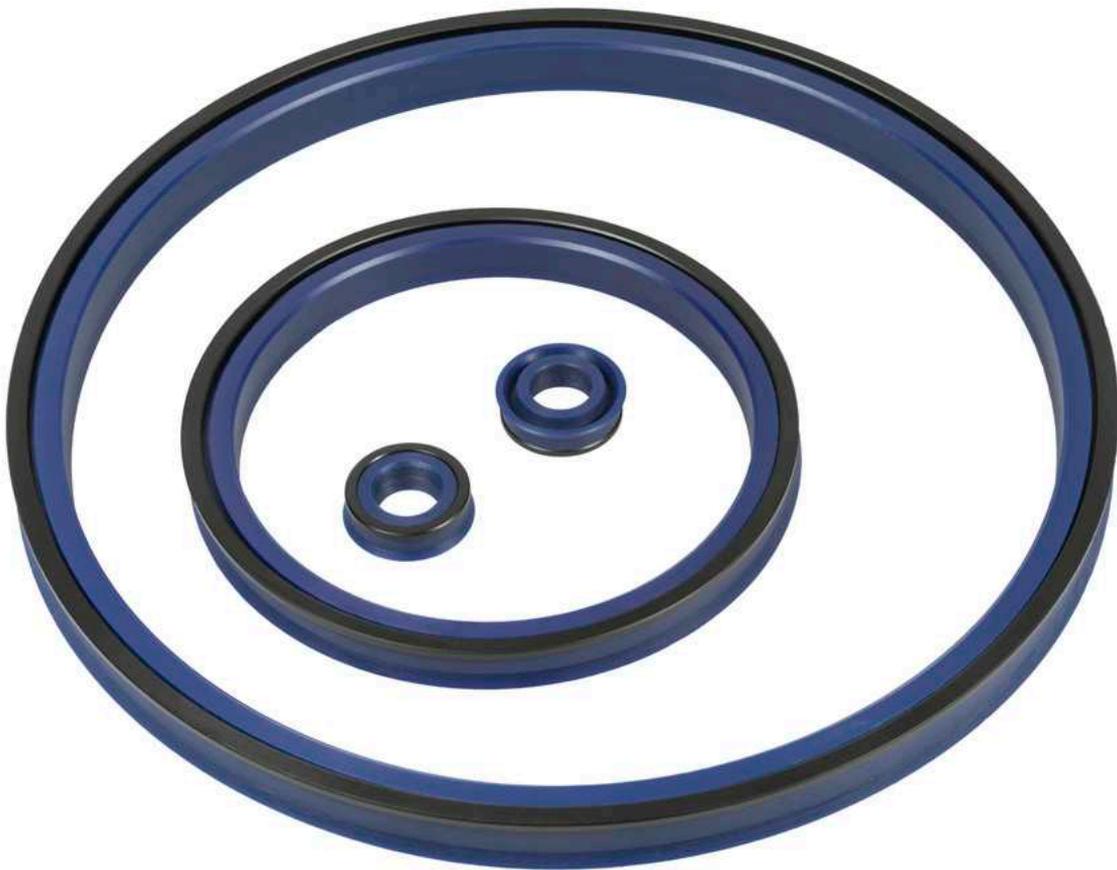


SKF SEALJET DD

Machined seals product range





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Machined seals concept



Meeting unique sealing demands, on-demand

Generally, the machined seals concept provides a fast and very flexible alternative to the moulded seal production. With a unique combination of machining capabilities, specially developed sealing materials and a pre-selection of seal profiles polymeric seals can be produced in virtually any dimension and any design, for virtually any industrial application.

The distribution business is more challenging than ever before. Customers are demanding more, faster, and they turn to distributors to deliver.

Seals in minutes – SKF SEAL JET DD

The SKF SEAL JET DD system is engineered with the distributor's challenges in mind:

- Enable faster machining of seals
- Offer more from a smaller inventory
- Reduce reliance on training

All in a machine the size of a coffee machine.

It adds up to meeting the needs of the end-users and the market, faster.

Be ahead of your time when your customers need a seal fast. Get machined seals in minutes, offer greater stock from a smaller inventory, all without the need to rely on the availability of skilled machine operators.

The SKF SEAL JET DD system saves hours in your working day and space in your distribution warehouse. Instead of hoping your supplier has the seal your customer needs or waiting for them to deliver it, you simply make the seal yourself in minutes. All to the highest quality and precise specifications with the potential to save warehouse storage space. With the help of the SKF SEAL JET DD you are able to deliver best-in-class seal service to your customers and end-users.

Profile and materials selection

The SKF SEAL JET DD system offers proprietary machining software with 83 pre-programmed seal profiles, covering the majority of the industrial demand. By proper selection of the seals profile and definition of the main seal dimensions - together with the right material selection - machined standard seals in non-standard dimensions up to a diameter of 200 mm can be manufactured within minutes - to meet end-user's demands.

CNC manufacturing process

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



Industrial Sealing Solutions – optimizing your customer's applications

If the end-user's demands exceed the SKF SEAL JET DD system capabilities in size, material request or volume, the whole SKF Industrial Seals portfolio is available via the SKF network.

We offer industrial equipment OEMs and end-users a comprehensive selection of sealing options, whether you need a replacement seal or a highly engineered solution for an extremely demanding application. With both - moulded and machined seal - manufacturing capabilities available worldwide, you can serve your end-users with seals in quantities ranging from a few prototypes to large volume serial production.

Whenever you need machined standard or customized seals in e.g. larger diameters, special materials or with highly customized design, the SKF Machined Seals Centres provide those solutions.

When you face high demand of standard seals - e.g. for shaft seals for rotating equipment or hydraulic seals for reciprocating equipment - the SKF Industrial Seals standard range also is available.

Please ask your SKF speaking partner for more details.

Sealing materials

Introduction

Increased requirements for sealing technology reinforces the importance of selecting the appropriate sealing materials. Sealing materials face demands for higher speeds, temperatures and pressures, and are often confronted with poor lubricating fluids. Fluids like HFA and HFB as well as biologically degradable hydraulic fluids (vegetable oils and synthetic esters) present many challenges for developers of sealing materials.

In the sealing technology, different groups of macromolecular (polymer) substances are used. Macromolecular substances are organic compounds whose molecules consist of several thousands, often even millions of atoms, known as macro, giant, string or chain molecules. They can be created either by modification of highly molecular natural materials (e.g. natural rubber) or by depositing low-molecular elements (so called monomers) through various chemical reactions (synthetic materials, plastics).

SKF acknowledged this with the transfer of R&D from a standard solution provider to becoming a developer of special, tailor-made solutions. Projects with close client co-operation succeed best in achieving the optimal sealing solution.

In this brochure, we feature five different materials to be used with the SKF SEAL JET DD machine. All of these materials have been developed by SKF to meet typical customer requirements. Additionally, we offer machined seals made of 25 standard materials that are accessible via the SKF Machined Seals Centres. There we also have a vast range of special materials available to meet very specific application demands like for food and beverage, oil and gas or the hydro power industry, just to name some examples.

Thermoplastic elastomers – Polyurethanes

The thermoplastic elastomers demonstrate the characteristic properties of elastomers over a wide temperature range, but with the processing behaviour of thermoplastics. They can be melted at high temperature and can be processed with traditional thermoplastic processing techniques. Thermoplastic elastomers are soluble and they generally swell less in comparison to their chemically cross-linked equivalents.

Elastomers

Elastomers are extremely flexible materials that can be expanded by exerting relatively little force. Because of their structure, elastomers have a high elasticity and resilience and usually offer a good compression set. The rubber materials are polymers, which are formed by chemically cross-linked macromolecules with various vulcanization additives. Due to their chemical bonds, they do not melt, but rather begin to decompose at high temperatures. The cross-linking also stops the rubber materials from dissolving or, depending on the medium, swelling or shrinking.

Thermoplastics

Thermoplastics can be melted. They are essentially harder and more rigid at their application temperature compared to elastomers. Depending on the chemical structure, the properties vary from hard, to stiff, to ductile and flexible. Due to the morphological structure, extensive stretching is non-reversible and moulded parts remain in the deformed state. Engineering thermoplastics are used for back-up rings and guide rings, bushings, etc.

Thermoplastic elastomers – Polyurethanes

ECOPUR DD

ECOPUR DD is a thermoplastic polyurethane elastomer with excellent abrasion resistance, low compression set and high tear strength. It is suitable for hydraulic, pneumatic and selected rotary seals. Products made from this material can be used in mineral oil, in water up to 40 °C. Depending on the seal design and housing, seals made of ECOPUR DD can be used up to 400 bar (for higher pressures anti-extrusion rings are required).

Elastomers

SKF Econbr

SKF Econbr is an elastomer based on nitrile rubber (NBR) and is used for U-cup seals, and rotary seals. The material has good resistance to mineral oils and greases and HFA, HFB and HFC pressure fluids.

SKF Ecofkm

SKF Ecofkm is an elastomer based on fluoro rubber (FKM) and is used for lip seals, chevron packings, wipers and rotary seals. Its outstanding properties are high resistance to heat, weathering, ozone and many other chemicals.

Thermoplastics

SKF Ecoptfe

SKF Ecoptfe is a thermoplastic material based on polytetrafluoro-ethylene (PTFE) with 15% glass fibre and 5% graphite. It is mainly used for back-up rings, selected lip seals and buffer seals. It has outstanding chemical and temperature resistance. Thanks to the fillers, this material has optimized compression strength and sliding properties.

SKF Ecotal

SKF Ecotal is a semi-crystalline polyacetal-copolymer (POM) which is used for anti extrusion rings, guide rings, bushings and scrapers. This material has good mechanical properties, low water absorption and good chemical resistance. It can be used in mineral oils and in water-based, fire-resistant hydraulic fluids (HFA, HFB and HFC).

Special materials

All standard materials can be modified to meet specific application requirements. Contact SKF for more information.

General remarks for technical data

The stated operating parameters represent general conditions. It is recommended NOT to use all maximum values simultaneously. The specified pressure limits apply for use in mineral oil with a maximum temperature of 60 °C and a maximum metal extrusion gap of 0,25 mm. The speed limits apply for adequate lubrication and running surface finishes as recommended. SKF also recommends testing material / media compatibility and sealing function for targeted performance under real working conditions. These tests are provided as a service by SKF, upon customers' request. Depending on application details, higher pressures and speed limits can be attained in most cases. If any of the indicated limits do not meet specific requirements, please contact SKF.



Material properties

Properties	Standard	Unit	Polyurethane	Elastomers		Thermoplastics	
			ECOPUR DD	SKF Econbr	SKF Ecofkm	SKF Ecoptfe	SKF Ecotal
			TPU	NBR	FPM, FKM	PTFE	POM
Standard colour			Dark blue	Black	Black	Dark grey	Black
Durometer Hardness ¹⁾	DIN ISO 7619	Shore A	93	85	85		
Durometer Hardness ¹⁾	DIN ISO 7619	Shore D	45			58 ²⁾	82 ²⁾
Density	DIN EN ISO 1183-1	g/cm ³	1,18	1,32	1,84	2,22	1,41
Tensile strength/yield stress	DIN 53504	MPa	50	18	11	19 ³⁾	65 ⁴⁾
Elongation at yield	ISO 527-1/2	%					8-10
Elongation at break	DIN 53504	%	520	160	190	250 ³⁾	25 ⁴⁾
Tensile modulus	ISO 527-1/2	MPa					2 900
100% modulus	DIN 53504	MPa	12,7	13	7		
Compression set							
70 °C / 24 h 20% compression	DIN ISO 815	%	26				
100 °C / 24 h 20% compression	DIN ISO 815	%	30	13			
100 °C / 24 h	DIN ISO 815	%					
175 °C / 24 h	DIN ISO 815	%			17		
Impact resistance, charpy							
at +23 °C	ISO 197-1	kJ/m ²					10
at -30 °C	ISO 197-1	kJ/m ²					8
Water absorption, 23 °C, saturation	ISO 62	%					0,65
Coefficient of sliding							0,25-0,32
Tear strength	DIN ISO 34-1	N/mm	85	19	20		
Minimum service temperature ⁵⁾		°C	-30	-30	-20	-200	-50
Maximum service temperature ⁵⁾		°C	+100	+100	+200	+260	+100

¹⁾ testing time is 3 s
²⁾ ISO 868
³⁾ ASTM D-4745
⁴⁾ ISO 527-1/2
⁵⁾ Minimum and maximum service temperatures are material properties only. Deviations due to varying application parameters are mentioned/stated at each seal profile at the following pages.



Piston seals

 Linear moving
  Rotating
  Oscillating
  Spiral moving
  Static
 Grey symbols: contact SKF for application limitations

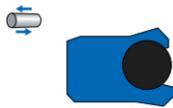
Appli-

	°C	m/s	bar (psi)	-
 <p>Asymmetric piston seal for standard applications. Design provides stable fit in the housing, ultimate sealing effect over a wide temperature range. Prevents extensive drag pressure. Back-to-back arrangement with guide ring in between for double-acting pistons or to separate different fluids.</p>				
 <p>Asymmetric piston seal for standard applications as K01-P, but with increased contact force designed for single acting pistons.</p>				
 <p>As profile K01-P, but more easily adaptable to diverse temperatures and media by selection of suitable seal material.</p>				
 <p>Asymmetric piston seal for standard applications as K01-R, but with increased contact force designed for single acting pistons.</p>				
 <p>Asymmetric piston seal for standard applications as K01-P, but thanks to design with active back-up ring, it is suitable for higher pressure range or larger extrusion gaps. K02-P for standard housing design.</p>				
 <p>As profile K02-P, but more easily adaptable to diverse temperatures and media by selection of suitable seal material. K02-R for standard housing design.</p>				

Piston seals

 Linear moving
  Rotating
  Oscillating
  Spiral moving
  Static
 Grey symbols: contact SKF for application limitations

Appli-

	°C	m/s	bar (psi)	-
 <p>O-ring activated, asymmetrical piston seal. Interference fit on inside diameter maintains stable fit in the housing. Design provides ultimate sealing effect. Especially suitable for short stroke applications (e.g. spindle seals, coupling actuators...)</p>				
 <p>O-ring activated, asymmetrical PTFE piston seal, low friction and no stick-slip effect. Easily adaptable for diverse temperatures and media by selection of suitable O-ring material, almost no dead spots as required for applications in food and pharma industry.</p>				
 <p>Asymmetric piston seal for standard applications as K03-P, but thanks to design with active back-up ring, it is suitable for larger extrusion gaps or higher pressure. K04-P for standard housing design.</p>				
 <p>Asymmetric piston seal, extremely wear resistant, for use in lubricated or dry pneumatic applications. Special design of sealing lip allows retention of initial lubricating film.</p>				
 <p>Asymmetric piston seal, good wear resistant, for use in lubricated or dry pneumatic applications. Easily adaptable for diverse temperatures and media by selection of suitable seal material. Special design of sealing lip allows retention of initial lubricating film.</p>				
 <p>Symmetric piston seal for simple standard applications, not recommended for new designs (profile K01-P preferred). Also, for larger cross section, easier to install.</p>				

Piston seals

 Linear moving
  Rotating
  Oscillating
  Spiral moving
  Static
 Grey symbols: contact SKF for application limitations

Appli-

°C m/s bar (psi) -



 As profile K06-P, but more easily adaptable for diverse temperatures and media by selection of suitable seal material. Also, for larger cross section, easier to install.



 O-ring activated symmetric piston seal for simple standard applications, not recommended for new designs (profile K03-P preferred).



 O-ring activated symmetric PTFE piston seal, low friction and no stick-slip effect for simple standard applications, not recommended for new designs (profile K03-F preferred)





 O-ring activated asymmetric PTFE piston seal, low friction. For extreme low or high speed. Suitable for positioning functions.





 O-ring activated symmetric PTFE piston seal, low friction. For extreme low or high speed, suitable for positioning functions. For mobile hydraulics, machine tools, injection moulding machines, heavy hydraulics.





 Profile ring-activated asymmetric PTFE piston seal, similar to K08-E, but special heavy duty design. For heavy industry hydraulics or for special housing dimensions.



Piston seals

 Linear moving
  Rotating
  Oscillating
  Spiral moving
  Static
 Grey symbols: contact SKF for application limitations

Appli-

°C m/s bar (psi) -



 Profile ring-activated symmetric PTFE piston seal, similar to S09-D, but special heavy duty design. For heavy industry hydraulics or for special housing dimensions.



 Profile ring-activated compact piston seal with integrated guiding elements. Excellent static and dynamic sealing capacity.





 Profile ring-activated compact PTFE piston seal with integrated guiding elements. Low friction, good chemical and thermal resistance.





 Simple cup seal, usually fixed on the piston by means of a clamping plate. Mainly used for replacement in old hydraulic and pneumatic cylinders or for low-grade secondary applications. Also used for food filling / portioning equipment.





 Space saving, compact piston seal with integrated guiding elements. Excellent static sealing capacity, suitable for small housings.





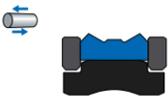
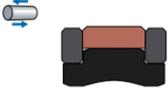
 Space saving, compact piston seal with integrated guiding elements. Excellent static sealing capacity, easily adaptable for diverse temperatures and media by selection of suitable material. Suitable for small housings.



Piston seals

 Linear moving
  Rotating
  Oscillating
  Spiral moving
  Static
 Grey symbols: contact SKF for application limitations

Appli-

	°C	m/s	bar (psi)	-
 <p>Profile ring-activated compact piston seal with integrated back-up rings. Excellent static and dynamic sealing capacity. External guiding elements required.</p>				
 <p>Profile ring-activated compact PTFE piston seal with integrated back-up rings. Low friction, good chemical and thermal resistance. External guiding elements required.</p>				
 <p>Compact piston seal with almost no dead spots as required for applications in food and pharmaceutical industry. Also commonly used as O-Ring replacement because design with interference fit on outside diameter prevents twisting in dynamic applications.</p>				

Rod seals

 Linear moving
  Rotating
  Oscillating
  Spiral moving
  Static
 Grey symbols: contact SKF for application limitations

Appli-

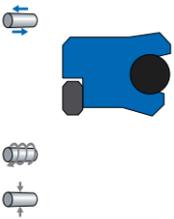
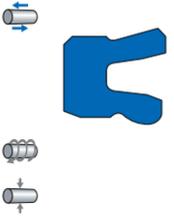
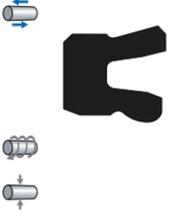
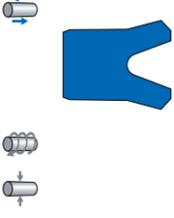
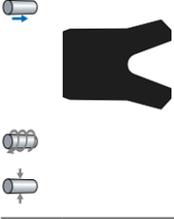
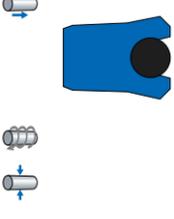
	°C	m/s	bar (psi)	-
 <p>Asymmetric rod seal for standard applications. Interference fit on outside diameter maintains stable fit in the housing. Design provides ultimate sealing effect over a wide temperature range and good backpumping ability. Also used as secondary seal in combination with PTFE seal type S09.</p>				
 <p>As profile S01-P, but more easily adaptable for diverse temperatures and media by selection of suitable seal material.</p>				
 <p>Asymmetric rod seal for standard applications as S01-P, but thanks to design with active back-up ring, it is suitable for larger extrusion gaps or higher pressure range. S02-P for standard housing design.</p>				
 <p>as profile S02-P, but more adaptation possibilities for diverse temperatures and media by selection of suitable seal material. S02-R for standard housing design.</p>				
 <p>O-Ring activated, asymmetrical rod seal. Interference fit on outside diameter maintains stable fit in the housing. Design provides ultimate sealing effect. Especially suitable for short stroke applications (e.g. spindle seals, coupling actuators...)</p>				
 <p>O-Ring activated, asymmetrical PTFE rod seal, low friction, good dry running properties and adaptation possibilities for diverse temperatures and media by selection of suitable O-Ring material. Almost no dead spots as required for applications in food and pharma industry.</p>				

B

Rod seals

 Linear moving
  Rotating
  Oscillating
  Spiral moving
  Static
 Grey symbols: contact SKF for application limitations

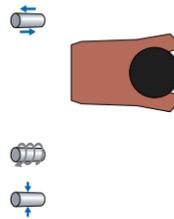
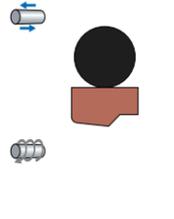
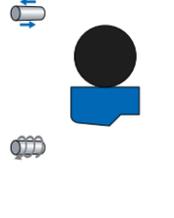
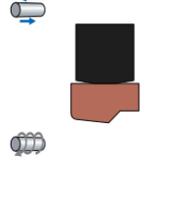
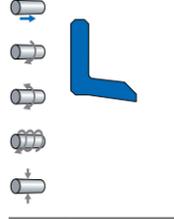
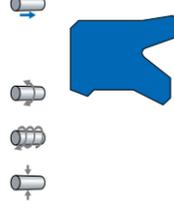
Appli-

	°C	m/s	bar (psi)	-
 <p>Asymmetric rod seal for standard applications as S03-P, but thanks to design with active back-up ring, it is suitable for larger extrusion gaps or higher pressure range. S04-P for standard housing design.</p>				
 <p>Asymmetric rod seal, extremely wear resistant, for use in lubricated or dry pneumatic applications. Special design of sealing lip allows retention of initial lubricating film.</p>				
 <p>As profile S05-P, good wear resistance and adaptation possibilities for diverse temperatures and media by selection of suitable seal material. Special design of sealing lip allows retention of initial lubricating film.</p>				
 <p>Symmetric rod seal for simple standard applications, not recommended for new designs (profile S01-P preferred).</p>				
 <p>As profile S06-P, but more adaptation possibilities for diverse temperatures and media by selection of suitable seal material.</p>				
 <p>O-ring activated symmetric rod seal for simple standard applications, not recommended for new designs (profile S03-P preferred)</p>				

Rod seals

 Linear moving
  Rotating
  Oscillating
  Spiral moving
  Static
 Grey symbols: contact SKF for application limitations

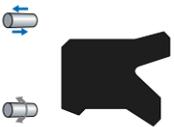
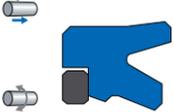
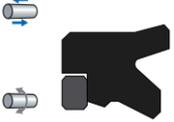
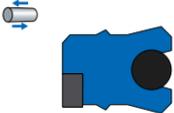
Appli-

	°C	m/s	bar	-
 <p>O-ring activated symmetric PTFE rod seal, low friction and no stick-slip effect for simple standard applications, not recommended for new designs (profile S03-P preferred)</p>				
 <p>O-ring activated asymmetric PTFE rod seal, low friction. In tandem design together with double-acting wipers for extremely low or high speed or positioning functions. As primary seal, in combination with secondary S01-P seal, with good resistance to pressure shocks used in mobile hydraulics, machine tools, injection moulding machines, heavy hydraulics.</p>				
 <p>O-ring activated asymmetric PU rod seal with excellent dynamic sealing capacity. Used as secondary seal in tandem design (together with primary S09-E) to minimize residual oil film. For mobile hydraulics, injection moulding machines, heavy hydraulics.</p>				
 <p>Profile ring-activated asymmetric PTFE rod seal, similar to S09-E, but special heavy duty design for heavy industry hydraulics or for special housing dimensions.</p>				
 <p>Simple hat seal, usually fixed in housing with clamp flange. Mainly used for replacement in old hydraulic and pneumatic cylinders or for secondary applications.</p>				
 <p>Asymmetric rod seal with additional sealing respectively stabilizing lip. Interference fit on outside diameter maintains stable fit in the housing. Design mainly used for telescopic cylinders, mobile hydraulic or for special housing dimensions.</p>				

Rod seals

 Linear moving
  Rotating
  Oscillating
  Spiral moving
  Static
 Grey symbols: contact SKF for application limitations

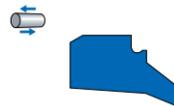
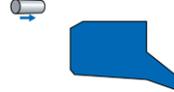
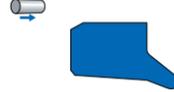
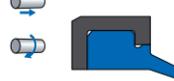
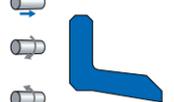
Appli-

	°C	m/s	bar (psi)	-
 <p>As profile S17-P, but easily adaptable for diverse temperatures and media by selection of suitable seal material.</p>				
 <p>Asymmetric rod seal as S17-P, but thanks to design with active back-up ring, it is suitable for larger extrusion gaps or higher pressure range.</p>				
 <p>Asymmetric rod seal with additional sealing— respectively stabilizing lip and back ring. Easily adaptable for diverse temperatures and media by selection of suitable seal material, thanks to design with active back-up ring, it is suitable for larger extrusion gaps or higher pressure range.</p>				
 <p>O-Ring activated rod seal with additional stabilizing lips and integrated active back ring for larger extrusion gaps, mainly used in mining industry.</p>				
 <p>Compact rod seal with almost no dead spots as required for applications in food and pharmaceutical industry. Also commonly used as O-Ring replacement because design with interference fit on outside diameter prevents twisting in dynamic applications.</p>				

Wipers

 Linear moving
  Rotating
  Oscillating
  Spiral moving
  Static
 Grey symbols: contact SKF for application limitations

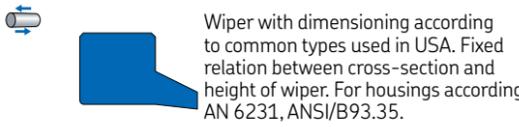
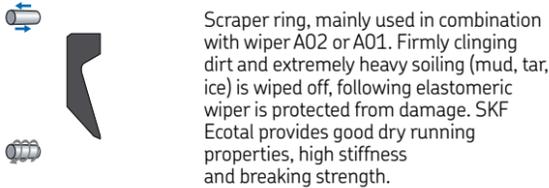
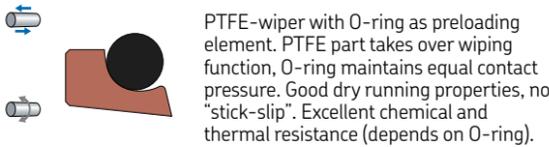
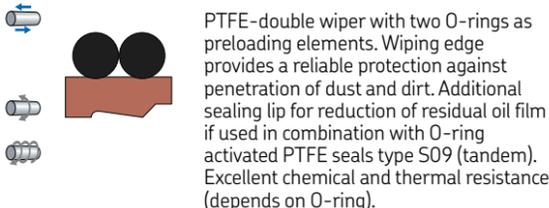
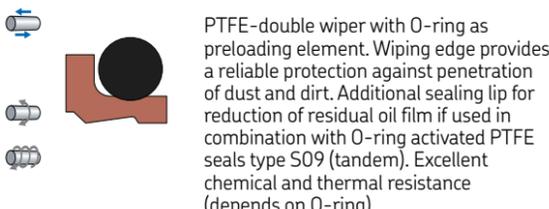
Appli-

	°C	m/s	-
 <p>Wiper with interference fit on outside diameter, providing a technically accurate closure at the cylinder. Wiping edge provides reliable protection against ingress of dust and dirt whilst allowing backflow of the residual oil film. For housings according ISO 6195-Type A.</p>			
 <p>Wiper with interference fit on outside diameter. Wiping edge provides a reliable protection against penetration of dust and dirt whilst allowing backflow of residual oil film.</p>			
 <p>Wiper with interference fit on outside diameter, providing a technically accurate closure at the cylinder. Special design of the wiper lip allows retention of initial lubrication film. For housings according ISO 6195-Type A. As profile A04-A, but without back support area. For housings according ISO 6195-Type A.</p>			
 <p>Wiper with interference fit on outside diameter. Special design of wiping lip allows retention of initial lubricating film.</p>			
 <p>Wiper with mounting cage for press-fit installation into axially open housings. Special design of wiping lip allows retention of initial lubricating film, the use of plastic mounting cages avoids corrosion at the press-fit. For housings according ISO 6195-Type B.</p>			
 <p>Wiper usually fixed in housing with clamp flange. Mainly used for replacement in old hydraulic and pneumatic cylinders or for secondary applications.</p>			
 <p>Wiper with dimensioning according to common types used in USA. For housings according AN 6231, ANSI/B93.35.</p>			

Wipers

 Linear moving
  Rotating
  Oscillating
  Spiral moving
  Static
 Grey symbols: contact SKF for application limitations

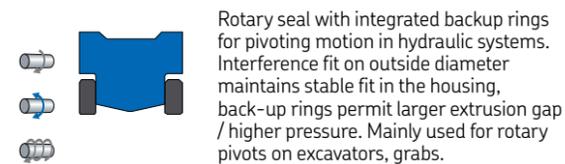
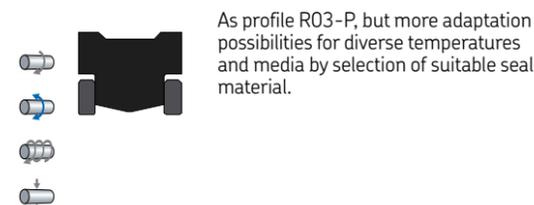
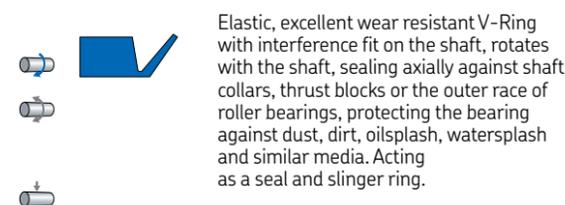
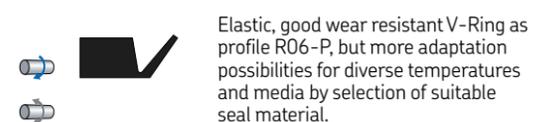
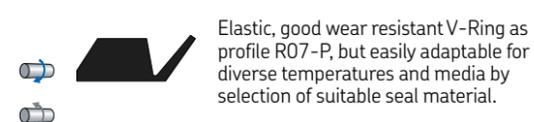
Appli-

	°C	m/s	bar (psi)	-
				
				
				
				
				

Rotary seals

 Linear moving
  Rotating
  Oscillating
  Spiral moving
  Static
 Grey symbols: contact SKF for application limitations

Appli-

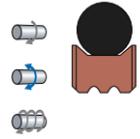
	°C	m/s	bar (psi)	-
				
				
				
				
				
				

Rotary seals

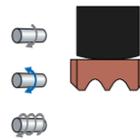
 Linear moving
  Rotating
  Oscillating
  Spiral moving
  Static
 Grey symbols: contact SKF for application limitations

Appli-

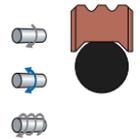
°C m/s bar (psi) –



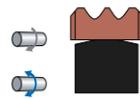
O-ring activated, low friction PTFE rotary seal. Mainly used in applications with alternating pressure from one side of the seal to the other, such as hose reels, swivel joints, rotating track rings and machine tool hydraulics. Good chemical and thermal resistance achievable by selection of suitable O-ring material.



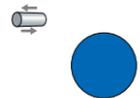
As profile R09-F, but with a profile ring energizer instead of the O-ring. For heavy duty applications and non-standard housings.



O-ring activated, low friction PTFE rotary seal. Mainly used in applications with alternating pressure from one side of the seal to the other, such as hose reels, swivel joints, rotating track rings and machine tool hydraulics. Good chemical and thermal resistance achievable by selection of suitable O-ring material.



As profile R10-F, but with a profile ring energizer instead of the O-ring. For heavy duty applications and non-standard housings.



Well known, simple O-ring with proven reliability in multiple applications in every sector of industry. Excellent adaptation possibilities for diverse temperatures and media by selection of suitable seal material. Mainly used as static seal or as preloading element for PTFE-seals. For most dynamic applications, we recommend to use S20/K20 or S35/K35.



Well-known, simple square ring, mainly used for static applications or as gaskets. Excellent adaptation possibilities for diverse temperatures and media by selection of suitable seal material.

¹⁾ Depending on the application. Contact SKF for more information

Rotary seals

 Linear moving
  Rotating
  Oscillating
  Spiral moving
  Static
 Grey symbols: contact SKF for application limitations

Appli-

°C m/s bar (psi) –



For static applications as an O-ring replacement to avoid drilling in the housing, simple installation and higher extrusion resistance.



Flange seal for static applications, suitable for high pressure range. Direction of pressurization (from inside or outside) must be indicated when ordering the seal.

Guide rings

 Linear moving
  Rotating
  Oscillating
  Spiral moving
  Static
 Grey symbols: contact SKF for application limitations

Appli-

°C m/s N/mm² -








 Most common guide ring for rod or piston application. Used in many standard cylinders, majority of applications require split version for installation into closed housings, non split design available (bushings).

Back-up rings

 Linear moving
  Rotating
  Oscillating
  Spiral moving
  Static
 Grey symbols: contact SKF for application limitations

Appli-

°C -







 Common inactive back-up ring, mainly used with O-rings to avoid gap extrusion. Split and non split design available.







 Common inactive back-up ring especially for O-rings to avoid gap extrusion. Split and non split design available.

Static seals

Beside the conventional O-rings and square-rings, SKF offers a standard range of specialized seals for static applications. Most of the profiles listed below fit in standard

O-ring-grooves (housings) and can be substituted easily without any rework of housing dimensions.

Appli-






Most common and simple seal profiles with proven reliability in a wide range of different applications and industries.






Interference fit on outside diameter provides stable fit in the housing and reliable performance at all pressures.






Interference fit on inside diameter provides stable fit in the housing and reliable performance at all pressures.





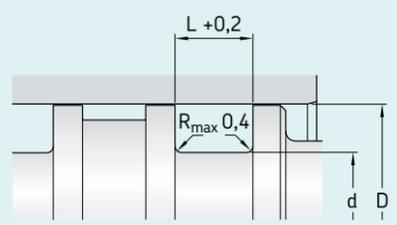

Robust profiles mainly used as flange seals, inside or outside pressurization possible. Direction of pressurization (from inside or outside) must be indicated when ordering the seal.

Piston seal housing details and recommendations

The table on the right shows an example of standard housing measurements for piston seals.

Please note that SKF can produce these profiles to application specific requirements or any non-standard housing.

Suggested standard housing dimension



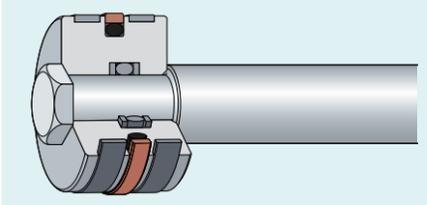
Surface properties
 R_{tmax} R_a

	μm	
Sliding surface for		
TPU/rubber seals	$\leq 2,5$	$\leq 0,1-0,5$
PTFE seals	≤ 2	$\leq 0,05-0,3$
Groove bottom	$\leq 6,3$	$\leq 1,6$
Groove face	≤ 15	≤ 3
Bearing area T_p	50-95% ¹⁾	

Indicated dimensions are required to process an order
 D bore diameter
 d housing groove diameter
 L housing groove length
 c/s cross section

Seal housing tolerances
 D H9
 d h10

¹⁾ at a cutting depth of 0,5 R_z based on $C_{ref} = 0\%$



DK08-D DK08-P DK08-E

Main function
 Single/double-acting piston seals, o-ring activated PTFE (TPU) seals

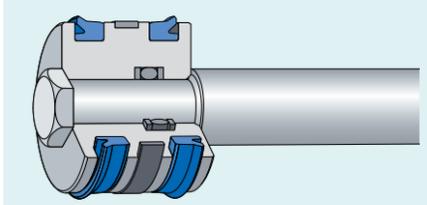
Main applications
 Standard cylinders for positioning functions, mobile hydraulics, etc

Advantages
 Low friction, no stick-slip, excellent resistance against pressure shocks

Standard materials
 SKF Ecoptfe / NBR
 SKF Ecoptfe / FKM
 ECOPUR DD / NBR

Bore diameter		Housing groove diameter d	Housing groove length L	Cross section c/s	
D over	incl.				
mm					
18 ¹⁾	40	D - 7,5	3,2	3,75	
40	80	D - 11	4,2	5,5	
80	133	D - 15,5	6,3	7,75	
133	200 ¹⁾	D - 21	8,1	10,5	

¹⁾ The bore diameter depends on choice of material, SKF Ecoptfe starts with 24 and ends at 190 mm.



DK01 DK02 DK03 DK04 DK05 DK06 DK07

Main function
 Single-acting piston seals lip type (U-cup) seals compact seals

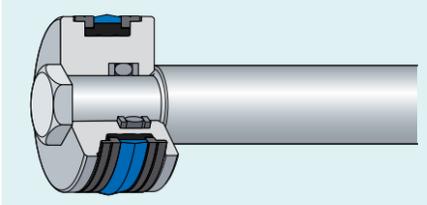
Main applications
 Support and retaining cylinders, standard cylinders

Advantages
 Stable fit in the housing, ultimate sealing effect, wide temperature range

Standard materials
 ECOPUR DD
 SKF Ecoptfe
 SKF Econbr
 SKF Ecofkm

Bore diameter		Housing groove diameter d	Housing groove length L	Cross section c/s	
D over	incl.				
mm					
18 ¹⁾	25	D - 8	6	4	
25	50	D - 10	7	5	
50	75	D - 12	8	6	
75	150	D - 15	10	7,5	
150	200 ¹⁾	D - 20	12	10	

¹⁾ The bore diameter depends on choice of material, SKF Ecoptfe starts with 24 mm and ends at 190 mm, SKF Econbr and SKF Ecofkm ends at 188 mm.



DK09

Main function
 Double-acting piston seal, compact type

Main applications
 Support and retaining cylinders, standard cylinders

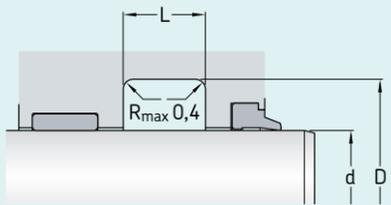
Advantages
 Excellent static and dynamic sealing capacity, integrated back-up rings

Standard materials
 ECOPUR DD / SKF Econbr / SKF Ecotal

Bore diameter		Housing groove diameter		Housing groove length	
D over	incl.	d	d ₁	L	L ₁
mm					
20	50	10	3	12,5	20,5
50	80	15	4	20	28
80	150	20	5	25	36
150	190	25	6	32	46

Rod seal housing details and recommendations

Suggested standard housing dimension



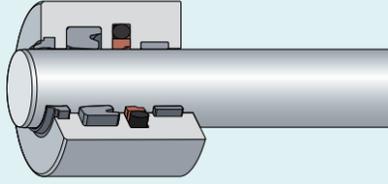
Surface properties
 R_{tmax} R_a

	μm	
Sliding surface for		
TPU/rubber seals	$\leq 2,5$	$\leq 0,1-0,5$
PTFE seals	≤ 2	$\leq 0,05-0,3$
Groove bottom	$\leq 6,3$	$\leq 1,6$
Groove face	≤ 15	≤ 3
Bearing area T_p	50-95% ¹⁾	

Seal housing tolerances
 D H10
 d f8

Indicated dimensions are required to process an order
 D housing groove diameter
 d rod diameter
 L housing groove length
 c/s cross section

¹⁾ at a cutting depth of 0,5 R_z based on $C_{ref} = 0\%$



S09-E S09-P

Main function
 Single/double-acting rod seals, O-ring activated PTFE (TPU) seals

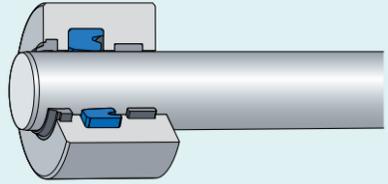
Main applications
 Earth moving equipment, heavy hydraulics

Advantages
 Excellent resistance against pressure shocks, long lifetime

Standard materials
 SKF Eceptfe / NBR
 SKF Eceptfe / FKM
 ECOPUR DD / NBR

Rod diameter		Housing groove diameter D	Housing groove length L	Cross section c/s
d over	incl.			
mm				
11	19	d + 7,3	3,2	3,65
19	38	d + 10,7	4,2	5,35
38	185 ¹⁾	d + 15,1	6,3	7,55

¹⁾ The minimum rod diameter depends on choice of material, SKF Eceptfe starts from 16 mm.



DS01 DS02¹⁾ DS03 DS04¹⁾ DS05 DS06 DS07 DS24¹⁾

Main function
 Single-acting rod seals lip type (U-cup) seals compact seals

Main applications
 Standard cylinders, light and standard hydraulic applications

Advantages
 Stable fit in the housing, ultimate sealing effect, wide temperature range, good backpumping ability

Standard materials
 ECOPUR DD
 SKF Eceptfe
 SKF Econbr
 SKF Ecofkm

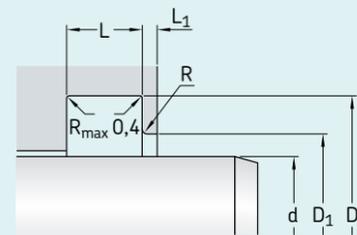
Rod diameter		Housing groove diameter D	Housing groove length L	Cross section
d over	incl.			c/s
mm				
11 ¹⁾	25	d + 8	6,3	4
25	50	d + 10	8	5
50	150	d + 15	10	7,5
150	200	d + 20	14	10

¹⁾ The minimum rod diameter depends on choice of material, SKF Eceptfe starts from 16 mm.

Wiper housing details and recommendations

The table on the right shows an example of standard housing measurements for wipers. Please note that SKF can produce these profiles to application specific requirements or any non-standard housing.

Suggested standard housing dimension



Indicated dimensions are required to process an order

D housing groove diameter
d rod diameter
L housing groove width
H total wiper height

Surface properties

R_{tmax} R_a
μm

Sliding surface for

TPU/rubber seals $\leq 2,5$ $\leq 0,1-0,5$
PTFE seals ≤ 2 $\leq 0,05-0,3$

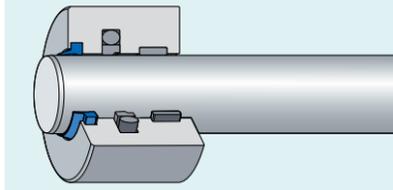
Groove bottom $\leq 6,3$ $\leq 1,6$
Groove face ≤ 15 ≤ 3

Bearing area T_p 50-95%¹⁾

Seal housing tolerances

D_1 H11 $L < 10$ mm +0,2
D H11 $L > 10$ mm +0,3

¹⁾ at a cutting depth of 0,5 R_z based on $C_{ref} = 0\%$



DA02 DA05

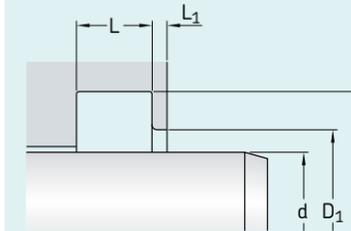
Main function
Single/double-acting wipers

Main applications
In combination with O-ring activated PTFE rod seals (S09)

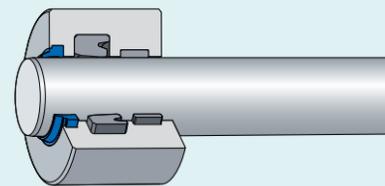
Advantages
Excellent wear resistance, double-acting function

Standard materials
ECOPUR DD
SKF Econbr
SKF Ecofkm

Rod diameter		Housing groove diameter		Housing groove width		Total wiper height
d over	incl.	D	D_1	L	L_1 min	H
mm						
10	50	d + 8	d + 4	5	2	8
50	100	d + 10	d + 5	6	2	9,7
100	185 ¹⁾	d + 15	d + 7	8,5	2	13



¹⁾ The maximum rod diameter depends on choice of material, SKF Econbr and SKF Ecofkm ends at 180 mm.



DA01 DA04

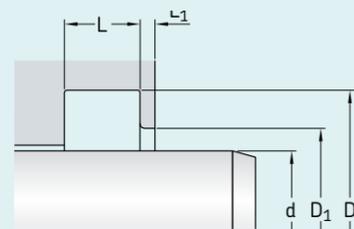
Main function
Single-acting wipers

Main applications
Standard wiper for hydraulics

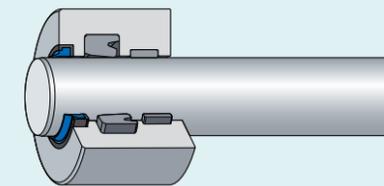
Advantages
Easy installation (snap-in), excellent wear resistance, technically accurate closure

Standard materials
ECOPUR DD
SKF Econbr
SKF Ecofkm

Rod diameter		Housing groove diameter		Housing groove width		Total wiper height
d over	incl.	D	D_1	L	L_1	H
mm						
10	100	d + 8	d + 6	4	1	7
100	150	d + 12	d + 9	5,5	1,5	10
150	185 ¹⁾	d + 15	d + 11	6,5	2	13



¹⁾ The maximum rod diameter depends on choice of material, SKF Econbr and SKF Ecofkm ends at 180 mm.



DA06

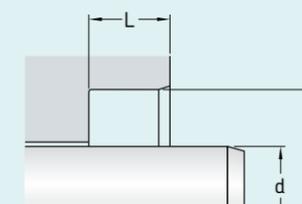
Main function
Single-acting wipers

Main applications
Standard hydraulic applications, pressfit for axially open housings

Advantages
Excellent wear resistance, plastic retainer ring, no oxidation problem between retainer and housing

Standard materials
ECOPUR DD / SKF Ecotal
SKF Econbr / SKF Ecotal

Rod diameter		Housing groove diameter	Housing groove width	Total wiper height
d over	incl.	D	L	H
mm				
11	22	d + 8	5	8
22	100	d + 10	7	10
100	181 ¹⁾	d + 15	9	12



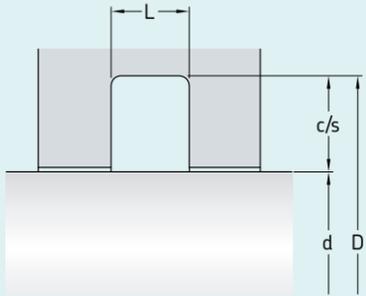
¹⁾ The maximum rod diameter depends on choice of material, SKF Econbr ends at 180 mm.

Rotary seal housing details and recommendations

The table on the right shows an example of standard housing measurements for rotary seals.

Please note that SKF can produce these profiles to application specific requirements or any non-standard housing.

Suggested standard housing dimension



Indicated dimensions are required to process an order
 D housing groove diameter
 d shaft diameter
 L housing groove length
 c/s cross section

Surface properties	
$R_{t,max}$	R_a
μm	
Sliding surface for PTFE seals	
≤ 2	$\leq 0,05-0,3$
Groove bottom	$\leq 6,3$ $\leq 1,6$
Groove face	≤ 15 ≤ 3
Bearing area T_p	50–95% ¹⁾

Seal housing tolerances
depending on seal profile

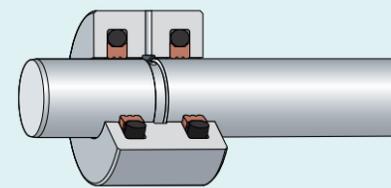
¹⁾ at a cutting depth of 0,5 R_z based on $C_{ref} = 0\%$

Guide ring housing details and recommendations

Guide ring housing details and recommendations for dynamic applications. SKF standard guide rings are available as 45° split versions. Those can be ordered as well as endless, 90° split versions or yard ware.

Seal housing tolerances

D H9
 d f8
 L +0,2



DR09

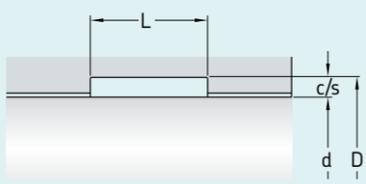
Main function
Double-acting rotary seal, O-ring activated PTFE seal

Main applications
Rotary pivots

Advantages
For high pressure

Standard materials
SKF Ecoptfe / NBR or FKM

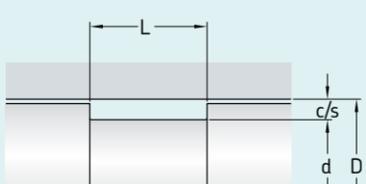
Shaft diameter		Housing groove diameter	Housing groove length	Cross section
d over	incl.	D	L	c/s
mm				
16	19	d + 4,9	2,2	2,45
19	38	d + 7,5	3,2	3,75
38	178	d + 11	4,2	5,5



DF01

Main function
Rod guide rings

Rod diameter		Housing groove diameter	Housing groove length	Cross section
d over	incl.	D	L	c/s
mm				
16	30	d + 3	4	1,5
30	50	d + 3	5,6	1,5
50	100	d + 5	9,7	2,5
100	181	d + 5	15	2,5



DF01

Main function
Piston guide rings

Bore diameter		Housing groove diameter	Housing groove length	Cross section
D over	incl.	d	L	c/s
mm				
19	30	D - 3	4	1,5
30	50	D - 3	5,6	1,5
50	100	D - 5	9,7	2,5
100	196 ¹⁾	D - 5	15	2,5

¹⁾ The maximum bore diameter depends on choice of material, SKF Ecoptfe ends at 190 mm.

O-ring housing details and recommendations

Housing tolerances

f7 / H8

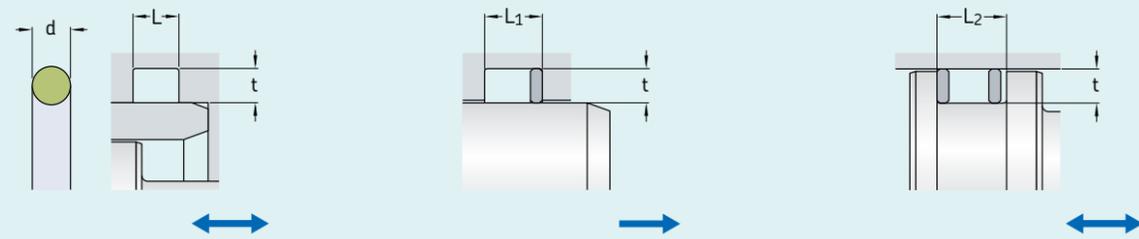
Bearing area

50–95% at a cutting depth of 0,5 R_z
based on C_{ref} = 0%

Surface	Surface roughness			
	Pressure constant		pulsating	
	R _{tmax}	R _a	R _{tmax}	R _a
	μm		μm	
Sliding surface ¹⁾	12,5	3,2	6,3	1,6
Bottom of groove ²⁾	12,5	3,2	6,3	1,6
Groove face	12,5	3,2	6,3	1,6

¹⁾ R_{tmax} / R_a for dynamic application 1,6 μm / 0,4 μm
²⁾ R_{tmax} / R_a for dynamic application 6,3 μm / 1,6 μm

O-ring housing recommendations for static applications



Cord	Groove	Without back-up ring	One back-up ring	Two back-up rings	Recommended back-up ring width
d	t + 0,05	L + 0,25	L ₁ + 0,25	L ₂ + 0,25	
mm					
1,5	1,10	2,1	3,1	4,1	1,0
1,78	1,35	2,5	3,5	4,5	1,0
2,00	1,56	2,7	4,2	5,7	1,5
2,50	2,05	3,3	4,8	6,3	1,5
2,62	2,18	3,5	5,0	6,5	1,5
3,00	2,52	3,9	5,4	6,9	1,5
3,50	3,00	4,4	5,9	7,4	1,5
3,53	3,00	4,4	5,9	7,4	1,5
4,00	3,40	5,0	6,7	8,4	1,7
5,00	4,25	6,3	8,0	9,7	1,7

skf.com/seals

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