	2,5	**PGR 240x235x15-PF**
250	242	20	4	**PGR 250x242x20-PF**
	242	25	4	**PGR 250x242x25-PF**
	242	40	4	**PGR 250x242x40-PF**
	244	19,5	3	**PGR 250x244x19.5-PF**
	244	50	3	**PGR 250x244x50-PF**
	245	9,7	2,5	**PGR 250x245x9.7-PF**
	245	15	2,5	**PGR 250x245x15-PF**
260	255	9,7	2,5	**PGR 260x255x9.7-PF**
	255	15	2,5	**PGR 260x255x15-PF**
270	262	25	4	**PGR 270x262x25-PF**
	262	30	4	**PGR 270x262x30-PF**
280	272	25	4	**PGR 280x272x25-PF**
	275	15	2,5	**PGR 280x275x15-PF**
	275	25	2,5	**PGR 280x275x25-PF**
300	292	20	4	**PGR 300x292x20-PF**
	292	25	4	**PGR 300x292x25-PF**
	292	40	4	**PGR 300x292x40-PF**
	295	15	2,5	**PGR 300x295x15-PF**
	295	25	2,5	**PGR 300x295x25-PF**
400	392	30	4	**PGR 400x392x30-PF**

1) Adjustments according to tolerance provided for piston seal are possible, however, the maximum e-gap also need to be considered (→ *Gap extrusion*, **page 34**)

Guide strips

SKF guide strips are made of PTFE as standard and should only be used in light duty applications or when fluid, temperature, friction, or speed do not allow any other material. They are typically used with PTFE sealing systems (→ **fig. 6**). At system operating pressures over 200 bar *(2 900 psi)*, contact SKF.

PTFE guide strips are available with different designs (→ **fig. 7**) and can be cut with different configurations (→ **fig. 8**).

Guide strips cut to length

Based on the hardware dimensions, SKF can supply guide strips with specified lengths. They are designated according to a system that states the type and design, dynamic diameter, housing groove diameter, housing groove width, type of cut and material (→ **table 2**, **page 286**).

For additional information and order assistance, contact SKF.

Fig. 6

PTFE sealing system

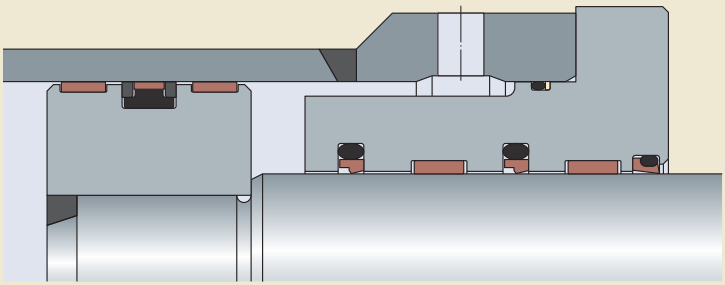


Fig. 7

Guide strip types and designs

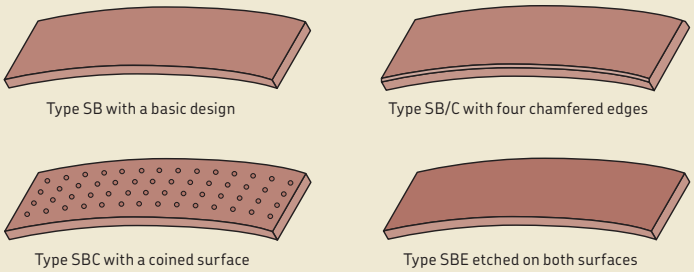
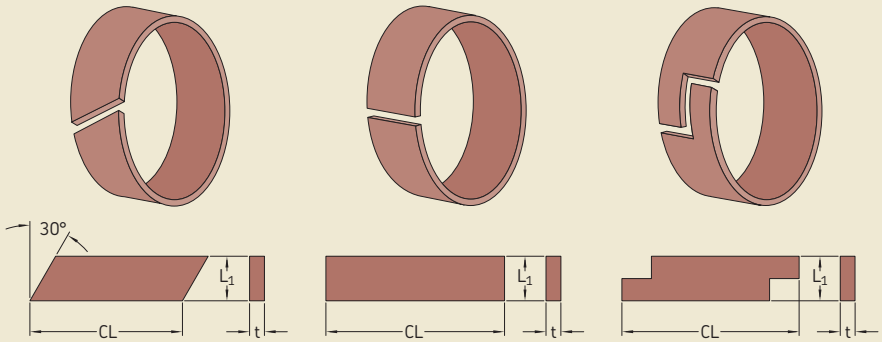


Fig. 8

Guide strips cut configurations



A cut forming an angle of 30° is the basic design for applications with reciprocating movements.

A straight cut is used in applications with rotating movements, designation suffix O.

A stepped cut is used in special applications and when the guide strip also has a sealing function, designation suffix S.

Table 2

Designation system for guide strips with individual length

Guide strips uncut

SKF can also supply uncut guide strips. They are designated by the type and design (→ **fig. 7**, **page 285**), guide strip thickness t and housing groove width in millimetres, material code, and length in metres, such as SB 2x8,1-292 / 25 m.

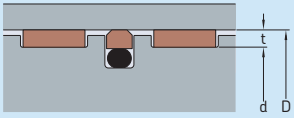
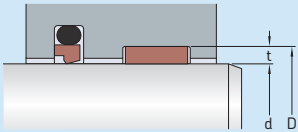
For additional information and order assistance, contact SKF.

Calculating the guide strip length

The individual guide strip length CL can be calculated using the formulas provided in **table 3**.

Table 3

Guide strip length CL

Material code	Guide strip for piston applications	Guide strip for rod applications
		
PTFE 292	CL = 3,11 (D – t) – 0,8	CL = 3,11 (d + t) – 0,8

CL = guide strip length [mm]
D = cylinder bore diameter or guide ring groove diameter in the head [mm]
d = guide ring groove diameter in the piston or rod diameter [mm]
t = guide strip thickness [mm]

More guides

Spark rings

Spark rings (also known as contamination rings, → **fig. 9**) are not technically guide rings, as they are not intended to accommodate radial loads. They rather protect the guides and piston seals from damage due to contamination particles or combustion of gases in the fluid media (diesel effect). SKF supplies spark rings in a variety of PTFE materials.

Customized machined guide profiles

SKF can manufacture a wide variety of guide profiles (→ **fig. 10**) with different materials and customized sizes with its industry-leading SKF SEAL JET production system. SKF can supply customized machined guide rings in close partnership with customers from the design phase to serial production.

For additional information about customized machined profiles, contact SKF.

Fig. 9

Guide rings combined with spark rings

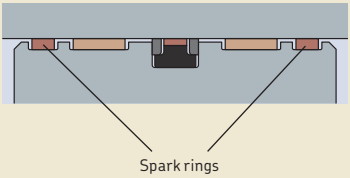
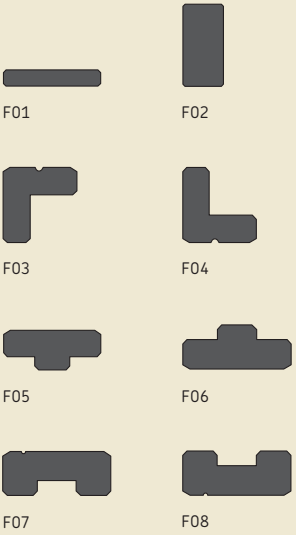
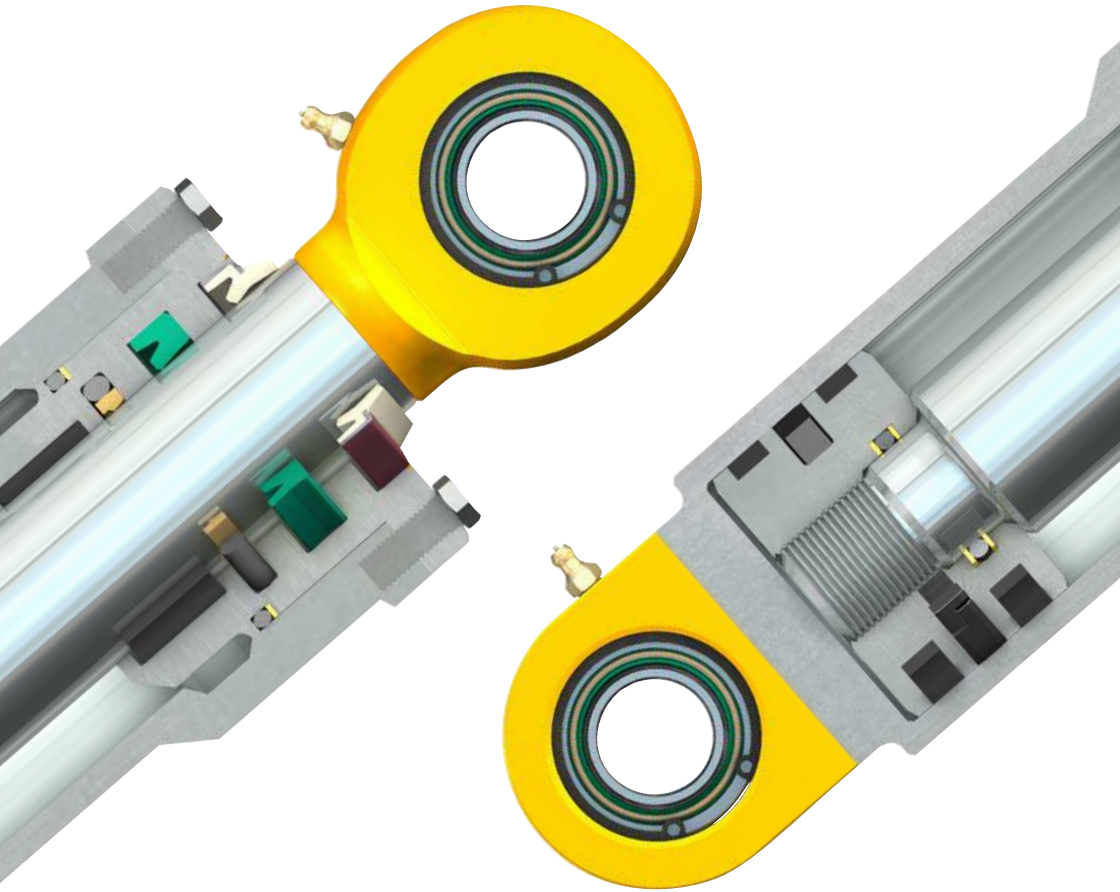
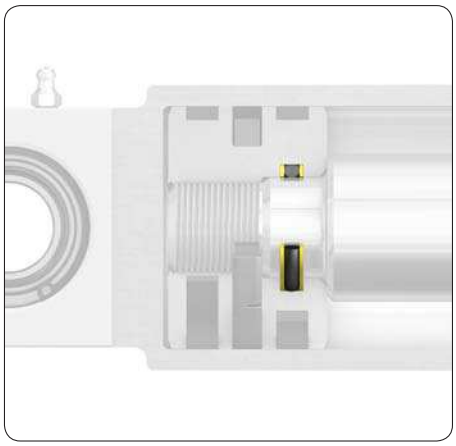


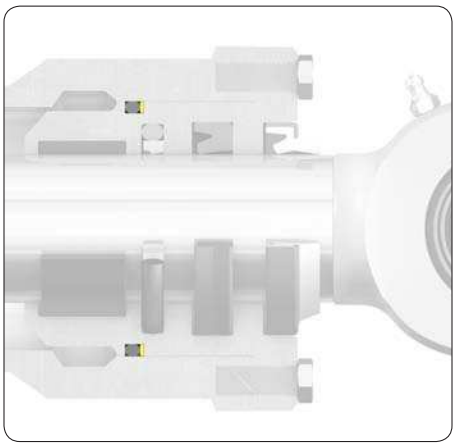
Fig. 10

Examples of SKF SEAL JET guide profiles









O-rings and back-up rings

Basics

O-rings are one of the most common sealing solutions. SKF supplies O-rings in a wide range of sizes and different materials, which make them appropriate for a wide variety of operating conditions and applications. They are easy to install and they enable a simple and cost-effective seal housing design.

O-rings maintain sealing contact force by radial or axial deformation in the seal housing between two machine components. The most important criteria that influence the maximum operating pressure at which O-rings in static radial sealing can be used are the following:

- extrusion gap (→ **fig. 2**, **page 298**)
- material (→ *Materials*, **page 26**)
- sealed fluid
- temperature

Under specific conditions, there is a risk for gap extrusion (→ *Extrusion gaps and back-up rings*, **page 298**). Back-up rings prevent O-rings from gap extrusion in static radial sealing.

O-rings are used in a wide variety of applications sealing various media. This catalogue focuses on sealing systems for hydraulic cylinders. Therefore, this chapter and provided recommendations apply to static sealing of common mineral-based hydraulic fluids (→ *Hydraulic fluids*, **page 31**).

More information

Designations

The designations of SKF O-rings (→ **table 1**) in both metric and inch sizes contain their dimensions in metric units.

The designations of SKF back-up rings (→ **table 2**) in metric sizes contain their dimensions in metric units, whereas those in inch sizes contain their dash-number.

The product tables for both are provided in inch and metric sizes. If applicable, the unique dash-numbers for O-ring sizes in accordance with standards AS586 and ISO 3601 are also listed there.

Materials

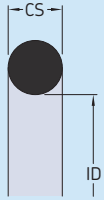
The O-rings listed in this catalogue are made of nitrile rubber (NBR) with 70 shA hardness as standard. This is the most common O-ring material and hardness used in hydraulic cylinder applications. On request, SKF can supply alternative hardnesses such as 80 shA or 90 shA. However, SKF generally recommends choosing O-rings with 70 shA and combining them with one or two back-up rings (→ *Extrusion gaps and back-up rings*, **page 298**). At operating temperatures above 100 °C *(210 °F)*, fluorocarbon rubber (FKM) or hydrogenated nitrile rubber (HNBR) can be an appropriate materials, depending on the fluid.

SKF back-up rings listed in this catalogue are made of polyurethane (TPU). On request, SKF can supply alternative materials and various hardness grades. Common back-up ring materials are listed in the designation system (→ **table 2**).

For additional information about O-ring and back-up ring materials, refer to *Materials* (→ **page 26**).

Table 1

Designation system for SKF O-rings



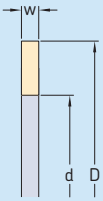
OR 99.1×5.7-N70

- O-ring
- Inside diameter ID [mm]
- Cross section diameter CS [mm]
- Material code (→ **table 5, page 29**)

Table 2

Designation system for SKF back-up rings

Metric sizes



STR 90×100×1.7-Y95A

- Back-up ring
- Inside diameter d [mm]
- Outside diameter D [mm]
- Width w [mm]
- Material code*)

Inch sizes with a dash-number

STR 19-342-395A

- Back-up ring dash-number series
- Dash-number
- Material code*)

*) **Material codes**

Y95A	Polyurethane 95 shA (yellow)
395A	Polyurethane 98 shA (black)
100	Unfilled PTFE (white)

Standards and sizes

Dimension standards

SKF can supply O-rings in a wide range of sizes in accordance with various O-ring standards. **Table 3** provides the most common national and international O-ring standards and their relevant sizes.

Inside diameter/cross section proportion

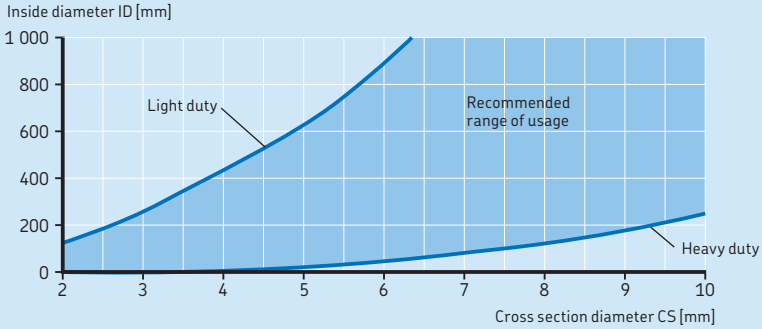
O-rings used in more demanding applications, such as those with higher operating pressures or larger misalignments, may require larger cross sections. SKF recommends inside diameter ID and cross section proportions as provided in **diagram 1**.

Tolerance standard

SKF supplies all O-rings with dimensional tolerances in accordance with ISO 3601-1 Class B (→ **table 4**). They are suitable for any elastomer material provided that appropriate tooling is used, whereas the tooling most commonly used is based upon the shrinkage of nitrile rubber (NBR) with 70 shA hardness.

Diagram 1

O-ring inside diameter/cross section proportion



O-ring standards and relevant sizes

Standard												
DIN 3771:1984			ISO 3601-1 Class B, AS568			BS 4518			JIS 240 P+G		
Cross section diameter	Inside diameter		Cross section diameter	Inside diameter		Cross section diameter	Inside diameter		Cross section diameter	Inside diameter	
CS	ID_{min}	ID_{max}	CS	ID_{min}	ID_{max}	CS	ID_{min}	ID_{max}	CS	ID_{min}	ID_{max}
mm	mm		mm	mm		mm	mm		mm	mm	
1,8	1,8	17	**1,78**	1,78	133,07	**1,6**	3,1	37,1	**1,9**	2,8	9,8
2,65	14	38,7	**2,62**	1,24	247,32	**2,4**	3,6	69,6	**2,4**	9,8	21,8
3,55	18	200	**3,53**	4,34	456,06	**3**	19,5	249,5	**3,1**	24,4	144,4
									3,5	21,7	49,7
5,3	40	400	**5,33**	10,46	658,88	**5,7**	44,3	499,3	**5,7**	47,6	299,3
7	206	670	**6,99**	113,67	658,88	**8,4**	144,1	249,1	**8,4**	149,5	399,5

Surface standard

SKF supplies O-rings that all have surfaces in accordance with ISO 3601-3 (→ **table 5, page 296**). This standard provides maximum acceptable imperfections and quality criteria for O-ring surfaces.

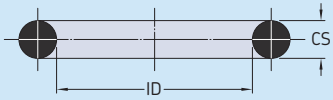
Table 3

SMS 1586

Cross section diameter CS	**Inside diameter** ID_{min}	ID_{max}
mm	mm	
1,6	3,1	37,1
2,4	3,3	17,3
3	19,2	44,2
5,7	44,2	144,3
8,4	144,1	249,1

Table 4

Tolerances in accordance with ISO 3601-1 Class B



Inside diameter ID

The tolerance ΔID can be calculated using

$$\Delta ID = \pm[(ID^{0,95} \times 0,009) + 0,11]$$

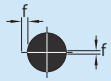
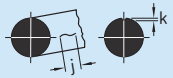
Calculation example:
What is the tolerance ΔID of an O-ring with ID = 94,5 mm?

$$\Delta ID = \pm[(94,5^{0,95} \times 0,009) + 0,11]$$
$$= \pm[(75,277 \times 0,009) + 0,11]$$
$$= \pm[0,677 + 0,11]$$
$$= \pm 0,79 \text{ mm}$$

Cross section diameter CS over	incl.	**Tolerance**
mm		mm
0,8	**2,25**	± 0,08
2,25	**3,15**	± 0,09
3,15	**4,5**	± 0,1
4,5	**6,3**	± 0,13
6,3	**8,4**	± 0,15

Table 5

Maximum acceptable surface imperfections in accordance with ISO 3601-3

Surface imperfection category Schematic illustration	Letter symbol	**Maximum acceptable limits** **Grade N O-rings** Cross section diameter CS >0,8 ≤2,25	>2,25 ≤3,15	>3,15 ≤4,50	>4,50 ≤6,30	>6,30 ≤8,40	**Grade S O-rings** Cross section diameter CS >0,8 ≤2,25	>2,25 ≤3,15	>3,15 ≤4,50	>4,50 ≤6,30	>6,30 ≤8,40
–		mm					mm				
Offset (off register and mismatch) 	e	0,08	0,1	0,13	0,15	0,15	0,08	0,08	0,1	0,12	0,13
Combined flash, offset and parting line projection 	f	0,1	0,12	0,14	0,16	0,18	0,1	0,1	0,13	0,15	0,15
Backrind 	g	0,18	0,27	0,36	0,53	0,7	0,1	0,15	0,2	0,2	0,3
	h	0,08	0,08	0,1	0,1	0,13	0,05	0,08	0,1	0,1	0,13
Excessive trimming 	–	Departure from a circular cross section due to trimming is allowed provided that the resultant surface is smoothly blended and is within the size tolerance limits for CS.									
Flow marks (radial orientation of flow marks is not permissible) 	j	1,5[1)]	1,5[1)]	6,5[1)]	6,5[1)]	6,5[1)]	1,5[1)]	1,5[1)]	5[1)]	5[1)]	5[1)]
	k	0,08	0,08	0,08	0,08	0,08	0,05	0,05	0,05	0,05	0,05
Non-fills and indentations (including parting line indentation) 	l	0,6	0,8	1	1,3	1,7	0,15	0,25	0,4	0,63	1
	m	0,08	0,08	0,1	0,1	0,13	0,08	0,08	0,1	0,1	0,13
Foreign material	–	Not permitted					Not permitted				

[1)] Or 0,05 x ID (O-ring inside diameter), whichever is greater

Housing design and dimensions

Housing dimensions for static radial sealing

O-rings for static (non-moving) sealing can be used in a wide variety of applications and arrangements. The most common arrangement in hydraulic cylinder applications is static radial sealing between coaxial cylindrical parts. The O-ring is installed in a housing that is machined either as an outside or inside groove (→ **fig. 1**) in one of the two cylindrical parts.

The housing dimensions for static radial sealing O-rings are listed in the product tables.

Housing groove edges

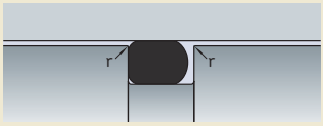
All housing groove edges should be smoothed and rounded off (→ **fig. 1**) to r = 0,1 to 0,2 mm *(0.004 to 0,008 in.)*.

Lead-in chamfers

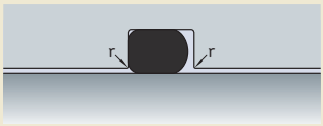
All edges and openings through which the O-ring has to pass during the assembly should have appropriate lead-in chamfers and should be well rounded off (→ **table 6**). The chamfers facilitate assembly and protect the O-ring from damage during the installation process. The O-ring and all surrounding parts should be well lubricated before assembly, preferably with the same fluid as used in the hydraulic system, ensuring compatibility with seals and cylinder components.

Fig. 1

Static radial sealing arrangements



Outside groove

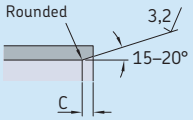


Inside groove

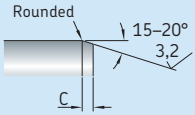
Table 6

Lead-in chamfers for O-rings

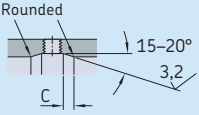
Inside chamfer



Outside chamfer



Hole



Cross section diameter CS		**Chamfer length** C
from	incl.	min.
mm		mm
1	**1,5**	1,5
1,6	**2**	2
2,4	**3**	2,5
3,53	**4,5**	3,5
5	**5,7**	4,5
6	**8,4**	5,5

Extrusion gaps and back-up rings

The size of the permissible extrusion gap (→ *Gap extrusion*, **page 34**) depends mainly on the seal material, temperature and operating pressure. Harder materials (→ *Materials*, **page 26**) provide a certain resistance to gap extrusion. When the permissible extrusion gap for the pressure and temperature in application is exceeded, back-up rings may be used to prevent the seal pressing into the gap and causing extrusion damage and possibly even premature failure. **Figure 2** shows the O-ring behaviour at different operating pressures and conditions. In applications where the O-ring is exposed to pressure from one side only, the back-up ring is installed at the zero pressure side. For an O-ring exposed to pressure from both sides, a back-up ring is installed on both sides.

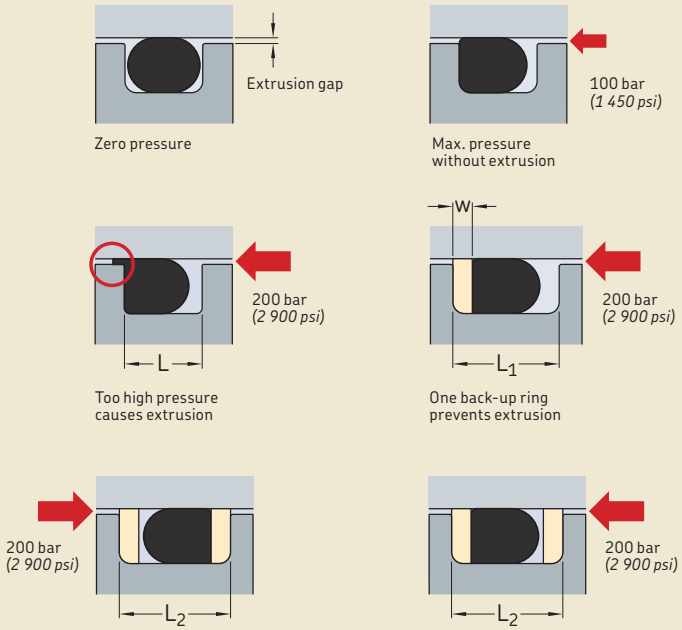
For the extrusion gaps, SKF recommends machining the fits according to the following tolerance classes:

- f8Ⓔ and H9Ⓔ for diameters up to 120 mm
- f7Ⓔ and H8Ⓔ for diameters larger than 120 mm

Diagrams 2 to **4** provide guideline values for the maximum extrusion gap in relation to the operating pressure for standard O-rings without back-up ring (→ **diagram 2**) and different back-up ring materials and sizes (→ **diagrams 3** and **4**). These guideline values are based on extensive tests conducted in SKF laboratories

Fig. 2

O-ring behaviour at different operating pressures and conditions



at 90 °C (*195 °F*) and 100 000 pressure pulses. However, other factors such as temperature and fluid can influence these guideline values and should be considered.

For additional information about O-ring and back-up ring materials, refer to *Materials* (→ **page 292**) and about extrusion, refer to *Gap extrusion* (→ **page 34**).

Housing groove width

To accommodate the additional back-up rings, the O-ring groove width L needs to be increased to L_1 for one back-up ring or L_2 for two back-up rings (→ **fig. 2**). The groove width dimensions are listed in the product tables.

Diagram 2

Guideline limit values for NBR O-rings, 70 shA

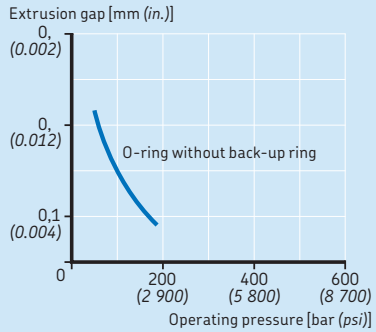


Diagram 3

Guideline limit values from test with OR 89.5×3-N70 and STR 90×95×1.3

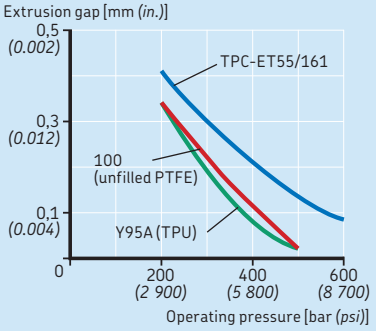
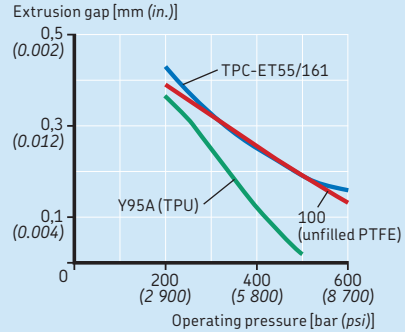


Diagram 4

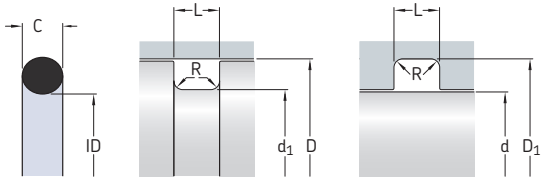
Guideline limit values from test with OR 89.1×5.7-N70 and STR 90×100×1.7



6

6.1 OR O-rings in static radial sealing, metric sizes

ID **2,9 – 17,3** mm



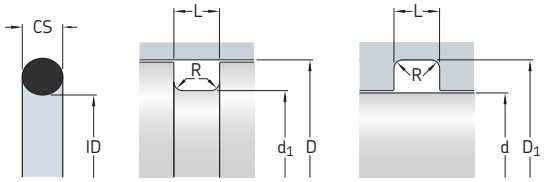
Outside groove | Inside groove

SKF recommends designing O-ring housings according to ISO 3601.
This table is a reference to O-ring sizes for common housing dimensions.

Dimensions				Outside groove		Inside groove		Dash-number	Designation
ID	CS	L +0,2	R max.	D H9	d_1 h11	d f8	D_1 H11		
mm								–	–
2,9	1,78	2,4	0,5	6,35	3,73	3,12	5,74	006	**OR 2.90x1.78-N70**
3,1	1,6	2,3	0,5	6	3,8	–	–	–	**OR 3.1x1.6-N70**
3,3	2,4	3,2	0,5	8	4,4	4,00	8	–	**OR 3.3x2.4-N70**
3,69	1,78	2,4	0,5	7,14	4,52	3,91	6,53	007	**OR 3.69x1.78-N70**
4,1	1,6	2,3	0,5	7	4,8	–	–	–	**OR 4.1x1.6-N70**
4,3	2,4	3,2	0,5	9	5,4	5,00	9	–	**OR 4.3x2.4-N70**
4,48	1,78	2,4	0,5	7,93	5,31	4,70	7,32	008	**OR 4.48x1.78-N70**
5,1	1,6	2,3	0,5	8	5,8	–	–	–	**OR 5.1x1.6-N70**
5,28	1,78	2,4	0,5	8,74	6,12	5,51	8,13	009	**OR 5.28x1.78-N70**
5,3	2,4	3,2	0,5	10	6,4	6,00	10	–	**OR 5.3x2.4-N70**
6,07	1,78	2,4	0,5	9,53	6,91	6,30	8,92	010	**OR 6.07x1.78-N70**
6,1	1,6	2,3	0,5	9	6,8	–	–	–	**OR 6.1x1.6-N70**
6,3	2,4	3,2	0,5	11	7,4	7,00	11	–	**OR 6.3x2.4-N70**
6,75	1,78	2,4	0,5	10,32	7,7	7,08	9,7	–	**OR 6.75x1.78-N70**
7,1	1,6	2,3	0,5	10	7,8	–	–	–	**OR 7.1x1.6-N70**
7,3	2,4	3,2	0,5	12	8,4	8,00	12	–	**OR 7.3x2.4-N70**
7,65	1,78	2,4	0,5	11,11	8,49	7,78	10,49	–	**OR 7.65x1.78-N70**
8,1	1,6	2,3	0,5	11	8,8	–	–	–	**OR 8.1x1.6-N70**
8,3	2,4	3,2	0,5	13	9,4	9,00	13	–	**OR 8.3x2.4-N70**
8,73	1,78	2,4	0,5	12,3	9,68	9,07	11,69	–	**OR 8.73x1.78-N70**
9,1	1,6	2,3	0,5	12	9,8	–	–	–	**OR 9.1x1.6-N70**

Dimensions				Outside groove		Inside groove		Dash-number	Designation
ID	CS	L +0,2	R max.	D H9	d_1 h11	d f8	D_1 H11		
mm								–	–
9,19	2,62	3,6	0,8	14,29	10,1	9,47	13,66	110	**OR 9.19x2.62-N70**
9,25	1,78	2,4	0,5	12,7	10,08	9,47	12,09	012	**OR 9.25x1.78-N70**
9,3	2,4	3,2	0,5	14	10,4	10,00	14	–	**OR 9.3x2.4-N70**
9,92	2,62	3,6	0,8	15,08	10,89	10,26	14,45	–	**OR 9.92x2.62-N70**
10,1	1,6	2,3	0,5	13	10,8	–	–	–	**OR 10.1x1.6-N70**
10,3	2,4	3,2	0,5	15	11,4	11,00	15	–	**OR 10.3x2.4-N70**
10,78	2,62	3,6	0,8	15,88	11,69	11,05	15,24	111	**OR 10.78x2.62-N70**
10,82	1,78	2,4	0,5	14,3	11,68	11,10	13,72	013	**OR 10.82x1.78-N70**
11,1	1,6	2,3	0,5	14	11,8	–	–	–	**OR 11.1x1.6-N70**
11,11	1,78	2,4	0,5	14,68	12,06	11,51	14,13	–	**OR 11.11x1.78-N70**
11,3	2,4	3,2	0,5	16	12,4	12,00	16	–	**OR 11.3x2.4-N70**
11,91	2,62	3,6	0,8	17,07	12,88	12,24	16,43	–	**OR 11.91x2.62-N70**
12,1	1,6	2,3	0,5	15	12,8	–	–	–	**OR 12.1x1.6-N70**
12,3	2,4	3,2	0,5	17	13,4	13,00	17	–	**OR 12.3x2.4-N70**
12,37	2,62	3,6	0,8	17,46	13,27	12,65	16,84	112	**OR 12.37x2.62-N70**
12,42	1,78	2,4	0,5	15,88	13,26	12,70	15,32	014	**OR 12.42x1.78-N70**
13,1	1,6	2,3	0,5	16	13,8	–	–	–	**OR 13.1x1.6-N70**
	2,62	3,6	0,8	18,26	14,07	13,43	17,62	–	**OR 13.1x2.62-N70**
13,3	2,4	3,2	0,5	18	14,4	14,00	18	–	**OR 13.3x2.4-N70**
13,94	2,62	3,6	0,8	19,05	14,86	14,22	18,41	–	**OR 13.94x2.62-N70**
14	1,78	2,4	0,5	17,48	14,86	14,28	16,9	015	**OR 14.0x1.78-N70**
14,1	1,6	2,3	0,5	17	14,8	–	–	–	**OR 14.1x1.6-N70**
14,3	2,4	3,2	0,5	19	15,4	15,00	19	–	**OR 14.3x2.4-N70**
15,08	2,62	3,6	0,8	20,24	16,05	15,42	19,61	–	**OR 15.08x2.62-N70**
15,1	1,6	2,3	0,5	18	15,8	–	–	–	**OR 15.1x1.6-N70**
15,3	2,4	3,2	0,5	20	16,4	16,00	20	–	**OR 15.3x2.4-N70**
15,54	2,62	3,6	0,8	20,64	16,45	15,82	20,01	114	**OR 15.54x2.62-N70**
15,6	1,78	2,4	0,5	19,05	16,43	15,88	18,5	016	**OR 15.6x1.78-N70**
15,88	2,62	3,6	0,8	21,03	16,84	16,20	20,39	–	**OR 15.88x2.62-N70**
16,1	1,6	2,3	0,5	19	16,8	–	–	–	**OR 16.1x1.6-N70**
16,3	2,4	3,2	0,5	21	17,4	17,00	21	–	**OR 16.3x2.4-N70**
17,1	1,6	2,3	0,5	20	17,8	–	–	–	**OR 17.1x1.6-N70**
17,12	2,62	3,6	0,8	22,23	18,04	17,40	21,59	–	**OR 17.12x2.62-N70**
17,17	1,78	2,4	0,5	20,63	18,01	17,48	20,1	017	**OR 17.17x1.78-N70**
17,3	2,4	3,2	0,5	22	18,4	18,00	22	–	**OR 17.3x2.4-N70**

6.1 OR O-rings in static radial sealing, metric sizes
ID **17,86 – 37,1** mm



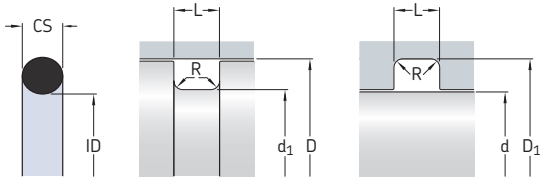
Outside groove | Inside groove

SKF recommends designing O-ring housings according to ISO 3601.
This table is a reference to O-ring sizes for common housing dimensions.

Dimensions				Outside groove		Inside groove		Dash-number	Designation
ID	CS	L +0,2	R max.	D H9	d_1 h11	d f8	D_1 H11		
mm								–	–
17,86	2,62	3,6	0,8	23,02	18,83	18,20	22,39	–	**OR 17.86x2.62-N70**
18,1	1,6	2,3	0,5	21	18,8	–	–	–	**OR 18.1x1.6-N70**
18,64	3,53	4,8	1	25,43	19,71	19,00	24,72	210	**OR 18.64x3.53-N70**
18,72	2,62	3,6	0,8	23,81	19,62	19,00	23,19	116	**OR 18.72x2.62-N70**
18,77	1,78	2,4	0,5	22,23	19,61	19,05	21,67	018	**OR 18.77x1.78-N70**
19,1	1,6	2,3	0,5	22	19,8	–	–	–	**OR 19.1x1.6-N70**
19,2	3	4	1	25	20,2	20,00	25	–	**OR 19.2x3.0-N70**
20,22	3,53	4,8	1	27	21,28	20,55	26,27	211	**OR 20.22x3.53-N70**
20,35	1,78	2,4	0,5	23,8	21,18	20,63	23,25	019	**OR 20.35x1.78-N70**
20,63	2,62	3,6	0,8	25,8	21,61	21,03	25,22	–	**OR 20.63x2.62-N70**
21,82	3,53	4,8	1	28,6	22,88	22,15	27,87	212	**OR 21.82x3.53-N70**
21,95	1,78	2,4	0,5	25,4	22,78	22,23	24,85	020	**OR 21.95x1.78-N70**
22,1	1,6	2,3	0,5	25	22,8	–	–	–	**OR 22.1x1.6-N70**
22,2	3	4	1	28	23,2	23,00	28	–	**OR 22.2x3.0-N70**
22,22	2,62	3,6	0,8	27,38	23,19	22,62	26,81	–	**OR 22.22x2.62-N70**
23,4	3,53	4,8	1	30,18	24,46	23,72	29,44	213	**OR 23.4x3.53-N70**
23,47	2,62	3,6	0,8	28,58	24,39	23,80	27,99	119	**OR 23.47x2.62-N70**
23,52	1,78	2,4	0,5	26,98	24,36	23,81	26,42	021	**OR 23.52x1.78-N70**
23,81	2,62	3,6	0,8	28,97	24,78	24,21	28,4	–	**OR 23.81x2.62-N70**
24,2	3	4	1	30	25,2	25,00	30	–	**OR 24.2x3.0-N70**
24,99	3,53	4,8	1	31,78	26,06	25,32	31,04	214	**OR 24.99x3.53-N70**

Dimensions				Outside groove		Inside groove		Dash-number	Designation
ID	CS	L +0,2	R max.	D H9	d_1 h11	d f8	D_1 H11		
mm								–	–
25,07	2,62	3,6	0,8	30,18	25,99	25,40	29,59	120	**OR 25.07x2.62-N70**
25,1	1,6	2,3	0,5	28	25,8	–	–	–	**OR 25.1x1.6-N70**
25,12	1,78	2,4	0,5	28,58	25,96	25,40	28,02	022	**OR 25.12x1.78-N70**
25,8	3,53	4,8	1	32,58	26,86	26,13	31,85	–	**OR 25.8x3.53-N70**
26,2	3	4	1	32	27,2	27,00	32	–	**OR 26.2x3.0-N70**
26,58	3,53	4,8	1	33,35	27,63	26,90	32,62	215	**OR 26.58x3.53-N70**
26,64	2,62	3,6	0,8	31,75	27,56	26,98	31,17	121	**OR 26.64x2.62-N70**
26,7	1,78	2,4	0,5	30,18	27,56	26,98	29,6	023	**OR 26.7x1.78-N70**
27,1	1,6	2,3	0,5	30	27,8	–	–	–	**OR 27.1x1.6-N70**
28,17	3,53	4,8	1	34,95	29,23	28,50	34,22	216	**OR 28.17x3.53-N70**
28,25	2,62	3,6	0,8	33,33	29,14	28,58	32,77	–	**OR 28.25x2.62-N70**
28,3	1,78	2,4	0,5	31,75	29,13	28,58	31,2	024	**OR 28.3x1.78-N70**
29,1	1,6	2,3	0,5	32	29,8	–	–	–	**OR 29.1x1.6-N70**
29,2	3	4	1	35	30,2	30,00	35	–	**OR 29.2x3.0-N70**
29,74	3,53	4,8	1	36,53	30,81	30,07	35,79	–	**OR 29.74x3.53-N70**
29,82	2,62	3,6	0,8	34,93	30,74	30,18	34,37	123	**OR 29.82x2.62-N70**
29,87	1,78	2,4	0,5	33,33	30,71	30,18	32,8	025	**OR 29.87x1.78-N70**
31,34	3,53	4,8	1	38,13	32,41	31,67	37,39	218	**OR 31.34x3.53-N70**
31,42	2,62	3,6	0,8	36,5	32,31	31,75	35,94	124	**OR 31.42x2.62-N70**
31,47	1,78	2,4	0,5	34,93	32,31	31,75	34,37	026	**OR 31.47x1.78-N70**
32,1	1,6	2,3	0,5	35	32,8	–	–	–	**OR 32.1x1.6-N70**
32,2	3	4	1	38	33,2	33,00	38	–	**OR 32.2x3.0-N70**
32,92	3,53	4,8	1	39,7	33,98	33,25	38,97	–	**OR 32.92x3.53-N70**
32,99	2,62	3,6	0,8	38,1	33,91	33,33	37,52	–	**OR 32.99x2.62-N70**
33,05	1,78	2,4	0,5	36,5	33,88	33,33	35,95	027	**OR 33.05x1.78-N70**
34,2	3	4	1	40	35,2	35,00	40	–	**OR 34.2x3.0-N70**
34,52	3,53	4,8	1	41,3	35,58	34,85	40,57	220	**OR 34.52x3.53-N70**
34,59	2,62	3,6	0,8	39,7	35,51	34,93	39,12	126	**OR 34.59x2.62-N70**
34,65	1,78	2,4	0,5	38,1	35,48	34,93	37,55	028	**OR 34.65x1.78-N70**
35,1	1,6	2,3	0,5	38	35,8	–	–	–	**OR 35.1x1.6-N70**
36,1	3,53	4,8	1	42,88	37,16	36,42	42,14	221	**OR 36.1x3.53-N70**
36,17	2,62	3,6	0,8	41,28	37,09	36,50	40,69	127	**OR 36.17x2.62-N70**
36,2	3	4	1	42	37,2	37,00	42	–	**OR 36.2x3.0-N70**
37,1	1,6	2,3	0,5	40	37,8	–	–	–	**OR 37.1x1.6-N70**

6.1 OR O-rings in static radial sealing, metric sizes
ID **37,47 – 61,91** mm

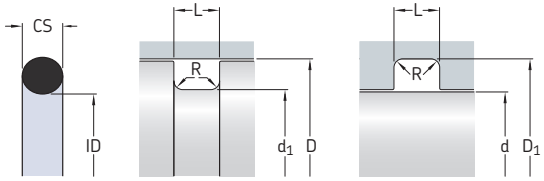


SKF recommends designing O-ring housings according to ISO 3601.
This table is a reference to O-ring sizes for common housing dimensions.

Dimensions				Outside groove		Inside groove		Dash-number	Designation
ID	CS	L +0,2	R max.	D H9	d_1 h11	d f8	D_1 H11		
mm								–	–
37,47	5,33	7,1	1	47,65	38,89	38,02	46,78	325	**OR 37.47x5.33-N70**
37,69	3,53	4,8	1	44,48	38,76	38,02	43,74	222	**OR 37.69x3.53-N70**
37,77	2,62	3,6	0,8	42,88	38,69	38,10	42,29	128	**OR 37.77x2.62-N70**
39,2	3	4	1	45	40,2	40,00	45	–	**OR 39.2x3.0-N70**
39,34	2,62	3,6	0,8	44,45	40,26	39,68	43,87	129	**OR 39.34x2.62-N70**
39,69	3,53	4,8	1	46,49	40,77	40,02	45,74	–	**OR 39.69x3.53-N70**
40,65	5,33	7,1	1	50,83	42,07	41,20	49,96	326	**OR 40.65x5.33-N70**
40,87	3,53	4,8	1	47,65	41,94	41,20	46,91	223	**OR 40.87x3.53-N70**
40,95	2,62	3,6	0,8	46,03	41,84	41,28	45,47	130	**OR 40.95x2.62-N70**
41,28	3,53	4,8	1	48,05	42,33	41,61	47,33	–	**OR 41.28x3.53-N70**
42,2	3	4	1	48	43,2	43,00	48	–	**OR 42.2x3.0-N70**
42,52	2,62	3,6	0,8	47,63	43,44	42,88	47,07	131	**OR 42.52x2.62-N70**
42,86	3,53	4,8	1	49,64	43,92	43,19	48,91	–	**OR 42.86x3.53-N70**
43,82	5,33	7,1	1	54	45,24	44,37	53,13	327	**OR 43.82x5.33-N70**
44,04	3,53	4,8	1	50,83	45,11	44,37	50,09	224	**OR 44.04x3.53-N70**
44,12	2,62	3,6	0,8	49,2	45,01	44,45	48,64	132	**OR 44.12x2.62-N70**
44,2	3	4	1	50	45,2	45,00	50	–	**OR 44.2x3.0-N70**
	5,7	7,5	1	55	45,3	45,00	55	–	**OR 44.2x5.7-N70**
44,45	3,53	4,8	1	51,22	45,5	44,77	50,49	–	**OR 44.45x3.53-N70**
45,69	2,62	3,6	0,8	50,8	46,61	46,03	50,22	133	**OR 45.69x2.62-N70**
46,04	3,53	4,8	1	52,8	47,08	46,35	52,07	–	**OR 46.04x3.53-N70**
46,99	5,33	7,1	1	57,18	48,42	47,55	56,31	328	**OR 46.99x5.33-N70**

Dimensions				Outside groove		Inside groove		Dash-number	Designation
ID	CS	L +0,2	R max.	D H9	d_1 h11	d f8	D_1 H11		
mm								–	–
47,22	3,53	4,8	1	54	48,29	47,55	53,26	225	**OR 47.22x3.53-N70**
47,29	2,62	3,6	0,8	52,38	48,19	47,63	51,82	134	**OR 47.29x2.62-N70**
47,63	3,53	4,8	1	54,39	48,67	47,94	53,66	–	**OR 47.63x3.53-N70**
48,9	2,62	3,6	0,8	53,98	49,79	49,20	53,39	135	**OR 48.9x2.62-N70**
49,2	5,7	7,5	1	60	50,3	50,00	60	–	**OR 49.2x5.7-N70**
49,21	3,53	4,8	1	55,98	50,26	49,53	55,25	–	**OR 49.21x3.53-N70**
49,5	3	3,7	1	55	50,2	–	–	–	**OR 49.5x3.0-N70**
50,16	5,33	7,1	1	60,35	51,59	50,72	59,48	329	**OR 50.16x5.33-N70**
50,4	3,53	4,8	1	57,18	51,46	50,72	56,44	226	**OR 50.4x3.53-N70**
50,47	2,62	3,6	0,8	55,58	51,39	50,80	54,99	136	**OR 50.47x2.62-N70**
50,8	3,53	4,8	1	57,57	51,85	51,12	56,84	–	**OR 50.8x3.53-N70**
52,07	2,62	3,6	0,8	57,15	52,96	52,38	56,57	137	**OR 52.07x2.62-N70**
52,39	3,53	4,8	1	59,17	53,45	52,70	58,42	–	**OR 52.39x3.53-N70**
53,34	5,33	7,1	1	63,53	54,77	53,90	62,66	330	**OR 53.34x5.33-N70**
53,56	3,53	4,8	1	60,35	54,64	53,90	59,61	227	**OR 53.56x3.53-N70**
53,64	2,62	3,6	0,8	58,73	54,54	53,98	58,17	138	**OR 53.64x2.62-N70**
53,97	3,53	4,8	1	60,74	55,02	54,29	60,01	–	**OR 53.97x3.53-N70**
54,2	5,7	7,5	1	65	55,3	55,00	65	–	**OR 54.2x5.7-N70**
54,5	3	3,7	1	60	55,2	–	–	–	**OR 54.5x3.0-N70**
55,25	2,62	3,6	0,8	60,33	56,14	55,58	59,77	139	**OR 55.25x2.62-N70**
55,56	3,53	4,8	1	62,34	56,62	55,88	61,6	–	**OR 55.56x3.53-N70**
56,52	5,33	7,1	1	66,7	57,94	57,07	65,83	331	**OR 56.52x5.33-N70**
56,74	3,53	4,8	1	63,92	57,81	57,07	62,79	228	**OR 56.74x3.53-N70**
56,82	2,62	3,6	0,8	61,9	57,71	57,15	61,34	140	**OR 56.82x2.62-N70**
57,15	3,53	4,8	1	63,92	58,22	57,47	63,19	–	**OR 57.15x3.53-N70**
58,42	2,62	3,6	0,8	63,5	59,31	58,73	62,92	141	**OR 58.42x2.62-N70**
58,74	3,53	4,8	1	65,5	59,78	59,05	64,77	–	**OR 58.74x3.53-N70**
59,2	5,7	7,5	1	70	60,3	60,00	70	–	**OR 59.2x5.7-N70**
59,5	3	3,7	1	65	60,2	–	–	–	**OR 59.5x3.0-N70**
59,69	5,33	7,1	1	69,88	61,12	60,25	69,01	332	**OR 59.69x5.33-N70**
59,92	3,53	4,8	1	66,7	60,99	60,25	65,96	229	**OR 59.92x3.53-N70**
60	2,62	3,6	0,8	65,1	60,91	60,33	64,52	142	**OR 60.0x2.62-N70**
60,33	3,53	4,8	1	67,09	61,37	60,66	66,38	–	**OR 60.33x3.53-N70**
61,6	2,62	3,6	0,8	66,68	62,49	61,90	66,09	143	**OR 61.6x2.62-N70**
61,91	3,53	4,8	1	68,68	62,96	62,23	67,95	–	**OR 61.91x3.53-N70**

6.1 OR O-rings in static radial sealing, metric sizes
ID **62,87 – 97,79** mm

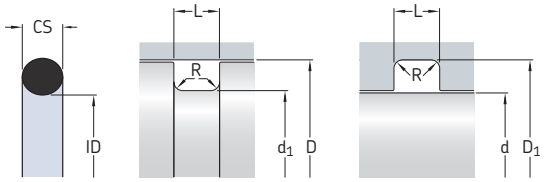


SKF recommends designing O-ring housings according to ISO 3601.
This table is a reference to O-ring sizes for common housing dimensions.

Dimensions				Outside groove		Inside groove		Dash-number	Designation
ID	CS	L +0,2	R max.	D H9	d_1 h11	d f8	D_1 H11		
mm								–	–
62,87	5,33	7,1	1	73,05	64,29	63,42	72,18	333	**OR 62.87x5.33-N70**
63,09	3,53	4,8	1	69,88	64,16	63,42	69,14	230	**OR 63.09x3.53-N70**
63,17	2,62	3,6	0,8	68,28	64,09	63,50	67,69	144	**OR 63.17x2.62-N70**
63,5	3,53	4,8	1	70,27	64,55	63,82	69,54	–	**OR 63.5x3.53-N70**
64,2	5,7	7,5	1	75	65,3	65,00	75	–	**OR 64.2x5.7-N70**
64,5	3	3,7	1	70	65,2	–	–	–	**OR 64.5x3.0-N70**
64,77	2,62	3,6	0,8	69,85	65,66	65,08	69,27	145	**OR 64.77x2.62-N70**
65,09	3,53	4,8	1	71,85	66,13	65,40	71,12	–	**OR 65.09x3.53-N70**
66,04	5,33	7,1	1	76,23	67,47	66,60	75,36	334	**OR 66.04x5.33-N70**
66,27	3,53	4,8	1	73,05	67,34	66,60	72,31	231	**OR 66.27x3.53-N70**
66,34	2,62	3,6	0,8	71,43	67,24	66,68	70,87	146	**OR 66.34x2.62-N70**
66,68	3,53	4,8	1	73,45	67,75	67,00	72,72	–	**OR 66.68x3.53-N70**
67,94	2,62	3,6	0,8	73,03	68,84	68,28	72,47	–	**OR 67.94x2.62-N70**
68,26	3,53	4,8	1	75,02	69,3	68,58	74,3	–	**OR 68.26x3.53-N70**
69,2	5,7	7,5	1	80	70,3	70,00	80	–	**OR 69.2x5.7-N70**
69,22	5,33	7,1	1	79,4	70,64	69,77	78,53	335	**OR 69.22x5.33-N70**
69,44	3,53	4,8	1	76,23	70,51	69,77	75,49	232	**OR 69.44x3.53-N70**
69,5	3	3,7	1	75	70,2	70,00	74,8	–	**OR 69.5x3.0-N70**
69,52	2,62	3,6	0,8	74,6	70,41	69,85	74,04	148	**OR 69.52x2.62-N70**
69,85	3,53	4,8	1	76,62	70,9	70,17	75,89	–	**OR 69.85x3.53-N70**

Dimensions				Outside groove		Inside groove		Dash-number	Designation
ID	CS	L +0,2	R max.	D H9	d_1 h11	d f8	D_1 H11		
mm								–	–
71,12	2,62	3,6	0,8	76,6	72,01	71,43	75,62	149	**OR 71.12x2.62-N70**
71,44	3,53	4,8	1	78,2	72,48	71,75	77,47	–	**OR 71.44x3.53-N70**
72,39	5,33	7,1	1	82,58	73,82	72,95	81,71	336	**OR 72.39x5.33-N70**
72,62	3,53	4,8	1	79,4	73,69	72,95	78,66	233	**OR 72.62x3.53-N70**
73,02	3,53	4,8	1	79,79	74,04	73,34	79,06	–	**OR 73.02x3.53-N70**
74,2	5,7	7,5	1	85	75,3	75,00	85	–	**OR 74.2x5.7-N70**
74,5	3	3,7	1	80	75,2	75,00	79,8	–	**OR 74.5x3.0-N70**
74,6	3,53	4,8	1	81,38	75,66	74,93	80,65	–	**OR 74.60x3.53-N70**
74,63	5,33	7,1	1	85	76,24	75,35	84,11	–	**OR 74.63x5.33-N70**
75,57	5,33	7,1	1	85,78	77,02	76,10	84,86	337	**OR 75.57x5.33-N70**
75,79	3,53	4,8	1	82,58	76,86	76,10	81,81	234	**OR 75.79x3.53-N70**
78,74	5,33	7,1	1	88,95	80,19	79,27	88,03	338	**OR 78.74x5.33-N70**
78,97	3,53	4,8	1	85,78	80,06	79,27	84,99	235	**OR 78.97x3.53-N70**
79,2	5,7	7,5	1	90	80,3	80,00	90	–	**OR 79.2x5.7-N70**
79,5	3	3,7	1	85	80,2	80,00	84,8	–	**OR 79.5x3.0-N70**
79,73	5,33	7,1	1	90,93	82,17	81,29	90,05	–	**OR 79.73x5.33-N70**
81,92	5,33	7,1	1	92,13	83,37	82,45	91,21	339	**OR 81.92x5.33-N70**
82,14	3,53	4,8	1	88,95	83,23	82,45	88,16	236	**OR 82.14x3.53-N70**
84,1	5,7	7,5	1	95	85,3	85,00	95	–	**OR 84.1x5.7-N70**
84,5	3	3,7	1	90	85,2	85,00	89,8	–	**OR 84.5x3.0-N70**
85,09	5,33	7,1	1	95,3	86,54	85,62	94,38	340	**OR 85.09x5.33-N70**
85,32	3,53	4,8	1	92,13	86,41	85,62	91,34	237	**OR 85.32x3.53-N70**
88,27	5,33	7,1	1	98,48	89,72	88,80	97,56	341	**OR 88.27x5.33-N70**
88,49	3,53	4,8	1	95,09	89,37	88,80	94,51	238	**OR 88.49x3.53-N70**
89,1	5,7	7,5	1	100	90,3	90,00	100	–	**OR 89.1x5.7-N70**
89,5	3	3,7	1	95	90,2	90,00	94,8	–	**OR 89.5x3.0-N70**
89,69	5,33	7,1	1	100,06	91,3	90,40	99,16	–	**OR 89.69x5.33-N70**
91,44	5,33	7,1	1	101,65	92,89	91,97	100,73	342	**OR 91.44x5.33-N70**
91,67	3,53	4,8	1	98,48	92,76	91,97	97,69	239	**OR 91.67x3.53-N70**
94,1	5,7	7,5	1	105	95,3	95,00	105	–	**OR 94.1x5.7-N70**
94,5	3	3,7	1	100	95,2	95,00	99,8	–	**OR 94.5x3.0-N70**
94,62	5,33	7,1	1	104,83	96,07	95,15	103,91	343	**OR 94.62x5.33-N70**
94,84	3,53	4,8	1	–	–	95,15	100,86	240	**OR 94.84x3.53-N70**
97,79	5,33	7,1	1	108	99,24	98,32	107,08	344	**OR 97.79x5.33-N70**

6.1 OR O-rings in static radial sealing, metric sizes
ID **98,02 – 120** mm

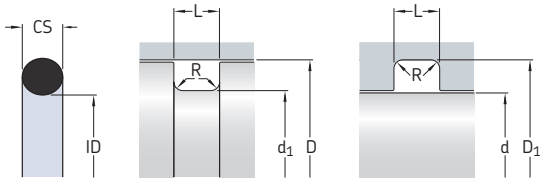


SKF recommends designing O-ring housings according to ISO 3601.
This table is a reference to O-ring sizes for common housing dimensions.

Dimensions				Outside groove		Inside groove		Dash-number	Designation
ID	CS	L +0,2	R max.	D H9	d_1 h11	d f8	D_1 H11		
mm								–	–
98,02	3,53	4,8	1	–	–	98,32	104,04	241	**OR 98.02x3.53-N70**
99,1	5,7	7,5	1	110	100,3	100,00	110	–	**OR 99.1x5.7-N70**
99,5	3	3,7	1	105	100,2	100,00	104,8	–	**OR 99.5x3.0-N70**
100	5,33	7,1	1	110,38	101,62	100,74	109,5	–	**OR 100.0x5.33-N70**
100,97	5,33	7,1	1	111,18	102,48	101,50	110,26	345	**OR 100.97x5.33-N70**
101,19	3,53	4,8	1	–	–	101,50	107,21	242	**OR 101.19x3.53-N70**
104,1	5,7	7,5	1	115	105,3	105,00	115	–	**OR 104.1x5.7-N70**
104,14	5,33	7,1	1	114,35	105,54	104,67	113,43	346	**OR 104.14x5.33-N70**
104,37	3,53	4,8	1	–	–	104,67	110,39	243	**OR 104.37x3.53-N70**
104,5	3	3,7	1	110	105,2	105,00	109,8	–	**OR 104.5x3.0-N70**
107,32	5,33	7,1	1	117,53	108,77	107,85	116,61	347	**OR 107.32x5.33-N70**
107,54	3,53	4,8	1	–	–	107,85	113,56	244	**OR 107.54x3.53-N70**
109,1	5,7 3	7,5 3,7	1 1	120 115	110,3 110,2	110,00 110,00	120 114,8	– –	**OR 109.1x5.7-N70** **OR 109.5x3.0-N70**
109,5	5,33	7,1	1	119,91	111,15	110,23	118,99	–	**OR 109.5x5.33-N70**
110,49	5,33	7,1	1	120,7	111,94	111,05	119,81	348	**OR 110.49x5.33-N70**
110,72	3,53	4,8	1	–	–	111,02	116,74	245	**OR 110.72x3.53-N70**
113,67	5,33	7,1	1	123,88	115,12	114,20	122,96	349	**OR 113.67x5.33-N70**
113,7	6,99	9,5	1,5	127,1	115,95	114,20	125,35	425	**OR 113.7x6.99-N70**
113,89	3,53	4,8	1	–	–	114,20	119,91	246	**OR 113.89x3.53-N70**
114,3	5,7	7,5	1	125	115,3	115,00	125	–	**OR 114.3x5.7-N70**

Dimensions				Outside groove		Inside groove		Dash-number	Designation
ID	CS	L +0,2	R max.	D H9	d_1 h11	d f8	D_1 H11		
mm								–	–
114,5	3	3,7	1	120	115,2	115,00	119,8	–	**OR 114.5x3.0-N70**
114,7	6,99	9,5	1,5	128,3	117,15	115,20	126,35	–	**OR 114.7x6.99-N70**
116,8	6,99	9,5	1,5	130,2	119,05	117,30	128,45	426	**OR 116.8x6.99-N70**
117,07	3,53	4,8	1	–	–	117,37	123,09	247	**OR 117.07x3.53-N70**
117,5	5,33	7,1	1	127,84	119,08	118,17	126,93	–	**OR 117.5x5.33-N70**
119,3	5,7	7,5	1	130	120,3	120,00	130	–	**OR 119.3x5.7-N70**
119,5	3	3,7	1	125	120,2	120,00	124,8	–	**OR 119.5x3.0-N70**
120	6,99	9,5	1,5	133,4	122,25	120,50	131,65	427	**OR 120.0x6.99-N70**

6.1 OR O-rings in static radial sealing, metric sizes
ID **120,24 – 164,3** mm

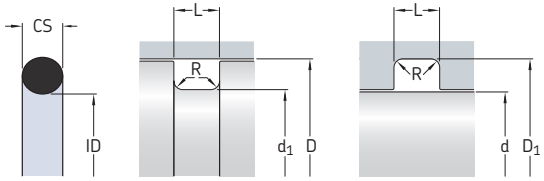


SKF recommends designing O-ring housings according to ISO 3601.
This table is a reference to O-ring sizes for common housing dimensions.

Dimensions				Outside groove		Inside groove		Dash-number	Designation
ID	CS	L +0,2	R max.	D H8	d_1 h11	d f7	D_1 H11		
mm								–	–
120,24	3,53	4,8	1	–	–	120,55	126,26	248	**OR 120.24x3.53-N70**
120,7	5,33	7,1	1	131,02	122,26	121,34	130,1	–	**OR 120.7x5.33-N70**
123,19	6,99	9,5	1,5	136,6	125,45	123,70	134,85	428	**OR 123.19x6.99-N70**
123,42	3,53	4,8	1	–	–	123,72	129,44	249	**OR 123.42x3.53-N70**
123,8	5,33	7,1	1	134,19	125,43	124,12	132,88	–	**OR 123.8x5.33-N70**
124,3	5,7	6,4	1	135	125,3	125,00	134,7	–	**OR 124.3x5.7-N70**
124,5	3	3,7	1	130	125,2	125,00	129,8	–	**OR 124.5x3.0-N70**
124,6	6,99	9,5	1,5	138,2	127,05	125,10	136,25	–	**OR 124.60x6.99-N70**
126,37	6,99	9,5	1,5	139,8	128,65	126,90	138,05	429	**OR 126.37x6.99-N70**
126,59	3,53	4,8	1	–	–	126,90	132,61	250	**OR 126.59x3.53-N70**
127	5,33	7,1	1	137,37	128,61	127,69	136,45	–	**OR 127.0x5.33-N70**
129,3	5,7	7,5	1	140	130,3	130,00	140	–	**OR 129.3x5.7-N70**
129,5	3	3,7	1	135	130,2	130,00	134,8	–	**OR 129.5x3.0-N70**
129,54	6,99	9,5	1,5	142,9	131,75	130,00	141,15	–	**OR 129.54x6.99-N70**
129,77	3,53	4,8	1	–	–	130,07	135,79	251	**OR 129.77x3.53-N70**
130,2	5,33	7,1	1	140,54	131,78	130,87	139,63	–	**OR 130.2x5.33-N70**
132,7	6,99	9,5	1,5	146,1	134,95	133,20	144,35	431	**OR 132.7x6.99-N70**
132,94	3,53	4,8	1	–	–	133,25	138,96	252	**OR 132.94x3.53-N70**
133,4	5,33	7,1	1	143,72	134,96	134,04	142,8	–	**OR 133.4x5.33-N70**
134,3	5,7	7,5	1	145	135,3	135,00	145	–	**OR 134.3x5.7-N70**
134,5	3	3,7	1	140	135,2	135,00	139,8	–	**OR 134.5x3.0-N70**
	6,99	9,5	1,5	148,2	137,05	135,00	146,15	–	**OR 134.5x6.99-N70**

Dimensions				Outside groove		Inside groove		Dash-number	Designation
ID	CS	L +0,2	R max.	D H8	d_1 h11	d f7	D_1 H11		
mm								–	–
135,9	6,99	9,5	1,5	149,3	138,15	138,15	149,3	432	**OR 135.9x6.99-N70**
136,12	3,53	4,8	1	–	–	136,42	142,14	253	**OR 136.12x3.53-N70**
136,5	5,33	7,1	1	146,89	138,13	137,22	145,98	–	**OR 136.5x5.33-N70**
139,07	6,99	9,5	1,5	152,5	141,35	141,35	152,5	433	**OR 139.07x6.99-N70**
139,29	3,53	4,8	1	–	–	139,60	145,31	254	**OR 139.29x3.53-N70**
139,3	5,7	7,5	1	150	140,3	140,00	150	–	**OR 139.3x5.7-N70**
139,5	3	3,7	1	145	140,2	140,00	144,8	–	**OR 139.5x3.0-N70**
139,7	5,33	7,1	1	150,07	141,31	140,39	149,15	–	**OR 139.7x5.33-N70**
142,24	6,99	9,5	1,5	155,6	144,45	144,45	155,6	434	**OR 142.24x6.99-N70**
142,47	3,53	4,8	1	–	–	142,77	148,49	255	**OR 142.47x3.53-N70**
142,88	5,33	7,1	1	153,24	144,48	143,57	152,33	–	**OR 142.88x5.33-N70**
144,1	8,4	11	1	160	145	145,00	160	–	**OR 144.1x8.4-N70**
144,3	5,7	7,5	1	155	145,3	145,00	155	–	**OR 144.3x5.7-N70**
144,5	3	3,7	1	150	145,2	145,00	149,8	–	**OR 144.5x3.0-N70**
145,4	6,99	9,5	1,5	158,8	147,65	147,65	158,8	435	**OR 145.4x6.99-N70**
145,64	3,53	4,8	1	–	–	145,95	151,66	256	**OR 145.64x3.53-N70**
146,1	5,33	7,1	1	156,42	147,66	146,74	155,5	–	**OR 146.1x5.33-N70**
148,6	6,99	9,5	1,5	162	150,85	150,85	162	436	**OR 148.6x6.99-N70**
148,82	3,53	4,8	1	–	–	149,12	154,84	257	**OR 148.82x3.53-N70**
149,1	8,4	11	1	165	150	150,00	165	–	**OR 149.1x8.4-N70**
149,2	5,33	7,1	1	159,59	150,83	149,92	158,68	–	**OR 149.2x5.33-N70**
149,3	5,7	6,4	1	160	150,4	150,00	159,6	–	**OR 149.3x5.7-N70**
151,8	6,99	9,5	1,5	165,2	154,05	154,05	165,2	437	**OR 151.8x6.99-N70**
151,99	3,53	4,8	1	–	–	152,30	158,01	258	**OR 151.99x3.53-N70**
154,1	8,4	11	1	170	155	155,00	170	–	**OR 154.1x8.4-N70**
154,3	5,7	6,4	1	165	155,4	155,00	164,6	–	**OR 154.3x5.7-N70**
155,6	6,99	9,5	1,5	169	157,85	157,85	169	–	**OR 155.6x6.99-N70**
158,12	6,99	9,5	1,5	171,5	160,35	160,35	171,5	438	**OR 158.12x6.99-N70**
158,34	3,53	4,8	1	–	–	158,65	164,36	259	**OR 158.34x3.53-N70**
159,1	8,4	11	1	175	160	160,00	175	–	**OR 159.1x8.4-N70**
159,3	5,7	6,4	1	170	160,4	160,00	169,6	–	**OR 159.3x5.7-N70**
159,5	6,99	9,5	1,5	173	161,85	161,85	173	–	**OR 159.5x6.99-N70**
161,9	6,99	9,5	1,5	175,3	164,15	164,15	175,3	–	**OR 161.9x6.99-N70**
164,1	8,4	11	1	180	165	165,00	180	–	**OR 164.1x8.4-N70**
164,3	5,7	6,4	1	175	165,4	165,00	174,6	–	**OR 164.3x5.7-N70**

6.1 OR O-rings in static radial sealing, metric sizes
ID **164,47 – 240,89** mm

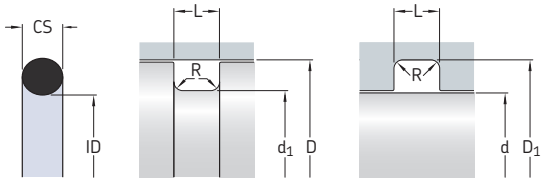


SKF recommends designing O-ring housings according to ISO 3601.
This table is a reference to O-ring sizes for common housing dimensions.

Dimensions				Outside groove		Inside groove		Dash-number	Designation
ID	CS	L +0,2	R max.	D H8	d_1 h11	d f7	D_1 H11		
mm								–	–
164,47	6,99	9,5	1,5	177,9	166,75	166,75	177,9	439	**OR 164.47x6.99-N70**
164,69	3,53	4,8	1	–	–	165,00	170,71	260	**OR 164.69x3.53-N70**
166,7	6,99	9,5	1,5	180,2	169,05	169,05	180,2	–	**OR 166.7x6.99-N70**
168,3	6,99	9,5	1,5	181,8	170,65	170,65	181,8	–	**OR 168.3x6.99-N70**
169,1	8,4	11	1	185	170	170,00	185	–	**OR 169.1x8.4-N70**
169,3	5,7	6,4	1	180	170,4	170,00	179,6	–	**OR 169.3x5.7-N70**
170,8	6,99	9,5	1,5	184,2	173,05	173,05	184,2	440	**OR 170.8x6.99-N70**
171,04	3,53	4,8	1	–	–	171,35	177,06	261	**OR 171.04x3.53-N70**
174,1	8,4	9	1	190	175	175,00	190	–	**OR 174.1x8.4-N70**
174,3	5,7	6,4	1	185	175,4	175,00	184,6	–	**OR 174.3x5.7-N70**
174,6	6,99	9,5	1,5	188,2	177,05	177,05	188,2	–	**OR 174.6x6.99-N70**
177,17	6,99	9,5	1,5	190,6	179,45	179,45	190,6	441	**OR 177.17x6.99-N70**
177,39	3,53	4,8	1	–	–	177,70	183,41	262	**OR 177.39x3.53-N70**
179,1	8,4	9	1	195	180	180,00	195	–	**OR 179.1x8.4-N70**
179,3	5,7	6,4	1	190	180,4	180,00	189,6	–	**OR 179.3x5.7-N70**
181	6,99	9,5	1,5	194,5	183,35	183,35	194,5	–	**OR 181.0x6.99-N70**
183,5	6,99	9,5	1,5	196,9	185,75	185,75	196,9	442	**OR 183.5x6.99-N70**
183,74	3,53	4,8	1	–	–	184,05	189,76	263	**OR 183.74x3.53-N70**
184,1	8,4	9	1	200	185	185,00	200	–	**OR 184.1x8.4-N70**
184,3	5,7	6,4	1	195	185,4	185,00	194,6	–	**OR 184.3x5.7-N70**
187,3	6,99	9,5	1,5	200,9	189,75	189,75	200,9	–	**OR 187.3x6.99-N70**

Dimensions				Outside groove		Inside groove		Dash-number	Designation
ID	CS	L +0,2	R max.	D H8	d_1 h11	d f7	D_1 H11		
mm								–	–
189,1	8,4	9	1	205	190	190,00	205	–	**OR 189.1x8.4-N70**
189,3	5,7	6,4	1	200	190,4	190,00	199,6	–	**OR 189.3x5.7-N70**
189,9	6,99	9,5	1,5	203,3	192,15	192,15	203,3	443	**OR 189.9x6.99-N70**
190,09	3,53	4,8	1	–	–	190,40	196,11	264	**OR 190.09x3.53-N70**
193,7	6,99	9,5	1,5	207,2	196,05	196,05	207,2	–	**OR 193.7x6.99-N70**
194,1	8,4	9	1	210	195	195,00	210	–	**OR 194.1x8.4-N70**
194,3	5,7	6,4	1	205	195,4	195,00	204,6	–	**OR 194.3x5.7-N70**
196,2	6,99	9,5	1,5	209,6	198,45	198,45	209,6	444	**OR 196.2x6.99-N70**
196,44	3,53	4,8	1	–	–	196,75	202,46	265	**OR 196.44x3.53-N70**
199,1	8,4	9	1	215	200	200,00	215	–	**OR 199.1x8.4-N70**
199,3	5,7	6,4	1	210	200,4	200,00	209,6	–	**OR 199.3x5.7-N70**
200	6,99	9,5	1,5	213,6	202,45	202,45	213,6	–	**OR 200.0x6.99-N70**
202,57	6,99	9,5	1,5	216	204,85	204,85	216	445	**OR 202.57x6.99-N70**
202,79	3,53	4,8	1	–	–	203,10	208,81	266	**OR 202.79x3.53-N70**
208,9	6,99	9,5	1,5	222,3	211,15	211,15	222,3	–	**OR 208.9x6.99-N70**
209,1	8,4	9	1	225	210	210,00	225	–	**OR 209.1x8.4-N70**
209,14	3,53	4,8	1	–	–	209,45	215,16	267	**OR 209.14x3.53-N70**
209,3	5,7	6,4	1	220	210,4	210,00	219,6	–	**OR 209.3x5.7-N70**
215,3	6,99	9,5	1,5	228,7	217,55	217,55	228,7	446	**OR 215.3x6.99-N70**
215,49	3,53	4,8	1	–	–	215,80	221,51	268	**OR 215.49x3.53-N70**
219,1	8,4	9	1	235	220	220,00	235	–	**OR 219.1x8.4-N70**
219,3	5,7	6,4	1	230	220,4	220,00	229,6	–	**OR 219.3x5.7-N70**
221,62	6,99	9,5	1,5	235	223,85	223,82	235	–	**OR 221.62x6.99-N70**
221,84	3,53	4,8	1	–	–	222,15	227,86	269	**OR 221.84x3.53-N70**
227,97	6,99	9,5	1,5	241,4	230,25	230,25	241,4	447	**OR 227.97x6.99-N70**
228,19	3,53	4,8	1	–	–	228,50	234,21	270	**OR 228.19x3.53-N70**
229,1	8,4	9	1	245	230	230,00	245	–	**OR 229.1x8.4-N70**
229,3	5,7	6,4	1	240	230,4	230,00	239,6	–	**OR 229.3x5.7-N70**
234,3	6,99	9,5	1,5	247,7	236,55	236,55	247,7	–	**OR 234.3x6.99-N70**
234,54	3,53	4,8	1	–	–	234,85	240,56	271	**OR 234.54x3.53-N70**
239,1	8,4	9	1	255	240	240,00	255	–	**OR 239.1x8.4-N70**
239,3	5,7	6,4	1	250	240,4	240,00	249,6	–	**OR 239.3x5.7-N70**
240,67	6,99	9,5	1,5	254,1	242,95	242,95	254,1	448	**OR 240.67x6.99-N70**
240,89	3,53	4,8	1	–	–	241,20	246,91	272	**OR 240.89x3.53-N70**

6.1 OR O-rings in static radial sealing, metric sizes
ID **247 – 499,3** mm



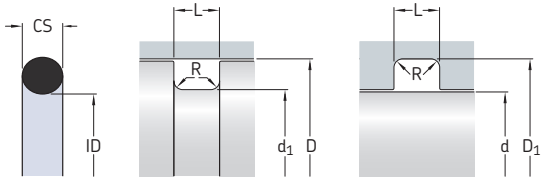
SKF recommends designing O-ring housings according to ISO 3601.
This table is a reference to O-ring sizes for common housing dimensions.

Dimensions				Outside groove		Inside groove		Dash-number	Designation
ID	CS	L +0,2	R max.	D H8	d_1 h11	d f7	D_1 H11		
mm								–	–
247	6,99	9,5	1,5	260,4	249,25	249,25	260,4	–	**OR 247.0x6.99-N70**
247,25	3,53	4,8	1	–	–	247,55	253,26	273	**OR 247.25x3.53-N70**
249,1	8,4	9	1	265	250	250,00	265	–	**OR 249.1x8.4-N70**
249,3	5,7	6,4	1	260	250,4	250,00	259,6	–	**OR 249.3x5.7-N70**
253,3	6,99	9,5	1,5	266,8	255,65	255,65	266,8	449	**OR 253.3x6.99-N70**
253,59	3,53	4,8	1	–	–	253,90	259,61	274	**OR 253.59x3.53-N70**
259,3	5,7	6,4	1	270	260,4	260,00	269,6	–	**OR 259.3x5.7-N70**
259,7	6,99	9,5	1,5	273,1	261,95	261,95	273,1	–	**OR 259.7x6.99-N70**
266,07	6,99	9,5	1,5	279,5	268,35	268,35	279,5	450	**OR 266.07x6.99-N70**
269,3	5,7	6,4	1	280	270,4	270,00	279,6	–	**OR 269.3x5.7-N70**
272,4	6,99	9,5	1,5	285,8	274,65	274,65	285,8	–	**OR 272.4x6.99-N70**
278,77	6,99	9,5	1,5	292,2	281,05	281,05	292,2	451	**OR 278.77x6.99-N70**
279,3	5,7	6,4	1	290	280,4	280,00	289,6	–	**OR 279.3x5.7-N70**
285,1	6,99	9,5	1,5	298,5	287,35	287,35	298,5	–	**OR 285.1x6.99-N70**
289,3	5,7	6,4	1	300	290,4	290,00	299,6	–	**OR 289.3x5.7-N70**
291,47	6,99	9,5	1,5	304,9	293,75	293,75	304,9	452	**OR 291.47x6.99-N70**
297,8	6,99	9,5	1,5	311,2	300,05	300,05	311,2	–	**OR 297.8x6.99-N70**
299,3	5,7	6,4	1	310	300,4	300,00	309,6	–	**OR 299.3x5.7-N70**
304,1	6,99	9,5	1,5	317,6	306,45	306,45	317,6	453	**OR 304.1x6.99-N70**
316,9	6,99	9,5	1,5	330,3	319,15	319,15	330,3	454	**OR 316.9x6.99-N70**
319,3	5,7	6,4	1	330	320,4	320,00	329,6	–	**OR 319.3x5.7-N70**

Dimensions				Outside groove		Inside groove		Dash-number	Designation
ID	CS	L +0,2	R max.	D H8	d_1 h11	d f7	D_1 H11		
mm								–	–
329,5	6,99	9,5	1,5	343	331,85	331,85	343	455	**OR 329.5x6.99-N70**
339,3	5,7	6,4	1	350	340,4	340,00	349,6	–	**OR 339.3x5.7-N70**
342,27	6,99	9,5	1,5	355,7	344,55	344,55	355,7	456	**OR 342.27x6.99-N70**
355	6,99	9,5	1,5	368,4	357,25	357,25	368,4	457	**OR 355.0x6.99-N70**
359,3	5,7	6,4	1	370	360,4	360,00	369,6	–	**OR 359.3x5.7-N70**
367,7	6,99	9,5	1,5	381,1	369,95	369,95	381,1	458	**OR 367.7x6.99-N70**
379,3	5,7	6,4	1	390	380,4	380,00	389,6	–	**OR 379.3x5.7-N70**
380,37	6,99	9,5	1,5	393,8	382,65	382,65	393,8	459	**OR 380.37x6.99-N70**
393,1	6,99	9,5	1,5	406,5	395,35	395,35	406,5	460	**OR 393.1x6.99-N70**
399,3	5,7	6,4	1	410	400,4	400,00	409,6	–	**OR 399.3x5.7-N70**
419,3	5,7	6,4	1	430	420,4	420,00	429,6	–	**OR 419.3x5.7-N70**
439,3	5,7	6,4	1	450	440,4	440,00	449,6	–	**OR 439.3x5.7-N70**
459,3	5,7	6,4	1	470	460,4	460,00	469,6	–	**OR 459.3x5.7-N70**
479,3	5,7	6,4	1	490	480,4	480,00	489,6	–	**OR 479.3x5.7-N70**
499,3	5,7	6,4	1	510	500,4	500,00	509,6	–	**OR 499.3x5.7-N70**

Other sizes are available on request

6.2 OR O-rings in static radial sealing, inch sizes
Dash-number **004 – 155**

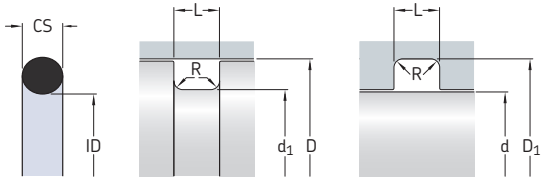


SKF recommends designing O-ring housings according to ISO 3601.
This table is a reference to O-ring sizes for common housing dimensions.

Dash-number	Dimensions				Outside groove		Inside groove		Designation
	CS	ID	L +0.008	R max.	D +0.002	d_1 −0.002	d −0.002	D_1 +0.002	
–	in.								–
004	0,07	0,07	0,093	0,02	0,206	0,106	0,081	0,181	**OR 1.78x1.78-N70**
005	0,07	0,101	0,093	0,02	0,237	0,137	0,112	0,212	**OR 2.57x1.78-N70**
006	0,07	0,114	0,093	0,02	0,25	0,15	0,125	0,225	**OR 2.90x1.78-N70**
007	0,07	0,145	0,093	0,02	0,281	0,181	0,156	0,256	**OR 3.69x1.78-N70**
008	0,07	0,176	0,093	0,02	0,312	0,212	0,187	0,287	**OR 4.48x1.78-N70**
009	0,07	0,208	0,093	0,02	0,343	0,243	0,218	0,318	**OR 5.28x1.78-N70**
010	0,07	0,239	0,093	0,02	0,375	0,275	0,25	0,35	**OR 6.07x1.78-N70**
011	0,07	0,301	0,093	0,02	0,437	0,337	0,312	0,412	**OR 7.65x1.78-N70**
012	0,07	0,364	0,093	0,02	0,5	0,4	0,375	0,475	**OR 9.25x1.78-N70**
013	0,07	0,426	0,093	0,02	0,562	0,462	0,437	0,537	**OR 10.82x1.78-N70**
014	0,07	0,489	0,093	0,02	0,625	0,525	0,5	0,6	**OR 12.42x1.78-N70**
015	0,07	0,551	0,093	0,02	0,687	0,587	0,562	0,662	**OR 14.0x1.78-N70**
016	0,07	0,614	0,093	0,02	0,75	0,65	0,625	0,725	**OR 15.6x1.78-N70**
017	0,07	0,676	0,093	0,02	0,812	0,712	0,687	0,787	**OR 17.17x1.78-N70**
018	0,07	0,739	0,093	0,02	0,875	0,775	0,75	0,85	**OR 18.77x1.78-N70**
019	0,07	0,801	0,093	0,02	0,937	0,837	0,812	0,912	**OR 20.35x1.78-N70**
020	0,07	0,864	0,093	0,02	1	0,9	0,875	0,975	**OR 21.95x1.78-N70**
021	0,07	0,926	0,093	0,02	1,062	0,962	0,937	1,037	**OR 23.52x1.78-N70**
022	0,07	0,989	0,093	0,02	1,125	1,025	1	1,1	**OR 25.12x1.78-N70**
023	0,07	1,051	0,093	0,02	1,187	1,087	1,062	1,162	**OR 26.7x1.78-N70**
024	0,07	1,114	0,093	0,02	1,25	1,15	1,125	1,225	**OR 28.3x1.78-N70**
025	0,07	1,176	0,093	0,02	1,312	1,212	1,187	1,287	**OR 29.87x1.78-N70**
026	0,07	1,239	0,093	0,02	1,375	1,275	1,25	1,35	**OR 31.47x1.78-N70**
027	0,07	1,301	0,093	0,02	1,437	1,337	1,312	1,412	**OR 33.05x1.78-N70**
028	0,07	1,364	0,093	0,02	1,5	1,4	1,375	1,475	**OR 34.65x1.78-N70**
029	0,07	1,489	0,093	0,02	1,625	1,525	1,5	1,6	**OR 37.82x1.78-N70**
030	0,07	1,614	0,093	0,02	1,75	1,65	1,625	1,725	**OR 41.0x1.78-N70**
031	0,07	1,739	0,093	0,02	1,875	1,775	1,75	1,85	**OR 44.17x1.78-N70**
032	0,07	1,864	0,093	0,02	2	1,9	1,875	1,975	**OR 47.35x1.78-N70**
033	0,07	1,989	0,093	0,02	2,125	2,025	2	2,1	**OR 50.52x1.78-N70**
034	0,07	2,114	0,093	0,02	2,25	2,15	2,125	2,225	**OR 53.7x1.78-N70**
035	0,07	2,239	0,093	0,02	2,375	2,275	2,25	2,35	**OR 56.87x1.78-N70**
036	0,07	2,364	0,093	0,02	2,5	2,4	2,375	2,475	**OR 60.04x1.78-N70**
037	0,07	2,489	0,093	0,02	2,625	2,525	2,5	2,6	**OR 63.22x1.78-N70**
038	0,07	2,614	0,093	0,02	2,75	2,65	2,625	2,725	**OR 66.4x1.78-N70**
039	0,07	2,739	0,093	0,02	2,875	2,775	2,75	2,85	**OR 69.57x1.78-N70**

Dash-number	Dimensions				Outside groove		Inside groove		Designation
	CS	ID	L +0.008	R max.	D +0.002	d_1 −0.002	d −0.002	D_1 +0.002	
–	in.								–
040	0,07	2,864	0,093	0,02	3	2,9	2,875	2,975	**OR 72.75x1.78-N70**
041	0,07	2,989	0,093	0,02	3,125	3,025	3	3,1	**OR 75.92x1.78-N70**
042	0,07	3,239	0,093	0,02	3,375	3,275	3,25	3,35	**OR 82.27x1.78-N70**
043	0,07	3,489	0,093	0,02	3,625	3,525	3,5	3,6	**OR 88.62x1.78-N70**
044	0,07	3,739	0,093	0,02	3,875	3,775	3,75	3,85	**OR 94.97x1.78-N70**
045	0,07	3,99	0,093	0,02	4,125	4,025	4	4,1	**OR 101.34x1.78-N70**
046	0,07	4,239	0,093	0,02	4,375	4,275	4,25	4,35	**OR 107.67x1.78-N70**
047	0,07	4,489	0,093	0,02	4,625	4,525	4,5	4,6	**OR 114.02x1.78-N70**
048	0,07	4,739	0,093	0,02	4,875	4,775	4,75	4,85	**OR 120.37x1.78-N70**
049	0,07	4,989	0,093	0,02	5,125	5,025	5	5,1	**OR 126.72x1.78-N70**
050	0,07	5,239	0,093	0,02	5,375	5,275	5,25	5,35	**OR 133.07x1.78-N70**
106	0,103	0,174	0,14	0,03	0,374	0,212	0,187	0,349	**OR 4.42x2.62-N70**
107	0,103	0,206	0,14	0,03	0,405	0,243	0,219	0,381	**OR 5.23x2.62-N70**
109	0,103	0,299	0,14	0,03	0,5	0,338	0,312	0,474	**OR 7.59x2.62-N70**
110	0,103	0,362	0,14	0,03	0,562	0,4	0,375	0,537	**OR 9.19x2.62-N70**
111	0,103	0,424	0,14	0,03	0,625	0,463	0,437	0,599	**OR 10.78x2.62-N70**
112	0,103	0,487	0,14	0,03	0,687	0,525	0,5	0,662	**OR 12.37x2.62-N70**
113	0,103	0,549	0,14	0,03	0,75	0,588	0,563	0,725	**OR 13.94x2.62-N70**
114	0,103	0,612	0,14	0,03	0,812	0,65	0,625	0,787	**OR 15.54x2.62-N70**
115	0,103	0,674	0,14	0,03	0,875	0,713	0,688	0,85	**OR 17.12x2.62-N70**
116	0,103	0,737	0,14	0,03	0,937	0,775	0,75	0,912	**OR 18.72x2.62-N70**
117	0,103	0,799	0,14	0,03	1	0,838	0,813	0,975	**OR 20.29x2.62-N70**
118	0,103	0,862	0,14	0,03	1,062	0,9	0,875	1,037	**OR 21.89x2.62-N70**
119	0,103	0,924	0,14	0,03	1,125	0,963	0,938	1,1	**OR 23.47x2.62-N70**
120	0,103	0,987	0,14	0,03	1,187	1,025	1	1,162	**OR 25.07x2.62-N70**
121	0,103	1,049	0,14	0,03	1,25	1,088	1,062	1,224	**OR 26.64x2.62-N70**
123	0,103	1,174	0,14	0,03	1,375	1,213	1,187	1,349	**OR 29.82x2.62-N70**
124	0,103	1,237	0,14	0,03	1,437	1,275	1,25	1,412	**OR 31.42x2.62-N70**
125	0,103	1,299	0,14	0,03	1,5	1,338	1,312	1,474	**OR 32.99x2.62-N70**
126	0,103	1,362	0,14	0,03	1,562	1,4	1,375	1,537	**OR 34.59x2.62-N70**
127	0,103	1,424	0,14	0,03	1,625	1,463	1,437	1,599	**OR 36.17x2.62-N70**
128	0,103	1,487	0,14	0,03	1,687	1,525	1,5	1,662	**OR 37.77x2.62-N70**
129	0,103	1,549	0,14	0,03	1,75	1,588	1,562	1,724	**OR 39.34x2.62-N70**
130	0,103	1,612	0,14	0,03	1,812	1,65	1,625	1,787	**OR 40.95x2.62-N70**
131	0,103	1,674	0,14	0,03	1,875	1,713	1,687	1,849	**OR 42.52x2.62-N70**
132	0,103	1,737	0,14	0,03	1,937	1,775	1,75	1,912	**OR 44.12x2.62-N70**
133	0,103	1,799	0,14	0,03	2	1,838	1,812	1,974	**OR 45.69x2.62-N70**
134	0,103	1,862	0,14	0,03	2,062	1,9	1,875	2,037	**OR 47.29x2.62-N70**
135	0,103	1,925	0,14	0,03	2,125	1,963	1,937	2,099	**OR 48.9x2.62-N70**
136	0,103	1,987	0,14	0,03	2,187	2,025	2	2,162	**OR 50.47x2.62-N70**
137	0,103	2,05	0,14	0,03	2,25	2,088	2,062	2,224	**OR 52.07x2.62-N70**
138	0,103	2,112	0,14	0,03	2,312	2,15	2,125	2,287	**OR 53.64x2.62-N70**
139	0,103	2,175	0,14	0,03	2,375	2,213	2,187	2,349	**OR 55.25x2.62-N70**
140	0,103	2,237	0,14	0,03	2,437	2,275	2,25	2,412	**OR 56.82x2.62-N70**
141	0,103	2,3	0,14	0,03	2,5	2,338	2,312	2,474	**OR 58.42x2.62-N70**
142	0,103	2,362	0,14	0,03	2,562	2,4	2,375	2,537	**OR 60.0x2.62-N70**
143	0,103	2,425	0,14	0,03	2,625	2,463	2,437	2,599	**OR 61.6x2.62-N70**
144	0,103	2,487	0,14	0,03	2,687	2,525	2,5	2,662	**OR 63.17x2.62-N70**
145	0,103	2,55	0,14	0,03	2,75	2,588	2,562	2,724	**OR 64.77x2.62-N70**
146	0,103	2,612	0,14	0,03	2,812	2,65	2,625	2,787	**OR 66.34x2.62-N70**
147	0,103	2,675	0,14	0,03	2,875	2,713	2,687	2,849	**OR 67.94x2.62-N70**
148	0,103	2,737	0,14	0,03	2,937	2,775	2,75	2,912	**OR 69.52x2.62-N70**
149	0,103	2,8	0,14	0,03	3	2,838	2,812	2,974	**OR 71.12x2.62-N70**
150	0,103	2,862	0,14	0,03	3,062	2,9	2,937	3,099	**OR 72.7x2.62-N70**
151	0,103	2,987	0,14	0,03	3,187	3,025	3	3,162	**OR 75.87x2.62-N70**
152	0,103	3,237	0,14	0,03	3,437	3,275	3,25	3,412	**OR 82.22x2.62-N70**
153	0,103	3,487	0,14	0,03	3,687	3,525	3,5	3,662	**OR 88.57x2.62-N70**
154	0,103	3,737	0,14	0,03	3,937	3,775	3,75	3,912	**OR 94.92x2.62-N70**
155	0,103	3,987	0,14	0,03	4,187	4,025	4	4,162	**OR 101.27x2.62-N70**

6.2 OR O-rings in static radial sealing, inch sizes
Dash-number **156 – 274**

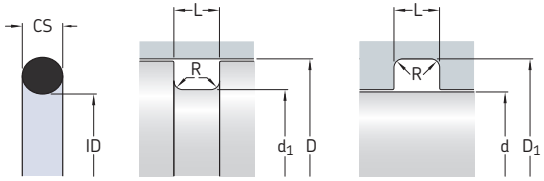


SKF recommends designing O-ring housings according to ISO 3601.
This table is a reference to O-ring sizes for common housing dimensions.

Dash-number	Dimensions				Outside groove		Inside groove		Designation
	CS	ID	L +0.008	R max.	D +0.002	d_1 −0.002	d −0.002	D_1 +0.002	
–	in.								–
156	0,103	4,237	0,14	0,03	4,437	4,275	4,25	4,412	**OR 107.62x2.62-N70**
157	0,103	4,487	0,14	0,03	4,687	4,525	4,5	4,662	**OR 113.97x2.62-N70**
158	0,103	4,737	0,14	0,03	4,937	4,775	4,75	4,912	**OR 120.32x2.62-N70**
159	0,103	4,987	0,14	0,03	5,187	5,025	5	5,162	**OR 126.67x2.62-N70**
160	0,103	5,237	0,14	0,03	5,437	5,275	5,25	5,412	**OR 133.02x2.62-N70**
161	0,103	5,487	0,14	0,03	5,687	5,525	5,5	5,662	**OR 139.37x2.62-N70**
162	0,103	5,737	0,14	0,03	5,937	5,775	5,75	5,912	**OR 145.72x2.62-N70**
163	0,103	5,987	0,14	0,03	6,187	6,025	6	6,162	**OR 152.07x2.62-N70**
164	0,103	6,237	0,14	0,03	6,437	6,275	6,25	6,412	**OR 158.42x2.62-N70**
165	0,103	6,487	0,14	0,03	6,687	6,525	6,5	6,662	**OR 164.77x2.62-N70**
166	0,103	6,737	0,14	0,03	6,937	6,775	6,75	6,912	**OR 171.12x2.62-N70**
167	0,103	6,987	0,14	0,03	7,187	7,025	7	7,162	**OR 177.47x2.62-N70**
168	0,103	7,237	0,14	0,03	7,437	7,275	7,25	7,412	**OR 183.82x2.62-N70**
169	0,103	7,487	0,14	0,03	7,687	7,525	7,5	7,662	**OR 190.17x2.62-N70**
170	0,103	7,737	0,14	0,03	7,937	7,775	7,75	7,912	**OR 196.52x2.62-N70**
171	0,103	7,987	0,14	0,03	8,187	8,025	8	8,162	**OR 202.87x2.62-N70**
172	0,103	8,237	0,14	0,03	8,437	8,275	8,25	8,412	**OR 209.22x2.62-N70**
173	0,103	8,487	0,14	0,03	8,687	8,525	8,5	8,662	**OR 215.57x2.62-N70**
174	0,103	8,737	0,14	0,03	8,937	8,775	8,75	8,912	**OR 221.92x2.62-N70**
175	0,103	8,987	0,14	0,03	9,187	9,025	9	9,162	**OR 228.27x2.62-N70**
176	0,103	9,237	0,14	0,03	9,437	9,275	9,25	9,412	**OR 234.62x2.62-N70**
177	0,103	9,487	0,14	0,03	9,687	9,525	9,5	9,662	**OR 240.97x2.62-N70**
178	0,103	9,737	0,14	0,03	9,937	9,775	9,75	9,912	**OR 247.32x2.62-N70**
205	0,139	0,421	0,187	0,04	0,687	0,465	0,437	0,659	**OR 10.69x3.53-N70**
206	0,139	0,484	0,187	0,04	0,75	0,528	0,5	0,722	**OR 12.29x3.53-N70**
207	0,139	0,546	0,187	0,04	0,812	0,59	0,562	0,784	**OR 13.87x3.53-N70**
208	0,139	0,609	0,187	0,04	0,875	0,653	0,625	0,847	**OR 15.47x3.53-N70**
209	0,139	0,671	0,187	0,04	0,937	0,715	0,687	0,909	**OR 17.04x3.53-N70**
210	0,139	0,734	0,187	0,04	1	0,778	0,75	0,972	**OR 18.64x3.53-N70**
211	0,139	0,796	0,187	0,04	1,062	0,84	0,812	1,034	**OR 20.22x3.53-N70**
212	0,139	0,859	0,187	0,04	1,125	0,903	0,875	1,097	**OR 21.82x3.53-N70**
213	0,139	0,921	0,187	0,04	1,187	0,965	0,937	1,159	**OR 23.4x3.53-N70**
214	0,139	0,984	0,187	0,04	1,25	1,028	1	1,222	**OR 24.99x3.53-N70**
215	0,139	1,046	0,187	0,04	1,312	1,09	1,062	1,284	**OR 26.58x3.53-N70**
216	0,139	1,109	0,187	0,04	1,375	1,153	1,125	1,347	**OR 28.17x3.53-N70**

Dash-number	Dimensions				Outside groove		Inside groove		Designation
	CS	ID	L +0.008	R max.	D +0.002	d_1 −0.002	d −0.002	D_1 +0.002	
–	in.								–
217	0,139	1,171	0,187	0,04	1,437	1,215	1,187	1,409	**OR 29.74x3.53-N70**
218	0,139	1,234	0,187	0,04	1,5	1,278	1,25	1,472	**OR 31.34x3.53-N70**
219	0,139	1,296	0,187	0,04	1,562	1,34	1,312	1,534	**OR 32.92x3.53-N70**
220	0,139	1,359	0,187	0,04	1,625	1,403	1,375	1,597	**OR 34.52x3.53-N70**
221	0,139	1,421	0,187	0,04	1,687	1,465	1,437	1,659	**OR 36.1x3.53-N70**
222	0,139	1,484	0,187	0,04	1,75	1,528	1,5	1,722	**OR 37.69x3.53-N70**
223	0,139	1,609	0,187	0,04	1,875	1,653	1,625	1,847	**OR 40.87x3.53-N70**
224	0,139	1,734	0,187	0,04	2	1,778	1,75	1,972	**OR 44.04x3.53-N70**
225	0,139	1,859	0,187	0,04	2,125	1,903	1,875	2,097	**OR 47.22x3.53-N70**
226	0,139	1,984	0,187	0,04	2,25	2,028	2	2,222	**OR 50.4x3.53-N70**
227	0,139	2,109	0,187	0,04	2,375	2,153	2,125	2,347	**OR 53.56x3.53-N70**
228	0,139	2,234	0,187	0,04	2,5	2,278	2,25	2,472	**OR 56.74x3.53-N70**
229	0,139	2,359	0,187	0,04	2,625	2,403	2,375	2,597	**OR 59.92x3.53-N70**
230	0,139	2,484	0,187	0,04	2,75	2,528	2,5	2,722	**OR 63.09x3.53-N70**
231	0,139	2,609	0,187	0,04	2,875	2,653	2,625	2,847	**OR 66.27x3.53-N70**
232	0,139	2,734	0,187	0,04	3	2,778	2,75	2,972	**OR 69.44x3.53-N70**
233	0,139	2,859	0,187	0,04	3,125	2,903	2,875	3,097	**OR 72.62x3.53-N70**
234	0,139	2,984	0,187	0,04	3,25	3,028	3	3,222	**OR 75.79x3.53-N70**
235	0,139	3,109	0,187	0,04	3,375	3,153	3,125	3,347	**OR 78.97x3.53-N70**
236	0,139	3,234	0,187	0,04	3,5	3,278	3,25	3,472	**OR 82.14x3.53-N70**
237	0,139	3,359	0,187	0,04	3,625	3,403	3,375	3,597	**OR 85.32x3.53-N70**
238	0,139	3,484	0,187	0,04	3,75	3,528	3,5	3,722	**OR 88.49x3.53-N70**
239	0,139	3,609	0,187	0,04	3,875	3,653	3,625	3,847	**OR 91.67x3.53-N70**
240	0,139	3,734	0,187	0,04	4	3,778	3,75	3,972	**OR 94.84x3.53-N70**
241	0,139	3,859	0,187	0,04	4,125	3,903	3,875	4,097	**OR 98.02x3.53-N70**
242	0,139	3,984	0,187	0,04	4,25	4,028	4	4,222	**OR 101.19x3.53-N70**
243	0,139	4,109	0,187	0,04	4,375	4,153	4,125	4,347	**OR 104.37x3.53-N70**
244	0,139	4,234	0,187	0,04	4,5	4,278	4,25	4,472	**OR 107.54x3.53-N70**
245	0,139	4,359	0,187	0,04	4,625	4,403	4,375	4,597	**OR 110.72x3.53-N70**
246	0,139	4,484	0,187	0,04	4,75	4,528	4,5	4,722	**OR 113.89x3.53-N70**
247	0,139	4,609	0,187	0,04	4,875	4,653	4,625	4,847	**OR 117.07x3.53-N70**
248	0,139	4,734	0,187	0,04	5	4,778	4,75	4,972	**OR 120.24x3.53-N70**
249	0,139	4,859	0,187	0,04	5,125	4,903	4,875	5,097	**OR 123.42x3.53-N70**
250	0,139	4,984	0,187	0,04	5,25	5,028	5	5,222	**OR 126.59x3.53-N70**
251	0,139	5,109	0,187	0,04	5,375	5,153	5,125	5,347	**OR 129.77x3.53-N70**
252	0,139	5,234	0,187	0,04	5,5	5,278	5,25	5,472	**OR 132.94x3.53-N70**
253	0,139	5,359	0,187	0,04	5,625	5,403	5,375	5,597	**OR 136.12x3.53-N70**
254	0,139	5,484	0,187	0,04	5,75	5,528	5,5	5,722	**OR 139.29x3.53-N70**
255	0,139	5,609	0,187	0,04	5,875	5,653	5,625	5,847	**OR 142.47x3.53-N70**
256	0,139	5,734	0,187	0,04	6	5,778	5,75	5,972	**OR 145.64x3.53-N70**
257	0,139	5,859	0,187	0,04	6,125	5,903	5,875	6,097	**OR 148.82x3.53-N70**
258	0,139	5,984	0,187	0,04	6,25	6,028	6	6,222	**OR 151.99x3.53-N70**
259	0,139	6,234	0,187	0,04	6,5	6,278	6,25	6,472	**OR 158.34x3.53-N70**
260	0,139	6,484	0,187	0,04	6,75	6,528	6,5	6,722	**OR 164.69x3.53-N70**
261	0,139	6,734	0,187	0,04	7	6,778	6,75	6,972	**OR 171.04x3.53-N70**
262	0,139	6,984	0,187	0,04	7,25	7,028	7	7,222	**OR 177.39x3.53-N70**
263	0,139	7,234	0,187	0,04	7,5	7,278	7,25	7,472	**OR 183.74x3.53-N70**
264	0,139	7,484	0,187	0,04	7,75	7,528	7,5	7,722	**OR 190.09x3.53-N70**
265	0,139	7,734	0,187	0,04	8	7,778	7,75	7,972	**OR 196.44x3.53-N70**
266	0,139	7,984	0,187	0,04	8,25	8,028	8	8,222	**OR 202.79x3.53-N70**
267	0,139	8,234	0,187	0,04	8,5	8,278	8,25	8,472	**OR 209.14x3.53-N70**
268	0,139	8,484	0,187	0,04	8,75	8,528	8,5	8,722	**OR 215.49x3.53-N70**
269	0,139	8,734	0,187	0,04	9	8,778	8,75	8,972	**OR 221.84x3.53-N70**
270	0,139	8,984	0,187	0,04	9,25	9,028	9	9,222	**OR 228.19x3.53-N70**
271	0,139	9,234	0,187	0,04	9,5	9,278	9,25	9,472	**OR 234.54x3.53-N70**
272	0,139	9,484	0,187	0,04	9,75	9,528	9,5	9,722	**OR 240.89x3.53-N70**
273	0,139	9,734	0,187	0,04	10	9,778	9,75	9,972	**OR 247.25x3.53-N70**
274	0,139	9,984	0,187	0,04	10,25	10,028	10	10,222	**OR 253.59x3.53-N70**

6.2 OR O-rings in static radial sealing, inch sizes
Dash-number **275 – 374**



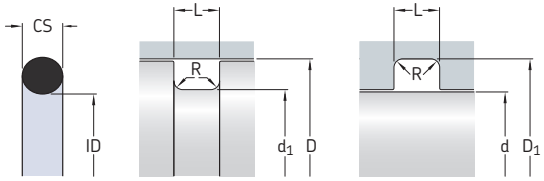
Outside groove | Inside groove

SKF recommends designing O-ring housings according to ISO 3601.
This table is a reference to O-ring sizes for common housing dimensions.

Dash-number	Dimensions				Outside groove		Inside groove		Designation
	CS	ID	L +0.008	R max.	D +0.002	d_1 −0.002	d −0.002	D_1 +0.002	
–	in.								–
275	0,139	10,484	0,187	0,04	10,75	10,528	10,5	10,722	**OR 266.29x3.53-N70**
276	0,139	10,984	0,187	0,04	11,25	11,028	11	11,222	**OR 279.0x3.53-N70**
277	0,139	11,484	0,187	0,04	11,75	11,528	11,5	11,722	**OR 291.69x3.53-N70**
278	0,139	11,984	0,187	0,04	12,25	12,028	12	12,222	**OR 304.39x3.53-N70**
279	0,139	12,984	0,187	0,04	13,25	13,028	13	13,222	**OR 329.79x3.53-N70**
280	0,139	13,984	0,187	0,04	14,25	14,028	14	14,222	**OR 355.19x3.53-N70**
281	0,139	14,984	0,187	0,04	15,25	15,028	15	15,222	**OR 380.59x3.53-N70**
282	0,139	15,955	0,187	0,04	16,25	16,028	16	16,222	**OR 405.26x3.53-N70**
283	0,139	16,955	0,187	0,04	17,25	17,028	17	17,222	**OR 430.66x3.53-N70**
284	0,139	17,955	0,187	0,04	18,25	18,028	18	18,222	**OR 456.06x3.53-N70**

Dash-number	Dimensions				Outside groove		Inside groove		Designation
	CS	ID	L +0.008	R max.	D +0.004	d_1 −0.004	d −0.002	D_1 +0.004	
–	in.								–
314	0,21	0,725	0,281	0,04	1,125	0,785	0,75	1,09	**OR 18.42x5.33-N70**
316	0,21	0,85	0,281	0,04	1,25	0,91	0,875	1,215	**OR 21.59x5.33-N70**
317	0,21	0,912	0,281	0,04	1,312	0,972	0,937	1,277	**OR 23.16x5.33-N70**
318	0,21	0,975	0,281	0,04	1,375	1,035	1	1,34	**OR 24.77x5.33-N70**
319	0,21	1,037	0,281	0,04	1,437	1,097	1,062	1,402	**OR 26.34x5.33-N70**
320	0,21	1,1	0,281	0,04	1,5	1,16	1,125	1,465	**OR 27.94x5.33-N70**
321	0,21	1,162	0,281	0,04	1,562	1,222	1,187	1,527	**OR 29.51x5.33-N70**
322	0,21	1,225	0,281	0,04	1,625	1,285	1,25	1,59	**OR 31.12x5.33-N70**
323	0,21	1,287	0,281	0,04	1,687	1,347	1,312	1,652	**OR 32.69x5.33-N70**
324	0,21	1,35	0,281	0,04	1,75	1,41	1,375	1,715	**OR 34.29x5.33-N70**
325	0,21	1,475	0,281	0,04	1,875	1,535	1,5	1,84	**OR 37.47x5.33-N70**
326	0,21	1,6	0,281	0,04	2	1,66	1,625	1,965	**OR 40.65x5.33-N70**
327	0,21	1,725	0,281	0,04	2,125	1,785	1,75	2,09	**OR 43.82x5.33-N70**
328	0,21	1,85	0,281	0,04	2,25	1,91	1,875	2,215	**OR 46.99x5.33-N70**
329	0,21	1,975	0,281	0,04	2,375	2,035	2	2,34	**OR 50.16x5.33-N70**
330	0,21	2,1	0,281	0,04	2,5	2,16	2,125	2,465	**OR 53.34x5.33-N70**
331	0,21	2,225	0,281	0,04	2,625	2,285	2,25	2,59	**OR 56.52x5.33-N70**
332	0,21	2,35	0,281	0,04	2,75	2,41	2,375	2,715	**OR 59.69x5.33-N70**
333	0,21	2,475	0,281	0,04	2,875	2,535	2,5	2,84	**OR 62.87x5.33-N70**
334	0,21	2,6	0,281	0,04	3	2,66	2,625	2,965	**OR 66.04x5.33-N70**
335	0,21	2,725	0,281	0,04	3,125	2,785	2,75	3,09	**OR 69.22x5.33-N70**
336	0,21	2,85	0,281	0,04	3,25	2,91	2,875	3,215	**OR 72.39x5.33-N70**
337	0,21	2,975	0,281	0,04	3,375	3,035	3	3,34	**OR 75.57x5.33-N70**
338	0,21	3,1	0,281	0,04	3,5	3,16	3,125	3,465	**OR 78.74x5.33-N70**
339	0,21	3,225	0,281	0,04	3,625	3,285	3,25	3,59	**OR 81.92x5.33-N70**
340	0,21	3,35	0,281	0,04	3,75	3,41	3,375	3,715	**OR 85.09x5.33-N70**
341	0,21	3,475	0,281	0,04	3,875	3,535	3,5	3,84	**OR 88.27x5.33-N70**
342	0,21	3,6	0,281	0,04	4	3,66	3,625	3,965	**OR 91.44x5.33-N70**
343	0,21	3,725	0,281	0,04	4,125	3,785	3,75	4,09	**OR 94.62x5.33-N70**
344	0,21	3,85	0,281	0,04	4,25	3,91	3,875	4,215	**OR 97.79x5.33-N70**
345	0,21	3,975	0,281	0,04	4,375	4,035	4	4,34	**OR 100.97x5.33-N70**
346	0,21	4,1	0,281	0,04	4,5	4,16	4,125	4,465	**OR 104.14x5.33-N70**
347	0,21	4,225	0,281	0,04	4,625	4,285	4,25	4,59	**OR 107.32x5.33-N70**
348	0,21	4,35	0,281	0,04	4,75	4,41	4,375	4,715	**OR 110.49x5.33-N70**
349	0,21	4,475	0,281	0,04	4,875	4,535	4,5	4,84	**OR 113.67x5.33-N70**
350	0,21	4,6	0,281	0,04	5	4,66	4,625	4,965	**OR 116.84x5.33-N70**
351	0,21	4,725	0,281	0,04	5,125	4,785	4,75	5,09	**OR 120.02x5.33-N70**
352	0,21	4,85	0,281	0,04	5,25	4,91	4,875	5,215	**OR 123.19x5.33-N70**
353	0,21	4,975	0,281	0,04	5,375	5,035	5	5,34	**OR 126.37x5.33-N70**
354	0,21	5,1	0,281	0,04	5,5	5,16	5,125	5,465	**OR 129.54x5.33-N70**
355	0,21	5,225	0,281	0,04	5,625	5,285	5,25	5,59	**OR 132.72x5.33-N70**
356	0,21	5,35	0,281	0,04	5,75	5,41	5,375	5,715	**OR 135.89x5.33-N70**
357	0,21	5,475	0,281	0,04	5,875	5,535	5,5	5,84	**OR 139.07x5.33-N70**
358	0,21	5,6	0,281	0,04	6	5,66	5,625	5,965	**OR 142.24x5.33-N70**
359	0,21	5,725	0,281	0,04	6,125	5,785	5,75	6,09	**OR 145.42x5.33-N70**
360	0,21	5,85	0,281	0,04	6,25	5,91	5,875	6,215	**OR 148.59x5.33-N70**
361	0,21	5,975	0,281	0,04	6,375	6,035	6	6,34	**OR 151.77x5.33-N70**
362	0,21	6,225	0,281	0,04	6,625	6,285	6,25	6,59	**OR 158.12x5.33-N70**
363	0,21	6,475	0,281	0,04	6,875	6,535	6,5	6,84	**OR 164.47x5.33-N70**
364	0,21	6,725	0,281	0,04	7,125	6,785	6,75	7,09	**OR 170.82x5.33-N70**
365	0,21	6,975	0,281	0,04	7,375	7,035	7	7,34	**OR 177.17x5.33-N70**
366	0,21	7,225	0,281	0,04	7,625	7,285	7,25	7,59	**OR 183.52x5.33-N70**
367	0,21	7,475	0,281	0,04	7,875	7,535	7,5	7,84	**OR 189.87x5.33-N70**
368	0,21	7,725	0,281	0,04	8,125	7,785	7,75	8,09	**OR 196.22x5.33-N70**
369	0,21	7,975	0,281	0,04	8,375	8,035	8	8,34	**OR 202.57x5.33-N70**
370	0,21	8,225	0,281	0,04	8,625	8,285	8,25	8,59	**OR 208.92x5.33-N70**
371	0,21	8,475	0,281	0,04	8,875	8,535	8,5	8,84	**OR 215.27x5.33-N70**
372	0,21	8,725	0,281	0,04	9,125	8,785	8,75	9,09	**OR 221.62x5.33-N70**
373	0,21	8,975	0,281	0,04	9,375	9,035	9	9,34	**OR 227.97x5.33-N70**
374	0,21	9,225	0,281	0,04	9,625	9,285	9,25	9,59	**OR 234.32x5.33-N70**

6.2 OR O-rings in static radial sealing, inch sizes
Dash-number **375 – 475**



Outside groove | Inside groove

SKF recommends designing O-ring housings according to ISO 3601.
This table is a reference to O-ring sizes for common housing dimensions.

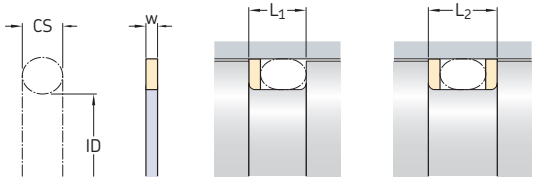
Dash-number	Dimensions				Outside groove		Inside groove		Designation
	CS	ID	L +0.008	R max.	D +0.004	d_1 −0.004	d −0.002	D_1 +0.004	
–	in.								–
375	0,21	9,475	0,281	0,04	9,875	9,535	9,5	9,84	**OR 240.67x5.33-N70**
376	0,21	9,725	0,281	0,04	10,125	9,785	9,75	10,09	**OR 247.02x5.33-N70**
377	0,21	9,975	0,281	0,04	10,375	10,035	10	10,34	**OR 253.37x5.33-N70**
378	0,21	10,475	0,281	0,04	10,875	10,535	10,5	10,84	**OR 266.07x5.33-N70**
379	0,21	10,975	0,281	0,04	11,375	11,035	11	11,34	**OR 278.77x5.33-N70**
380	0,21	11,475	0,281	0,04	11,875	11,535	11,5	11,84	**OR 291.47x5.33-N70**
381	0,21	11,975	0,281	0,04	12,375	12,035	12	12,34	**OR 304.17x5.33-N70**
382	0,21	12,975	0,281	0,04	13,375	13,035	13	13,34	**OR 329.57x5.33-N70**
383	0,21	13,975	0,281	0,04	14,375	14,035	14	14,34	**OR 354.97x5.33-N70**
384	0,21	14,975	0,281	0,04	15,375	15,035	15	15,34	**OR 380.37x5.33-N70**
385	0,21	15,955	0,281	0,04	16,375	16,035	16	16,34	**OR 405.26x5.33-N70**
386	0,21	16,955	0,281	0,04	17,375	17,035	17	17,34	**OR 430.66x5.33-N70**
387	0,21	17,955	0,281	0,04	18,375	18,035	18	18,34	**OR 456.06x5.33-N70**
388	0,21	18,953	0,281	0,04	19,375	19,035	19	19,34	**OR 481.41x5.33-N70**
389	0,21	19,953	0,281	0,04	20,375	20,035	20	20,34	**OR 506.81x5.33-N70**
390	0,21	20,953	0,281	0,04	21,375	21,035	21	21,34	**OR 532.21x5.33-N70**
391	0,21	21,953	0,281	0,04	22,375	22,035	22	22,34	**OR 557.61x5.33-N70**
392	0,21	22,94	0,281	0,04	23,375	23,035	23	23,34	**OR 582.68x5.33-N70**
393	0,21	23,94	0,281	0,04	24,375	24,035	24	24,34	**OR 608.08x5.33-N70**
394	0,21	24,94	0,281	0,04	25,375	25,035	25	25,34	**OR 633.48x5.33-N70**
395	0,21	25,94	0,281	0,04	26,375	26,035	26	26,34	**OR 658.88x5.33-N70**
425	0,275	4,476	0,375	0,06	5	4,548	4,5	4,952	**OR 113.7x6.99-N70**
426	0,275	4,598	0,375	0,06	5,125	4,673	4,625	5,077	**OR 116.8x6.99-N70**
427	0,275	4,724	0,375	0,06	5,25	4,798	4,75	5,202	**OR 120.0x6.99-N70**
428	0,275	4,85	0,375	0,06	5,375	4,923	4,875	5,327	**OR 123.19x6.99-N70**
429	0,275	4,975	0,375	0,06	5,5	5,048	5	5,452	**OR 126.37x6.99-N70**
430	0,275	5,1	0,375	0,06	5,625	5,173	5,125	5,577	**OR 129.54x6.99-N70**
431	0,275	5,224	0,375	0,06	5,75	5,298	5,25	5,702	**OR 132.7x6.99-N70**
432	0,275	5,35	0,375	0,06	5,875	5,423	5,375	5,827	**OR 135.9x6.99-N70**
433	0,275	5,475	0,375	0,06	6	5,548	5,5	5,952	**OR 139.07x6.99-N70**
434	0,275	5,6	0,375	0,06	6,125	5,673	5,625	6,077	**OR 142.24x6.99-N70**
435	0,275	5,724	0,375	0,06	6,25	5,798	5,75	6,202	**OR 145.4x6.99-N70**
436	0,275	5,85	0,375	0,06	6,375	5,923	5,875	6,327	**OR 148.6x6.99-N70**

Dash-number	Dimensions				Outside groove		Inside groove		Designation
	CS	ID	L +0.008	R max.	D +0.004	d_1 −0.004	d −0.002	D_1 +0.004	
–	in.								–
437	0,275	5,976	0,375	0,06	6,5	6,048	6	6,452	**OR 151.8x6.99-N70**
438	0,275	6,225	0,375	0,06	6,75	6,298	6,25	6,702	**OR 158.12x6.99-N70**
439	0,275	6,475	0,375	0,06	7	6,548	6,5	6,952	**OR 164.47x6.99-N70**
440	0,275	6,724	0,375	0,06	7,25	6,798	6,75	7,202	**OR 170.8x6.99-N70**
441	0,275	6,975	0,375	0,06	7,5	7,048	7	7,452	**OR 177.17x6.99-N70**
442	0,275	7,224	0,375	0,06	7,75	7,298	7,25	7,702	**OR 183.5x6.99-N70**
443	0,275	7,476	0,375	0,06	8	7,548	7,5	7,952	**OR 189.9x6.99-N70**
444	0,275	7,724	0,375	0,06	8,25	7,798	7,75	8,202	**OR 196.2x6.99-N70**
445	0,275	7,975	0,375	0,06	8,5	8,048	8	8,452	**OR 202.57x6.99-N70**
446	0,275	8,476	0,375	0,06	9	8,548	8,5	8,952	**OR 215.3x6.99-N70**
447	0,275	8,975	0,375	0,06	9,5	9,048	9	9,452	**OR 227.97x6.99-N70**
448	0,275	9,475	0,375	0,06	10	9,548	9,5	9,952	**OR 240.67x6.99-N70**
449	0,275	9,972	0,375	0,06	10,5	10,048	10	10,452	**OR 253.3x6.99-N70**
450	0,275	10,475	0,375	0,06	11	10,548	10,5	10,952	**OR 266.07x6.99-N70**
451	0,275	10,975	0,375	0,06	11,5	11,048	11	11,452	**OR 278.77x6.99-N70**
452	0,275	11,475	0,375	0,06	12	11,548	11,5	10,952	**OR 291.47x6.99-N70**
453	0,275	11,972	0,375	0,06	12,5	12,048	12	12,452	**OR 304.1x6.99-N70**
454	0,275	12,476	0,375	0,06	13	12,548	12,5	12,952	**OR 316.9x6.99-N70**
455	0,275	12,972	0,375	0,06	13,5	13,048	13	13,452	**OR 329.5x6.99-N70**
456	0,275	13,475	0,375	0,06	14	13,548	13,5	13,952	**OR 342.27x6.99-N70**
457	0,275	13,976	0,375	0,06	14,5	14,048	14	14,452	**OR 355.0x6.99-N70**
458	0,275	14,476	0,375	0,06	15	14,548	14,5	14,952	**OR 367.7x6.99-N70**
459	0,275	14,975	0,375	0,06	15,5	15,048	15	15,452	**OR 380.37x6.99-N70**
460	0,275	15,476	0,375	0,06	16	15,548	15,5	15,952	**OR 393.1x6.99-N70**
461	0,275	15,955	0,375	0,06	16,5	16,048	16	16,452	**OR 405.26x6.99-N70**
462	0,275	16,455	0,375	0,06	17	16,548	16,5	16,952	**OR 417.96x6.99-N70**
463	0,275	16,955	0,375	0,06	17,5	17,048	17	17,452	**OR 430.66x6.99-N70**
464	0,275	17,455	0,375	0,06	18	17,548	17,5	17,952	**OR 443.36x6.99-N70**
465	0,275	17,955	0,375	0,06	18,5	18,048	18	18,452	**OR 456.06x6.99-N70**
466	0,275	18,455	0,375	0,06	19	18,548	18,5	18,952	**OR 468.76x6.99-N70**
467	0,275	18,955	0,375	0,06	19,5	19,048	19	19,452	**OR 481.46x6.99-N70**
468	0,275	19,455	0,375	0,06	20	19,548	19,5	19,952	**OR 494.16x6.99-N70**
469	0,275	19,955	0,375	0,06	20,5	20,048	20	20,452	**OR 506.86x6.99-N70**
470	0,275	20,955	0,375	0,06	21,5	21,048	21	21,452	**OR 532.26x6.99-N70**
471	0,275	21,955	0,375	0,06	22,5	22,048	22	22,452	**OR 557.66x6.99-N70**
472	0,275	22,94	0,375	0,06	23,5	23,048	23	23,452	**OR 582.68x6.99-N70**
473	0,275	23,94	0,375	0,06	24,5	24,048	24	24,452	**OR 608.08x6.99-N70**
474	0,275	24,94	0,375	0,06	25,5	25,048	25	25,452	**OR 633.48x6.99-N70**
475	0,275	25,94	0,375	0,06	26,5	26,048	26	26,452	**OR 658.88x6.99-N70**

Other sizes are available on request

6.3 STR Back-up rings in static radial sealing, metric sizes

ID **9,3 – 99,5** mm

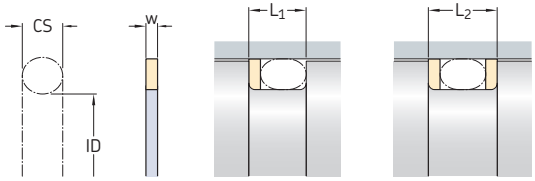


Back-up rings are selected by the corresponding O-ring dimensions.

Dimensions					Designation
ID	CS	w	L_1 +0,2	L_2 +0,2	
mm					–
9,3	2,4	1,3	4,6	6	**STR 10x14x1.3-Y95A**
10,3	2,4	1,3	4,6	6	**STR 11x15x1.3-Y95A**
11,3	2,4	1,3	4,6	6	**STR 12x16x1.3-Y95A**
12,3	2,4	1,3	4,6	6	**STR 13x17x1.3-Y95A**
13,3	2,4	1,3	4,6	6	**STR 14x18x1.3-Y95A**
14,3	2,4	1,3	4,6	6	**STR 15x19x1.3-Y95A**
15,3	2,4	1,3	4,6	6	**STR 16x20x1.3-Y95A**
17,3	2,4	1,3	4,6	6	**STR 18x22x1.3-Y95A**
18,3	2,4	1,3	4,6	6	**STR 17x21x1.3-Y95A**
19,2	3	1,3	5,4	6,8	**STR 20x25x1.3-Y95A**
21,2	3	1,3	5,4	6,8	**STR 22x27x1.3-Y95A**
22,2	3	1,3	5,4	6,8	**STR 23x28x1.3-Y95A**
24,2	3	1,3	5,4	6,8	**STR 25x30x1.3-Y95A**
26,2	3	1,3	5,4	6,8	**STR 27x32x1.3-Y95A**
29,2	3	1,3	5,4	6,8	**STR 30x35x1.3-Y95A**
31,2	3	1,3	5,4	6,8	**STR 32x37x1.3-Y95A**
32,2	3	1,3	5,4	6,8	**STR 33x38x1.3-Y95A**
34,2	3	1,3	5,4	6,8	**STR 35x40x1.3-Y95A**
35	3	1,3	5,4	6,8	**STR 36x41x1.3-Y95A**
36,2	3	1,3	5,4	6,8	**STR 37x42x1.3-Y95A**
39,2	3	1,3	5,4	6,8	**STR 40x45x1.3-Y95A**
	5,7	1,7	9,3	11,1	**STR 40x50x1.7-Y95A**

Dimensions					Designation
ID	CS	w	L_1 +0,2	L_2 +0,2	
mm					–
42,2	3	1,3	5,4	6,8	**STR 43x48x1.3-Y95A**
44,2	3	1,3	5,4	6,8	**STR 45x50x1.3-Y95A**
	5,7	1,7	9,3	11,1	**STR 45x55x1.7-Y95A**
49,2	5,7	1,7	9,3	11,1	**STR 50x60x1.7-Y95A**
49,5	3	1,3	5,4	6,8	**STR 50x55x1.3-Y95A**
52,3	5,7	1,7	9,3	11,1	**STR 53x63x1.7-Y95A**
54,2	5,7	1,7	9,3	11,1	**STR 55x65x1.7-Y95A**
54,5	3	1,3	5,4	6,8	**STR 55x60x1.3-Y95A**
56	3	1,3	5,4	6,8	**STR 57x62x1.3-Y95A**
57,5	3	1,3	5,4	6,8	**STR 58x63x1.3-Y95A**
59,2	5,7	1,7	9,3	11,1	**STR 60x70x1.7-Y95A**
59,5	3	1,3	5,4	6,8	**STR 60x65x1.3-Y95A**
62	3	1,3	5,4	6,8	**STR 63x68x1.3-Y95A**
64,2	5,7	1,7	9,3	11,1	**STR 65x75x1.7-Y95A**
64,5	3	1,3	5,4	6,8	**STR 65x70x1.3-Y95A**
67	3	1,3	5,4	6,8	**STR 68x73x1.3-Y95A**
68	3	1,3	5,4	6,8	**STR 69x74x1.3-Y95A**
69,2	5,7	1,7	9,3	11,1	**STR 70x80x1.7-Y95A**
69,5	3	1,3	5,4	6,8	**STR 70x75x1.3-Y95A**
74,2	5,7	1,7	9,3	11,1	**STR 75x85x1.7-Y95A**
74,5	3	1,3	5,4	6,8	**STR 75x80x1.3-Y95A**
75	3	1,3	5,4	6,8	**STR 76x81x1.3-Y95A**
78	3	1,3	5,4	6,8	**STR 79x84x1.3-Y95A**
79,2	5,7	1,7	9,3	11,1	**STR 80x90x1.7-Y95A**
79,5	3	1,3	5,4	6,8	**STR 80x85x1.3-Y95A**
84,1	5,7	1,7	9,3	11,1	**STR 85x95x1.7-Y95A**
84,5	3	1,3	5,4	6,8	**STR 85x90x1.3-Y95A**
87	3	1,3	5,4	6,8	**STR 88x93x1.3-Y95A**
89,1	5,7	1,7	9,3	11,1	**STR 90x100x1.7-Y95A**
89,5	3	1,3	5,4	6,8	**STR 90x95x1.3-Y95A**
94,1	5,7	1,7	9,3	11,1	**STR 95x105x1.7-Y95A**
94,5	3	1,3	5,4	6,8	**STR 95x100x1.3-Y95A**
98	3	1,3	5,4	6,8	**STR 98x103x1.3-Y95A**
99,1	5,7	1,7	9,3	11,1	**STR 100x110x1.7-Y95A**
99,5	3	1,3	5,4	6,8	**STR 100x105x1.3-Y95A**

6.3 STR Back-up rings in static radial sealing, metric sizes
ID **104,1 – 269,3** mm



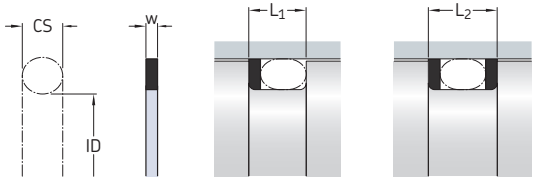
Back-up rings are selected by the corresponding O-ring dimensions.

Dimensions					Designation
ID	CS	w	L_1 +0,2	L_2 +0,2	
mm					–
104,1	5,7	1,7	9,3	11,1	**STR 105x115x1.7-Y95A**
104,5	3	1,3	5,4	6,8	**STR 105x110x1.3-Y95A**
109,1	5,7	1,7	9,3	11,1	**STR 110x120x1.7-Y95A**
109,5	3	1,3	5,4	6,8	**STR 110x115x1.3-Y95A**
114,3	5,7	1,7	9,3	11,1	**STR 115x125x1.7-Y95A**
114,5	3	1,3	5,4	6,8	**STR 115x120x1.3-Y95A**
119,3	5,7	1,7	9,3	11,1	**STR 120x130x1.7-Y95A**
119,5	3	1,3	5,4	6,8	**STR 120x125x1.3-Y95A**
124,3	5,7	1,7	9,3	11,1	**STR 125x135x1.7-Y95A**
124,5	3	1,3	5,4	6,8	**STR 125x130x1.3-Y95A**
129,3	5,7	1,7	9,3	11,1	**STR 130x140x1.7-Y95A**
129,5	3	1,3	5,4	6,8	**STR 130x135x1.3-Y95A**
134,3	5,7	1,7	9,3	11,1	**STR 135x145x1.7-Y95A**
134,5	3	1,3	5,4	6,8	**STR 135x140x1.3-Y95A**
139,3	5,7	1,7	9,3	11,1	**STR 140x150x1.7-Y95A**
139,5	3	1,3	5,4	6,8	**STR 140x145x1.3-Y95A**
144,3	5,7	1,7	9,3	11,1	**STR 145x155x1.7-Y95A**
144,5	3	1,3	5,4	6,8	**STR 145x150x1.3-Y95A**
149,3	5,7	1,7	9,3	11,1	**STR 150x160x1.7-Y95A**
154,3	5,7	1,7	9,3	11,1	**STR 155x165x1.7-Y95A**
154,5	3	1,3	5,4	6,8	**STR 155x160x1.3-Y95A**

Dimensions					Designation
ID	CS	w	L_1 +0,2	L_2 +0,2	
mm					–
159,3	5,7	1,7	9,3	11,1	**STR 160x170x1.7-Y95A**
164,3	5,7	1,7	9,3	11,1	**STR 165x175x1.7-Y95A**
169,3	5,7	1,7	9,3	11,1	**STR 170x180x1.7-Y95A**
174	3	1,3	5,4	6,8	**STR 175x180x1.3-Y95A**
174,3	5,7	1,7	9,3	11,1	**STR 175x185x1.7-Y95A**
179,3	5,7	1,7	9,3	11,1	**STR 180x190x1.7-Y95A**
184,3	5,7	1,7	9,3	11,1	**STR 185x195x1.7-Y95A**
189,3	5,7	1,7	9,3	11,1	**STR 190x200x1.7-Y95A**
194,3	5,7	1,7	9,3	11,1	**STR 195x205x1.7-Y95A**
199,3	5,7	1,7	9,3	11,1	**STR 200x210x1.7-Y95A**
209,3	5,7	1,7	9,3	11,1	**STR 210x220x1.7-Y95A**
219,3	5,7	1,7	9,3	11,1	**STR 220x230x1.7-Y95A**
229,3	5,7	1,7	9,3	11,1	**STR 230x240x1.7-Y95A**
239,3	5,7	1,7	9,3	11,1	**STR 240x250x1.7-Y95A**
244,3	5,7	1,7	9,3	11,1	**STR 245x255x1.7-Y95A**
249,3	5,7	1,7	9,3	11,1	**STR 250x260x1.7-Y95A**
269,3	5,7	1,7	9,3	11,1	**STR 270x280x1.7-Y95A**

Other sizes are available on request

6.4 STR Back-up rings in static radial sealing, inch sizes by dash-number, metric dimensions
Dash-number **013 – 128**

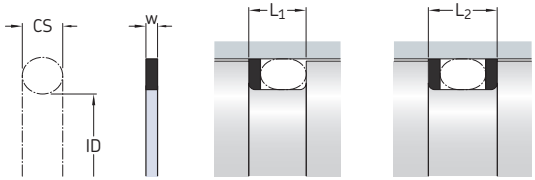


Back-up rings are selected by the corresponding O-ring dimensions.

Dash-number	Dimensions					Designation
	ID	CS	w	L_1 +0,2	L_2 +0,2	
–	mm					–
013	10,82	1,78	1,1	3,8	5,2	**STR 19-013-395A**
014	12,42	1,78	1,1	3,8	5,2	**STR 19-014-395A**
015	14	1,78	1,1	3,8	5,2	**STR 19-015-395A**
016	15,6	1,78	1,1	3,8	5,2	**STR 19-016-395A**
017	17,17	1,78	1,1	3,8	5,2	**STR 19-017-395A**
018	18,77	1,78	1,1	3,8	5,2	**STR 19-018-395A**
019	20,35	1,78	1,1	3,8	5,2	**STR 19-019-395A**
020	21,95	1,78	1,1	3,8	5,2	**STR 19-020-395A**
021	23,52	1,78	1,1	3,8	5,2	**STR 19-021-395A**
022	25,12	1,78	1,1	3,8	5,2	**STR 19-022-395A**
023	26,7	1,78	1,1	3,8	5,2	**STR 19-023-395A**
024	28,3	1,78	1,1	3,8	5,2	**STR 19-024-395A**
025	29,87	1,78	1,1	3,8	5,2	**STR 19-025-395A**
026	31,47	1,78	1,1	3,8	5,2	**STR 19-026-395A**
027	33,05	1,78	1,1	3,8	5,2	**STR 19-027-395A**
028	34,65	1,78	1,1	3,8	5,2	**STR 19-028-395A**
029	37,62	1,78	1,1	3,8	5,2	**STR 19-029-395A**
030	41	1,78	1,1	3,8	5,2	**STR 19-030-395A**
031	44,17	1,78	1,1	3,8	5,2	**STR 19-031-395A**
032	47,35	1,78	1,1	3,8	5,2	**STR 19-032-395A**
033	50,52	1,78	1,1	3,8	5,2	**STR 19-033-395A**

Dash-number	Dimensions					Designation
	ID	CS	w	L_1 +0,2	L_2 +0,2	
–	mm					–
034	53,7	1,78	1,1	3,8	5,2	**STR 19-034-395A**
035	56,87	1,78	1,1	3,8	5,2	**STR 19-035-395A**
036	60,05	1,78	1,1	3,8	5,2	**STR 19-036-395A**
037	63,22	1,78	1,1	3,8	5,2	**STR 19-037-395A**
038	66,4	1,78	1,1	3,8	5,2	**STR 19-038-395A**
039	69,57	1,78	1,1	3,8	5,2	**STR 19-039-395A**
040	72,75	1,78	1,1	3,8	5,2	**STR 19-040-395A**
041	75,92	1,78	1,1	3,8	5,2	**STR 19-041-395A**
042	82,27	1,78	1,1	3,8	5,2	**STR 19-042-395A**
043	88,62	1,78	1,1	3,8	5,2	**STR 19-043-395A**
044	94,97	1,78	1,1	3,8	5,2	**STR 19-044-395A**
045	101,32	1,78	1,1	3,8	5,2	**STR 19-045-395A**
046	107,67	1,78	1,1	3,8	5,2	**STR 19-046-395A**
047	114,02	1,78	1,1	3,8	5,2	**STR 19-047-395A**
048	120,37	1,78	1,1	3,8	5,2	**STR 19-048-395A**
049	126,72	1,78	1,1	3,8	5,2	**STR 19-049-395A**
050	133,07	1,78	1,1	3,8	5,2	**STR 19-050-395A**
111	10,77	2,62	1,3	5	6,4	**STR 19-111-395A**
112	12,37	2,62	1,3	5	6,4	**STR 19-112-395A**
113	13,94	2,62	1,3	5	6,4	**STR 19-113-395A**
114	15,54	2,62	1,3	5	6,4	**STR 19-114-395A**
115	17,12	2,62	1,3	5	6,4	**STR 19-115-395A**
116	18,72	2,62	1,3	5	6,4	**STR 19-116-395A**
117	20,29	2,62	1,3	5	6,4	**STR 19-117-395A**
118	21,89	2,62	1,3	5	6,4	**STR 19-118-395A**
119	23,47	2,62	1,3	5	6,4	**STR 19-119-395A**
120	25,07	2,62	1,3	5	6,4	**STR 19-120-395A**
121	26,64	2,62	1,3	5	6,4	**STR 19-121-395A**
122	28,24	2,62	1,3	5	6,4	**STR 19-122-395A**
123	29,82	2,62	1,3	5	6,4	**STR 19-123-395A**
124	31,42	2,62	1,3	5	6,4	**STR 19-124-395A**
125	32,99	2,62	1,3	5	6,4	**STR 19-125-395A**
126	34,59	2,62	1,3	5	6,4	**STR 19-126-395A**
127	36,17	2,62	1,3	5	6,4	**STR 19-127-395A**
128	37,77	2,62	1,3	5	6,4	**STR 19-128-395A**

6.4 STR Back-up rings in static radial sealing, inch sizes by dash-number, metric dimensions
Dash-number **129 – 225**

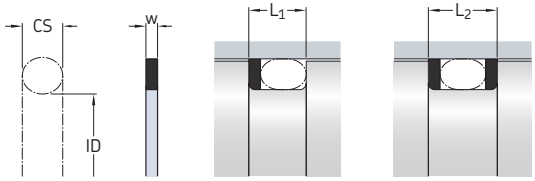


Back-up rings are selected by the corresponding O-ring dimensions.

Dash-number	Dimensions					Designation
	ID	CS	w	L_1 +0,2	L_2 +0,2	
–	mm					–
129	39,34	2,62	1,3	5	6,4	**STR 19-129-395A**
130	40,94	2,62	1,3	5	6,4	**STR 19-130-395A**
131	42,52	2,62	1,3	5	6,4	**STR 19-131-395A**
132	44,12	2,62	1,3	5	6,4	**STR 19-132-395A**
133	45,69	2,62	1,3	5	6,4	**STR 19-133-395A**
134	47,29	2,62	1,3	5	6,4	**STR 19-134-395A**
135	48,9	2,62	1,3	5	6,4	**STR 19-135-395A**
136	50,47	2,62	1,3	5	6,4	**STR 19-136-395A**
137	52,07	2,62	1,3	5	6,4	**STR 19-137-395A**
138	53,64	2,62	1,3	5	6,4	**STR 19-138-395A**
139	55,25	2,62	1,3	5	6,4	**STR 19-139-395A**
140	56,82	2,62	1,3	5	6,4	**STR 19-140-395A**
141	58,42	2,62	1,3	5	6,4	**STR 19-141-395A**
142	59,99	2,62	1,3	5	6,4	**STR 19-142-395A**
143	61,6	2,62	1,3	5	6,4	**STR 19-143-395A**
144	63,17	2,62	1,3	5	6,4	**STR 19-144-395A**
145	64,77	2,62	1,3	5	6,4	**STR 19-145-395A**
146	66,34	2,62	1,3	5	6,4	**STR 19-146-395A**
147	67,95	2,62	1,3	5	6,4	**STR 19-147-395A**
148	69,52	2,62	1,3	5	6,4	**STR 19-148-395A**
149	71,12	2,62	1,3	5	6,4	**STR 19-149-395A**

Dash-number	Dimensions					Designation
	ID	CS	w	L_1 +0,2	L_2 +0,2	
–	mm					–
150	72,69	2,62	1,3	5	6,4	**STR 19-150-395A**
151	75,87	2,62	1,3	5	6,4	**STR 19-151-395A**
152	82,22	2,62	1,3	5	6,4	**STR 19-152-395A**
153	88,57	2,62	1,3	5	6,4	**STR 19-153-395A**
154	94,92	2,62	1,3	5	6,4	**STR 19-154-395A**
155	101,27	2,62	1,3	5	6,4	**STR 19-155-395A**
158	120,32	2,62	1,3	5	6,4	**STR 19-158-395A**
159	126,67	2,62	1,3	5	6,4	**STR 19-159-395A**
160	133,02	2,62	1,3	5	6,4	**STR 19-160-395A**
161	139,37	2,62	1,3	5	6,4	**STR 19-161-395A**
162	145,72	2,62	1,3	5	6,4	**STR 19-162-395A**
163	152,07	2,62	1,3	5	6,4	**STR 19-163-395A**
167	177,47	2,62	1,3	5	6,4	**STR 19-167-395A**
205	10,69	3,53	1,5	6,2	7,6	**STR 19-205-395A**
206	12,29	3,53	1,5	6,2	7,6	**STR 19-206-395A**
207	13,87	3,53	1,5	6,2	7,6	**STR 19-207-395A**
208	15,47	3,53	1,5	6,2	7,6	**STR 19-208-395A**
209	17,04	3,53	1,5	6,2	7,6	**STR 19-209-395A**
210	18,64	3,53	1,5	6,2	7,6	**STR 19-210-395A**
211	20,22	3,53	1,5	6,2	7,6	**STR 19-211-395A**
212	21,82	3,53	1,5	6,2	7,6	**STR 19-212-395A**
213	23,39	3,53	1,5	6,2	7,6	**STR 19-213-395A**
214	24,99	3,53	1,5	6,2	7,6	**STR 19-214-395A**
215	26,57	3,53	1,5	6,2	7,6	**STR 19-215-395A**
216	28,17	3,53	1,5	6,2	7,6	**STR 19-216-395A**
217	29,74	3,53	1,5	6,2	7,6	**STR 19-217-395A**
218	31,34	3,53	1,5	6,2	7,6	**STR 19-218-395A**
219	32,92	3,53	1,5	6,2	7,6	**STR 19-219-395A**
220	34,52	3,53	1,5	6,2	7,6	**STR 19-220-395A**
221	36,09	3,53	1,5	6,2	7,6	**STR 19-221-395A**
222	37,69	3,53	1,5	6,2	7,6	**STR 19-222-395A**
223	40,87	3,53	1,5	6,2	7,6	**STR 19-223-395A**
224	44,04	3,53	1,5	6,2	7,6	**STR 19-224-395A**
225	47,22	3,53	1,5	6,2	7,6	**STR 19-225-395A**

6.4 STR Back-up rings in static radial sealing, inch sizes by dash-number, metric dimensions
Dash-number **226 – 324**

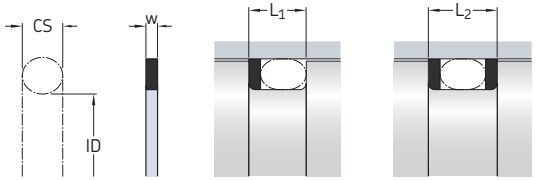


Back-up rings are selected by the corresponding O-ring dimensions.

Dash-number	Dimensions					Designation
	ID	CS	w	L_1 +0,2	L_2 +0,2	
–	mm					–
226	50,39	3,53	1,5	6,2	7,6	**STR 19-226-395A**
227	53,57	3,53	1,5	6,2	7,6	**STR 19-227-395A**
228	56,74	3,53	1,5	6,2	7,6	**STR 19-228-395A**
229	59,92	3,53	1,5	6,2	7,6	**STR 19-229-395A**
230	63,09	3,53	1,5	6,2	7,6	**STR 19-230-395A**
231	66,27	3,53	1,5	6,2	7,6	**STR 19-231-395A**
232	69,44	3,53	1,5	6,2	7,6	**STR 19-232-395A**
233	72,62	3,53	1,5	6,2	7,6	**STR 19-233-395A**
234	75,79	3,53	1,5	6,2	7,6	**STR 19-234-395A**
235	78,97	3,53	1,5	6,2	7,6	**STR 19-235-395A**
236	82,14	3,53	1,5	6,2	7,6	**STR 19-236-395A**
237	85,32	3,53	1,5	6,2	7,6	**STR 19-237-395A**
238	88,49	3,53	1,5	6,2	7,6	**STR 19-238-395A**
239	91,67	3,53	1,5	6,2	7,6	**STR 19-239-395A**
240	94,84	3,53	1,5	6,2	7,6	**STR 19-240-395A**
242	101,19	3,53	1,5	6,2	7,6	**STR 19-242-395A**
243	104,37	3,53	1,5	6,2	7,6	**STR 19-243-395A**
244	107,54	3,53	1,5	6,2	7,6	**STR 19-244-395A**
245	110,72	3,53	1,5	6,2	7,6	**STR 19-245-395A**
246	113,89	3,53	1,5	6,2	7,6	**STR 19-246-395A**
247	117,07	3,53	1,5	6,2	7,6	**STR 19-247-395A**

Dash-number	Dimensions					Designation
	ID	CS	w	L_1 +0,2	L_2 +0,2	
–	mm					–
248	120,24	3,53	1,5	6,2	7,6	**STR 19-248-395A**
249	123,42	3,53	1,5	6,2	7,6	**STR 19-249-395A**
250	126,59	3,53	1,5	6,2	7,6	**STR 19-250-395A**
251	129,77	3,53	1,5	6,2	7,6	**STR 19-251-395A**
252	132,94	3,53	1,5	6,2	7,6	**STR 19-252-395A**
253	136,12	3,53	1,5	6,2	7,6	**STR 19-253-395A**
254	139,29	3,53	1,5	6,2	7,6	**STR 19-254-395A**
255	142,47	3,53	1,5	6,2	7,6	**STR 19-255-395A**
256	145,64	3,53	1,5	6,2	7,6	**STR 19-256-395A**
257	148,82	3,53	1,5	6,2	7,6	**STR 19-257-395A**
258	151,99	3,53	1,5	6,2	7,6	**STR 19-258-395A**
259	158,34	3,53	1,5	6,2	7,6	**STR 19-259-395A**
260	164,69	3,53	1,5	6,2	7,6	**STR 19-260-395A**
261	171,04	3,53	1,5	6,2	7,6	**STR 19-261-395A**
262	177,39	3,53	1,5	6,2	7,6	**STR 19-262-395A**
265	196,44	3,53	1,5	6,2	7,6	**STR 19-265-395A**
266	202,79	3,53	1,5	6,2	7,6	**STR 19-266-395A**
267	209,14	3,53	1,5	6,2	7,6	**STR 19-267-395A**
268	215,49	3,53	1,5	6,2	7,6	**STR 19-268-395A**
269	221,84	3,53	1,5	6,2	7,6	**STR 19-269-395A**
270	228,19	3,53	1,5	6,2	7,6	**STR 19-270-395A**
271	234,54	3,53	1,5	6,2	7,6	**STR 19-271-395A**
272	240,89	3,53	1,5	6,2	7,6	**STR 19-272-395A**
273	247,24	3,53	1,5	6,2	7,6	**STR 19-273-395A**
314	18,42	5,33	1,7	8,8	10,5	**STR 19-314-395A**
316	21,59	5,33	1,7	8,8	10,5	**STR 19-316-395A**
317	23,16	5,33	1,7	8,8	10,5	**STR 19-317-395A**
318	24,77	5,33	1,7	8,8	10,5	**STR 19-318-395A**
319	26,34	5,33	1,7	8,8	10,5	**STR 19-319-395A**
320	27,94	5,33	1,7	8,8	10,5	**STR 19-320-395A**
321	29,51	5,33	1,7	8,8	10,5	**STR 19-321-395A**
322	31,12	5,33	1,7	8,8	10,5	**STR 19-322-395A**
323	32,69	5,33	1,7	8,8	10,5	**STR 19-323-395A**
324	34,29	5,33	1,7	8,8	10,5	**STR 19-324-395A**

6.4 STR Back-up rings in static radial sealing, inch sizes by dash-number, metric dimensions
Dash-number **325 – 429**

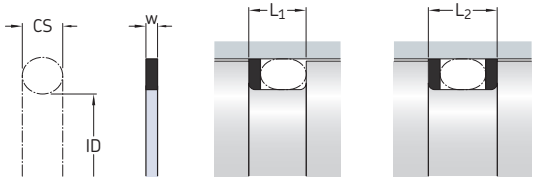


Back-up rings are selected by the corresponding O-ring dimensions.

Dash-number	Dimensions					Designation
	ID	CS	w	L_1 +0,2	L_2 +0,2	
–	mm					–
325	37,47	5,33	1,7	8,8	10,5	**STR 19-325-395A**
326	40,64	5,33	1,7	8,8	10,5	**STR 19-326-395A**
327	43,82	5,33	1,7	8,8	10,5	**STR 19-327-395A**
328	46,99	5,33	1,7	8,8	10,5	**STR 19-328-395A**
329	50,17	5,33	1,7	8,8	10,5	**STR 19-329-395A**
330	53,34	5,33	1,7	8,8	10,5	**STR 19-330-395A**
331	56,52	5,33	1,7	8,8	10,5	**STR 19-331-395A**
332	59,69	5,33	1,7	8,8	10,5	**STR 19-332-395A**
333	62,87	5,33	1,7	8,8	10,5	**STR 19-333-395A**
334	66,04	5,33	1,7	8,8	10,5	**STR 19-334-395A**
335	69,22	5,33	1,7	8,8	10,5	**STR 19-335-395A**
336	72,39	5,33	1,7	8,8	10,5	**STR 19-336-395A**
337	75,57	5,33	1,7	8,8	10,5	**STR 19-337-395A**
338	78,74	5,33	1,7	8,8	10,5	**STR 19-338-395A**
339	81,92	5,33	1,7	8,8	10,5	**STR 19-339-395A**
340	85,09	5,33	1,7	8,8	10,5	**STR 19-340-395A**
341	88,27	5,33	1,7	8,8	10,5	**STR 19-341-395A**
342	91,44	5,33	1,7	8,8	10,5	**STR 19-342-395A**
343	94,62	5,33	1,7	8,8	10,5	**STR 19-343-395A**
344	97,79	5,33	1,7	8,8	10,5	**STR 19-344-395A**
345	100,97	5,33	1,7	8,8	10,5	**STR 19-345-395A**

Dash-number	Dimensions					Designation
	ID	CS	w	L_1 +0,2	L_2 +0,2	
–	mm					–
346	104,14	5,33	1,7	8,8	10,5	**STR 19-346-395A**
347	107,32	5,33	1,7	8,8	10,5	**STR 19-347-395A**
348	110,49	5,33	1,7	8,8	10,5	**STR 19-348-395A**
349	113,67	5,33	1,7	8,8	10,5	**STR 19-349-395A**
350	116,84	5,33	1,7	8,8	10,5	**STR 19-350-395A**
351	120,02	5,33	1,7	8,8	10,5	**STR 19-351-395A**
352	123,19	5,33	1,7	8,8	10,5	**STR 19-352-395A**
353	126,37	5,33	1,7	8,8	10,5	**STR 19-353-395A**
354	129,54	5,33	1,7	8,8	10,5	**STR 19-354-395A**
355	132,72	5,33	1,7	8,8	10,5	**STR 19-355-395A**
356	135,89	5,33	1,7	8,8	10,5	**STR 19-356-395A**
357	139,07	5,33	1,7	8,8	10,5	**STR 19-357-395A**
358	142,24	5,33	1,7	8,8	10,5	**STR 19-358-395A**
359	145,42	5,33	1,7	8,8	10,5	**STR 19-359-395A**
360	148,59	5,33	1,7	8,8	10,5	**STR 19-360-395A**
361	151,77	5,33	1,7	8,8	10,5	**STR 19-361-395A**
362	158,12	5,33	1,7	8,8	10,5	**STR 19-362-395A**
363	164,47	5,33	1,7	8,8	10,5	**STR 19-363-395A**
364	170,82	5,33	1,7	8,8	10,5	**STR 19-364-395A**
365	177,17	5,33	1,7	8,8	10,5	**STR 19-365-395A**
366	183,52	5,33	1,7	8,8	10,5	**STR 19-366-395A**
367	189,87	5,33	1,7	8,8	10,5	**STR 19-367-395A**
368	196,22	5,33	1,7	8,8	10,5	**STR 19-368-395A**
369	202,57	5,33	1,7	8,8	10,5	**STR 19-369-395A**
370	208,92	5,33	1,7	8,8	10,5	**STR 19-370-395A**
371	215,27	5,33	1,7	8,8	10,5	**STR 19-371-395A**
372	221,62	5,33	1,7	8,8	10,5	**STR 19-372-395A**
373	227,97	5,33	1,7	8,8	10,5	**STR 19-373-395A**
374	234,32	5,33	1,7	8,8	10,5	**STR 19-374-395A**
375	240,67	5,33	1,7	8,8	10,5	**STR 19-375-395A**
425	113,67	6,99	2	12	14,5	**STR 19-425-395A**
426	116,84	6,99	2	12	14,5	**STR 19-426-395A**
427	120,02	6,99	2	12	14,5	**STR 19-427-395A**
428	123,19	6,99	2	12	14,5	**STR 19-428-395A**
429	126,37	6,99	2	12	14,5	**STR 19-429-395A**

6.4 STR Back-up rings in static radial sealing, inch sizes by dash-number, metric dimensions
Dash-number **430 – 449**

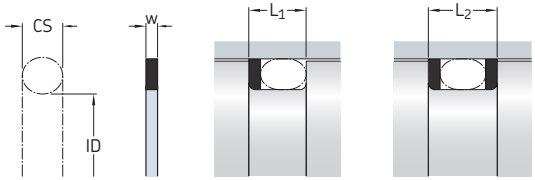


Back-up rings are selected by the corresponding O-ring dimensions.

Dash-number	Dimensions					Designation
	ID	CS	w	L_1 +0,2	L_2 +0,2	
–	mm					–
430	129,54	6,99	2	12	14,5	**STR 19-430-395A**
431	132,72	6,99	2	12	14,5	**STR 19-431-395A**
432	135,89	6,99	2	12	14,5	**STR 19-432-395A**
433	139,07	6,99	2	12	14,5	**STR 19-433-395A**
434	142,24	6,99	2	12	14,5	**STR 19-434-395A**
435	145,42	6,99	2	12	14,5	**STR 19-435-395A**
436	148,59	6,99	2	12	14,5	**STR 19-436-395A**
437	151,77	6,99	2	12	14,5	**STR 19-437-395A**
438	158,12	6,99	2	12	14,5	**STR 19-438-395A**
439	164,47	6,99	2	12	14,5	**STR 19-439-395A**
440	170,82	6,99	2	12	14,5	**STR 19-440-395A**
441	177,17	6,99	2	12	14,5	**STR 19-441-395A**
442	183,52	6,99	2	12	14,5	**STR 19-442-395A**
443	189,87	6,99	2	12	14,5	**STR 19-443-395A**
444	196,22	6,99	2	12	14,5	**STR 19-444-395A**
445	202,57	6,99	2	12	14,5	**STR 19-445-395A**
446	215,27	6,99	2	12	14,5	**STR 19-446-395A**
447	227,97	6,99	2	12	14,5	**STR 19-447-395A**
448	240,67	6,99	2	12	14,5	**STR 19-448-395A**
449	253,37	6,99	2	12	14,5	**STR 19-449-395A**

Other sizes are available on request

6.5 STR Back-up rings in static radial sealing, inch sizes by dash-number
Dash-number **013 – 167**



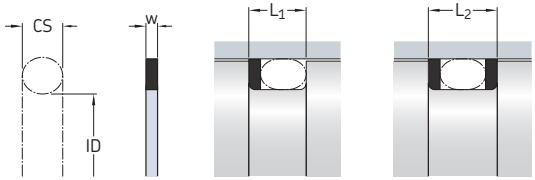
Back-up rings are selected by the corresponding O-ring dimensions.

Dash-number	Dimensions					Designation
	CS	ID	w	L_1 +0.008	L_2 +0.008	
–	in.					–
013	0,07	0,426	0,043	0,15	0,205	**STR 19-013-395A**
014	0,07	0,489	0,043	0,15	0,205	**STR 19-014-395A**
015	0,07	0,551	0,043	0,15	0,205	**STR 19-015-395A**
016	0,07	0,614	0,043	0,15	0,205	**STR 19-016-395A**
017	0,07	0,676	0,043	0,15	0,205	**STR 19-017-395A**
018	0,07	0,739	0,043	0,15	0,205	**STR 19-018-395A**
019	0,07	0,801	0,043	0,15	0,205	**STR 19-019-395A**
020	0,07	0,864	0,043	0,15	0,205	**STR 19-020-395A**
021	0,07	0,926	0,043	0,15	0,205	**STR 19-021-395A**
022	0,07	0,989	0,043	0,15	0,205	**STR 19-022-395A**
023	0,07	1,051	0,043	0,15	0,205	**STR 19-023-395A**
024	0,07	1,114	0,043	0,15	0,205	**STR 19-024-395A**
025	0,07	1,176	0,043	0,15	0,205	**STR 19-025-395A**
026	0,07	1,239	0,043	0,15	0,205	**STR 19-026-395A**
027	0,07	1,301	0,043	0,15	0,205	**STR 19-027-395A**
028	0,07	1,364	0,043	0,15	0,205	**STR 19-028-395A**
029	0,07	1,489	0,043	0,15	0,205	**STR 19-029-395A**
030	0,07	1,614	0,043	0,15	0,205	**STR 19-030-395A**
031	0,07	1,739	0,043	0,15	0,205	**STR 19-031-395A**
032	0,07	1,864	0,043	0,15	0,205	**STR 19-032-395A**
033	0,07	1,989	0,043	0,15	0,205	**STR 19-033-395A**
034	0,07	2,114	0,043	0,15	0,205	**STR 19-034-395A**
035	0,07	2,239	0,043	0,15	0,205	**STR 19-035-395A**
036	0,07	2,364	0,043	0,15	0,205	**STR 19-036-395A**
037	0,07	2,489	0,043	0,15	0,205	**STR 19-037-395A**
038	0,07	2,614	0,043	0,15	0,205	**STR 19-038-395A**
039	0,07	2,739	0,043	0,15	0,205	**STR 19-039-395A**
040	0,07	2,864	0,043	0,15	0,205	**STR 19-040-395A**
041	0,07	2,989	0,043	0,15	0,205	**STR 19-041-395A**
042	0,07	3,239	0,043	0,15	0,205	**STR 19-042-395A**
043	0,07	3,489	0,043	0,15	0,205	**STR 19-043-395A**
044	0,07	3,739	0,043	0,15	0,205	**STR 19-044-395A**
045	0,07	3,989	0,043	0,15	0,205	**STR 19-045-395A**
046	0,07	4,239	0,043	0,15	0,205	**STR 19-046-395A**

Dash-number	Dimensions					Designation
	CS	ID	w	L_1 +0.008	L_2 +0.008	
–	in.					–
047	0,07	4,489	0,043	0,15	0,205	**STR 19-047-395A**
048	0,07	4,739	0,043	0,15	0,205	**STR 19-048-395A**
049	0,07	4,989	0,043	0,15	0,205	**STR 19-049-395A**
050	0,07	5,239	0,043	0,15	0,205	**STR 19-050-395A**
111	0,103	0,424	0,051	0,197	0,252	**STR 19-111-395A**
112	0,103	0,487	0,051	0,197	0,252	**STR 19-112-395A**
113	0,103	0,549	0,051	0,197	0,252	**STR 19-113-395A**
114	0,103	0,612	0,051	0,197	0,252	**STR 19-114-395A**
115	0,103	0,674	0,051	0,197	0,252	**STR 19-115-395A**
116	0,103	0,737	0,051	0,197	0,252	**STR 19-116-395A**
117	0,103	0,799	0,051	0,197	0,252	**STR 19-117-395A**
118	0,103	0,862	0,051	0,197	0,252	**STR 19-118-395A**
119	0,103	0,924	0,051	0,197	0,252	**STR 19-119-395A**
120	0,103	0,987	0,051	0,197	0,252	**STR 19-120-395A**
121	0,103	1,049	0,051	0,197	0,252	**STR 19-121-395A**
122	0,103	1,112	0,051	0,197	0,252	**STR 19-122-395A**
123	0,103	1,174	0,051	0,197	0,252	**STR 19-123-395A**
124	0,103	1,237	0,051	0,197	0,252	**STR 19-124-395A**
125	0,103	1,299	0,051	0,197	0,252	**STR 19-125-395A**
126	0,103	1,362	0,051	0,197	0,252	**STR 19-126-395A**
127	0,103	1,424	0,051	0,197	0,252	**STR 19-127-395A**
128	0,103	1,487	0,051	0,197	0,252	**STR 19-128-395A**
129	0,103	1,549	0,051	0,197	0,252	**STR 19-129-395A**
130	0,103	1,612	0,051	0,197	0,252	**STR 19-130-395A**
131	0,103	1,674	0,051	0,197	0,252	**STR 19-131-395A**
132	0,103	1,737	0,051	0,197	0,252	**STR 19-132-395A**
133	0,103	1,799	0,051	0,197	0,252	**STR 19-133-395A**
134	0,103	1,862	0,051	0,197	0,252	**STR 19-134-395A**
135	0,103	1,925	0,051	0,197	0,252	**STR 19-135-395A**
136	0,103	1,987	0,051	0,197	0,252	**STR 19-136-395A**
137	0,103	2,05	0,051	0,197	0,252	**STR 19-137-395A**
138	0,103	2,112	0,051	0,197	0,252	**STR 19-138-395A**
139	0,103	2,175	0,051	0,197	0,252	**STR 19-139-395A**
140	0,103	2,237	0,051	0,197	0,252	**STR 19-140-395A**
141	0,103	2,3	0,051	0,197	0,252	**STR 19-141-395A**
142	0,103	2,362	0,051	0,197	0,252	**STR 19-142-395A**
143	0,103	2,425	0,051	0,197	0,252	**STR 19-143-395A**
144	0,103	2,487	0,051	0,197	0,252	**STR 19-144-395A**
145	0,103	2,55	0,051	0,197	0,252	**STR 19-145-395A**
146	0,103	2,612	0,051	0,197	0,252	**STR 19-146-395A**
147	0,103	2,675	0,051	0,197	0,252	**STR 19-147-395A**
148	0,103	2,737	0,051	0,197	0,252	**STR 19-148-395A**
149	0,103	2,8	0,051	0,197	0,252	**STR 19-149-395A**
150	0,103	2,862	0,051	0,197	0,252	**STR 19-150-395A**
151	0,103	2,987	0,051	0,197	0,252	**STR 19-151-395A**
152	0,103	3,237	0,051	0,197	0,252	**STR 19-152-395A**
153	0,103	3,487	0,051	0,197	0,252	**STR 19-153-395A**
154	0,103	3,737	0,051	0,197	0,252	**STR 19-154-395A**
155	0,103	3,987	0,051	0,197	0,252	**STR 19-155-395A**
158	0,103	4,737	0,051	0,197	0,252	**STR 19-158-395A**
159	0,103	4,987	0,051	0,197	0,252	**STR 19-159-395A**
160	0,103	5,237	0,051	0,197	0,252	**STR 19-160-395A**
161	0,103	5,487	0,051	0,197	0,252	**STR 19-161-395A**
162	0,103	5,737	0,051	0,197	0,252	**STR 19-162-395A**
163	0,103	5,987	0,051	0,197	0,252	**STR 19-163-395A**
167	0,103	6,987	0,051	0,197	0,252	**STR 19-167-395A**

6.5 STR Back-up rings in static radial sealing, inch sizes by dash-number

Dash-number **205 – 339**

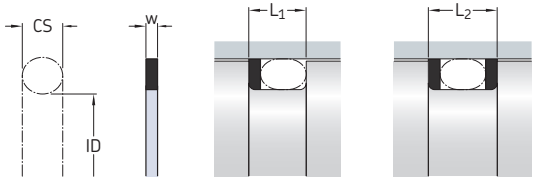


Back-up rings are selected by the corresponding O-ring dimensions.

Dash-number	Dimensions					Designation
	CS	ID	w	L_1 +0.008	L_2 +0.008	
–	in.					–
205	0,139	0,421	0,051	0,244	0,299	**STR 19-205-395A**
206	0,139	0,484	0,051	0,244	0,299	**STR 19-206-395A**
207	0,139	0,546	0,051	0,244	0,299	**STR 19-207-395A**
208	0,139	0,609	0,051	0,244	0,299	**STR 19-208-395A**
209	0,139	0,671	0,051	0,244	0,299	**STR 19-209-395A**
210	0,139	0,734	0,051	0,244	0,299	**STR 19-210-395A**
211	0,139	0,796	0,051	0,244	0,299	**STR 19-211-395A**
212	0,139	0,859	0,051	0,244	0,299	**STR 19-212-395A**
213	0,139	0,921	0,051	0,244	0,299	**STR 19-213-395A**
214	0,139	0,984	0,051	0,244	0,299	**STR 19-214-395A**
215	0,139	1,046	0,051	0,244	0,299	**STR 19-215-395A**
216	0,139	1,109	0,051	0,244	0,299	**STR 19-216-395A**
217	0,139	1,171	0,051	0,244	0,299	**STR 19-217-395A**
218	0,139	1,234	0,051	0,244	0,299	**STR 19-218-395A**
219	0,139	1,296	0,051	0,244	0,299	**STR 19-219-395A**
220	0,139	1,359	0,051	0,244	0,299	**STR 19-220-395A**
221	0,139	1,421	0,051	0,244	0,299	**STR 19-221-395A**
222	0,139	1,484	0,051	0,244	0,299	**STR 19-222-395A**
223	0,139	1,609	0,051	0,244	0,299	**STR 19-223-395A**
224	0,139	1,734	0,051	0,244	0,299	**STR 19-224-395A**
225	0,139	1,859	0,051	0,244	0,299	**STR 19-225-395A**
226	0,139	1,984	0,051	0,244	0,299	**STR 19-226-395A**
227	0,139	2,109	0,051	0,244	0,299	**STR 19-227-395A**
228	0,139	2,234	0,051	0,244	0,299	**STR 19-228-395A**
229	0,139	2,359	0,051	0,244	0,299	**STR 19-229-395A**
230	0,139	2,484	0,051	0,244	0,299	**STR 19-230-395A**
231	0,139	2,609	0,051	0,244	0,299	**STR 19-231-395A**
232	0,139	2,734	0,051	0,244	0,299	**STR 19-232-395A**
233	0,139	2,859	0,051	0,244	0,299	**STR 19-233-395A**
234	0,139	2,984	0,051	0,244	0,299	**STR 19-234-395A**
235	0,139	3,109	0,051	0,244	0,299	**STR 19-235-395A**
236	0,139	3,234	0,051	0,244	0,299	**STR 19-236-395A**
237	0,139	3,359	0,051	0,244	0,299	**STR 19-237-395A**
238	0,139	3,484	0,051	0,244	0,299	**STR 19-238-395A**
239	0,139	3,609	0,051	0,244	0,299	**STR 19-239-395A**
240	0,139	3,734	0,051	0,244	0,299	**STR 19-240-395A**

Dash-number	Dimensions					Designation
	CS	ID	w	L_1 +0.008	L_2 +0.008	
–	in.					–
242	0,139	3,984	0,051	0,244	0,299	**STR 19-242-395A**
243	0,139	4,109	0,051	0,244	0,299	**STR 19-243-395A**
244	0,139	4,234	0,051	0,244	0,299	**STR 19-244-395A**
245	0,139	4,359	0,051	0,244	0,299	**STR 19-245-395A**
246	0,139	4,484	0,051	0,244	0,299	**STR 19-246-395A**
247	0,139	4,609	0,051	0,244	0,299	**STR 19-247-395A**
248	0,139	4,734	0,051	0,244	0,299	**STR 19-248-395A**
249	0,139	4,859	0,051	0,244	0,299	**STR 19-249-395A**
250	0,139	4,984	0,051	0,244	0,299	**STR 19-250-395A**
251	0,139	5,109	0,051	0,244	0,299	**STR 19-251-395A**
252	0,139	5,234	0,051	0,244	0,299	**STR 19-252-395A**
253	0,139	5,359	0,051	0,244	0,299	**STR 19-253-395A**
254	0,139	5,484	0,051	0,244	0,299	**STR 19-254-395A**
255	0,139	5,609	0,051	0,244	0,299	**STR 19-255-395A**
256	0,139	5,734	0,051	0,244	0,299	**STR 19-256-395A**
257	0,139	5,859	0,051	0,244	0,299	**STR 19-257-395A**
258	0,139	5,984	0,051	0,244	0,299	**STR 19-258-395A**
259	0,139	6,234	0,051	0,244	0,299	**STR 19-259-395A**
260	0,139	6,484	0,051	0,244	0,299	**STR 19-260-395A**
261	0,139	6,734	0,051	0,244	0,299	**STR 19-261-395A**
262	0,139	6,984	0,051	0,244	0,299	**STR 19-262-395A**
265	0,139	7,734	0,051	0,244	0,299	**STR 19-265-395A**
266	0,139	7,984	0,051	0,244	0,299	**STR 19-266-395A**
267	0,139	8,234	0,051	0,244	0,299	**STR 19-267-395A**
268	0,139	8,484	0,051	0,244	0,299	**STR 19-268-395A**
269	0,139	8,734	0,051	0,244	0,299	**STR 19-269-395A**
270	0,139	8,984	0,051	0,244	0,299	**STR 19-270-395A**
271	0,139	9,234	0,051	0,244	0,299	**STR 19-271-395A**
272	0,139	9,484	0,051	0,244	0,299	**STR 19-272-395A**
273	0,139	9,734	0,051	0,244	0,299	**STR 19-273-395A**
310	0,21	0,475	0,067	0,346	0,413	**STR 19-310-395A**
311	0,21	0,537	0,067	0,346	0,413	**STR 19-311-395A**
312	0,21	0,6	0,067	0,346	0,413	**STR 19-312-395A**
313	0,21	0,662	0,067	0,346	0,413	**STR 19-313-395A**
314	0,21	0,725	0,067	0,346	0,413	**STR 19-314-395A**
315	0,21	0,787	0,067	0,346	0,413	**STR 19-315-395A**
316	0,21	0,85	0,067	0,346	0,413	**STR 19-316-395A**
317	0,21	0,912	0,067	0,346	0,413	**STR 19-317-395A**
318	0,21	0,975	0,067	0,346	0,413	**STR 19-318-395A**
319	0,21	1,037	0,067	0,346	0,413	**STR 19-319-395A**
320	0,21	1,1	0,067	0,346	0,413	**STR 19-320-395A**
321	0,21	1,162	0,067	0,346	0,413	**STR 19-321-395A**
322	0,21	1,225	0,067	0,346	0,413	**STR 19-322-395A**
323	0,21	1,287	0,067	0,346	0,413	**STR 19-323-395A**
324	0,21	1,35	0,067	0,346	0,413	**STR 19-324-395A**
325	0,21	1,475	0,067	0,346	0,413	**STR 19-325-395A**
326	0,21	1,6	0,067	0,346	0,413	**STR 19-326-395A**
327	0,21	1,725	0,067	0,346	0,413	**STR 19-327-395A**
328	0,21	1,85	0,067	0,346	0,413	**STR 19-328-395A**
329	0,21	1,975	0,067	0,346	0,413	**STR 19-329-395A**
330	0,21	2,1	0,067	0,346	0,413	**STR 19-330-395A**
331	0,21	2,225	0,067	0,346	0,413	**STR 19-331-395A**
332	0,21	2,35	0,067	0,346	0,413	**STR 19-332-395A**
333	0,21	2,475	0,067	0,346	0,413	**STR 19-333-395A**
334	0,21	2,6	0,067	0,346	0,413	**STR 19-334-395A**
335	0,21	2,725	0,067	0,346	0,413	**STR 19-335-395A**
336	0,21	2,85	0,067	0,346	0,413	**STR 19-336-395A**
337	0,21	2,975	0,067	0,346	0,413	**STR 19-337-395A**
338	0,21	3,1	0,067	0,346	0,413	**STR 19-338-395A**
339	0,21	3,225	0,067	0,346	0,413	**STR 19-339-395A**

6.5 STR Back-up rings in static radial sealing, inch sizes by dash-number
Dash-number **340 – 449**



Back-up rings are selected by the corresponding O-ring dimensions.

Dash-number	Dimensions					Designation
	CS	ID	w	L_1 +0.008	L_2 +0.008	
–	in.					–
340	0,21	3,35	0,067	0,346	0,413	**STR 19-340-395A**
341	0,21	3,475	0,067	0,346	0,413	**STR 19-341-395A**
342	0,21	3,6	0,067	0,346	0,413	**STR 19-342-395A**
343	0,21	3,725	0,067	0,346	0,413	**STR 19-343-395A**
344	0,21	3,85	0,067	0,346	0,413	**STR 19-344-395A**
345	0,21	3,975	0,067	0,346	0,413	**STR 19-345-395A**
346	0,21	4,1	0,067	0,346	0,413	**STR 19-346-395A**
347	0,21	4,225	0,067	0,346	0,413	**STR 19-347-395A**
348	0,21	4,35	0,067	0,346	0,413	**STR 19-348-395A**
349	0,21	4,475	0,067	0,346	0,413	**STR 19-349-395A**
350	0,21	4,6	0,067	0,346	0,413	**STR 19-350-395A**
351	0,21	4,725	0,067	0,346	0,413	**STR 19-351-395A**
352	0,21	4,85	0,067	0,346	0,413	**STR 19-352-395A**
353	0,21	4,975	0,067	0,346	0,413	**STR 19-353-395A**
354	0,21	5,1	0,067	0,346	0,413	**STR 19-354-395A**
355	0,21	5,225	0,067	0,346	0,413	**STR 19-355-395A**
356	0,21	5,35	0,067	0,346	0,413	**STR 19-356-395A**
357	0,21	5,475	0,067	0,346	0,413	**STR 19-357-395A**
358	0,21	5,6	0,067	0,346	0,413	**STR 19-358-395A**
359	0,21	5,725	0,067	0,346	0,413	**STR 19-359-395A**
360	0,21	5,85	0,067	0,346	0,413	**STR 19-360-395A**
361	0,21	5,975	0,067	0,346	0,413	**STR 19-361-395A**
362	0,21	6,225	0,067	0,346	0,413	**STR 19-362-395A**
363	0,21	6,475	0,067	0,346	0,413	**STR 19-363-395A**
364	0,21	6,725	0,067	0,346	0,413	**STR 19-364-395A**
365	0,21	6,975	0,067	0,346	0,413	**STR 19-365-395A**
366	0,21	7,225	0,067	0,346	0,413	**STR 19-366-395A**
367	0,21	7,475	0,067	0,346	0,413	**STR 19-367-395A**
368	0,21	7,725	0,067	0,346	0,413	**STR 19-368-395A**
369	0,21	7,975	0,067	0,346	0,413	**STR 19-369-395A**
370	0,21	8,225	0,067	0,346	0,413	**STR 19-370-395A**
371	0,21	8,475	0,067	0,346	0,413	**STR 19-371-395A**
372	0,21	8,725	0,067	0,346	0,413	**STR 19-372-395A**
373	0,21	8,975	0,067	0,346	0,413	**STR 19-373-395A**
374	0,21	9,225	0,067	0,346	0,413	**STR 19-374-395A**
375	0,21	9,475	0,067	0,346	0,413	**STR 19-375-395A**

Dash-number	Dimensions					Designation
	CS	ID	w	L_1 +0.008	L_2 +0.008	
–	in.					–
425	0,275	4,475	0,079	0,472	0,571	**STR 19-425-395A**
426	0,275	4,6	0,079	0,472	0,571	**STR 19-426-395A**
427	0,275	4,725	0,079	0,472	0,571	**STR 19-427-395A**
428	0,275	4,85	0,079	0,472	0,571	**STR 19-428-395A**
429	0,275	4,975	0,079	0,472	0,571	**STR 19-429-395A**
430	0,275	5,1	0,079	0,472	0,571	**STR 19-430-395A**
431	0,275	5,225	0,079	0,472	0,571	**STR 19-431-395A**
432	0,275	5,35	0,079	0,472	0,571	**STR 19-432-395A**
433	0,275	5,475	0,079	0,472	0,571	**STR 19-433-395A**
434	0,275	5,6	0,079	0,472	0,571	**STR 19-434-395A**
435	0,275	5,725	0,079	0,472	0,571	**STR 19-435-395A**
436	0,275	5,85	0,079	0,472	0,571	**STR 19-436-395A**
437	0,275	5,975	0,079	0,472	0,571	**STR 19-437-395A**
438	0,275	6,225	0,079	0,472	0,571	**STR 19-438-395A**
439	0,275	6,475	0,079	0,472	0,571	**STR 19-439-395A**
440	0,275	6,725	0,079	0,472	0,571	**STR 19-440-395A**
441	0,275	6,975	0,079	0,472	0,571	**STR 19-441-395A**
442	0,275	7,225	0,079	0,472	0,571	**STR 19-442-395A**
443	0,275	7,475	0,079	0,472	0,571	**STR 19-443-395A**
444	0,275	7,725	0,079	0,472	0,571	**STR 19-444-395A**
445	0,275	7,975	0,079	0,472	0,571	**STR 19-445-395A**
446	0,275	8,475	0,079	0,472	0,571	**STR 19-446-395A**
447	0,275	8,975	0,079	0,472	0,571	**STR 19-447-395A**
448	0,275	9,475	0,079	0,472	0,571	**STR 19-448-395A**
449	0,275	9,975	0,079	0,472	0,571	**STR 19-449-395A**

Other sizes are available on request

Other O-ring sealing and ring materials

Dynamic radial sealing

Under certain conditions, O-rings can be used for dynamic sealing with relative motion between the coaxial parts. These sealing arrangements are limited to slow reciprocating or oscillating motions. The radial depth S should be increased to S1 using

$$S1 = \frac{CS + S}{2}$$

where
S1 = increased radial depth [mm]
CS = cross section [mm] (→ **product tables**)
S = radial depth [mm]
= (D - d1) / 2 for outside grooves
= (D1 - d) / 2 for inside grooves

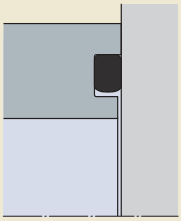
For additional dimensions, refer to the relevant standards (→ **table 3, page 294**).
For additional information, contact SKF.

Static axial sealing

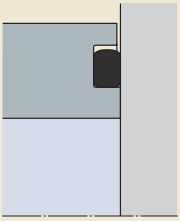
O-rings can also be used for static axial sealing between two opposing parts. Although, static axial sealing arrangements are not common in hydraulic cylinder applications, some examples are shown in **figure 3**.
For additional information, contact SKF.

Fig. 3

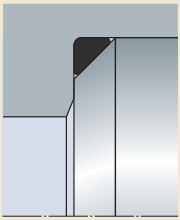
Static axial sealing examples



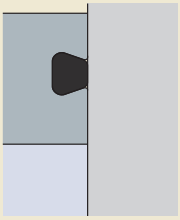
Rectangular groove, inside pressure



Rectangular groove, outside pressure



Triangular groove



Trapezoidal groove

PTFE encapsulated O-rings

SKF also supplies O-rings type ECOR that are encapsulated with PTFE materials (FEP or PFA). These O-rings have a core made of silicone or fluorocarbon rubber. The seamless and uniform PTFE encapsulation protects the core material against fluids and air.

ECOR O-rings are preferred for static sealing and not appropriate for continuously dynamic applications due to its thin and soft encapsulation. They are characterized by the following properties:

- chemical resistant
- wide temperature range
- anti-adhesive, low breakaway friction
- good resistance to wear
- good resistance to UV light
- can be sterilized in accordance with FDA (Food and Drug Administration) requirements
- low steam permeability
- low water absorption

For available sizes and additional information, contact SKF.

Back-up rings made of thermoplastic polyester elastomer

SKF also supplies back-up rings made of thermoplastic polyester elastomer (TPC).

For additional information, contact SKF.

Back-up rings made of PTFE

SKF back-up rings made of PTFE are suitable in applications with high temperatures or aggressive fluids. PTFE back-up rings are available unfilled or with an appropriate filler. Back-up rings made of unfilled PTFE can be machined from tube blanks with outside diameters ranging from 1 to 1 500 mm *(0.039 to 59 in.)*. Therefore, they can easily be adapted to customer specific installations and delivered on short notice.

For additional information, contact SKF.

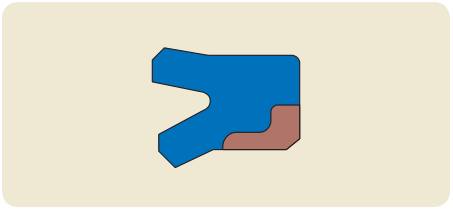
Other fluid power applications

This catalogue contains the standard assortment of SKF hydraulic seals and guides typically used in hydraulic cylinders. Furthermore, SKF provides a wide range of standard and customized sealing solutions for a variety of other fluid power applications. In this chapter, you find some examples of these capabilities. For a solution that best meets the demands of your application, contact SKF.

Hydraulic rock breaker hammers

Hydraulic rock breaker hammers are a demanding application requiring hydraulic reciprocating seals working in short strokes and extreme high velocity.

SKF has many special solutions for rock hammers, including TEFLATHANE seals with a special high-temperature polyurethane U-cup seal that is bonded to a low-friction PTFE anti-extrusion ring to extend service life for significant maintenance savings.



Hydraulic presses

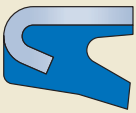
Each hydraulic press application is unique and should work reliably for many years without costly downtime or expensive repairs. SKF has decades of experience developing and manufacturing customized press sealing solutions for original equipment manufacturers, as well as retrofit assemblies for existing equipment.

With moulding and machining capabilities and virtually unlimited diameter range, SKF can customize and manufacture sealing solutions to optimize system performance and decrease operating costs.

Hinge pin joints

Hinge pin seals retain pin joint bearing lubricants and exclude contaminants on off highway equipment that operates in harsh outdoor environments across all climates and weather conditions.

PAK-L press-in seals are optimized for demanding pin joint applications. The wear resistant polyurethane seal materials reduce relubrication intervals and extend both seal and hinge joint bearing life. In addition, SKF has experience developing customized pin joint seal solutions.



Rotary unions

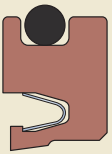
Rotary unions (also known as rotary manifolds or swivel joints) accommodate the flow of fluids between machine components with relative rotating or oscillating motion. They convey gases, lubricants, coolants and working fluids for fluid power.

SKF has sealing solutions and capabilities to accommodate virtually any rotary union application. The IM profile seal for hydraulic rotary manifolds is optimized for low friction and is available with a bonded energizer to improve energy efficiency and extend service life.

Hydraulic motors

Hydraulic motors rotate with high torque from high-pressure hydraulic fluid flow. Certain motor designs and applications require the shaft seal to handle high pressure. The demands for higher power, efficient operation and long life require other solutions than typical rubber shaft seals.

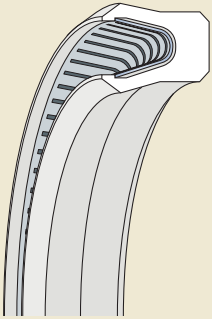
SKF designs and develops customized high-pressure PTFE shaft seals for hydraulic motors for reduced friction and wear to support energy saving and extend service life.



Pneumatic fluid power applications

Special gas-sealing applications with high pressure, high speed, extreme high temperatures, cryogenic low temperatures or special gases place high demands on pneumatic seals.

SKF can provide customized solutions that meets your most demanding pneumatic sealing needs, designed specifically to enhance reliability and performance in your application.



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[1)] Starting page of the product table

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