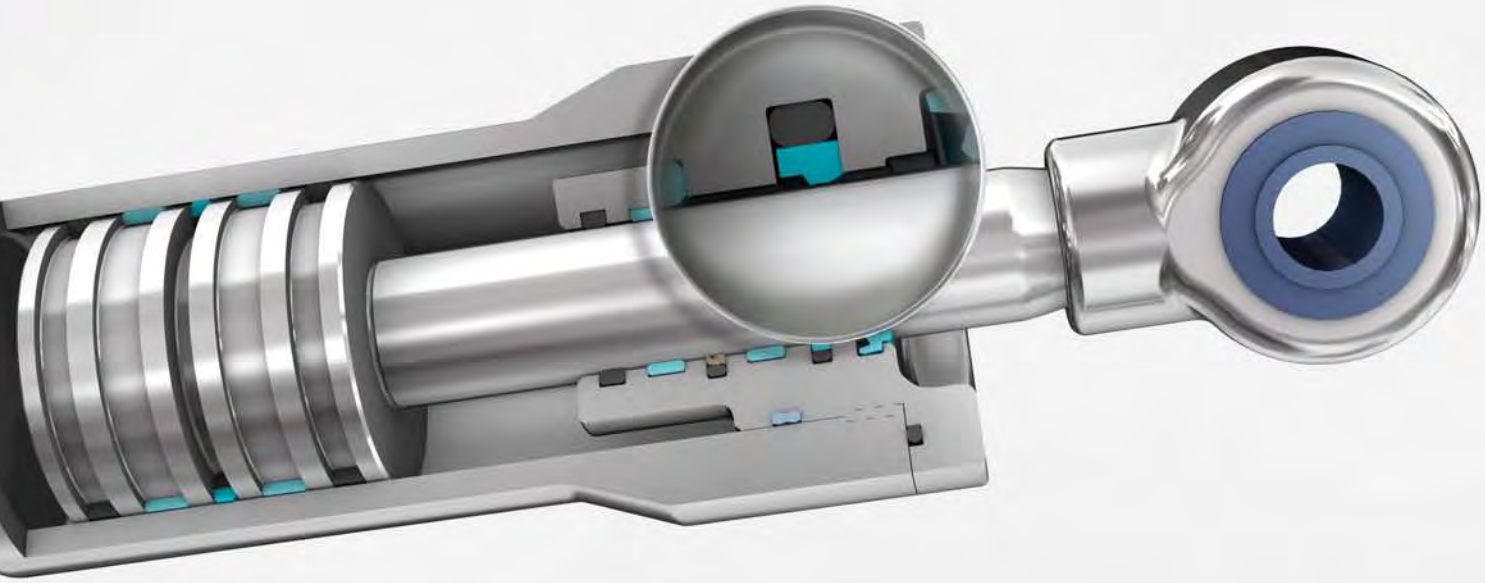
Rod Seals



Contents

■ Choice of Sealing Element

Sealing elements have a decisive influence on the design, function and service life of hydraulic and pneumatic cylinders and systems.

This applies equally to the piston rod seals where leak tightness, resistance to wear and gap extrusion, resistance to process media, resistance to high and low temperatures, low friction, compact form and simple installation are demanded in order to meet the requirements of industry for a functional sealing solution.

Trelleborg Sealing Solutions has developed a complete range of seals which, due to their optimized geometries, designs and use of high-quality materials such as Turcon® and Zurcon® , satisfy the technical and economic demands of the industry.

In order to select the most appropriate seal type and material, it is necessary to first define all the desired functional parameters. Table 1 can then be used to make an initial selection of seals and materials according to the specific requirements of the application.

The second column of the table contains the number of the page on which further general information, together with specific design and installation instructions on the particular seal type and materials (or material combinations with multi-element seals, e.g. Turcon® Stepseal® 2K), can be found.

Furthermore, on page 36 attention is drawn to the quality of the mating surface. We recommend that the limits specified there be observed, as they have a decisive influence on the functionality and service life of the system.

The final choice of seal type and material must also take account of the detailed information on the seal elements.

Please do not hesitate to contact your local Trelleborg Sealing Solutions marketing company for further information on specific applications and special technical questions.

NOTE ON ORDERING

All multi-element standard rod seals, e.g. Turcon® Stepseal® 2K, are generally supplied as complete seal sets. The sets include the seal and matching elastomer energizing elements. The O-Ring does not have to be ordered separately. It is also possible to use other O-Ring materials from our O-Ring catalog. In this case, please order the seal ring and O-Ring separately.

When ordering the seal ring separately, it is then not necessary to mention the "O-Ring material code" in the TSS Article No. shown in the ordering examples.

Older designs of seals no longer contained in this catalog naturally continue to be available (see chapter "Additional Seals"). For all new applications, however, we recommend the use of the seal types and preferred sizes (ISO series, wherever possible) listed in this catalog.

Other combinations of Turcon® materials and special designs can be developed and supplied for special applications in all sizes up to 2,600 mm diameter, provided there is sufficient demand.

The sizes contained in this catalog are mostly available from stock or can be supplied at short notice. We reserve the right to modify our supply program.

Table 1: Selection Criteria for Rod Seals

Seal		Application				Standard	Action		Size Range	Technical Data*			Recommended Seal Material
		Field of Application								Temp. Range **	Speed	Pressure	
Type	Page		Light	Medium	Heavy	ISO	Single	Double	mm	°C	m/s	MPa max.	
Turcon® Stepseal® 2K 	45	Mobile hydraulics	•	•	•	7425-2	•		3 - 2,600	-45/ +200	15	50	M12
		Standard cylinders	•	•	•								
		Machine tools	•	•	•							50	T46
		Injection molding machines	•	•	•								
		Presses	•	•	•							20	T05
		Automotive industry	•	•	•								
		Hydraulic hammers	•	•	•				3 - 2,200	-45/ +110	2	60	Z53
		Servo hydraulics	•	•	•								
Turcon® Stepseal® V 	59	Mobile hydraulics	•	•	•	7425-2	•		12 - 2,600	-45/ +200	15	50	M12
		Construction equipment	•	•	•								
		Presses	•	•	•							50	T46
		Injection molding machines	•	•	•								
Turcon® Stepseal® V LM 	71	Mobile hydraulics	•	•	•	7425-2	•		12 - 2,600	-45/ +200	15	50	M12
		Wind turbines	•	•	•								
		Injection molding machines	•	•	•								
		Presses	•	•	•							50	T46
Zurcon® Rimseal 	83	Mobile hydraulics	•	•	•	7425-2	•		8 - 2,200	-45/ +110	In tandem with Turcon® Stepseal® 2K 5m/s	In tandem 60 MPa As single seal 25 MPa	Z54
		Standard cylinders	•	•	•								
		Machine tools	•	•	•								
		Injection molding machines	•	•	•								
		Presses	•	•	•								
Zurcon® Rimseal IM 	91	Mobile hydraulics	•	•	•	7425-2	•		50 - 150	-45/ +110	0.5	In tandem 60 MPa As single seal 25 MPa	Z13
		Standard cylinders	•	•	•								
		Machine tools	•	•	•								
		Injection molding machines	•	•	•								
		Presses	•	•	•								

* The data below are maximum values and cannot be used at the same time.
The maximum pressure depends on temperature and gap dimensions.
** Temperature range depends on choice of elastomer material and media.

Table continues on next page

Seal		Application				Standard	Action		Size Range	Technical Data*			Recommended Seal Material
		Field of Application								Temp. Range **	Speed	Pressure	
Type	Page		Light	Medium	Heavy	ISO	Single	Double	mm	°C	m/s	MPa max.	
Veepac CH 	99	Presses Steel mills Ship hydraulics Scrape shears Civil engineering Continuous casting Special hydraulic cylinders Water locks	• • • • • • • •	• • • • • • • •	• • • • • • • •	-	•		10 - 750	-30/ +130	0.5	40	Rubber fabric reinforced + POM
Veepac CH/ G5 	111	Hydraulic cylinders Presses Mining Steel mills Water locks		• • • • •	• • • • •	-	•		25 - 160	-30/ +130	0.5	40	Rubber fabric reinforced + POM
Selemaster SM 	117	Hydraulic cylinders Presses Mining Steel mills Water locks		• • • • •	• • • • •	-	•		15 - 335	-40/ +130	0.5	70	Rubber fabric reinforced + POM
Balsele 	123	Hydraulic cylinders Presses Truck cranes	• • •	• • •		5597/1	•		10 - 1,200	-30/ +130	0.5	25 With Back-Up 40	Rubber fabric reinforced NBR
Zurcon® L-Cup® 	139	Hydraulic cylinders Tail lift cylinders Steering cylinders	• • •	• • •		5597/1	•		6 - 250	-50/ +130	0.5	40	Z20 Z22 Z25
Zurcon® U-Cup RU2 	147	Hydraulic cylinders Telescopic cylinders Mobile hydraulics	• • •	• • •		5597/1	•		6 - 185	-50/ +110	0.5	40	Z20 Z22

* The data below are maximum values and cannot be used at the same time.
The maximum pressure depends on temperature and gap dimensions.
** Temperature range depends on choice of elastomer material and media.

Table continues on next page

Seal		Application				Standard	Action		Size Range	Technical Data*			Recommended Seal Material
		Field of Application								Temp. Range **	Speed	Pressure	
Type	Page		Light	Medium	Heavy	ISO	Single	Double	mm	°C	m/s	MPa max.	
Zurcon® U-Cup RU6 	153	Hydraulic cylinders Industrial hydraulics Mobile hydraulics	• • •	• • •		7425-2	•		12 - 350	-35/ +110	0.5	25	Z20
Zurcon® U-Cup RU9 	159	Hydraulic cylinders Industrial hydraulics Mobile hydraulics	• • •	• • •		5597/1	•		6 - 140	-50/ +130	0.5	40	Z20 Z22 Z25
Zurcon® Buffer Seal LM 	169	Earthmoving Equipment Mobile hydraulics Construction Machinery		• • •	• • •	7425-2	•		40 - 140	-35/ +110	1	40 60 (peak)	Z20
Turcon® Variseal® M2 	175	High and low temperatures Aggressive media Food-contact	• • •	• • •		-	•		3 - 2,600	-253/ +300	15	40 20	T40 T05
Turcon® VL Seal® 	185	Automation Telescopic cylinders Valve stems Down-hole tools	• • • •	• • • •	• • • •	-	•		6 - 2,600 6 - 2,200	-45/ +200 - 45/ +110	15 2	50 50 25	M12 T46 Z54
Turcon® Glyd Ring® 	197	Special cylinders Pumps and valves Machine tools Servo equipment	• • • •	• • • •	• • • •	7425-2		•	3 - 2,600 3 - 2,200	-45/ +200 -45/ +110	15 2	50 50 20 60	M12 T46 T05 Z53
Turcon® Glyd Ring® T 	207	Special cylinders Pumps and valves Machine tools Robotics/ manipulators Presses	• • • • •	• • • • •	• • • • •	7425-2		•	3 - 2,600 3 - 2,200	-45/ +200 -45/ +110	15 2	50 50 60	M12 T46 Z53

* The data below are maximum values and cannot be used at the same time.
The maximum pressure depends on temperature and gap dimensions.
** Temperature range depends on choice of elastomer material and media.

Table continues on next page

Seal		Application				Standard	Action		Size Range	Technical Data*			Recommended Seal Material
			Field of Application							Temp. Range **	Speed	Pressure	
Type	Page		Light	Medium	Heavy	ISO	Single	Double	mm	°C	m/s	MPa max.	
Turcon® Glyd Ring® Hz 	217	Machine tools Handling machinery Servo equipment	• • •	• • •		7425-2	•	•	8 - 999	-45/ +200	15	30	M12
												25	T40
										-45/ +80	2	25	Z80
Turcon® AQ-Seal® with Bean Seal 	229	Hydraulics Machine operation Fluid/gas separation Holding cylinders	• • • •	• • • •		7425-2		•	18 - 2,200	-45/ +110	2	40	M12
												40	T46
Turcon® AQ-Seal® 5 with Bean Seal 	239	Hydraulics Fluid/gas separation Mobile hydraulics Holding cylinders		• • • •	• • • •	-		•	32 - 2,200	-45/ +110	2	50	M12
												50	T46
Zurcon® Wynseal M 	247	Industrial hydraulics Handling machinery Agricultural equipment	• • •	• • •		7425-2		•	3 - 2,600	-45/ +200	10	35	M12
									3 - 2,200	-45/ +110	0.5	25	Z54
												45	Z53
Turcon® Double Delta® 	257	Valve stems Mini hydraulics Hydraulic tools	• • •	• • •		-		•	2 - 2,600	-45/ +200	15	20	T05
												35	M12
												35	T46

* The data below are maximum values and cannot be used at the same time.
The maximum pressure depends on temperature and gap dimensions.
** Temperature range depends on choice of elastomer material and media.

REDUNDANT SEALING SYSTEM

Sealing of environmentally harmful fluids has led Trelleborg Sealing Solutions to develop innovative sealing systems that meet the demanding industry specifications for leak-free performance and long service life.

In heavy-duty applications, these characteristics cannot be assured by a single sealing element; therefore, specially developed system seals are arranged in series, building a tandem arrangement.

Each sealing element in a system has its specific function and their interaction needs to be secured to get a redundant sealing system.

The primary seal, manufactured from proprietary Turcon® PTFE-based materials, generates low friction and demonstrates excellent wear and extrusion resistance under extreme working conditions. It allows a fine lubrication film to pass this first barrier, ensuring the necessary lubrication of the secondary sealing element, giving long service life.

The tandem arrangement requires the primary seal to have an outstanding backpumping ability. If a double acting scraper is installed, the secondary seal must also possess back-pumping capabilities. A combination of different sealing materials in a system, such as a Turcon® PTFE and a Zurcon® polyurethane, ensures the best sealing performance.

Trelleborg Sealing Solutions has pioneered work in this area and continues development of redundant sealing today.

Trelleborg Sealing Solutions has successfully used the Turcon® Stepseal® 2K in tandem arrangement for heavy-duty applications. A tandem sealing system can also be created by using other seals, such as Zurcon® Rimseal, Zurcon® L-Cup® or Zurcon® U-Cup as secondary sealing elements. Depending on the type of secondary seal, a single- or double-acting scraper can be used to completes the system, offering the highest possible operation reliability, ensuring both adequate lubrication of the sealing system and long service life.

Figure 1 shows an example of a redundant sealing system consisting of Turcon® Stepseal® 2K, Zurcon® Rimseal and Rod Scraper DA22 with corresponding wear ring arrangement.

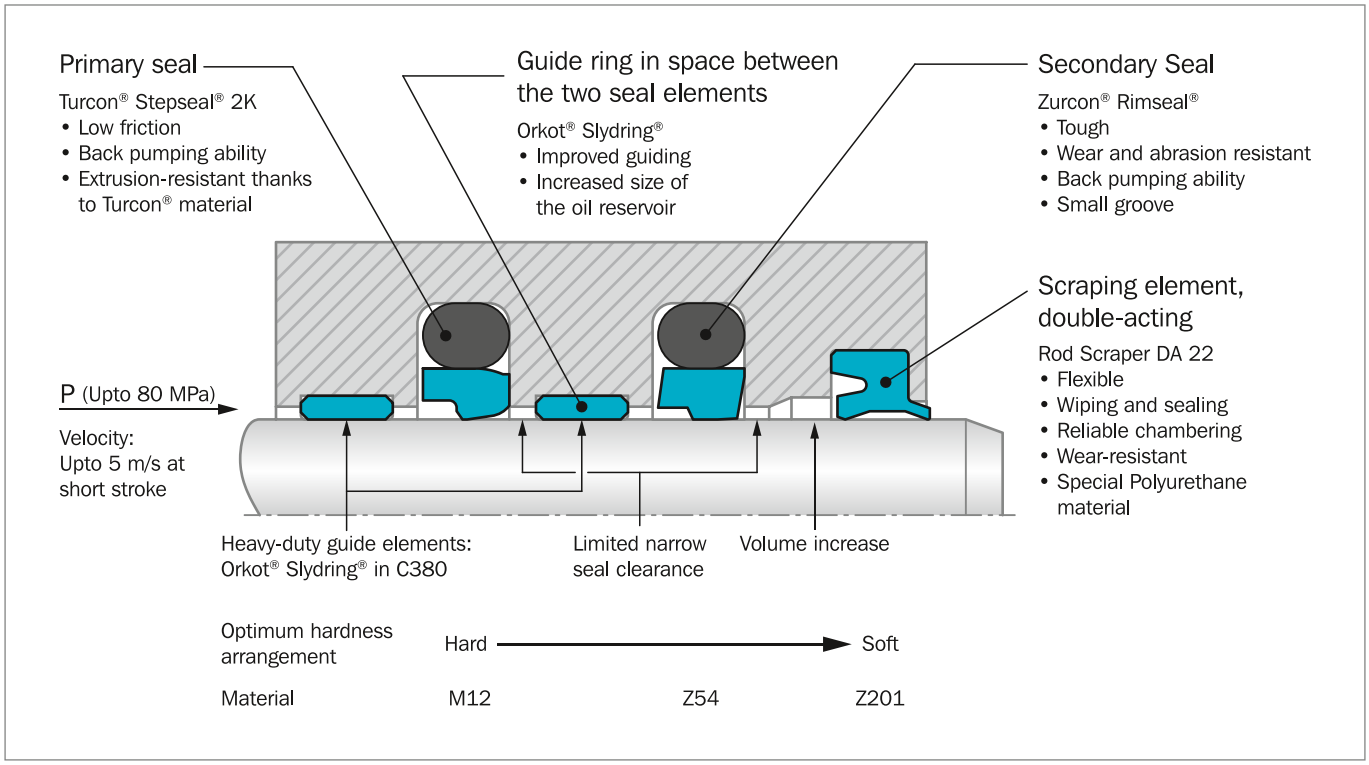


Figure 1: Example of a Redundant Modular Sealing System

■ Design Instructions

LEAD-IN CHAMFERS

In order to avoid damage to the rod seal during installation, lead-in chamfers and rounded edges must be provided on the piston rods, see Figure 2. If this is not possible for design reasons, a separate installation tool must be used.

The minimum length of the lead-in chamfer Z_{min} depends on the profile size of the seal and can be seen from the following tables.

Generally Z_{min} from Table 2, Table 3 and Table 4 is recommended but at 15° Z must also exceed 2.5% of the rod diameter d_N (relevant for large diameter rods). At 20° Z is calculated correspondingly.

The rod should have a lead-in chamfer of 15° to 20° by Z length minimum to gently guide the seal assembly into the hardware as shown in Figure 2. The chamfer should clear the seal assembly - in a free condition - after the seal has been calibrated.

Table 2: Elastomer Energized Seals

Minimum chamfer for a calibrated seal.

Groove Width L_1*	Lead-in Chamfer Length Z_{min}	
	15°	20°
2.2	2.5	2.0
3.2	3.0	2.5
4.2	3.5	3.0
6.3	5.0	4.0
8.1	6.5	5.0
9.5	7.5	5.5
13.8	10.5	8.0

* The groove width can be found in the table Installation Dimensions for Turcon® Glyd Ring® , Glyd Ring® T, Glyd Ring® Hz, AQ-Seal® Stepseal® 2K, Stepseal® V and Zurcon® Wynseal M.

Table 3: Double Delta®

Minimum chamfer for a calibrated seal.

O-Ring Cross Section** d_2		Lead-in Chamfer* Length Z_{min}	
		15°	20°
1.78	-	2.5	2.0
2.40	2.62	3.0	2.5
3.00	3.53	3.5	3.0
5.33	5.70	5.0	4.0
7.00	-	6.5	5.0
8.40	-	7.5	5.5

* Though not less than 2.5% of rod diameter.
**The O-Ring cross section d_2 can be found in the Installation Dimensions table from the Double Delta® chapter.

Table 4: U-Cup and Variseal®

Minimum chamfer for a calibrated seal (Variseal®)

U-Cup Groove Depth*	Variseal® M2 Series	Lead-in Chamfer Length Z_{min}	
		15°	20°
3.0 / 3.5 / 4.0		2.5	1.5
5.0		2.5	1.5
6.0 / 6.5		3.0	2.0
7.5 / 8.0	RVA0	4.5	3.0
10.0	RVA1 / RVA2	5.0	4.0
12.5		6.5	6.0
15.0	RVA3	7.5	6.5
20.0		10.0	8.5
	RVA4	12.0	9.0
	RVA5	17.0	13.0

* The groove depth is calculated from: $(d_1-d)/2$. The dimensions for d_1 and d can be found in the Installation Dimensions tables.

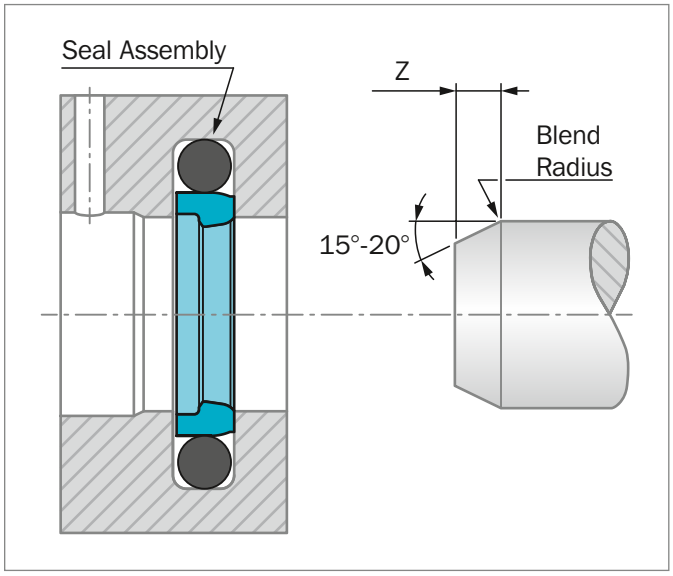


Figure 2: Lead-in chamfers

DISTANCE BETWEEN GROOVES

When installing tandem seal arrangements or double-acting scraper seals in conjunction with rod seals with back-pumping effects such as Turcon® Stepseal® 2K and Zurcon® Rimseal, we recommend the following arrangement:

- Distance between seal grooves and/or scraper seal groove L = at least groove depth X
- Oil reservoir for collecting the returning oil as shown in Figure 3.

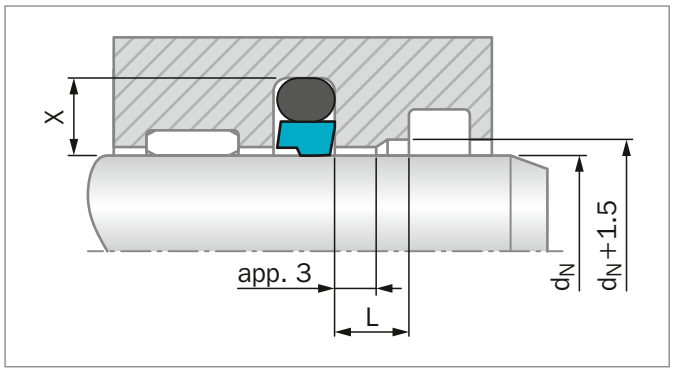


Figure 3: Recommendation for groove spacings between grooves

SURFACE ROUGHNESS DIN EN ISO 4287

The functional reliability and service life of a sealing system is dependent upon the quality and surface finish of the mating surface to be sealed.

Scores, scratches, pores, concentric or spiral machining marks are not permitted. Higher demands must be made on the surface finish of dynamic mating surfaces than on static mating surfaces.

The characteristics most frequently used to describe the surface micro-finish R_a, R_z and R_{max} are defined in DIN 4762 / ISO 4287-1. These characteristics alone, however, are not sufficient for assessing suitability of a surface finish in seal engineering. The material contact area M_r in accordance with ISO 4287-1, must be taken into consideration. The significance of this surface specification is illustrated in Figure 4. It shows that specification of R_a and R_z does not describe the surface roughness profile accurately enough. The material contact area M_r is essential as the specific profile form determines this parameter. This in turn is directly dependent on the machining process employed.

Trelleborg Sealing Solutions recommends that the following surface finishes be observed:

Table 5: Surface Roughness

Surface Roughness µm			
Parameter	Mating Surface		Groove Surface
	Turcon® Materials	Zurcon® and Rubber	
R_{max}	0.63 - 2.50	1.00 - 4.00	< 16.0
R_z	0.40 - 1.60	0.63 - 2.50	< 10.0
R_a	0.05 - 0.20	0.10 - 0.40	< 1.6

The material contact area M_r should be approximately 50 to 70%, determined at a cut depth c = 0.25 x R_z, relative to a reference line of $C_{ref.}$ 5%.

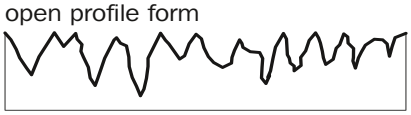
Surface profile	R_a	R_z	M_r
closed profile form 	0.1	1.0	70%
open profile form 	0.2	1.0	15%

Figure 4: Profile forms of surfaces

Figure 4 shows two surface profiles, both of which exhibit nearly the same value for R_z in the test procedure. The difference becomes obvious when the material contact areas of the surface roughness profiles are compared. These show that the upper profile with M_r = 70% has the better seal to mating surface ratio.

HARDWARE

For optimum performance Trelleborg Sealing Solutions recommends a piston rod of chrome-plated steel.

Material:	Preferably 42CrMo4V, purity class K3 to DIN 50602.
Induction hardened	min. HRC 45
Hardening depth	min. 2.5 mm

Ground and hard chrome-plated, coating thickness 20 to 30 µm, polished

Roughness	R_a 0.1 to 0.3 µm max. corresponding to N4 DIN/ISO 1302
Material contact area	M_r = 50 to 70%
Cut depth	c = 0.25 x R_z

For other rod materials, special coatings and treatments please contact your local Trelleborg Sealing Solutions marketing company.

Installation Instructions

The following points should be observed before installation of the seals:

- Ensure the piston rod has a lead-in chamfer; if not, use a calibration mandrel, see Figure 9.
- Deburr and chamfer, or round sharp edges, cover the tips of screw threads.
- Remove machining residue such as chips, dirt and other foreign particles, and carefully clean all parts.
- The seals can be installed more easily if the rod is greased or oiled. Attention must be paid to the compatibility of the seal materials with these lubricants. Use only grease without solid additives (e.g. molybdenum disulphide or zinc sulphide).
- Do not use tools with sharp edges.

INSTALLATION IN SPLIT GROOVES

Installation in split grooves is problem-free. The sequence of installation corresponds to the configuration of the seal, whereby the individual seal elements must not be allowed to twist. During final installation (insertion of the piston rod into the seal), elastomer or spring-energized seals must be calibrated. The piston rod itself can be used for this purpose, provided that it has a long lead-in chamfer. Alternatively, a calibration mandrel should be used.

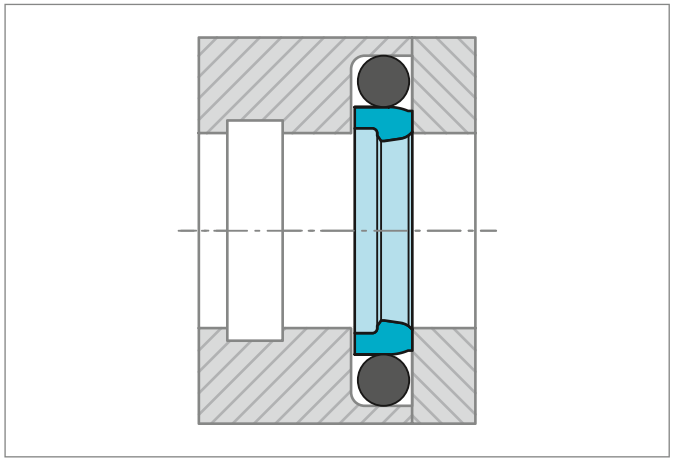


Figure 5: Installation in a split groove

INSTALLATION IN CLOSED GROOVES

By following the instructions in each seal type description (sizes for closed or split grooves) or using the light series for Turcon® seals, installation of our rod seal elements at small diameters will be problem-free.

For Zurcon® and polyurethane seals, the use of installation tools is recommended. If installation has to be performed without installation tools, use the same sequence as for Turcon® elastomer energized seals:

- Place the O-Ring into the groove (not necessary with U-Cup seals).
- Compress the Turcon® or Zurcon® seals into a kidney shape while avoiding sharp bends see Figure 6.

When a rod seal with notches is folded into a kidney shape, take care to avoid bending the seal at the position of the notches as this may cause overstretch or damage to the seal material.

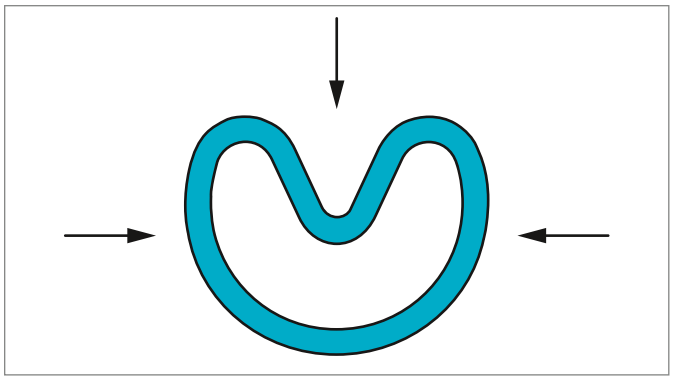


Figure 6: Kidney-shaped deformation of the seal ring

- Place the seal ring in compressed form into the groove and push against the O-Ring in the direction of the arrow and form the seal into a ring see Figure 7.

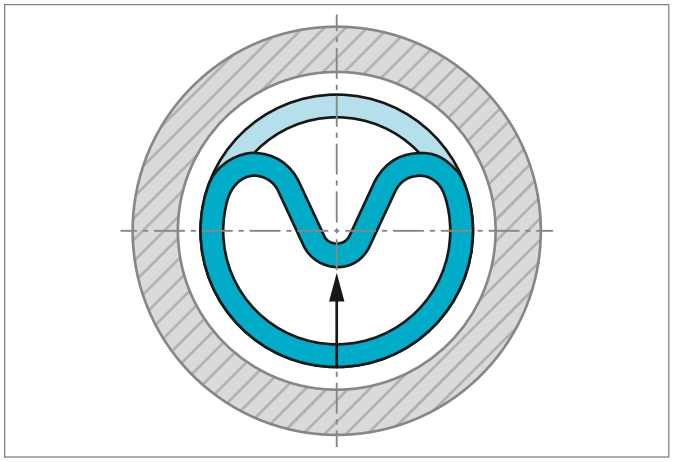


Figure 7: Inserting the seal ring into the closed groove

- Finally size the seal ring using a mandrel which should have a chamfer of 15° to 20° over at least the lead-in chamfer length Z_{min} x 2 see Table 2.

The calibration mandrel should be made from a polymer material (e.g. polyamide) with good sliding characteristics and high surface quality in order to avoid damage to the seals.

The piston rod itself can also be used for calibration, provided it has a sufficiently long lead-in chamfer.

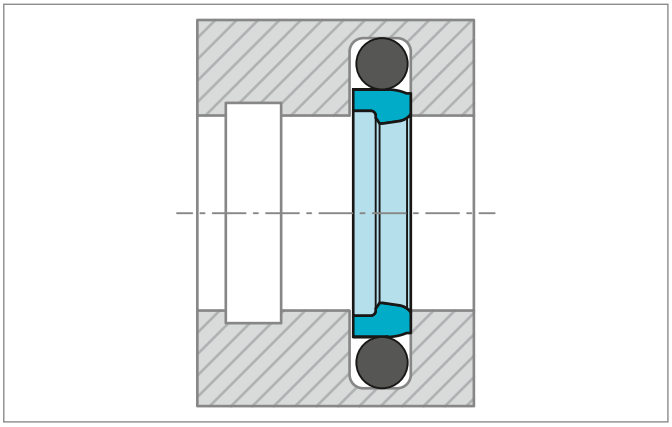


Figure 8: Installation in a closed groove

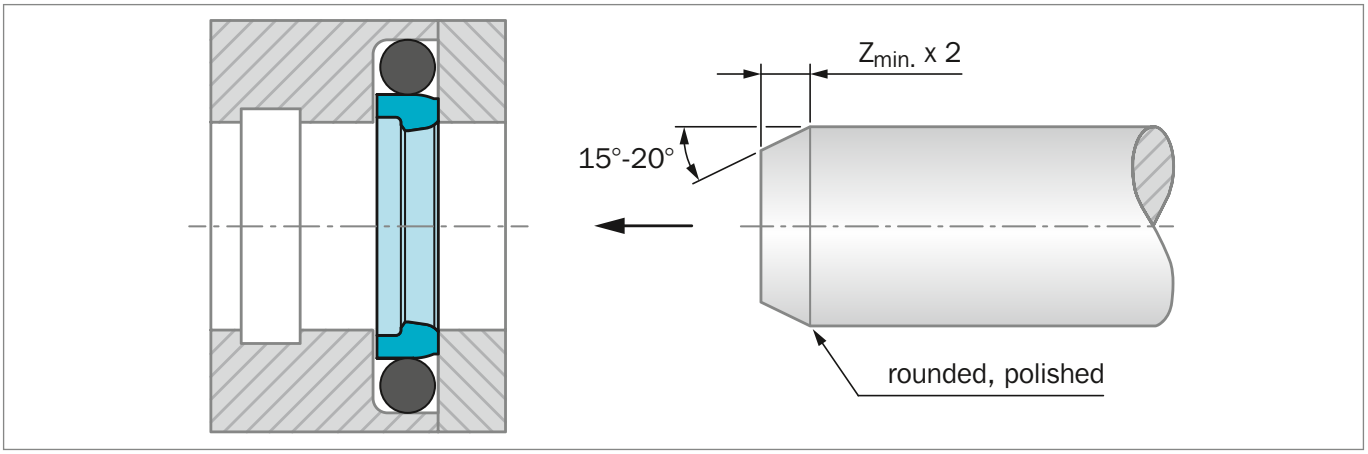


Figure 9: Calibration of the installed seal

Table 6: Closed groove installation for Turcon® rod seals

Stepseal® 2K and seals for similar groove sizes can be installed in closed grooves above the following rod diameters*:

O-Ring Series	Rod Diameter d_N mm	Materials
000	≥ 12	Turcon® M04, M12, T05, T08, T10, T29, T40, T46. Zurcon® Z53, Z54, Z80
100	≥ 16	
200	≥ 19	
300	≥ 38	
400	≥ 70	
400 H	≥ 200	
8.4**	≥ 256	
12.0***	≥ 650	

* For diameter d_N below 30 mm and/or not very accessible grooves it is often essential to use installation tools.
** O-Ring cross section according to SMS 1586
*** The energizer can have a special shape.

INSTALLATION OF AQ-SEAL® AND AQ-SEAL® 5 WITH QUAD-RING® OR BEAN SEAL:

The same installation procedure for rod Stepseal® 2K may be used for AQ-Seal® or AQ-Seal® 5 - see Figure 6 and Figure 7 - except AQ-Seal® 5 uses different groove sizes. However, the Quad-Ring® and Bean Seal should not be fitted until the AQ-Seal® or AQ-Seal® 5 have been calibrated - see Figure 9.

INSTALLATION HINT

AQ-Seal® and AQ-Seal® 5 with Quad-Ring® or Bean Seals are normally supplied without the Quad-Ring® / Bean Seal installed:

To assist mounting of the elastomer element after the AQ-Seal® or AQ-Seal® 5 ring has been calibrated, dental floss could be used to avoid twisting of the Quad-Ring® / Bean Seal - see Figure 10.

INSTALLATION OF TURCON® VL SEAL®

Installation in closed grooves is possible for diameters according to Table 7.

Table 7: Closed groove installation for VL Seal®

Series No.	Rod Diameter d_N mm
REL1	≥ 30
REL2	≥ 30
REL3	≥ 50
REL4	≥ 80
REL5	≥ 125
REL6	≥ 400

The O-Ring is inserted and positioned in the groove, then the seal is folded and inserted into the groove - see Figure 11.

The seal is folded out in the groove and is thereafter calibrated before the piston rod is inserted.

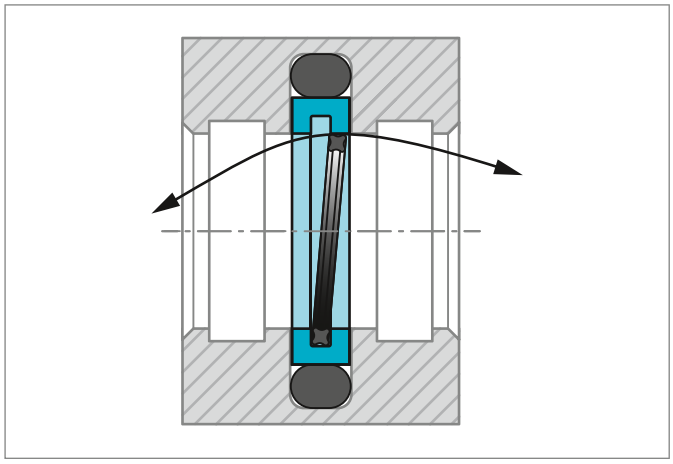


Figure 10: Installation of AQ-Seal® with Bean Seal for Rod

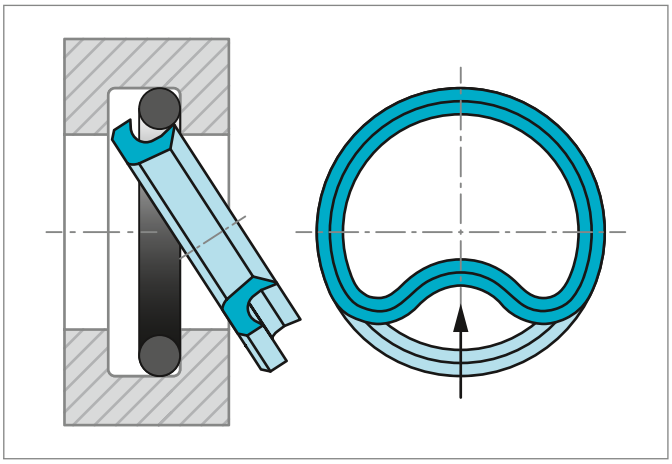


Figure 11: Installation of Rod VL Seal® in closed groove

INSTALLATION OF DOUBLE DELTA®

Installation in closed grooves is possible for diameters from 12 mm using the following procedure:

- Place the O-Ring into the groove.
- Compress the Turcon® seal into a kidney shape, while avoiding sharp bends - see Figure 12. When a rod seal with notches is folded in kidney shape, take care to avoid bending the seal at the position of the notches as this may cause overstretch or damage to the seal material.
- Place the seal ring in compressed form into the groove and push against the O-Ring in the direction of the arrow in the groove by hand - see Figure 13. For diameters smaller than 30 mm an inserter tube is recommended - see Figure 14.
- Finally, size the seal ring using a mandrel, see Figure 15, which should have a chamfer of 10° to 15° over a minimum length of 2 x lead-in chamfer length Z_{min} see Table 3

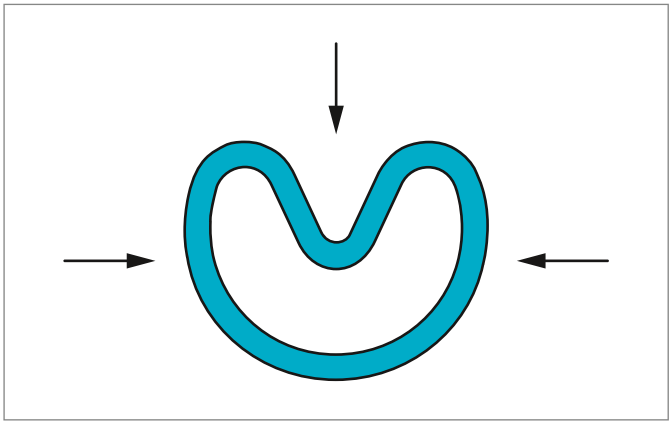


Figure 12: Kidney-shaped deformation

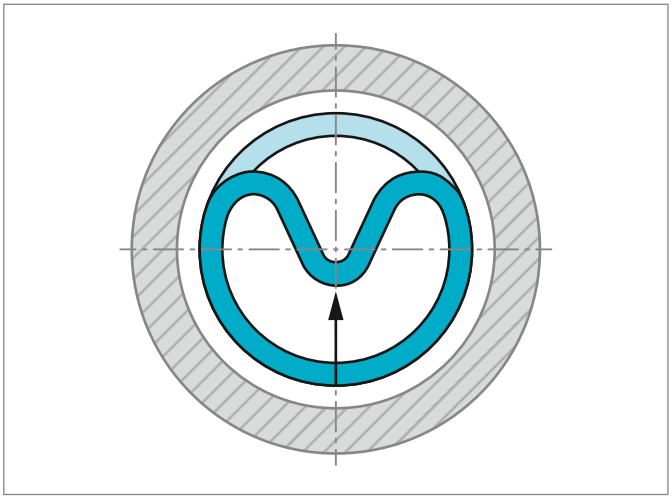


Figure 13: Inserting the seal ring into the closed groove

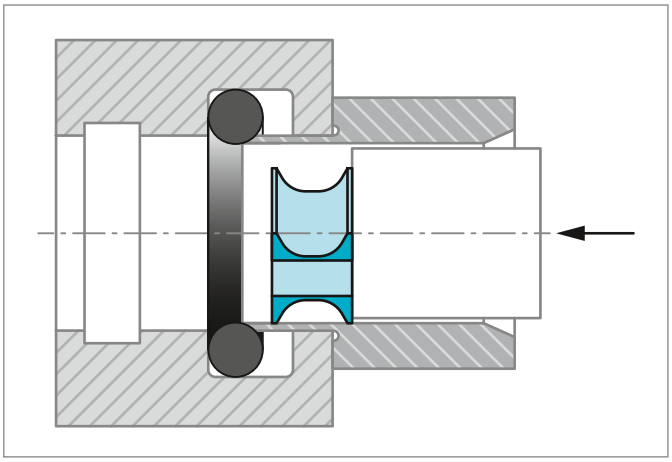


Figure 14: Insertion with an inserter tube

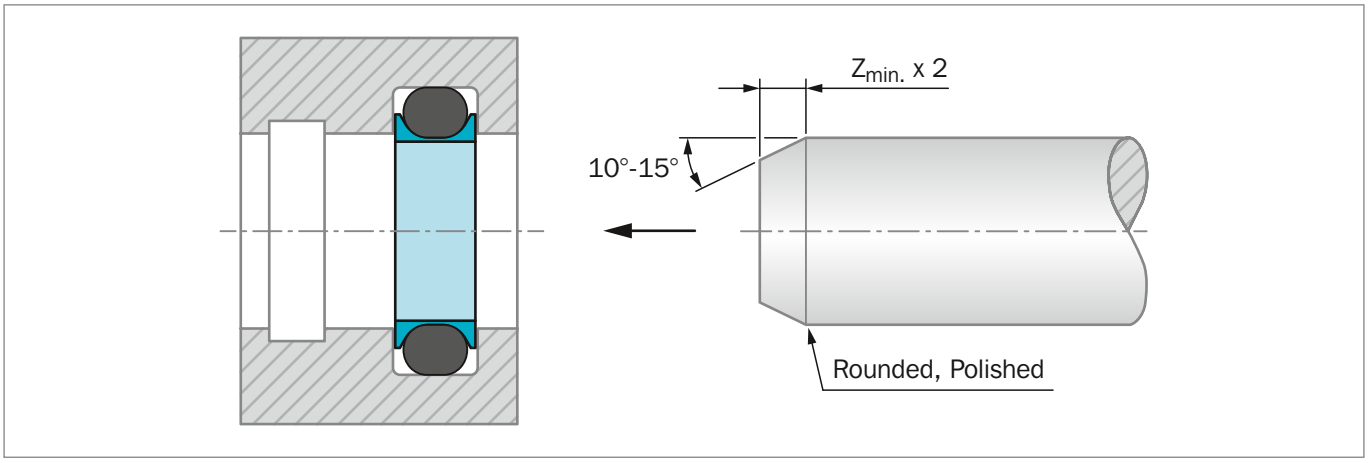


Figure 15: Calibration of the installed seal by means of a calibration mandrel

INSTALLATION OF SPRING ENERGIZED SEALS

Turcon® Variseal® M2 and M2S seals should preferably be installed in split grooves.

Installation in half-open grooves is possible with a snap fitting. Figure 16 shows the design of the groove.

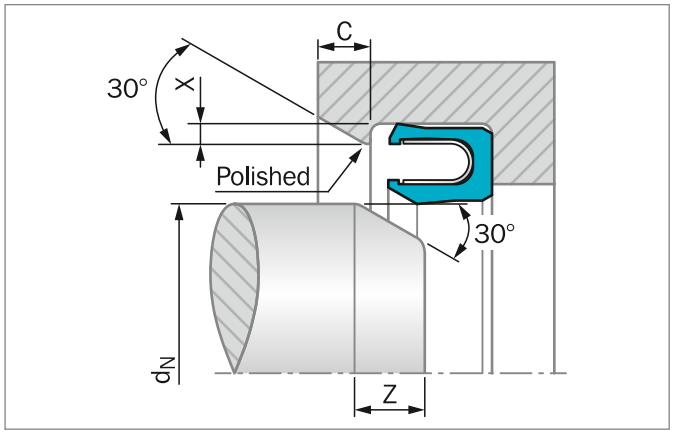


Figure 16: Installation in a half-open groove

Table 8: Installation in Half-Open Grooves

Serial-No.	X min.	d_N min.	Length Z min.	C min.
RVA0 / RVC0	0.4	20.00	1.20	0.70
RVA1 / RVC1	0.6	30.00	1.50	1.10
RVA2 / RVC2	0.7	35.00	2.50	1.25
RVA3 / RVC3	0.8	40.00	4.50	1.40
RVA4 / RVC4	0.9	45.00	6.00	1.60
RVA5 / RVC5	1.5	80.00	11.00	2.60

RVC alongside the RVA references: RVA0 / RVC0
For further information, see Figure 78 and Figure 219 and Figure 58 and Figure 197.

In exceptional cases, or with existing designs, an installation in closed grooves is also possible. The details in Table 9 should be regarded as guide values for installation.

Table 9: Installation in Closed Grooves

Serial-No.	d_N min.
RVA0 / RVC0	30
RVA1 / RVC1	70
RVA2 / RVC2	110
RVA3 / RVC3	300
RVA4 / RVC4	500
RVA5 / RVC5	800

RVC alongside the RVA references: RVA0 / RVC0

General Quality Criteria

The cost-effective use of seals and bearings is highly influenced by the quality criteria applied in production. Seals and bearings from Trelleborg Sealing Solutions are continuously monitored according to strict quality standards from material acquisition through to delivery.

Certification of our production plants in accordance with international standards including ISO 9001, IATF 16949, EN/AS 9100, ISO 13485, ISO 14001, OHSAS 18001 or ISO 29001 meets the specific requirements of the quality management system.

Our quality policy is consistently controlled by strict procedures and guidelines which are implemented within all strategic areas of the company.

All testing of materials and products is performed in accordance with accepted test standards and specifications, e.g. random sample testing in accordance with ISO 2859-1 AQL 1.0 general inspection level II, normal inspection.

Inspection specifications correspond to standards applicable to individual product groups (e.g. for O-Rings: ISO 3601).

Our sealing materials are produced free of chlorofluorinated hydrocarbons and carcinogenic elements.

Guidelines for the Storage of Polymer Products Based on ISO 2230

Many polymer products and components are stored for long periods of time before being put into service, so it is important they are stored in conditions that minimize unwanted changes in properties. Such changes may result from degradation, in which case they may include excessive hardening, softening, cracking, crazing and other surface effects. Other changes may be caused by deformation, contamination or mechanical damage.

Packaging
Unless otherwise specified in the appropriate product specification, rubber products should be enclosed in individual sealed envelopes. The packaging should be carried out in an atmosphere in which the relative humidity is less than 70%, or if polyurethanes are being packed, less than 65%. Where there is serious risk of ingress of moisture (e.g. rubber-metal-bonded parts), aluminum foil/paper/polyethylene laminate or other similar means of protection should be used to ensure protection from ingress of moisture.

Temperature
The preferred storage temperature for elastomer parts is +15 °C and should not exceed +25 °C. The products should be stored away from direct sources of heat such as boilers, radiators and direct sunlight. If the storage temperature is below +15 °C, care should be exercised during handling of stored products, as they may have stiffened and have become susceptible to distortion if not handled carefully.

Humidity
The relative humidity should be such that, given in the variations of temperature in storage, condensation does not occur. In all cases, the relative humidity of the atmosphere in storage should be less than 70%, or if polyurethanes are being stored, less than 65%.

Light
Rubber should be protected from light sources, in particular direct sunlight or intense light having a high ultra-violet content. It is advisable that any windows of storage rooms be covered with a red or orange coating or screen.

Radiation
Precautions should be taken to protect stored products from all sources of ionizing radiation likely to cause damage to the products.

Ozone
Ozone has a particularly harmful effect on rubber. Storage rooms should not contain any equipment that is capable of generating ozone, such as mercury vapor lamps or highvoltage electrical equipment giving rise to electric sparks or electrical discharges. Combustion gases and organic vapors should also be excluded, as they may give rise to ozone via photo-chemical processes. When equipment such as a fork-lift truck is used to handle large rubber products, care needs to be taken to ensure this equipment is not a source of pollution that may affect the rubber. Combustion gases should be considered separately. While they are responsible for generating ground-level ozone, they may also contain unburned fuel which, by condensing on rubber products, can cause additional deterioration.

Deformation
Rubber should be stored free from tension, compressive stresses or other causes of deformation. Where products are packaged in a strain-free condition, they should be stored in their original packaging. In case of doubt, the manufacturer's advice should be sought. It is advisable that rings of large internal diameter are formed into three equal loops so as to avoid creasing or twisting. It is not possible to achieve this condition by forming just two loops.

Contact with liquids and semi-liquid materials
Rubber should not be allowed to come into contact with liquid or semi-liquid materials (for example, petrol, greases, acids, disinfectants, cleaning fluids) or their vapors at any time during storage, unless these materials are by design an integral part of the product or the manufacturer's packaging. When rubber products are received coated with their operational media, they should be stored in this condition.

Contact with metals
Certain metals and their alloys (in particular, copper and manganese) are known to have harmful effects on some rubbers. Rubber should not be stored in contact with such metals except when bonded to them. They should be protected by wrapping in, or by separation with, a suitable material, e.g. paper or polyethylene.

Contact with dusting powder
Dusting powders should only be used for the packaging of rubber items in order to prevent adhesion. In such cases, the minimum quantity of powder to prevent adhesion should be used. Any powder used should be free from any constituent that would have a harmful effect on the rubber or the subsequent application of the rubber.

Contact between different products
Contact between products made from rubbers of different compositions should be avoided. This includes products of the same type but differing in color.

Rubber-to-metal bonded products
The metal part of rubber-to-metal bonded products should not come into contact with the rubber of other products. Preservative used on the metal should be of a type that it will not adversely affect the rubber or the bond to such an extent that it does not comply with the product specification.

Storage life
This is the maximum period of time that a rubber product, appropriately packaged, may be stored. After this time the product is regarded as unserviceable for the purposes for which it was originally manufactured. The storage life of a rubber product is influenced by its shape and size as well as its composition. Thick products usually undergo slower changes through degradation than thinner ones.

Initial storage period
This is the maximum period, starting from the time of manufacture, for which a rubber product, appropriately packaged, may be stored under specified conditions before a sample needs to be inspected or re-tested.

Extension storage period
This is the period for which a rubber product, appropriately packaged, may be stored after the initial storage period, before further inspection and re-testing is necessary.

Assembly
These are products or components containing more than one element, one or more of which is made of rubber. Generally it is not recommended to store elastomeric products in an assembled condition. If it is necessary to do so, the units should be checked more often. The inspection interval depends on the design and geometry of the components.

Inspection before extension storage
Before any items are to be stored for an extension period, representative samples of each type should be selected for inspection at the end of the appropriate initial storage period. Inspection should be in accordance with the relevant product specification.

Visual inspection
Inspect each of the items for the following:
1. Permanent distortions, such as creases or flats.
2. Mechanical damage, such as cuts, tears, abraded areas or delaminated plies.
3. Surface cracking when viewed under a microscope at x10 magnification.
4. Changes in surface condition, such as hardening, softening or tackiness.

Assessment at the end of the initial period

If, following the visual inspection procedure the items are not satisfactory, they should not be stored for an extended period. If the items are satisfactory and are stored for an extended period a record should be kept of the date initial storage began as well as the date the extended storage period began. Items stored for an extended period should be inspected and tested at, or before, the expiry of the extension storage period before they are put into service or stored for a further extended period.

Table 10: Initial and extension storage periods for unassembled components

Material Group	Initial Storage Period	Extended Storage Period
AU, EU, NR, SBR	5 years	2 years
ACM, AEM, CR, ECO, HNBR, IIR, NBR	7 years	3 years
CSM, EPDM, FKM, FMQ, FVMQ	10 years	5 years
FFKM Isolast®	20 years	5 years
Zurcon®	10 years	5 years
PTFE	unlimited	

Note 1: If the storage temperature is over or under +25 °C this will influence the storage time. Storage at +10 °C higher will reduce the storage time by about 50%. Storage at +10 °C lower will increase the storage time by around 100%.

Note 2: In application areas such as aerospace the storage periods can differ from this specification. These specific storage conditions have to be agreed between the supplier and the buyer.

Turcon® Stepseal® 2K

Single-acting

Rubber-energized plastic-faced seal

Material:
Turcon®, Zurcon® and Elastomer

■ Turcon® Stepseal® 2K*

■ Description

Under all operating conditions, dynamic rod seals must not exhibit any leakage to the atmosphere side and must be completely leak tight when the machine is at a standstill.

Furthermore, they should achieve a high degree of mechanical efficiency through low friction and be easy to install in small grooves. Costs and service life must meet the high expectations of the operator.

The rod seal Turcon® Stepseal® 2K comes closest to satisfying these ideal demands. Since the first Stepseal® was patented, Trelleborg Sealing Solutions has maintained the series as technically outstanding through continuous innovation. Turcon® Stepseal® 2K marks the latest development.

The introduction of Stepseal® made it possible to arrange several seals in sequence, thus allowing statically and dynamically tight double-acting tandem seal configurations to be created, while avoiding build-up of intermediate pressure. The single-acting seal element is made of high-grade Turcon® or Zurcon® materials with outstanding sliding and wear resistance properties. It is installed in Trelleborg Sealing Solutions standard Stepseal® grooves as well as ISO 7425-2 seal housing, using an O-Ring as an energizing element.

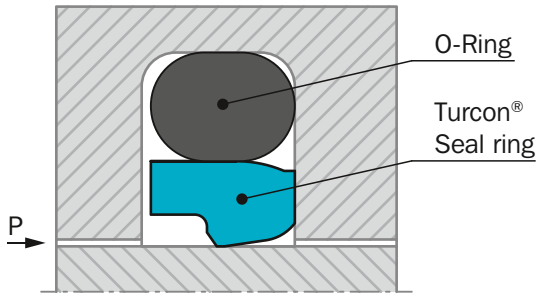


Figure 17: Turcon® Stepseal® 2K

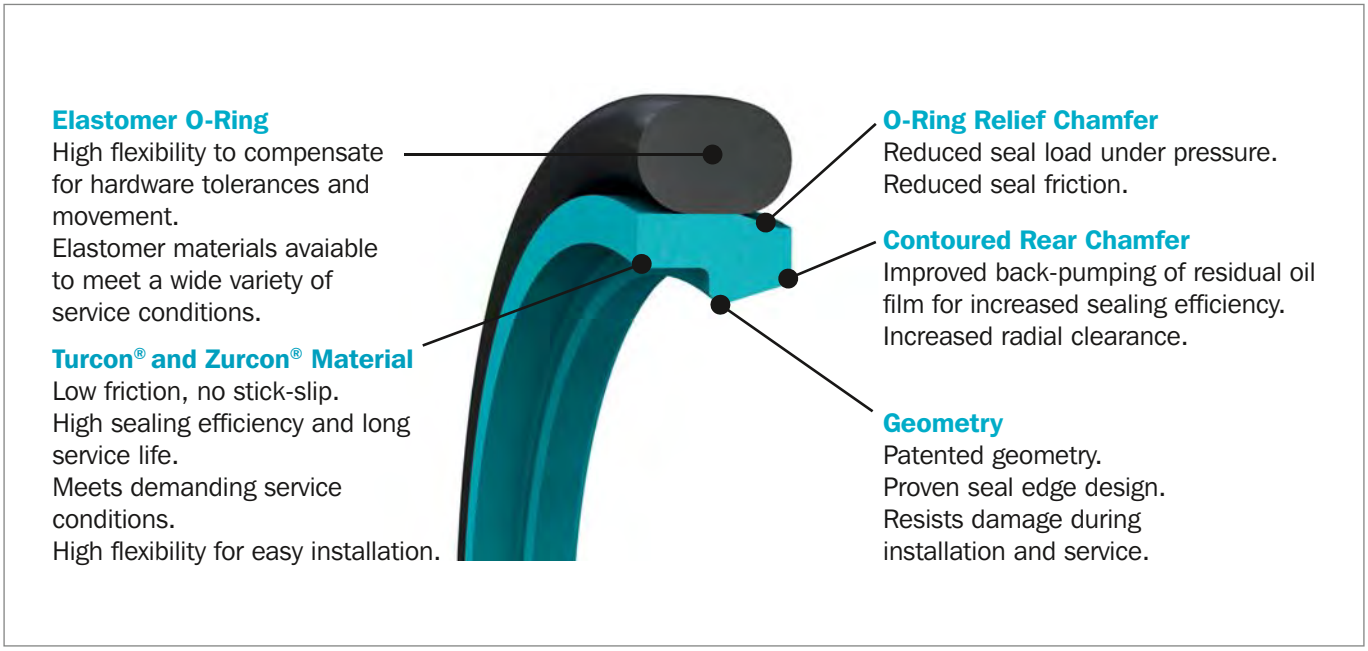


Figure 18: Turcon® Stepseal® 2K design features

* Patented geometry

METHOD OF OPERATION

The sealing performance of Turcon® Stepseal® 2K (Figure 17) results from its hydrodynamic properties. The classic Stepseal® seal edge creates a steep contact pressure gradient on the high pressure side and a shallow contact pressure gradient on the low pressure side. The controlled pressure gradients minimize fluid adherence to the piston rod during the extending stroke, and enables residual fluid film on the rod to be returned into the system on the return stroke. This is united with patented design features which further improve the performance of Stepseal® 2K under severe service conditions.

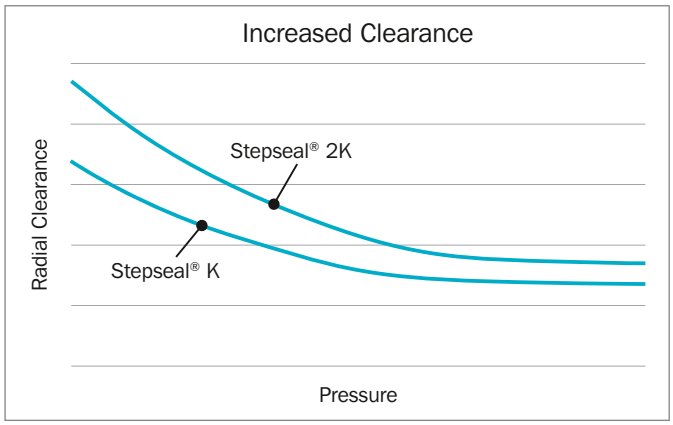


Figure 19: Turcon® Stepseal® 2K possesses superior extrusion resistance and allows increased hardware clearance

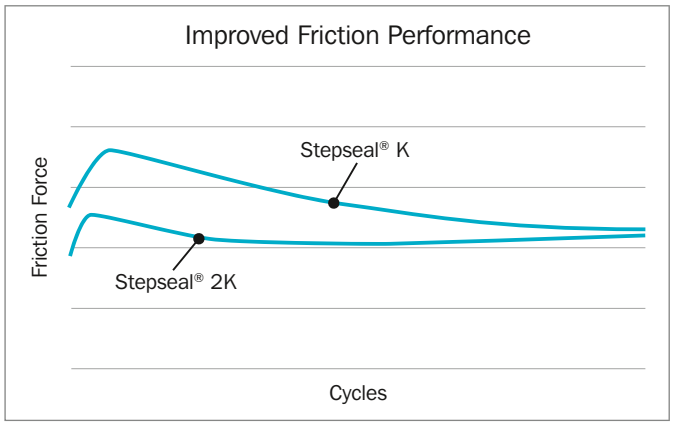


Figure 20: Turcon® Stepseal® 2K offers a uniform, low-friction characteristic

The O-Ring relief chamfer reduces pressure loading on the seal, whereby contact with the rod is optimised and sealing performance is improved at high service pressures. The special high-lift rear chamfer combines a smooth downstream sealing face with the ability to meet large radial clearances and hardware tolerances.

Stepseal® 2K gives high static and dynamic sealing performance, and the build-up of intermediate pressure often found with tandem seal configurations (Figure 21) is efficiently suppressed.

ADVANTAGES

- High static and dynamic sealing effect
- High extrusion resistance, allowing large hardware clearances
- Low friction, high efficiency
- Stick-slip free operation
- High abrasion resistance, high operational reliability
- Wide range of application temperatures and high resistance to chemicals, depending on the choice of O-Ring material
- Simple installation without seal edge deformation
- Available for all diameters up to 2,600 mm rod diamter
- Fits standard Stepseal® 2K groove dimensions as well as ISO 7425 seal housings

APPLICATION EXAMPLES

- Mobile hydraulics
- Construction equipment
- Mining
- Standard cylinders
- Machine tools
- Injection molding machines
- Presses
- Clamp cylinders
- Wind turbines
- Automotive industry
- Shock absorbers
- Hydraulic hammers
- Servo hydraulics

OPERATING CONDITIONS

Pressure:	Up to 60 MPa
Speed:	Up to 15 m/s with reciprocating movements, frequency up to 5 Hz
Temperature:	-45 °C to +200 °C depending on O-Ring material
Media:	Mineral oil-based hydraulic fluids, flame retardant hydraulic fluids, environmentally friendly hydraulic fluids (bio-oils), phosphate ester, water and others, depending on the O-Ring material compatibility (see Table 11)
Clearance:	The maximum permissible radial clearance S_{max} is shown in Table 12, as a function of the operating pressure and functional diameter.

IMPORTANT NOTE

The above data are maximum values and cannot be used at the same time, e.g. the maximum operating speed depends on material type, pressure, temperature and gap value. Temperature range also depends on media.

SERIES

Different cross section sizes are recommended as a function of the seal diameters.

Table 12 shows the relationship between the series number according to the seal diameter range and the different application class sizes. These application classes are:

Standard application:	General applications without exceptional operating conditions.
Light application:	Applications with demands for reduced friction or for smaller grooves.
Heavy-duty application:	For exceptional operating loads such as high pressures, pressure peaks, etc.

Table 10: Available Range

Series No.	Rod Diameter d_N f8/h9
RSK00	1.5 - 130.0
RSK10	6.0 - 250.0
RSK20	8.0 - 450.0
RSK30	12.0 - 650.0
RSK40	38.0 - 650.0
RSK80	140.0 - 999.9
RSK50	180.0 - 999.9
RSK5X	1,000.0 - 1,200.0
RSK60	650.0 - 999.9
RSK6X	1,000.0 - 2,600.0

For the Standard Recommendations Application range see Table 12.

ISO GROOVE

Stepseal® 2K is installed in Trelleborg Sealing Solutions standard Stepseal® grooves or according to ISO 7425-2 seal housing.

REDUNDANT SEALING SYSTEM

In many applications, secondary seal systems are required. Figure 21 shows a tandem configuration with the Stepseal® 2K.

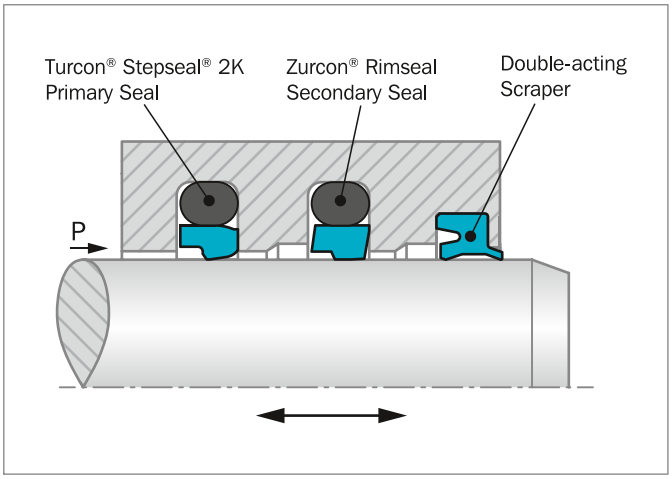


Figure 21: Turcon® Stepseal® 2K and Zurcon® Rimseal in tandem configuration

In this configuration it must be noted that a sufficiently large space is formed between the seals to take the hydraulic fluid, as shown in the figure.

Depending on the application and the operating conditions, the combination of different materials offers a further improvement in the sealing efficiency and the service life of the system, e.g. in hydraulic cylinders subject to high loads and under rough operating conditions, the primary seal should be made of Turcon® and the secondary seal of Zurcon®.

Stepseal® 2K elements should always be used in combination with a double-acting scraper to provide optimum sealing effect.

The scrapers Turcon® Excluder® 2, Turcon® Excluder® 5, Turcon® Excluder® F, Zurcon® Excluder® 500, DA17, DA22 and DA24 are well suited to such applications. For further details, please refer to the Scrapers section in this catalog.

INSTALLATION INSTRUCTIONS

Stepseal® 2K is installed according to information on page 37 and 38.

Closed groove installation according to dimensions in Table 6 auf Seite 38.

RECOMMENDED MATERIALS

The following material combinations have proven effective for hydraulic applications:

Turcon® Stepseal® 2K in Turcon® M12
All round material for light to heavy hydraulic applications with linear, short stroke or helical movements in mineral oils, flame retardant hydraulic fluids, phosphate ester, bio-oils or fluids having low lubricating properties:

O-Ring	NBR 70 Shore A	N
	FKM 70 Shore A	V
Set Code:	M12N or M12V	

Turcon® Stepseal® 2K in Turcon® T46
For medium to heavy applications with linear movements in mineral oils and other media with good lubrication:

O-Ring:	NBR 70 Shore A	N
	FKM 70 Shore A	V
Set Code:	T46N or T46V	

For specific applications, all Turcon® materials are available. Other material combinations are listed in Table 11.

Table 11: Turcon® and Zurcon® Materials for Stepseal® 2K

Material, Applications, Properties	Code	O–Ring Material Shore A	Code	O-Ring Operating Temp.* °C	Mating Surface Material	MPa max. Dyna-mic
Turcon® M12 First material choice for seals in linear motion Overall improved properties For new constructions and updating For all commonly applied hydraulic fluids including fluids with low lubrication performance Lowest friction and best sliding properties Lowest wear on seals Improved absorption of abrasive contaminants Low wear or abrasion of counter surface BAM tested Mineral fiber and additives filled Color: Dark gray	M12	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Steel plated (rod) Cast iron Stainless steel Titanium	50
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
Turcon® T05 For lubricating fluids Also for gas service Very low friction Very good sliding and sealing properties Color: Turquoise	T05	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod)	20
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
Turcon® T08 For lubricating fluids and linear motion Very high compressive strength and extrusion resistance Hard counter surfaces is recommended Bronze filled Color: Light to dark brown, which may have variations in shading	T08	NBR 70	N	-30 to +100	Steel hardened Steel chrome plated (rod) Cast iron	60
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
Turcon® T10 For hydraulic and pneumatic For lubricating and non-lubricating fluids High extrusion resistance Good chemical resistance Not for electrically conducting fluids BAM tested Carbon, graphite filled Color: Black	T10	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Stainless steel	40
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
		EPDM 70	E**	-45 to +145		
Turcon® T29 For lubricating and non-lubricating fluids Good extrusion resistance Surface texture is not suitable for gas sealing Not for electrically conducting fluids Carbon fiber filled Color: Gray	T29	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Cast iron Stainless steel	30
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
		EPDM 70	E**	-45 to +145		

Table continues on next page

Material, Applications, Properties	Code	O–Ring Material Shore A	Code	O-Ring Operating Temp.* °C	Mating Surface Material	MPa max. Dyna-mic
Turcon® T40 For lubricating and non-lubricating fluids High frequency and short strokes Water hydraulics Surface texture is not suitable for gas sealing Carbon fiber filled Color: Gray	T40	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Cast iron Stainless steel Aluminum	25
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
		EPDM 70	E**	-45 to +145		
Turcon® T46 For lubricated hydraulics in linear motion High compressive strength High extrusion resistance Very good sliding and wear properties BAM tested Bronze filled Color: Light to dark brown, which may have variations in shading	T46	NBR 70	N	-30 to +100	Steel hardened Steel chrome plated (rod) Cast iron	50
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
Zurcon® Z53*** For mineral oil based fluids Very high abrasion and extrusion resistance For counter surfaces with rougher surface finish Limited chemical resistance Max. working temperature +110 °C Cast polyurethane Color: Yellow to light-brown	Z53	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Cast iron Stainless steel Ceramic coating	60
		NBR 70 Low temp.	T	-45 to +80		
Zurcon® Z80 For lubricating and non-lubricating fluids Water based fluids, air and gases Dry air pneumatics High abrasion and extrusion resistance For service in abrasive conditions and media with particles Good chemical resistance Limited temperature capability (-60 to +80 °C) UHMWPE (Ultra High Molecular Weight Polyethylene) Color: White to off-white	Z80	NBR 70	N	-30 to (+100)	Steel Steel hardened Steel chrome plated (rod) Stainless steel Aluminum Ceramic coating	35
		NBR 70 Low temp.	T	-45 to +80		
		EPDM 70	E**	-45 to (+145)		

* The O-Ring operation temperature is only valid in mineral hydraulic oil (except EPDM).

** Material not suitable for mineral oils.

*** Max. diameter 2,200 mm.

BAM: Tested by “Bundesanstalt Materialprufung, Germany”.

Highlighted materials are recommended.

■ Installation Recommendation

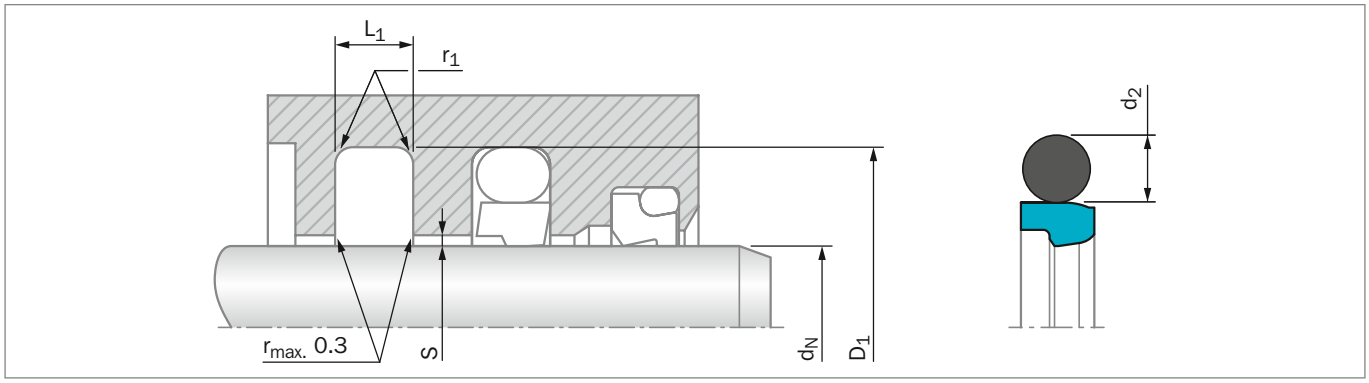


Figure 22: Installation Drawing

Table 12: Installation Dimensions – Standard Recommendations

Series No.	Rod Diameter d_N f8/h9			Groove Diameter	Groove Width	Radius	Radial Clearance S_{max}*			O-Ring Cross Section
	Standard Application	Light Application**	Heavy Duty Application	D_1 H9	L_1 +0.2	r_1 max	10 MPa	20 MPa	40 MPa	d_2
RSK0	3 - 7.9	8 - 18.9	-	d_N + 4.9	2.2	0.4	0.30	0.20	0.15	1.78
RSK1	8 - 18.9	19 - 37.9	-	d_N + 7.3	3.2	0.6	0.40	0.25	0.15	2.62
RSK2	19 - 37.9	38 - 199.9	8 - 18.9	d_N + 10.7	4.2	1.0	0.50	0.30	0.20	3.53
RSK3	38 - 199.9	200 - 255.9	19 - 37.9	d_N + 15.1	6.3	1.3	0.70	0.40	0.25	5.33
RSK4	200 - 255.9	256 - 649.9	38 - 199.9	d_N + 20.5	8.1	1.8	0.80	0.60	0.35	7.00
RSK8	256 - 649.9	650 - 999.9	200 - 255.9	d_N + 24.0	8.1	1.8	0.90	0.70	0.40	7.00
RSK5	650 - 999.9	-	256 - 649.9	d_N + 27.3	9.5	2.5	1.00	0.80	0.50	8.40
RSK5X	-	1,000 - 1,200	-	d_N + 27.3	9.5	2.5	1.00	0.80	0.50	8.40
RSK6***	-	-	650 - 999.9	d_N + 38.0	13.8	3.0	1.20	0.90	0.60	12.00
RSK6X***	1,000 - 2,600	-	-	d_N + 38.0	13.8	3.0	1.20	0.90	0.60	12.00

* At pressures > **40 MPa** use diameter tolerance H8/f8 (bore/rod) in the area behind seal or consult your local Trelleborg Sealing Solutions marketing company for alternative material or profiles.
Slydring® / Wear Rings are not applicable at very small radial clearances, please consult the Slydring® section in this catalog.

** For easier installation in closed grooves with small rod diameters < 40 mm.

*** All O-Rings with 12 mm cross section are delivered as a special profile ring.

ORDERING EXAMPLE

Turcon® Stepseal® 2K complete with O-Ring, standard application:

Series:	RSK4 from Table 12
Rod diameter:	d_N = 250.0 mm
TSS Part No.:	RSK402500 from Table 13

Select the material from Table 11. The corresponding code numbers are appended to the TSS Part No. Together these form the TSS Article Number. The TSS Article Number for all intermediate sizes can be determined by following the example:

TSS Article No. **RSK4 0 2500 - M12 N**

- RSK4 — TSS Series No.
- 0 — Type (Standard)
- 2500 — Rod Diameter x 10****
- - — Quality Index (Standard)
- M12 — Material Code (Seal Ring)
- N — Material code (O-Ring)

**** For diameters $d_n \geq$ 1,000.0 mm multiply only by factor 1.
Example: RSK6 for diameter d_n = 1,200.0 mm.
TSS Article No.: RSK6**X1200**-M12N.

Table 13: Installation Dimensions / TSS Part No.

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
3.0	7.9	2.2	RSK000030	4.80 x 1.80
4.0	**8.9**	**2.2**	**RSK000040**	**5.60 x 1.80**
5.0	**9.9**	**2.2**	**RSK000050**	**6.70 x 1.80**
6.0	**10.9**	**2.2**	**RSK000060**	**7.65 x 1.78**
7.0	11.9	2.2	RSK000070	8.75 x 1.80
8.0	**12.9**	**2.2**	**RSK000080**	**9.50 x 1.80**
8.0	**15.3**	**3.2**	**RSK100080**	**10.77 x 2.62**
9.0	13.9	2.2	RSK000090	10.82 x 1.78
9.0	16.3	3.2	RSK100090	10.77 x 2.62
10.0	**14.9**	**2.2**	**RSK000100**	**11.80 x 1.80**
10.0	**17.3**	**3.2**	**RSK100100**	**12.37 x 2.62**
12.0	**16.9**	**2.2**	**RSK000120**	**14.00 x 1.78**
12.0	**19.3**	**3.2**	**RSK100120**	**14.50 x 2.65**
12.7	17.6	2.2	RSK000127	14.00 x 1.78
12.7	20.0	3.2	RSK100127	15.54 x 2.62
14.0	**18.9**	**2.2**	**RSK000140**	**15.60 x 1.78**
14.0	**21.3**	**3.2**	**RSK100140**	**17.12 x 2.62**
15.0	19.9	2.2	RSK000150	17.17 x 1.78
15.0	22.3	3.2	RSK100150	18.00 x 2.65
16.0	**20.9**	**2.2**	**RSK000160**	**17.17 x 1.78**
16.0	**23.3**	**3.2**	**RSK100160**	**18.72 x 2.62**
17.0	21.9	2.2	RSK000170	18.77 x 1.78
18.0	**22.9**	**2.2**	**RSK000180**	**20.35 x 1.78**
18.0	**25.3**	**3.2**	**RSK100180**	**20.29 x 2.62**
19.0	29.7	4.2	RSK200190	23.40 x 3.53
20.0	**27.3**	**3.2**	**RSK100200**	**21.89 x 2.62**
20.0	**30.7**	**4.2**	**RSK200200**	**25.00 x 3.53**
22.0	**29.3**	**3.2**	**RSK100220**	**25.07 x 2.62**
22.0	**32.7**	**4.2**	**RSK200220**	**26.58 x 3.53**
24.0	31.3	3.2	RSK100240	26.64 x 2.62
25.0	**32.3**	**3.2**	**RSK100250**	**28.24 x 2.62**
25.0	**35.7**	**4.2**	**RSK200250**	**29.75 x 3.53**
25.4	32.7	3.2	RSK100254	28.24 x 2.62
25.4	36.1	4.2	RSK200254	29.75 x 3.53
26.0	33.3	3.2	RSK100260	28.24 x 2.62
26.0	36.7	4.2	RSK200260	29.75 x 3.53
28.0	**35.3**	**3.2**	**RSK100280**	**29.82 x 2.62**
28.0	**38.7**	**4.2**	**RSK200280**	**32.92 x 3.53**
28.575	35.875	3.2	RSK100286	31.42 x 2.62
30.0	37.3	3.2	RSK100300	32.99 x 2.62
30.0	40.7	4.2	RSK200300	34.52 x 3.53

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
32.0	**39.3**	**3.2**	**RSK100320**	**34.59 x 2.62**
32.0	**42.7**	**4.2**	**RSK200320**	**36.09 x 3.53**
34.0	44.7	4.2	RSK200340	37.69 x 3.53
35.0	42.3	3.2	RSK100350	37.77 x 2.62
35.0	45.7	4.2	RSK200350	37.69 x 3.53
36.0	**43.3**	**3.2**	**RSK100360**	**39.34 x 2.62**
36.0	**46.7**	**4.2**	**RSK200360**	**40.87 x 3.53**
37.0	44.3	3.2	RSK100370	39.34 x 2.62
37.0	47.7	4.2	RSK200370	40.87 x 3.53
38.0	48.7	4.2	RSK200380	40.87 x 3.53
38.0	53.1	6.3	RSK300380	43.82 x 5.33
40.0	**50.7**	**4.2**	**RSK200400**	**44.04 x 3.53**
40.0	**55.1**	**6.3**	**RSK300400**	**43.82 x 5.33**
42.0	52.7	4.2	RSK200420	47.22 x 3.53
42.0	57.1	6.3	RSK300420	46.99 x 5.33
43.0	53.7	4.2	RSK200430	47.22 x 3.53
44.4	59.5	6.3	RSK300444	50.17 x 5.33
45.0	**55.7**	**4.2**	**RSK200450**	**50.39 x 3.53**
45.0	**60.1**	**6.3**	**RSK300450**	**50.17 x 5.33**
48.0	58.7	4.2	RSK200480	53.57 x 3.53
48.0	63.1	6.3	RSK300480	53.34 x 5.33
50.0	**60.7**	**4.2**	**RSK200500**	**53.57 x 3.53**
50.0	**65.1**	**6.3**	**RSK300500**	**56.52 x 5.33**
50.8	61.5	4.2	RSK200508	53.57 x 3.53
50.8	65.9	6.3	RSK300508	56.52 x 5.33
52.0	62.7	4.2	RSK200520	56.74 x 3.53
52.0	67.1	6.3	RSK300520	56.52 x 5.33
54.0	69.1	6.3	RSK300540	59.69 x 5.33
55.0	65.7	4.2	RSK200550	59.92 x 3.53
55.0	70.1	6.3	RSK300550	59.69 x 5.33
56.0	**66.7**	**4.2**	**RSK200560**	**59.92 x 3.53**
56.0	**71.1**	**6.3**	**RSK300560**	**62.87 x 5.33**
56.0	**76.5**	**8.1**	**RSK400560**	**64 x 7.00**
57.0	72.1	6.3	RSK300570	62.87 x 5.33
59.0	69.7	4.2	RSK200590	63.09 x 3.53
60.0	70.7	4.2	RSK200600	63.09 x 3.53
60.0	75.1	6.3	RSK300600	66.04 x 5.33
63.0	**73.7**	**4.2**	**RSK200630**	**66.27 x 3.53**
63.0	**78.1**	**6.3**	**RSK300630**	**69.22 x 5.33**
63.5	78.6	6.3	RSK300635	69.22 x 5.33
65.0	75.7	4.2	RSK200650	69.44 x 3.53

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
65.0	80.1	6.3	RSK300650	69.22 x 5.33
67.0	77.7	4.2	RSK200670	72.62 x 3.53
69.0	84.1	6.3	RSK300690	75.57 x 5.33
70.0	**80.7**	**4.2**	**RSK200700**	**75.79 x 3.53**
70.0	**85.1**	**6.3**	**RSK300700**	**75.57 x 5.33**
70.0	**90.5**	**8.1**	**RSK400700**	**78 x 7.00**
72.0	82.7	4.2	RSK200720	75.79 x 3.53
73.0	88.1	6.3	RSK300730	78.74 x 5.33
75.0	85.7	4.2	RSK200750	78.97 x 3.53
75.0	90.1	6.3	RSK300750	81.92 x 5.33
76.2	91.3	6.3	RSK300762	81.92 x 5.33
78.0	93.1	6.3	RSK300780	85.09 x 5.33
80.0	**90.7**	**4.2**	**RSK200800**	**85.32 x 3.53**
80.0	**95.1**	**6.3**	**RSK300800**	**85.09 x 5.33**
80.0	**100.5**	**8.1**	**RSK400800**	**88 x 7.00**
82.5	97.6	6.3	RSK300825	88.27 x 5.33
83.0	93.7	4.2	RSK200830	88.49 x 3.53
85.0	95.7	4.2	RSK200850	88.49 x 3.53
85.0	100.1	6.3	RSK300850	91.44 x 5.33
85.0	105.5	8.1	RSK400850	93 x 7.00
89.0	104.1	6.3	RSK300890	94.62 x 5.33
90.0	**100.7**	**4.2**	**RSK200900**	**94.84 x 3.53**
90.0	**105.1**	**6.3**	**RSK300900**	**94.62 x 5.33**
90.0	**110.5**	**8.1**	**RSK400900**	**98 x 7.00**
92.0	102.7	4.2	RSK200920	98.02 x 3.53
92.0	107.1	6.3	RSK300920	97.79 x 5.33
95.0	105.7	4.2	RSK200950	101.19 x 3.53
95.0	110.1	6.3	RSK300950	100.97 x 5.33
100.0	**110.7**	**4.2**	**RSK201000**	**104.37 x 3.53**
100.0	**115.1**	**6.3**	**RSK301000**	**107.32 x 5.33**
100.0	**120.5**	**8.1**	**RSK401000**	**108 x 7.00**
101.6	116.7	6.3	RSK301016	107.32 x 5.33
104.7	119.8	6.3	RSK301047	110.49 x 5.33
105.0	120.1	6.3	RSK301050	110.49 x 5.33
105.0	125.5	8.1	RSK401050	113.67 x 7.00
110.0	**120.7**	**4.2**	**RSK201100**	**113.89 x 3.53**
110.0	**125.1**	**6.3**	**RSK301100**	**116.84 x 5.33**
110.0	**130.5**	**8.1**	**RSK401100**	**116.84 x 7.00**
115.0	130.1	6.3	RSK301150	120.02 x 5.33
120.0	135.1	6.3	RSK301200	126.37 x 5.33
120.0	140.5	8.1	RSK401200	129.54 x 7.00

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
125.0	**140.1**	**6.3**	**RSK301250**	**129.54 x 5.33**
125.0	**145.5**	**8.1**	**RSK401250**	**132.72 x 7.00**
125.4	140.5	6.3	RSK301254	132.72 x 5.33
127.0	142.1	6.3	RSK301270	132.72 x 5.33
130.0	145.1	6.3	RSK301300	135.89 x 5.33
130.0	150.5	8.1	RSK401300	139.07 x 7.00
132.0	147.1	6.3	RSK301320	139.07 x 5.33
135.0	145.7	4.2	RSK201350	139.29 x 3.53
135.0	150.1	6.3	RSK301350	142.24 x 5.33
137.0	152.1	6.3	RSK301370	142.24 x 5.33
138.0	153.1	6.3	RSK301380	142.24 x 5.33
140.0	150.7	4.2	RSK201400	145.64 x 3.53
140.0	**155.1**	**6.3**	**RSK301400**	**145.42 x 5.33**
140.0	160.5	8.1	RSK401400	148.59 x 7.00
140.5	155.6	6.3	RSK301405	145.42 x 5.33
145.0	160.1	6.3	RSK301450	151.77 x 5.33
145.0	165.5	8.1	RSK401450	151.77 x 7.00
150.0	165.1	6.3	RSK301500	158.12 x 5.33
150.0	170.5	8.1	RSK401500	158.12 x 7.00
153.0	168.1	6.3	RSK301530	158.12 x 5.33
155.0	170.1	6.3	RSK301550	158.12 x 5.33
160.0	**175.1**	**6.3**	**RSK301600**	**164.47 x 5.33**
160.0	**180.5**	**8.1**	**RSK401600**	**170.82 x 7.00**
165.0	180.1	6.3	RSK301650	170.82 x 5.33
170.0	185.1	6.3	RSK301700	177.17 x 5.33
170.0	190.5	8.1	RSK401700	177.17 x 7.00
173.0	188.1	6.3	RSK301730	177.17 x 5.33
175.0	190.1	6.3	RSK301750	183.52 x 5.33
180.0	**195.1**	**6.3**	**RSK301800**	**183.52 x 5.33**
180.0	**200.5**	**8.1**	**RSK401800**	**189.87 x 7.00**
185.0	200.1	6.3	RSK301850	189.87 x 5.33
185.0	205.5	8.1	RSK401850	196.22 x 7.00
190.0	205.1	6.3	RSK301900	196.22 x 5.33
190.0	210.5	8.1	RSK401900	196.22 x 7.00
195.0	210.1	6.3	RSK301950	202.57 x 5.33
200.0	**215.1**	**6.3**	**RSK302000**	**208.92 x 5.33**
200.0	**220.5**	**8.1**	**RSK402000**	**208.90 x 7.00**
205.0	225.5	8.1	RSK402050	215.27 x 7.00
210.0	230.5	8.1	RSK402100	215.27 x 7.00
211.0	231.5	8.1	RSK402110	215.27 x 7.00
212.0	232.5	8.1	RSK402120	227.97 x 7.00

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
215.0	235.5	8.1	RSK402150	227.97 x 7.00
220.0	**240.5**	**8.1**	**RSK402200**	**227.97 x 7.00**
225.0	245.5	8.1	RSK402250	240.67 x 7.00
230.0	245.1	6.3	RSK302300	234.32 x 5.33
230.0	250.5	8.1	RSK402300	240.67 x 7.00
235.0	255.5	8.1	RSK402350	240.67 x 7.00
240.0	260.5	8.1	RSK402400	253.37 x 7.00
245.0	265.5	8.1	RSK402450	253.37 x 7.00
250.0	**270.5**	**8.1**	**RSK402500**	**266.07 x 7.00**
260.0	284.0	8.1	RSK802600	266.07 x 7.00
265.0	289.0	8.1	RSK802650	278.77 x 7.00
270.0	290.5	8.1	RSK402700	278.77 x 7.00
270.0	294.0	8.1	RSK802700	278.77 x 7.00
275.0	299.0	8.1	RSK802750	291.47 x 7.00
280.0	**304.0**	**8.1**	**RSK802800**	**291.47 x 7.00**
285.0	309.0	8.1	RSK802850	291.47 x 7.00
290.0	314.0	8.1	RSK802900	304.17 x 7.00
295.0	319.0	8.1	RSK802950	304.17 x 7.00
300.0	320.5	8.1	RSK403000	304.17 x 7.00
300.0	324.0	8.1	RSK803000	316.87 x 7.00
310.0	334.0	8.1	RSK803100	316.87 x 7.00
320.0	**344.0**	**8.1**	**RSK803200**	**329.57 x 7.00**
330.0	354.0	8.1	RSK803300	342.27 x 7.00
340.0	364.0	8.1	RSK803400	354.97 x 7.00
350.0	370.5	8.1	RSK403500	354.97 x 7.00
350.0	374.0	8.1	RSK803500	367.67 x 7.00
360.0	**384.0**	**8.1**	**RSK803600**	**367.67 x 7.00**
365.0	389.0	8.1	RSK803650	380.37 x 7.00
370.0	394.0	8.1	RSK803700	380.37 x 7.00
375.0	399.0	8.1	RSK803750	393.07 x 7.00
380.0	404.0	8.1	RSK803800	393.07 x 7.00
390.0	414.0	8.1	RSK803900	405.26 x 7.00
400.0	424.0	8.1	RSK804000	417.96 x 7.00
410.0	434.0	8.1	RSK804100	417.96 x 7.00
420.0	444.0	8.1	RSK804200	430.66 x 7.00
430.0	454.0	8.1	RSK804300	443.36 x 7.00
435.0	459.0	8.1	RSK804350	443.36 x 7.00
440.0	464.0	8.1	RSK804400	456.06 x 7.00
450.0	474.0	8.1	RSK804500	468.76 x 7.00
460.0	484.0	8.1	RSK804600	468.76 x 7.00
470.0	494.0	8.1	RSK804700	481.38 x 7.00

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
480.0	504.0	8.1	RSK804800	494.16 x 7.00
485.0	509.0	8.1	RSK804850	494.16 x 7.00
490.0	514.0	8.1	RSK804900	506.86 x 7.00
500.0	524.0	8.1	RSK805000	506.86 x 7.00
510.0	534.0	8.1	RSK805100	532.26 x 7.00
520.0	544.0	8.1	RSK805200	532.26 x 7.00
525.0	549.0	8.1	RSK805250	532.26 x 7.00
530.0	554.0	8.1	RSK805300	557.66 x 7.00
540.0	564.0	8.1	RSK805400	557.66 x 7.00
550.0	574.0	8.1	RSK805500	557.66 x 7.00
560.0	584.0	8.1	RSK805600	582.68 x 7.00
570.0	594.0	8.1	RSK805700	582.68 x 7.00
580.0	604.0	8.1	RSK805800	608.08 x 7.00
585.0	609.0	8.1	RSK805850	608.08 x 7.00
590.0	614.0	8.1	RSK805900	608.08 x 7.00
600.0	624.0	8.1	RSK806000	608.08 x 7.00
610.0	634.0	8.1	RSK806100	633.48 x 7.00
620.0	644.0	8.1	RSK806200	633.48 x 7.00
630.0	654.0	8.1	RSK806300	658.88 x 7.00
640.0	664.0	8.1	RSK806400	658.88 x 7.00
650.0	677.3	9.5	RSK506500	663.00 x 8.40
656.0	683.3	9.5	RSK506560	669.00 x 8.40
660.0	687.3	9.5	RSK506600	673.00 x 8.40
680.0	707.3	9.5	RSK506800	693.00 x 8.40
685.0	712.3	9.5	RSK506850	698.00 x 8.40
700.0	724.0	8.1	RSK807000	712.00 x 7.00
700.0	727.3	9.5	RSK507000	713.00 x 8.40
710.0	737.3	9.5	RSK507100	723.00 x 8.40
730.0	757.3	9.5	RSK507300	743.00 x 8.40
760.0	787.3	9.5	RSK507600	773.00 x 8.40
765.0	792.3	9.5	RSK507650	778.00 x 8.40
780.0	807.3	9.5	RSK507800	793.00 x 8.40
790.0	817.3	9.5	RSK507900	803.00 x 8.40
800.0	827.3	9.5	RSK508000	813.00 x 8.40
810.0	837.3	9.5	RSK508100	823.00 x 8.40
820.0	847.3	9.5	RSK508200	833.00 x 8.40
830.0	857.3	9.5	RSK508300	843.00 x 8.40
850.0	877.3	9.5	RSK508500	863.00 x 8.40
870.0	897.3	9.5	RSK508700	883.00 x 8.40
880.0	907.3	9.5	RSK508800	893.00 x 8.40
885.0	912.3	9.5	RSK508850	898.00 x 8.40

Rod Dia.	Groove Dia.	Groove Width	TSS Part No.	O-Ring Size
d_N f8/h9	D_1 H9	L_1 +0.2		
890.0	917.3	9.5	RSK508900	903.00 x 8.40
930.0	957.3	9.5	RSK509300	943.00 x 8.40
955.0	982.3	9.5	RSK509550	968.00 x 8.40
1,000.0	1,038.0	13.8	RSK6X1000	1,016.00 x 12.00
1,035.0	1,073.0	13.8	RSK6X1035	1,051.00 x 12.00
1,040.0	1,067.3	9.5	RSK5X1040	1,052.00 x 8.40
1,040.0	1,078.0	13.8	RSK6X1040	1,056.00 x 12.00
1,050.0	1,077.3	9.5	RSK5X1050	1,062.00 x 8.40
1,050.0	1,088.0	13.8	RSK6X1050	1,066.00 x 12.00
1,100.0	1,138.0	13.8	RSK6X1100	1,116.00 x 12.00
1,120.0	1,147.3	9.5	RSK5X1120	1,132.00 x 8.40
1,120.0	1,158.0	13.8	RSK6X1120	1,136.00 x 12.00
1,200.0	1,227.3	9.5	RSK5X1200	1,212.00 x 8.40
1,200.0	1,238.0	13.8	RSK6X1200	1,216.00 x 12.00
1,330.0	1,368.0	13.8	RSK6X1330	1,346.00 x 12.00
1,500.0	1,538.0	13.8	RSK6X1500	1,516.00 x 12.00
1,600.0	1,638.0	13.8	RSK6X1600	1,616.00 x 12.00
2,000.0	2,038.0	13.8	RSK6X2000	2,016.00 x 12.00
2,600.0	2,638.0	13.8	RSK6X2600	2,616.00 x 12.00

The rod diameters in **bold** type are in accordance with the recommendations of ISO 3320.

Other dimensions and all intermediate sizes up to 2,600 mm diameter including imperial (inch) sizes can be supplied.

All O-Rings with 12 mm cross section are delivered as special profile ring.

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Turcon® Stepseal® V

Single-acting

Rubber-energized plastic-faced seal

Material:
Turcon®, Zurcon® and Elastomer

■ Turcon® Stepseal® V*

Description

Stepseal® V is based on the dynamic, unidirectional Turcon® Stepseal® sealing concept. During the extending stroke of the rod, the contact force on the sealing edge creates high local sealing pressure and limits the formation of fluid film under the seal. When the rod is retracted, the Stepseal® sealing face supports hydrodynamic back-pumping of the fluid film, and ensures leak-free sealing efficiency with low friction and long service life.

In long-stroke cylinders and equipment operating with low speed during retraction, it has been found that hydrodynamic back-pumping may become insufficient to prevent build-up of pressure in the seal system behind the primary seal. Pressure build-up in the seal system leads to leakage, increased friction and wear, and may ultimately require replacement of the seals. The usual precaution in such equipment has been to provide space for a buffer volume behind the primary seal or to install a drain line.

First invented by Trelleborg Sealing Solutions, the built-in check valve function eliminates pressure build-up and so render buffer volumes and drain lines obsolete.

Stepseal® V has the efficient seal performance and outstanding service life of the Turcon® Stepseal® range and the reliable prevention of pressure build-up brought by a refined check valve function. Stepseal® V is available in high-grade Turcon® or Zurcon® materials with outstanding sliding and wear resistance properties.

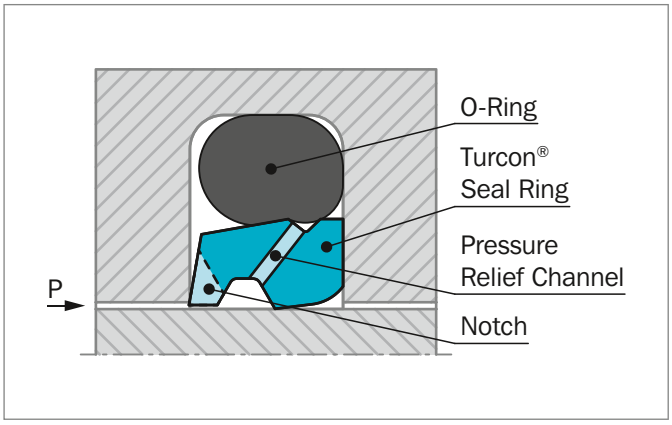


Figure 23: Turcon® Stepseal® V with tight axial groove fit

ADVANTAGES

- Check valve function of O-Ring eliminates risk of fluid bypassing the seal during pressure loading when pressurized
- No pressure build-up on secondary sealing element and Excluder®
- Independent of any speed relation of counter surface
- Independent of stroke length
- High tolerance to hardware non-concentricity and radial play
- Minimum contribution of friction of secondary sealing element and/or Excluder®
- Minimum wear of secondary sealing element and/or Excluder®
- Increased leakage control
- Prolonged seal life
- Increased operational reliability
- Fits standard Stepseal® 2K groove dimensions as well as ISO 7425 seal housings

APPLICATION EXAMPLES

- Mobile hydraulics
- Construction equipment
- Crane boom cylinders
- Presses
- Injection molding machines
- Clamp cylinders
- Wind power cylinders
- Long stroke cylinders
- Waterpower cylinders
- Storm barrier cylinders
- Tensioner cylinders
- Theater hydraulics
- Safety systems

* Patent DE 9654357; 24. 2. 996

CHARACTERISTICS

- Primary seal with hydrostatic ventilation
- Check valve function
- Hydrodynamic back-pumping
- Stabilized position in the groove
- Prolonged seal life
- Increased leakage control

IMPROVED FRICTION PERFORMANCE

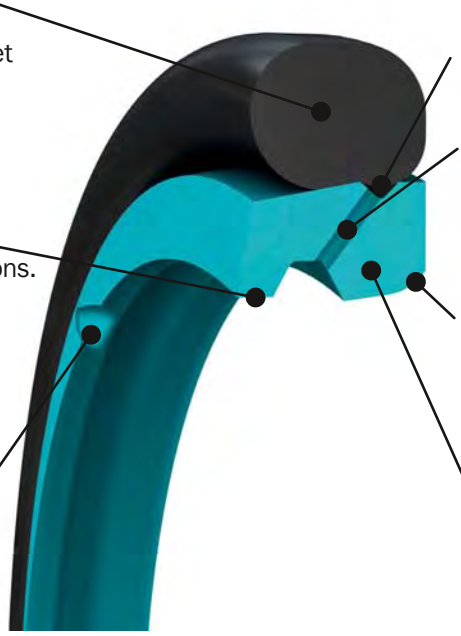
Turcon® Stepseal® V offers a uniform, low friction characteristic to the sealing system throughout its whole life by preventing undefined pressurization of the secondary seal element.

FEATURES

Stepseal® V has been developed to meet continuously increasing demands on sealing systems. In dynamic applications, Stepseal® V brings efficient, reliable sealing performance under even the most demanding service conditions. The high seal efficiency and refined valve function of Stepseal® V eliminates seal system pressure build-up between tandem rod seal configuration and makes buffer volume between the seals a thing of the past.

In rod seal systems, Stepseal® V is preferably used together with a secondary seal from the range of Turcon® and Zurcon® rod seals, or with only a double-acting Turcon® Excluder® or Scraper.

Applied as a piston seal, Stepseal® V is used with a double-acting seal from the Turcon® range of piston seals. Under extreme performance requirements Stepseal® V offers improved leakage control, extended service life and increased reliability.



Elastomer O-Ring
High flexibility to satisfy hardware tolerances and movement.
Elastomer materials available to meet a wide variety of service conditions.
Pressure relief valve function

Stabilizing Edge
Prevents seal deformation under the most demanding service conditions.
Protects the seal face during installation.
Scraping edge prevents contamination of the sealing lip.
Scraping edge prevents contamination from embedding into the sealing lip.

Notch
Ensures rapid pressure actuation and pressure balancing.

Machined Valve Groove
Provides robust performance of the relief function independently of hardware deflection.

Patented Hydrostatic Pressure Relief Channel
Prevents pressure trap between seals under all service conditions. Prolongs life of sealing system.

Contoured Rear Chamfer
For hydrodynamic back-pumping
Improved back-pumping of residual oil film for increased sealing efficiency.
Increased radial clearance.

Turcon® and Zurcon® Material
Low friction, no stick-slip. High sealing efficiency and long service life.
Meets demanding service conditions.
High flexibility for easy installation.

Figure 24: Turcon® Stepseal® V design features

OPERATING CONDITIONS

Pressure:	Up to 50 MPa (Turcon® M12) Up to 60 MPa (Turcon® T08 and Zurcon® Z53
Speed:	Up to 15 m/s with linear movements, frequency up to 15 Hz
Temperature:	-45 °C to +200 °C depending on seal and O-Ring material
Media:	Mineral oil based hydraulic fluids, flame retardant hydraulic fluids, environmentally friendly hydraulic fluids (bio-oils), phosphate ester, water and others, depending on the seal and O-Ring material - see Table 15.
Clearance:	The maximum permissible radial clearance S_{max} is shown in Table 16, as a function of the operating pressure and functional diameter.

IMPORTANT NOTE

The above data are maximum values and cannot be used at the same time, e.g. the maximum operating speed depends on material type, pressure, temperature and gap value. Temperature range also depends on media.

SERIES

Different cross section sizes are recommended as a function of the seal diameters. Table 14 shows the relationship between the series number according to the seal diameter range and the different application class sizes:

Standard application:	General applications without exceptional operating conditions.
Light application:	Applications with demands for reduced friction or for smaller grooves.
Heavy-duty application:	For exceptional operating loads such as high pressures, pressure peaks, etc.

Table 14: Available Range

Series No.	Rod Diameter d_N f8/h9
RSV20	12.0 - 455.0
RSV30	12.0 - 655.0
RSV40	38.0 - 655.0
RSV80	140.0 - 999.9
RSV50	160.0 - 999.9
RSV5X	1,000.0 - 1,200.0
RSV60	650.0 - 999.9
RSV6X	1,000.0 - 2,600.0

For the Standard Recommendations Application range see Table 14.

REDUNDANT SEALING SYSTEM

In many applications, secondary seal systems are needed. Figure 25 shows such a tandem configuration with the Stepseal® V.

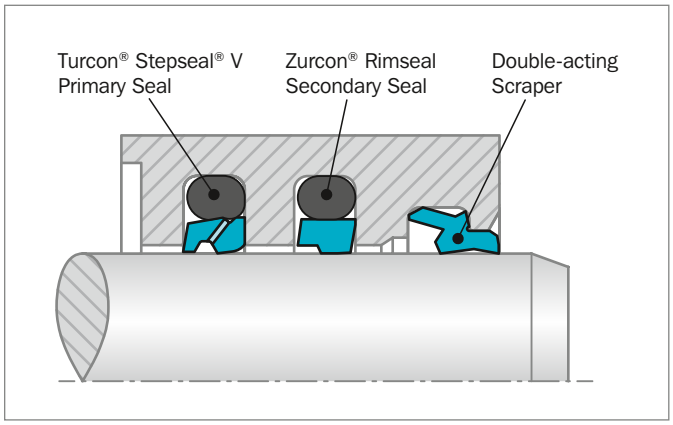


Figure 25: Turcon® Stepseal® 2K and Zurcon® Rimseal in tandem configuration

The integrated check valve function of Stepseal® V renders pressure trapping between the primary and secondary seal impossible and a dedicated buffer volume between them is unnecessary.

Depending on the application and the operating conditions, the combination of different materials offers a further improvement in the sealing efficiency and the service life of the system. For example in hydraulic cylinders subject to high loads and under rough operating conditions the primary seal should be made of Turcon® and the secondary seal of Zurcon® .

INSTALLATION INSTRUCTIONS

Stepseal® V is installed according to information on page 37 to 38

Closed groove installation applies the same dimensions as for Turcon® Stepseal® 2K in Table 6 auf Seite 38.

RECOMMENDED MATERIALS

The following material combinations have proven effective for hydraulic applications:

Turcon® Stepseal® V in Turcon® M12
All-round material for light to heavy hydraulic applications with linear, short stroke or helical movements in mineral oils, flame retardant hydraulic fluids, phospate ester, bio-oils or fluids with low lubricating properties:

O-Ring:	NBR 70 Shore A	N
	FKM 70 Shore A	V

Set code: M12N or M12V

Turcon® Stepseal® V in Turcon® T46
For medium to heavy applications with linear movements in mineral oils and other media with good lubrication:

O-Ring:	NBR 70 Shore A	N
	FKM 70 Shore A	V

Set code: T46N or T46V

For specific applications, all Turcon® materials are available.

Other material combinations are listed in Table 15.

Table 15: Turcon® and Zurcon® Materials for Stepseal® V

Material, Applications, Properties	Code	O–Ring Material Shore A	Code	O-Ring Operating Temp.* °C	Mating Surface Material	MPa max. Dyna-mic
Turcon® M12 First material choice for seals in linear motion Overall improved properties For new constructions and updating For all commonly applied hydraulic fluids including fluids with low lubrication performance Lowest friction and best sliding properties Lowest wear on seals Improved absorption of abrasive contaminants Low wear or abrasion of counter surface BAM tested Mineral fiber and Additives filled Color: Dark gray	M12	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Steel plated (rod) Cast iron Stainless steel Titanium	50
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
Turcon® T05 For lubricating fluids Also for gas service Very low friction Very good sliding and sealing properties Color: Turquoise	T05	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod)	20
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
Turcon® T08 For lubricating fluids and linear motion Very high compressive strength and extrusion resistance Hard counter surfaces are recommended Bronze filled Color: Light to dark brown, which may have variations in shading	T08	NBR 70	N	-30 to +100	Steel hardened Steel chrome plated (rod) Cast iron	60
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
Turcon® T10 For hydraulic and pneumatic For lubricating and non-lubricating fluids High extrusion resistance Good chemical resistance Not for electrically conducting fluids BAM tested Carbon, graphite filled Color: Black	T10	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Stainless steel	40
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
		EPDM 70	E**	-45 to +145		
Turcon® T29 For lubricating and non-lubricating fluids Good extrusion resistance Surface texture is not suitable for gas sealing Not for electrically conducting fluids Carbon fiber filled Color: Gray	T29	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Cast iron Stainless steel	30
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
		EPDM 70	E**	-45 to +145		

Table continues on next page

Material, Applications, Properties	Code	O–Ring Material Shore A	Code	O-Ring Operating Temp.* °C	Mating Surface Material	MPa max. Dyna-mic
Turcon® T40 For lubricating and non-lubricating fluids High frequency and short strokes Water hydraulics Surface texture is not suitable for gas sealing Carbon fiber filled Color: Gray	T40	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Cast iron Stainless steel Aluminum	25
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
		EPDM 70	E**	-45 to +145		
Turcon® T46 For lubricated hydraulics in linear motion High compressive strength High extrusion resistance Very good sliding and wear properties BAM tested Bronze filled Color: Light to dark brown, which may have variations in shading	T46	NBR 70	N	-30 to +100	Steel hardened Steel chrome plated (rod) Cast iron	50
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
Zurcon® Z53*** For mineral oil based fluids Very high abrasion and extrusion resistance For counter surface with rougher surface finish Limited chemical resistance Max. working temperature +110 °C Cast polyurethane Color: Yellow to light-brown	Z53	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Cast iron Stainless steel Ceramic coating	60
		NBR 70 Low temp.	T	-45 to +80		
Zurcon® Z80 For lubricating and non-lubricating fluids Water based fluids, air and gases Dry air pneumatics High abrasion and extrusion resistance For service in abrasive conditions and media with particles Good chemical resistance Limited temperature capability (-60 to +80 °C) UHMWPE (Ultra High Molecular Weight Polyethylene) Color: White to off-white	Z80	NBR 70	N	-30 to (+100)	Steel Steel hardened Steel chrome plated (rod) Stainless steel Aluminum Ceramic coating	35
		NBR 70 Low temp.	T	-45 to +80		
		EPDM 70	E**	-45 to (+145)		

* The O-Ring operation temperature is only valid in mineral hydraulic oil (except EPDM).

** Material not suitable for mineral oils.

*** Max. diameter 2,200 mm.

BAM: Tested by “Bundesanstalt Materialprufung, Germany”.

Highlighted materials are recommended.

■ Installation Recommendation

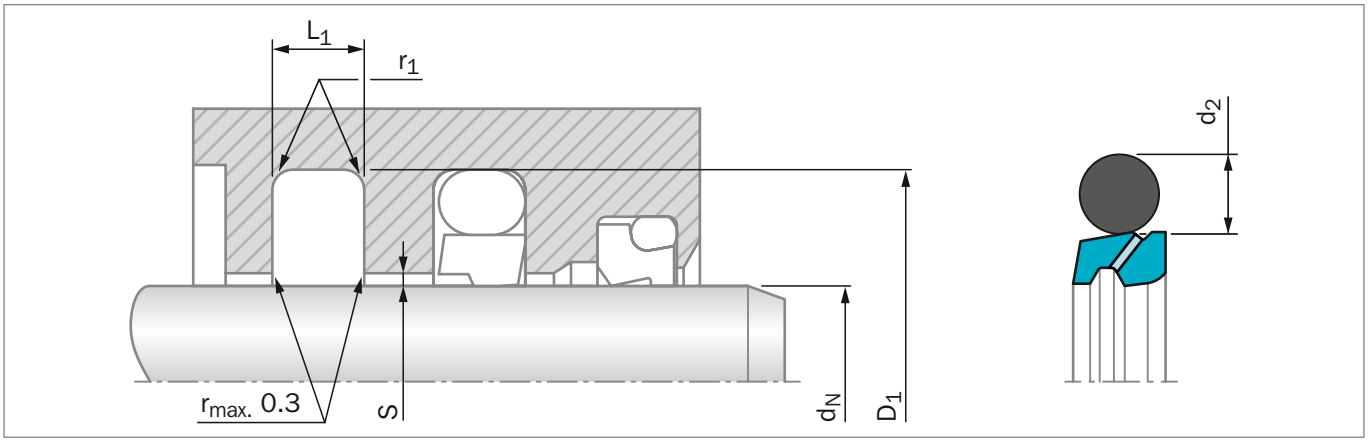


Figure 26: Installation Drawing

Table 16: Installation Dimensions – Standard Recommendations

Series No.	Rod Diameter d_N f8/h9			Groove Diameter	Groove Width	Radius	Radial Clearance S_{max}*			O-Ring Cross Section
	Standard Application	Light Application	Heavy Duty Application	D_1 H9	L_1 +0.2	r_1 max	10 MPa	20 MPa	40 MPa	d_2
RSV2	12 - 37.9	38 - 199.9	-	d_N + 10.7	4.2	1.0	0.50	0.30	0.20	3.53
RSV3	38 - 199.9	200 - 255.9	19 - 37.9	d_N + 15.1	6.3	1.3	0.70	0.40	0.25	5.33
RSV4	200 - 255.9	256 - 649.9	38 - 199.9	d_N + 20.5	8.1	1.8	0.80	0.60	0.35	7.00
RSV8	256 - 649.9	650 - 999.9	200 - 255.9	d_N + 24.0	8.1	1.8	0.90	0.70	0.40	7.00
RSV5	650 - 999.9	-	256 - 649.9	d_N + 27.3	9.5	2.5	1.00	0.80	0.50	8.40
RSV5X	-	1,000 - 1,200	-	d_N + 27.3	9.5	2.5	1.00	0.80	0.50	8.40
RSV6**	-	-	650 - 999.9	d_N + 38.0	13.8	3.0	1.20	0.90	0.60	12.00
RSV6X**	1,000 - 2,600	-	-	d_N + 38.0	13.8	3.0	1.20	0.90	0.60	12.00

* At pressures > **40 MPa** use diameter tolerance H8/f8 (bore/rod) in the area behind seal or consult your local Trelleborg Sealing Solutions marketing company for alternative material or profiles.
Slydring® / Wear Rings are not applicable at very small radial clearances please consult the Slydring® section in this catalog.

** All O-Rings with 12 mm cross section are delivered as a special profile ring.

ORDERING EXAMPLE

Turcon® Stepseal® V complete with O-Ring, standard application:

Series:	RSV4 from Table 16
Rod diameter:	d_N = 250.0 mm
TSS Part No.:	RSV402500 from Table 17

Select the material from Table 15. The corresponding code numbers are appended to the TSS Part No. Together these form the TSS Article Number. The TSS Article Number for all intermediate sizes can be determined by following the example:

TSS Article No. **RSV4 0 2500 - M12 N**

- Series No.
- Type (Standard)
- Rod Diameter x 10***
- Quality Index (Standard)
- Material Code (Seal Ring)
- Material Code (O-Ring)

*** For diameters $d_N \geq$ 1,000.0 mm multiply only by factor 1.
Example: RSV6 for diameter d_N = 1,200.0 mm.
TSS Article No.: RSV6**X1200** -M12N

Table 17: Installation Dimensions / TSS Part No.

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
12.0	**22.7**	**4.2**	**RSV200120**	**17.04 x 3.53**
15.0	25.7	4.2	RSV200150	18.66 x 3.53
19.0	29.7	4.2	RSV200190	23.40 x 3.53
20.0	**30.7**	**4.2**	**RSV200200**	**25.00 x 3.53**
22.0	**32.7**	**4.2**	**RSV200220**	**26.58 x 3.53**
25.0	**35.7**	**4.2**	**RSV200250**	**29.75 x 3.53**
25.4	36.1	4.2	RSV200254	29.75 x 3.53
26.0	36.7	4.2	RSV200260	29.75 x 3.53
28.0	**38.7**	**4.2**	**RSV200280**	**32.92 x 3.53**
30.0	40.7	4.2	RSV200300	34.52 x 3.53
32.0	**42.7**	**4.2**	**RSV200320**	**36.09 x 3.53**
35.0	45.7	4.2	RSV200350	37.69 x 3.53
36.0	**46.7**	**4.2**	**RSV200360**	**40.87 x 3.53**
37.0	47.7	4.2	RSV200370	40.87 x 3.53
38.0	48.7	4.2	RSV200380	40.87 x 3.53
38.0	53.1	6.3	RSV300380	43.82 x 5.33
40.0	**50.7**	**4.2**	**RSV200400**	**44.04 x 3.53**
40.0	**55.1**	**6.3**	**RSV300400**	**43.82 x 5.33**
42.0	52.7	4.2	RSV200420	47.22 x 3.53
42.0	57.1	6.3	RSV300420	46.99 x 5.33
43.0	53.7	4.2	RSV200430	47.22 x 3.53
44.45	59.5	6.3	RSV300444	50.17 x 5.33
45.0	**55.7**	**4.2**	**RSV200450**	**50.39 x 3.53**
45.0	**60.1**	**6.3**	**RSV300450**	**50.17 x 5.33**
48.0	58.7	4.2	RSV200480	53.57 x 3.53
48.0	63.1	6.3	RSV300480	53.34 x 5.33
50.0	**60.7**	**4.2**	**RSV200500**	**53.57 x 3.53**
50.0	**65.1**	**6.3**	**RSV300500**	**56.52 x 5.33**
50.8	61.5	4.2	RSV200508	53.57 x 3.53
50.8	65.9	6.3	RSV300508	56.52 x 5.33
52.0	62.7	4.2	RSV200520	56.74 x 3.53
52.0	67.1	6.3	RSV300520	56.52 x 5.33
54.0	69.1	6.3	RSV300540	59.69 x 5.33
55.0	65.7	4.2	RSV200550	59.92 x 3.53
55.0	70.1	6.3	RSV300550	59.69 x 5.33
56.0	**66.7**	**4.2**	**RSV200560**	**59.92 x 3.53**
56.0	**71.1**	**6.3**	**RSV300560**	**62.87 x 5.33**
57.1	67.8	4.2	RSV200571	59.92 x 3.53
59.0	69.7	4.2	RSV200590	63.09 x 3.53
60.0	70.7	4.2	RSV200600	63.09 x 3.53
60.0	75.1	6.3	RSV300600	66.04 x 5.33
63.0	**73.7**	**4.2**	**RSV200630**	**66.27 x 3.53**
63.0	**78.1**	**6.3**	**RSV300630**	**69.22 x 5.33**
63.5	78.6	6.3	RSV300635	69.22 x 5.33
65.0	75.7	4.2	RSV200650	69.44 x 3.53
65.0	80.1	6.3	RSV300650	69.22 x 5.33
67.0	77.7	4.2	RSV200670	72.62 x 3.53
69.0	84.1	6.3	RSV300690	75.57 x 5.33
70.0	**80.7**	**4.2**	**RSV200700**	**75.79 x 3.53**
70.0	**85.1**	**6.3**	**RSV300700**	**75.57 x 5.33**
70.0	**90.5**	**8.1**	**RSV400700**	**78.00 x 7.00**
72.0	82.7	4.2	RSV200720	75.79 x 3.53
73.0	88.1	6.3	RSV300730	78.74 x 5.33
75.0	85.7	4.2	RSV200750	78.97 x 3.53
75.0	90.1	6.3	RSV300750	81.92 x 5.33
75.0	95.5	8.1	RSV400750	83.00 x 7.00
76.2	91.3	6.3	RSV300762	81.92 x 5.33
78.0	93.1	6.3	RSV300780	85.09 x 5.33
78.0	98.5	8.1	RSV400780	86.00 x 7.00
80.0	**90.7**	**4.2**	**RSV200800**	**85.32 x 3.53**
80.0	**95.1**	**6.3**	**RSV300800**	**85.09 x 5.33**
80.0	**100.5**	**8.1**	**RSV400800**	**88.00 x 7.00**
82.5	97.6	6.3	RSV300825	88.27 x 5.33
83.0	93.7	4.2	RSV200830	88.49 x 3.53
85.0	95.7	4.2	RSV200850	88.49 x 3.53
85.0	100.1	6.3	RSV300850	91.44 x 5.33
85.0	105.5	8.1	RSV400850	93.00 x 7.00
89.0	104.1	6.3	RSV300890	94.62 x 5.33
90.0	**100.7**	**4.2**	**RSV200900**	**94.84 x 3.53**
90.0	**105.1**	**6.3**	**RSV300900**	**94.62 x 5.33**
90.0	**110.5**	**8.1**	**RSV400900**	**98.00 x 7.00**
92.0	102.7	4.2	RSV200920	98.02 x 3.53
92.0	107.1	6.3	RSV300920	97.79 x 5.33
95.0	105.7	4.2	RSV200950	101.19 x 3.53
95.0	110.1	6.3	RSV300950	100.97 x 5.33
95.0	115.5	8.1	RSV400950	103.00 x 7.00
100.0	**110.7**	**4.2**	**RSV201000**	**104.37 x 3.53**
100.0	**115.1**	**6.3**	**RSV301000**	**107.32 x 5.33**

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
100.0	**120.5**	**8.1**	**RSV401000**	**108.00 x 7.00**
101.6	116.7	6.3	RSV301016	107.32 x 5.33
105.0	120.1	6.3	RSV301050	110.49 x 5.33
105.0	125.5	8.1	RSV401050	113.67 x 7.00
110.0	120.7	4.2	RSV201100	113.89 x 3.53
110.0	**125.1**	**6.3**	**RSV301100**	**116.84 x 5.33**
110.0	**130.5**	**8.1**	**RSV401100**	**116.84 x 7.00**
115.0	130.1	6.3	RSV301150	120.02 x 5.33
120.0	135.1	6.3	RSV301200	126.37 x 5.33
120.0	140.5	8.1	RSV401200	129.54 x 7.00
125.0	**140.1**	**6.3**	**RSV301250**	**129.54 x 5.33**
125.0	**145.5**	**8.1**	**RSV401250**	**132.72 x 7.00**
125.4	140.5	6.3	RSV301254	132.72 x 5.33
127.0	142.1	6.3	RSV301270	132.72 x 5.33
130.0	145.1	6.3	RSV301300	135.89 x 5.33
130.0	150.5	8.1	RSV401300	139.07 x 7.00
132.0	147.1	6.3	RSV301320	139.07 x 5.33
135.0	145.7	4.2	RSV201350	139.29 x 3.53
135.0	150.1	6.3	RSV301350	142.24 x 5.33
137.0	152.1	6.3	RSV301370	142.24 x 5.33
138.0	153.1	6.3	RSV301380	142.24 x 5.33
140.0	**150.7**	**4.2**	**RSV201400**	**145.64 x 3.53**
140.0	**155.1**	**6.3**	**RSV301400**	**145.42 x 5.33**
140.0	**160.5**	**8.1**	**RSV401400**	**148.59 x 7.00**
140.5	155.6	6.3	RSV301405	145.42 x 5.33
145.0	160.1	6.3	RSV301450	151.77 x 5.33
145.0	165.5	8.1	RSV401450	151.77 x 7.00
150.0	165.1	6.3	RSV301500	158.12 x 5.33
150.0	170.5	8.1	RSV401500	158.12 x 7.00
153.0	168.1	6.3	RSV301530	158.12 x 5.33
155.0	170.1	6.3	RSV301550	158.12 x 5.33
160.0	**175.1**	**6.3**	**RSV301600**	**164.47 x 5.33**
160.0	**180.5**	**8.1**	**RSV401600**	**170.82 x 7.00**
165.0	180.1	6.3	RSV301650	170.82 x 5.33
170.0	185.1	6.3	RSV301700	177.17 x 5.33
170.0	190.5	8.1	RSV401700	177.17 x 7.00
173.0	188.1	6.3	RSV301730	177.17 x 5.33
175.0	190.1	6.3	RSV301750	183.52 x 5.33
180.0	**195.1**	**6.3**	**RSV301800**	**183.52 x 5.33**

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
180.0	**200.5**	**8.1**	**RSV401800**	**189.87 x 7.00**
185.0	200.1	6.3	RSV301850	189.87 x 5.33
185.0	205.5	8.1	RSV401850	196.22 x 7.00
190.0	205.1	6.3	RSV301900	196.22 x 5.33
190.0	210.5	8.1	RSV401900	196.22 x 7.00
195.0	210.1	6.3	RSV301950	202.57 x 5.33
200.0	**215.1**	**6.3**	**RSV302000**	**208.92 x 5.33**
200.0	**220.5**	**8.1**	**RSV402000**	**208.90 x 7.00**
205.0	225.5	8.1	RSV402050	215.27 x 7.00
210.0	230.5	8.1	RSV402100	215.27 x 7.00
211.0	231.5	8.1	RSV402110	215.27 x 7.00
212.0	232.5	8.1	RSV402120	227.97 x 7.00
215.0	235.5	8.1	RSV402150	227.97 x 7.00
220.0	**240.5**	**8.1**	**RSV402200**	**227.97 x 7.00**
225.0	**245.5**	**8.1**	**RSV402250**	**240.67 x 7.00**
230.0	245.1	6.3	RSV302300	234.32 x 5.33
230.0	250.5	8.1	RSV402300	240.67 x 7.00
235.0	255.5	8.1	RSV402350	240.67 x 7.00
240.0	260.5	8.1	RSV402400	253.37 x 7.00
245.0	265.5	8.1	RSV402450	253.37 x 7.00
250.0	**270.5**	**8.1**	**RSV402500**	**266.07 x 7.00**
260.0	284.0	8.1	RSV802600	266.07 x 7.00
265.0	289.0	8.1	RSV802650	278.77 x 7.00
270.0	290.5	8.1	RSV402700	278.77 x 7.00
270.0	294.0	8.1	RSV802700	278.77 x 7.00
275.0	299.0	8.1	RSV802750	291.47 x 7.00
280.0	**304.0**	**8.1**	**RSV802800**	**291.47 x 7.00**
285.0	309.0	8.1	RSV802850	291.47 x 7.00
290.0	314.0	8.1	RSV802900	304.17 x 7.00
295.0	319.0	8.1	RSV802950	304.17 x 7.00
300.0	320.5	8.1	RSV403000	304.17 x 7.00
300.0	324.0	8.1	RSV803000	316.87 x 7.00
310.0	334.0	8.1	RSV803100	316.87 x 7.00
320.0	**344.0**	**8.1**	**RSV803200**	**329.57 x 7.00**
330.0	354.0	8.1	RSV803300	342.27 x 7.00
340.0	364.0	8.1	RSV803400	354.97 x 7.00
350.0	370.5	8.1	RSV403500	354.97 x 7.00
350.0	374.0	8.1	RSV803500	367.67 x 7.00
360.0	**384.0**	**8.1**	**RSV803600**	**367.67 x 7.00**

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
365.0	389.0	8.1	RSV803650	380.37 x 7.00
370.0	394.0	8.1	RSV803700	380.37 x 7.00
375.0	399.0	8.1	RSV803750	393.07 x 7.00
380.0	404.0	8.1	RSV803800	393.07 x 7.00
390.0	414.0	8.1	RSV803900	405.26 x 7.00
400.0	424.0	8.1	RSV804000	417.96 x 7.00
410.0	434.0	8.1	RSV804100	417.96 x 7.00
420.0	444.0	8.1	RSV804200	430.66 x 7.00
430.0	454.0	8.1	RSV804300	443.36 x 7.00
435.0	459.0	8.1	RSV804350	443.36 x 7.00
440.0	464.0	8.1	RSV804400	456.06 x 7.00
450.0	474.0	8.1	RSV804500	468.76 x 7.00
460.0	484.0	8.1	RSV804600	468.76 x 7.00
470.0	494.0	8.1	RSV804700	481.38 x 7.00
480.0	504.0	8.1	RSV804800	494.16 x 7.00
485.0	509.0	8.1	RSV804850	494.16 x 7.00
490.0	514.0	8.1	RSV804900	506.86 x 7.00
500.0	524.0	8.1	RSV805000	506.86 x 7.00
510.0	534.0	8.1	RSV805100	532.26 x 7.00
520.0	544.0	8.1	RSV805200	532.26 x 7.00
525.0	549.0	8.1	RSV805250	532.26 x 7.00
530.0	554.0	8.1	RSV805300	557.66 x 7.00
540.0	564.0	8.1	RSV805400	557.66 x 7.00
550.0	574.0	8.1	RSV805500	557.66 x 7.00
560.0	584.0	8.1	RSV805600	582.68 x 7.00
570.0	594.0	8.1	RSV805700	582.68 x 7.00
580.0	604.0	8.1	RSV805800	608.08 x 7.00
585.0	609.0	8.1	RSV805850	608.08 x 7.00
590.0	614.0	8.1	RSV805900	608.08 x 7.00
600.0	624.0	8.1	RSV806000	608.08 x 7.00
610.0	634.0	8.1	RSV806100	633.48 x 7.00
620.0	644.0	8.1	RSV806200	633.48 x 7.00
630.0	654.0	8.1	RSV806300	658.88 x 7.00
640.0	664.0	8.1	RSV806400	658.88 x 7.00
650.0	677.3	9.5	RSV506500	663.00 x 8.40
656.0	683.3	9.5	RSV506560	669.00 x 8.40
660.0	687.3	9.5	RSV506600	673.00 x 8.40
680.0	707.3	9.5	RSV506800	693.00 x 8.40
685.0	712.3	9.5	RSV506850	698.00 x 8.40
700.0	724.0	8.1	RSV807000	713.00 x 7.00
700.0	727.3	9.5	RSV507000	713.00 x 8.40
710.0	737.3	9.5	RSV507100	723.00 x 8.40
730.0	757.3	9.5	RSV507300	743.00 x 8.40
760.0	787.3	9.5	RSV507600	773.00 x 8.40
765.0	792.3	9.5	RSV507650	778.00 x 8.40
780.0	807.3	9.5	RSV507800	793.00 x 8.40
790.0	817.3	9.5	RSV507900	803.00 x 8.40
800.0	827.3	9.5	RSV508000	813.00 x 8.40
810.0	837.3	9.5	RSV508100	823.00 x 8.40
820.0	847.3	9.5	RSV508200	833.00 x 8.40
830.0	857.3	9.5	RSV508300	843.00 x 8.40
850.0	877.3	9.5	RSV508500	863.00 x 8.40
870.0	897.3	9.5	RSV508700	883.00 x 8.40
880.0	907.3	9.5	RSV508800	893.00 x 8.40
885.0	912.3	9.5	RSV508850	898.00 x 8.40
890.0	917.3	9.5	RSV508900	903.00 x 8.40
930.0	957.3	9.5	RSV509300	943.00 x 8.40
955.0	982.3	9.5	RSV509550	968.00 x 8.40
1,000.0	1,038.0	13.8	RSV6X1000	1,017.00 x 12.0
1,035.0	1,073.0	13.8	RSV6X1035	1,052.00 x 12.0
1,040.0	1,067.3	9.5	RSV5X1040	1,053.00 x 8.40
1,040.0	1,078.0	13.8	RSV6X1040	1,057.00 x 12.0
1,050.0	1,077.3	9.5	RSV5X1050	1,063.00 x 8.40
1,050.0	1,088.0	13.8	RSV6X1050	1,067.00 x 12.0
1,100.0	1,138.0	13.8	RSV6X1100	1,117.00 x 12.0
1,120.0	1,147.3	9.5	RSV5X1120	1,133.00 x 8.40
1,120.0	1,158.0	13.8	RSV6X1120	1,137.00 x 12.0
1,200.0	1,227.3	9.5	RSV5X1200	1,213.00 x 8.40
1,200.0	1,238.0	13.8	RSV6X1200	1,217.00 x 12.0
1,330.0	1,368.0	13.8	RSV6X1330	1,347.00 x 12.0
1,500.0	1,538.0	13.8	RSV6X1500	1,517.00 x 12.0
1,600.0	1,638.0	13.8	RSV6X1600	1,617.00 x 12.0
2,000.0	2,038.0	13.8	RSV6X2000	2,017.00 x 12.0
2,600.0	2,638.0	13.8	RSV6X2600	2,617.00 x 12.0

The rod diameters in **bold** type are in accordance with the recommendations of ISO 3320.

Other dimensions and all intermediate sizes up to 2,600 mm diameter including imperial (inch) sizes can be supplied.

All O-Rings with 12 mm cross section are delivered as special profile ring.

Turcon® Stepseal® V LM

Single-acting

Designed for Lubrication Management Technology

Rubber-energized plastic-faced seal

Material:
Turcon®, Zurcon® and Elastomer

■ Turcon® Stepseal® V LM

Description

Turcon® Stepseal® V LM is a new type of primary seal, conceived and developed to improve system performance and service life of the whole system, including hardware and other seals.

Stepseal® V LM is the first unidirectional seal element to integrate the Lubrication Management principles developed by Trelleborg Sealing Solutions as a standard feature.

Traditionally unidirectional seals provide sealing by means of sharp, defined sealing edges, which establish high contact pressure with the hardware and suppress fluid film during the forward stroke.

With Lubrication Management, a modified seal edge reduces contact pressure with the hardware and supports the formation of a lubricating fluid film during the forward stroke. This allows fluid to reach secondary seals and scrapers in a controlled way, while back-pumping of fluid ensures lubrication during the return stroke. The efficient, built-in check valve action introduced with Stepseal® V protects secondary seals and scrapers against system pressure, and it ensures that pressure build-up between the seals is eliminated.

Lower contact pressure and improved lubrication reduce the mechanical and thermal load on seals and hardware, resulting in increased service life and system reliability.

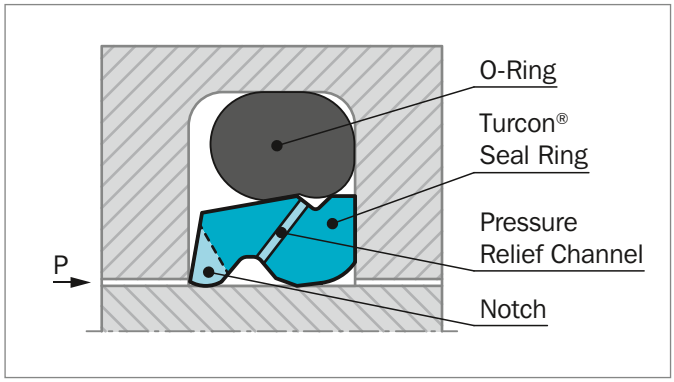


Figure 27: Turcon® Stepseal® V LM

ADVANTAGES

- Built-in check valve performance identical to that of Stepseal® V
- No pressure build-up on secondary sealing element and Excluder®
- Independent of in- and outstroke velocity
- Independent of stroke length
- High tolerance to hardware non-concentricity and radial play
- Minimum contribution to friction by secondary sealing element and Excluder®
- Minimum wear of secondary sealing element and Excluder®
- Robust, optimized seal face
- Increased leakage control
- Extended seal life
- Increased operational reliability
- Fits standard Stepseal® 2K groove dimensions as well as ISO 7425 seal housings

APPLICATION EXAMPLES

- Wind turbine pitch control
- Production presses
- Injection molding clamping cylinders
- Mobile cranes and lifts
- Vehicle suspensions

CHARACTERISTICS

- Primary seal with hydrostatic pressure release
- Check valve function
- Hydrodynamic back-pumping
- Stabilized position in the groove
- Extended seal life
- Improved system reliability

IMPROVED FRICTION PERFORMANCE

Turcon® Stepseal® V LM offers uniform, low friction of the complete sealing system through improved lubrication of all sealing elements and by preventing pressurization of the secondary seal element.

FEATURES

Stepseal® V LM combines efficiency with reliability and longevity for the full sealing system and of the hardware. Controlled support of lubrication and lowered contact pressure reduce friction and wear, while the refined valve function eliminates pressure build-up in seal systems, making drain lines and buffer volumes between seals a thing of the past.

In rod seal systems, Stepseal® V LM is used together with a secondary rod seal, preferably from the range of Turcon® and Zurcon® Rod Seals.

OPERATING CONDITIONS

Pressure:	Up to 50 MPa (Turcon® M12) Up to 60 MPa (Turcon® T08 and Zurcon® Z53
Speed:	Up to 15 m/s with linear movements, frequency up to 15 Hz
Temperature:	-45 °C to +200 °C depending on seal and O-Ring material
Media:	Mineral oil based hydraulic fluids, flame retardant hydraulic fluids, environmentally friendly fluids (bio-oils), phosphate ester, water and others, depending on the seal and O-Ring material - see Table 19.
Clearance:	The maximum permissible radial clearance S_{max} is shown in Table 20, as a function of the operating pressure and functional diameter.

IMPORTANT NOTE

The above data are maximum values and cannot be used at the same time, e.g. the maximum operating speed depends on material type, pressure, temperature and gap value. Temperature range also depends on media.

SERIES

Different cross section sizes are recommended as a function of the seal diameters. Table 18 shows the relationship between the series number according to the seal diameter range and the different application class sizes:

Standard application:	General applications without exceptional operating conditions.
Light application:	Applications with demands for reduced friction or for smaller grooves.
Heavy-duty application:	For exceptional operating loads such as high pressures, pressure peaks, large clearances, etc.

Table 18: Available Range

Series No.	Rod Diameter d_N f8/h9
RSL20	12.0 - 455.0
RSL30	12.0 - 655.0
RSL40	38.0 - 655.0
RSL80	140.0 - 999.9
RSL50	160.0 - 999.9
RSL5X	1,000.0 - 1,200.0
RSL60	650.0 - 999.9
RSL6X	1,000.0 - 2,600.0

SEALING SYSTEM

Stepseal® V LM is developed for use with a secondary sealing element. Figure 28 shows such a tandem configuration with the Stepseal® V LM.

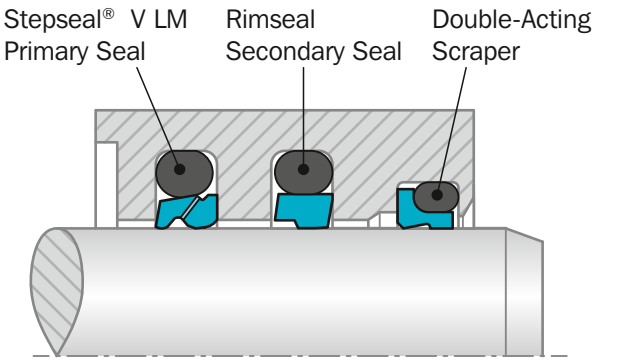


Figure 28: Turcon® Stepseal® V LM and Zurcon® Rimseal in tandem configuration

The integrated check valve function of Stepseal® V LM ensures that pressure cannot be trapped between the primary and secondary seals, and no extra space between them is required to accumulate hydraulic fluid.

Depending on the application and the operating conditions, the combination of different materials offers a further improvement in sealing efficiency and service life of the system.
For example, in hydraulic cylinders subject to high loads and under rough operating conditions, the primary seal should be made of Turcon® and the secondary seal of Zurcon® .

INSTALLATION INSTRUCTIONS

Stepseal® V LM is installed according to information on page 37 to 38

Closed groove installation applies the same dimensions as for Turcon® Stepseal® 2K in Table 6 page 38.

RECOMMENDED MATERIALS

The following material combinations have proven effective for hydraulic applications:

Turcon® Stepseal® V LM in Turcon® M12
All-round material for light to heavy hydraulic applications with linear, short stroke or helical movements in mineral oils, flame retardant hydraulic fluids, phospate ester, bio-oils or fluids with low lubricating properties:

O-Ring:	NBR 70 Shore A	N
	FKM 70 Shore A	V
Set code:	M12N or M12V	

Turcon® Stepseal® V LM in Turcon® T46
For medium to heavy applications with linear movements in mineral oils and other media with good lubrication:

O-Ring:	NBR 70 Shore A	N
	FKM 70 Shore A	V
Set code:	T46N or T46V	

For specific applications, all Turcon® materials are available.

Other material combinations are listed in Table 19.

Table 19: Turcon® and Zurcon® Materials for Stepseal® V LM

Material, Applications, Properties	Code	O–Ring Material Shore A	Code	O-Ring Operating Temp.* °C	Mating Surface Material	MPa max. Dyna-mic
Turcon® M12 First material choice for seals in linear motion Overall improved properties For new constructions and updating For all commonly applied hydraulic fluids including fluids with low lubrication performance Lowest friction and best sliding properties Lowest wear on seals Improved absorption of abrasive contaminants Low wear or abrasion of counter surface BAM tested Mineral fiber and Additives filled Color: Dark gray	M12	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Steel plated (rod) Cast iron Stainless steel Titanium	50
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
Turcon® T05 For lubricating fluids Also for gas service Very low friction Very good sliding and sealing properties Color: Turquoise	T05	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod)	20
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
Turcon® T08 For lubricating fluids and linear motion Very high compressive strength and extrusion resistance Hard counter surfaces are recommended Bronze filled Color: Light to dark brown, which may have variations in shading	T08	NBR 70	N	-30 to +100	Steel hardened Steel chrome plated (rod) Cast iron	60
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
Turcon® T10 For hydraulic and pneumatic For lubricating and non-lubricating fluids High extrusion resistance Good chemical resistance Not for electrically conducting fluids BAM tested Carbon, graphite filled Color: Black	T10	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Stainless steel	40
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
		EPDM 70	E**	-45 to +145		
Turcon® T29 For lubricating and non-lubricating fluids Good extrusion resistance Surface texture is not suitable for gas sealing Not for electrically conducting fluids Carbon fiber filled Color: Gray	T29	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Cast iron Stainless steel	30
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
		EPDM 70	E**	-45 to +145		

Material, Applications, Properties	Code	O–Ring Material Shore A	Code	O-Ring Operating Temp.* °C	Mating Surface Material	MPa max. Dyna-mic
Turcon® T40 For lubricating and non-lubricating fluids High frequency and short strokes Water hydraulics Surface texture is not suitable for gas sealing Carbon fiber filled Color: Gray	T40	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Cast iron Stainless steel Aluminum	25
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
		EPDM 70	E**	-45 to +145		
Turcon® T46 For lubricated hydraulics in linear motion High compressive strength High extrusion resistance Very good sliding and wear properties BAM tested Bronze filled Color: Light to dark brown, which may have variations in shading	T46	NBR 70	N	-30 to +100	Steel hardened Steel chrome plated (rod) Cast iron	50
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
Zurcon® Z53*** For mineral oil based fluids Very high abrasion and extrusion resistance For counter surface with rougher surface finish Limited chemical resistance Max. working temperature +110 °C Cast polyurethane Color: Yellow to light-brown	Z53	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Cast iron Stainless steel Ceramic coating	60
		NBR 70 Low temp.	T	-45 to +80		
Zurcon® Z80 For lubricating and non-lubricating fluids Water based fluids, air and gases Dry air pneumatics High abrasion and extrusion resistance For service in abrasive conditions and media with particles Good chemical resistance Limited temperature capability (-60 to +80 °C) UHMWPE (Ultra High Molecular Weight Polyethylene) Color: White to off-white	Z80	NBR 70	N	-30 to (+100)	Steel Steel hardened Steel chrome plated (rod) Stainless steel Aluminum Ceramic coating	35
		NBR 70 Low temp.	T	-45 to +80		
		EPDM 70	E**	-45 to (+145)		

* The O-Ring operation temperature is only valid in mineral hydraulic oil (except EPDM).

** Material not suitable for mineral oils.

*** Max. diameter 2,200 mm.

BAM: Tested by “Bundesanstalt Materialprufung, Germany”.

Highlighted materials are recommended.

■ Installation Recommendation

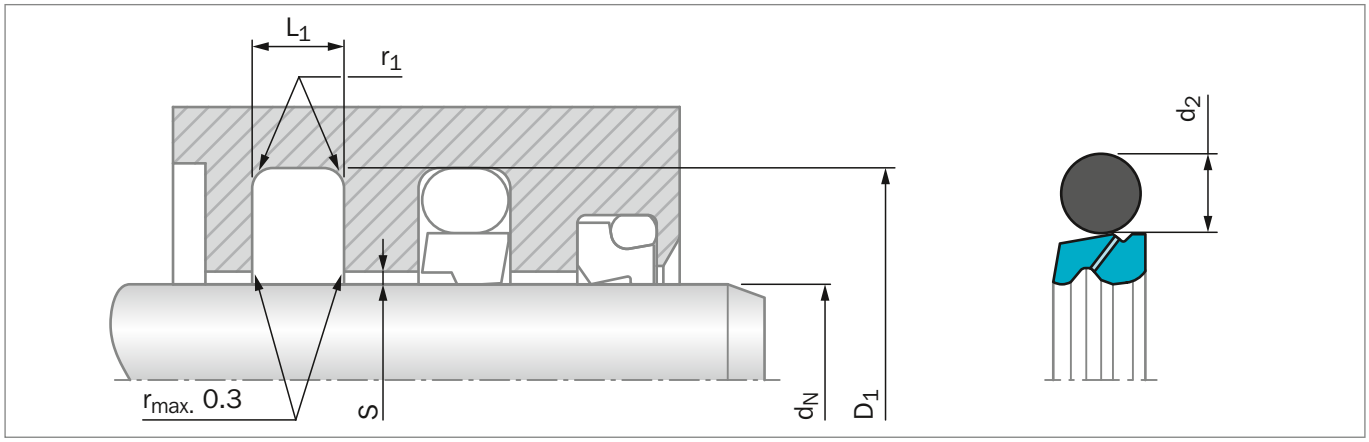


Figure 29: Installation Drawing

Table 20: Installation Dimensions – Standard Recommendations

Series No.	Rod Diameter d_N f8/h9			Groove Diameter	Groove Width	Radius	Radial Clearance S_{max}*			O-Ring Cross Section
	Standard Application	Light Application	Heavy Duty Application	D_1 H9	L_1 +0.2	r_1 max	10 MPa	20 MPa	40 MPa	d_2
RSL20	19 - 37.9	38 - 199.9	12 - 18.9	d_N + 10.7	4.2	1.0	0.50	0.30	0.20	3.53
RSL30	38 - 199.9	200 - 255.9	19 - 37.9	d_N + 15.1	6.3	1.3	0.70	0.40	0.25	5.33
RSL40	200 - 255.9	256 - 649.9	38 - 199.9	d_N + 20.5	8.1	1.8	0.80	0.60	0.35	7.00
RSL80	256 - 649.9	650 - 999.9	200 - 255.9	d_N + 24.0	8.1	1.8	0.90	0.70	0.40	7.00
RSL50	650 - 999.9	-	256 - 649.9	d_N + 27.3	9.5	2.5	1.00	0.80	0.50	8.40
RSL5X	-	1,000 - 1,200	-	d_N + 27.3	9.5	2.5	1.00	0.80	0.50	8.40
RSL60**	-	-	650 - 999.9	d_N + 38.0	13.8	3.0	1.20	0.90	0.60	12.00
RSL6X**	1,000 - 2,600	-	-	d_N + 38.0	13.8	3.0	1.20	0.90	0.60	12.00

* At pressures > **40 MPa** use diameter tolerance H8/f8 (bore/rod) in the area behind seal or consult your local Trelleborg Sealing Solutions marketing company for alternative material or profiles.
Slydring® / Wear Rings are not applicable at very small radial clearances S, consult the Slydring® catalog.

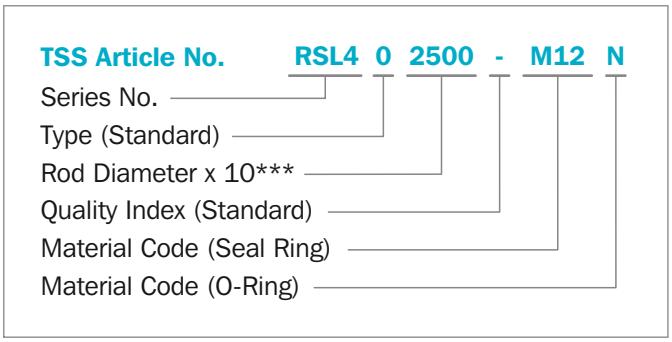
** All O-Rings with 12 mm cross section are delivered as a special profile ring.

ORDERING EXAMPLE

Turcon® Stepseal® V LM complete with O-Ring, standard application:

Series:	RSL4 from Table 20
Rod diameter:	d_N = 250.0 mm
TSS Part No.:	RSL402500 from Table 21

Select the material from Table 19. The corresponding code numbers are appended to the TSS Part No. Together these form the TSS Article Number. The TSS Article Number for all intermediate sizes can be determined by following the example:



*** For diameters $d_N \geq$ 1,000.0 mm multiply only by factor 1.
Example: RSL6 for diameter d_N = 1,200.0 mm.
TSS Article No.: RSL6**X1200** -M12

Table 21: Installation Dimensions / TSS Part No.

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
12.0	**22.7**	**4.2**	**RSL200120**	**17.04 x 3.53**
15.0	25.7	4.2	RSL200150	18.66 x 3.53
19.0	29.7	4.2	RSL200190	23.40 x 3.53
20.0	**30.7**	**4.2**	**RSL200200**	**25.00 x 3.53**
22.0	**32.7**	**4.2**	**RSL200220**	**26.58 x 3.53**
25.0	**35.7**	**4.2**	**RSL200250**	**29.75 x 3.53**
25.4	36.1	4.2	RSL200254	29.75 x 3.53
26.0	36.7	4.2	RSL200260	29.75 x 3.53
28.0	**38.7**	**4.2**	**RSL200280**	**32.92 x 3.53**
30.0	40.7	4.2	RSL200300	34.52 x 3.53
32.0	**42.7**	**4.2**	**RSL200320**	**36.09 x 3.53**
35.0	45.7	4.2	RSL200350	37.69 x 3.53
36.0	**46.7**	**4.2**	**RSL200360**	**40.87 x 3.53**
37.0	47.7	4.2	RSL200370	40.87 x 3.53
38.0	48.7	4.2	RSL200380	40.87 x 3.53
38.0	53.1	6.3	RSL300380	43.82 x 5.33
40.0	**50.7**	**4.2**	**RSL200400**	**44.04 x 3.53**
40.0	**55.1**	**6.3**	**RSL300400**	**43.82 x 5.33**
42.0	52.7	4.2	RSL200420	47.22 x 3.53
42.0	57.1	6.3	RSL300420	46.99 x 5.33
43.0	53.7	4.2	RSL200430	47.22 x 3.53
44.45	59.5	6.3	RSL300444	50.17 x 5.33
45.0	**55.7**	**4.2**	**RSL200450**	**50.39 x 3.53**
45.0	**60.1**	**6.3**	**RSL300450**	**50.17 x 5.33**
48.0	58.7	4.2	RSL200480	53.57 x 3.53
48.0	63.1	6.3	RSL300480	53.34 x 5.33
50.0	**60.7**	**4.2**	**RSL200500**	**53.57 x 3.53**
50.0	**65.1**	**6.3**	**RSL300500**	**56.52 x 5.33**
50.8	61.5	4.2	RSL200508	53.57 x 3.53
50.8	65.9	6.3	RSL300508	56.52 x 5.33
52.0	62.7	4.2	RSL200520	56.74 x 3.53
52.0	67.1	6.3	RSL300520	56.52 x 5.33
54.0	69.1	6.3	RSL300540	59.69 x 5.33
55.0	65.7	4.2	RSL200550	59.92 x 3.53
55.0	70.1	6.3	RSL300550	59.69 x 5.33
56.0	**66.7**	**4.2**	**RSL200560**	**59.92 x 3.53**
56.0	**71.1**	**6.3**	**RSL300560**	**62.87 x 5.33**
57.1	67.8	4.2	RSL200571	59.92 x 3.53
59.0	69.7	4.2	RSL200590	63.09 x 3.53
60.0	70.7	4.2	RSL200600	63.09 x 3.53

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
60.0	75.1	6.3	RSL300600	66.04 x 5.33
63.0	**73.7**	**4.2**	**RSL200630**	**66.27 x 3.53**
63.0	**78.1**	**6.3**	**RSL300630**	**69.22 x 5.33**
63.5	78.6	6.3	RSL300635	69.22 x 5.33
65.0	75.7	4.2	RSL200650	69.44 x 3.53
65.0	80.1	6.3	RSL300650	69.22 x 5.33
67.0	77.7	4.2	RSL200670	72.62 x 3.53
69.0	84.1	6.3	RSL300690	75.57 x 5.33
70.0	80.7	4.2	RSL200700	75.79 x 3.53
70.0	**85.1**	**6.3**	**RSL300700**	**75.57 x 5.33**
70.0	90.5	8.1	RSL400700	78 x 7.00
72.0	82.7	4.2	RSL200720	75.79 x 3.53
73.0	88.1	6.3	RSL300730	78.74 x 5.33
75.0	85.7	4.2	RSL200750	78.97 x 3.53
75.0	90.1	6.3	RSL300750	81.92 x 5.33
75.0	95.5	8.1	RSL400750	83 x 7.00
76.2	91.3	6.3	RSL300762	81.92 x 5.33
78.0	93.1	6.3	RSL300780	85.09 x 5.33
78.0	98.5	8.1	RSL400780	86 x 7.00
80.0	90.7	4.2	RSL200800	85.32 x 3.53
80.0	**95.1**	**6.3**	**RSL300800**	**85.09 x 5.33**
80.0	100.5	8.1	RSL400800	88 x 7.00
82.5	97.6	6.3	RSL300825	88.27 x 5.33
83.0	93.7	4.2	RSL200830	88.49 x 3.53
85.0	95.7	4.2	RSL200850	88.49 x 3.53
85.0	100.1	6.3	RSL300850	91.44 x 5.33
85.0	105.5	8.1	RSL400850	93 x 7.00
89.0	104.1	6.3	RSL300890	94.62 x 5.33
90.0	100.7	4.2	RSL200900	94.84 x 3.53
90.0	**105.1**	**6.3**	**RSL300900**	**94.62 x 5.33**
90.0	110.5	8.1	RSL400900	98 x 7.00
92.0	102.7	4.2	RSL200920	98.02 x 3.53
92.0	107.1	6.3	RSL300920	97.79 x 5.33
95.0	105.7	4.2	RSL200950	101.19 x 3.53
95.0	110.1	6.3	RSL300950	100.97 x 5.33
95.0	115.5	8.1	RSL400950	103 x 7.00
100.0	110.7	4.2	RSL201000	104.37 x 3.53
100.0	**115.1**	**6.3**	**RSL301000**	**107.32 x 5.33**
100.0	120.5	8.1	RSL401000	108 x 7.00
101.6	116.7	6.3	RSL301016	107.32 x 5.33

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
105.0	120.1	6.3	RSL301050	110.49 x 5.33
105.0	125.5	8.1	RSL401050	113.67 x 7.00
110.0	120.7	4.2	RSL201100	113.89 x 3.53
110.0	**125.1**	**6.3**	**RSL301100**	**116.84 x 5.33**
110.0	130.5	8.1	RSL401100	116.84 x 7.00
115.0	130.1	6.3	RSL301150	120.02 x 5.33
120.0	135.1	6.3	RSL301200	126.37 x 5.33
120.0	140.5	8.1	RSL401200	129.54 x 7.00
125.0	**140.1**	**6.3**	**RSL301250**	**129.54 x 5.33**
125.0	145.5	8.1	RSL401250	132.72 x 7.00
125.4	140.5	6.3	RSL301254	132.72 x 5.33
127.0	142.1	6.3	RSL301270	132.72 x 5.33
130.0	145.1	6.3	RSL301300	135.89 x 5.33
130.0	150.5	8.1	RSL401300	139.07 x 7.00
132.0	147.1	6.3	RSL301320	139.07 x 5.33
135.0	145.7	4.2	RSL201350	139.29 x 3.53
135.0	150.1	6.3	RSL301350	142.24 x 5.33
137.0	152.1	6.3	RSL301370	142.24 x 5.33
138.0	153.1	6.3	RSL301380	142.24 x 5.33
140.0	150.7	4.2	RSL201400	145.64 x 3.53
140.0	**155.1**	**6.3**	**RSL301400**	**145.42 x 5.33**
140.0	160.5	8.1	RSL401400	148.59 x 7.00
140.5	155.6	6.3	RSL301405	145.42 x 5.33
145.0	160.1	6.3	RSL301450	151.77 x 5.33
145.0	165.5	8.1	RSL401450	151.77 x 7.00
150.0	165.1	6.3	RSL301500	158.12 x 5.33
150.0	170.5	8.1	RSL401500	158.12 x 7.00
153.0	168.1	6.3	RSL301530	158.12 x 5.33
155.0	170.1	6.3	RSL301550	158.12 x 5.33
160.0	**175.1**	**6.3**	**RSL301600**	**164.47 x 5.33**
160.0	**180.5**	**8.1**	**RSL401600**	**170.82 x 7.00**
165.0	180.1	6.3	RSL301650	170.82 x 5.33
170.0	185.1	6.3	RSL301700	177.17 x 5.33
170.0	190.5	8.1	RSL401700	177.17 x 7.00
173.0	188.1	6.3	RSL301730	177.17 x 5.33
175.0	190.1	6.3	RSL301750	183.52 x 5.33
180.0	**195.1**	**6.3**	**RSL301800**	**183.52 x 5.33**
180.0	**200.5**	**8.1**	**RSL401800**	**189.87 x 7.00**
185.0	200.1	6.3	RSL301850	189.87 x 5.33
185.0	205.5	8.1	RSL401850	196.22 x 7.00
190.0	205.1	6.3	RSL301900	196.22 x 5.33
190.0	210.5	8.1	RSL401900	196.22 x 7.00

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
195.0	210.1	6.3	RSL301950	202.57 x 5.33
200.0	215.1	6.3	RSL302000	208.92 x 5.33
200.0	**220.5**	**8.1**	**RSL402000**	**208.90 x 7.00**
205.0	225.5	8.1	RSL402050	215.27 x 7.00
210.0	230.5	8.1	RSL402100	215.27 x 7.00
211.0	231.5	8.1	RSL402110	215.27 x 7.00
212.0	232.5	8.1	RSL402120	227.97 x 7.00
215.0	235.5	8.1	RSL402150	227.97 x 7.00
220.0	240.5	8.1	RSL402200	227.97 x 7.00
225.0	**245.5**	**8.1**	**RSL402250**	**240.67 x 7.00**
230.0	245.1	6.3	RSL302300	234.32 x 5.33
230.0	250.5	8.1	RSL402300	240.67 x 7.00
235.0	255.5	8.1	RSL402350	240.67 x 7.00
240.0	260.5	8.1	RSL402400	253.37 x 7.00
245.0	265.5	8.1	RSL402450	253.37 x 7.00
250.0	**270.5**	**8.1**	**RSL402500**	**266.07 x 7.00**
260.0	284.0	8.1	RSL802600	266.07 x 7.00
265.0	289.0	8.1	RSL802650	278.77 x 7.00
270.0	290.5	8.1	RSL402700	278.77 x 7.00
270.0	294.0	8.1	RSL802700	278.77 x 7.00
275.0	299.0	8.1	RSL802750	291.47 x 7.00
280.0	**304.0**	**8.1**	**RSL802800**	**291.47 x 7.00**
285.0	309.0	8.1	RSL802850	291.47 x 7.00
290.0	314.0	8.1	RSL802900	304.17 x 7.00
295.0	319.0	8.1	RSL802950	304.17 x 7.00
300.0	320.5	8.1	RSL403000	304.17 x 7.00
300.0	324.0	8.1	RSL803000	316.87 x 7.00
310.0	334.0	8.1	RSL803100	316.87 x 7.00
320.0	**344.0**	**8.1**	**RSL803200**	**329.57 x 7.00**
330.0	354.0	8.1	RSL803300	342.27 x 7.00
340.0	364.0	8.1	RSL803400	354.97 x 7.00
350.0	370.5	8.1	RSL403500	354.97 x 7.00
350.0	374.0	8.1	RSL803500	367.67 x 7.00
360.0	**384.0**	**8.1**	**RSL803600**	**367.67 x 7.00**
365.0	389.0	8.1	RSL803650	380.37 x 7.00
370.0	394.0	8.1	RSL803700	380.37 x 7.00
375.0	399.0	8.1	RSL803750	393.07 x 7.00
380.0	404.0	8.1	RSL803800	393.07 x 7.00
390.0	414.0	8.1	RSL803900	405.26 x 7.00
400.0	424.0	8.1	RSL804000	417.96 x 7.00
410.0	434.0	8.1	RSL804100	417.96 x 7.00
420.0	444.0	8.1	RSL804200	430.66 x 7.00

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
430.0	454.0	8.1	RSL804300	443.36 x 7.00
435.0	459.0	8.1	RSL804350	443.36 x 7.00
440.0	464.0	8.1	RSL804400	456.06 x 7.00
450.0	474.0	8.1	RSL804500	468.76 x 7.00
460.0	484.0	8.1	RSL804600	468.76 x 7.00
470.0	494.0	8.1	RSL804700	481.38 x 7.00
480.0	504.0	8.1	RSL804800	494.16 x 7.00
485.0	509.0	8.1	RSL804850	494.16 x 7.00
490.0	514.0	8.1	RSL804900	506.86 x 7.00
500.0	524.0	8.1	RSL805000	506.86 x 7.00
510.0	534.0	8.1	RSL805100	532.26 x 7.00
520.0	544.0	8.1	RSL805200	532.26 x 7.00
525.0	549.0	8.1	RSL805250	532.26 x 7.00
530.0	554.0	8.1	RSL805300	557.66 x 7.00
540.0	564.0	8.1	RSL805400	557.66 x 7.00
550.0	574.0	8.1	RSL805500	557.66 x 7.00
560.0	584.0	8.1	RSL805600	582.68 x 7.00
570.0	594.0	8.1	RSL805700	582.68 x 7.00
580.0	604.0	8.1	RSL805800	608.08 x 7.00
585.0	609.0	8.1	RSL805850	608.08 x 7.00
590.0	614.0	8.1	RSL805900	608.08 x 7.00
600.0	624.0	8.1	RSL806000	608.08 x 7.00
610.0	634.0	8.1	RSL806100	633.48 x 7.00
620.0	644.0	8.1	RSL806200	633.48 x 7.00
630.0	654.0	8.1	RSL806300	658.88 x 7.00
640.0	664.0	8.1	RSL806400	658.88 x 7.00
650.0	677.3	9.5	RSL506500	663 x 8.40
656.0	683.3	9.5	RSL506560	669 x 8.40
660.0	687.3	9.5	RSL506600	673 x 8.40
680.0	707.3	9.5	RSL506800	693 x 8.40
685.0	712.3	9.5	RSL506850	698 x 8.40
700.0	724.0	8.1	RSL807000	713 x 7.00
700.0	727.3	9.5	RSL507000	713 x 8.40
710.0	737.3	9.5	RSL507100	723 x 8.40
730.0	757.3	9.5	RSL507300	743 x 8.40
760.0	787.3	9.5	RSL507600	773 x 8.40
765.0	792.3	9.5	RSL507650	778 x 8.40
780.0	807.3	9.5	RSL507800	793 x 8.40
790.0	817.3	9.5	RSL507900	803 x 8.40
800.0	827.3	9.5	RSL508000	813 x 8.40
810.0	837.3	9.5	RSL508100	823 x 8.40
820.0	847.3	9.5	RSL508200	833 x 8.40
830.0	**857.3**	**9.5**	**RSL508300**	**843 x 8.40**
850.0	**877.3**	**9.5**	**RSL508500**	**863 x 8.40**
870.0	**897.3**	**9.5**	**RSL508700**	**883 x 8.40**
880.0	**907.3**	**9.5**	**RSL508800**	**893 x 8.40**
885.0	**912.3**	**9.5**	**RSL508850**	**898 x 8.40**
890.0	**917.3**	**9.5**	**RSL508900**	**903 x 8.40**
930.0	**957.3**	**9.5**	**RSL509300**	**943 x 8.40**
955.0	**982.3**	**9.5**	**RSL509550**	**968 x 8.40**
1,000.0	**1,038.0**	**13.8**	**RSL6X1000**	**1,017 x 12.0**
1,035.0	**1,073.0**	**13.8**	**RSL6X1035**	**1,052 x 12.0**
1,040.0	**1,067.3**	**9.5**	**RSL5X1040**	**1,053 x 8.40**
1,040.0	**1,078.0**	**13.8**	**RSL6X1040**	**1,057 x 12.0**
1,050.0	**1,077.3**	**9.5**	**RSL5X1050**	**1,063 x 8.40**
1,050.0	**1,088.0**	**13.8**	**RSL6X1050**	**1,067 x 12.0**
1,100.0	**1,138.0**	**13.8**	**RSL6X1100**	**1,117 x 12.0**
1,120.0	**1,147.3**	**9.5**	**RSL5X1120**	**1,133 x 8.40**
1,120.0	**1,158.0**	**13.8**	**RSL6X1120**	**1,137 x 12.0**
1,200.0	**1,227.3**	**9.5**	**RSL5X1200**	**1,213 x 8.40**
1,200.0	**1,238.0**	**13.8**	**RSL6X1200**	**1,217 x 12.0**
1,330.0	**1,368.0**	**13.8**	**RSL6X1330**	**1,347 x 12.0**
1,500.0	**1,538.0**	**13.8**	**RSL6X1500**	**1,517 x 12.0**
1,600.0	**1,638.0**	**13.8**	**RSL6X1600**	**1,617 x 12.0**
2,000.0	**2,038.0**	**13.8**	**RSL6X2000**	**2,017 x 12.0**
2,600.0	**2,638.0**	**13.8**	**RSL6X2600**	**2,617 x 12.0**

The rod diameters in **bold** type are in accordance with the recommendations of ISO 3320.

Other dimensions and all intermediate sizes up to 2,600 mm diameter including imperial (inch) sizes can be supplied.

All O-Rings with 12 mm cross section are delivered as special profile ring.

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Zurcon® Rimseal

Single-acting

Rubber-energized plastic-faced seal

Material:
Zurcon® and Elastomer

■ Zurcon® Rimseal*

■ Description

When the application requirements make high demands on leakage control and reliability, a redundant sealing system is necessary to ensure reliable sealing of hydraulic cylinders at the piston rod.

METHOD OF OPERATION

Zurcon® Rimseal is an elastomer energized seal element. The changes in seal position in the groove, necessary for optimum sealing function, are guaranteed by the combination of the two parts: the O-Ring and seal ring.

In order to achieve a contact force increasing sealing effect with increasing pressure, the seal has a chamfer on the low pressure side which causes the seal to tilt slightly so that the seal ring is forced against the side of the groove. This creates an area of maximum pressure at the edge of the seal.

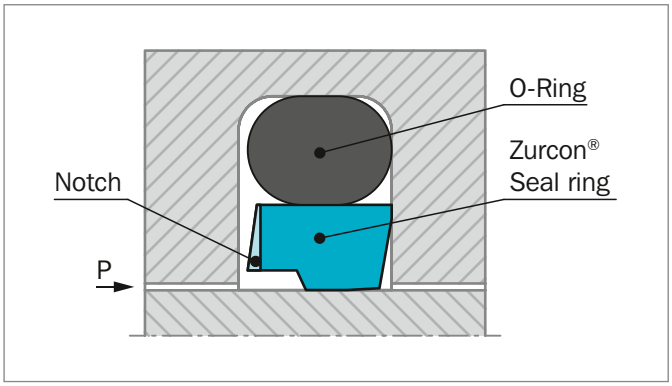

Figure 30: Zurcon® Rimseal

When Zurcon® Rimseal is used in a system with a double-acting scraper DA24 (DA22, DA17, DA27, Excluder® 2 resp. 5 or 500), the sealing function of the system must be assured even if pressure build-up occurs between Rimseal and the double-acting scraper.

The high-pressure side of the seal ring also has a chamfer which, in the event of a build-up of pressure behind Rimseal, comes into contact with the flank of the groove. Rimseal moves in the groove so that a contact pressure distribution is obtained on the rod which enhances the back-pumping effect.

ADVANTAGES

- High static and dynamic sealing effect
- Low friction for reduced power loss
- High wear resistance for long service life
- Small groove
- Easy installation
- ISO 7425-2 grooves optional
- Available for any diameter from 8 to 2,200 mm

APPLICATION EXAMPLES

- Mobile hydraulics
- Standard cylinders
- Machine tools
- Injection molding machines
- Presses

OPERATING CONDITIONS:

Pressure:	In tandem system: Up to 60 MPa As an individual element: 25 MPa
Velocity:	5 m/s with short strokes <1 m in tandem system
Temperature:	-45 °C to +110 °C depending on O-Ring material
Media:	Hydraulic fluids - Mineral oil - Synthetic and natural esters - HEES, HETG up to +60 °C - Flame retardant fluids HFA, HFC
Clearance:	The maximum permissible radial clearance S_{max} is shown in Table 22, as a function of the operating pressure and functional diameter.

IMPORTANT NOTE

The above data are maximum values and cannot be used at the same time, e.g. the maximum operating speed depends on material type, pressure, temperature and gap value. Temperature range also depends on media.

* Patent No.: EP 0 670 444

SERIES

Zurcon® Rimseal is a system seal and is preferably used in tandem sealing systems in conjunction with Stepseal® 2K. For this reason the type series are identical with those for Stepseal® 2K.

Table 22 shows the relationship between the series number according to the seal diameter range and the different application class sizes:

Standard application	RR13
Light application	RR15
Heavy-duty application	RR11

REDUNDANT SEALING SYSTEM

Redundant sealing systems are used where the application conditions no longer permit reliable sealing over the demanded service life with a single seal.

The tandem sealing system is particularly important during cold starts when, due to the very high viscosity of the oil, the primary seal allows oil to pass as the piston rod is extended. In the tandem system the oil is heated as a result of the friction at the primary seal and is then reliably wiped off - at a now lower viscosity - by the secondary seal, the Zurcon® Rimseal.

As the piston rod is retracted, the oil is stored in the reservoir between the seals, and is then pumped back against the system pressure by the hydrodynamics in the seal clearance of Stepseal® 2K.

Particularly with strokes of more than 1 meter, measures have to be taken to provide a storage chamber between the seals.

Rimseal is designed to have the back-pumping effect necessary when using a double-acting scraper in the rod sealing system.

Figure 31 shows a redundant rod seal system consisting of Stepseal® 2K, Rimseal and Scraper DA22 with corresponding wear ring arrangement.

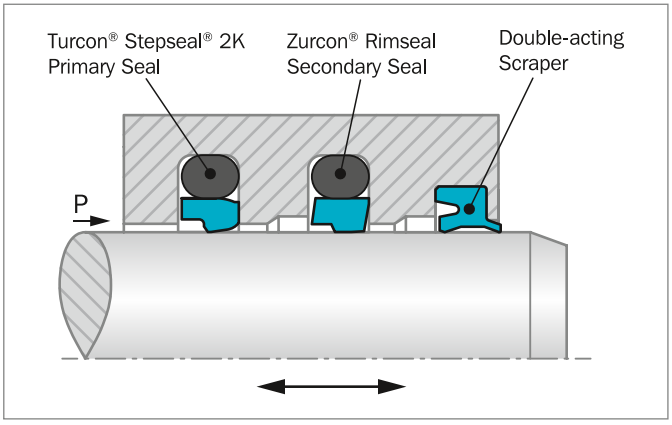

Figure 31: Zurcon® Rimseal in tandem configuration

The optimum rod sealing system for hydraulic cylinders subject to heavy loads should consist of three elements:

1) Turcon® Stepseal® 2K used as a primary seal. This seal element offers the back-pumping property necessary for redundant rod seal systems.

2) Zurcon® Rimseal as the secondary seal in this system to ensure reliable sealing of thin oil films at low secondary pressures. A Zurcon® material (polyurethane Shore D 58) is used combined with a new seal profile.

3) The final outer element of the redundant sealing system is a double-acting scraper seal (e.g. DA24, DA22, DA17, DA27. Turcon® Excluder® 2 resp. 5 or Zurcon® Excluder® 500).

The sealing system thus consists of three independent lip seals installed in line, in which the hardness of the material decreases from the pressure side to the atmospheric side.

INSTALLATION INSTRUCTIONS

Zurcon® Rimseal is installed according to information at page 37 and 38.

Closed groove installation applies the same dimensions as Turcon® Stepseal® 2K in Table 2 auf Seite 35.

MATERIAL

Zurcon® Rimseal in Zurcon® Z54
For light to heavy applications with linear movements in mineral oils and other media according to the Technical Data. Rimseal in Zurcon® Z54, special polyurethane 58 Shore D, is available in the following material combinations as standard:

O-Ring:	NBR 70 Shore A	N
	NBR 70 Shore A Low temp.	T
Set code:	Z54N or Z54T	

■ Installation Recommendation

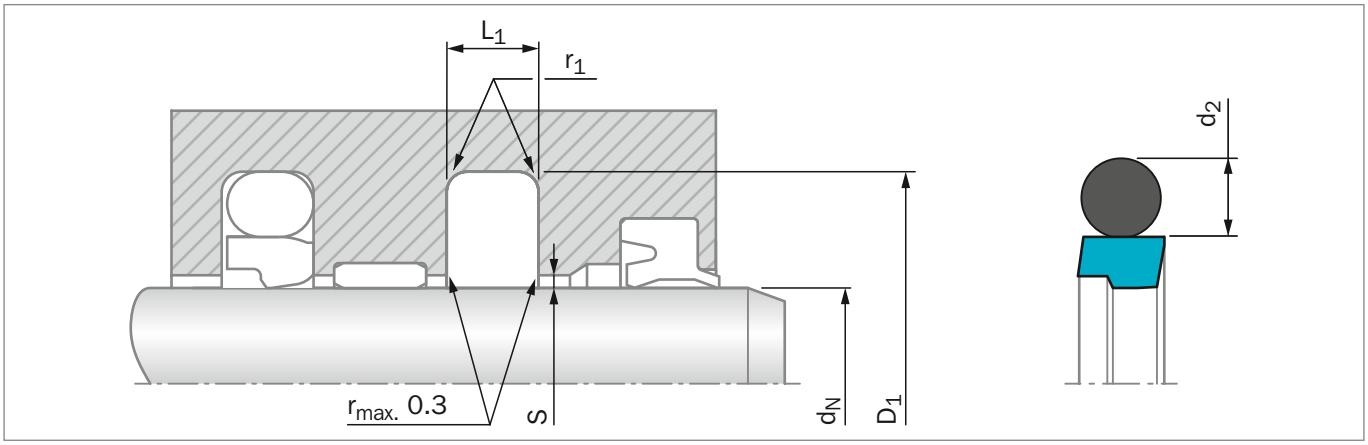

Figure 32: Installation Drawing

Table 22: Installation Dimensions – Standard Recommendations

Rod Diameter d_N f8/h9			Groove Diameter	Groove Width	Radius	Radial Clearance S_{max}*		O-Ring Cross Section
Series No. RR 13 Standard Application	Series No. RR 15 Light Application	Series No. RR 11 Heavy Duty Application	D_1 H9	L_1 +0.2	$r_{1\ max}$	10 MPa	20 MPa	d_2
8 - 18.9	19 - 37.9	-	d_N + 7.3	3.2	0.6	0.40	0.25	2.62
19 - 37.9	38 - 199.9	8 - 18.9	d_N + 10.7	4.2	1.0	0.40	0.25	3.53
38 - 199.9	200 - 255.9	19 - 37.9	d_N + 15.1	6.3	1.3	0.50	0.30	5.33
200 - 255.9	256 - 649.9	38 - 199.9	d_N + 20.5	8.1	1.8	0.60	0.35	7.00
256 - 649.9	650 - 999.9	200 - 255.9	d_N + 24.0	8.1	1.8	0.60	0.35	7.00
650 - 999.9	1,000 - 2,200	256 - 649.9	d_N + 27.3	9.5	2.5	0.70	0.50	8.40
1,000 - 2,200	-	650 - 999.9	d_N + 38.0	13.8	3.0	1.00	0.70	12.00**

Installation in closed grooves from diameters > 18 mm. Also for installation according to ISO 7425-2.
* Installed as secondary seal utilize S_{max} of the primary seal.
**All O-Rings with 12 mm cross section are delivered as a special profile ring.

ORDERING EXAMPLE

Zurcon® Rimseal complete with O-Ring, standard application:

Series:	RR13 from Table 22
Rod diameter:	d_N = 80.0 mm
TSS Part No.:	RR1300800 from Table 23

Select material Z54. The corresponding code numbers are appended to the TSS Part No. Together these form the TSS Article Number. The TSS Article Number for all intermediate sizes can be determind by following the example:

TSS Article No. RR13 0 0800 - Z54 N***

- TSS Series No.
- Type (Standard)
- Rod Diameter x 10****
- Quality Index (Standard)
- Material Code (Seal Ring)
- Material Code (O-Ring)

*** Zurcon® Rimseal is always supplied as a set with a Nitrile O-Ring, code N or T. See page 68 O-Ring Code.

**** For diameters $d_N \geq$ 1,000.0 mm multiply only by factor 1.
Example: RR13 for diameter d_N = 1,200.0 mm.
TSS Article No.: RR13**X1200** - Z54N.

Table 23: Installation Dimensions / TSS Article No.

Rod	Groove Dia.	Groove Width	TSS Article No.*	O-Ring Size	Rod	Groove Dia.	Groove Width	TSS Article No.*	O-Ring Size
d_N f8/h9	D_1 H9	L_1 +0.2			d_N f8/h9	D_1 H9	L_1 +0.2		
8.0	**15.3**	**3.2**	**RR1300080-Z54N**	**10.77 x 2.62**	95.0	110.1	6.3	RR1300950-Z54N	100.97 x 5.33
10.0	**17.3**	**3.2**	**RR1300100-Z54N**	**12.37 x 2.62**	**100.0**	**115.1**	**6.3**	**RR1301000-Z54N**	**107.32 x 5.33**
12.0	**19.3**	**3.2**	**RR1300120-Z54N**	**13.94 x 2.62**	105.0	120.1	6.3	RR1301050-Z54N	110.49 x 5.33
14.0	**21.3**	**3.2**	**RR1300140-Z54N**	**17.12 x 2.62**	**110.0**	**125.1**	**6.3**	**RR1301100-Z54N**	**116.84 x 5.33**
16.0	**23.3**	**3.2**	**RR1300160-Z54N**	**18.72 x 2.62**	**110.0**	**130.5**	**8.1**	**RR1101100-Z54N**	**116.89 x 7.00**
18.0	**25.3**	**3.2**	**RR1300180-Z54N**	**20.29 x 2.62**	115.0	130.1	6.3	RR1301150-Z54N	120.02 x 5.33
20.0	27.3	3.2	RR1500200-Z54N	21.89 x 2.62	120.0	135.1	6.3	RR1301200-Z54N	126.37 x 5.33
20.0	**30.7**	**4.2**	**RR1300200-Z54N**	**23.40 x 3.53**	**125.0**	**140.1**	**6.3**	**RR1301250-Z54N**	**129.54 x 5.33**
22.0	29.3	3.2	RR1500220-Z54N	25.07 x 2.62	**125.0**	**145.5**	**8.1**	**RR1101250-Z54N**	**132.72 x 7.00**
22.0	**32.7**	**4.2**	**RR1300220-Z54N**	**26.58 x 3.53**	130.0	145.1	6.3	RR1301300-Z54N	135.89 x 5.33
25.0	**32.3**	**3.2**	**RR1500250-Z54N**	**26.64 x 2.62**	135.0	150.1	6.3	RR1301350-Z54N	142.24 x 5.33
25.0	**35.7**	**4.2**	**RR1300250-Z54N**	**29.75 x 3.53**	**140.0**	**155.1**	**6.3**	**RR1301400-Z54N**	**145.42 x 5.33**
28.0	**35.3**	**3.2**	**RR1500280-Z54N**	**29.82 x 2.62**	145.0	160.1	6.3	RR1301450-Z54N	151.77 x 7.00
28.0	**38.7**	**4.2**	**RR1300280-Z54N**	**32.92 x 3.53**	150.0	165.1	6.3	RR1301500-Z54N	158.12 x 5.33
30.0	37.3	3.2	RR1500300-Z54N	32.99 x 2.62	150.0	170.5	8.1	RR1101500-Z54N	158.12 x 7.00
30.0	40.7	4.2	RR1300300-Z54N	34.52 x 3.53	155.0	170.1	6.3	RR1301550-Z54N	158.12 x 5.33
32.0	**39.3**	**3.2**	**RR1500320-Z54N**	**34.59 x 2.62**	**160.0**	**175.1**	**6.3**	**RR1301600-Z54N**	**164.47 x 5.33**
32.0	**42.7**	**4.2**	**RR1300320-Z54N**	**36.09 x 3.53**	**160.0**	**180.5**	**8.1**	**RR1101600-Z54N**	**170.82 x 7.0**
35.0	42.3	3.2	RR1500350-Z54N	37.77 x 2.62	165.0	180.1	6.3	RR1301650-Z54N	170.82 x 5.33
35.0	45.7	4.2	RR1300350-Z54N	37.70 x 3.53	170.0	185.1	6.3	RR1301700-Z54N	177.17 x 5.33
36.0	**43.3**	**3.2**	**RR1500360-Z54N**	**39.34 x 2.62**	175.0	190.1	6.3	RR1301750-Z54N	183.52 x 5.33
36.0	**46.7**	**4.2**	**RR1300360-Z54N**	**40.87 x 3.53**	**180.0**	**195.1**	**6.3**	**RR1301800-Z54N**	**183.52 x 5.33**
40.0	**50.7**	**4.2**	**RR1500400-Z54N**	**44.04 x 3.53**	**180.0**	**200.5**	**8.1**	**RR1101800-Z54N**	**189.87 x 7.00**
40.0	**55.1**	**6.3**	**RR1300400-Z54N**	**43.82 x 5.33**	185.0	200.1	6.3	RR1301850-Z54N	189.87 x 5.33
45.0	**55.7**	**4.2**	**RR1500450-Z54N**	**50.39 x 3.53**	190.0	205.1	6.3	RR1301900-Z54N	196.22 x 5.33
45.0	**60.1**	**6.3**	**RR1300450-Z54N**	**50.17 x 5.33**	**200.0**	**220.5**	**8.1**	**RR1302000-Z54N**	**208.92 x 7.00**
50.0	**60.7**	**4.2**	**RR1500500-Z54N**	**53.57 x 3.53**	210.0	230.5	8.1	RR1302100-Z54N	215.27 x 7.00
50.0	**65.1**	**6.3**	**RR1300500-Z54N**	**56.52 x 5.33**	**220.0**	**240.5**	**8.1**	**RR1302200-Z54N**	**227.97 x 7.00**
55.0	65.7	4.2	RR1500550-Z54N	59.92 x 3.53	230.0	250.5	8.1	RR1302300-Z54N	240.67 x 7.00
55.0	70.1	6.3	RR1300550-Z54N	59.69 x 5.33	240.0	260.5	8.1	RR1302400-Z54N	253.37 x 7.00
56.0	**71.1**	**6.3**	**RR1300560-Z54N**	**62.87 x 5.33**	**250.0**	**270.5**	**8.1**	**RR1302500-Z54N**	**266.07 x 7.00**
60.0	70.7	4.2	RR1500600-Z54N	63.09 x 3.53	260.0	284.0	8.1	RR1302600-Z54N	266.07 x 7.00
60.0	75.1	6.3	RR1300600-Z54N	66.04 x 5.33	**280.0**	**304.0**	**8.1**	**RR1302800-Z54N**	**291.47 x 7.00**
63.0	73.7	4.2	RR1500630-Z54N	66.27 x 3.53	300.0	324.0	8.1	RR1303000-Z54N	316.87 x 7.00
63.0	**78.1**	**6.3**	**RR1300630-Z54N**	**69.22 x 5.33**	310.0	334.0	8.1	RR1303100-Z54N	316.87 x 7.00
65.0	80.1	6.3	RR1300650-Z54N	69.22 x 5.33	**320.0**	**344.0**	**8.1**	**RR1303200-Z54N**	**329.57 x 7.00**
70.0	**85.1**	**6.3**	**RR1300700-Z54N**	**75.57 x 5.33**	340.0	364.0	8.1	RR1303400-Z54N	354.97 x 7.00
75.0	90.1	6.3	RR1300750-Z54N	81.92 x 5.33	350.0	374.0	8.1	RR1303500-Z54N	367.67 x 7.00
80.0	**90.7**	**4.2**	**RR1500800-Z54N**	**85.32 x 3.53**	**360.0**	**384.0**	**8.1**	**RR1303600-Z54N**	**367.67 x 7.00**
80.0	**95.1**	**6.3**	**RR1300800-Z54N**	**85.09 x 5.33**	380.0	404.0	8.1	RR1303800-Z54N	393.07 x 7.00
85.0	100.1	6.3	RR1300850-Z54N	91.44 x 5.33	400.0	424.0	8.1	RR1304000-Z54N	417.96 x 7.00
90.0	**105.1**	**6.3**	**RR1300900-Z54N**	**94.62 x 5.33**	420.0	444.0	8.1	RR1304200-Z54N	430.66 x 7.00

Rod d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Article No.*	O-Ring Size
450.0	474.0	8.1	RR1304500-Z54N	468.76 x 7.00
480.0	504.0	8.1	RR1304800-Z54N	494.16 x 7.00
500.0	524.0	8.1	RR1305000-Z54N	506.86 x 7.00
600.0	624.0	8.1	RR1306000-Z54N	608.08 x 7.00
610.0	634.0	8.1	RR1306100-Z54N	633.48 x 7.00
620.0	644.0	8.1	RR1306200-Z54N	633.48 x 7.00
630.0	654.0	8.1	RR1306300-Z54N	658.88 x 7.00
640.0	664.0	8.1	RR1306400-Z54N	658.88 x 7.00
650.0	677.3	9.5	RR1306500-Z54N	663.00 x 8.40
656.0	683.3	9.5	RR1306560-Z54N	669.00 x 8.40
660.0	687.3	9.5	RR1306600-Z54N	673.00 x 8.40
680.0	707.3	9.5	RR1306800-Z54N	693.00 x 8.40
685.0	712.3	9.5	RR1306850-Z54N	698.00 x 8.40
700.0	724.0	8.1	RR1507000-Z54N	712.00 x 7.00
700.0	727.3	9.5	RR1307000-Z54N	713.00 x 8.40
710.0	737.3	9.5	RR1307100-Z54N	723.00 x 8.40
730.0	757.3	9.5	RR1307300-Z54N	743.00 x 8.40
760.0	787.3	9.5	RR1307600-Z54N	773.00 x 8.40
765.0	792.3	9.5	RR1307650-Z54N	778.00 x 8.40
780.0	807.3	9.5	RR1307800-Z54N	793.00 x 8.40
790.0	817.3	9.5	RR1307900-Z54N	803.00 x 8.40
800.0	827.3	9.5	RR1308000-Z54N	813.00 x 8.40
810.0	837.3	9.5	RR1308100-Z54N	823.00 x 8.40
820.0	847.3	9.5	RR1308200-Z54N	833.00 x 8.40
830.0	857.3	9.5	RR1308300-Z54N	843.00 x 8.40
850.0	877.3	9.5	RR1308500-Z54N	863.00 x 8.40
870.0	897.3	9.5	RR1308700-Z54N	883.00 x 8.40
880.0	907.3	9.5	RR1308800-Z54N	893.00 x 8.40
885.0	912.3	9.5	RR1308850-Z54N	898.00 x 8.40
890.0	917.3	9.5	RR1308900-Z54N	903.00 x 8.40
930.0	957.3	9.5	RR1309300-Z54N	943.00 x 8.40
955.0	982.3	9.5	RR1309550-Z54N	968.00 x 8.40
1,000.0	1,038.0	13.8	RR13X1000-Z54N	1,016.00 x 12.00
1,035.0	1,073.0	13.8	RR13X1035-Z54N	1,051.00 x 12.00
1,040.0	1,067.3	9.5	RR15X1040-Z54N	1,053.00 x 8.40
1,040.0	1,078.0	13.8	RR13X1040-Z54N	1,056.00 x 12.00
1,050.0	1,077.3	9.5	RR15X1050-Z54N	1,063.00 x 8.40
1,050.0	1,088.0	13.8	RR13X1050-Z54N	1,066.00 x 12.00
1,100.0	1,138.0	13.8	RR13X1100-Z54N	1,116.00 x 12.00
1,120.0	1,147.3	9.5	RR15X1120-Z54N	1,133.00 x 8.40
1,120.0	1,158.0	13.8	RR13X1120-Z54N	1,136.00 x 12.00
1,200.0	1,227.3	9.5	RR15X1200-Z54N	1,213.00 x 8.40
1,200.0	1,238.0	13.8	RR13X1200-Z54N	1,216.00 x 12.00
1,330.0	1,357.3	9.5	RR15X1330-Z54N	1,343.00 x 8.40
1,330.0	1,368.0	13.8	RR13X1330-Z54N	1,346.00 x 12.00
1,500.0	1,527.3	9.5	RR15X1500-Z54N	1,513.00 x 8.40
1,500.0	1,538.0	13.8	RR13X1500-Z54N	1,516.00 x 12.00
1,600.0	1,638.0	13.8	RR13X1600-Z54N	1,616.00 x 12.00
2,000.0	2,038.0	13.8	RR13X2000-Z54N	2,016.00 x 12.00

The rod diameters in **bold** type are in accordance with the recommendations of ISO 3320.

Other dimensions and all intermediate sizes up to 2,200 mm diameter including imperial (inch) sizes can be supplied.

* TSS Article Number incl. of NBR O-Ring.
For application of low-temperature O-Ring, please use Material Set Code Z54T instead of Z54N

All O-Rings with 12 mm cross section are delivered as special profile ring.

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Zurcon® Rimseal IM

Injection Molded (IM)

Single-acting

Rubber-energized plastic-faced seal

Material:
Zurcon® Z13 and Elastomer

Zurcon® Rimseal IM

Description

Zurcon® Rimseal IM is an O-Ring energized rod seal designed for high demanding applications, with manufacturing feasible by both injection molding and by lathing from injection molded TPU Zurcon® tubes.

Zurcon® Rimseal IM is an asymmetric rod seal with a slipper ring made of Zurcon® Z13, fitting into both Stepseal® and ISO 7425-2 grooves.

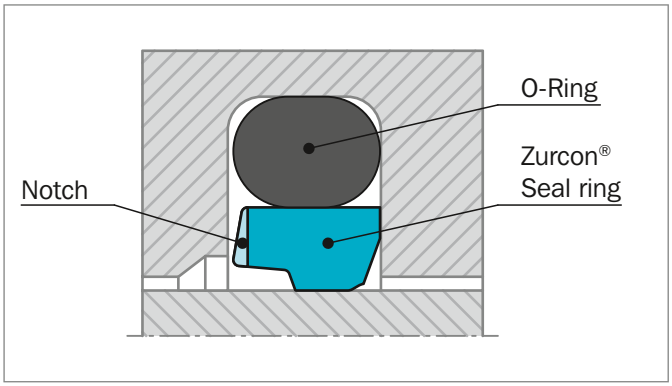


Figure 33: Zurcon® Rimseal IM

Contact length and profile tilting angles are optimized to give the desired contact pressure distribution throughout a wide range of pressures, hardware machining tolerances and different working temperatures within the admissible temperature range.

Especially in tandem with various primary seals, this new design promises to give an effective solution for modern hydraulic applications.

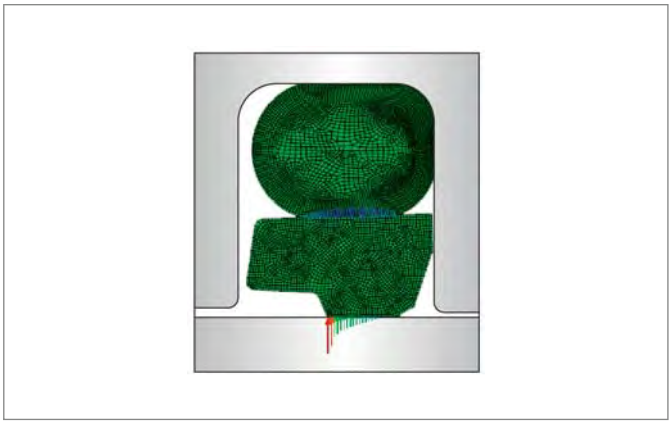


Figure 34: Zurcon® Rimseal IM

This profile is tested and proven to work efficiently within a Lubrication Management (LM) PUR system configuration.

Zurcon® Rimseal IM is able to combine very high abrasion and extrusion resistance together with chemical compatibility.

The wear resistance is improved even more with a LM configuration due to friction reduction within the whole sealing system compared to other traditional TPU solutions.

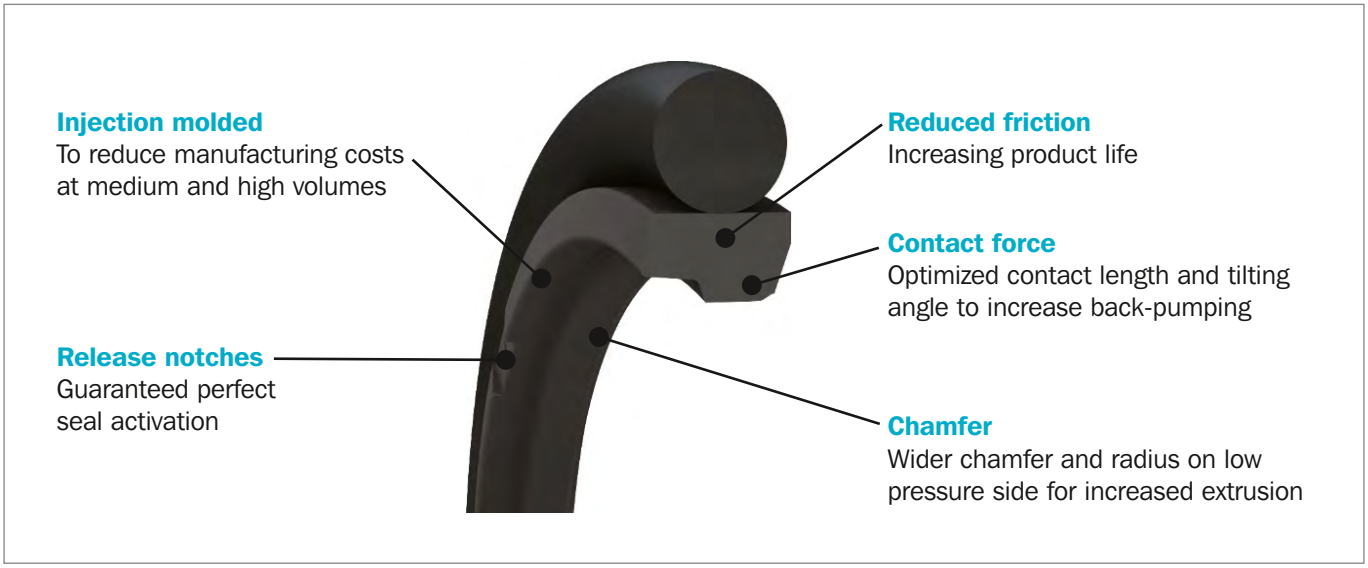


Figure 35: Zurcon® Rimseal IM design features

METHOD OF OPERATION

Like all slipper seals, the initial compression is generated by O-Ring squeeze. The contact force distribution at low pressures is optimized for low friction and tight sealing.
Four radial notches at the back of the seal guarantee O-Ring activation, even in the cases of contact with the back side of the groove or for sudden pressure release when the pressure drops. A design shape at the outer corner was studied to increase extrusion resistance (Figure 34).
In Figure 35 shows Von Mises Stress at 3 different pressure levels: after installation, medium range and 25 MPa.

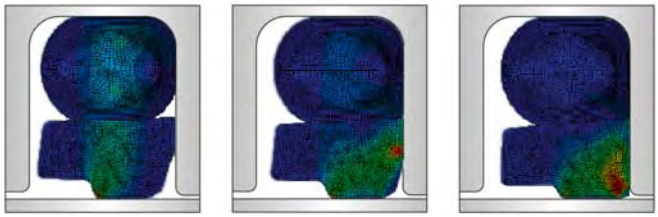


Figure 36: left: 0 MPa; center: 5 MPa; right: 25 MPa

Contact length and tilt angle are also optimized for seal stability at high pressures. The FEA design, shows very good positioning in the groove and relatively small deformation, keeping displacement to a low level with consequent lower material stress, which reduces extrusion risk. Zurcon® Rimseal IM is designed to control fluid film during both outstroke and instroke. The back-pumping function was improved with a special design on the low-pressure side which also provides additional extrusion resistance, unique to Zurcon® Z13 (Figure 36).

ADVANTAGES

- Feasible both by injection moulding and by lathing from injection moulded TPU Zurcon® tubes.
- Increased extrusion resistance and outstanding abrasion resistance of TPU Zurcon® positions Zurcon® Rimseal IM as an effective and reliable choice for tandem seal configurations
- Calibrated rod contact pressure and reduced friction from optimized back-pumping behaviour give Zurcon® Rimseal IM the capability to control oil film, making it a very good choice as a secondary seal in Lubrication Management configurations

APPLICATION EXAMPLES

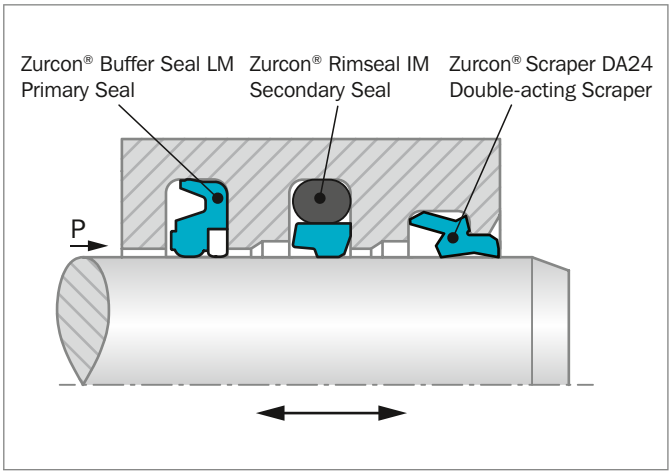


Figure 37: Tandem configuration

- Construction machinery
- Hydraulic cylinders
- Earth moving equipment
- Mobile hydraulics
- Agriculture

- Mobile cranes
- Fork lifts

OPERATING CONDITIONS:

Pressure:	60 MPa in tandem system 25 MPa as individual element
Velocity:	0.5 m/s as primary seal 5 m/s with short strokes (<1 m) in tandem systems
Temperature:	-45 °C to +110 °C depending on O-Ring material
Media:	- Mineral oil - Synthetic and natural esters - HEES, HETG up to +60 °C - Flame retardant fluids HF - Special optimized for flame retardant fluids (HFC) up to +60 °C
Installation:	- Standard mounting in closed grooves. - For Ø <18 mm request a split groove. - No recalibration needed for installation in closed groove.

IMPORTANT NOTE

The above data are maximum values and cannot be used at the same time, e.g. the maximum operating speed depends on pressure, temperature and gap value. A combination of pressure and speed might cause local heat increases, so care should be taken when evaluating high values for the above parameters simultaneously.

MATERIAL

Zurcon® Z13 is the 60 ShD TPU that combines excellent mechanical and elastic material properties:

- Temperature range from -45 °C to +110 °C (for short periods, up to +120 °C)
- Good combination of elasticity and tensile strength
- Low friction
- Excellent chemical compatibility
- Low compression set at high temperatures

Table 24: Recommended materials

Code	O-Ring Material Shore A	Code	O-Ring Temp. °C*
Z13	NBR 70	N	-30 to +100
	NBR 70 Low temp.	T	-45 to +80
	HNBR 70	H	-30 to +110
	FKM 70	V	-10 to (+200)

* The O-Ring operation temperature is only valid in mineral hydraulic oil.

Table 25: Z13 Chemical compatibility: General guideline (Laboratory compatibility tests 1,008 hours)

FLUIDS TYPE	DIN / ISO Code	Temperatur	Results
Mineral Oils	HLP HVLP HLPD	+110 °C	Excellent
Synthetics fluids	HEES	+80 °C to +100 °C	Excellent
	HEPG (PAG)	+60 °C	Good
	HEPR (PAO)	+100 °C	Excellent
Water based fluids	HFA	+50 °C to +60 °C	Good
	HFC	+60 °C	Excellent
Synthetics water free fluids	HFDU	+100 °C	Excellent

The above results must be considered as general guidelines. We recommend verifying the compound compatibility with the specific fluids and temperature conditions experienced in the application.

■ Installation Recommendation

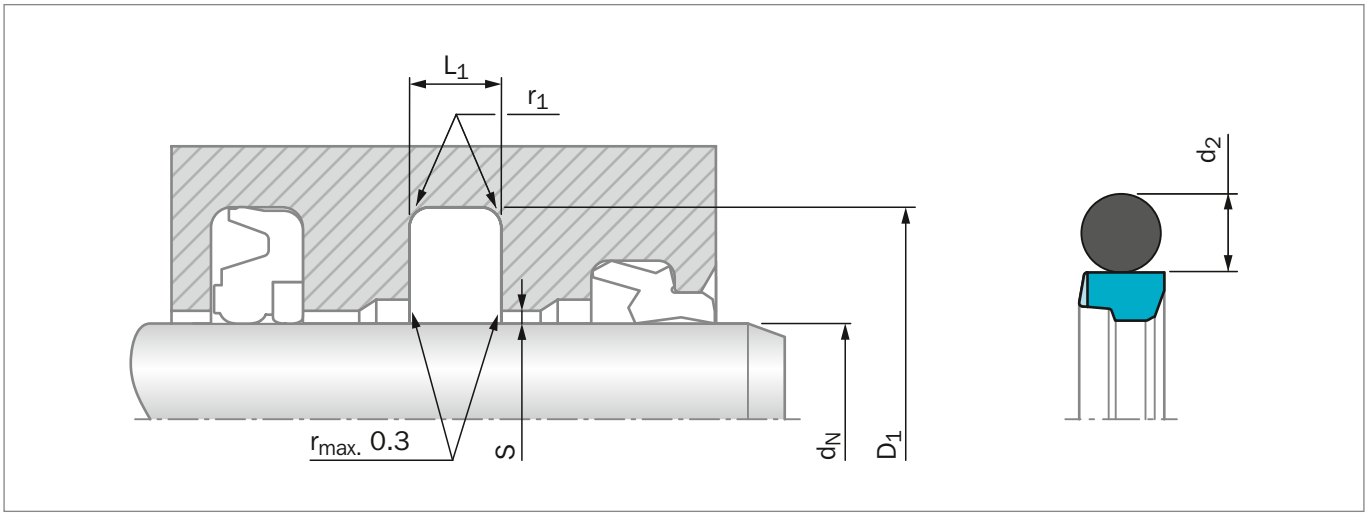


Figure 38: Installation Drawing

Table 26: Installation Dimensions – Standard Recommendations

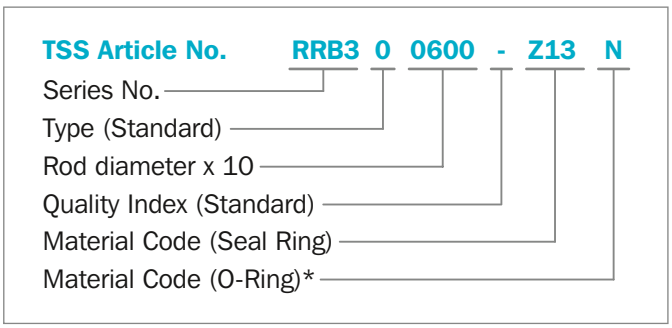
Seal Series No.	Rod Diameter d_N f8/h9			Groove Diameter	Groove Width	Radial Clearance S_{max}** @ +110 °C				O-Ring Cross Section
	Light Application	Standard Application	Heavy Duty Application	D_1 H9	L_1 +0.2	16 MPa	26 MPa	32 MPa	40 MPa	d_2
RRB1	19 - 37.9	8 - 18.9***	-	d_N + 7.3	3.2	0.30	0.20	-	-	2.62
RRB2	38 - 199.9	19 - 37.9	8 - 18.9	d_N + 10.7	4.2	0.40	0.30	0.20	-	3.53
RRB3	200 - 255.9	38 - 199.9	19 - 37.9	d_N + 15.1	6.3	0.40	0.30	0.20	-	5.33
RRB4	256 - 399.9*	200 - 255.9	38 - 199.9	d_N + 20.5	8.1	0.50	0.40	0.30	0.25	7.00
RRB8	-	256 - 399.9*	200 - 255.9	d_N + 24.0	8.1	0.50	0.40	0.30	0.25	7.00
RRB5	-	-	256 - 399.9*	d_N + 27.3	9.5	0.60	0.50	0.40	0.35	8.40

Installation in closed grooves from diameters > 18 mm. Also for installation according to ISO 7425-2.
* Max diameter for lathed seal from IM Z13 tube
** When installed as secondary seal utilize S_{max} of the primary seal.
*** Special type of mold is necessary

ORDERING EXAMPLE

Zurcon® Rimseal IM complete with O-Ring:

Rod diameter	d_N = 60.0 mm
Groove width:	L_1 = 6.3 mm
TSS Part No.:	RRB300600 from Table 26 and Table 27



Zurcon® Rimseal IM is always supplied as a set with a Nitrile O-Ring, code N or T.

Table 27: Installation Dimensions / TSS Article No.

Rod Diameter	Groove Diameter	Groove Width	TSS Article No.	O-Ring Size
d_N f8/h9	D_1 H9	L_1 +0.2		
50.0	**65.1**	**6.3**	**RRB300500-Z13**	**56.52 x 5.33**
60.0	75.1	6.3	RRB300600-Z13	66.04 x 5.33
65.0	80.1	6.3	RRB300650-Z13	69.22 x 5.33
70.0	**85.1**	**6.3**	**RRB300700-Z13**	**75.57 x 5.33**
75.0	90.1	6.3	RRB300750-Z13	81.92 x 5.33
80.0	**95.1**	**6.3**	**RRB300800-Z13**	**85.09 x 5.33**
85.0	100.1	6.3	RRB300850-Z13	91.44 x 5.33
90.0	**105.1**	**6.3**	**RRB300900-Z13**	**94.62 x 5.33**
95.0	110.1	6.3	RRB300950-Z13	100.97 x 5.33
100.0	**115.1**	**6.3**	**RRB301000-Z13**	**107.32 x 5.33**
105.0	120.1	6.3	RRB301050-Z13	110.49 x 5.33
110.0	**125.1**	**6.3**	**RRB301100-Z13**	**116.84 x 5.33**
115.0	130.1	6.3	RRB301150-Z13	120.02 x 5.33
120.0	135.1	6.3	RRB301200-Z13	126.37 x 5.33
125.0	**140.1**	**6.3**	**RRB301250-Z13**	**129.54 x 5.33**
130.0	145.1	6.3	RRB301300-Z13	135.89 x 5.33
140.0	**155.1**	**6.3**	**RRB301400-Z13**	**145.42 x 5.33**
150.0	165.1	6.3	RRB301500-Z13	158.12 x 5.33

All dimensions in **bold** type are in accordance with ISO 3320

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Polypac® - Veepac CH

Single-acting

Set of Chevron Rings

With Support and Pressure Energizing Ring

Without and with Anti-extrusion Ring

Material:
Fabric Reinforced Rubber - POM or PTFE

Veepac CH

Description

Veepac seals are sets of fabric reinforced chevron rings. They are composed by a support ring, "V" shaped sealing rings and a pressure energizing ring.

The support ring or base ring guides and sustains the other "V" shaped rings for best performance. Special versions provide incorporated anti-extrusion rings, either on the inner or outer side, for rod or piston applications (see type CH/NEI or CH/NEO). In standard versions, the support ring is manufactured in cotton fabric reinforced rubber, for a good anti-extrusion resistance.

The intermediate "V" shaped rings (vee-rings) are the real sealing elements of Veepac seals. Their particular shape confers the capacity of increasing sealing effectiveness under high pressure. In standard versions, they are made in cotton fabric reinforced NBR and pure NBR.

The energizer ring ensures uniform loading of pressure on the other rings. This element is manufactured in acetal resin, or cotton fabric reinforced nitrile for diameters over 300 mm (standard material).

DESIGN

The Veepac seals are available in different compositions. The standard version consists in a support ring, two fabric reinforced vee-rings, one rubber vee-ring and the energizing ring.

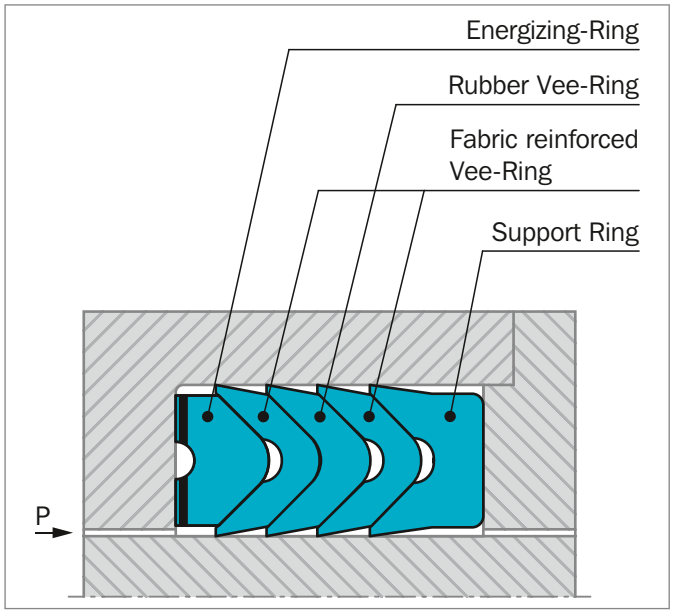


Figure 39: Veepac standard design

When the rubber vee-ring isn't available (indicated in Table 29 with the symbol ^) the Veepac are assembled with three fabric reinforced vee-ring as shown in figure below.

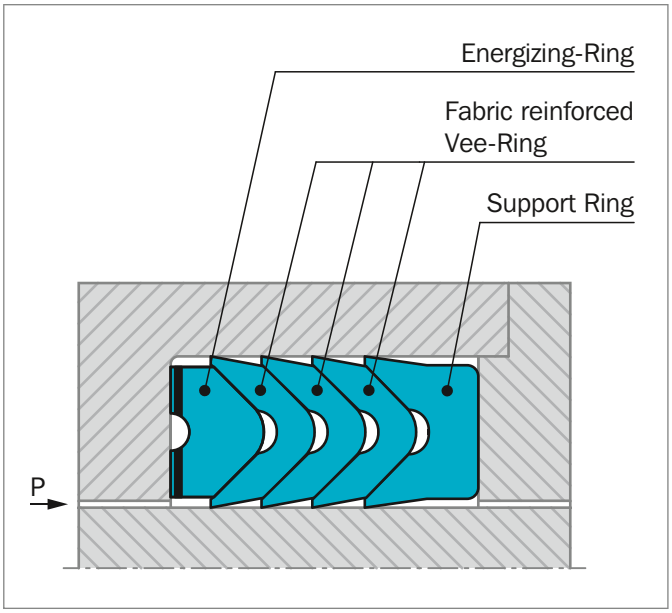


Figure 40: Veepac design with 3 fabric reinforced vee-ring

Where extrusion gaps are greater than those specified or for higher pressure conditions, special designs incorporating anti-extrusion rings can be made, to suit rods (suffix NEI) and at the Polypac ref.

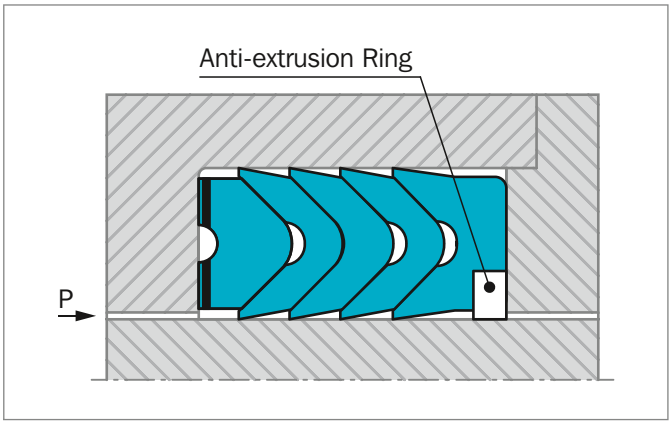


Figure 41: Veepac design with anti-extrusion ring

ADVANTAGES

- Exceptional wear resistance
- Pre-load adjustment capability
- Excellent behavior in harsh conditions
- Rod-seal replacement without complete cylinder dismantling possible
- Long service life

APPLICATION EXAMPLES

Veepac seals are recommended for single- or double-acting (back-to-back installation) hydraulic cylinders in the following applications:

- Ship hydraulics
- Excavators
- Steel mills
- Presses

OPERATING CONDITIONS

Pressure:	Up to 40 MPa
Velocity:	Up to 0.5 m/s
Temperature:	-30 °C to +200 °C
Media:	Hydraulic fluids Mineral Oil based hydraulic fluids,Water/oil and Water/Glycol emulsions
Groove Type:	Open

IMPORTANT NOTE

The above data are maximum values and cannot be used at the same time, e.g. the maximum operating speed depends on material type, pressure, temperature and gap value. Temperature range also depends on media.

GAP DIMENSIONS

To prevent extrusion the diameter not facing the pressure must be max. 0.3 mm smaller (than the piston seal) and 0.3 mm larger (than the rod seal). Using Veepac with Back-up Ring enables double values.

MATERIALS

Components of the Veepac seals are made in different combinations of materials, according to the specific application (see table below).

Table 28: Material Selection

Material Set Code	Temperature	Sealing Material	Energizer Ring Material	
N0O0C	-30 to +130 °C	Cotton reinforced NBR	POM-GL-BK	up to 300 mm I.D.
			Cotton reinforced NBR	over 300 mm I.D.
V0O0A	-20 to +150 °C	Aramidic Fiber reinforced FKM	POM-GL-BK	up to 300 mm I.D.
			Aramidic Fiber reinforced FKM	over 300 mm I.D.
V0P0A	-20 to +200 °C	Aramidic Fiber reinforced FKM	Filled PTFE	up to 300 mm I.D.
			Aramidic Fiber reinforced FKM	over 300 mm I.D.

Highlighted material is standard

Installation Recommendation

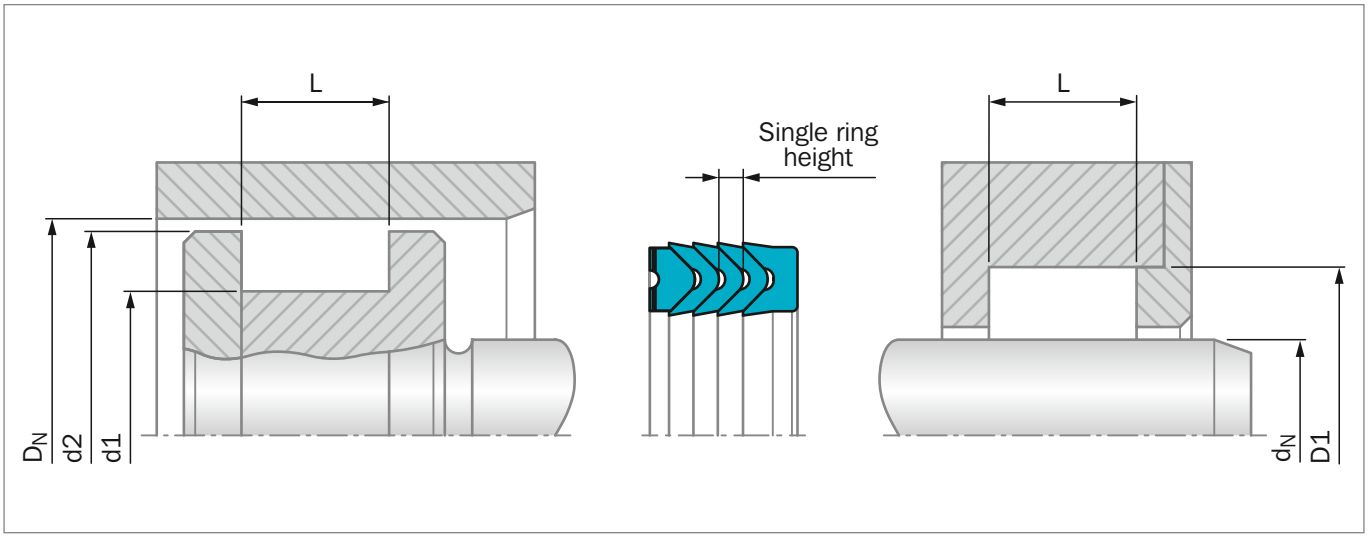


Figure 42: Installation Drawing

ORDERING EXAMPLE

For a **rod or piston** application of standard Veepac sealing element composed by: Support ring, 3 vee-rings and an energizer ring:

Rod/Groove Dia.:	d_N/d1 = 80.0 mm
Groove Dia./Bore:	D1/D_N = 100.0 mm
TSS Part No.:	RCH100800
Material Set-Code:	N000C
Polypac Part. No.:	CH 393314

TSS Article No. **RCH1 0 0800 - N000C**

- TSS Series No.
- Type (Standard)
- Rod Diameter x 10
- Quality Index
- Material Set-Code

Table 29: Installation Dimensions / TSS Part No.

Rod/Groove Diameter	Groove Dia./Bore	Groove Width	Diameter	Single Ring Height	Special Version		TSS Part No.	Polypac Ref. No.*
d_N h9/F8 **d1** h11	**D1** H11 **D_N** H9/f8	**L** -0.25	**d2** +/-0.1					
10.00	20.00	11.00	19.00	1.70			RCH000100	CH 078039/B
12.00	25.00	14.32	24.00	2.56			RCH000120	CH 098047/B
12.70	25.40	19.05	24.40	3.17			RCH000127	CH 100050
14.00	27.00	14.32	26.00	2.56	#		RCH000140	CH 106055/B
16.00	29.00	14.32	28.00	2.56			RCH000160	CH 114062/B
18.00	31.00	14.32	30.00	2.56			RCH000180	CH 122070/B
18.25	28.57	16.05	27.60	2.56			RCH000183	CH 112071
20.00	30.00	21.50	29.00	3.81			RCH000200	CH 118078
20.00	31.50	17.50	30.50	2.97			RCH100200	CH 124078
20.00	32.00	18.15	31.00	3.15	#	^	RCH200200	CH 125078
20.00	33.00	14.32	32.00	2.56			RCH300200	CH 129078/B
20.00	36.00	24.00	35.00	4.04			RCH400200	CH 141078

Rod/Groove Diameter	Groove Dia./Bore	Groove Width	Diameter	Single Ring Height	Special Version		TSS Part No.	Polypac Ref. No.*
d_N h9/F8 **d1** h11	**D1** H11 D_N H9/f8	**L** -0.25	**d2** +/-0.1					
22.00	32.00	18.13	31.00	2.75			RCH000220	CH 125086
22.00	38.00	26.00	37.00	4.21			RCH100220	CH 149086
22.00	40.00	22.50	39.00	3.70		^	RCH200220	CH 157086
25.00	35.00	17.30	34.00	2.82			RCH000250	CH 137098
25.00	40.00	19.84	39.00	3.50			RCH100250	CH 157098
25.00	42.00	25.40	41.00	4.29			RCH200250	CH 165098
25.00	45.00	25.40	44.00	4.50	#	^	RCH300250	CH 177098
25.40	38.10	19.45	37.10	3.48			RCH000254	CH 150100
26.00	45.00	29.37	44.00	5.16			RCH000260	CH 177102
28.00	40.00	17.00	39.00	2.80			RCH000280	CH 157110
28.00	44.00	17.62	43.00	3.17	#		RCH100280	CH 173110/B
28.00	44.00	24.00	43.00	4.15	#		RCH200280	CH 173110/1
28.57	41.27	19.84	40.30	3.50			RCH000286	CH 162112
30.00	40.00	21.80	39.00	3.76			RCH000300	CH 157118
30.00	42.00	20.00	41.00	3.50			RCH100300	CH 165118
30.00	50.00	29.37	49.00	5.08			RCH300300	CH 196118
31.75	44.45	16.25	43.40	3.19			RCH000318	CH 175125/1
31.75	44.45	19.05	43.40	3.50			RCH100318	CH 175125
31.75	47.62	29.05	46.60	4.34		^	RCH200318	CH 187125
32.00	42.00	17.30	41.00	2.82			RCH000320	CH 165125
32.00	48.00	17.63	47.00	3.17	#	^	RCH100320	CH 188125/B
34.92	47.62	20.64	46.60	3.43			RCH000349	CH 187137
34.92	50.80	24.21	49.80	4.14	#		RCH100349	CH 200137
35.00	45.00	21.78	44.00	3.81			RCH000350	CH 177137
35.00	50.00	22.50	49.00	3.57			RCH100350	CH 196137
36.00	52.00	17.60	51.00	3.17			RCH100360	CH 204141/B
38.00	55.00	28.00	54.00	5.05			RCH000380	CH 216149
38.10	50.80	19.45	49.00	3.51			RCH000381	CH 200150
38.10	53.97	25.27	53.00	4.60			RCH100381	CH 212150
38.10	53.97	27.78	53.00	4.60			RCH200381	CH 212150/1
39.00	55.00	25.40	54.00	4.65		^	RCH000390	CH 216153
40.00	50.00	17.30	49.00	2.82			RCH000400	CH 196157
40.00	55.00	22.62	54.00	3.84			RCH100400	CH 216157
40.00	55.00	26.19	54.00	3.84			RCH200400	CH 216157/1
40.00	56.00	17.63	55.00	3.17			RCH300400	CH 220157/B
40.00	60.00	30.00	59.00	5.16	#		RCH400400	CH 236157
40.00	65.00	35.72	64.00	6.15			RCH500400	CH 255157
44.45	57.15	21.83	56.20	3.38			RCH000445	CH 225175
44.45	60.32	27.80	59.30	4.07	#		RCH100445	CH 237175
45.00	55.00	17.50	54.00	2.80			RCH000450	CH 216177
45.00	60.00	22.22	59.00	3.89			RCH100450	CH 236177
45.00	65.00	28.00	64.00	5.34			RCH200450	CH 255177

Rod/Groove Diameter d_N h9/F8 **d1** h11	Groove Dia./Bore **D1** H11 D_N H9/f8	Groove Width **L** -0.25	Diameter **d2** +/-0.1	Single Ring Height	Special Version		TSS Part No.	Polypac Ref. No.*
48.00	60.00	25.00	59.00	4.07		^	RCH000480	CH 236188
50.00	70.00	21.94	69.00	3.95			RCH200500	CH 275196/B
50.00	70.00	30.00	69.00	5.16			RCH300500	CH 275196
50.80	63.50	19.84	62.50	3.35			RCH000508	CH 250200
50.80	66.67	23.00	65.70	4.27			RCH100508	CH 262200
50.80	66.67	25.27	65.70	4.27			RCH200508	CH 262200/1
50.80	69.85	33.50	68.80	5.08	#		RCH300508	CH 275200
50.80	70.80	38.50	69.80	6.75	#	^	RCH400508	CH 278200
51.00	69.00	28.00	68.00	5.03			RCH000510	CH 271200
53.97	63.50	16.70	62.50	2.59	#		RCH000540	CH 250212
53.97	66.67	19.45	65.70	3.35	#	^	RCH100540	CH 262212
53.97	69.85	28.00	68.80	4.07			RCH200540	CH 275212
55.00	67.00	25.00	66.00	4.07			RCH000550	CH 263216
55.00	70.00	26.50	69.00	4.02			RCH100550	CH 275216
55.00	75.00	30.00	74.00	6.48			RCH200550	CH 295216
55.00	75.00	38.50	74.00	6.48			RCH400550	CH 295216/1
55.00	80.00	33.73	79.00	5.16	#		RCH500550	CH 314216
56.00	76.00	21.95	75.00	3.94		^	RCH000560	CH 299220/B
56.00	76.00	33.40	75.00	5.38			RCH100560	CH 299220
57.15	69.85	19.05	68.80	3.25			RCH000572	CH 275225
57.15	73.02	27.78	72.00	4.27	#		RCH100572	CH 287225
57.15	76.20	32.54	75.20	5.16			RCH200572	CH 300225
60.00	76.00	29.00	75.00	4.34			RCH100600	CH 299236
60.00	77.00	27.00	76.00	4.59			RCH200600	CH 303236
60.00	80.00	32.15	79.00	5.66			RCH300600	CH 314236
63.00	83.00	21.94	82.00	3.95			RCH000630	CH 326248/B
63.00	85.00	32.00	84.00	5.67			RCH100630	CH 334248
63.50	80.00	28.00	79.00	5.03		^	RCH200635	CH 314250
63.50	82.50	26.59	81.50	4.76			RCH300635	CH 325250
63.50	82.50	31.62	81.50	4.76			RCH400635	CH 325250/1
64.00	80.00	25.80	79.00	4.65			RCH000640	CH 314251
65.00	77.00	21.00	76.00	4.04			RCH000650	CH 303255
65.00	80.00	26.00	79.00	4.00	#		RCH100650	CH 314255
65.00	85.00	29.00	84.00	5.21			RCH200650	CH 334255
65.00	90.00	30.00	89.00	5.00		^	RCH300650	CH 354255
66.30	85.00	24.13	84.00	4.60	#		RCH000663	CH 334261
68.00	88.00	30.00	87.00	5.21	#		RCH000680	CH 346267
69.85	88.90	25.40	87.90	4.83			RCH100699	CH 350275
69.85	88.90	35.50	87.90	4.83			RCH200699	CH 350275/1
70.00	85.00	28.00	84.00	4.32			RCH100700	CH 334275
70.00	90.00	21.95	89.00	3.95		^	RCH200700	CH 354275/B
70.00	90.00	30.00	89.00	5.08			RCH300700	CH 354275

Rod/Groove Diameter	Groove Dia./Bore	Groove Width	Diameter	Single Ring Height	Special Version		TSS Part No.	Polypac Ref. No.*
d_N h9/F8 **d1** h11	**D1** H11 D_N H9/f8	**L** -0.25	**d2** +/-0.1					
72.00	90.00	30.16	89.00	4.86		^	RCH000720	CH 354283
73.02	88.90	26.58	87.90	4.34			RCH000730	CH 350287
75.00	90.00	22.50	89.00	4.04			RCH000750	CH 354295
75.00	95.00	30.00	94.00	5.21			RCH100750	CH 374295
75.00	100.00	30.00	99.00	5.80		^	RCH300750	CH 393295
75.00	100.00	37.50	99.00	6.32	#	^	RCH400750	CH 393295/1
76.20	88.90	16.27	87.50	2.78			RCH000762	CH 350300
76.20	95.25	25.52	94.20	5.16	#		RCH100762	CH 375300/1
76.20	95.25	28.97	94.20	5.16			RCH200762	CH 375300
80.00	95.00	17.50	94.00	3.05			RCH000800	CH 374314
80.00	100.00	30.00	99.00	4.83			RCH100800	CH 393314
80.00	105.00	27.41	104.00	4.98		^	RCH200800	CH 413314/B
82.55	101.60	28.97	100.60	4.88			RCH100826	CH 400325
85.00	100.00	17.30	99.00	2.50			RCH000850	CH 393334
85.00	105.00	30.00	104.00	5.35			RCH100850	CH 413334
85.72	104.77	29.37	103.80	4.88			RCH100857	CH 412337
88.90	101.60	17.00	100.60	3.40			RCH000889	CH 400350
88.90	107.95	33.33	106.90	4.90		^	RCH200889	CH 425350/1
89.00	105.00	25.80	104.00	4.65			RCH000890	CH 413350
90.00	105.00	31.75	104.00	5.71			RCH000900	CH 413354
90.00	110.00	25.00	109.00	4.88			RCH100900	CH 433354/1
90.00	110.00	26.88	109.00	4.88			RCH200900	CH 433354
90.00	115.00	27.41	114.00	4.98		^	RCH300900	CH 452354/B
92.07	111.13	29.37	110.10	5.16	#	^	RCH000921	CH 437362
95.00	110.00	24.00	109.00	4.11			RCH200950	CH 433374
95.25	111.13	24.30	110.10	4.09	#	^	RCH300953	CH 452375
98.42	123.82	36.96	122.80	6.55			RCH000984	CH 437387
100.00	114.30	20.64	113.30	3.57			RCH001000	CH 450393
100.00	115.00	25.30	114.00	3.96			RCH101000	CH 452393
100.00	120.00	28.00	119.00	5.16			RCH201000	CH 472393
100.00	120.00	31.00	119.00	5.16	#		RCH301000	CH 472393/1
100.00	125.00	27.40	124.00	4.98		^	RCH401000	CH 492393/B
100.00	125.00	36.90	124.00	6.60		^	RCH501000	CH 492393
101.60	127.00	32.15	126.00	5.82	#		RCH001016	CH 500400
104.00	130.00	37.00	129.00	6.73			RCH001040	CH 511409
105.00	120.00	25.00	119.00	4.00			RCH001050	CH 472413
105.00	125.00	29.76	124.00	5.00		^	RCH201050	CH 492413
105.00	135.00	34.50	134.00	5.80		^	RCH301050	CH 531413
106.00	135.00	33.00	134.00	5.65	#	^	RCH001060	CH 531417
110.00	132.00	36.50	131.00	6.96			RCH201100	CH 519433
111.12	136.52	38.89	135.50	6.53	#	^	RCH001111	CH 537437
114.00	130.00	25.80	129.00	4.80			RCH001140	CH 511448

Rod/Groove Diameter d_N h9/F8 **d1** h11	Groove Dia./Bore **D1** H11 D_N H9/f8	Groove Width **L** -0.25	Diameter **d2** +/-0.1	Single Ring Height	Special Version		TSS Part No.	Polypac Ref. No.*
114.30	127.00	18.41	126.00	3.43			RCH001143	CH 500450
114.30	133.35	28.18	132.30	5.26		^	RCH101143	CH 525450
114.30	139.70	31.75	138.70	5.56	#	^	RCH201143	CH 550450
115.00	140.00	37.12	139.00	6.00		^	RCH101150	CH 551452
117.47	142.87	36.10	141.90	6.15	#	^	RCH001175	CH 562462
120.00	140.00	30.00	139.00	5.36			RCH001200	CH 551472
125.00	145.00	29.62	144.00	5.18			RCH001250	CH 570492
125.00	150.00	27.40	149.00	4.98			RCH101250	CH 590492/B
125.00	155.00	34.50	154.00	5.80	#	^	RCH201250	CH 610492
127.00	152.40	38.63	151.40	6.48			RCH001270	CH 600500
130.00	150.00	29.76	149.00	4.96			RCH001300	CH 590511
130.00	155.00	40.00	154.00	7.25	#	^	RCH101300	CH 610511
130.00	160.00	41.50	159.00	5.50	#		RCH201300	CH 629511
130.00	160.00	43.50	159.00	5.50	#		RCH301300	CH 629511/1
135.00	155.00	30.55	154.00	5.11			RCH001350	CH 610531
139.70	165.10	37.30	164.10	5.56	#	^	RCH001397	CH 6950550
140.00	160.00	28.50	159.00	5.16			RCH001400	CH 629551
140.00	165.00	41.95	164.00	6.56	#		RCH101400	CH 649551
140.00	170.00	32.97	169.00	5.99		^	RCH201400	CH 669551/B
145.00	170.00	38.10	169.00	6.45		^	RCH001450	CH 669570
146.05	171.45	38.89	170.40	6.53		^	RCH001461	CH 675575
150.00	170.00	30.56	169.00	5.16			RCH001500	CH 669590
150.00	180.00	40.00	179.00	6.28		^	RCH101500	CH 708590
152.40	177.80	33.34	176.80	5.77		^	RCH001524	CH 700600
154.00	175.00	29.44	174.00	5.31		^	RCH001540	CH 688606
157.00	182.00	30.25	181.00	5.72		^	RCH001570	CH 716618
160.00	180.00	30.00	179.00	5.00	#		RCH001600	CH 708629
160.00	190.00	32.97	189.00	5.99		^	RCH101600	CH 748629/B
161.92	180.97	28.57	180.00	5.00	#	^	RCH001619	CH 712637
170.00	195.00	37.50	194.00	6.55		^	RCH001700	CH 767669
170.00	200.00	50.00	199.00	8.00	#	^	RCH101700	CH 787669
171.45	187.32	24.20	186.30	4.09	#	^	RCH001715	CH 737675
175.00	200.00	42.00	199.00	7.54			RCH001750	CH 787688
177.80	196.85	31.00	195.80	5.16		^	RCH001778	CH 775700
177.80	203.20	32.54	202.20	5.95		^	RCH101778	CH 800700
180.00	210.00	32.97	209.00	5.99			RCH001800	CH 826708/B
180.97	203.20	31.75	202.20	5.95			RCH000810	CH 800712
187.32	200.00	21.74	199.00	3.86		^	RCH001873	CH 787737
190.50	222.25	50.00	221.20	7.57		^	RCH001905	CH 875750
200.00	220.00	30.00	219.00	5.00			RCH002000	CH 866787
200.00	230.00	32.97	229.00	5.99		^	RCH102000	CH 905787/B
205.00	225.00	19.48	224.00	3.17		^	RCH002050	CH 885807

Rod/Groove Diameter	Groove Dia./Bore	Groove Width	Diameter	Single Ring Height	Special Version		TSS Part No.	Polypac Ref. No.*
d_N h9/F8 **d1** h11	**D1** H11 D_N H9/f8	**L** -0.25	**d2** +/-0.1					
210.00	240.00	34.50	239.00	5.80			RCH002100	CH 944826
210.00	240.00	42.10	239.00	7.55		^	RCH102100	CH 944826/1
220.00	250.00	52.00	249.00	8.25		^	RCH002200	CH 984866
224.00	254.00	32.97	253.00	5.99		^	RCH002240	CH 1000881/B
228.60	254.00	38.10	253.00	6.30		^	RCH002286	CH 1000900
228.60	260.35	48.42	259.30	8.46			RCH102286	CH 1025900
240.00	270.00	45.00	269.00	8.03		^	RCH002400	CH 1062944
250.00	270.00	32.00	269.00	5.00			RCH002500	CH 1062984
254.00	279.40	38.10	268.40	5.95		^	RCH102540	CH 11001000
268.29	298.45	45.24	297.40	7.97		^	RCH002683	CH 11751056
269.88	307.98	53.97	307.00	8.44		^	RCH002699	CH 12121062
280.00	315.00	38.45	314.00	6.98		^	RCH002800	CH 12401102/B
288.93	307.98	28.57	307.00	5.21		^	RCH002889	CH 12121137
290.00	320.00	50.80	319.00	7.29		^	RCH002900	CH 12591141
300.00	320.00	32.00	319.00	5.00			RCH003000	CH 12591181
304.80	330.20	38.10	329.20	6.55		^	RCH003048	CH 13001200
310.00	330.00	30.00	329.00	5.50		^	RCH003100	CH 12991220
315.00	350.00	38.45	349.00	6.98		^	RCH003150	CH 13771240/B
320.00	365.00	55.00	364.00	8.50		^	RCH003200	CH 14371259
340.00	380.00	60.00	379.00	10.41		^	RCH003400	CH 14961338
350.00	390.00	60.00	389.00	10.54	#	^	RCH003500	CH 15351377
355.60	381.00	38.10	380.00	5.95			RCH003556	CH 15001400
368.30	406.40	57.15	405.40	10.00		^	RCH003683	CH 16001450
369.00	400.00	45.00	399.00	7.68		^	RCH003690	CH 15741452
400.00	440.00	54.00	439.00	8.38		^	RCH004000	CH 17321574
416.00	450.00	50.00	449.00	8.67		^	RCH004160	CH 17711637
420.00	460.00	51.60	459.00	8.40			RCH004200	CH 18111653
505.00	545.00	60.00	544.00	10.40		^	RCH005050	CH 21451988
700.00	750.00	73.00	749.00	6.35	#		RCH007000	CH 29532756

* As the Polypac Ref. No. does not refer to the material, please always state the full number if available for identification.
"#" and "^" see Table 30.

Table 30: Explanation to "Special Version"

Not available with rubber Vee-ring		^
Available upon request	#	

Installation Recommendation, Type Polypac CH/NEI (with Back-up Ring)

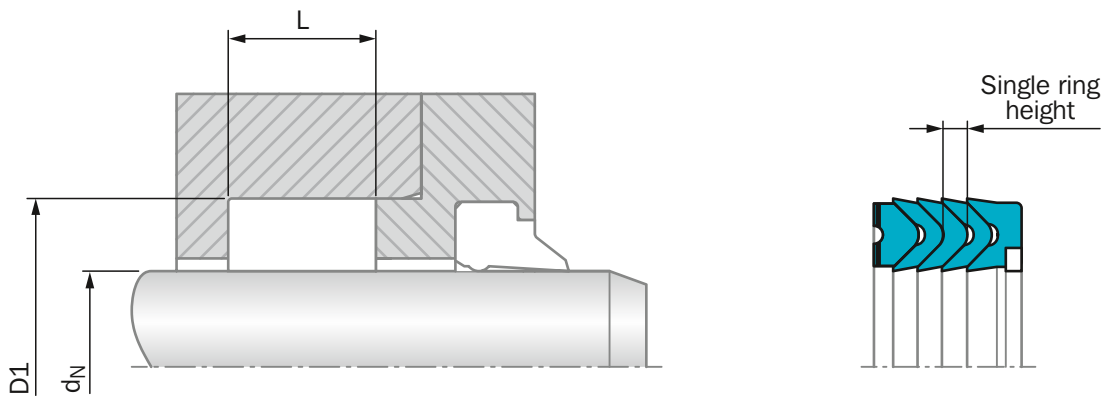


Figure 43: Installation Drawing

ORDERING EXAMPLE

For a **rod** application of Veepac sealing element composed by: Support ring **with anti-extrusion ring**, 3 vee-rings and an energizer ring:

Rod Diamater:	d_N = 80.0 mm
Groove Diameter:	D1 = 100.0 mm
TSS Part No.:	RCH1E0800
Material Set-Code:	N000C
Polypac Part. No.:	CH 393314/NEI

TSS Article No. **RCH1 E 0800 - N000C**

- TSS Series No.
- Type (Standard)
- Rod Diameter x 10
- Quality Index
- Material Set-Code

Table 31: Installation Dimensions / TSS Part No.

Rod Diameter	Groove Diameter	Groove Width	Single Ring Height	Special Version		TSS Part No.	Polypac Ref. No.*
d_N h9/F8	**D1** H11	**L** -0.25					
d_1 h11	D_N H9/f8						
10.00	20.00	11.00	1.70			RCH0E0100	CH 078039/B/NEI
28.00	44.00	17.62	3.17	#		RCH1E0280	CH 173110/B/NEI
28.00	44.00	24.00	4.15	#		RCH2E0280	CH 173110/1/NEI
30.00	45.00	22.20	3.80	#		RCH2E0300	CH 177118/NEI
30.00	50.00	29.37	5.08			RCH3E0300	CH 196118/NEI
32.00	48.00	17.63	3.17	#	^	RCH1E0320	CH 188125/B/NEI
36.00	51.00	24.00	4.14	#		RCH0E0360	CH 200141/NEI
40.00	55.00	22.62	3.84			RCH1E0400	CH 216157/NEI
40.00	55.00	26.19	3.84			RCH2E0400	CH 216157/1/NEI
45.00	60.00	22.22	3.89			RCH1E0450	CH 236177/NEI
48.00	62.00	22.22	3.73			RCH1E0480	CH 244188/NEI
50.00	65.00	24.60	4.34			RCH0E0500	CH 255196/NEI

Rod Diameter d_N h9/F8 d_1 h11	Groove Diameter D1 H11 D_N H9/f8	Groove Width L -0.25	Single Ring Height	Special Version		TSS Part No.	Polypac Ref. No.*
50.00	65.00	26.00	4.34			RCH1E0500	CH 255196/1/NEI
50.00	70.00	30.00	5.16			RCH3E0500	CH 275196/NEI
53.97	73.02	31.75	5.16			RCH3E0540	CH 287212/NEI
55.00	70.00	26.50	4.02			RCH1E0550	CH 275216/NEI
55.00	75.00	31.00	6.48	#		RCH3E0550	CH 295216/2/NEI
55.00	75.00	38.50	6.48			RCH4E0550	CH 295216/1/NEI
56.00	76.00	33.40	5.38			RCH1E0560	CH 299220/NEI
60.00	75.00	19.00	3.00			RCH0E0600	CH 295236/NEI
60.00	76.00	29.00	4.34			RCH1E0600	CH 299236/NEI
60.00	80.00	32.15	5.66			RCH3E0600	CH 314236/NEI
63.00	85.00	32.00	5.67			RCH1E0630	CH 334248/NEI
63.50	82.50	26.59	4.76			RCH3E0635	CH 325250/NEI
63.50	82.50	31.62	4.76			RCH4E0635	CH 325250/1/NEI
65.00	80.00	26.00	4.00	#		RCH1E0650	CH 314255/NEI
65.00	85.00	29.00	5.21			RCH2E0650	CH 334255/NEI
69.85	85.72	23.81	4.09			RCH0E0699	CH 337275/NEI
70.00	83.00	25.00	4.25	#		RCH0E0700	CH 326275/NEI
75.00	90.00	22.50	4.04			RCH0E0750	CH 354295/NEI
75.00	95.00	31.50	5.21			RCH2E0750	CH 374295/1/NEI
80.00	100.00	30.00	4.83			RCH1E0800	CH 393314/NEI
85.00	105.00	30.00	5.35			RCH1E0850	CH 413334/NEI
85.72	104.77	29.37	4.88			RCH1E0857	CH 412337/NEI
90.00	110.00	26.88	4.88			RCH2E0900	CH 433354/NEI
95.00	110.00	24.00	4.11			RCH0E0950	CH 433374/NEI
95.00	120.00	41.00	7.50	#	^	RCH1E0950	CH 472374/NEI
100.00	120.00	28.00	5.16			RCH2E1000	CH 472393/NEI
106.00	135.00	33.00	5.65	#	^	RCH0E1060	CH 531417/NEI
110.00	130.00	27.00	5.00	#		RCH0E1100	CH 511433/1/NEI
110.00	130.00	30.00	5.00	#		RCH1E1100	CH 511433/NEI
110.00	132.00	36.50	6.96			RCH2E1100	CH 519433/NEI
110.00	135.00	41.50	7.00	#	^	RCH3E1100	CH 531433/NEI
115.00	130.00	25.49	4.35	#		RCH0E1150	CH 511452/NEI
120.00	140.00	30.00	5.36			RCH0E1200	CH 551472/NEI
120.00	145.00	39.50	7.25	#	^	RCH1E1200	CH 570472/NEI

* As the Polypac Ref. No. does not refer to the material, please always state the full number if available for identification.
"#" and "^" see Table 32.

Table 32: Explanation to "Special Version"

Not available with rubber V-ring		^
Available upon request	#	

Polypac® - Veepac CH/G5

Single-acting

Set of Chevron Rings

With Support and Pressure Energizing Ring

Material:
Fabric Reinforced Rubber, POM or PTFE

Veepac CH/G5 Set

Description

Veepac is a set of fabric reinforced Chevron rings comprising of a support ring (1), sealing rings (2) and a pressure energizing ring (3). In the packing set, the energizing axial force is transferred between the individual packing rings so that each ring is pressed into positive contact with the rod surface. In addition to the standard materials, special material grades are available for a large variety of working conditions. The Figure 44 shows the Veepac design.

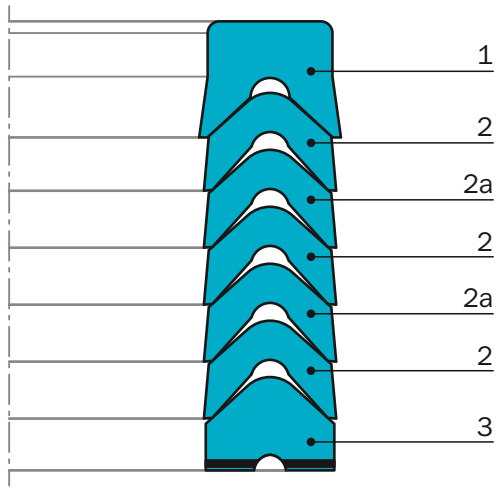


Figure 44: Veepac design

1) "U" or base rings in standard versions manufactured in reinforced fabric comprising of layers of cotton impregnated with nitrile rubber, compounded to resist extrusion. This component supports the vee-rings for effective performance.

2) Vee-rings are made of reinforced cotton fabric and nitrile elastomer in standard versions, to give good resilience, sealing efficiency and extrusion resistance.
Due to their specific design, Vee Rings are sensitive to fluid pressure variations, enabling them to deflect throughout their radial section, increase the seal loading and effectiveness in proportion to the pressures applied.

2a) Vee-rings are made of pure elastomer for high sealing efficiency.

3) Energizer or spreader rings are manufactured in acetal resin or PTFE. The function of this component is to ensure a uniform pressure distribution.

ADVANTAGES

- Very robust seal
- Non sensitive
- Adjustable
- Easy replacement in the field with split rings
- Extensive range of sizes
- Requires non super mating surfaces

APPLICATION EXAMPLES

- Mining equipment (with approvals)
- Excavators-steel mills
- Water hydraulic
- Presses
- Ship hydraulics
- Stabilizer cylinders on cranes
- Continous casting equipment

OPERATING CONDITIONS

Pressure:	Up to 40 MPa
Velocity:	Up to 0.5 m/s
Temperature:	-30 °C to +200 °C depending on material
Media:	Mineral oil, water glycol, water emulsions

IMPORTANT NOTE

The above data are maximum values and cannot be used at the same time, e.g. the maximum operating speed depends on material type, pressure, temperature and gap value. Temperature range also depends on media.

MATERIALS

The following material combination can be supplied:

Table 33: Common material choices

	Standard	Non standard	Non standard
Materials	NOONC	V0PVA	V0OVA
Vee-rings and Back-up Ring	Cotton Fabric NBR	Aramid Fabric FKM	Aramid Fabric FKM
Spreader*	POM	PTFE	POM
Elastomeric Vee-rings	NBR	FKM	FKM
Temperature Range °C	-30 +130	-20 +200	-20 +150

* The material for the spreader is dependent from the diameter.

DESIGN INSTRUCTIONS

Lead in chamfers

In order to avoid damage to the Veepac during installation, lead-in chamfers of min. 5 x 20° must be provided on the rods.

Table 34: Lead in chamfers

Rod Diameter	Lead in Chamfer
0 - 100	5 x 20°
101 - 200	7 x 20°
201 - 400	10 x 20°

Surface roughness

Table 35: Surface parameters

Parameter	Mating Surface µm	Groove Surface µm
R_{max}	1.00 - 4.00	< 16.0
$R_{z\ DIN}$	0.63 - 2.50	< 10.0
R_a	0.10 - 0.40	< 1.6

The material contact area R_{mr} should be approximately 50 to 70%, determined at a cut depth c = 0.25 x R_z, relative to a reference line of C_{ref}. 5%.

CLEARANCE

The gap behind the seal should not be larger than 0.30 mm in diameter.

■ Installation Recommendation

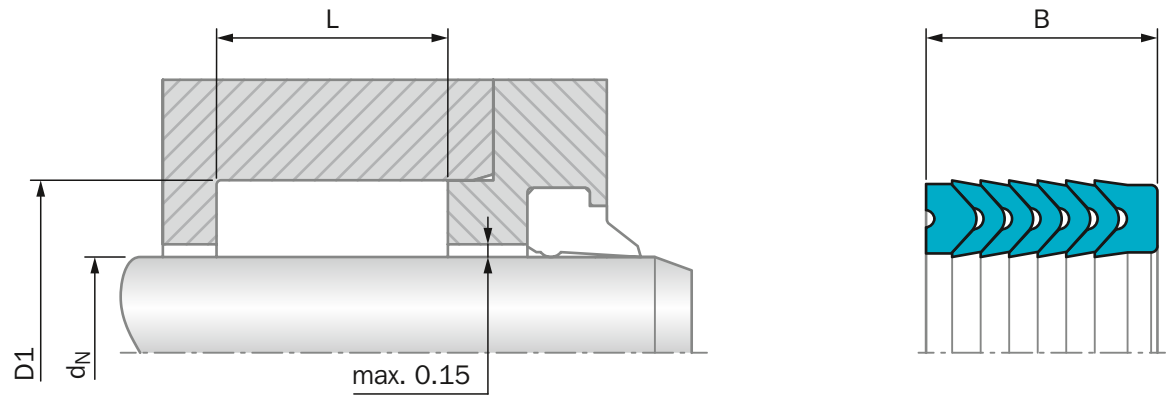


Figure 45: Installation Drawing

ORDERING EXAMPLE

Veepac Type RCH_G

Rod Diameter:	d_N = 70.0 mm
Groove Diameter:	D1 = 85.0 mm
Groove Width:	L = 22.5 mm
TSS Part No.:	RCH0G0700 -
Material:	N0ONC (standard)

TSS Article No. RCH 0 G 0700 - N0ONC

TSS Series No.
Design Code
Execution Mark
Rod Diameter x 10
Quality Index (Standard)
Material Code (Standard)

Polypac Ref. No.: CH 334275/G5

Table 36: Installation Dimensions / TSS Part No.

Rod Diameter	Groove Diameter	Groove Width	Seal Width	TSS Part No.	Description
d_N f8/h9	D1 H11	L +0.2	B		
25.0	37.0	22.5	22.5	RCH0G0250	CH 145098/G5
25.0	40.0	22.5	22.5	RCH1G0250	CH 157098/G5
28.0	40.0	22.5	22.5	RCH0G0280	CH 157110/G5
30.0	45.0	22.5	22.5	RCH0G0300	CH 177118/G5
36.0	48.0	22.5	22.5	RCH0G0360	CH 188141/G5
40.0	55.0	22.5	22.5	RCH0G0400	CH 216157/G5
45.0	60.0	22.5	22.5	RCH0G0450	CH 236177/G5
45.0	65.0	27.5	27.5	RCH1G0450	CH 255177/G5
50.0	65.0	22.5	22.5	RCH0G0500	CH 255196/G5
56.0	71.0	22.5	22.5	RCH0G0560	CH 279220/G5
60.0	80.0	37.0	37.0	RCH0G0600	CH 314236/G5
65.0	85.0	40.0	40.0	RCH0G0650	CH 334255/G5
70.0	85.0	22.5	22.5	RCH0G0700	CH 334275/G5
70.0	90.0	40.0	40.0	RCH1G0700	CH 354275/G5
75.0	90.0	22.5	22.5	RCH0G0750	CH 354295/G5
80.0	95.0	22.5	22.5	RCH0G0800	CH 374314/G5
80.0	100.0	40.0	40.0	RCH1G0800	CH 393314/G5
85.0	100.0	22.5	22.5	RCH0G0850	CH 393334/G5
90.0	105.0	22.5	22.5	RCH0G0900	CH 413354/G5
90.0	110.0	40.0	40.0	RCH1G0900	CH 433354/G5
100.0	115.0	30.0	30.0	RCH0G1000	CH 452393/G5
100.0	120.0	40.0	40.0	RCH1G1000	CH 472393/G5
110.0	125.0	30.0	30.0	RCH0G1100	CH 492433/G5
110.0	130.0	40.0	40.0	RCH1G1100	CH 511433/G5
120.0	145.0	50.0	50.0	RCH0G1200	CH 570472/G5
125.0	140.0	34.0	34.0	RCH0G1250	CH 551492/G5
125.0	150.0	46.0	46.0	RCH1G1250	CH 590492/G5
140.0	155.0	34.0	34.0	RCH0G1400	CH 610551/G5
140.0	165.0	46.0	46.0	RCH1G1400	CH 649551/G5
160.0	180.0	40.0	40.0	RCH0G1600	CH 708629/G5
160.0	190.0	60.0	60.0	RCH1G1600	CH 748629/G5

CH Production numbers of the available dimensions in standard materials. For specific materials, please indicate existing Polypac designations.

Polypac® - Selemaster SM

Single-acting

Compact Rod Seal

With Anti-extrusion Ring

Material:
Rubber + Fabric Reinforced
Rubber + POM

Selemaster SM

Description

The rod seal range has been designed to meet the needs of hydraulic equipment operating at high pressures and subjected to severe loading and vibration conditions.

The main sealing element is manufactured in a highly compression-set resistant nitrile. The most important quality of this element is the design of the multiple sealing lips for maximum sealing efficiency and end face configuration, which ensures that the Selemaster can tolerate vibrations and severe misalignment.

The support ring is made in cotton fabric reinforced nitrile elastomer; the “U“ shape is energized when pressure is applied.

The last element is the anti-extrusion ring, manufactured in POM.

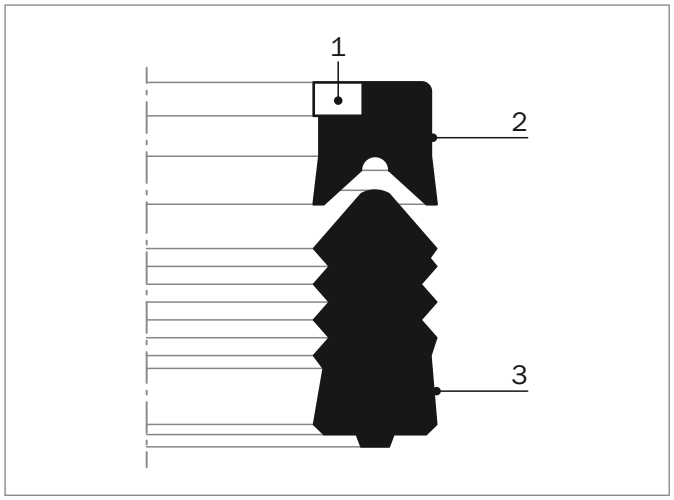


Figure 46: Selemaster design

1) POM anti-extrusion ring
2) Support ring in cotton fabric reinforced nitrile, NBR 80 Shore A
3) Sealing element in nitrile, NBR 80 Shore A

NOTE

- For low-temperature applications (-50 °C to +110 °C), a special material - code N7C0 - Polypac Ref.: /1AX - 2187 is available

ADVANTAGES

- High sealing efficiency
- Effective sealing during vibration and shock loading
- Extrusion resistance at high pressure

APPLICATION EXAMPLES

- Earth-moving machines
- Excavators
- Lift platforms

OPERATING CONDITIONS

Pressure:	Up to 70 MPa
Velocity:	Up to 0.5 m/s
Temperature:	-40 °C to +130 °C
Media:	Hydraulic fluids Mineral oil-based hydraulic fluids, water and water/glycol emulsions
Groove Type:	Open

IMPORTANT NOTE

The above data are maximum values and cannot be used at the same time, e.g. the maximum operating speed depends on material type, pressure, temperature and gap value. Temperature range also depends on media.

■ Installation Recommendation

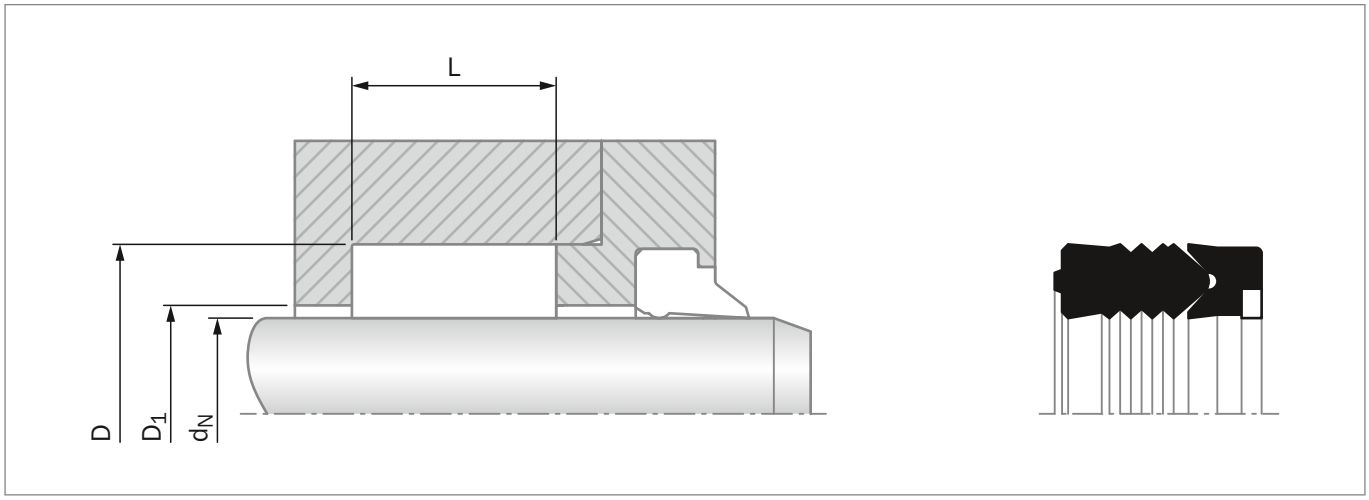


Figure 47: Installation Drawing

ORDERING EXAMPLE

Selemaster RCK

Rod Diameter:	d_N = 50.0 mm
Groove Diameter:	D = 63.0 mm
Groove Width:	L = 20.0 mm
TSS Part No.:	RCK000500
Material Code:	N8C0 standard
Polypac Ref.:	SM 248196/1AX

TSS Article No. **RCK 0 00500 - N8C0**

TSS Series No.
Type (Standard)
Rod Diameter x 10
Quality Index (Standard)
Material Set-code

Table 37: Installation Dimensions / TSS Article No.

Rod Diameter	Groove Diameter	Groove Width	Diameter	TSS Article No. Standard	Description
d_N h9	D H10	L +0.4	D_1 +-0.1		
15.00	27.00	20.00	15.40	RCK000150-N8C0	SM 106059/1AX
20.00	33.00	20.00	20.40	RCK000200-N8C0	SM 129078/1AX
22.00	35.00	20.00	22.40	RCK000220-N8C0	SM 137086/1AX
25.00	38.00	20.00	25.40	RCK000250-N8C0	SM 149098/1AX
28.00	41.00	20.00	28.40	RCK000280-N8C0	SM 161110/1AX
30.00	43.00	20.00	30.40	RCK000300-N8C0	SM 169118/1AX
32.00	47.00	22.50	32.40	RCK000320-N8C0	SM 185125/1AX
35.00	45.00	25.60	35.40	RCK000350-N8C0	SM 177137/1AX
35.00	47.00	22.50	35.40	RCK100350-N8C0	SM 185137/1AX
35.00	50.00	22.50	35.40	RCK200350-N8C0	SM 196137/1AX
36.00	51.00	22.50	36.40	RCK000360-N8C0	SM 200141/1AX
38.10	50.80	23.90	38.50	RCK000381-N8C0	SM 200150/1AX

Rod Diameter	Groove Diameter	Groove Width	Diameter		TSS Article No. Standard	Description
d_N h9	D H10	L +0.4	D_1 +-0.1			
40.00	52.00	22.50	40.40		RCK200400-N8C0	SM 204157/1AX
40.00	55.00	22.60	40.40		RCK100400-N8C0	SM 216157/1AX
40.00	60.00	30.00	40.40		RCK000400-N8C0	SM 236157/1AX
45.00	60.00	22.50	45.40		RCK000450-N8C0	SM 236177/1AX
45.00	65.00	28.00	45.40		RCK100450-N8C0	SM 255177/1AX
50.00	63.00	20.00	50.40		RCK000500-N8C0	SM 248196/1AX
50.00	65.00	24.50	50.40		RCK100500-N8C0	SM 255196/1AX
50.00	65.00	26.50	50.40	^	RCK200500-N8C0	SM 255196/2AX
50.00	65.00	22.50	50.40		RCK300500-N8C0	SM 255196/1BX
50.00	70.00	30.00	50.40		RCK400500-N8C0	SM 275196/1BX
50.00	70.00	31.90	50.40		RCK500500-N8C0	SM 275196/1AX
50.80	66.67	24.90	51.20		RCK000508-N8C0	SM 262200/1AX
55.00	70.00	25.00	55.40		RCK000550-N8C0	SM 275216/1AX
55.00	70.00	22.50	55.40		RCK100550-N8C0	SM 275216/2AX
55.00	75.00	32.00	55.40		RCK200550-N8C0	SM 295216/1AX
55.00	75.00	30.00	55.40		RCK300550-N8C0	SM 295216/2AX
56.00	71.00	25.00	56.40	^	RCK000560-N8C0	SM 279220/1AX
56.00	76.00	28.00	56.40		RCK100560-N8C0	SM 299220/1AX
60.00	75.00	25.00	60.40		RCK000600-N8C0	SM 295236/1AX
60.00	75.00	22.50	60.40		RCK100600-N8C0	SM 295236/2AX
60.00	77.00	27.00	60.40		RCK200600-N8C0	SM 303236/1AX
60.00	80.00	34.90	40.40		RCK300600-N8C0	SM 314236/1AX
63.00	83.00	29.00	63.40	^	RCK000630-N8C0	SM 326248/1AX
63.00	83.00	27.00	63.40		RCK100630-N8C0	SM 326248/1BX
63.50	82.55	26.60	63.90		RCK000635-N8C0	SM 325250/1AX
65.00	85.00	29.00	65.40		RCK000650-N8C0	SM 334255/1AX
70.00	83.00	25.00	70.40		RCK000700-N8C0	SM 326275/1AX
70.00	85.00	25.00	70.40		RCK200700-N8C0	SM 334275/1BX
70.00	85.00	22.50	70.40		RCK100700-N8C0	SM 334275/1AX
70.00	90.00	30.00	70.40		RCK300700-N8C0	SM 354275/1AX
70.00	90.00	31.90	70.40		RCK400700-N8C0	SM 354275/2AX
75.00	95.00	30.00	75.40		RCK100750-N8C0	SM 374295/2CX
75.00	95.00	28.00	75.40		RCK000750-N8C0	SM 374295/2AX
76.20	95.25	24.60	76.60		RCK000762-N8C0	SM 375300/1AX
76.50	96.50	32.50	76.90		RCK000765-N8C0	SM 379301/1AX
80.00	100.00	30.00	80.40		RCK000800-N8C0	SM 393314/1AX
85.00	98.00	25.00	85.40		RCK000850-N8C0	SM 385334/1AX
85.00	105.00	30.00	85.40		RCK100850-N8C0	SM 413334/1AX
90.00	105.00	33.50	90.40		RCK100900-N8C0	SM 413354/1BX
90.00	105.00	25.00	90.40		RCK000900-N8C0	SM 413354/1AX
90.00	110.00	32.50	90.40		RCK300900-N8C0	SM 433354/2BX

Rod Diameter	Groove Diameter	Groove Width	Diameter		TSS Article No. Standard	Description
d_N h9	D H10	L +0.4	D_1 +-0.1			
90.00	110.00	30.00	90.40		RCK200900-N8C0	SM 433354/1AX
95.00	115.00	28.00	95.40		RCK000950-N8C0	SM 452374/1AX
100.00	114.30	24.20	100.40		RCK001000-N8C0	SM 450393/1AX
100.00	120.00	30.00	100.40		RCK101000-N8C0	SM 472393/1AX
105.00	118.00	25.00	105.40		RCK001050-N8C0	SM 464413/1AX
105.00	120.00	34.00	105.40		RCK101050-N8C0	SM 472413/1AX
110.00	130.00	32.50	110.40		RCK001100-N8C0	SM 511433/1AX
110.00	132.00	36.50	110.40		RCK101100-N8C0	SM 519433/1AX
115.00	130.00	30.00	115.70		RCK001150-N8C0	SM 511452/1AX
115.00	130.00	22.50	115.70		RCK101150-N8C0	SM 511452/2AX
120.00	135.00	22.50	120.70		RCK001200-N8C0	SM 531472/1AX
120.00	140.00	30.00	120.70	^	RCK101200-N8C0	SM 551472/1AX
125.00	145.00	29.60	125.70		RCK001250-N8C0	SM 570492/1AX
127.00	142.00	22.50	127.40		RCK001270-N8C0	SM 559500/1AX
130.00	150.00	28.00	130.70	^	RCK001300-N8C0	SM 590511/1AX
135.00	155.00	28.00	135.70		RCK001350-N8C0	SM 610531/1AX
140.00	160.00	28.00	140.70		RCK001400-N8C0	SM 629551/1AX
145.00	165.00	28.00	145.70		RCK001450-N8C0	SM 649570/1AX
150.00	170.00	28.00	150.70		RCK001500-N8C0	SM 669590/1AX
155.00	175.00	28.00	155.70		RCK001550-N8C0	SM 688610/1AX
158.50	180.00	28.00	159.20	^	RCK001585-N8C0	SM 708624/1AX
160.00	180.00	28.00	160.70		RCK001600-N8C0	SM 708629/1AX
165.00	185.00	30.00	165.70		RCK001650-N8C0	SM 729649/1AX
170.00	195.00	35.00	170.70		RCK001700-N8C0	SM 767669/1AX
180.00	205.00	35.00	180.70		RCK001800-N8C0	SM 807708/1AX
185.00	200.00	22.50	185.70		RCK001850-N8C0	SM 787728/2AX
185.00	210.00	35.00	210.70		RCK101850-N8C0	SM 826728/1AX
190.00	215.00	35.00	190.70		RCK001900-N8C0	SM 846748/2AX
200.00	225.00	35.00	200.70		RCK002000-N8C0	SM 885787/1AX
215.00	240.00	35.00	215.70	^	RCK002150-N8C0	SM 944846/1AX
220.00	245.00	35.00	220.70		RCK002200-N8C0	SM 964866/1AX
225.00	250.00	35.00	225.70		RCK002250-N8C0	SM 984886/1AX
230.00	255.00	35.00	230.70		RCK002300-N8C0	SM 1003905/1AX
240.00	265.00	35.00	240.70		RCK002400-N8C0	SM 1043945/1AX
250.00	275.00	35.00	250.70		RCK002500-N8C0	SM 1082984/1AX
260.00	280.00	30.00	260.70		RCK002600-N8C0	SM 11021024/1AX
265.00	290.00	35.00	265.70		RCK002650-N8C0	SM 11411043/1AX
275.00	300.00	35.00	275.70		RCK002750-N8C0	SM 11811082/1AX
280.00	305.00	35.00	280.70		RCK002800-N8C0	SM 12011102/1AX
300.00	325.00	35.00	300.70		RCK003000-N8C0	SM 12791181/1AX
335.00	360.00	35.00	335.70		RCK003350-N8C0	SM 14171318/1AX

^ Available upon request

Polypac® - Balsele

Single-acting

Compact Seal

Without and with Back-up Ring

Material:
Fabric Reinforced NBR + POM

Balsele

Description

The Balsele is a compact rod seal consisting of an elastomeric sealing element and an integrated fabric reinforced base.

Due to the radial pre-load, an excellent sealing performance will be achieved even at low pressures. The fabric reinforced base prevents the seal from extrusion. Where extrusion gaps are greater than those specified or for higher pressure conditions the series B/NEI with incorporated anti-extrusion ring shall be selected.

DESIGN

1) Sealing element manufactured from a specially developed nitrile compound particularly resistant to compression set. The sealing lips are produced to give optimum efficiency and wear resistance.

2) The reinforced base of the seal element is of cotton fabric impregnated with nitrile elastomer and vulcanized with the first sealing element, thus forming an integral component.

3) Guide rings or anti-extrusion rings are made from acetal resin. As previously described, these rings maintain the seal in the optimum position for maximum performance, and minimize all possible extrusion gaps.

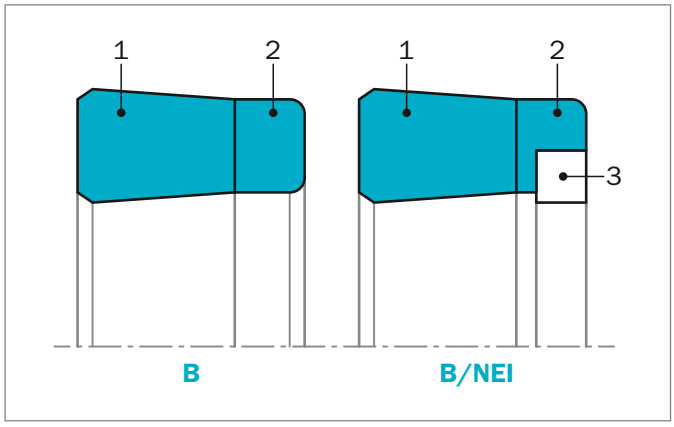


Figure 48: Balsele design

ADVANTAGES

- Small cross section
- Good chemical resistance
- Large size range
- No hydrolysis problems
- Wide temperature range

APPLICATION EXAMPLES

- Standard hydraulic cylinders (low to medium duty)
- Mobile hydraulic
- Water based fluids equipment
- After market
- Presses

OPERATING CONDITIONS

Pressure:	Up to 25 MPa (Type B) Up to 40 MPa (Type B/NEI)
Velocity:	Up to 0.5 m/s
Temperature:	-30 °C to +130 °C
Media:	Mineral oil, water, air
Groove Type:	Open

IMPORTANT NOTE

The above data are maximum values and cannot be used at the same time, e.g. the maximum operating speed depends on material type, pressure, temperature and gap value. Temperature range also depends on media.

MATERIALS

For type B:
NBR + cotton fabric
Material code N8C0

For type B/NEI:
NBR + cotton fabric
Back-up Ring material POM
Material code N8C0

DESIGN INSTRUCTIONS

Lead in chamfers
In order to avoid damage to the Balsele during installation, lead-in chamfers of min. 5 x 20° must be provided on the rods.

Table 38: Lead in chamfers

Rod Diameter	Lead in Chamfer
0 - 100	5 x 20°
101 - 200	7 x 20°
201 - 400	10 x 20°

Surface roughness

Table 39: Surface parameters

Parameter	Mating Surface µm	Groove Surface µm
R_{max}	0.63 - 2.50	< 16.0
$R_{z\ DIN}$	0.40 - 1.60	< 10.0
R_a	0.05 - 0.20	< 1.6

The material contact area R_{mr} should be approximately 50 to 70%, determined at a cut depth c = 0.25 x R_z, relative to a reference line of $C_{ref.}$ 5%.

Clearance

Table 40: Radial Clearance

Operating max. Pressure MPa	Radial Clearance S_{max}
16	0.20
25	0.10

For Type B/NEI (with Back-up Ring) the values can be double and with similar gap measure $S_{max.}$ = 0.10 a pressure of 40 MPa can be tightened.

Installation Recommendation

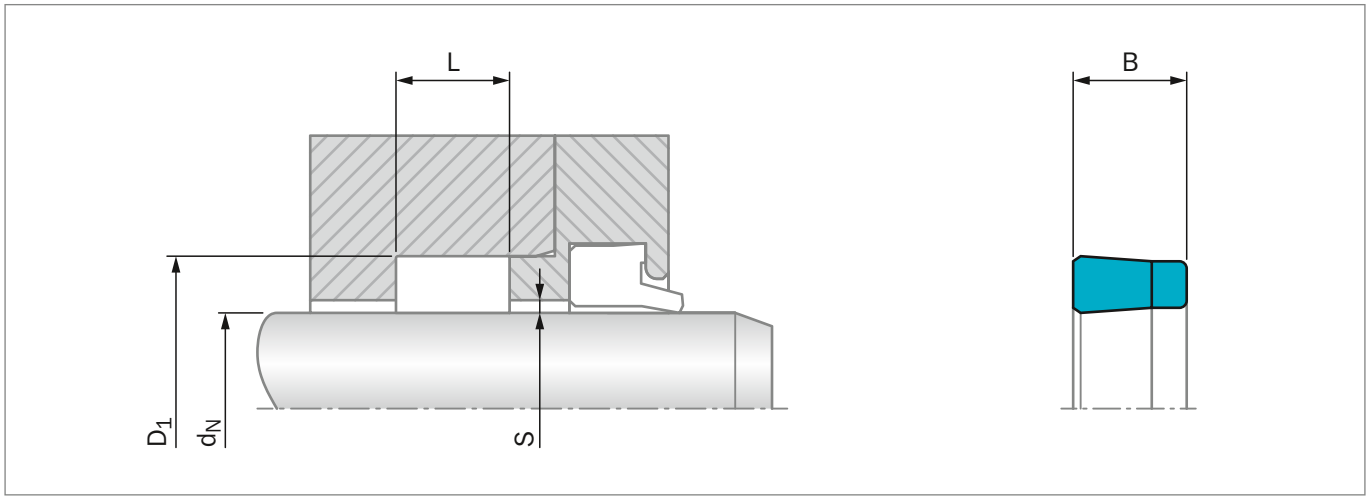


Figure 49: Installation Drawing

ORDERING EXAMPLE

Balsele Type B

Rod Diameter:	d_N = 6.0 mm
Groove Diameter:	D1 = 10.0 mm
Groove Width:	L = 5.0 mm
TSS Part No.:	RUM000060 -
Compound:	N8C0 (NBR + cotton fabric)

TSS Article No. RUM 0 0 0060 - N8C0

- TSS Series No.
- Design code
- Execution Mark
- Rod diameter x 10
- Quality Index (Standard)
- Material code (Seal Ring)

Polypac Ref. No.: B 039023

Table 41: Installation Dimensions / TSS Article No.

Rod Diameter d_N h11	Groove Diameter D_1 H11	Groove Width L +0.1	Seal Width B	TSS Article No. Standard	Description
*4.76	12.70	6.40	5.75	RUM000047-N8C0	B 050018
*6.00	10.00	5.00	4.00	RUM000060-N8C0	B 039023
***6.00**	**14.00**	**6.40**	**5.90**	**RUM100060-N8C0**	**B 055024**
*6.35	14.28	6.85	6.30	RUM000063-N8C0	B 056025
*8.00	15.00	6.40	5.90	RUM000080-N8C0	B 059031
*10.00	17.00	6.40	5.90	RUM100100-N8C0	B 066039
*11.11	20.63	7.65	7.00	RUM000111-N8C0	B 081043
*12.00	18.00	7.50	7.00	RUM000120-N8C0	B 070047
*12.00	19.00	6.30	5.80	RUM100120-N8C0	B 075047
***12.00**	**20.00**	**6.40**	**5.80**	**RUM200120-N8C0**	**B 078047**
*12.70	19.05	5.25	4.80	RUM000127-N8C0	B 075050
*12.70	20.63	6.85	6.30	RUM100127-N8C0	B 081050
*12.70	22.22	7.65	7.00	RUM200127-N8C0	B 087050
*14.00	22.00	6.50	5.90	RUM000140-N8C0	B 086055

Rod Diameter	Groove Diameter	Groove Width	Seal Width	TSS Article No. Standard	Description
d_N h11	D_1 H11	L +0.1	B		
*14.28	23.81	7.65	7.00	RUM000142-N8C0	B 093056
*15.00	23.00	6.40	5.80	RUM000150-N8C0	B 090059
*15.87	22.22	5.25	4.80	RUM000158-N8C0	B 087062
*15.87	25.40	7.65	7.00	RUM100158-N8C0	B 100062
***16.00**	**24.00**	**6.40**	**5.90**	**RUM000160-N8C0**	**B 094063/1**
*16.00	24.00	7.00	6.50	RUM100160-N8C0	B 094063
*17.46	30.16	10.00	9.20	RUM000174-N8C0	B 118068
*18.00	25.00	8.00	7.30	RUM100180-N8C0	B 098070
***18.00**	**26.00**	**6.40**	**5.80**	**RUM200180-N8C0**	**B 102070/1**
*18.00	26.00	7.00	6.50	RUM300180-N8C0	B 102070
*18.00	28.00	6.30	5.70	RUM400180-N8C0	B 110070
*19.05	28.58	9.00	8.00	RUM100190-N8C0	B 112075
*19.05	31.75	8.50	7.70	RUM000190-N8C0	B 125075/1
*20.00	27.00	6.50	5.90	RUM000200-N8C0	B 106078
***20.00**	**28.00**	**6.30**	**5.70**	**RUM200200-N8C0**	**B 110078/1**
*20.00	28.00	7.00	6.50	RUM100200-N8C0	B 110078
*20.00	30.00	8.50	7.60	RUM300200-N8C0	B 118078
*20.00	35.00	11.50	10.60	RUM400200-N8C0	B 137078
*20.63	33.33	10.00	9.20	RUM000206-N8C0	B 131081
*22.00	30.00	6.50	5.90	RUM000220-N8C0	B 118086/1
*22.00	30.00	7.00	6.50	RUM100220-N8C0	B 118086
*22.00	35.00	10.00	9.20	RUM400220-N8C0	B 137086
*22.22	31.75	9.20	8.60	RUM000222-N8C0	B 125087
*23.81	36.51	10.00	9.20	RUM000238-N8C0	B 143093
*24.00	32.00	7.50	6.90	RUM000240-N8C0	B 125094
*24.00	34.00	6.50	5.90	RUM100240-N8C0	B 134094
25.00	**33.00**	**6.40**	**5.80**	**RUM000250-N8C0**	**B 129098/1**
*25.00	35.00	9.00	8.40	RUM100250-N8C0	B 137098
*25.00	38.00	10.00	9.15	RUM200250-N8C0	B 149098
*25.00	44.00	12.50	11.40	RUM300250-N8C0	B 173098
*25.40	31.75	5.25	4.70	RUM000254-N8C0	B 125100
*25.40	34.92	6.85	6.20	RUM100254-N8C0	B 137100
*25.40	38.10	10.00	9.20	RUM200254-N8C0	B 150100
*25.40	41.27	11.60	10.70	RUM300254-N8C0	B 162100
*26.00	40.00	10.00	9.20	RUM000260-N8C0	B 157102/1
*27.00	35.00	6.50	5.90	RUM000270-N8C0	B 137106
28.00	**36.00**	**6.40**	**5.80**	**RUM000280-N8C0**	**B 141110**
*28.19	39.68	8.00	7.30	RUM000281-N8C0	B 156111
*28.57	41.27	10.00	9.20	RUM100285-N8C0	B 162112
*28.57	44.45	11.60	10.70	RUM200285-N8C0	B 175112
30.00	37.50	6.50	6.00	RUM100300-N8C0	B 147118
30.00	38.00	6.40	5.80	RUM000300-N8C0	B 149118

Rod Diameter	Groove Diameter	Groove Width	Seal Width	TSS Article No. Standard	Description
d_N h11	D_1 H11	L +0.1	B		
*30.00	40.00	7.50	6.80	RUM300300-N8C0	B 157118
*30.00	41.60	8.00	7.20	RUM500300-N8C0	B 164118
*30.00	45.00	9.00	8.50	RUM600300-N8C0	B 177118/1
*30.00	50.00	14.50	13.50	RUM700300-N8C0	B 196118
*31.75	47.62	11.60	10.60	RUM200317-N8C0	B 187125
32.00	40.00	6.30	5.80	RUM000320-N8C0	B 157125/1
*32.00	40.00	9.00	8.50	RUM100320-N8C0	B 157125
*34.92	50.80	10.00	9.10	RUM100349-N8C0	B 200137/1
*34.92	50.80	11.60	10.60	RUM200349-N8C0	B 200137/2
35.00	43.00	6.50	6.00	RUM000350-N8C0	B 169137
*35.00	45.00	8.00	7.20	RUM100350-N8C0	B 177137/5
*35.00	45.00	13.50	12.80	RUM300350-N8C0	B 177137/2
*35.00	50.00	11.50	10.60	RUM400350-N8C0	B 196137
36.00	43.00	6.50	6.00	RUM000360-N8C0	B 169141
36.00	44.00	6.40	5.90	RUM100360-N8C0	B 173141
*37.72	50.80	9.00	8.20	RUM000377-N8C0	B 200148
*38.00	50.00	9.50	8.80	RUM000380-N8C0	B 196149
*38.10	50.80	12.40	11.90	RUM100381-N8C0	B 200150/1
*38.10	53.97	11.50	10.50	RUM400381-N8C0	B 212150/1
*38.10	53.97	12.83	12.00	RUM500381-N8C0	B 212150/2
40.00	48.00	6.50	6.00	RUM000400-N8C0	B 188157
40.00	**50.00**	**8.00**	**7.40**	**RUM100400-N8C0**	**B 196157/3**
*40.00	50.00	11.00	10.30	RUM300400-N8C0	B 196157
*40.00	50.00	13.50	12.80	RUM400400-N8C0	B 196157/2
*40.00	60.00	14.50	13.30	RUM700400-N8C0	B 236157
41.27	57.12	11.60	10.70	RUM000412-N8C0	B 225162
42.00	50.00	6.40	6.00	RUM000420-N8C0	B 196165
*42.92	55.50	8.90	8.10	RUM000429-N8C0	B 218169
43.00	53.00	9.00	8.40	RUM000430-N8C0	B 208169
44.00	53.00	8.00	7.30	RUM000440-N8C0	B 208173
*44.45	60.32	11.60	10.70	RUM100444-N8C0	B 237175
*44.45	61.91	11.60	10.60	RUM200444-N8C0	B 243175
45.00	53.00	6.50	6.00	RUM000450-N8C0	B 208177
45.00	**55.00**	**8.00**	**7.30**	**RUM100450-N8C0**	**B 216177**
*45.00	63.00	11.00	10.00	RUM500450-N8C0	B 248177
*45.00	65.00	14.50	13.30	RUM600450-N8C0	B 255177
45.97	55.37	8.33	7.60	RUM000459-N8C0	B 218181
46.00	56.00	8.00	7.30	RUM100460-N8C0	B 220181
*47.23	60.32	10.00	9.20	RUM000472-N8C0	B 237186
*47.62	63.50	11.50	10.60	RUM000476-N8C0	B 250187
*48.00	60.00	7.00	6.30	RUM000480-N8C0	B 236188
*50.00	58.00	12.50	12.00	RUM000500-N8C0	B 228196

Rod Diameter	Groove Diameter	Groove Width	Seal Width	TSS Article No. Standard	Description
d_N h11	D_1 H11	L +0.1	B		
50.00	**60.00**	**8.00**	**7.30**	**RUM100500-N8C0**	**B 236196**
*50.00	60.00	10.00	9.30	RUM200500-N8C0	B 236196/1
*50.00	62.00	9.50	8.50	RUM300500-N8C0	B 244196/1
*50.00	64.50	11.50	10.50	RUM400500-N8C0	B 254196
*50.00	70.00	14.50	13.30	RUM600500-N8C0	B 275196
50.80	60.35	11.00	10.30	RUM000508-N8C0	B 237200
*50.80	66.67	11.50	10.50	RUM100508-N8C0	B 262200
*53.97	73.02	14.80	13.80	RUM000539-N8C0	B 287212
55.00	70.00	10.50	9.60	RUM200550-N8C0	B 275216
*55.00	75.00	14.50	13.30	RUM300550-N8C0	B 295216
56.00	66.00	8.00	7.30	RUM000560-N8C0	B 259220
*56.00	76.00	14.50	13.40	RUM200560-N8C0	B 299220
57.00	67.00	8.00	7.30	RUM000570-N8C0	B 263224
57.15	69.85	10.00	9.20	RUM000571-N8C0	B 275225
*57.15	73.02	11.50	10.60	RUM100571-N8C0	B 287225
*57.15	76.20	10.00	8.90	RUM200571-N8C0	B 300225
*57.15	76.20	13.50	12.40	RUM300571-N8C0	B 300225/1
*57.15	76.20	14.28	13.20	RUM400571-N8C0	B 300225/2
60.00	69.50	7.00	6.40	RUM000600-N8C0	B 273236
60.00	70.00	8.00	7.50	RUM100600-N8C0	B 275236
60.00	71.00	9.60	9.00	RUM400600-N8C0	B 279236
60.00	72.00	10.00	9.20	RUM500600-N8C0	B 283236
60.00	75.00	13.00	12.10	RUM600600-N8C0	B 295236
*60.00	80.00	14.50	13.50	RUM700600-N8C0	B 314236
*60.32	79.37	14.80	13.80	RUM000603-N8C0	B 312237
61.00	69.00	8.50	7.90	RUM000610-N8C0	B 271240
63.00	75.00	9.60	8.80	RUM000630-N8C0	B 295248/1
*63.00	83.00	14.50	13.30	RUM300630-N8C0	B 326248
*63.50	82.55	14.28	13.13	RUM200635-N8C0	B 325250/1
65.00	75.00	8.50	7.80	RUM000650-N8C0	B 295255/1
65.00	75.00	13.50	12.30	RUM100650-N8C0	B 295255
65.00	77.00	9.60	8.80	RUM200650-N8C0	B 303255
65.00	80.00	11.50	10.60	RUM300650-N8C0	B 314255
*65.00	85.00	14.50	13.50	RUM600650-N8C0	B 334255
*65.00	95.00	17.50	15.80	RUM500650-N8C0	B 374255
*66.00	80.00	11.00	10.10	RUM000660-N8C0	B 314259
*66.67	85.72	14.80	13.70	RUM000667-N8C0	B 337262
68.00	76.00	8.00	7.40	RUM000680-N8C0	B 299267
70.00	80.00	8.00	7.30	RUM100700-N8C0	B 314275/1
70.00	82.00	9.60	8.80	RUM300700-N8C0	B 322275/1
70.00	84.00	12.50	11.20	RUM500700-N8C0	B 330275
70.00	85.00	12.00	11.00	RUM600700-N8C0	B 334275/1

Rod Diameter	Groove Diameter	Groove Width	Seal Width	TSS Article No. Standard	Description
d_N h11	D_1 H11	L +0.1	B		
*70.00	90.00	14.50	13.50	RUM800700-N8C0	B 354275
*73.02	88.90	12.50	11.50	RUM000730-N8C0	B 350287
75.00	85.00	8.00	7.30	RUM000750-N8C0	B 334295/1
75.00	89.50	11.50	10.50	RUM200750-N8C0	B 352295
75.00	90.00	11.50	10.60	RUM300750-N8C0	B 354295
*75.00	95.00	11.00	10.00	RUM500750-N8C0	B 374295/1
76.00	84.00	8.50	7.90	RUM000760-N8C0	B 330299
76.20	88.90	9.40	8.70	RUM000762-N8C0	B 350300
*76.20	95.25	14.80	13.70	RUM200762-N8C0	B 375300
77.00	87.00	8.00	7.30	RUM000770-N8C0	B 342303
79.00	88.50	7.00	6.40	RUM000790-N8C0	B 348311
80.00	90.00	8.00	7.30	RUM000800-N8C0	B 354314
80.00	92.00	9.60	8.80	RUM100800-N8C0	B 362314
80.00	96.00	10.50	9.60	RUM400800-N8C0	B 377314
80.00	100.00	14.50	13.40	RUM600800-N8C0	B 393314
81.00	91.00	8.00	7.30	RUM000810-N8C0	B 358318
82.55	101.60	14.80	13.70	RUM000825-N8C0	B 400325/1
84.00	94.00	8.00	7.30	RUM100840-N8C0	B 370330
85.00	95.00	8.00	7.30	RUM000850-N8C0	B 374334
85.00	95.00	8.50	7.80	RUM100850-N8C0	B 374334/1
85.00	97.00	9.60	9.00	RUM200850-N8C0	B 381334
85.00	100.00	12.00	10.80	RUM300850-N8C0	B 393334/1
85.00	105.00	14.50	13.40	RUM400850-N8C0	B 413334
*85.00	110.00	13.50	12.20	RUM500850-N8C0	B 433334
*85.72	104.77	14.80	13.80	RUM000857-N8C0	B 412337
*85.72	111.12	19.50	18.20	RUM100857-N8C0	B 437337
88.00	96.00	8.00	7.50	RUM000880-N8C0	B 377346
88.90	101.60	10.00	9.20	RUM000889-N8C0	B 400350
*88.90	107.95	12.70	11.60	RUM100889-N8C0	B 425350
90.00	102.00	9.60	8.80	RUM100900-N8C0	B 401354
90.00	110.00	12.50	11.40	RUM500900-N8C0	B 433354
91.00	99.00	8.50	7.90	RUM000910-N8C0	B 389358
*92.07	117.45	13.20	12.00	RUM100920-N8C0	B 462362/1
95.00	105.00	11.00	10.30	RUM000950-N8C0	B 413374
95.00	107.00	12.50	11.70	RUM100950-N8C0	B 421374
95.00	110.00	12.50	11.36	RUM200950-N8C0	B 433374
95.25	114.30	13.50	12.40	RUM000952-N8C0	B 450375
*95.25	120.65	19.50	18.20	RUM100952-N8C0	B 475375
96.00	105.00	8.50	7.90	RUM000960-N8C0	B 413377
96.00	108.00	12.50	11.70	RUM100960-N8C0	B 425377
97.00	108.00	12.50	11.80	RUM000970-N8C0	B 425381
98.00	107.50	7.00	6.20	RUM000980-N8C0	B 423385

Rod Diameter	Groove Diameter	Groove Width	Seal Width	TSS Article No. Standard	Description
d_N h11	D_1 H11	L +0.1	B		
100.00	113.00	13.50	12.70	RUM001000-N8C0	B 444393
100.00	115.00	11.50	10.60	RUM101000-N8C0	B 452393/1
100.00	120.00	12.00	11.20	RUM301000-N8C0	B 472393/1
100.00	120.00	14.50	13.40	RUM401000-N8C0	B 472393
101.50	123.82	17.18	16.00	RUM001015-N8C0	B 487400
101.60	127.00	19.50	18.00	RUM001016-N8C0	B 500400
103.00	115.00	12.50	11.80	RUM001030-N8C0	B 452405
104.00	120.00	12.00	11.20	RUM001040-N8C0	B 472409
104.00	130.00	19.50	18.00	RUM101040-N8C0	B 511409
105.00	115.00	11.00	10.00	RUM001050-N8C0	B 452413
105.00	117.00	12.50	11.80	RUM101050-N8C0	B 460413
105.00	120.00	12.00	11.00	RUM201050-N8C0	B 472413
105.00	125.00	12.50	11.40	RUM301050-N8C0	B 492413
106.00	116.00	8.50	7.80	RUM001060-N8C0	B 457417
107.00	115.00	8.00	7.40	RUM001070-N8C0	B 452421
107.95	133.35	19.00	17.70	RUM001079-N8C0	B 525425
110.00	125.00	12.00	11.20	RUM001100-N8C0	B 492433
110.00	140.00	16.50	15.00	RUM301100-N8C0	B 551433
114.30	133.35	12.40	11.40	RUM001143-N8C0	B 525450
114.30	139.70	19.50	18.00	RUM101143-N8C0	B 550450
115.00	125.00	8.00	7.40	RUM001150-N8C0	B 492452
115.00	135.00	16.00	14.80	RUM101150-N8C0	B 531452
118.00	130.00	12.50	11.80	RUM001180-N8C0	B 511464
120.00	130.00	8.00	7.40	RUM001200-N8C0	B 511472
120.00	132.70	10.00	9.20	RUM101200-N8C0	B 522472
120.00	140.00	12.50	11.40	RUM301200-N8C0	B 551472
120.65	146.05	19.50	18.20	RUM001206-N8C0	B 575475
123.00	133.00	8.00	7.40	RUM001230-N8C0	B 523484
125.00	135.00	8.50	7.80	RUM001250-N8C0	B 531492
125.00	140.00	12.00	11.00	RUM101250-N8C0	B 551492
126.00	134.00	8.00	7.50	RUM001260-N8C0	B 527496
126.00	136.00	8.50	7.80	RUM101260-N8C0	B 535496
127.00	139.70	10.00	8.70	RUM001270-N8C0	B 550500
127.00	152.40	19.50	18.20	RUM201270-N8C0	B 600500
130.00	140.00	8.00	7.40	RUM001300-N8C0	B 551511
131.00	144.00	13.50	12.70	RUM001310-N8C0	B 566515
133.35	158.75	14.00	12.60	RUM001333-N8C0	B 625525/1
139.70	165.10	19.50	18.20	RUM001397-N8C0	B 650550
140.00	155.00	13.00	12.00	RUM001400-N8C0	B 610551
146.05	171.45	19.50	18.20	RUM101460-N8C0	B 675575
152.40	177.80	19.50	18.20	RUM001524-N8C0	B 700600
152.40	184.15	25.80	24.20	RUM101524-N8C0	B 725600

Rod Diameter	Groove Diameter	Groove Width	Seal Width	TSS Article No. Standard	Description
d_N h11	D_1 H11	L +0.1	B		
155.00	170.00	9.50	8.55	RUM001550-N8C0	B 669610
158.75	190.50	25.80	24.20	RUM001587-N8C0	B 750625
160.00	174.00	11.50	10.60	RUM001600-N8C0	B 685629
163.00	178.00	13.00	12.00	RUM001630-N8C0	B 700641
165.10	177.80	10.00	9.20	RUM001651-N8C0	B 700650
165.10	196.85	25.80	24.20	RUM101651-N8C0	B 775650
170.00	182.70	10.00	9.20	RUM001700-N8C0	B 719669
171.45	203.20	25.80	24.20	RUM001714-N8C0	B 800675
175.00	200.00	14.50	13.10	RUM001750-N8C0	B 787688
177.80	203.20	22.70	21.40	RUM001778-N8C0	B 800700
180.00	195.00	12.50	11.50	RUM001800-N8C0	B 767708
184.15	215.90	25.80	24.20	RUM001841-N8C0	B 850725
187.00	202.00	11.50	10.60	RUM001870-N8C0	B 795736
188.00	203.00	13.00	12.00	RUM001880-N8C0	B 799740
190.50	222.25	25.80	24.20	RUM001905-N8C0	B 875750
196.00	208.70	9.50	8.70	RUM001960-N8C0	B 821771
196.85	228.60	25.80	24.20	RUM001968-N8C0	B 900775
203.20	235.00	25.80	24.20	RUM002032-N8C0	B 925800
214.00	229.00	13.00	12.10	RUM002140-N8C0	B 901842
215.90	247.65	25.80	24.20	RUM002159-N8C0	B 975850
222.25	254.00	25.80	24.20	RUM002222-N8C0	B 1000875
224.00	236.70	9.50	8.70	RUM002240-N8C0	B 931881
228.60	260.35	25.80	24.20	RUM002286-N8C0	B 1025900
238.00	258.00	15.50	14.40	RUM002380-N8C0	B 1015937
240.00	255.00	13.00	12.00	RUM002400-N8C0	B 1003944
241.30	273.05	25.80	24.20	RUM002413-N8C0	B 1075950
250.00	290.00	25.40	23.30	RUM002500-N8C0	B 1141984
254.00	285.75	25.80	24.20	RUM002540-N8C0	B 11251000
260.35	292.10	25.80	24.20	RUM002603-N8C0	B 11501025
266.70	298.45	25.80	24.20	RUM002667-N8C0	B 11751050
273.05	304.80	25.80	24.20	RUM002730-N8C0	B 12001075
279.40	311.15	25.80	24.20	RUM002794-N8C0	B 12251100
280.00	320.00	22.50	20.30	RUM002800-N8C0	B 12591102
285.75	317.50	25.80	24.20	RUM002857-N8C0	B 12501125
298.45	330.20	25.80	24.20	RUM002984-N8C0	B 13001175
304.80	336.55	25.80	24.20	RUM003048-N8C0	B 13251200
318.00	355.00	13.00	11.90	RUM003180-N8C0	B 13191252
320.00	**360.00**	**25.50**	**23.30**	**RUM003200-N8C0**	**B 14171259**
350.00	385.00	25.40	23.50	RUM003500-N8C0	B 15151377
375.00	415.00	25.40	23.20	RUM003750-N8C0	B 16331476
445.00	482.00	35.50	33.50	RUM004450-N8C0	B 19001750

Dimensions and TSS Part Numbers in bold according to ISO/DIN 5597 and ISO 5597/1. * Split groove

■ Installation Recommendation

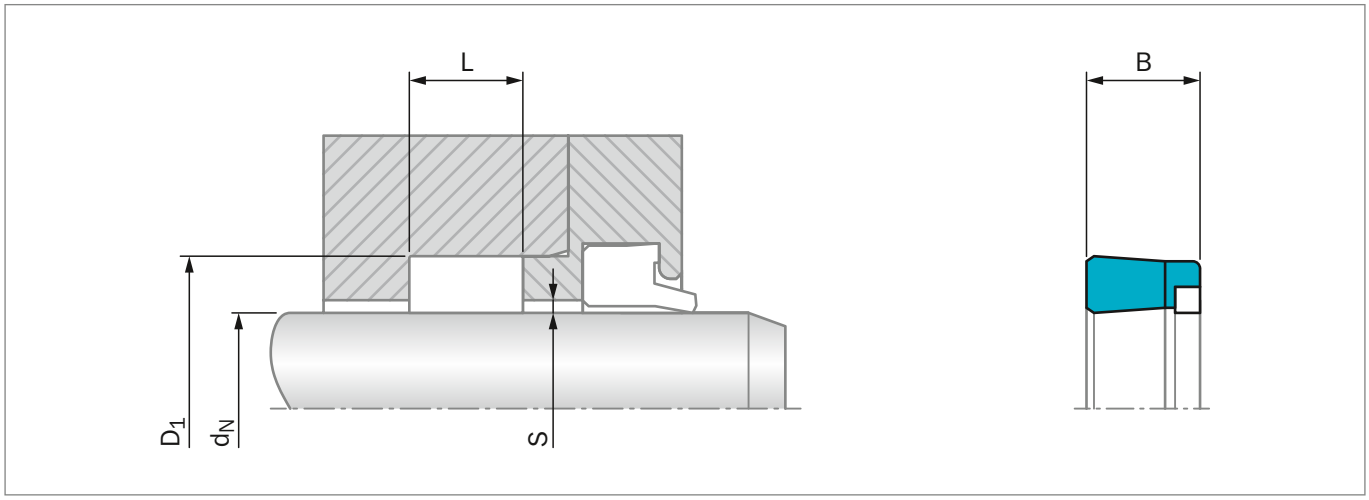


Figure 50: Installation Drawing

ORDERING EXAMPLE

Balsele Type B/NEI

Rod Diameter:	d_N = 20.0 mm
Groove Diameter:	D_1 = 28.0 mm
Groove Width:	L = 7.0 mm
TSS Part No.:	RUM1E0200 -
Compound:	N8C0 (NBR + cotton fabric and POM Back-up Ring)

TSS Article No. **RUM 1 E 0200 - N8C0**

TSS Series No.
Design Code
Execution Mark
Rod Diameter x 10
Quality Index (Standard)
Material Code (Seal Ring)
Polypac Ref. No.: B 110078/NEI

Table 42: Installation Dimensions / TSS Article No.

Rod Diameter d_N h11	Groove Diameter D_1 H11	Groove Width L +0.1	Seal Width B	TSS Article No. Standard	Description
*12.00	23.00	7.50	6.80	RUM3E0120-N8C0	B090047/NEI
*15.00	27.00	7.00	6.30	RUM1E0150-N8C0	B106059/NEI
*16.00	24.00	7.00	6.50	RUM1E0160-N8C0	B094063/NEI
*16.00	28.00	7.50	6.90	RUM2E0160-N8C0	B110062/NEI
***18.00**	**28.00**	**6.30**	**5.70**	**RUM4E0180-N8C0**	**B110070/NEI**
*18.00	30.00	7.50	6.90	RUM5E0180-N8C0	B118070/NEI
***20.00**	**28.00**	**6.30**	**5.70**	**RUM2E0200-N8C0**	**B110078/1/NEI**
*20.00	28.00	7.00	6.50	RUM1E0200-N8C0	B110078/NEI
*20.00	30.00	8.50	7.60	RUM3E0200-N8C0	B118078/NEI
*22.00	30.00	7.00	6.50	RUM1E0220-N8C0	B118086/NEI
*22.00	32.00	10.00	9.00	RUM2E0220-N8C0	B125086/NEI
*22.00	34.00	9.50	8.90	RUM3E0220-N8C0	B133086/NEI

Rod Diameter	Groove Diameter	Groove Width	Seal Width	TSS Article No. Standard	Description
d_N h11	D_1 H11	L +0.1	B		
*22.00	35.00	10.00	9.20	RUM4E0220-N8C0	B137086/NEI
***25.00**	**33.00**	**6.40**	**5.80**	**RUM0E0250-N8C0**	**B129098/1/NEI**
*25.00	35.00	9.00	8.40	RUM1E0250-N8C0	B137098/NEI
*25.00	38.00	10.00	9.15	RUM2E0250-N8C0	B149098/NEI
*25.40	38.10	10.00	9.20	RUM2E0254-N8C0	B150100/NEI
*28.00	36.00	6.40	5.80	RUM0E0280-N8C0	B141110/NEI
***28.00**	**38.00**	**8.00**	**7.40**	**RUM1E0280-N8C0**	**B149110/1/NEI**
*28.00	40.00	9.50	8.90	RUM2E0280-N8C0	B157110/NEI
*28.00	41.00	10.00	9.30	RUM3E0280-N8C0	B161110/NEI
*28.57	39.68	9.25	8.50	RUM0E0285-N8C0	B156112/NEI
*30.00	38.00	6.40	5.80	RUM0E0300-N8C0	B149118/NEI
*30.00	40.00	7.50	6.80	RUM3E0300-N8C0	B157118/NEI
*30.00	40.00	10.50	9.80	RUM4E0300-N8C0	B157118/1/NEI
*30.00	45.00	9.00	8.50	RUM6E0300-N8C0	B177118/1/NEI
*30.00	50.00	14.50	13.50	RUM7E0300-N8C0	B196118/NEI
*31.75	47.62	11.60	10.60	RUM2E0317-N8C0	B187125/NEI
*32.00	40.00	6.30	5.80	RUM0E0320-N8C0	B157125/1/NEI
*32.00	40.00	9.00	8.50	RUM1E0320-N8C0	B157125/NEI
*32.00	42.00	8.50	7.80	RUM2E0320-N8C0	B165125/1/NEI
*32.00	42.00	11.00	10.30	RUM3E0320-N8C0	B165125/NEI
*32.00	45.00	10.00	9.50	RUM4E0320-N8C0	B177125/NEI
*34.92	50.80	8.50	7.50	RUM0E0349-N8C0	B200137/4/NEI
*34.92	50.80	11.60	10.60	RUM2E0349-N8C0	B200137/2/NEI
35.00	43.00	6.50	6.00	RUM0E0350-N8C0	B169137/NEI
*35.00	45.00	10.50	9.80	RUM2E0350-N8C0	B177137/3/NEI
*35.00	50.00	11.50	10.60	RUM4E0350-N8C0	B196137/NEI
36.00	43.00	6.50	6.00	RUM0E0360-N8C0	B169141/NEI
36.00	44.00	6.40	5.90	RUM1E0360-N8C0	B173141/NEI
*36.00	46.00	8.50	7.80	RUM2E0360-N8C0	B181141/NEI
*36.00	48.00	9.50	8.70	RUM3E0360-N8C0	B188141/NEI
*36.00	48.00	12.00	11.20	RUM4E0360-N8C0	B188141/1/NEI
*38.10	50.80	10.00	9.22	RUM2E0381-N8C0	B200150/NEI
*38.10	53.97	10.50	9.50	RUM3E0381-N8C0	B212150/5/NEI
40.00	48.00	6.50	6.00	RUM0E0400-N8C0	B188157/NEI
***40.00**	**50.00**	**8.00**	**7.40**	**RUM1E0400-N8C0**	**B196157/3/NEI**
*40.00	50.00	10.50	9.80	RUM2E0400-N8C0	**B196157/1/NEI**
*40.00	50.00	11.00	10.30	RUM3E0400-N8C0	B196157/NEI
***40.00**	**55.00**	**8.00**	**7.00**	**RUM5E0400-N8C0**	**B216157/NEI**
*40.00	55.00	11.00	10.10	RUM6E0400-N8C0	B216157/1/NEI
*40.00	60.00	14.50	13.30	RUM7E0400-N8C0	B236157/NEI
*42.00	52.00	9.00	8.40	RUM1E0420-N8C0	B204165/NEI
44.45	53.97	7.62	7.00	RUM0E0444-N8C0	B212175/1/NEI

Rod Diameter	Groove Diameter	Groove Width	Seal Width	TSS Article No. Standard	Description
d_N h11	D_1 H11	L +0.1	B		
*44.45	60.32	11.60	10.70	RUM1E0444-N8C0	B237175/NEI
45.00	**55.00**	**8.00**	**7.30**	**RUM1E0450-N8C0**	**B216177/NEI**
45.00	55.00	11.00	10.00	RUM2E0450-N8C0	B216177/1/NEI
*45.00	57.00	10.00	9.00	RUM3E0450-N8C0	B224177/NEI
*45.00	60.00	10.50	9.60	RUM4E0450-N8C0	B236177/NEI
*45.00	65.00	14.50	13.30	RUM6E0450-N8C0	B255177/NEI
50.00	**60.00**	**8.00**	**7.30**	**RUM1E0500-N8C0**	**B236196/NEI**
50.00	60.00	10.00	9.30	RUM2E0500-N8C0	B236196/1/NEI
*50.00	62.00	9.50	8.50	RUM3E0500-N8C0	B244196/1/NEI
50.00	65.00	11.00	10.10	RUM5E0500-N8C0	B255196/NEI
*50.00	70.00	14.50	13.30	RUM6E0500-N8C0	B275196/NEI
*54.00	66.00	9.50	8.70	RUM0E0540-N8C0	B259212/NEI
55.00	65.00	8.00	7.30	RUM0E0550-N8C0	B255216/1/NEI
55.00	65.00	11.00	10.30	RUM1E0550-N8C0	B255216/NEI
55.00	70.00	10.50	9.60	RUM2E0550-N8C0	B275216/NEI
*55.00	75.00	14.50	13.30	RUM3E0550-N8C0	B295216/NEI
*56.00	71.00	10.50	9.60	RUM1E0560-N8C0	B279220/NEI
*56.00	76.00	14.50	13.40	RUM2E0560-N8C0	B299220/NEI
57.15	69.85	10.00	9.20	RUM0E0571-N8C0	B275225/NEI
60.00	69.50	7.00	6.40	RUM0E0600-N8C0	B273236/NEI
60.00	70.00	8.00	6.40	RUM1E0600-N8C0	B275236/NEI
60.00	70.00	11.00	10.30	RUM2E0600-N8C0	B275236/1/NEI
60.00	70.00	13.00	12.25	RUM3E0600-N8C0	B275236/2/NEI
60.00	72.00	10.00	9.20	RUM5E0600-N8C0	B283236/NEI
*60.00	75.00	13.00	12.10	RUM6E0600-N8C0	B295236/NEI
*60.00	80.00	14.50	13.50	RUM7E0600-N8C0	B314236/NEI
63.00	75.00	11.00	10.20	RUM1E0630-N8C0	B295248/NEI
***63.00**	**78.00**	**12.50**	**11.50**	**RUM2E0630-N8C0**	**B307248/NEI**
*63.00	83.00	14.50	13.30	RUM3E0630-N8C0	B326248/NEI
63.50	76.20	8.50	7.70	RUM0E0635-N8C0	B300250/NEI
*63.50	77.78	11.50	10.70	RUM1E0635-N8C0	B306250/NEI
65.00	75.00	13.50	12.30	RUM1E0650-N8C0	B295255/NEI
65.00	77.00	9.60	8.80	RUM2E0650-N8C0	B303255/NEI
*65.00	80.00	11.50	10.60	RUM3E0650-N8C0	B314255/NEI
*65.00	80.00	12.50	11.50	RUM4E0650-N8C0	B314255/2/NEI
70.00	80.00	8.00	7.30	RUM0E0700-N8C0	B314275/1/NEI
70.00	80.00	13.00	12.30	RUM2E0700-N8C0	B314275/NEI
70.00	82.00	10.50	9.70	RUM4E0700-N8C0	B322275/NEI
70.00	84.00	12.50	11.20	RUM5E0700-N8C0	B330275/NEI
*70.00	85.00	12.00	11.00	RUM6E0700-N8C0	B334275/1/NEI
***70.00**	**85.00**	**12.50**	**11.50**	**RUM7E0700-N8C0**	**B334275/NEI**
*70.00	90.00	14.50	13.50	RUM8E0700-N8C0	B354275/NEI

Rod Diameter	Groove Diameter	Groove Width	Seal Width	TSS Article No. Standard	Description
d_N h11	D_1 H11	L +0.1	B		
*72.00	87.00	11.00	10.00	RUM0E0720-N8C0	B342283/NEI
75.00	85.00	11.00	10.30	RUM1E0750-N8C0	B334295/2/NEI
75.00	90.00	11.50	10.60	RUM3E0750-N8C0	B354295/NEI
75.00	90.00	12.80	11.80	RUM4E0750-N8C0	B354295/1/NEI
*75.00	95.00	14.50	13.50	RUM6E0750-N8C0	B374295/NEI
80.00	93.00	14.50	13.50	RUM2E0800-N8C0	B366314/NEI
80.00	95.00	12.00	11.10	RUM3E0800-N8C0	B374314/NEI
80.00	96.00	10.50	9.60	RUM4E0800-N8C0	B377314/NEI
*80.00	100.00	12.00	10.80	RUM5E0800-N8C0	B393314/1/NEI
*80.00	100.00	14.50	13.40	RUM6E0800-N8C0	B393314/NEI
85.00	95.00	8.00	7.30	RUM0E0850-N8C0	B374334/NEI
85.00	97.00	9.60	9.00	RUM2E0850-N8C0	B381334/NEI
85.00	100.00	12.00	10.80	RUM3E0850-N8C0	B393334/1/NEI
*85.00	105.00	14.50	13.40	RUM4E0850-N8C0	B413334/NEI
*88.90	114.30	19.50	18.20	RUM2E0889-N8C0	B450350/2/NEI
90.00	**105.00**	**9.50**	**8.70**	**RUM2E0900-N8C0**	**B413354/NEI**
90.00	**105.00**	**12.50**	**11.60**	**RUM3E0900-N8C0**	**B413354/1/NEI**
90.00	106.20	10.80	9.80	RUM4E0900-N8C0	B418354/NEI
***90.00**	**110.00**	**12.50**	**11.40**	**RUM5E0900-N8C0**	**B433354/NEI**
*92.07	111.12	12.50	11.30	RUM0E0920-N8C0	B437362/NEI
95.00	105.00	11.00	10.30	RUM0E0950-N8C0	B413374/NEI
95.00	112.00	12.00	11.10	RUM3E0950-N8C0	B441374/NEI
*95.00	115.00	14.50	13.30	RUM4E0950-N8C0	B452374/NEI
100.00	113.00	13.50	12.70	RUM0E1000-N8C0	B444393/NEI
100.00	115.00	11.50	10.60	RUM1E1000-N8C0	B452393/1/NEI
100.00	115.00	12.50	11.50	RUM2E1000-N8C0	B452393/NEI
100.00	120.00	12.00	11.20	RUM3E1000-N8C0	B472393/1/NEI
100.00	120.00	14.50	13.40	RUM4E1000-N8C0	B472393/NEI
105.00	115.00	11.00	10.00	RUM0E1050-N8C0	B452413/NEI
105.00	125.00	12.50	11.40	RUM3E1050-N8C0	B492413/NEI
110.00	125.00	12.00	11.20	RUM0E1100-N8C0	B492433/NEI
110.00	**130.00**	**12.50**	**11.40**	**RUM1E1100-N8C0**	**B511433/NEI**
110.00	135.00	15.50	14.20	RUM2E1100-N8C0	B531433/NEI
120.00	132.70	10.00	9.20	RUM1E1200-N8C0	B522472/NEI
120.00	135.00	12.50	11.60	RUM2E1200-N8C0	B531472/NEI
120.00	140.00	12.50	11.40	RUM3E1200-N8C0	B551472/NEI
120.00	145.00	18.80	17.50	RUM4E1200-N8C0	B570472/NEI
125.00	150.00	14.50	13.10	RUM2E1250-N8C0	B590492/NEI
130.00	145.00	13.00	12.00	RUM2E1300-N8C0	B570511/1/NEI
130.00	145.00	15.00	14.00	RUM3E1300-N8C0	B570511/NEI
130.00	150.00	16.00	14.80	RUM4E1300-N8C0	B590511/NEI
133.35	158.75	14.00	12.60	RUM0E1333-N8C0	B625525/1/NEI

Rod Diameter	Groove Diameter	Groove Width	Seal Width	TSS Article No. Standard	Description
d_N h11	D_1 H11	L +0.1	B		
135.00	150.00	14.00	13.00	RUM0E1350-N8C0	B590531/1/NEI
135.00	155.00	16.00	14.80	RUM1E1350-N8C0	B610531/NEI
135.00	160.00	14.00	12.70	RUM2E1350-N8C0	B629531/NEI
140.00	155.00	13.00	12.00	RUM0E1400-N8C0	B610551/NEI
140.00	**160.00**	**12.50**	**11.40**	**RUM1E1400-N8C0**	**B629551/NEI**
140.00	160.00	14.50	13.40	RUM2E1400-N8C0	B629551/1/NEI
140.00	170.00	22.80	21.20	RUM3E1400-N8C0	B669551/NEI
145.00	157.70	10.00	9.20	RUM0E1450-N8C0	B620570/NEI
150.00	170.00	14.50	13.40	RUM1E1500-N8C0	B669590/1/NEI
160.00	175.00	16.00	15.50	RUM1E1600-N8C0	B688629/NEI
160.00	180.00	14.50	13.30	RUM2E1600-N8C0	B708629/NEI
165.00	184.00	16.00	14.80	RUM0E1650-N8C0	B728649/NEI
165.00	195.00	20.40	18.70	RUM1E1650-N8C0	B767649/NEI
175.00	200.00	23.00	21.55	RUM1E1750-N8C0	B787688/1/NEI
180.00	200.00	14.50	13.30	RUM1E1800-N8C0	B787708/NEI
180.00	210.00	20.50	18.90	RUM2E1800-N8C0	B826708/1/NEI
190.00	210.00	14.50	13.40	RUM0E1900-N8C0	B826748/NEI
198.00	208.00	12.00	11.30	RUM0E1980-N8C0	B819779/NEI
200.00	220.00	14.50	13.30	RUM0E2000-N8C0	B866787/NEI
210.00	230.00	14.50	13.30	RUM0E2100-N8C0	B905826/NEI
210.00	240.00	22.50	21.00	RUM1E2100-N8C0	B944826/NEI
220.00	250.00	20.50	18.90	RUM0E2200-N8C0	B984866/NEI
230.00	260.00	20.50	19.00	RUM0E2300-N8C0	B1023905/NEI
500.00	540.00	35.00	32.80	RUM0E5000-N8C0	B21261968/NEI
530.00	570.00	25.00	23.00	RUM0E5300-N8C0	B22442086/NEI
640.00	680.00	25.00	23.00	RUM0E6400-N8C0	B26772519/NEI
702.00	752.40	30.00	27.50	RUM0E7020-N8C0	B29612764/NEI
760.00	820.00	35.00	32.00	RUM0E7600-N8C0	B32282992/NEI
785.00	845.00	35.00	32.00	RUM0E7850-N8C0	B33273090/NEI
845.00	905.00	35.00	32.00	RUM0E8450-N8C0	B35633327/NEI
921.00	981.00	35.00	32.00	RUM0E9210-N8C0	B38623626/NEI
1,040.00	1,110.00	35.00	32.00	RUM0X1040-N8C0	B43704094/NEI
1,195.00	1,265.00	35.00	32.00	RUM0X1195-N8C0	B49804705/NEI

Dimensions and TSS Part Numbers in bold according to ISO/DIN 5597 and ISO 5597/1. * Split groove

Zurcon® L-Cup

Single-acting

Low Friction Properties

Material:
Zurcon®

■ Zurcon® L-Cup® *

■ Introduction

The rod sealing system is the most critical part of a hydraulic cylinder. Therefore it is expected that a rod sealing system performs under leak-free conditions in the static and dynamic state. Moreover it has to fulfil a lifetime of several thousand hours.

To meet these requirements, Trelleborg Sealing Solutions has developed the Zurcon® L-Cup® *, a highly effective and innovative rod sealing component.

DESCRIPTION

Zurcon® L-Cup® is a single-acting polyurethane rod seal with a unique design offering a hydrodynamic backpumping ability over the complete working pressure range. The pressure-independent, hydrodynamic sealing ability of this new sealing element requires no lubrication reservoir in the sealing area and ensures a constant and controlled pressure distribution over a wide pressure range.

The advantages of the Zurcon® L-Cup® design lead to the following improved properties:

ADVANTAGES

- Hydrodynamic back-pumping ability over the complete working pressure range
- Low friction and therefore a reduction of heat generated
- Low breakout force even after a long period of non-operation
- Very low stick-slip
- Low increase in friction at increasing pressure
- High extrusion resistance
- Optimum geometry of the static sealing lip for higher sealing ability
- No entrapped oil and grease between seal and groove (due to notches)
- No pressure build-up between seal and groove OD
- Long service life

The Zurcon® L-Cup® was designed in accordance with customers' demands.

- Groove dimensions according to ISO 5597 Part 2
- Interchangeable with existing U-Cup grooves
- Installation into closed grooves
- Wear and extrusion resistant high-performance polyurethane

APPLICATION EXAMPLES

Zurcon® L-Cup® can be used in all applications in which previously a conventional U-Cup was applied, such as:

- Fork lifts
- Agricultural machines
- Light and medium mobile hydraulics
- Industrial hydraulics
- Machine tools
- Injection molding machines
- Hydraulic presses

Another preferred solution for tandem rod sealing systems is the combination with the Turcon® Stepseal® 2K as primary seal and L-Cup® as secondary seal, in conjunction with a double acting scraper.

OPERATING CONDITIONS

Pressure:	Up to 40 MPa
Velocity:	Up to 0.5 m/s
Temperature:	-35 °C to +110 °C (Zurcon® Z20 standard)
Media:	Hydraulic fluids based on mineral oil

IMPORTANT NOTE

The above data are maximum values and cannot be used at the same time, e.g. the maximum operating speed depends on material type, pressure, temperature and gap value. Temperature range also depends on media.

*Patent for: Europe No. EP 0724693
*Patent for: US No. 5,649,711
*Patent for: China No. ZL 94193869.7
*Zurcon® L-Cup® is a trade name.

MATERIALS

Zurcon® Z20 Standard polyurethane 93 Shore A
Temperature: -35 °C to +110 °C
Color: turquoise

Zurcon® Z22 Premium polyurethane 93 Shore A
Temperature: -50 °C to +110 °C
Color: dark petrol

Zurcon® Z25 Premium polyurethane 93 Shore A
Temperature: -35 °C to +130 °C
Color: black

METHOD OF OPERATION

Trelleborg Sealing Solutions experience in the production of hydrodynamic back-pumping seals such as Turcon® Stepseal® 2K, and the use of Finite Element Analysis (FEA) and other laboratory tests have led to the development of Zurcon® L-Cup® . The main objective in the development of this seal was the ability to achieve an optimum pressure distribution over the complete pressure range.

The pressure distribution curve under the sealing lip needs to have a steep gradient on the high-pressure side and a shallow gradient on the rear of the seal.

The operating principles and function of Zurcon® L-Cup® is similar to the well-known Turcon® Stepseal® 2K.

FRICTION

In Figure 51 the friction values of a conventional U-Cup and of Zurcon® L-Cup® are being compared. A high increase in friction of the U-Cup is clearly shown between approximately 5 and 15 MPa. This is due to the U-Cup being totally pressed on the rod surface at increased pressure, causing elimination of the oil reservoir and dry running of the U-Cup.

In comparison, the L-Cup® shows only a low increase in friction which is due to the smaller contact area and better tribological behaviour. The result is a low friction heat generation.

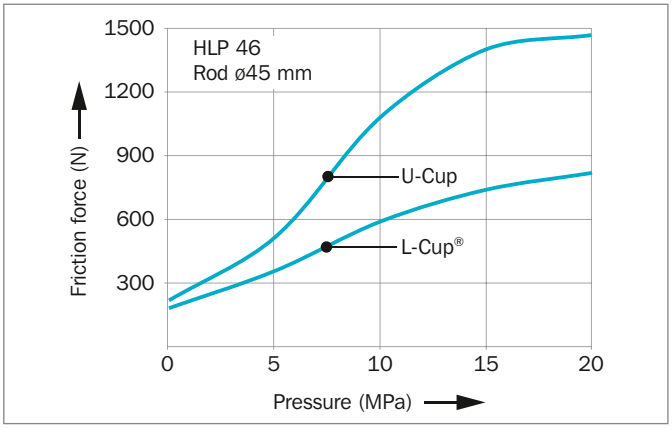


Figure 51: Friction dependent on pressure

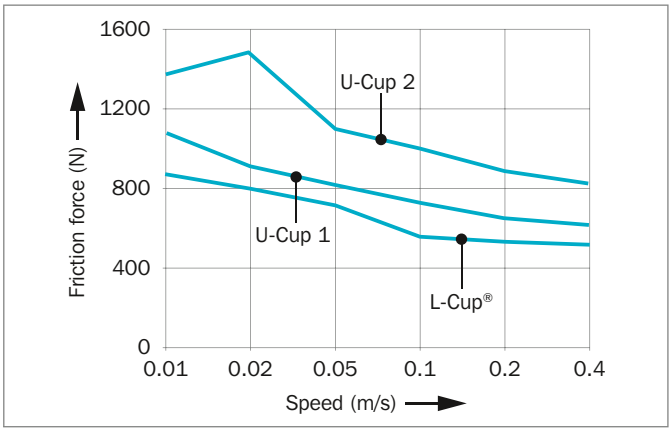


Figure 52: Friction dependent on speed

FRICTION HEAT

The effect described above can be made visible by simply measuring the temperature. Figure 53 shows the increase in temperature on the rod surface caused by friction, measured at a pressure of 40 MPa after 20,000 cycles. This explains the prolonged service life of L-Cup® .

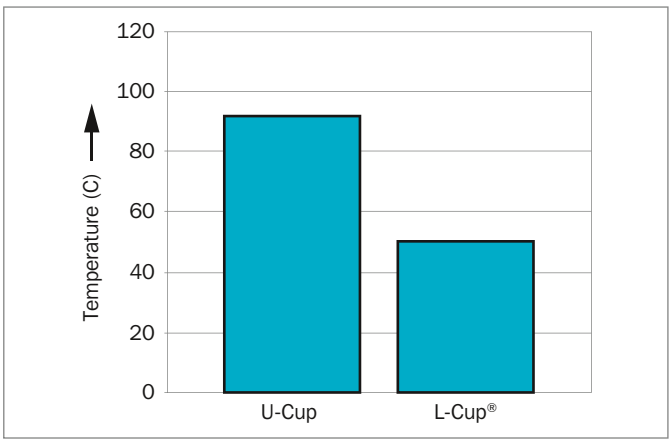


Figure 53: Increase in temperature caused by friction

TEST CONDITIONS (FIGURE 53)

Dimension:	50 x 60 x 11 mm
Pressure:	0/40 MPa
Velocity:	0.1 m/s
Temperature:	ambient

SEALING GAP

The recommended gap dimensions described in Figure 54, depend on pressure and temperature.

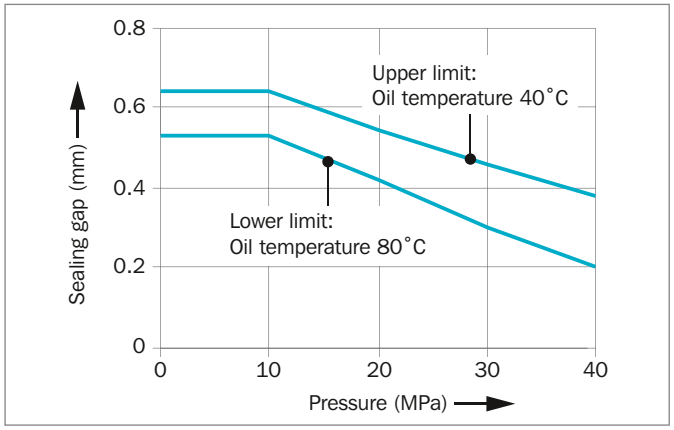


Figure 54: Sealing gap

DESIGN INSTRUCTIONS

Lead in chamfers

In order to avoid damage to the rod seal during installation, lead-in chamfers and rounded edges must be provided on the piston rods (Figure 55). If this is not possible for design reasons, a separate installation tool must be used.

The minimum length of the lead-in chamfer depends on the profile size of the seal and can be seen from the following tables.

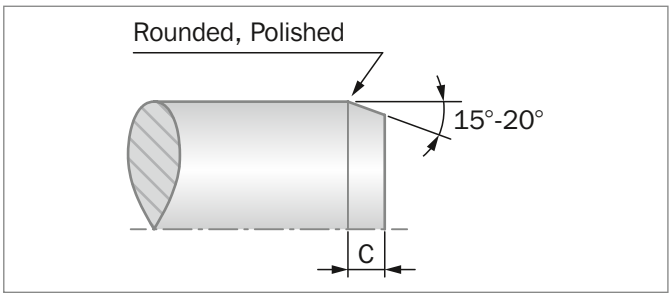


Figure 55: Lead-in chamfer

Table 43: Lead-in chamfers

Lead-in Chamfer Length C min.	Zurcon® L-Cup® Groove Depth*
2.0	3.5
2.0	4.0
2.5	5.0
4.0	7.5
5.0	10.0
6.5	12.5
7.5	15.0

* The groove depth is calculated from: $(D - d_N)/2$.
The dimensions for D and d_N can be found in Table 45.

Table 44: Material Selection

Material Code	Material Description	Temperature Range	Application
Zurcon® Z20	High performance Polyurethane 93 Shore A; standard grade for hydraulic	-35 °C to +110 °C	Excellent abrasion and extrusion resistance, minimal swelling in mineral oil, acceptable hydrolysis resistance.
Zurcon® Z22	High performance Polyurethane 93 Shore A; Premium grade for low temperature	-50 °C to +110 °C	Wide range of working temperatures with very good compression set performance at very low temperature. Excellent balance between swelling in mineral oil and hydrolysis resistance.
Zurcon® Z25	High performance Polyurethane 95 Shore A; Premium grade for high temperature	-35 °C to +130 °C	Wide range of working temperatures with excellent mechanical proprieties at high temperature.

■ Installation Recommendation

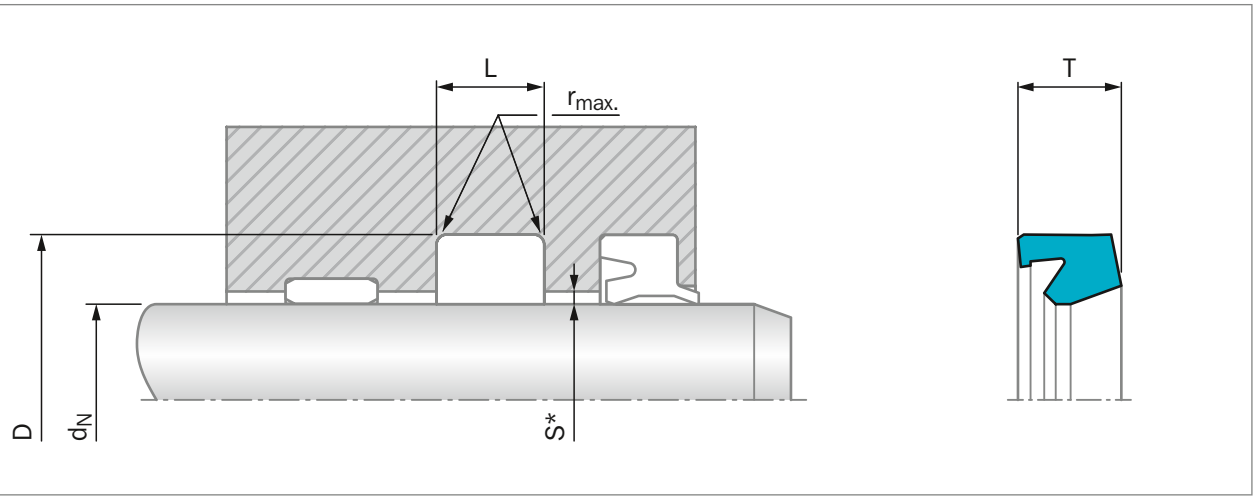


Figure 56: Installation Drawing

* Gap measure "S" see Figure 54

ORDERING EXAMPLE

L-Cup

Rod Diameter:	d_N = 25.0 mm
Groove Diameter:	D = 33.0 mm
Groove Width:	L = 6.3 mm
TSS Part No.:	RL08N0250 - Z20

TSS Article No. **RL08 N 0250 - Z20**

TSS Series No.
Type (Standard)
Rod Diameter x 10
Quality Index (Standard)
Material Code

MATERIAL

Standard Zurcon®:	Z20
Special Polyurethane:	93 Shore A
Color:	turquoise

Table 45: Installation Dimensions / TSS Article No.

Rod Diameter	Groove Diameter	Groove Width	Radius	Ring Width	TSS Part No.
d_N f8	D H10	L +0.25	$r_{max.}$	T	
16	22	6.0	0.3	5.4	RL38N0160
20	26	5.5	0.3	5.0	RL04N0200
***20**	**28**	**6.3**	**0.3**	**5.7**	**RL08N0200**
***22**	**30**	**6.3**	**0.3**	**5.7**	**RL08N0220**
25	**33**	**8.0**	**0.3**	**7.2**	**RL10N0250**
25	**33**	**6.3**	**0.3**	**5.7**	**RL08N0250**
28	**36**	**6.3**	**0.5**	**5.7**	**RL08N0280**
***28**	**38**	**8.0**	**0.3**	**7.2**	**RL14N0280**
30	38	6.3	0.3	5.7	RL08N0300
30	40	8.0	0.3	7.2	RL14N0300
30	38	8.0	0.3	7.2	RL10N0300
30	40	11.0	0.3	9.9	RL17N0300
32	**42**	**8.0**	**0.3**	**7.2**	**RL14N0320**
35	43	6.3	0.3	5.7	RL08N0350
35	45	11.0	0.3	9.9	RL17N0350
36	**44**	**6.3**	**0.5**	**5.7**	**RL08N0360**
36	**46**	**8.0**	**0.3**	**7.2**	**RL14N0360**
36	46	10.0	0.3	9.0	RL16N0360
38	48	11.0	0.3	9.9	RL17N0380
40	48	7.0	0.3	6.3	RL09N0400
40	**50**	**8.0**	**0.3**	**7.2**	**RL14N0400**
40	50	10.0	0.3	9.0	RL16N0400
42	52	8.0	0.3	7.2	RL14N0420
42	52	10.0	0.3	9.0	RL16N0420
45	53	8.0	0.3	7.2	RL10N0450
45	**55**	**8.0**	**0.3**	**7.2**	**RL14N0450**
48	60	11.0	0.3	9.9	RL36N0480
50	58	9.0	0.3	8.1	RL11N0500
50	**60**	**8.0**	**0.3**	**7.2**	**RL14N0500**
50	60	10.0	0.3	9.0	RL16N0500
50	**65**	**12.5**	**0.4**	**11.3**	**RL26N0500**
55	63	9.0	0.3	8.1	RL11N0550
55	65	10.0	0.3	9.0	RL16N0550
***56**	**71**	**12.5**	**0.4**	**11.3**	**RL26N0560**
60	68	9.0	0.3	8.1	RL11N0600
60	70	8.0	0.3	7.2	RL14N0600
60	70	10.0	0.3	9.0	RL16N0600
63	**78**	**12.5**	**0.4**	**11.3**	**RL26N0630**
65	75	10.0	0.3	9.0	RL16N0650
70	80	10.0	0.3	9.0	RL16N0700

Rod Diameter	Groove Diameter	Groove Width	Radius	Ring Width	TSS Part No.
d_N f8	D H10	L +0.25	$r_{max.}$	T	
70	**85**	**12.5**	**0.4**	**11.3**	**RL26N0700**
75	90	12.5	0.3	11.3	RL26N0750
80	**95**	**12.5**	**0.4**	**11.3**	**RL26N0800**
85	100	13.1	0.4	11.8	RL27N0850
90	**105**	**12.5**	**0.4**	**11.3**	**RL26N0900**
100	**120**	**16.0**	**0.6**	**14.4**	**RL30N1000**
110	**130**	**16.0**	**0.6**	**14.4**	**RL30N1100**
115	135	16.0	0.6	14.4	RL30N1150
119	134	9.4	0.4	8.1	RL22N1190
120	135	12.5	0.4	11.3	RL26N1200
120	140	16.0	0.6	14.4	RL30N1200
125	140	12.0	0.4	10.8	RL25N1250
125	**145**	**16.0**	**0.6**	**14.4**	**RL30N1250**
130	150	16.0	0.6	14.4	RL30N1300
135	155	16.0	0.6	14.4	RL30N1350
140	**160**	**16.0**	**0.6**	**14.4**	**RL30N1400**
150	170	16.0	0.6	14.4	RL30N1500
155	175	16.0	0.6	14.4	RL30N1550
160	180	16.0	0.6	14.4	RL30N1600
195	220	20.0	0.6	18.0	RL32N1950

Dimensions and TSS Part Numbers in bold according to ISO 5597. * Split groove

Zurcon® U-Cup RU2

Single-acting U-Cup

Asymmetric, Double Lip, Compact

Material:
Zurcon®

U-Cup RU2

Description

Today, U-Cups are used primarily as seals for piston rods in hydraulic cylinders. U-Cups in polyurethane are proven elements, due to their good mechanical properties, for standard cylinder construction, particularly for mobile hydraulics under rough operating conditions. The U-Cup RU2 is a double lip seal in a compact design.

TYPE RU2

The compact U-Cup type RU2 is designed for small grooves. It is thus particularly suitable for use in space-saving designs. The compact form provides a high sealing effect even with low system pressures.

The U-Cup has two sealing lips in the dynamic sealing zone. The compact form with two sealing lips provides an improvement in the leakage behavior at low system pressures. Due to the incorporation of an oil trap between the two sealing lips, friction at pressures above approximately 10 MPa is reduced. Furthermore, the second sealing lip prevents the entry of dirt from the atmosphere side.

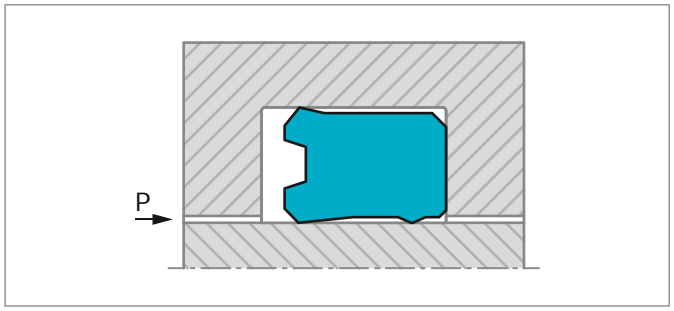


Figure 57: U-Cup, type RU2

METHOD OF OPERATION

The sealing effect of the U-Cup comes from the intrinsic preload of the seal body and from the compression of the seal lips during installation. In operating conditions, the radial mechanical contact forces are superimposed by the system pressure.

At low stroke speeds, U-Cups can tend to have a stick-slip effect due to an inadequate lubrication film formation in the seal clearance and to their material properties. This behavior corresponds to the Stribeck curve described in the relevant literature.

ADVANTAGES

- Good sealing effect at high and low pressures
- Good abrasion resistance, wear-resistant
- Unaffected by sudden loads
- Suitable for small grooves
- Simple installation

OPERATING CONDITIONS

Pressure:	Max. 35 MPa
Speed:	Up to 0.5 m/s
Temperature:	Use in mineral oils: -35 °C to +110 °C
Media:	Mineral oil-based hydraulic fluids.

IMPORTANT NOTE

The above data are maximum values and cannot be used at the same time, e.g. the maximum operating speed depends on material type, pressure, temperature and gap value. Temperature range also depends on media.

MATERIAL

Standard Zurcon® :	Z20
Special Polyurethane:	93 Shore A
Temperature:	-35 °C to +110 °C
Color:	turquoise

SEAL CLEARANCE

Guide values for the radial clearance between rod and gland in relation to the operating pressure and rod diameter can be found in the table below.

Table 46: Radial Clearance

Operating max. Pressure MPa	Radial Clearance S_{max}	
	d_N < 60 mm	d_N > 60 mm
5	0.40	0.50
10	0.30	0.40
20	0.20	0.30
30	0.15	0.20
40	0.10	0.15

The values for S_{max} given in this table apply to all types for the low-pressure side of the U-Cup. They are designed for an operating temperature of 60 °C.

Table 47: Material Selection

Material Code	Material Description	Temperatur Range	Application
Zurcon® Z20	High performance Polyurethane 94 Shore A; standard grade for hydraulic	-35 °C to +110 °C	Excellent abrasion and extrusion resistance, minimal swelling in mineral oil, acceptable hydrolysis resistance.
Zurcon® Z22	High performance Polyurethane 93 Shore A; Premium grade for low temperature	-50 °C to +110 °C	Wide range of working temperatures with very good compression set performance at very low temperature. Excellent balance between swelling in mineral oil and hydrolysis resistance.

■ Installation Recommendation

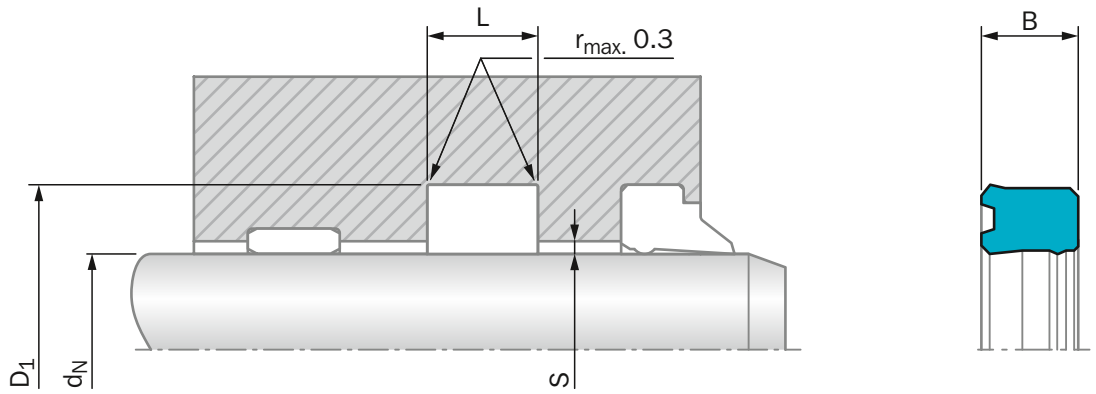


Figure 58: Installation Drawing

Dimensions "S" (see table on previous page)

ORDERING EXAMPLE

U-Cup Type RU2

Rod Diameter:	d_N = 45.0 mm
Groove Diameter:	D_1 = 55.0 mm
Groove Width:	L = 6.3 mm
TSS Part No.:	RU2300450 -

TSS Article No. RU23 0 0450 - Z20

- TSS Series No.
- Type (Standard)
- Rod Diameter x 10
- Quality Index (Standard)
- Material Code

MATERIAL

Standard Zurcon® :	Z20
Special Polyurethane:	93 Shore A
Color:	turquoise

Table 48: Installation Dimensions / TSS Article No.

Rod Diameter	Groove Diameter	Groove Width	Seal Width	TSS Part No.
d_N f8/h9	D_1 H10	L +0.2	B	
*6.0	14.0	6.3	5.8	RU2000060
*8.0	16.0	6.3	5.8	RU2200080
*10.0	18.0	6.3	5.8	RU2000100
*12.0	20.0	6.3	5.8	RU2100120
*14.0	22.0	6.3	5.8	RU2100140
*16.0	24.0	6.3	5.8	RU2000160
*18.0	26.0	6.3	5.8	RU2100180
20.0	28.0	6.3	5.8	RU2100200

Rod Diameter	Groove Diameter	Groove Width	Seal Width	TSS Part No.
d_N f8/h9	D_1 H10	L +0.2	B	
***20.0**	**30.0**	**8.0**	**7.0**	**RU2300200**
22.0	**30.0**	**6.3**	**5.8**	**RU2300220**
24.0	32.0	6.3	5.7	RU2000240
25.0	**33.0**	**6.3**	**5.7**	**RU2000250**
***25.0**	**35.0**	**8.0**	**7.0**	**RU2400250**
*25.0	35.0	9.0	8.0	RU2500250
28.0	36.0	6.3	5.8	RU2000280
***28.0**	**38.0**	**6.3**	**5.8**	**RU2300280**
***28.0**	**38.0**	**8.0**	**7.0**	**RU2400280**
32.0	**42.0**	**8.0**	**7.0**	**RU2100320**
36.0	44.0	6.3	5.8	RU2000360
36.0	**46.0**	**8.0**	**7.3**	**RU2300360**
40.0	**50.0**	**8.0**	**7.0**	**RU2500400**
45.0	53.0	6.3	5.8	RU2000450
45.0	**55.0**	**6.3**	**5.7**	**RU2300450**
45.0	**55.0**	**8.0**	**7.0**	**RU2500450**
50.0	**60.0**	**8.0**	**7.0**	**RU2400500**
56.0	66.0	7.5	6.5	RU2100560
56.0	**71.0**	**12.5**	**11.5**	**RU2200560**
63.0	**78.0**	**12.5**	**11.5**	**RU2100630**
70.0	80.0	7.5	6.5	RU2200700
80.0	**95.0**	**12.5**	**11.5**	**RU2100800**
90.0	100.0	7.5	6.5	RU2000900
90.0	**105.0**	**12.5**	**11.4**	**RU2400900**
110.0	125.0	10.5	9.5	RU2001100
110.0	**130.0**	**16.0**	**15.0**	**RU2101100**
140.0	**160.0**	**16.0**	**15.0**	**RU2201400**

Dimensions and TSS Part Numbers in bold according to ISO 5597. * Split groove
Additional dimensions can be delivered on request.

Zurcon® U-Cup RU6

Single-acting U-Cup

Rubber Energized

Material:
Zurcon® + NBR

U-Cup RU6

Description

Additional to the machined seals Stepseal® 2K and Rimseal for housings to ISO 7425/2 (rubber energised plastic seals) the U-Cup type RU6 has been developped as an injection molded seal of polyurethane material to fit in the same ISO housings. The integrated NBR O-Ring (only available for series RU62 - RU64) improves the performance at low pressure and low temperature applications. Polyurethan (Zurcon® Z20) is a proven material for U-cups due to their good mechanical properties.

TYPE RU6

The U-Cup type RU6 can be installed as a single seal for low to medium duty applications; for sealing systems, the U-Cup RU6 shall be installed mainly as a secondary seal together with the Turcon® Stepseal® 2K as primary seals.

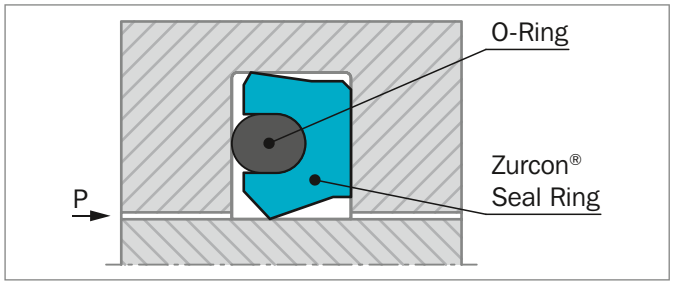


Figure 59: U-Cup, type RU6

METHOD OF OPERATION

The sealing effect of the U-Cup RU6 comes from the intrinsive preload of the seal body and from the compression of the seal lip and the O-Ring during installation. In operation conditions, the radial contact forces are superimposed by the system pressure.

Due to the special design and the integrated O-Ring the RU6 U-Cups have an excellent sealing behavior with and without pressure activation. The short sealing lip gives better friction values compared to common U-Cups.

ADVANTAGES

- Very good low pressure sealability
- Simple installation
- Lower friction compared with common U-Cups
- Installation in ISO 7475/2 grooves
- Very low compression set due to O-Ring

APPLICATION EXAMPLES

- General hydraulic cylinders
- Injection molding machines
- Lift trucks
- Agricultural machines

OPERATING CONDITIONS

Pressure:	Max. 25 MPa (as single element)
Speed:	Up to 0.5 m/s
Temperature:	Use in mineral oils: -35 °C to +110 °C
Media:	Mineral oil-based hydraulic fluids.

IMPORTANT NOTE

The above data are maximum values and cannot be used at the same time, e.g. the maximum operating speed depends on material type, pressure, temperature and gap value. Temperature range also depends on media.

CLEARANCE

Table 49: Radial Clearance U-Cup RU6

Operating Pressure MPa max.	Radial Clearance S_{max}
16	0.60
25	0.50

The values for S_{max} given in this table apply to all types for the low-pressure side of the U-Cup. They are designed for an operating temperature of 60 °C. (for harsh conditions and high side loads the gap must be reduced by 50%)

MATERIAL

The thermoplastic polyurethane material Zurcon® Z20 has a high abrasion resistance, a low compression set and exhibits a high resistance to clearance extrusion. The integrated O-Ring is an NBR with 70 shore A and a very low compression set.

U-Cup: polyurethane 93 shore A
material code Z20
O-Ring: NBR 70 Shore A
material code N
Set code: Z20N

Table 50: Materials

Material Code	Material Description	Temp. Range	Application
Zurcon® Z20	High performance Polyurethane 94 Shore A; standard grade for hydraulic	-35 °C to +110 °C	Excellent abrasion and extrusion resistance, minimal swelling in mineral oil, acceptable hydrolysis resistance.

■ Installation Recommendation

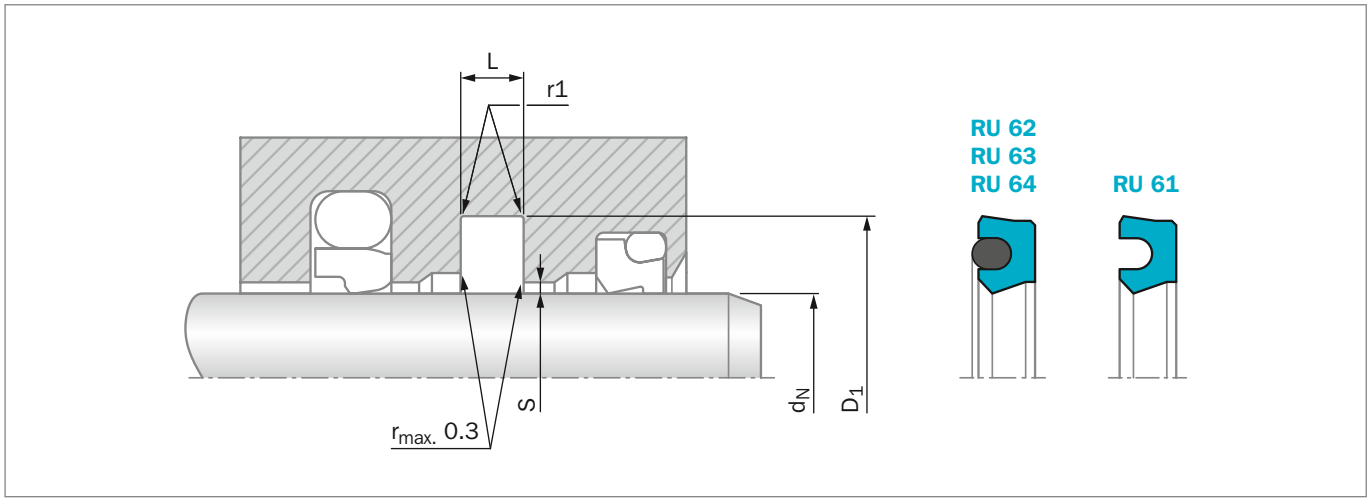


Figure 60: Installation Drawing

ORDERING EXAMPLE

U-Cup Type RU6

Rod Diameter:	d_N = 70.0 mm
Groove Diameter:	D_1 = 85.5 mm
Groove Width:	L = 6.3 mm
TSS Part No.:	RU6300700 -
Compound code seal:	Z20 turquoise
Compound code O-Ring:	N
Material set code:	Z20N

TSS Article No. **RU63 0 0700 - Z20N**

TSS Series No.
Type (Standard)
Rod Diameter x 10
Quality Index (Standard)
Material Set Code

Table 51: Installation Dimensions / TSS Part No.

Rod Diameter d_N f8/h9	Groove Diameter D_1 H10	Groove Width L +0.2	Radius r1	TSS Part No.	O-Ring Size
12.0	**19.5**	**3.2**	**0.5**	**RU6100120**	**-**
14.0	**21.5**	**3.2**	**0.5**	**RU6100140**	**-**
16.0	**23.5**	**3.2**	**0.5**	**RU6100160**	**-**
18.0	**25.5**	**3.2**	**0.5**	**RU6100180**	**-**
25.0	**32.5**	**3.2**	**0.5**	**RU6100250**	**-**
***28.0**	**39.0**	**4.2**	**0.5**	**RU6200280**	**31.42 x 2.62**
36.0	**47.0**	**4.2**	**0.5**	**RU6200360**	**39.34 x 2.62**
***40.0**	**51.0**	**4.2**	**0.5**	**RU6200400**	**44.12 x 2.62**
***45.0**	**56.0**	**4.2**	**0.5**	**RU6200450**	**48.90 x 2.62**
50.0	**61.0**	**4.2**	**0.5**	**RU6200500**	**53.64 x 2.62**
55.0	66.0	4.2	0.5	RU6200550	58.42 x 2.62
56.0	**71.5**	**6.3**	**0.9**	**RU6300560**	**59.92 x 3.53**

Rod Diameter	Groove Diameter	Groove Width	Radius	TSS Part No.	O-Ring Size
d_N f8/h9	D_1 H10	L +0.2	r1		
63.0	**74.0**	**4.2**	**0.5**	**RU6200630**	**66.34 x 2.62**
63.0	**78.5**	**6.3**	**0.9**	**RU6300630**	**66.27 x 3.53**
70.0	**85.5**	**6.3**	**0.9**	**RU6300700**	**75.79 x 3.53**
80.0	**95.5**	**6.3**	**0.9**	**RU6300800**	**85.32 x 3.53**
90.0	**105.5**	**6.3**	**0.9**	**RU6300900**	**94.84 x 3.53**
100.0	**115.5**	**6.3**	**0.9**	**RU6301000**	**104.37 x 3.53**
110.0	**125.5**	**6.3**	**0.9**	**RU6301100**	**113.89 x 3.53**
120.0	135.5	6.3	0.9	RU6301200	126.59 x 3.53
150.0	165.5	6.3	0.9	RU6301500	158.34 x 3.53
160.0	**175.5**	**6.3**	**0.9**	**RU6301600**	**164.69 x 3.53**
190.0	205.5	6.3	0.9	RU6301900	196.44 x 3.53
200.0	**221.0**	**8.1**	**0.9**	**RU6402000**	**208.92 x 5.33**
210.0	231.0	8.1	0.9	RU6402100	221.62 x 5.33
260.0	281.0	8.1	0.9	RU6402600	266.07 x 5.33
300.0	321.0	8.1	0.9	RU6403000	329.57 x 5.33
350.0	371.0	8.1	0.9	RU6403500	354.97 x 5.33

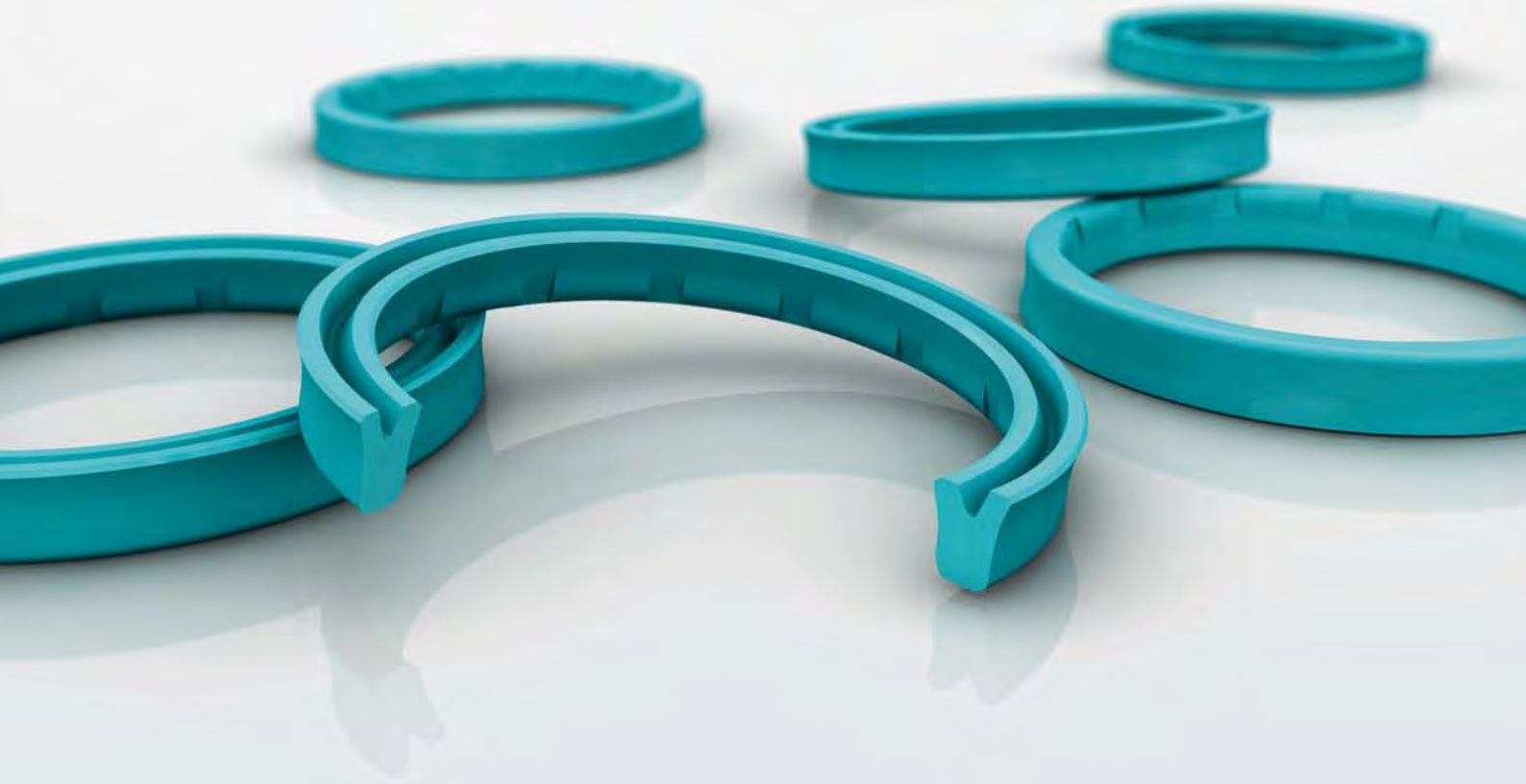
Dimensions in **bold** according to ISO/DIN 7425/2. Is also suitable for Stepseal® groove. * Split groove

Zurcon® U-Cup RU9

Single-acting U-Cup

New U-Cup Design

Material:
Zurcon®



U-Cup RU9

Introduction

Rod seals are particularly exposed to pressure and friction. A long service life is a specific requirement of piston rods. Features such as wear and extrusion resistance, media and temperature compatibility, low friction, compact Installation Dimensions and ease of assembly are also essential and require the introduction of new products and materials. It is against this background that we have developed the Zurcon® U-Cup RU9.

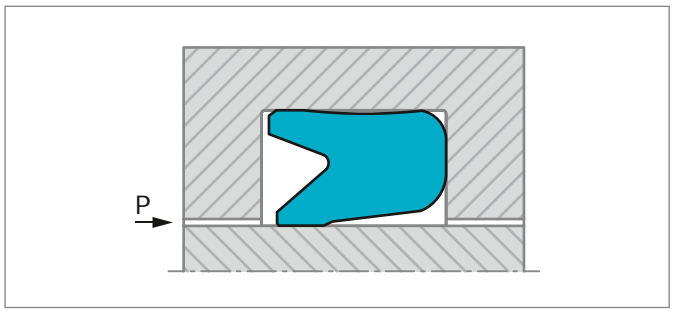


Figure 61: U-Cup, type RU9

DESCRIPTION

Due to its special design, behind the dynamic seal lip, the Zurcon® U-Cup RU9 with its structure of slide segments interspersed by back-pumping channels features excellent back-pumping ability across the entire pressure range. The dynamic seal slide segments also have a micro-structure with excellent tribological and sealing characteristics. As well as increasing the sealing ability of the U-Cup RU9, this also ensures a constant lubrication film underneath the seal sliding surface, reducing breakaway force even after prolonged periods of rest and reduces dynamic friction force.

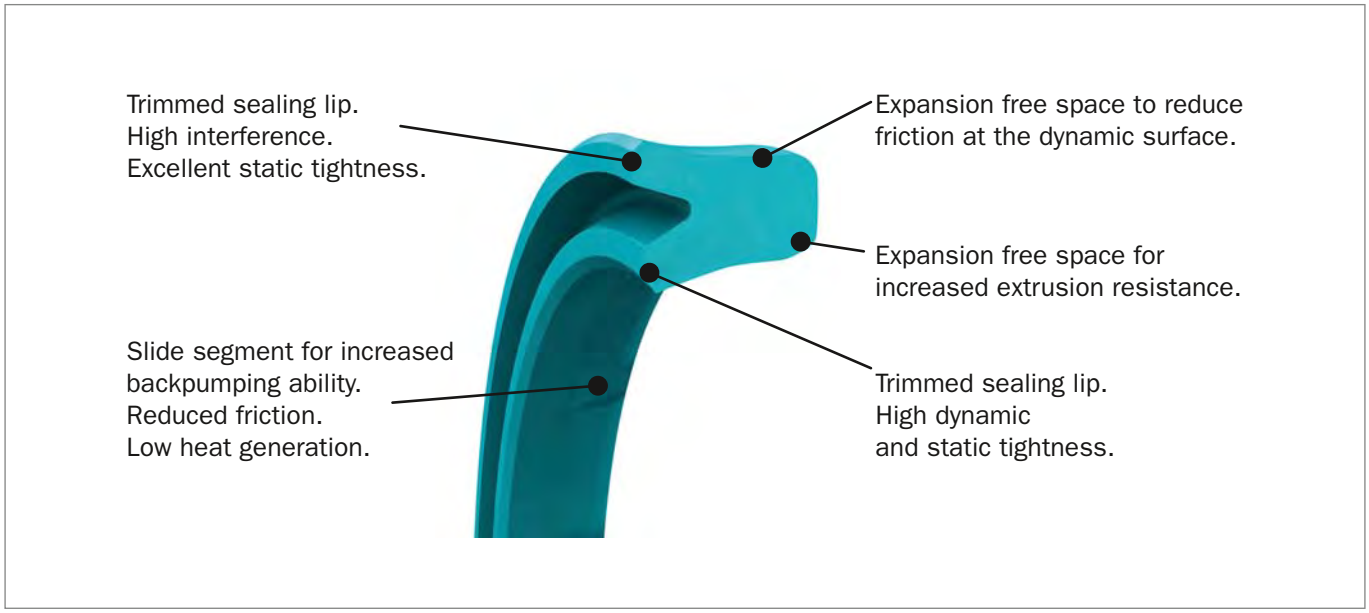


Figure 62: Zurcon® U-Cup RU9 design features

FRICTION

The friction force of U-Cups dramatically increases between 2.5 and 10 MPa. The Zurcon® U-Cup RU9 has a unique feature. As the system pressure increases, the contact surface between the U-Cup and the piston rod increases. Once a specific system pressure is reached, the seal deforms to such an extent that its entire friction-generating inside surface gets in contact with the piston rod. Due to the special design of Zurcon® U-Cup RU9 there is improved pressure distribution on the rod. The resulting tribological benefits restrict the increase in friction. When we compare the friction values of conventional U-Cups with those of the Zurcon® U-Cup RU9 the results are self-evident.

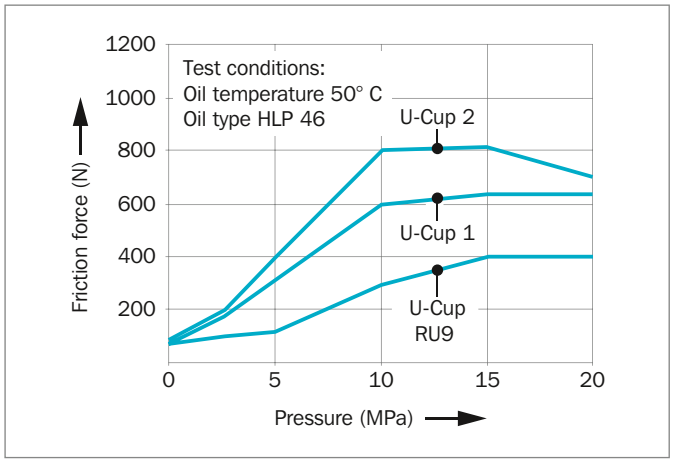


Figure 63: Friction dependent on pressure

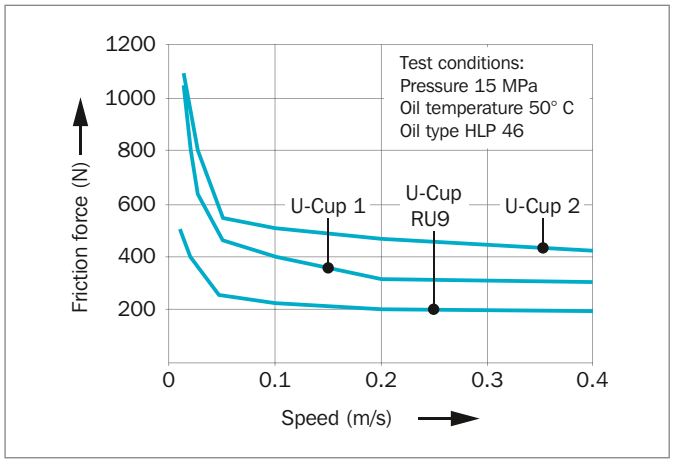


Figure 64: Friction dependent on speed

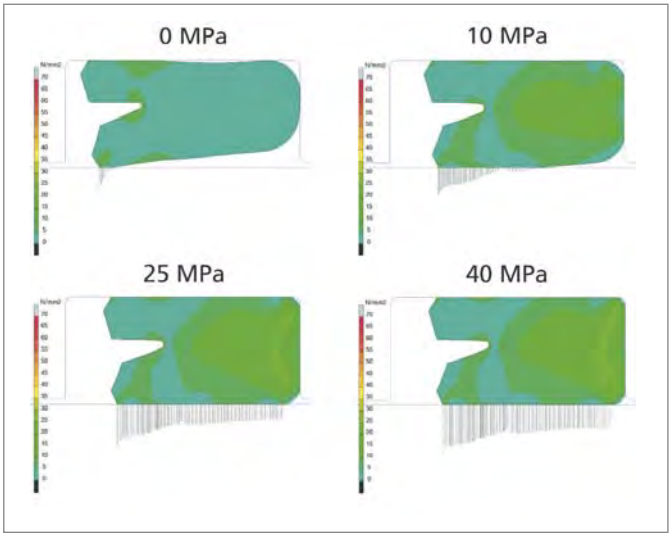


Figure 65: How the Zurcon® U-Cup RU9 performs underpressure

SEALING PERFORMANCE

The high sealing performance is achieved by:

- Interference fit at the external diameter
- Special shape of both trimmed seal lips
- Controlled pressure distribution and hydrodynamic backpumping ability over a wide pressure range

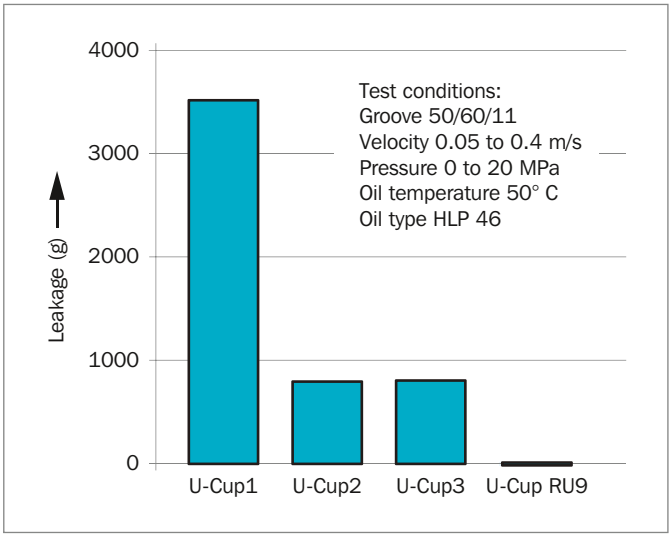


Figure 66: Leakage performance dependent on U-Cup type

RADIAL CLEARANCE

The new Zurcon® RU9 design combined with the special compound properties shows a better extrusion resistance compared to standard U-Cup under all working conditions. The hardware clearance can be increased significantly.

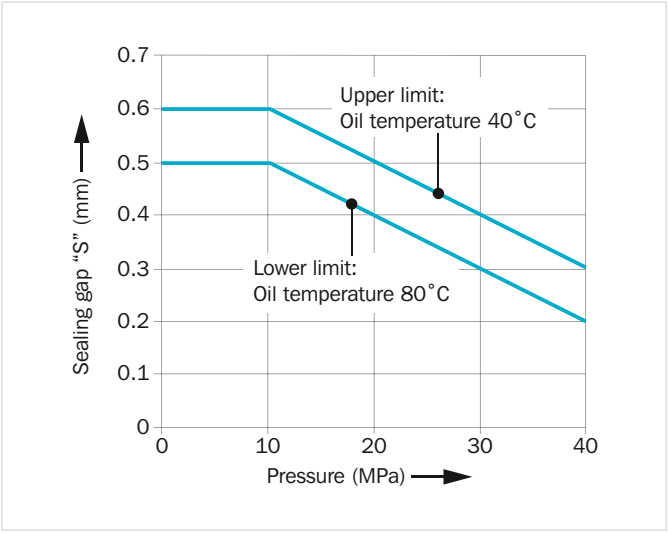


Figure 67: Radial clearance "S" as function of pressure

ADVANTAGES

- Lower friction than standard U-Cups
- Lower heat generation than standard U-Cups
- High extrusion resistance
- Excellent dynamic and static sealing
- Optimum environment protection
- Back pumping ability over the entire pressure range achieved by grooved profile
- Suitable with the Zurcon® Buffer Seal as secondary seal in "tandem design"
- Suitable for sealing systems with double scraper
- Seal stability within the groove

APPLICATION EXAMPLES

Zurcon® U-Cup RU9 can be used in all applications in whichpreviously a conventional U-Cup was applied, such as:

- Hydraulic cylinders
- Construction machinery
- Fork lifts
- Truck cranes
- Telescopic cylinders
- Agricultural machines
- Machine tools
- Injection molding machines
- Hydraulic presses
- Gas spring

In medium/heavy duty applications the preferred solution for tandem rod sealing systems is the combination with the Zurcon® Buffer Seal primary seal and Zurcon® U-Cup RU9 in conjunction with a double acting scraper.

MATERIALS

Zurcon® Z20 Standard polyurethane 93 Shore A
Temperature: -35 °C to +110 °C
Color: Turquoise

Zurcon® Z22 Premium polyurethane 93 Shore A
Temperature: -50 °C to +110 °C
Color: Dark petrol

Zurcon® Z25 Premium polyurethane 93 Shore A
Temperature: -35 °C to +130 °C
Color: Black

The Zurcon® polyurethane has high abrasion resistance, a low compression set, high extrusion resistance and a wide temperature range.

OPERATING CONDITIONS

Pressure:	Up to 40 MPa
Velocity:	Up to 0.5 m/s
Temperature:	
Zurcon® Z20 Standard:	-35 °C to +110 °C
Media:	
Hydraulic fluids based on mineral oil:	-35 °C to +110 °C
Synthetic and natural ester HEES, HETG:	Up to +60 °C
Flame-retardant hydraulic fluids HFA/HFB:	Up to +40 °C

IMPORTANT NOTE

The above stated limits for pressure and speed are maximum values individually. Friction heat generated by the combination of pressure and speed may cause local heat built-up. Care should be taken not to apply high values for pressure and speed at the same time.

Table 52: Materials

Material Code	Material Description	Temperature Range	Application
Zurcon® Z20	High performance Polyurethane 94 Shore A; standard grade for hydraulic	-35 °C to +110 °C	Excellent abrasion and extrusion resistance, minimal swelling in mineral oil, acceptable hydrolysis resistance.
Zurcon® Z22	High performance Polyurethane 93 Shore A; Premium grade for low temperature	-50 °C to +110 °C	Wide range of working temperatures with very good compression set performance at very low temperature. Excellent balance between swelling in mineral oil and hydrolysis resistance.
Zurcon® Z25	High performance Polyurethane 95 Shore A; Premium grade for high temperature	-35 °C to +130 °C	Wide range of working temperatures with excellent mechanical proprieties at high temperature. Products: Ideal for use in heavy duty cylinder and cylinders exposed to high-temperature painting processes.

■ Installation Recommendation

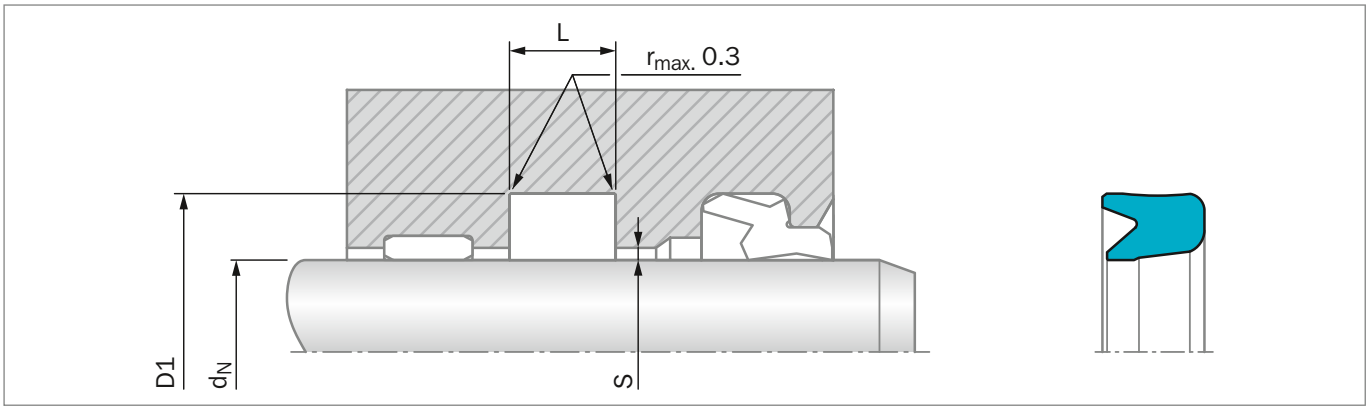


Figure 68: Installation Drawing, Dimension “S“ see Figure 67

ORDERING EXAMPLE (METRIC)

Zurcon® U-Cup Type RU9

Rod Diameter:	d_N = 20.0 mm
Groove Diameter:	D1 = 28.0 mm
Groove Width:	L = 6.3 mm
TSS Part No.:	RU9000200 -

TSS Article No. **RU90 0 0200 - Z20**

- TSS Series No.
- Type (Standard)
- Rod Diameter x 10
- Quality Index (Standard)
- Material Code

MATERIAL

Standard Zurcon® :	Z20
Special polyurethane:	93 Shore A
Color:	Turquoise

Table 53: Preferred Series / TSS Article No.

Rod Diameter	Groove Diameter	Groove Width	TSS Part No.
d_N f8/h9	**D1** H10	**L** +0.25	
*6.0	14.0	6.3	RU9000060
***8.0**	**16.0**	**6.3**	**RU9000080**
12.0	19.0	6.0	RU9000120
15.0	20.0	5.0	RU9000150
*15.0	23.0	6.3	RU9100150
*16.0	22.0	6.0	RU9100160
*16.0	24.0	6.0	RU9200160
***16.0**	**24.0**	**6.3**	**RU9000160**
18.0	25.0	5.3	RU9100180
***18.0**	**26.0**	**6.3**	**RU9000180**
20.0	26.0	6.0	RU9100200
***22.0**	**30.0**	**6.3**	**RU9100220**

Rod Diameter	Groove Diameter	Groove Width	TSS Part No.
d_N f8/h9	D1 H10	L +0.25	
***20.0**	**28.0**	**5.0**	**RU9300200**
***20.0**	**30.0**	**8.0**	**RU9200200**
***20.0**	**28.0**	**6.3**	**RU9000200**
22.0	29.0	5.6	RU9200220
***22.0**	**30.0**	**6.3**	**RU9000220**
25.0	31.0	6.3	RU9100250
25.0	**33.0**	**6.3**	**RU9000250**
28.0	**36.0**	**6.3**	**RU9000280**
***28.0**	**38.0**	**8.0**	**RU9100280**
30.0	38.0	9.0	RU9100300
30.0	40.0	7.5	RU9200300
30.0	40.0	11.0	RU9000300
32.0	40.0	6.3	RU9200320
32.0	40.0	9.0	RU9100320
32.0	**42.0**	**8.0**	**RU9000320**
35.0	42.0	8.0	RU9100350
35.0	**45.0**	**8.0**	**RU9000350**
36.0	**44.0**	**6.3**	**RU9100360**
36.0	44.0	9.0	RU9000360
36.0	**46.0**	**8.0**	**RU9200360**
40.0	**50.0**	**8.0**	**RU9000400**
*45.0	53.0	8.5	RU9200450
45.0	**55.0**	**6.3**	**RU9100450**
45.0	**55.0**	**8.0**	**RU9000450**
50.0	**60.0**	**8.0**	**RU9000500**
50.0	60.0	11.0	RU9200500
50.0	**65.0**	**12.5**	**RU9100500**
55.0	65.0	8.0	RU9000550
56.0	68.0	11.0	RU9100560
56.0	**71.0**	**12.5**	**RU9000560**
60.0	68.0	7.0	RU9100600
60.0	70.0	8.0	RU9200600
60.0	**75.0**	**12.5**	**RU9000600**
63.0	75.0	13.0	RU9100630
63.0	**78.0**	**12.5**	**RU9000630**
65.0	75.0	8.0	RU9000650
65.0	85.0	12.5	RU9100650
70.0	82.0	9.6	RU9200700
70.0	**85.0**	**12.5**	**RU9000700**
75.0	83.0	7.0	RU9000750
80.0	93.0	12.5	RU9300800
80.0	95.0	10.0	RU9200800

Rod Diameter	Groove Diameter	Groove Width	TSS Part No.
d_N f8/h9	D1 H10	L +0.25	
80.0	**95.0**	**12.5**	**RU9100800**
80.0	100.0	12.5	RU9000800
85.0	100.0	10.0	RU9200850
85.0	100.0	12.5	RU9100850
90.0	100.0	7.5	RU9100900
90.0	102.0	9.6	RU9200900
90.0	**105.0**	**12.5**	**RU9000900**
95.0	110.0	10.0	RU9200950
95.0	110.0	12.5	RU9100950
95.0	115.0	13.0	RU9000950
100.0	108.0	12.0	RU9101000
100.0	115.0	13.0	RU9201000
100.0	**120.0**	**16.0**	**RU9001000**
105.0	120.0	12.5	RU9001050
110.0	120.0	11.0	RU9101100
110.0	125.0	12.0	RU9301100
110.0	125.0	12.5	RU9201100
110.0	**130.0**	**16.0**	**RU9001100**
115.0	125.0	11.0	RU9001150
120.0	135.0	12.5	RU9001200
125.0	**145.0**	**16.0**	**RU9001250**
130.0	140.0	7.5	RU9001300
130.0	145.0	13.0	RU9101300
140.0	**160.0**	**16.0**	**RU9001400**

Dimensions and TSS Part Numbers in bold according to ISO 5597. * splitted groove

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Zurcon® Buffer Seal LM

Single-acting

Designed for Lubrication Management Technology

Integrated Back-Up Ring

Material:
Zurcon®

Zurcon® Buffer Seal LM

Introduction

In heavy-duty applications, leak-free performance and long service life cannot be assured by a single sealing element; therefore, specially developed system seals are arranged in series, building a tandem configuration.

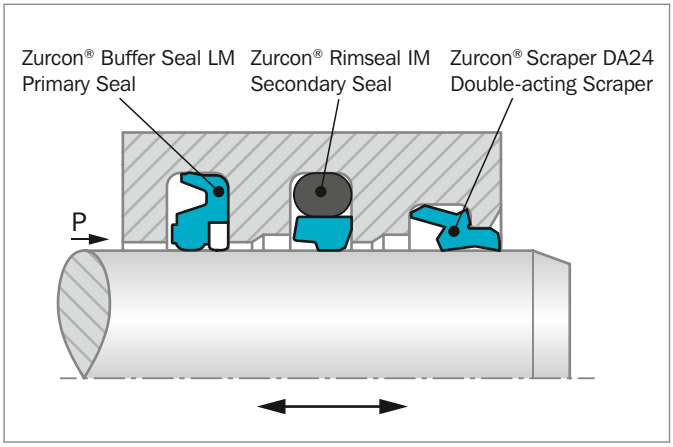


Figure 69: Zurcon® Buffer Seal LM in tandem configuration

Each sealing element in a system has its specific function, and their interaction needs to be secured to incorporate redundancy into the sealing system. The primary seal, manufactured from Zurcon® material, has excellent wear and extrusion resistance under extreme working conditions. It allows an optimized lubrication film to pass this first barrier, ensuring the necessary lubrication of the secondary sealing element for long service life.

In order to further optimize the performance, friction and service life of sealing systems using a tandem sealing configuration, Trelleborg Sealing Solutions developed the already known and appreciated capabilities of Zurcon® Buffer Seal into a new design called Zurcon® Buffer Seal LM.

DESCRIPTION

The single-acting Zurcon® Buffer Seal LM is designed as a heavy-duty primary rod seal. The design of the product incorporates a combination of a Zurcon® sealing ring with a Back-up Ring. By utilizing two materials, the performance of the product is enhanced and life is extended.

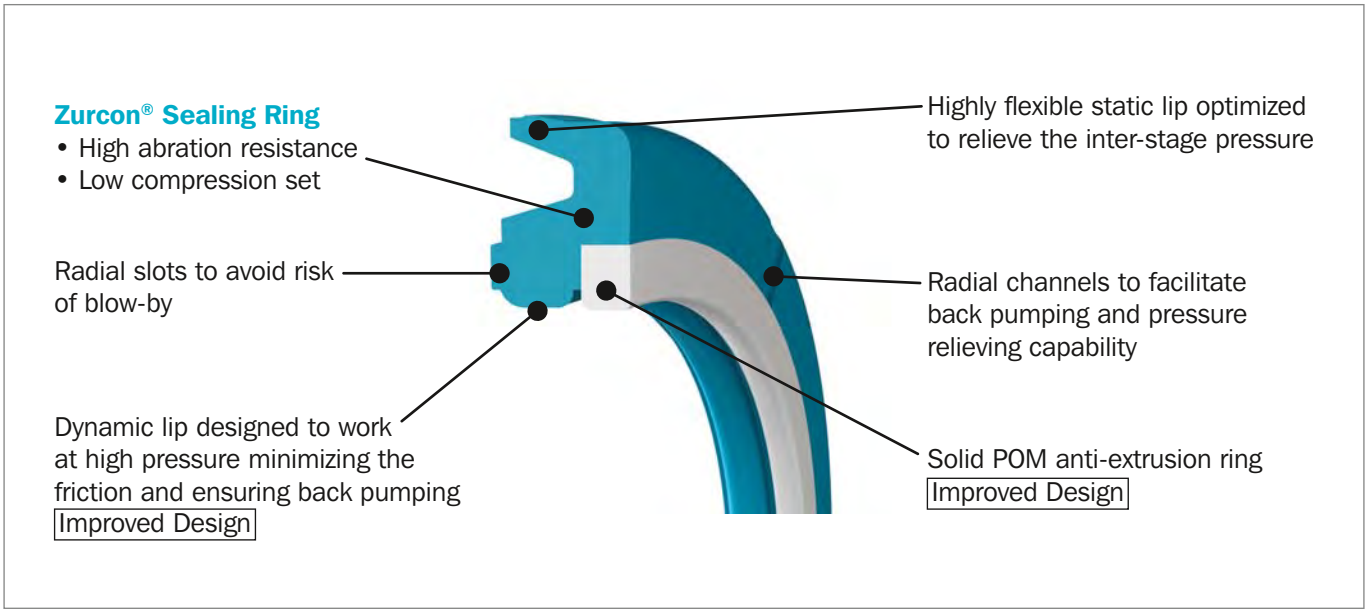


Figure 70: Zurcon® Buffer Seal design features

LUBRICATION MANAGEMENT FEATURE

This innovative design incorporates large radius rounded edges on both seal ring and Back-up Ring that lower the contact pressure, allowing a thicker amount of fluid to lubricate and better activate the secondary seal.
By means of this, friction and wear on the lips are reduced significantly, therefore increasing life time and reliability, as well as rod wear.

This engineered wet running creates the right environment to enhance the Zurcon® PU sealing system. New generation secondary seals like RU9, L-Cup and Rimseal IM can manage the larger oil film in the best way, compensating for pressure from oil accumulation, as well as returning oil to the main pressure chamber due to excellent back pumping behavior under all pressure ranges.

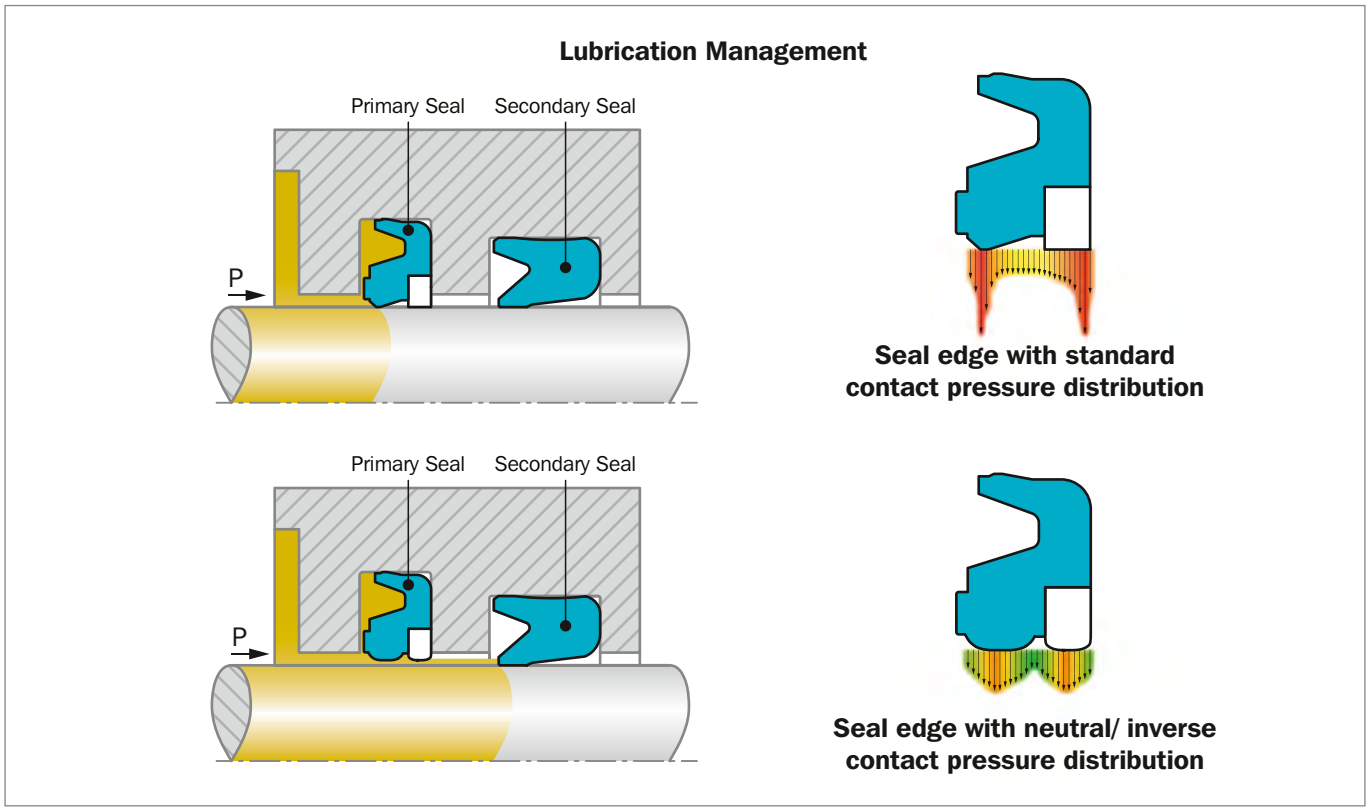


Figure 71: Pressure distribution and function of a standard (top) and a LM (bottom) sealing system

PRESSURE RELIEF

The relief mechanism is activated by the special seal design, through its thin, short and flexible static lip. The radial channels on the back side offer the fluid a direct stream up to both lips. A minimum difference between the pressure trapped and the pressure in the chamber is able to deflect the seal and recover the same pressure level.

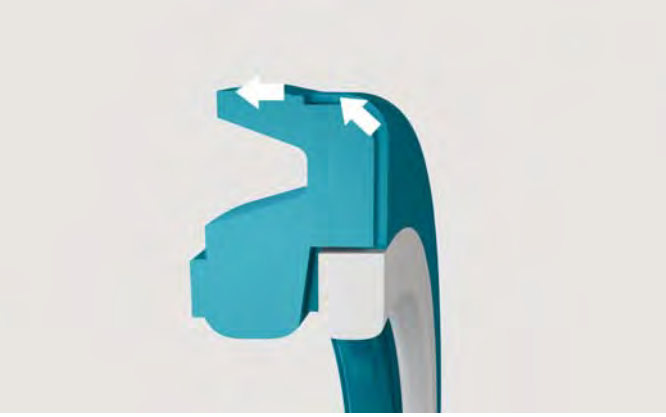


Figure 72: Venting path

Zurcon® Buffer Seal LM is able to guarantee an optimal pressure distribution and sufficient rod lubrication across the entire pressure range.

In unpressurized conditions, head-on slots on the dynamic lip assure correct positioning and avoid any risk of blow-by. When installed, Zurcon® Buffer seal is ready for fast activation, protecting the secondary seal from peaks in pressure.

ADVANTAGES

- Resistance to very high pressure peaks due to an integrated Back-up Ring that closes the radial gap
- Outstanding pressure relief
- Excellent back-pumping guaranteed over the entire pressure range
- Suitable to use both in ISO 7425/2 standard grooves and in Stepseal® grooves
- High performance Zurcon® material with an excellent abrasion resistance and low compression set

APPLICATION EXAMPLES

Medium and heavy-duty applications:

- Construction machinery
- Earth moving equipment
- Mobile hydraulics
- Fork lifts

MATERIALS - STANDARD APPLICATION

For hydraulic components in mineral oils or media with good lubricating performance.
Seal Ring: Zurcon® Z20
Back-up Ring: Polyacetal resin (POM)
Set reference: Z2054

Zurcon® polyurethane has high abrasion resistance, a low compression set, high extrusion resistance and a wide temperature range.

OPERATING CONDITIONS

Pressure:	Up to 40 MPa Up to 60 MPa peak
Velocity:	Up to 1 m/s
Temperature:	-35 °C to +110 °C*
Media:	
Mineral oil:	Up to 110 °C
Synthetic and natural esters HEES, HETG:	Up to +60 °C
Flame retardant fluids HFA/HFB:	Up to +40 °C

IMPORTANT NOTE

The above data are maximum values and cannot be used at the same time, e.g. the maximum operating speed depends on pressure, temperature and gap value. A combination of pressure and speed might cause local heat increases, so care should be taken when evaluating high values the above parameters simultaneously.

■ Installation Recommendation

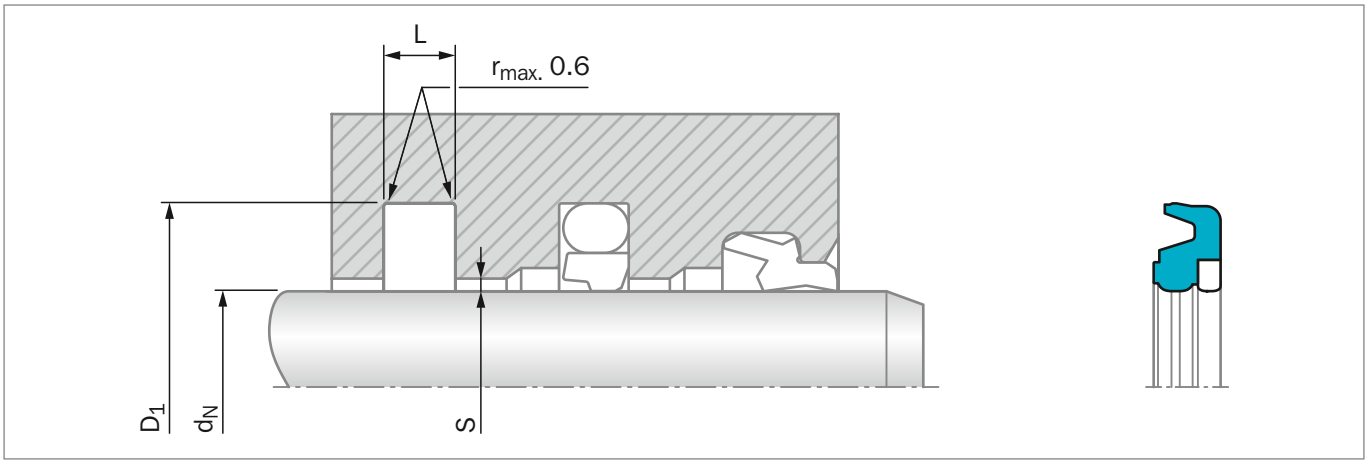


Figure 73: Installation Drawing

ORDERING EXAMPLE

Zurcon® Buffer Seal LM Type RUKC

Rod Diameter:	d_N = 63.0 mm
Groove Diameter:	D_1 = 78.5 mm
Groove Width:	L = 6.3 mm
TSS Part No.:	RUKCB0630 -

TSS Article No. **RUKC B 0630 - Z2054**

TSS Series No.
Type (Standard)
Rod diameter x 10
Quality Index (Standard)
Material Code (Seal Ring)

Table 54: Installation Dimensions / TSS Article No.

Rod Diameter d_N f8/h9	Groove Diameter D_1 H9	Groove Width L +0.25	Radial Clearance S_{max}	TSS Article No.
50.0	**65.5**	**6.3**	**0.4**	**RUKCB0500-Z2054**
60.0	75.5	6.3	0.4	RUKCB0600-Z2054
65.0	80.5	6.3	0.4	RUKCB0650-Z2054
70.0	**85.5**	**6.3**	**0.4**	**RUKCB0700-Z2054**
75.0	90.5	6.3	0.4	RUKCB0750-Z2054
80.0	**95.5**	**6.3**	**0.4**	**RUKCB0800-Z2054**
85.0	100.5	6.3	0.4	RUKCB0850-Z2054
90.0	**105.5**	**6.3**	**0.4**	**RUKCB0900-Z2054**
95.0	**110.5**	**6.3**	**0.4**	**RUKCB0950-Z2054**
100.0	**115.5**	**6.3**	**0.4**	**RUKCB1000-Z2054**
105.0	120.5	6.3	0.4	RUKCB1050-Z2054
110.0	**125.5**	**6.3**	**0.4**	**RUKCB1100-Z2054**
115.0	130.5	6.3	0.4	RUKCB1150-Z2054
120.0	135.5	6.3	0.4	RUKCB1200-Z2054
125.0	**140.5**	**6.3**	**0.4**	**RUKCB1250-Z2054**
140.0	**155.5**	**6.3**	**0.4**	**RUKCB1400-Z2054**
150.0	165.5	6.3	0.4	RUKCB1500-Z2054

All dimensions in **bold** type are in accordance with the recommendation of ISO 7425/2. Suitable also in Stepseal groove.

Turcon® Variseal® M2

Single-acting

Spring Energized Plastic U-Cup

Material:
Turcon® and Zurcon®

■ Turcon® Variseal® M2

■ Description

Turcon® Variseal® M2 is a single acting seal consisting of a U-shaped jacket and a V-shaped corrosion resistant spring. Variseal® M2 has an asymmetric seal profile. The optimized front angle offers good leakage control, reduced friction and long service life.

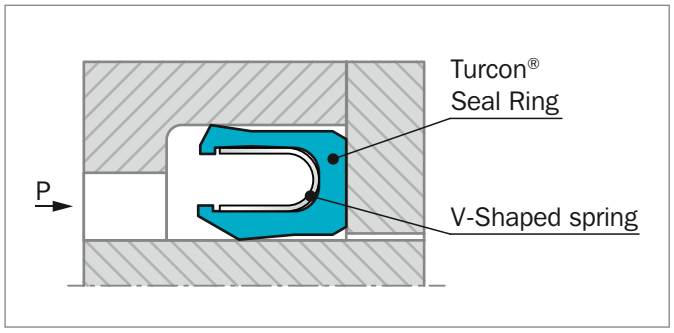


Figure 74: Turcon® Variseal® M2

AREAS OF APPLICATION

- Hydraulic components, e.g. cylinders, valves, pumps, etc.
- Chemical processing equipment
- Pharmaceutical processing
- Food and beverage processing
- Spindle seals for machine tools
- Pneumatics, cylinders and valves

ADVANTAGES

- Suitable for reciprocating and rotary applications
- Low coefficient of friction
- Stick-slip free operating
- High abrasion resistance
- Dimensionally stable
- Resistant to most fluids, chemicals and gases
- Withstands rapid changes in temperature
- No vulcanizing between seal and hardware
- Excellent resistance to aging
- Can be sterilized
- Available in Hi-Clean version
- Interchangeable with O-Ring and Back-up Ring combinations to AS4716 and ISO 6194

OPERATING CONDITIONS

Pressure:	Maximum dynamic load: 20 MPa Maximum static load: 40 MPa (207 MPa with back-up ring)
Speed:	Reciprocating up to 15 m/s Rotating up to 1.27 m/s
Operating temperature:	-70 °C to +300 °C Special Turcon and Zurcon® materials as well as alternative spring materials are available for applications outside this temperature range.
Media compatibility:	Virtually all fluids, chemicals and gases

IMPORTANT NOTE

The above data are maximum values and cannot be used at the same time. e.g. the maximum operating speed depends on material type, pressure, temperature and gap value. Temperature range also dependent on media.

GENERAL

Turcon® Variseal® are single acting, spring-energized seals which are used for dynamic and static applications.

Variseal® are effective in a wide range of applications. They are chosen when higher resistance to chemical media is required, if the seal is required to operate in extremes of temperature and/or where good extrusion and compression characteristics are needed.

Turcon® Variseal® designs have three main characteristics:

- Application specific U-shaped seal profile
- Spring geometry suited to the particular application
- Proven high-performance Turcon® or Zurcon® polymers

Standard or custom geometries available in metric, inch and intermediate sizes ranging from 2 to 3,300 mm.

METHOD OF OPERATION

All Variseal® designs included in this catalog have the same operating principle and differ only in their profile form and type of metallic spring used.

The Variseal® spring supplies the load required for sealing at low pressures (Figure 75). The "U" shaped jacket allows fluid pressure to energize the sealing lips, so total sealing pressure rises with increasing operating pressure (Figure 76).

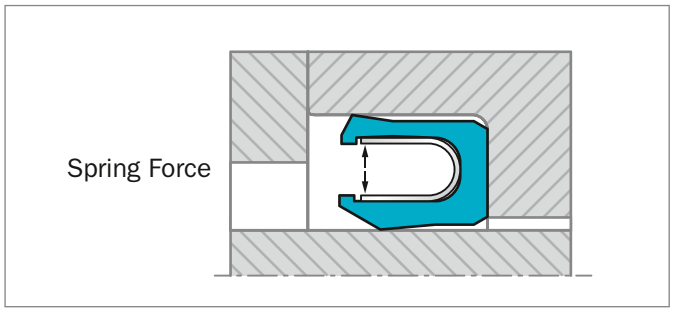


Figure 75: Turcon® Variseal® without system pressure

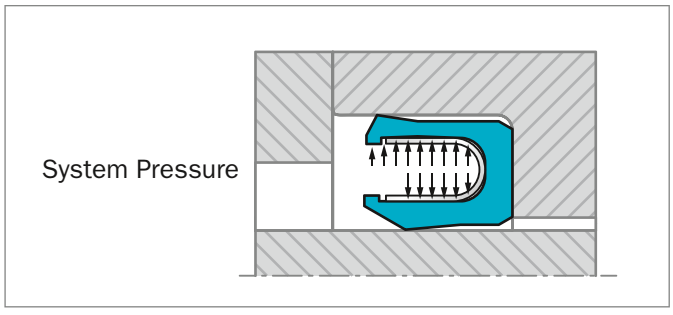


Figure 76: Turcon® Variseal® with system pressure

PERFORMANCE

The different types of Variseal® designs combined with the properties of Turcon® and Zurcon® materials offer design engineers a wide range of solutions to a large number of applications.

The most important characteristics of Variseal® designs are listed below:

- Very low coefficient of friction
- Good dynamic and static sealing
- Capable of sealing at high speeds up to 15 m/s
- Almost universal chemical compatibility
- Operating temperature of -253 °C up to +300 °C
- Very good thermal resistance
- Properties unaffected by contact with chemicals
- Good aging characteristics
- Low compression set
- Capable of withstanding high pressures above 200 MPa (2,000 bar / 29,000 psi) when using Back-up Rings
- Very good dry-running properties
- Can be installed in grooves according to AS4716 (Mil-G-5514 is an old spec) and DIN 3771

MATERIALS

All materials used are physiologically safe. They contain no odor or taste-affecting substances.

The following material combination has proved effective for most fluid applications:

Seal ring: Turcon® T40

Spring: Stainless Steel Material No. AISI 301
Code S

For gas application use:

Seal ring: Turcon® T05/Zurcon® Z80

For use in accordance with the demands of the "Food and Drug Administration", suitable materials are available on request.

Table 55: Turcon® and Zurcon® Materials for Variseal® M2

Material Code	Material Description	Operating Temp.* °C	Mating Surface Material	MPa max.
Turcon® T05	Premium grade modified PTFE. Light duty material with greater wear resistance than Turcon T01. Reciprocating and slow rotary applications. Color: Turquoise	-200 to + 260	Steel Steel, chromeplated Cast iron Stainless steel Aluminum Bronze Alloys	20
Turcon® T40	High-grade formulation of virgin polytetrafluoroethylene (PTFE) based material compounded with carbon fiber additive. Excellent wear and low friction characteristics. Suited to reciprocating and rotary applications. Suitable for use in media with poor lubricating properties and for dry-running situations. Color: Black / gray	-60 to + 300	Steel, hardened Steel, chromeplated	40
Zurcon® Z80	UHMW Polyethylene. Excellent wear and abrasion resistance. Very good lubricity in water based media. Color: Translucent white	-253 to + 80	Steel Steel, chromeplated Stainless steel Aluminum Bronze Ceramic coating	40

* Depending on media.
Highlighted material is standard.

Spring Materials

The standard spring material for Turcon® Variseal® is stainless steel (spring code S).

Table 56: Spring Material

Media	Spring materials	Spring order code
For General use e.g. Oil Grease Air Water, steam Solvents Food, drugs Gas	**Stainless steel** DIN Mat No. 1.4310/1.4319 AISI 301/302 UNS 30100	S (Standard spring material)
For use in corrosive media e.g. Acids Caustics Seawater	**Hastelloy®** C-276 DIN Mat No. 2.4819 UNS N10276	H
For petrochemical use e.g. Crude oil Sour gas	**Elgiloy®** 1) DIN Mat No. 2.4711 UNSR30003	E

® Hastelloy is a registered trademark of Haynes International, Inc.
® Elgiloy is a registered trademark of the Elgiloy Specialty Metals Alternative brand may be used.
1) NACE-approval

■ Groove Design

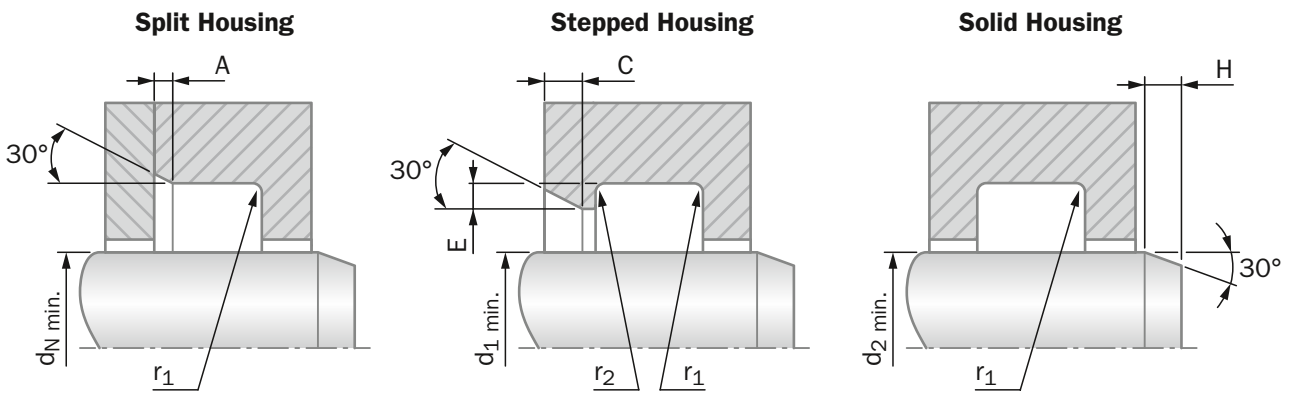


Figure 77: Variseal Groove Configurations

Installation lead-in chamfers and steps to include blend radii and are to be polished.

Table 57: Dimensions for Groove Designs

Series	Rod / Piston Groove Dimensions					
	A Chamfer	r_1 Maximum Radius	C Minimum Chamfer	r_2 Maximum Radius	E Minimum Step Height	H Minimum Chamfer
000	0.25 / 0.38	0.25	0.70	0.13	0.40	1.20
100	0.38 / 0.51	0.38	1.10	0.13	0.60	1.50
200	0.38 / 0.51	0.38	1.25	0.18	0.70	2.50
300	0.51 / 0.69	0.38	1.40	0.25	0.80	4.50
400	0.51 / 0.69	0.51	1.60	0.25	0.90	6.00
500	0.76 / 1.02	0.51	2.60	0.38	1.50	11.00

Table 58: Groove Design for Rod

Series	Rod Diameter Recommendations		
	Split Groove Ø d_N Minimum	Stepped Groove Ø d_1 Minimum	Solid Groove Ø d_2 Minimum
000	3.00	20.00	31.75
100	6.00	30.00	69.85
200	10.00	35.00	111.13
300	20.00	40.00	298.45
400	35.00	45.00	495.30
500	80.00	80.00	762.00

■ Installation Recommendation

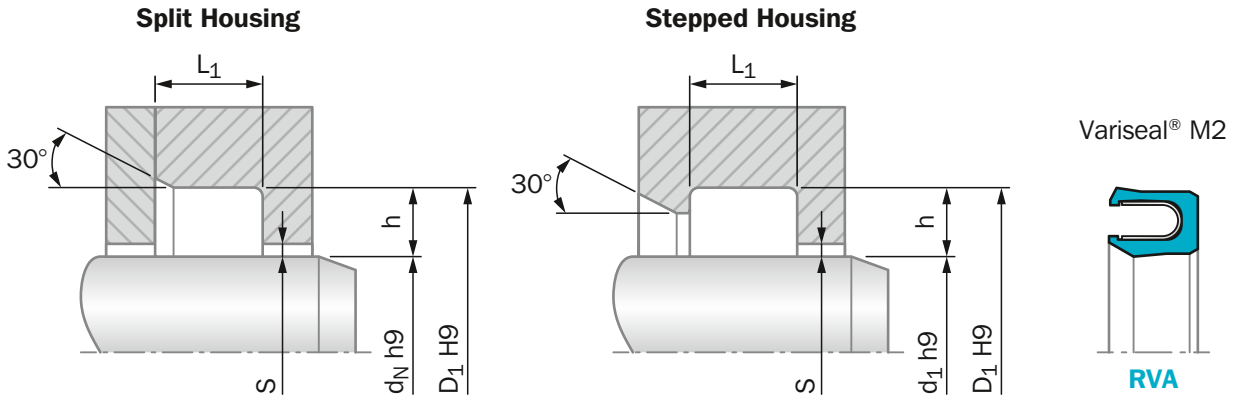


Figure 78: Installation Drawing (see Figure 77 for additional groove details)

Table 59: Installation Dimensions

Series No.	Rod Diameter d_N/d_1 h9		Groove Diameter	Groove Width	Radial Clearance S_{max}*			
	Recommended Range	Extended Range**	D_1 H9	L_1 +0.2	<2 MPa	<10 MPa	<20 MPa	<40 MPa
RVA0	3.0 - 9.9	3.0 - 40.0	d_N/d_1 + 2.9	2.4	0.20	0.10	0.08	0.05
RVA1	10.0 - 19.9	6.0 - 200.0	d_N/d_1 + 4.5	3.6	0.25	0.15	0.10	0.07
RVA2	20.0 - 39.9	10.0 - 400.0	d_N/d_1 + 6.2	4.8	0.35	0.20	0.15	0.08
RVA3	40.0 - 119.9	20.0 - 700.0	d_N/d_1 + 9.4	7.1	0.50	0.25	0.20	0.10
RVA4	120.0 - 999.0	35.0 - 1,600.0	d_N/d_1 + 12.2	9.5	0.60	0.30	0.25	0.12
RVA5	1,000.0 - 2,500.0	80.0 - 2,500.0	d_N/d_1 + 19.0	15.0	0.90	0.50	0.40	0.20

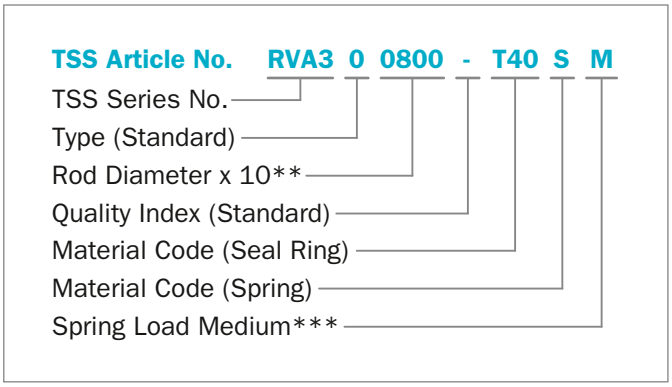
* We recommend that the gap dimensions be reduced for temperatures ≥80 °C.
At pressures >40MPa a Back-up Ring would be incorporated and the extrusion gap would not be considered.
** Available on request.

ORDERING EXAMPLE

Turcon® Variseal® M2, recommended range.

Series:	Series RVA3 (from Table 59)
Rod Diameter:	d_N = 80.0 mm
TSS Part No.:	RVA300800 (from Table 60)

For other seal and spring materials please contact the Trelleborg Sealing Solutions representative.



** For diameters ≥ 1,000.0 mm multiply only by factor 1.
Example: RVA5 for diameter 1,200.0 mm.
TSS Article No.: RVA5**X1200** - T40SM according to 15 digit part number system of latest Variseal catalog.

*** M Medium, R Hi Clean

Table 60: Installation Dimensions / TSS Part No.

d_N	D_1	TSS Part No.	d_N	D_1	TSS Part No.	d_N	D_1	TSS Part No.
3.0	**5.9**	**RVA0_0030**	**32.0**	**38.2**	**RVA2_0320**	**80.0**	**89.4**	**RVA3_0800**
4.0	**6.9**	**RVA0_0040**	35.0	41.2	RVA2_0350	85.0	94.4	RVA3_0850
5.0	**7.9**	**RVA0_0050**	**36.0**	**42.2**	**RVA2_0360**	**90.0**	**99.4**	**RVA3_0900**
6.0	**8.9**	**RVA0_0060**	**40.0**	**49.4**	**RVA3_0400**	95.0	104.4	RVA3_0950
8.0	**10.9**	**RVA0_0080**	42.0	51.4	RVA3_0420	**100.0**	**109.4**	**RVA3_1000**
10.0	**14.5**	**RVA1_0100**	**45.0**	**54.4**	**RVA3_0450**	105.0	114.4	RVA3_1050
12.0	**16.5**	**RVA1_0120**	48.0	57.4	RVA3_0480	**110.0**	**119.4**	**RVA3_1100**
14.0	**18.5**	**RVA1_0140**	**50.0**	**59.4**	**RVA3_0500**	115.0	124.4	RVA3_1150
15.0	**19.5**	**RVA1_0150**	52.0	61.4	RVA3_0520	120.0	132.2	RVA4_1200
16.0	**20.5**	**RVA1_0160**	55.0	64.4	RVA3_0550	**125.0**	**137.2**	**RVA4_1250**
18.0	**22.5**	**RVA1_0180**	**56.0**	**65.4**	**RVA3_0560**	130.0	142.2	RVA4_1300
20.0	**26.2**	**RVA2_0200**	60.0	69.4	RVA3_0600	135.0	147.2	RVA4_1350
22.0	**28.2**	**RVA2_0220**	**63.0**	**72.4**	**RVA3_0630**	**140.0**	**152.2**	**RVA4_1400**
25.0	**31.2**	**RVA2_0250**	65.0	74.4	RVA3_0650			
28.0	**34.2**	**RVA2_0280**	**70.0**	**79.4**	**RVA3_0700**			
30.0	36.2	RVA2_0300	75.0	84.4	RVA3_0750			

The rod diameters in bold type correspond to the recommendations of ISO 3320. Other dimensions and all intermediate sizes up to 2,500 mm diameter including imperial (inch) sizes converted to mm, can be supplied.

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Turcon® VL Seal®

Single-acting

Rubber-energized plastic-faced seal

Material:
Turcon®, Zurcon® and Elastomer

■ Turcon® VL Seal® *

■ Description

Turcon® VL Seal® is a unidirectional Rod seal for the same groove dimensions as standard O-Rings - Figure 79.

The design is optimized with regard to performance, friction, leakage and service life through meticulous simulation, in-house testing and qualification in the most demanding Aerospace applications.

VL Seal® effectively provides static sealing by the O-Ring. The O-Ring is protected from damage under pressure cycles by the contoured O-Ring contact zone which supports the O-Ring and keeps it in position also at high working pressure.

VL Seal® is designed with hydrodynamic back-pumping effect which allows the seal to relieve pressure trapped between tandem seals or between seals and double-acting scrapers.

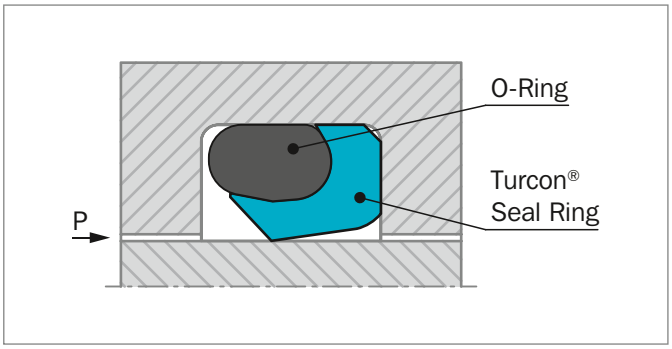
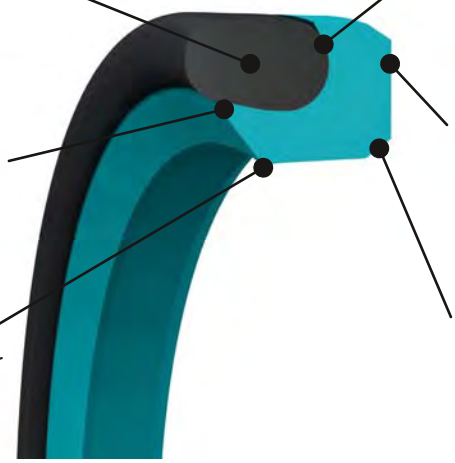


Figure 79: Turcon® VL Seal® mounted in O-Ring groove

Elastomer O-Ring
High flexibility to satisfy hardware tolerances. High static sealing function. Elastomer materials available to meet a wide variety of service conditions.

Stabilizing Wing
Keeps the O-Ring in the correct position when un-pressurised. Assists pressure transfer from O-Ring to seal lip.

Pressure Relieved Sealing Lip
Optimised sealing lip position for high sealing efficiency.
Short dynamic contact area for low friction.



Contoured O-Ring Contact Zone
Stabilizes the O-Ring position in the seal groove. Secures optimal pressure transfer to dynamic sealing lip. Prevents O-Ring nibbling.

Stabilized Groove Contact
Strong seal profile with full groove wall contact for stable seal position. Minimizes risk of extrusion.

Contoured Rear Chamfer
Improved back-pumping of residual oil film for increased sealing efficiency. Increased radial clearance.

Figure 80: Turcon® VL Seal® design features

* Patent pending. (US Patent No. 6,497,415)

METHOD OF OPERATION

The sealing mechanism of VL Seal® is based on the hydrodynamic properties of the seal. The specially formed seal edge has a steep contact pressure gradient on the high pressure side and a shallow contact pressure gradient on the low pressure side. This ensures that the fluid film adhering to the piston rod is returned to the high pressure chamber on the return stroke of the rod, minimizing the risk of leaks.

This also prevents the build-up of inter-seal pressure normally associated with tandem seal configurations - Figure 81. Inter-seal pressure depends on the system pressure, speed, stroke length and groove design.

ADVANTAGES

- Groove design with shallow radial depth
- Optimized leakage control and service life
- Low friction with small contact area between seal and counter surface
- Featuring the Turcon® Stepseal® 2K back pumping effect
- Utilize standard O-Ring installation groove
- Available in all diameter sizes from 6 to 2,600 mm

APPLICATION EXAMPLES

VL Seal® is recommended for hydraulics and general machine construction as an alternative to Stepseal® 2K and other single-acting seals for example in:

- Aerospace hydraulics
- Machine tools
- Automation
- Handling devises
- Telescopic cylinders
- Automobile industry
- Servo hydraulics
- Valves
- Valve stems
- Down-hole tools
- O-Ring replacement

OPERATING CONDITIONS

Pressure:	Up to 60 MPa
Speed:	Up to 15 m/s with linear movements, frequency up to 5 Hz
Temperature:	-45 °C to +200 °C depending on O-Ring material
Media:	Mineral oil-based hydraulic fluids, flame retardant hydraulic fluids, environmentally friendly hydraulic fluids (bio-oils), phosphate ester, water and others, depending on the seal and O-Ring material compatibility see Table 61
Clearance:	The maximum permissible radial clearance S_{max} is shown in Table 62, as a function of the operating pressure and functional diameter.

IMPORTANT NOTE

The above data are maximum values and cannot be used at the same time. e.g. the maximum operating speed depends on material type, pressure, temperature and gap value. Temperature range also dependent on media.

RADIAL NOTCH

VL Seal® can be delivered with radial notches at the low pressure side. This is an advantage if the seal is used in rotary applications. Notches can prevent the seal from rotating in the groove by avoiding pressurised fluid being trapped between seal and groove corner.

REDUNDANT SEALING SYSTEM

In many applications, secondary seal systems are required. Figure 79 shows such a tandem configuration with VL Seal® .

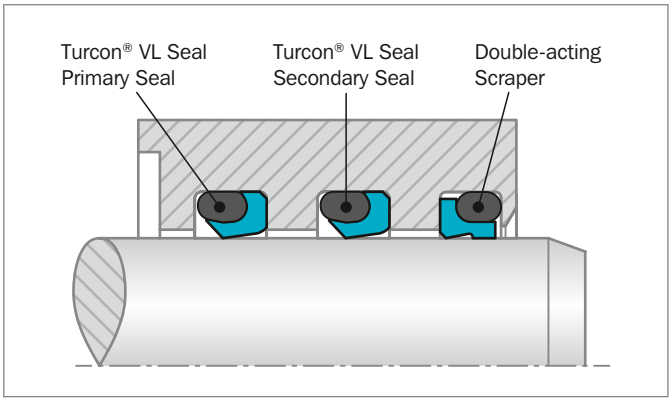


Figure 81: Turcon® VL Seal® in tandem configuration

INSTALLATION INSTRUCTIONS

VL Seal® is dimensionally interchangeable with seals for O-Ring housings, like Turcon® Double Delta® and Turcon® Variseal® M2. Groove dimensions, radial clearances and recommended seal series in relation to diameter are as illustrated in Table 62.

VL Seal® is preferably installed in closed grooves according to Figure 11 page 39. Depending on type and size installation in split grooves is also possible. Recommended minimum diameters for installation in closed grooves see Table 7 page 39.

RECOMMENDED MATERIALS

The following material combinations have proven effective for hydraulic applications:

Turcon® VL Seal ® in Turcon® M12
All round material for light to heavy hydraulic applications with linear, short stroke or helical movements in mineral oils, flame retardant hydraulic fluids, phosphate ester, bio-oils or fluids having lubricating properties:

O-Ring:	NBR 70 Shore A	N
	FKM 70 Shore A	V

Set code: M12N or M12V

Turcon® VL Seal® in Turcon® T46
For medium to heavy applictions with linear movements in mineral oils and other media with good lubrication.

O-Ring:	NBR 70 Shore A	N
	FKM 70 Shore A	V

Set code: T46N or T46V

Zurcon® Z54 is recommended for VL Seal® as an alternative to polyurethane U-Cups especially outside the size range of these products.

For specific applications, all Turcon® materials are available.

Other material combinations are listed in Table 61.

Table 61: Turcon® and Zurcon® Materials for VL Seal®

Material, Applications, Properties	Code	O-Ring Material Shore A	Code	O-Ring Operating Temp.* °C	Mating Surface Material	MPa max. Dyna-mic
Turcon® M12 First material choice for seals in linear motion Overall improved properties For new constructions and updating For all commonly applied hydraulic fluids including fluids with low lubrication performance Lowest friction and best sliding properties Lowest wear on seals Improved absorption of abrasive contaminants Low wear or abrasion of counter surface BAM tested Mineral fiber and Additives filled Color: Dark Gray	M12	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Steel plated (rod) Cast iron Stainless steel Titanium	50
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-20 to +200		
Turcon® T05 For lubricating fluids Also for gas service Very low friction Very good sliding and sealing properties Color: Turquoise	T05	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod)	20
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
Turcon® T08 For lubricating fluids and linear motion Very high compressive strength and extrusion resistance Hard counter surfaces is recommended Bronze filled Color: Light to dark brown, which may have variations in shading	T08	NBR 70	N	-30 to +100	Steel hardened Steel chrome plated (rod) Cast iron	60
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
Turcon® T29 For lubricating and non-lubricating fluids Good extrusion resistance Surface texture is not suitable for gas sealing Not for electrically conducting fluids Carbon fiber filled Color: Gray	T29	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Cast iron Stainless steel	30
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
		EPDM 70	E**	-45 to +145		
Turcon® T40 For lubricating and non-lubricating fluids High frequency and short strokes Water hydraulics Surface texture is not suitable for gas sealing Carbon fiber filled Color: Gray	T40	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Cast iron Stainless steel Aluminum	25
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
		EPDM 70	E**	-45 to +145		

Table continues on next page

Material, Applications, Properties	Code	O-Ring Material Shore A	Code	O-Ring Operating Temp.* °C	Mating Surface Material	MPa max. Dynamic
Turcon® T46 For lubricated hydraulics in linear motion High compressive strength High extrusion resistance Very good sliding and wear properties BAM tested Bronze filled Color: Light to dark brown, which may have variations in shading.	T46	NBR 70	N	-30 to +100	Steel hardened Steel chrome plated (rod) Cast iron	50
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
Zurcon® Z53*** For mineral oil based fluids Very high abrasion and extrusion resistance For counter surface with rougher surface finish Limited chemical resistance Max. working temperature 110 °C Cast polyurethane Color: Yellow to light-brown	Z53	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Cast iron Stainless steel Ceramic coating	60
		NBR 70 Low temp.	T	-45 to +80		
Zurcon® Z54*** For mineral oil based fluids Linear and slowly turning movements High abrasion resistance For counter surface with rougher surface finish Good extrusion resistance Limited chemical resistance Max. working temperature 110 °C Cast polyurethane Color: Turquoise	Z54	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Cast iron Stainless steel Ceramic coating	25
		NBR 70 Low temp.	T	-45 to +80		
Zurcon® Z80 For lubricating and non-lubricating fluids Water based fluids, air and gases Dry air pneumatics High abrasion and extrusion resistance For service in abrasive conditions and media with particles Good chemical resistance Limited temperature capability (-60 to +80 °C) UHMWPE (Ultra High Molecular Weight Polyethylene) Color: White to off-white	Z80	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Stainless steel Aluminum Ceramic coating	35
		NBR 70 Low temp.	T	-45 to +80		
		EPDM 70	E**	-45 to (+145)		

* The O-Ring Operation Temperature is only valid in mineral hydraulic oil.

** Material not suitable for mineral oils.

*** Max. diameter 2,200 mm.

BAM: Tested by "Bundesanstalt Materialprüfung, Germany".

Highlighted materials are recommended.

■ Installation Recommendation

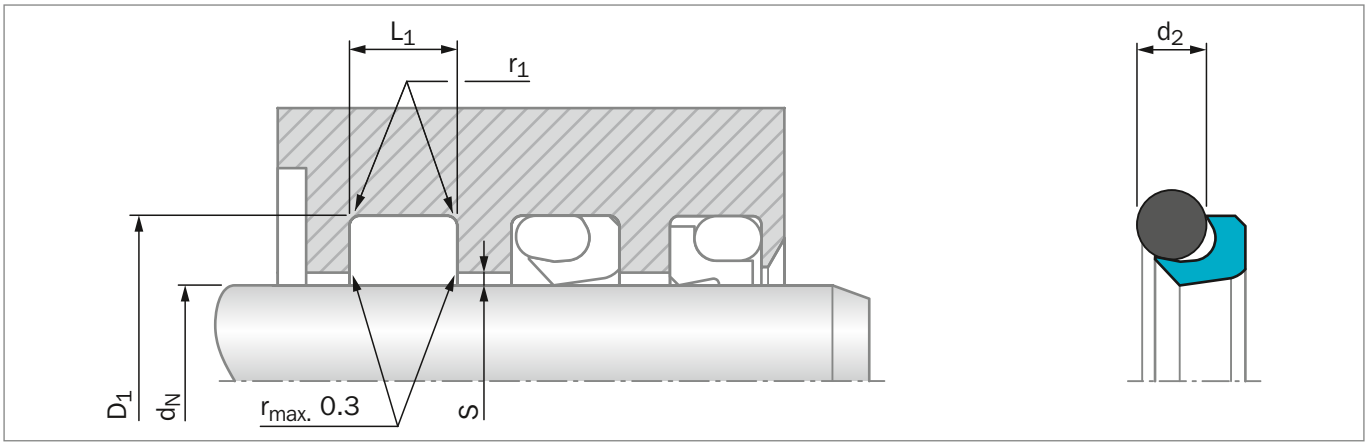


Figure 82: Installation Drawing

Table 62: Installation Dimensions - Standard Recommendations

Series No.	Rod Diameter d_N f8/h9		Groove Diameter	Groove Width	Radius	Radial Clearance S_{max}*			O-Ring Cross Section
	Standard Application	Available Range	D_1 H9	L_1 +0.2	r_1 max	10 MPa	20 MPa	30 MPa	d_2
REL10	10 - 19.9	6 - 100.0	d_N + 4.5	3.6	0.4	0.40	0.25	0.15	1.78
REL20	20 - 39.9	10 - 200.0	d_N + 6.2	4.8	0.6	0.40	0.25	0.20	2.62
REL30	40 - 119.9	20 - 400.0	d_N + 9.4	7.1	0.8	0.50	0.30	0.20	3.53
REL40	120 - 399.9	35 - 650.0	d_N + 12.2	9.5	0.8	0.60	0.35	0.25	5.33
REL50	400 - 649.9	125 - 999.9	d_N + 15.9	12.2	0.8	0.70	0.50	0.30	7.00
REL60	650 - 999.9	400 - 999.9	d_N + 19.0	15.0	0.8	1.00	0.70	0.60	8.40
REL6X	1,000 - 2,600		d_N + 19.0	15.0	0.8	1.00	0.70	0.60	8.40

* At pressures **> 40 MPa** use diameter tolerance H8/f8 (bore/rod) in the area behind seal or consult your local Trelleborg Sealing Solutions marketing company for alternative material or profiles.
Slydring® / Wear Rings are not applicable at very small radial clearances please consult the Slydring® catalog.
For minimum diameter installation in closed grooves see Table 7 page 39.

ORDERING EXAMPLE

Turcon® VL Seal® complete with O-Ring, standard application:

Series:	REL40 from Table 62
Rod diameter:	d_N = 250.0 mm
TSS Part No.:	REL402500 from Table 63

Select the material from Table 61. The corresponding code numbers are appended to the TSS Part No. Together these form the TSS Article Number. The TSS Article Number for all intermediate sizes can be determined by following the example.

TSS Article No. **REL4 0 2500 - M12 N**

- Series No.
- Type (Standard)***
- Rod Diameter x 10**
- Quality Index (Standard)
- Material Code (Seal Ring)
- Material Code (O-Ring)

** For diameters $d_N \geq 1{,}000.0$ mm multiply only by factor 1.
Example: REL6X for diameter d_N = 1,200.0 mm
TSS Article No.: REL6**X1200** - M12N

*** Use suffix "N" for seals with radial notches, for diameter $d_N < 1{,}000$ mm. (Radial notches for diameter $d_N \geq 1{,}000$ mm a special part number is required).

Table 63: Installation Dimensions / TSS Part No.

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
6.0	**10.5**	**3.6**	**REL100060**	**7.10 x 1.80**
8.0	**12.5**	**3.6**	**REL100080**	**9.25 x 1.78**
9.0	13.5	3.6	REL100090	10.60 x 1.80
10.0	**14.5**	**3.6**	**REL100100**	**11.20 x 1.80**
12.0	**16.5**	**3.6**	**REL100120**	**13.20 x 1.80**
12.7	17.2	3.6	REL100127	14.00 x 1.78
14.0	**18.5**	**3.6**	**REL100140**	**15.60 x 1.78**
15.0	19.5	3.6	REL100150	17.17 x 1.78
16.0	**20.5**	**3.6**	**REL100160**	**17.17 x 1.78**
18.0	**22.5**	**3.6**	**REL100180**	**19.00 x 1.80**
19.0	25.2	4.8	REL200190	20.29 x 2.62
20.0	**24.5**	**3.6**	**REL100200**	**21.95 x 1.78**
20.0	**26.2**	**4.8**	**REL200200**	**21.89 x 2.62**
22.0	**26.5**	**3.6**	**REL100220**	**23.52 x 1.78**
22.0	**28.2**	**4.8**	**REL200220**	**23.47 x 2.62**
24.0	28.5	3.6	REL100240	25.12 x 1.78
25.0	**29.5**	**3.6**	**REL100250**	**26.70 x 1.78**
25.0	**31.2**	**4.8**	**REL200250**	**26.64 x 2.62**
25.4	29.9	3.6	REL100254	26.70 x 1.78
25.4	31.6	4.8	REL200254	26.64 x 2.62
26.0	30.5	3.6	REL100260	28.30 x 1.78
26.0	32.2	4.8	REL200260	28.24 x 2.62
28.0	**32.5**	**3.6**	**REL100280**	**29.87 x 1.78**
28.0	**34.2**	**4.8**	**REL200280**	**29.82 x 2.62**
30.0	34.5	3.6	REL100300	31.47 x 1.78
30.0	36.2	4.8	REL200300	31.42 x 2.62
32.0	**36.5**	**3.6**	**REL100320**	**33.05 x 1.78**
32.0	**38.2**	**4.8**	**REL200320**	**34.59 x 2.62**
35.0	39.5	3.6	REL100350	37.82 x 1.78
35.0	41.2	4.8	REL200350	36.17 x 2.62
36.0	**40.5**	**3.6**	**REL100360**	**37.82 x 1.78**
36.0	**42.2**	**4.8**	**REL200360**	**37.77 x 2.62**
37.0	41.5	3.6	REL100370	37.82 x 1.78
37.0	43.2	4.8	REL200370	39.34 x 2.62
38.0	44.2	4.8	REL200380	39.34 x 2.62
38.0	47.4	7.1	REL300380	40.87 x 3.53
40.0	**46.2**	**4.8**	**REL200400**	**42.52 x 2.62**
40.0	**49.4**	**7.1**	**REL300400**	**44.04 x 3.53**
42.0	48.2	4.8	REL200420	44.12 x 2.62
42.0	51.4	7.1	REL300420	44.04 x 3.53
43.0	49.2	4.8	REL200430	44.12 x 2.62
45.0	**51.2**	**4.8**	**REL200450**	**47.29 x 2.62**
45.0	**54.4**	**7.1**	**REL300450**	**47.22 x 3.53**
48.0	54.2	4.8	REL200480	50.47 x 2.62
48.0	57.4	7.1	REL300480	50.39 x 3.53
50.0	**56.2**	**4.8**	**REL200500**	**52.07 x 2.62**
50.0	**59.4**	**7.1**	**REL300500**	**53.57 x 3.53**
50.8	57.0	4.8	REL200508	52.07 x 2.62
50.8	60.2	7.1	REL300508	53.57 x 3.53
52.0	58.2	4.8	REL200520	53.64 x 2.62
52.0	61.4	7.1	REL300520	56.74 x 3.53
54.0	63.4	7.1	REL300540	56.74 x 3.53
55.0	61.2	4.8	REL200550	56.82 x 2.62
55.0	64.4	7.1	REL300550	59.92 x 3.53
56.0	**62.2**	**4.8**	**REL200560**	**58.42 x 2.62**
56.0	**65.4**	**7.1**	**REL300560**	**59.92 x 3.53**
56.0	**68.2**	**9.5**	**REL400560**	**59.69 x 5.33**
60.0	66.2	4.8	REL200600	61.60 x 2.62
60.0	69.4	7.1	REL300600	63.09 x 3.53
63.0	**69.2**	**4.8**	**REL200630**	**64.77 x 2.62**
63.0	**72.4**	**7.1**	**REL300630**	**66.27 x 3.53**
65.0	71.2	4.8	REL200650	66.34 x 2.62
65.0	74.4	7.1	REL300650	69.44 x 3.53
70.0	**76.2**	**4.8**	**REL200700**	**71.12 x 2.62**
70.0	**79.4**	**7.1**	**REL300700**	**72.62 x 3.53**
70.0	**82.2**	**9.5**	**REL400700**	**75.57 x 5.33**
72.0	78.2	4.8	REL200720	75.87 x 2.62
75.0	81.2	4.8	REL200750	77.00 x 2.62
75.0	84.4	7.1	REL300750	78.97 x 3.53
76.2	85.6	7.1	REL300762	78.97 x 3.53
80.0	**86.2**	**4.8**	**REL200800**	**82.22 x 2.62**
80.0	**89.4**	**7.1**	**REL300800**	**82.14 x 3.53**
80.0	**92.2**	**9.5**	**REL400800**	**85.09 x 5.33**
85.0	91.2	4.8	REL200850	88.57 x 2.62
85.0	94.4	7.1	REL300850	88.49 x 3.53
85.0	97.2	9.5	REL400850	88.27 x 5.33
90.0	**96.2**	**4.8**	**REL200900**	**94.92 x 2.62**
90.0	**99.4**	**7.1**	**REL300900**	**94.84 x 3.53**
90.0	**102.2**	**9.5**	**REL400900**	**94.62 x 5.33**
95.0	101.2	4.8	REL200950	97.00 x 2.62

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
95.0	104.4	7.1	REL300950	98.02 x 3.53
100.0	**106.2**	**4.8**	**REL201000**	**101.27 x 2.62**
100.0	**109.4**	**7.1**	**REL301000**	**104.37 x 3.53**
100.0	**112.2**	**9.5**	**REL401000**	**104.14 x 5.33**
101.6	111.0	7.1	REL301016	104.37 x 3.53
105.0	114.4	7.1	REL301050	107.54 x 3.53
105.0	117.2	9.5	REL401050	110.49 x 5.33
110.0	**116.2**	**4.8**	**REL201100**	**113.97 x 2.62**
110.0	**119.4**	**7.1**	**REL301100**	**113.89 x 3.53**
110.0	**122.2**	**9.5**	**REL401100**	**113.67 x 5.33**
115.0	124.4	7.1	REL301150	117.07 x 3.53
120.0	129.4	7.1	REL301200	123.42 x 3.53
120.0	132.2	9.5	REL401200	123.19 x 5.33
125.0	**134.4**	**7.1**	**REL301250**	**129.77 x 3.53**
125.0	**137.2**	**9.5**	**REL401250**	**129.54 x 5.33**
127.0	136.4	7.1	REL301270	129.77 x 3.53
130.0	139.4	7.1	REL301300	132.94 x 3.53
130.0	142.2	9.5	REL401300	132.72 x 5.33
135.0	141.2	4.8	REL201350	139.37 x 2.62
135.0	144.4	7.1	REL301350	139.29 x 3.53
140.0	**146.2**	**4.8**	**REL201400**	**145.72 x 2.62**
140.0	**149.4**	**7.1**	**REL301400**	**142.47 x 3.53**
140.0	**152.2**	**9.5**	**REL401400**	**145.42 x 5.33**
145.0	154.4	7.1	REL301450	148.82 x 3.53
145.0	157.2	9.5	REL401450	148.49 x 5.33
150.0	159.4	7.1	REL301500	158.34 x 3.53
150.0	162.2	9.5	REL401500	158.12 x 5.33
155.0	164.4	7.1	REL301550	158.34 x 3.53
160.0	**169.4**	**7.1**	**REL301600**	**164.69 x 3.53**
160.0	**172.2**	**9.5**	**REL401600**	**164.47 x 5.33**
165.0	174.4	7.1	REL301650	171.04 x 3.53
170.0	179.4	7.1	REL301700	177.39 x 3.53
170.0	182.2	9.5	REL401700	177.17 x 5.33
175.0	184.4	7.1	REL301750	177.39 x 3.53
180.0	**189.4**	**7.1**	**REL301800**	**183.74 x 3.53**
180.0	**192.2**	**9.5**	**REL401800**	**183.52 x 5.33**
185.0	194.4	7.1	REL301850	190.09 x 3.53
185.0	197.2	9.5	REL401850	189.87 x 5.33
190.0	199.4	7.1	REL301900	196.44 x 3.53
190.0	202.2	9.5	REL401900	196.22 x 5.33
195.0	204.4	7.1	REL301950	202.79 x 3.53

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
200.0	**209.4**	**7.1**	**REL302000**	**202.79 x 3.53**
200.0	**212.2**	**9.5**	**REL402000**	**202.57 x 5.33**
205.0	217.2	9.5	REL402050	208.92 x 5.33
210.0	222.2	9.5	REL402100	215.27 x 5.33
215.0	227.2	9.5	REL402150	221.62 x 5.33
220.0	**232.2**	**9.5**	**REL402200**	**227.97 x 5.33**
225.0	237.2	9.5	REL402250	227.97 x 5.33
230.0	239.4	7.1	REL302300	234.54 x 3.53
230.0	242.2	9.5	REL402300	234.32 x 5.33
235.0	247.2	9.5	REL402350	240.67 x 5.33
240.0	252.2	9.5	REL402400	247.02 x 5.33
245.0	257.2	9.5	REL402450	253.37 x 5.33
250.0	**262.2**	**9.5**	**REL402500**	**253.37 x 5.33**
270.0	282.2	9.5	REL402700	278.77 x 5.33
275.0	287.2	9.5	REL402750	278.77 x 5.33
280.0	**292.2**	**9.5**	**REL402800**	**291.47 x 5.33**
285.0	297.2	9.5	REL402850	291.47 x 5.33
290.0	302.2	9.5	REL402900	304.17 x 5.33
295.0	307.2	9.5	REL402950	304.17 x 5.33
300.0	312.2	9.5	REL403000	304.17 x 5.33
310.0	322.2	9.5	REL403100	313.00 x 5.33
320.0	**332.2**	**9.5**	**REL403200**	**329.57 x 5.33**
330.0	342.2	9.5	REL403300	333.00 x 5.33
340.0	352.2	9.5	REL403400	354.97 x 5.33
350.0	362.2	9.5	REL403500	354.97 x 5.33
360.0	**372.2**	**9.5**	**REL403600**	**365.00 x 5.30**
370.0	382.2	9.5	REL403700	380.37 x 5.33
380.0	392.2	9.5	REL403800	383.00 x 5.33
390.0	402.2	9.5	REL403900	405.26 x 5.33
400.0	412.2	9.5	REL404000	405.26 x 5.33
400.0	415.9	12.2	REL504000	405.26 x 7.00
410.0	422.2	9.5	REL404100	413.00 x 5.33
420.0	432.2	9.5	REL404200	430.66 x 5.33
420.0	435.9	12.2	REL504200	430.66 x 7.00
430.0	442.2	9.5	REL404300	433.00 x 5.33
440.0	452.2	9.5	REL404400	456.06 x 5.33
450.0	462.2	9.5	REL404500	456.06 x 5.33
450.0	465.9	12.2	REL504500	456.06 x 7.00
460.0	472.2	9.5	REL404600	481.38 x 5.33
470.0	482.2	9.5	REL404700	481.38 x 5.33
480.0	492.2	9.5	REL404800	483.00 x 5.33

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
480.0	495.9	12.2	REL504800	494.16 x 7.00
490.0	502.2	9.5	REL404900	506.78 x 5.33
500.0	512.2	9.5	REL405000	506.78 x 5.33
500.0	515.9	12.2	REL505000	506.86 x 7.00
510.0	522.2	9.5	REL405100	532.18 x 5.33
520.0	532.2	9.5	REL405200	532.18 x 5.33
520.0	535.9	12.2	REL505200	532.26 x 7.00
530.0	542.2	9.5	REL405300	533.00 x 5.33
540.0	552.2	9.5	REL405400	557.58 x 5.33
550.0	562.2	9.5	REL405500	557.58 x 5.33
550.0	565.9	12.2	REL505500	557.66 x 7.00
560.0	572.2	9.5	REL405600	582.68 x 5.33
570.0	582.2	9.5	REL405700	582.68 x 5.33
580.0	592.2	9.5	REL405800	582.68 x 5.33
580.0	595.9	12.2	REL505800	608.08 x 7.00
590.0	602.2	9.5	REL405900	608.08 x 5.33
600.0	612.2	9.5	REL406000	608.08 x 5.33
600.0	615.9	12.2	REL506000	608.08 x 7.00
610.0	622.2	9.5	REL406100	633.48 x 5.33
620.0	632.2	9.5	REL406200	633.48 x 5.33
620.0	635.9	12.2	REL506200	633.48 x 7.00
630.0	642.2	9.5	REL406300	633.48 x 5.33
640.0	652.2	9.5	REL406400	658.88 x 5.33
650.0	665.9	12.2	REL506500	658.88 x 7.00
650.0	669.0	15.0	REL606500	654.00 x 8.40
660.0	675.9	12.2	REL506600	664.00 x 7.00
660.0	679.0	15.0	REL606600	664.00 x 8.40
680.0	695.9	12.2	REL506800	684.00 x 7.00
680.0	699.0	15.0	REL606800	684.00 x 8.40
700.0	715.9	12.2	REL507000	704.00 x 7.00
700.0	719.0	15.0	REL607000	704.00 x 8.40
710.0	725.9	12.2	REL507100	714.00 x 7.00
710.0	729.0	15.0	REL607100	714.00 x 8.40
730.0	745.9	12.2	REL507300	734.00 x 7.00
730.0	749.0	15.0	REL607300	734.00 x 8.40
760.0	775.9	12.2	REL507600	764.00 x 7.00
760.0	779.0	15.0	REL607600	764.00 x 8.40
780.0	795.9	12.2	REL507800	784.00 x 7.00
780.0	799.0	15.0	REL607800	784.00 x 8.40
790.0	805.9	12.2	REL507900	794.00 x 7.00
790.0	809.0	15.0	REL607900	794.00 x 8.40
800.0	815.9	12.2	REL508000	804.00 x 7.00
800.0	819.0	15.0	REL608000	804.00 x 8.40
810.0	825.9	12.2	REL508100	814.00 x 7.00
810.0	829.0	15.0	REL608100	814.00 x 8.40
820.0	835.9	12.2	REL508200	824.00 x 7.00
820.0	839.0	15.0	REL608200	824.00 x 8.40
830.0	845.9	12.2	REL508300	834.00 x 7.00
830.0	849.0	15.0	REL608300	834.00 x 8.40
850.0	865.9	12.2	REL508500	854.00 x 7.00
850.0	869.0	15.0	REL608500	854.00 x 8.40
870.0	885.9	12.2	REL508700	874.00 x 7.00
870.0	889.0	15.0	REL608700	874.00 x 8.40
880.0	895.9	12.2	REL508800	884.00 x 7.00
880.0	899.0	15.0	REL608800	884.00 x 8.40
890.0	905.9	12.2	REL508900	894.00 x 7.00
890.0	909.0	15.0	REL608900	894.00 x 8.40
930.0	945.9	12.2	REL509300	934.00 x 7.00
930.0	949.0	15.0	REL609300	934.00 x 8.40
1,000.0	1,019.0	15.0	REL6X1000	1,004.00 x 8.40
1,050.0	1,069.0	15.0	REL6X1050	1,054.00 x 8.40
1,100.0	1,119.0	15.0	REL6X1100	1,104.00 x 8.40
1,200.0	1,219.0	15.0	REL6X1200	1,204.00 x 8.40
1,500.0	1,519.0	15.0	REL6X1500	1,504.00 x 8.40
1,600.0	1,619.0	15.0	REL6X1600	1,604.00 x 8.40
2,000.0	2,019.0	15.0	REL6X2000	2,004.00 x 8.40
2,600.0	2,619.0	15.0	REL6X2600	2,604.00 x 8.40

The rod diameters in **bold** type are in accordance with the recommendations of ISO 3320.

Other dimensions and all intermediate sizes up to 2,600 mm diameter, including imperial (inch) sizes converted to mm, can be supplied.

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Turcon® Glyd Ring®

Double-acting

Rubber-energized plastic-faced seal

Material:
Turcon®, Zurcon® and Elastomer

■ Turcon® Glyd Ring®

■ Description

Turcon® Glyd Ring® is a very effective and reliable low friction seal. It is particularly suitable as a rod seal in both high and low pressure systems.

The double-acting Glyd Ring® is a combination of a Turcon® based slipper seal and an energizing O-Ring. It has an interference fit which together with the squeeze of the O-Ring ensures a good sealing effect even at low pressure. At higher system pressures, the O-Ring is energized by the fluid, pushing Glyd Ring® against the sealing face with increased force.

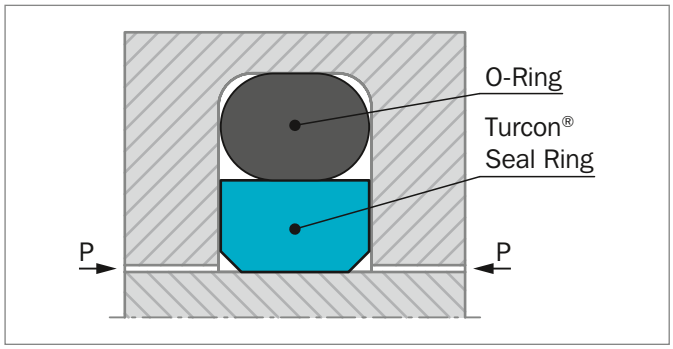


Figure 83: Turcon® Glyd Ring®

The geometry of Glyd Ring® ensures good static sealing and allows the lubricating hydrodynamic fluid film to be built under the seal in linear applications.

ADVANTAGES

- No stick-slip effect when starting for smooth operation
- Minimum static and dynamic friction for a minimum energy loss and operating temperature
- Suitable for non lubricating fluids depending on seal material for optimum design flexibility
- High wear resistance ensures long service life
- Fits standard Stepseal® groove dimensions as well as ISO 7425-2 seal housing
- No adhesive effect to the mating surface during long period of inactivity or storage
- Suitable for most hydraulic fluids in relation with most modern hardware materials and surface finish depending on material selected.
- Suitable for environmentally friendly hydraulic fluids
- Available for all rod diameters up to 2,600 mm

APPLICATIONS EXAMPLES

Over several decades Glyd Ring® has been successfully implemented in a large variety applications as double acting Rod seals in hydraulic components such as:

- Injection molding machines
- Machine tools
- Presses
- Handling machinery
- Valve stems
- Valves for hydraulic & pneumatic circuits.
- Servo equipment
- Hydraulic motors
- Brake booster
- Jacks

OPERATING CONDITIONS

Glyd Ring® is recommended for linear (with a length of stroke at least twice the groove width) and helical movements.

Pressure:	Up to 60 MPa
Speed:	Up to 15 m/s
Frequency:	Up to 5 Hz.
Temperature:	-45 °C to +200 °C depending on O-Ring material
Media:	Mineral oil-based hydraulic fluids, flame retardant hydraulic fluids, environmentally friendly hydraulic fluids (bio-oils), phosphate ester, water, air and others, depending on the seal and O-Ring material compatibility, see Table 64.
Clearance:	The maximum permissible radial clearance S_{max} is shown in Table 65, as a function of the operating pressure and functional diameter.

IMPORTANT NOTE

The above data are maximum values and cannot be used at the same time, e.g. the maximum operating speed depends on material type, pressure, temperature and gap value. Temperature range also depends on media.

NOTCHES

To assure that a rapid energizing of the seal takes place at sudden changes of pressure and direction of motion, the seal can be delivered with radial notches on both sides.

Ordering of Glyd Ring® with notches see page 203.

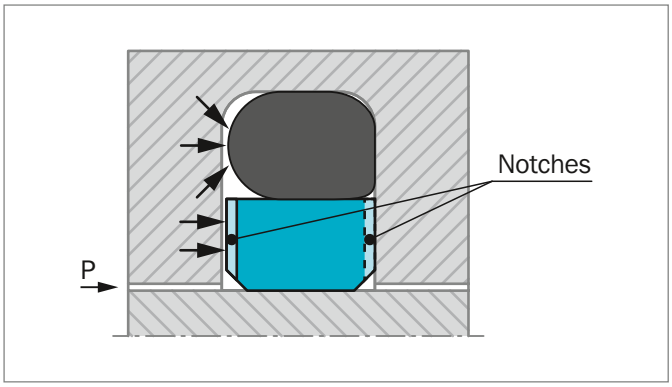


Figure 84: Turcon® Glyd Ring® with notches

INSTALLATION INSTRUCTIONS

Glyd Ring® is installed according to information on page 37 and page 38

Closed groove installation applies same dimensions as for Turcon® Stepseal® 2K in Table 6 page 38.

RECOMMENDED MATERIALS

The following material combinations have proven effective for hydraulic applications:

Turcon® Glyd Ring® in Turcon® M12
All round material for light to heavy hydraulic applications with linear or helical movements in mineral oils, flame retardant hydraulic fluids, phosphate ester, bio-oils or fluids having low lubricating properties:

O-Ring:	NBR 70 Shore A	N
	FKM 70 Shore A	V
Set code:	M12N or M12V	

Turcon® Glyd Ring® in Turcon® T46
For media to heavy applications with linear movements in mineral oils and other media with good lubrication:

O-Ring:	NBR 70 Shore A	N
	FKM 70 Shore A	V
Set code:	T46N or T46V	

For specific applications, all Turcon® materials are available. Other material combinations are listed in Table 64.

Table 64: Turcon® and Zurcon® Materials for Glyd Ring®

Material, Applications, Properties	Code	O-Ring Material Shore A	Code	O-Ring Operating Temp.* °C	Mating Surface Material	MPa max. Dyna-mic
Turcon® M12 First material choice for seals in linear motion Overall improved properties For new constructions and updating For all commonly applied hydraulic fluids including fluids with low lubrication performance Lowest friction and best sliding properties Lowest wear on seals Improved absorption of abrasive contaminanants Low wear or abrasion of counter surface BAM tested Mineral fiber and Additives filled Color: Dark gray	M12	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Steel plated (rod) Cast iron Stainless steel Titanium	50
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
Turcon® T05 For lubricating fluids Also for gas service Very low friction Very good sliding and sealing properties Color: Turquoise	T05	NBR 70	N	-30 to +100	Steel Steel, hardened Steel chrome plated (rod)	20
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
Turcon® T08 For lubricating fluids and linear motion Very high compressive strength and good extrusion resistance Hard counter surfaces is recommended Bronze filled Color: Light to dark brown which may have variations in shading	T08	NBR 70	N	-30 to +100	Steel, hardened Steel chrome plated (rod) Cast iron	60
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
Turcon® T10 For hydraulic and pneumatic For lubricating and non-lubricating fluids High extrusion resistance Good chemical resistance Not for electrically conducting fluids BAM tested. Carbon, graphite filled Color: Black	T10	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Stainless steel	40
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
		EPDM 70	E**	-45 to +145		
Turcon® T29 For all lubricating and non-lubricating fluids Good extrusion resistance Surface texture is not suitable for gas sealing Not for electrically conducting fluids Carbon fiber filled Color: Gray	T29	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Cast iron Stainless steel	30
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
		EPDM 70	E**	-45 to +145		

Table continues on next page

Material, Applications, Properties	Code	O-Ring Material Shore A	Code	O-Ring Operating Temp.* °C	Mating Surface Material	MPa max. Dyna-mic
Turcon® T40 For all lubricating and non-lubricating fluids Water hydraulics Surface texture not suitable for gas sealing Carbon fiber filled Color: Gray	T40	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Cast iron Stainless steel Aluminum	25
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
		EPDM 70	E**	-45 to +145		
Turcon® T46 For lubricated hydraulics in linear motion High compressive strength High extrusion resistance Very good sliding and wear properties BAM tested Bronze filled Color: Light to dark brown, which may have variations in shading	T46	NBR 70	N	-30 to +100	Steel hardened Steel chrome plated (rod) Cast iron	50
		NBR 70 Low temp	T	-45 to +80		
		FKM 70	V	-10 to +200		
Zurcon® Z53*** For mineral oil based fluids Very high abrasion and extrusion resistance For counter surface with rougher surface finish Limited chemical resistance. Max. working termperature 110 °C Cast polyurethane Color: Yellow to light-brown	Z53	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Cast iron Ceramic coating Stainless steel	60
		NBR 70 Low temp.	T	-45 to +80		
Zurcon® Z80 For lubricating and non-lubricating fluids Water based fluids, air and gases Dry air pneumatics High abrasion and extrusion resistance For service in abrasive conditions and media with particles Good chemical resistance Limited temperature capability (-60 to +80 °C) UHMWPE (Ultra High Molecular Weight Polyethylene) Color: White to off-white	Z80	NBR 70	N	-30 to (+100)	Steel Steel hardened Steel, chrome plated (rod) Stainless steel Aluminum Ceramic coating	35
		NBR 70 Low temp.	T	-45 to +80		
		EPDM 70	E**	-45 to (+145)		

* The O-Ring Operation Temperature is only valid in mineral hydraulic oil (except EPDM).

** Material not suitable for mineral oils.

*** Max. diameter 2,200 mm

BAM: Tested by “Bundesanstalt Materialprüfung, Germany“

Highlighted materials are recommended.

■ Installation Recommendation

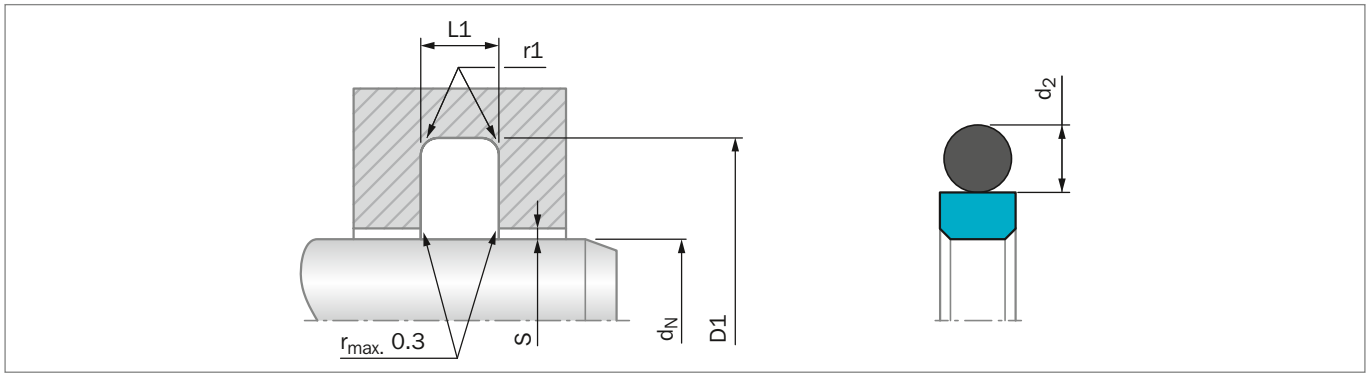


Figure 85: Installation Drawing

Table 65: Installation Dimensions – Standard Recommendations

Rod Diameter d_N f8/h9			Groove Diameter*	Groove Width	Radius	Radial Clearance S_{max}**			O-Ring Cross Section
Series No. RG 43 Standard Application	**Series No. RG 45 Light Application**	**Series No. RG 41 Heavy Duty Application**	**D1** H9	**L1** +0.2	$r_{1\ max}$	**10 MPa**	**20 MPa**	**40 MPa**	d_2
3 - 7.9	8 - 18.9	-	d_N + 4.9	2.2	0.4	0.30	0.20	0.15	1.78
8 - 18.9	19 - 37.9	3 - 7.9	d_N + 7.3	3.2	0.6	0.40	0.25	0.15	2.62
19 - 37.9	38 - 199.9	8 - 18.9	d_N + 10.7	4.2	1.0	0.40	0.25	0.20	3.53
38 - 199.9	200 - 255.9	19 - 37.9	d_N + 15.1	6.3	1.3	0.50	0.30	0.20	5.33
200 - 255.9	256 - 649.9	38 - 199.9	d_N + 20.5	8.1	1.8	0.60	0.35	0.25	7.00
256 - 649.9	650 - 999.9	200 - 255.9	d_N + 24.0	8.1	1.8	0.60	0.35	0.25	7.00
650 - 999.9	1,000 - 1,200	256 - 649.9	d_N + 27.3	9.5	2.5	0.70	0.50	0.30	8.40
1,000 - 2,600***	-	650 - 999.9	d_N + 38.0	13.8	3.0	1.00	0.70	0.60	12.00

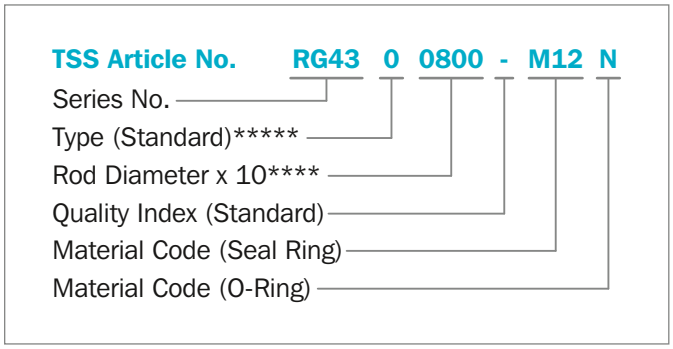
* Installation with groove dimensions to ISO 7425-2 is also recommendable.
** At pressures **> 40 MPa** use diameter tolerance H8/f8 (bore/rod) in the area of the seal or consult your local Trelleborg Sealing Solutions marketing company for alternative material or profiles.
Slydring® / Wear Rings are not applicable at very small radial clearances please consult the Slydring® catalog.
*** O-Rings with 12 mm cross section are delivered as special profile ring.

ORDERING EXAMPLE

Turcon® Glyd Ring® complete with O-Ring, standard application:

Series:	RG43 from Table 65
Rod diameter:	d_N = 80.0 mm
TSS Part No.:	RG4300800 from Table 66

Select the material from Table 64. The corresponding code numbers are appended to the TSS Part No. Together these form the TSS Article Number. The TSS Article Number for all intermediate sizes can be determined by following the example.



**** For diameters $d_N \geq 1{,}000.0$ mm multiply only by factor 1.
Example: RG43 for diamater d_N = 1,200.0 mm
TSS Article No.: RG43**X1200** - M12N

***** Ordering Glyd Ring® with radial notches, please use suffix "N" in the fifth character, for diameter d_N < 1,000 mm (Radial notches for diameter dN ≥ 1,000 mm a special part number is required).

Table 66: Installation Dimensions / TSS Part No.

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
3.0	7.9	2.2	RG4300030	4.47 x 1.78
4.0	**8.9**	**2.2**	**RG4300040**	**5.60 x 1.80**
5.0	**9.9**	**2.2**	**RG4300050**	**6.70 x 1.80**
6.0	**10.9**	**2.2**	**RG4300060**	**7.65 x 1.78**
7.0	11.9	2.2	RG4300070	8.75 x 1.80
8.0	**12.9**	**2.2**	**RG4500080**	**9.50 x 1.80**
8.0	**15.3**	**3.2**	**RG4300080**	**10.77 x 2.62**
10.0	**14.9**	**2.2**	**RG4500100**	**11.80 x 1.80**
10.0	**17.3**	**3.2**	**RG4300100**	**12.37 x 2.62**
12.0	**16.9**	**2.2**	**RG4500120**	**13.20 x 1.80**
12.0	**19.3**	**3.2**	**RG4300120**	**14.50 x 2.65**
14.0	**18.9**	**2.2**	**RG4500140**	**15.60 x 1.78**
14.0	**21.3**	**3.2**	**RG4300140**	**17.12 x 2.62**
15.0	19.9	2.2	RG4500150	17.17 x 1.78
15.0	22.3	3.2	RG4300150	18.00 x 2.65
16.0	**20.9**	**2.2**	**RG4500160**	**17.17 x 1.78**
16.0	**23.3**	**3.2**	**RG4300160**	**18.72 x 2.62**
18.0	**22.9**	**2.2**	**RG4500180**	**19.00 x 1.80**
18.0	**25.3**	**3.2**	**RG4300180**	**20.29 x 2.62**
19.0	29.7	4.2	RG4300190	23.40 x 3.53
20.0	**27.3**	**3.2**	**RG4500200**	**21.89 x 2.62**
20.0	**30.7**	**4.2**	**RG4300200**	**23.40 x 3.53**
22.0	**29.3**	**3.2**	**RG4500220**	**25.07 x 2.62**
22.0	**32.7**	**4.2**	**RG4300220**	**26.58 x 3.53**
24.0	31.3	3.2	RG4500240	26.64 x 2.62
25.0	**32.3**	**3.2**	**RG4500250**	**28.24 x 2.62**
25.0	**35.7**	**4.2**	**RG4300250**	**29.75 x 3.53**
25.4	32.7	3.2	RG4500254	28.24 x 2.62
25.4	36.1	4.2	RG4300254	29.75 x 3.53
26.0	33.3	3.2	RG4500260	28.24 x 2.62
26.0	36.7	4.2	RG4300260	29.75 x 3.53
27.0	34.3	3.2	RG4500270	29.82 x 2.62
28.0	**35.3**	**3.2**	**RG4500280**	**29.82 x 2.62**
28.0	**38.7**	**4.2**	**RG4300280**	**32.92 x 3.53**
28.575	35.9	3.2	RG4500286	31.42 x 2.62
29.0	36.3	3.2	RG4500290	31.42 x 2.62
30.0	37.3	3.2	RG4500300	32.99 x 2.62
30.0	40.7	4.2	RG4300300	34.52 x 3.53
32.0	**39.3**	**3.2**	**RG4500320**	**34.59 x 2.62**
32.0	**42.7**	**4.2**	**RG4300320**	**36.09 x 3.53**

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
35.0	42.3	3.2	RG4500350	37.77 x 2.62
35.0	45.7	4.2	RG4300350	37.69 x 3.53
36.0	**43.3**	**3.2**	**RG4500360**	**39.34 x 2.62**
36.0	**46.7**	**4.2**	**RG4300360**	**40.87 x 3.53**
38.0	48.7	4.2	RG4500380	40.87 x 3.53
38.0	53.1	6.3	RG4300380	43.82 x 5.33
39.0	49.7	4.2	RG4500390	44.04 x 3.53
40.0	**50.7**	**4.2**	**RG4500400**	**44.04 x 3.53**
40.0	**55.1**	**6.3**	**RG4300400**	**43.82 x 5.33**
42.0	52.7	4.2	RG4500420	47.22 x 3.53
42.0	57.1	6.3	RG4300420	46.99 x 5.33
44.0	54.7	4.2	RG4500440	47.22 x 3.53
44.45	59.5	6.3	RG4300444	50.17 x 5.33
45.0	**55.7**	**4.2**	**RG4500450**	**50.39 x 3.53**
45.0	**60.1**	**6.3**	**RG4300450**	**50.17 x 5.33**
48.0	58.7	4.2	RG4500480	51.50 x 3.55
48.0	63.1	6.3	RG4300480	53.34 x 5.33
50.0	**60.7**	**4.2**	**RG4500500**	**53.57 x 3.53**
50.0	**65.1**	**6.3**	**RG4300500**	**56.52 x 5.33**
50.8	61.5	4.2	RG4500508	53.57 x 3.53
50.8	65.9	6.3	RG4300508	56.52 x 5.33
52.0	62.7	4.2	RG4500520	56.74 x 3.53
52.0	67.1	6.3	RG4300520	56.52 x 5.33
54.0	69.1	6.3	RG4300540	59.69 x 5.33
55.0	65.7	4.2	RG4500550	59.92 x 3.53
55.0	70.1	6.3	RG4300550	59.69 x 5.33
56.0	**66.7**	**4.2**	**RG4500560**	**59.92 x 3.53**
56.0	**71.1**	**6.3**	**RG4300560**	**62.87 x 5.33**
58.0	73.1	6.3	RG4300580	62.87 x 5.33
60.0	70.7	4.2	RG4500600	63.09 x 3.53
60.0	75.1	6.3	RG4300600	66.04 x 5.33
63.0	**73.7**	**4.2**	**RG4500630**	**66.27 x 3.53**
63.0	**78.1**	**6.3**	**RG4300630**	**69.22 x 5.33**
65.0	80.1	6.3	RG4300650	69.22 x 5.33
67.0	77.7	4.2	RG4500670	72.62 x 3.53
70.0	**80.7**	**4.2**	**RG4500700**	**75.79 x 3.53**
70.0	**85.1**	**6.3**	**RG4300700**	**75.57 x 5.33**
72.0	82.7	4.2	RG4500720	75.79 x 3.53
75.0	85.7	4.2	RG4500750	78.97 x 3.53
75.0	90.1	6.3	RG4300750	81.92 x 5.33

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
80.0	**90.7**	**4.2**	**RG4500800**	**85.32 x 3.53**
80.0	**95.1**	**6.3**	**RG4300800**	**85.09 x 5.33**
83.0	93.7	4.2	RG4500830	88.49 x 3.53
85.0	100.1	6.3	RG4300850	91.44 x 5.33
86.0	96.7	4.2	RG4500860	91.67 x 3.53
90.0	**100.7**	**4.2**	**RG4500900**	**94.84 x 3.53**
90.0	**105.1**	**6.3**	**RG4300900**	**94.62 x 5.33**
92.0	102.7	4.2	RG4500920	98.02 x 3.53
95.0	105.7	4.2	RG4500950	101.19 x 3.53
95.0	110.1	6.3	RG4300950	100.97 x 5.33
100.0	**110.7**	**4.2**	**RG4501000**	**104.37 x 3.53**
100.0	**115.1**	**6.3**	**RG4301000**	**107.32 x 5.33**
101.6	112.3	4.2	RG4501016	107.54 x 3.53
101.6	116.7	6.3	RG4301016	107.32 x 5.33
104.7	119.8	6.3	RG4301047	110.49 x 5.33
105.0	115.7	4.2	RG4501050	110.72 x 3.53
105.0	120.1	6.3	RG4301050	110.49 x 5.33
110.0	**120.7**	**4.2**	**RG4501100**	**113.89 x 3.53**
110.0	**125.1**	**6.3**	**RG4301100**	**116.84 x 5.33**
110.0	**130.5**	**8.1**	**RG4101100**	**116.84 x 7.00**
112.0	127.1	6.3	RG4301120	116.84 x 5.33
115.0	125.7	4.2	RG4501150	120.24 x 3.53
115.0	130.1	6.3	RG4301150	120.02 x 5.33
118.0	133.1	6.3	RG4301180	123.19 x 5.33
120.0	130.7	4.2	RG4501200	123.42 x 3.53
120.0	135.1	6.3	RG4301200	126.37 x 5.33
125.0	**135.7**	**4.2**	**RG4501250**	**129.77 x 3.53**
125.0	**140.1**	**6.3**	**RG4301250**	**129.54 x 5.33**
129.0	139.7	4.2	RG4501290	132.94 x 3.53
130.0	140.7	4.2	RG4501300	136.12 x 3.53
130.0	145.1	6.3	RG4301300	135.89 x 5.33
135.0	145.7	4.2	RG4501350	139.29 x 3.53
135.0	150.1	6.3	RG4301350	142.24 x 5.33
140.0	**150.7**	**4.2**	**RG4501400**	**145.64 x 3.53**
140.0	**155.1**	**6.3**	**RG4301400**	**145.42 x 5.33**
145.0	155.7	4.2	RG4501450	148.82 x 3.53
145.0	160.1	6.3	RG4301450	151.77 x 5.33
150.0	165.1	6.3	RG4301500	158.12 x 5.33
160.0	**175.1**	**6.3**	**RG4301600**	**164.47 x 5.33**
160.0	**180.5**	**8.1**	**RG4101600**	**170.82 x 7.00**

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
165.0	180.1	6.3	RG4301650	170.82 x 5.33
170.0	180.7	4.2	RG4501700	177.39 x 3.53
170.0	185.1	6.3	RG4301700	177.17 x 5.33
175.0	190.1	6.3	RG4301750	183.52 x 5.33
180.0	**190.7**	**4.2**	**RG4501800**	**183.74 x 3.53**
180.0	**195.1**	**6.3**	**RG4301800**	**183.52 x 5.33**
180.0	**200.5**	**8.1**	**RG4101800**	**189.87 x 7.00**
190.0	200.7	4.2	RG4501900	196.44 x 3.53
190.0	205.1	6.3	RG4301900	196.22 x 5.33
200.0	**215.1**	**6.3**	**RG4502000**	**208.92 x 5.33**
200.0	**220.5**	**8.1**	**RG4302000**	**208.90 x 7.00**
205.0	220.1	6.3	RG4502050	208.92 x 5.33
210.0	225.1	6.3	RG4502100	215.27 x 5.33
220.0	**235.1**	**6.3**	**RG4502200**	**227.97 x 5.33**
220.0	**240.5**	**8.1**	**RG4302200**	**227.97 x 7.00**
230.0	245.1	6.3	RG4502300	234.32 x 5.33
230.0	250.5	8.1	RG4302300	240.67 x 7.00
240.0	255.1	6.3	RG4502400	247.02 x 5.33
240.0	260.5	8.1	RG4302400	253.37 x 7.00
250.0	**270.5**	**8.1**	**RG4302500**	**266.07 x 7.00**
260.0	284.0	8.1	RG4302600	266.07 x 7.00
270.0	294.0	8.1	RG4302700	278.77 x 7.00
270.0	290.5	8.1	RG4502700	278.77 x 7.00
275.0	299.0	8.1	RG4302750	291.47 x 7.00
280.0	**304.0**	**8.1**	**RG4302800**	**291.47 x 7.00**
280.0	**300.5**	**8.1**	**RG4502800**	**291.47 x 7.00**
290.0	314.0	8.1	RG4302900	304.17 x 7.00
290.0	310.5	8.1	RG4502900	304.17 x 7.00
300.0	324.0	8.1	RG4303000	316.87 x 7.00
310.0	334.0	8.1	RG4303100	316.87 x 7.00
310.0	330.5	8.1	RG4503100	316.87 x 7.00
320.0	**344.0**	**8.1**	**RG4303200**	**329.57 x 7.00**
330.0	354.0	8.1	RG4303300	342.27 x 7.00
340.0	364.0	8.1	RG4303400	354.97 x 7.00
350.0	374.0	8.1	RG4303500	367.67 x 7.00
350.0	370.5	8.1	RG4503500	354.97 x 7.00
360.0	**384.0**	**8.1**	**RG4303600**	**367.67 x 7.00**
370.0	394.0	8.1	RG4303700	380.37 x 7.00
370.0	390.5	8.1	RG4503700	380.37 x 7.00
380.0	404.0	8.1	RG4303800	393.07 x 7.00

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
390.0	414.0	8.1	RG4303900	405.26 x 7.00
400.0	424.0	8.1	RG4304000	417.96 x 7.00
400.0	420.5	8.1	RG4504000	405.26 x 7.00
410.0	434.0	8.1	RG4304100	417.96 x 7.00
420.0	444.0	8.1	RG4304200	430.66 x 7.00
430.0	454.0	8.1	RG4304300	443.36 x 7.00
440.0	464.0	8.1	RG4304400	456.06 x 7.00
450.0	474.0	8.1	RG4304500	468.76 x 7.00
460.0	484.0	8.1	RG4304600	468.76 x 7.00
470.0	494.0	8.1	RG4304700	481.38 x 7.00
480.0	504.0	8.1	RG4304800	494.16 x 7.00
490.0	514.0	8.1	RG4304900	506.86 x 7.00
500.0	524.0	8.1	RG4305000	506.86 x 7.00
510.0	534.0	8.1	RG4305100	532.26 x 7.00
520.0	544.0	8.1	RG4305200	532.26 x 7.00
530.0	554.0	8.1	RG4305300	557.66 x 7.00
540.0	564.0	8.1	RG4305400	557.66 x 7.00
550.0	574.0	8.1	RG4305500	557.66 x 7.00
560.0	584.0	8.1	RG4305600	582.68 x 7.00
570.0	594.0	8.1	RG4305700	582.68 x 7.00
570.0	594.0	8.1	RG4305700	582.68 x 7.00
580.0	604.0	8.1	RG4305800	608.08 x 7.00
590.0	614.0	8.1	RG4305900	608.08 x 7.00
600.0	624.0	8.1	RG4306000	608.08 x 7.00
610.0	634.0	8.1	RG4306100	633.48 x 7.00
620.0	644.0	8.1	RG4306200	633.48 x 7.00
630.0	654.0	8.1	RG4306300	658.88 x 7.00
640.0	664.0	8.1	RG4306400	658.88 x 7.00
650.0	677.3	9.5	RG4306500	663.00 x 8.40
660.0	687.3	9.5	RG4306600	673.00 x 8.40
670.0	697.3	9.5	RG4306700	683.00 x 8.40
680.0	707.3	9.5	RG4306800	693.00 x 8.40
688.0	715.3	9.5	RG4306880	701.00 x 8.40
690.0	717.3	9.5	RG4306900	703.00 x 8.40
700.0	724.0	8.1	RG4507000	712.00 x 7.00
710.0	737.3	9.5	RG4307100	723.00 x 8.40
740.0	767.3	9.5	RG4307400	753.00 x 8.40
760.0	784.0	8.1	RG4507600	772.00 x 7.00
770.0	797.3	9.5	RG4307700	783.00 x 8.40
800.0	827.3	9.5	RG4308000	813.00 x 8.40

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
850.0	877.3	9.5	RG4308500	863.00 x 8.40
870.0	897.3	9.5	RG4308700	883.00 x 8.40
900.0	927.3	9.5	RG4309000	913.00 x 8.40
910.0	937.3	9.5	RG4309100	923.00 x 8.40
950.0	977.3	9.5	RG4309500	963.00 x 8.40
960.0	987.3	9.5	RG4309600	973.00 x 8.40
1,000.0	1,027.3	9.5	RG45X1000	1,013.00 x 8.40
1,000.0	1,038.0	13.8	RG43X1000	1,016.00 x 12.00
1,050.0	1,077.3	9.5	RG45X1050	1,063.00 x 8.40
1,050.0	1,088.0	13.8	RG43X1050	1,066.00 x 12.00
1,100.0	1,138.0	13.8	RG43X1100	1,116.00 x 12.00
1,160.0	1,187.3	9.5	RG45X1160	1,173.00 x 8.40
1,200.0	1,227.3	9.5	RG45X1200	1,213.00 x 8.40
1,200.0	1,238.0	13.8	RG43X1200	1,216.00 x 12.00
1,300.0	1,327.3	9.5	RG45X1300	1,313.00 x 8.40
1,300.0	1,338.0	13.8	RG43X1300	1,316.00 x 12.00
1,500.0	1,527.3	9.5	RG45X1500	1,513.00 x 8.40
1,500.0	1,538.0	13.8	RG43X1500	1,516.00 x 12.00
1,600.0	1,638.0	13.8	RG43X1600	1,616.00 x 12.00
2,000.0	2,038.0	13.8	RG43X2000	2,016.00 x 12.00
2,600.0	2,638.0	13.8	RG43X2600	2,616.00 x 12.00

The rod diameters in **bold** type are in accordance with the recommendations of ISO 3320.

Other dimensions and all intermediate sizes up to 2,600 mm diameter, including imperial (inch) sizes converted to mm, can be supplied.

All O-Rings with 12 mm cross section are delivered as special profile ring.

Turcon® Glyd Ring® T

Double-acting

Rubber-energized plastic-faced seal

Material:
Turcon®, Zurcon® and Elastometer

Turcon® Glyd Ring® T*

■ Description

Turcon® Glyd Ring® T is a further technical development of Turcon® Glyd Ring® . It is fully interchangeable with earlier Glyd Ring® seals in all new applications.

The main benefits of the patented seal are provided by the innovative functional principle of the trapezoidal profile cross section. The sides of the seal profile tapers towards the seal surface. The profile can thus retain the robust and compact form typical of piston seals without losing any of the flexibility required to achieve a pressure-related maximum compression - Figure 86.

The edge angle of Glyd Ring® T permits an additional degree of freedom and enables a slight tilting movement of the seal. The maximum compression is thus always shifted towards the area of the seal edge directly exposed to the pressure.

On the low-pressure edge of the seal, Glyd Ring® T exhibits only zones with neutral strains without compressive or shearing loads, thus effectively reducing the danger of gap extrusion. The resulting benefits are as follows below.

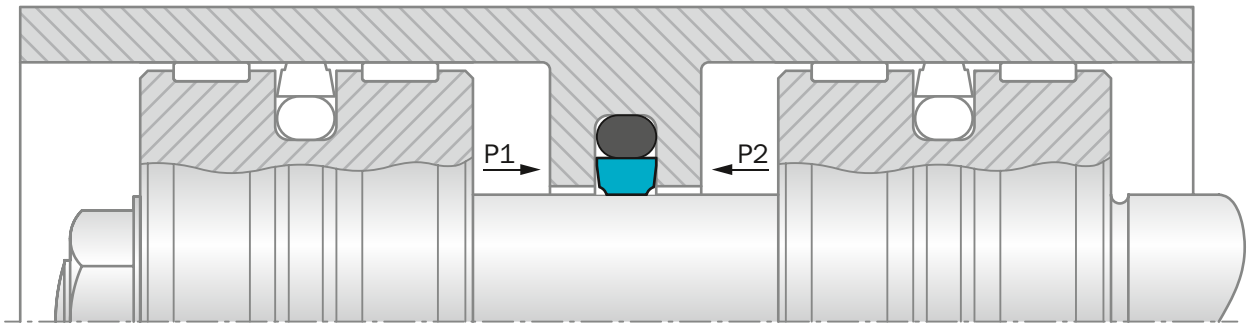


Figure 86: Turcon® Glyd Ring® T

ADVANTAGES

- Very good static sealing performance
- Increased clearance possible (approximately +50%), depending on the operating conditions
- Low friction, no stick-slip effect
- Simple groove design
- Fits standard Stepseal® groove dimensions as well as ISO 7425-2 seal housing
- Adaptable to the operating conditions due to a wide range of materials (Turcon® , Zurcon®)
- Suitable for environmentally friendly hydraulic fluids
- Available for all rod diameters up to 2,600 mm

APPLICATION EXAMPLES

Glyd Ring® T is the recommended sealing element for double acting inside sealing seal for hydraulic components such as:

- Injection molding machines
- Machine tools
- Presses
- Handling machinery
- Servo equipment
- Agriculture
- Valves.

It is particularly recommended for heavy duty and large diameter applications.

* Patent-No.:

DE	41 40833 C3
EP	0 582 593
Japan	2 799 367
USA	5,433,452

OPERATING CONDITIONS

Pressure:	Up to 60 MPa
Speed:	Up to 15 m/s
Frequency:	Up to 5 Hz.
Temperature:	-45 °C to +200 °C depending on O-Ring material
Media:	Mineral oil-based hydraulic fluids, flame retardant hydraulic fluids, environmentally friendly hydraulic fluids (bio-oils), phosphate ester, water, air and others, depending on the seal and O-Ring material compatibility see Table 68.
Clearance:	The maximum permissible radial clearance S_{max} is shown in Table 69 as a function of the operating pressure and functional diameter.

IMPORTANT NOTE

The above data are maximum values and cannot be used at the same time, e.g. the maximum operating speed depends on material type, pressure, temperature and gap value. Temperature range also depends on media.

SERIES

Different cross section sizes are recommended as a function of the seal diameters.

Table 67 shows the relationship between the series number according to the seal diameter range and the different application class sizes.

Standard application: General applications without exceptional operating conditions.

Light application: Applications with demands for reduced friction or for smaller grooves.

Heavy-duty application: For exceptional operating loads such as high pressures, pressure peaks, etc.

Table 67: Available Range

Series No.	Rod Diameter d_N f8/h9
RT00	2.0 - 130.0
RT01	4.0 - 240.0
RT02	6.0 - 450.0
RT03	12.0 - 650.0
RT04	38.0 - 650.0
RT08	200.0 - 999.9
RT05	256.0 - 999.9
RT05X	1,000.0 - 1,200.0
RT06	650.0 - 999.9
RT06X	1,000.0 - 2,600.0

For the recommended Standard Application range see Table 69.

INSTALLATION INSTRUCTIONS

Glyd Ring® T is installed according to information on page 37 to 38.

Closed groove installation applies same dimensions as for Turcon® Stepseal® 2K in Table 6 page 38.

RECOMMENDED MATERIALS

The following material combinations have proven effective for hydraulic applications:

Turcon® Glyd Ring® T in Turcon® M12
All round material for light to heavy hydraulic applications with linear or helical movements in mineral oils, flame retardant hydraulic fluids, phosphate ester, bio-oils or fluids having low lubricating properties:

O-Ring: NBR 70 Shore A N
FKM 70 Shore A V

Set code: M12N or M12V

Turcon® Glyd Ring® T in Turcon® T46
For medium to heavy applications with linear movements in mineral oils and other media with good lubrication:

O-Ring: NBR 70 Shore A N
FKM 70 Shore A V

Set code: T46N or T46V

For specific applications, all Turcon® materials are available. Other material combinations are listed in Table 68.

Table 68: Turcon® and Zurcon® Materials for Glyd Ring® T

Material, Applications, Properties	Code	O-Ring Material Shore A	Code	O-Ring Operating Temp.* °C	Mating Surface Material	MPa max. Dynamic
Turcon® M12 First material choice for seals in linear motion Overall improved properties For new constructions and updating For all commonly applied hydraulic fluids including fluids with low lubrication performance Lowest friction and best sliding properties Lowest wear on seals Improved absorption of abrasive contaminants Low wear or abrasion of counter surface BAM tested Mineral fiber an Additives filled Color: Dark gray	M12	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Steel plated (rod) Cast iron Stainless steel Titanium	40
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
Turcon® T40 For lubricating and non-lubricating fluids **Water hydraulics** Surface texture is not suitable for gas sealing Carbon fiber filled Color: Gray	T40	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Cast iron Stainless steel Aluminum	25
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
		EPDM 70	E**	-45 to +145		
Turcon® T46 For lubricated hydraulics in linear motion High compressive strength High extrusion resistance Very good sliding and wear properties BAM tested Bronze filled Color: Light to dark brown, which may have variations in shading.	T46	NBR 70	N	-30 to +100	Steel hardened Steel chrome plated (rod) Cast iron	50
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
Zurcon® Z53*** For mineral oil based fluids **Very high abrasion and extrusion resistance** For counter surface with rougher surface finish Hard to install Limited chemical resistance Max. working temperature +110 °C Cast polyurethane Color: Yellow to light-brown	Z53	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Cast iron Stainless steel Ceramic coating	60
		NBR 70 Low temp.	T	-45 to +80		

Table continues on next page

Material, Applications, Properties	Code	O-Ring Material Shore A	Code	O-Ring Operating Temp.* °C	Mating Surface Material	MPa max. Dyna-mic
Zurcon® Z80 For lubricating and non-lubricating fluids Water based fluids, air and gases Dry air pneumatics High abrasion and extrusion resistance For service in abrasive conditions and media with particles Good chemical resistance Limited temperature capability (-60 to +80 °C) UHMWPE (Ultra High Molecular Weight Polyethylene) Color: White to off-white	Z80	NBR 70	N	-30 to (+100)	Steel Steel hardened Steel chrome plated (rod) Stainless steel Aluminum Ceramic coating	35
		NBR 70 Low temp.	T	-45 to +80		
		EPDM 70	E**	-45 to (+145)		

* The O-Ring Operation Temperature is only valid in mineral hydraulic oil (except EPDM).

** Material not suitable for mineral oils.

*** Max. diameter 2,200 mm

BAM: Tested by “Bundesanstalt Materialprüfung, Germany”

Highlighted materials are recommended.

■ Installation Recommendation

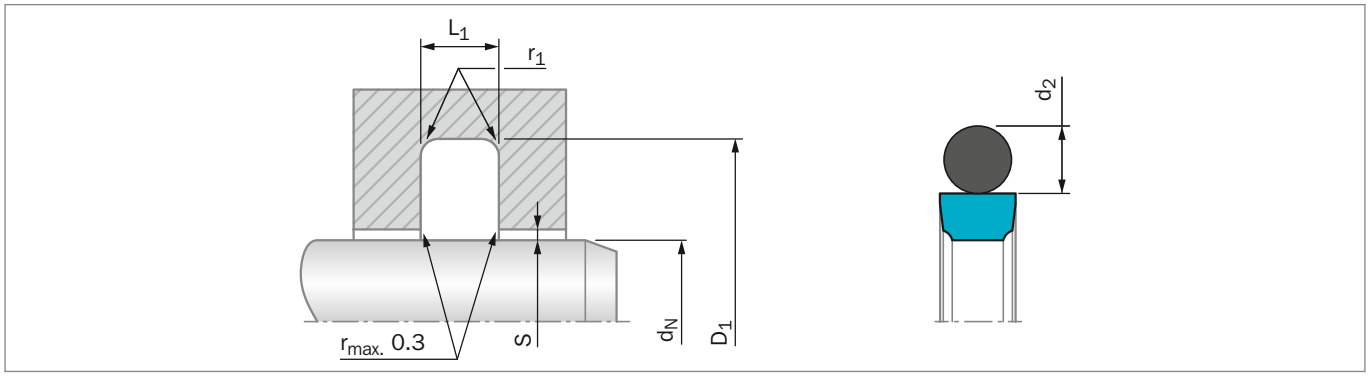


Figure 87: Installation Drawing

Table 69: Installation Dimensions – Standard Recommendations

Series No.	Rod Diameter d_N f8/h9			Groove Diameter*	Groove Width	Radius	Radial Clearance S_{max}**			O-Ring Cross Section
	Standard Application	Light Application	Heavy Duty Application	D_1 H9	L_1 +0.2	r_1 max	10 MPa	20 MPa	40 MPa	d_2
RT00	3 - 7.9	8 - 18.9	-	d_N + 4.9	2.2	0.4	0.40	0.30	0.20	1.78
RT01	8 - 18.9	19 - 37.9	-	d_N + 7.3	3.2	0.6	0.60	0.50	0.30	2.62
RT02	19 - 37.9	38 - 199.9	8 - 18.9	d_N + 10.7	4.2	1.0	0.70	0.50	0.30	3.53
RT03	38 - 199.9	200 - 255.9	19 - 37.9	d_N + 15.1	6.3	1.3	0.80	0.60	0.40	5.33
RT04	200 - 255.9	256 - 649.9	38 - 199.9	d_N + 20.5	8.1	1.8	0.80	0.60	0.40	7.00
RT08	256 - 649.9	650 - 999.9	200 - 255.9	d_N + 24.0	8.1	1.8	0.90	0.70	0.50	7.00
RT05	650 - 999.9	-	256 - 649.9	d_N + 27.3	9.5	2.5	1.00	0.80	0.60	8.40
RT05X	-	1,000 - 1,200	-	d_N + 27.3	9.5	2.5	1.00	0.80	0.60	8.40
RT06***	-	-	650 - 999.9	d_N + 38.0	13.8	3.0	1.20	0.90	0.70	12.00
RT06X***	1,000 - 2,600	-	-	d_N + 38.0	13.8	3.0	1.20	0.90	0.70	12.00

* Installation with groove dimensions to ISO 7425-2 is also recommendable.
** At pressures > **40 MPa** use diameter tolerance H8/f8 (bore/rod) in the area of the seal or consult your local Trelleborg Sealing Solutions marketing company for alternative material or profiles.
Slydring® / Wear Rings are not applicable at very small radial clearances please consult the Slydring® section in this catalog.
*** O-Rings with 12 mm cross section are delivered as special profile ring.

ORDERING EXAMPLE

Turcon® Glyd Ring® T complete with O-Ring, standard application:

Series:	RT03 from Table 69
Rod diameter:	dN = 80.0 mm
TSS Part No.:	RT0300800 from Table 70

Select the material from Table 68. The corresponding code numbers are appended to the TSS Part No. Together these form the TSS Article Number. The TSS Article Number for all intermediate sizes can be determined by following the example.

TSS Article No. **RT03 0 0800 - M12 N**

- RT03 — Series No.
- 0 — Type (Standard)
- 0800 — Rod Diameter x 10****
- M12 — Quality Index (Standard)
- N — Material Code (Seal Ring)
- Material Code (O-Ring)

**** For diameters $d_N \geq 1{,}000.0$ mm multiply only by factor 1.
Example: RT06 for diameter d_N = 1,200.0 mm
TSS Article No.: RT06**X1200** - M12N

Table 70: Installation Dimensions / TSS Part No.

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
3.0	7.9	2.2	RT0000030	4.80 x 1.80
4.0	**8.9**	**2.2**	**RT0000040**	**5.60 x 1.80**
5.0	**9.9**	**2.2**	**RT0000050**	**6.70 x 1.80**
6.0	**10.9**	**2.2**	**RT0000060**	**7.65 x 1.78**
7.0	11.9	2.2	RT0000070	8.75 x 1.80
8.0	**12.9**	**2.2**	**RT0000080**	**9.50 x 1.80**
8.0	**15.3**	**3.2**	**RT0100080**	**10.77 x 2.62**
10.0	**14.9**	**2.2**	**RT0000100**	**11.80 x 1.80**
10.0	**17.3**	**3.2**	**RT0100100**	**12.37 x 2.62**
12.0	**16.9**	**2.2**	**RT0000120**	**14.00 x 1.78**
12.0	**19.3**	**3.2**	**RT0100120**	**14.50 x 2.65**
14.0	**18.9**	**2.2**	**RT0000140**	**15.60 x 1.78**
14.0	**21.3**	**3.2**	**RT0100140**	**17.12 x 2.62**
15.0	19.9	2.2	RT0000150	17.17 x 1.78
15.0	22.3	3.2	RT0100150	18.00 x 2.65
16.0	**20.9**	**2.2**	**RT0000160**	**17.17 x 1.78**
16.0	**23.3**	**3.2**	**RT0100160**	**18.72 x 2.62**
18.0	**22.9**	**2.2**	**RT0000180**	**20.35 x 1.78**
18.0	**25.3**	**3.2**	**RT0100180**	**20.29 x 2.62**
19.0	29.7	4.2	RT0200190	23.40 x 3.53
20.0	**27.3**	**3.2**	**RT0100200**	**21.89 x 2.62**
20.0	**30.7**	**4.2**	**RT0200200**	**25.00 x 3.53**
22.0	**29.3**	**3.2**	**RT0100220**	**25.07 x 2.62**
22.0	**32.7**	**4.2**	**RT0200220**	**26.58 x 3.53**
24.0	31.3	3.2	RT0100240	26.64 x 2.62
25.0	**32.3**	**3.2**	**RT0100250**	**28.24 x 2.62**
25.0	**35.7**	**4.2**	**RT0200250**	**29.75 x 3.53**
25.4	32.7	3.2	RT0100254	28.24 x 2.62
25.4	36.1	4.2	RT0200254	29.75 x 3.53
26.0	33.3	3.2	RT0100260	28.24 x 2.62
26.0	36.7	4.2	RT0200260	29.75 x 3.53
27.0	34.3	3.2	RT0100270	29.82 x 2.62
28.0	**35.3**	**3.2**	**RT0100280**	**29.82 x 2.62**
28.0	**38.7**	**4.2**	**RT0200280**	**32.92 x 3.53**
28.575	35.875	3.2	RT0100286	31.42 x 2.62
29.0	36.3	3.2	RT0100290	31.42 x 2.62
30.0	37.3	3.2	RT0100300	32.99 x 2.62
30.0	40.7	4.2	RT0200300	34.52 x 3.53
32.0	**39.3**	**3.2**	**RT0100320**	**34.59 x 2.62**
32.0	**42.7**	**4.2**	**RT0200320**	**36.09 x 3.53**

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
35.0	42.3	3.2	RT0100350	37.77 x 2.62
35.0	45.7	4.2	RT0200350	37.69 x 3.53
36.0	**43.3**	**3.2**	**RT0100360**	**39.34 x 2.62**
36.0	**46.7**	**4.2**	**RT0200360**	**40.87 x 3.53**
38.0	48.7	4.2	RT0200380	40.87 x 3.53
38.0	53.1	6.3	RT0300380	43.82 x 5.33
39.0	49.7	4.2	RT0200390	44.04 x 3.53
40.0	**50.7**	**4.2**	**RT0200400**	**44.04 x 3.53**
40.0	**55.1**	**6.3**	**RT0300400**	**43.82 x 5.33**
42.0	52.7	4.2	RT0200420	47.22 x 3.53
42.0	57.1	6.3	RT0300420	46.99 x 5.33
44.0	54.7	4.2	RT0200440	47.22 x 3.53
44.4	59.5	6.3	RT0300444	50.17 x 5.33
45.0	**55.7**	**4.2**	**RT0200450**	**50.39 x 3.53**
45.0	**60.1**	**6.3**	**RT0300450**	**50.17 x 5.33**
48.0	58.7	4.2	RT0200480	53.57 x 3.53
48.0	63.1	6.3	RT0300480	53.34 x 5.33
50.0	**60.7**	**4.2**	**RT0200500**	**53.57 x 3.53**
50.0	**65.1**	**6.3**	**RT0300500**	**56.52 x 5.33**
50.8	61.5	4.2	RT0200508	53.57 x 3.53
50.8	65.9	6.3	RT0300508	56.52 x 5.33
52.0	62.7	4.2	RT0200520	56.74 x 3.53
52.0	67.1	6.3	RT0300520	56.52 x 5.33
54.0	69.1	6.3	RT0300540	59.69 x 5.33
55.0	65.7	4.2	RT0200550	59.92 x 3.53
55.0	70.1	6.3	RT0300550	59.69 x 5.33
56.0	**66.7**	**4.2**	**RT0200560**	**59.92 x 3.53**
56.0	**71.1**	**6.3**	**RT0300560**	**62.87 x 5.33**
58.0	73.1	6.3	RT0300580	62.87 x 5.33
60.0	70.7	4.2	RT0200600	63.09 x 3.53
60.0	75.1	6.3	RT0300600	66.04 x 5.33
63.0	**73.7**	**4.2**	**RT0200630**	**66.27 x 3.53**
63.0	**78.1**	**6.3**	**RT0300630**	**69.22 x 5.33**
65.0	80.1	6.3	RT0300650	69.22 x 5.33
67.0	77.7	4.2	RT0200670	72.62 x 3.53
70.0	**80.7**	**4.2**	**RT0200700**	**75.79 x 3.53**
70.0	**85.1**	**6.3**	**RT0300700**	**75.57 x 5.33**
72.0	82.7	4.2	RT0200720	75.79 x 3.53
75.0	85.7	4.2	RT0200750	78.97 x 3.53
75.0	90.1	6.3	RT0300750	81.92 x 5.33

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
80.0	**90.7**	**4.2**	**RT0200800**	**85.32 x 3.53**
80.0	**95.1**	**6.3**	**RT0300800**	**85.09 x 5.33**
83.0	93.7	4.2	RT0200830	88.49 x 3.53
85.0	100.1	6.3	RT0300850	91.44 x 5.33
86.0	96.7	4.2	RT0200860	91.67 x 3.53
90.0	**100.7**	**4.2**	**RT0200900**	**94.84 x 3.53**
90.0	**105.1**	**6.3**	**RT0300900**	**94.62 x 5.33**
92.0	102.7	4.2	RT0200920	98.02 x 3.53
95.0	105.7	4.2	RT0200950	101.19 x 3.53
95.0	110.1	6.3	RT0300950	100.97 x 5.33
100.0	**110.7**	**4.2**	**RT0201000**	**104.37 x 3.53**
100.0	**115.1**	**6.3**	**RT0301000**	**107.32 x 5.33**
101.6	112.3	4.2	RT0201016	107.54 x 3.53
101.6	116.7	6.3	RT0301016	107.32 x 5.33
104.7	119.8	6.3	RT0301047	110.49 x 5.33
105.0	115.7	4.2	RT0201050	110.72 x 3.53
105.0	120.1	6.3	RT0301050	110.49 x 5.33
110.0	**120.7**	**4.2**	**RT0201100**	**113.89 x 3.53**
110.0	**125.1**	**6.3**	**RT0301100**	**116.84 x 5.33**
110.0	**130.5**	**8.1**	**RT0401100**	**120.02 x 7.00**
112.0	127.1	6.3	RT0301120	116.84 x 5.33
115.0	125.7	4.2	RT0201150	120.24 x 3.53
115.0	130.1	6.3	RT0301150	120.02 x 5.33
118.0	133.1	6.3	RT0301180	123.19 x 5.33
120.0	130.7	4.2	RT0201200	123.42 x 3.53
120.0	135.1	6.3	RT0301200	126.37 x 5.33
125.0	**135.7**	**4.2**	**RT0201250**	**129.77 x 3.53**
125.0	**140.1**	**6.3**	**RT0301250**	**129.54 x 5.33**
129.0	139.7	4.2	RT0201290	132.94 x 3.53
130.0	140.7	4.2	RT0201300	136.12 x 3.53
130.0	145.1	6.3	RT0301300	135.89 x 5.33
135.0	145.7	4.2	RT0201350	139.29 x 3.53
135.0	150.1	6.3	RT0301350	142.24 x 5.33
140.0	**150.7**	**4.2**	**RT0201400**	**145.64 x 3.53**
140.0	**155.1**	**6.3**	**RT0301400**	**145.42 x 5.33**
145.0	155.7	4.2	RT0201450	148.82 x 3.53
145.0	160.1	6.3	RT0301450	151.77 x 5.33
150.0	165.1	6.3	RT0301500	158.12 x 5.33
160.0	**175.1**	**6.3**	**RT0301600**	**164.47 x 5.33**
160.0	**180.5**	**8.1**	**RT0401600**	**170.82 x 7.00**

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
165.0	180.1	6.3	RT0301650	170.82 x 5.33
170.0	180.7	4.2	RT0201700	177.39 x 3.53
170.0	185.1	6.3	RT0301700	177.17 x 5.33
175.0	190.1	6.3	RT0301750	183.52 x 5.33
180.0	**190.7**	**4.2**	**RT0201800**	**183.74 x 3.53**
180.0	**195.1**	**6.3**	**RT0301800**	**183.52 x 5.33**
180.0	**200.5**	**8.1**	**RT0401800**	**189.87 x 7.00**
190.0	200.7	4.2	RT0201900	196.44 x 3.53
190.0	205.1	6.3	RT0301900	196.22 x 5.33
200.0	**215.1**	**6.3**	**RT0302000**	**208.92 x 5.33**
200.0	**220.5**	**8.1**	**RT0402000**	**208.90 x 7.00**
205.0	220.1	6.3	RT0302050	208.92 x 5.33
210.0	225.1	6.3	RT0302100	215.27 x 5.33
220.0	235.1	6.3	RT0302200	227.97 x 5.33
220.0	**240.5**	**8.1**	**RT0402200**	**227.97 x 7.00**
230.0	245.1	6.3	RT0302300	234.32 x 5.33
230.0	250.5	8.1	RT0402300	240.67 x 7.00
240.0	255.1	6.3	RT0302400	247.02 x 5.33
240.0	260.5	8.1	RT0402400	253.37 x 7.00
250.0	**270.5**	**8.1**	**RT0402500**	**266.07 x 7.00**
260.0	284.0	8.1	RT0802600	266.07 x 7.00
270.0	290.5	8.1	RT0402700	278.77 x 7.00
270.0	294.0	8.1	RT0802700	278.77 x 7.00
275.0	299.0	8.1	RT0802750	291.47 x 7.00
280.0	**300.5**	**8.1**	**RT0402800**	**291.47 x 7.00**
280.0	**304.0**	**8.1**	**RT0802800**	**291.47 x 7.00**
290.0	310.5	8.1	RT0402900	304.17 x 7.00
290.0	314.0	8.1	RT0802900	304.17 x 7.00
300.0	324.0	8.1	RT0803000	316.87 x 7.00
310.0	330.5	8.1	RT0403100	316.87 x 7.00
310.0	334.0	8.1	RT0803100	316.87 x 7.00
320.0	**344.0**	**8.1**	**RT0803200**	**329.57 x 7.00**
330.0	354.0	8.1	RT0803300	342.27 x 7.00
340.0	364.0	8.1	RT0803400	354.97 x 7.00
350.0	370.5	8.1	RT0403500	354.97 x 7.00
350.0	374.0	8.1	RT0803500	367.67 x 7.00
360.0	**384.0**	**8.1**	**RT0803600**	**367.67 x 7.00**
370.0	390.5	8.1	RT0403700	380.37 x 7.00
370.0	394.0	8.1	RT0803700	380.37 x 7.00
380.0	404.0	8.1	RT0803800	393.07 x 7.00

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
390.0	414.0	8.1	RT0803900	405.26 x 7.00
400.0	420.5	8.1	RT0404000	405.26 x 7.00
400.0	424.0	8.1	RT0804000	417.96 x 7.00
410.0	434.0	8.1	RT0804100	417.96 x 7.00
420.0	444.0	8.1	RT0804200	430.66 x 7.00
430.0	454.0	8.1	RT0804300	443.36 x 7.00
440.0	464.0	8.1	RT0804400	456.06 x 7.00
450.0	474.0	8.1	RT0804500	468.76 x 7.00
460.0	484.0	8.1	RT0804600	468.76 x 7.00
470.0	494.0	8.1	RT0804700	481.38 x 7.00
480.0	504.0	8.1	RT0804800	494.16 x 7.00
490.0	514.0	8.1	RT0804900	506.86 x 7.00
500.0	524.0	8.1	RT0805000	506.86 x 7.00
510.0	534.0	8.1	RT0805100	532.26 x 7.00
520.0	544.0	8.1	RT0805200	532.26 x 7.00
530.0	554.0	8.1	RT0805300	557.66 x 7.00
540.0	564.0	8.1	RT0805400	557.66 x 7.00
550.0	574.0	8.1	RT0805500	557.66 x 7.00
560.0	584.0	8.1	RT0805600	582.68 x 7.00
570.0	594.0	8.1	RT0805700	582.68 x 7.00
580.0	604.0	8.1	RT0805800	608.08 x 7.00
590.0	614.0	8.1	RT0805900	608.08 x 7.00
600.0	624.0	8.1	RT0806000	608.08 x 7.00
610.0	634.0	8.1	RT0806100	633.48 x 7.00
620.0	644.0	8.1	RT0806200	633.48 x 7.00
630.0	654.0	8.1	RT0806300	658.88 x 7.00
640.0	664.0	8.1	RT0806400	658.88 x 7.00
650.0	677.3	9.5	RT0506500	663.00 x 8.40
660.0	687.3	9.5	RT0506600	673.00 x 8.40
670.0	697.3	9.5	RT0506700	683.00 x 8.40
680.0	707.3	9.5	RT0506800	693.00 x 8.40
688.0	715.3	9.5	RT0506880	701.00 x 8.40
690.0	717.3	9.5	RT0506900	703.00 x 8.40
700.0	724.0	8.1	RT0807000	721.00 x 7.00
710.0	737.3	9.5	RT0507100	723.00 x 8.40
740.0	767.3	9.5	RT0507400	753.00 x 8.40
760.0	784.0	8.1	RT0807600	772.00 x 7.00
770.0	797.3	9.5	RT0507700	783.00 x 8.40
800.0	827.3	9.5	RT0508000	813.00 x 8.40
850.0	877.3	9.5	RT0508500	863.00 x 8.40
870.0	897.3	9.5	RT0508700	883.00 x 8.40
900.0	927.3	9.5	RT0509000	913.00 x 8.40
910.0	937.3	9.5	RT0509100	923.00 x 8.40
950.0	977.3	9.5	RT0509500	963.00 x 8.40
960.0	987.3	9.5	RT0509600	973.00 x 8.40
1,000.0	1,027.3	9.5	RT05X1000	1,013.00 x 8.40
1,000.0	1,038.0	13.8	RT06X1000	1,016.00 x 12.00
1,050.0	1,077.3	9.5	RT05X1050	1,063.00 x 8.40
1,050.0	1,088.0	13.8	RT06X1050	1,066.00 x 12.00
1,100.0	1,138.0	13.8	RT06X1100	1,116.00 x 12.00
1,160.0	1,187.3	9.5	RT05X1160	1,173.00 x 8.40
1,200.0	1,227.3	9.5	RT05X1200	1,213.00 x 8.40
1,200.0	1,238.0	13.8	RT06X1200	1,216.00 x 12.00
1,300.0	1,338.0	13.8	RT06X1300	1,316.00 x 12.00
1,500.0	1,538.0	13.8	RT06X1500	1,516.00 x 12.00
1,600.0	1,638.0	13.8	RT06X1600	1,616.00 x 12.00
2,000.0	2,038.0	13.8	RT06X2000	2,016.00 x 12.00
2,600.0	2,638.0	13.8	RT06X2600	2,616.00 x 12.00

The rod diameters in **bold** type are in accordance with the recommendations of ISO 3320.

Other dimensions and all intermediate sizes up to 2,600 mm diameter, including imperial (inch) sizes converted to mm, can be supplied.

All O-Rings with 12 mm cross section are delivered as a special profile ring.

Turcon® Glyd Ring® Hz

Double-acting

Rubber-energized plastic-faced seal

Material:
Turcon®, Zurcon® and Elastomer

■ Turcon® Glyd Ring® Hz

■ Description

Glyd Ring® Hz is a symmetric single- and double-acting rod seal for applications with short-stroke high-frequency linear movements. It is designed to fit into ISO 7425-2 housing grooves.

Glyd Ring® Hz is wider than Turcon® Glyd Ring® giving a tighter fit in the housing groove and limiting its axial movement. It also prevents the seal from being damaged under short-stroke high-frequency movement. Furthermore it eliminates the risk of wear between O-Ring and seal.

Glyd Ring® Hz has notches on both sides to ensure system pressure can instantly activate the O-Ring under the seal despite the tighter fit and the fast alternation of pressure direction.

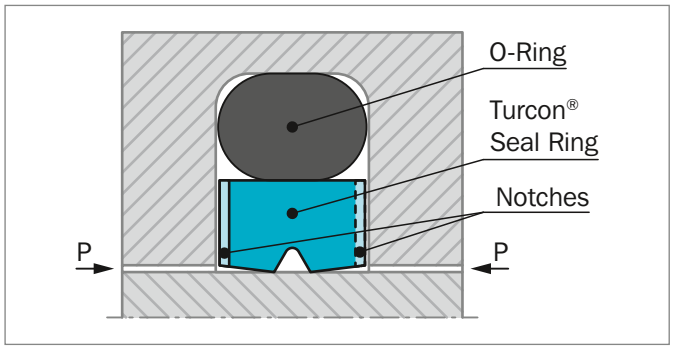


Figure 88: Turcon® Glyd Ring® Hz – short-stroke

The angled contact faces ensure that oil film is not scraped away from the surface but is transported into the groove in the middle of the contact area forming an oil reservoir for lubrication. Wear particles are also likely to be captured in this groove, thus preventing them from embedding in the surface where the highest contact force occurs.

DEFINITION

Short-stroke high-frequency movements are conditions, which in combination can cause problems in hydraulic systems:

Short-Stroke: ≤ 3 x G (Groove width).
Very short reciprocating movements can cause reduced service life due to insufficient lubrication film, giving an increasing temperature on a limited area. These factors increase wear on seal and hardware and wear particles will not be removed from the seal face.

High-Frequency: Reciprocating movement above 5 Hz.
With an increasing frequency the formation of lubrication under the contact face is reduced. High-frequency is most often occurring in connection with short-strokes. These two types of movements together accelerate the wear on hardware and seal.

ADVANTAGES

- Seal face gets lubricated in short-stroke high-frequency linear movements
- Low friction
- No stick-slip effect
- Single and double acting
- High wear resistance
- Installation grooves acc. to ISO 7425-2
- No adhesive effect to the mating surface during long period of inactivity or storage
- Available for all cylinder diameters up to 999.9 mm. (For diameter ≥ 1,000 mm special part number is required)

APPLICATIONS EXAMPLES

Glyd Ring® Hz has been successfully implemented in a large variety of applications as double acting rod seal for hydraulic components such as:

- Injection molding machines
- Machine tools
- Press brakes
- Handling machinery
- Servo equipment
- Pressure intensifiers
- Shock absorbers
- Wind power pitch cylinders

OPERATING CONDITIONS

Pressure:	Up to 30 MPa with mineral oil depending on seal material
Speed:	Up to 15 m/s with linear movements
Temperature:	-45 °C to +200 °C depending on Seal and O-Ring material
Media:	Mineral oil and other fluids with very high lubricity depending on temperature, seal and O-Ring material compatibility
Clearance:	The maximum permissible radial clearance S_{max} is shown in Table 72 as a function of the operating pressure and functional diameter.

IMPORTANT NOTE

The above data are maximum values and cannot be used at the same time, e.g. the maximum operating speed depends on material type, pressure, temperature and gap value. Temperature range also depends on media.

HARDWARE

Short-stroke high-frequency can cause heavy wear on hardware due to poor lubrication under the seal and the fact that wear products cannot be removed from the contact area. The hardest possible hardware material should be recommended, especially when system pressure is above 10 MPa.

INSTALLATION INSTRUCTIONS

Glyd Ring® Hz is installed according to information on page 37 and 38.

Closed groove installation applies the same limits for diameter d_N as for Turcon® Stepseal® 2K in Table 6 page 38.

Tandem seal installation of Glyd Ring® Hz cannot be recommended as the short-strokes create a risk of pressure build-up between the seals.

When used as rod seal we recommend two possibilities, either one Glyd Ring® Hz and one Turcon® Excluder® 2 with drain in between - Figure 89 - or one Glyd Ring® Hz and a single-acting Turcon® Excluder® 1 - Figure 90.

All elements should be in one of the recommended materials.

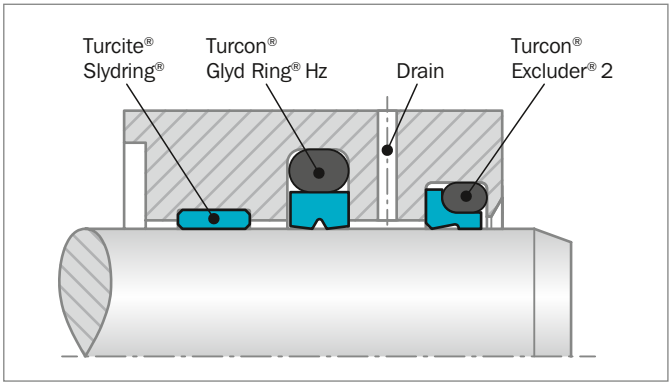


Figure 89: Glyd Ring® Hz with Turcon® Excluder® 2 and Turcite® Slydring®

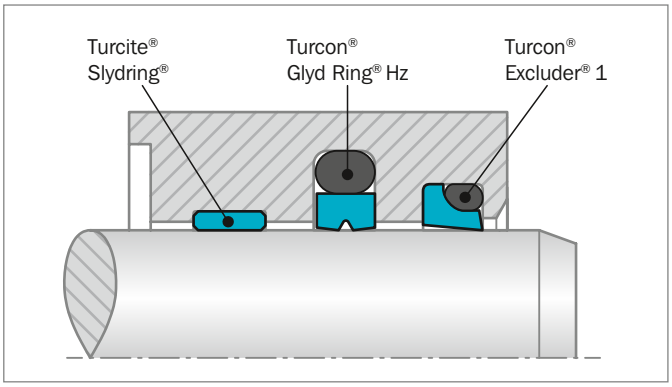


Figure 90: Glyd Ring® Hz with Turcon® Excluder® 1 and Turcite® Slydring®

RECOMMENDED MATERIALS

The following material combinations have proven effective for short-stroke and/or high-frequency applications:

Turcon® Glyd Ring® Hz in Turcon® M12
All round material for hydraulic applications with linear, short-stroke and /or high-frequency movements in mineral oils and fluids having high lubricating properties:

O-Ring:	NBR 70 Shore A	N
	FKM 70 Shore A	V
	depending on medium and temperature	
Set code:	M12N or M12V	

Turcon® Glyd Ring® Hz in Turcon® T49
For medium to heavy applications with linear, short-stroke and/or high-frequency movements in mineral oils:

O-Ring:	NBR 70 Shore A	N
	FKM 70 Shore A	V
	depending on media and temperature	

Set code: T49N or T49V

Turcon® Glyd Ring® Hz in Turcon® T40
For light to medium applications with linear, short-stroke and/or high-frequency movements in fluids with lower lubricating properties:

O-Ring:	NBR 70 Shore A	N
	FKM 70 Shore A	V
	EPDM 70 Shore A	E
	depending on media and temperature	

Set code: T40N, T40V or T40E

Zurcon® Glyd Ring® Hz in Zurcon® Z80
For light applications with linear, short-stroke and/or high-frequency movements in water based fluids, air and gases at reduced pressure and frequencies due to the temperature limitation of the material:

O-Ring:	NBR 70 Shore A	N
	EPDM 70 Shore A	E
	depending on media and temperature	

Set code: Z80N or Z80E

Table 71: Turcon® and Zurcon® Materials for Glyd Ring® Hz

Material, Applications, Properties	Code	O-Ring Material Shore A	Code	O-Ring Operating Temp.* °C	Mating Surface Material	MPa max. Dyna-mic
Turcon® M12 First material choice for seals in linear motion with high-frequency and short-strokes For new constructions and updating For commonly applied hydraulic fluids Lowest friction and best sliding properties Lowest wear on seals Improved absorption of abrasive contaminants Low wear or abrasion of counter surface BAM tested Mineral fiber and Additives filled Color: Dark gray	M12	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Steel plated (rod) Cast iron Stainless steel Titanium	30
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
Turcon® T40 For lubricating fluids and fluids with lower lubrication performance Water hydraulics at reduced pressure and frequency Surface texture is only suitable for gas sealing when lubricated with fluid Carbon fiber filled Color: Gray	T40	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Cast iron Stainless steel Aluminum	25
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
		EPDM-70	E**	-45 to +145		
Turcon® T49 For lubricated hydraulics in linear motion High compressive strength High extrusion resistance Very good sliding and wear properties Surface treated for very quick run-in BAM tested Bronze filled Color: Light to dark brown, which may have variations in shading.	T49	NBR 70	N	-30 to +100	Steel (tubes) Steel hardened Steel chrome plated (rod) Cast iron	30
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		

Table continues on next page

Material, Applications, Properties	Code	O-Ring Material Shore A	Code	O-Ring Operating Temp.* °C	Mating Surface Material	MPa max. Dyna-mic
Zurcon® Z80 For low frequencies due to the temperature limitation of the material For lubricating fluids and fluids with lower lubrication performance Water based fluids, air and gases at reduced pressure Dry air pneumatics High abrasion and extrusion resistance For service in abrasive conditions and media with particles Good chemical resistance Limited temperature capability (-60 to +80 °C) UHMWPE (Ultra High Molecular Weight Polyethylene) Color: White to off-white	Z80	NBR 70	N	-30 to (+100)	Steel Steel hardened Steel chrome plated (rod) Stainless steel Aluminum Ceramic coating	25
		NBR 70 Low temp.	T	-45 to +80		
		EPDM 70	E**	-45 to (+145)		

* The O-Ring Operation Temperature is only valid in mineral hydraulic oil (except EPDM).

** Material not suitable for mineral oils.

BAM: Tested by “Bundes-anstalt Materialprüfung, Germany”

Highlighted materials are recommended.

■ Installation Recommendation

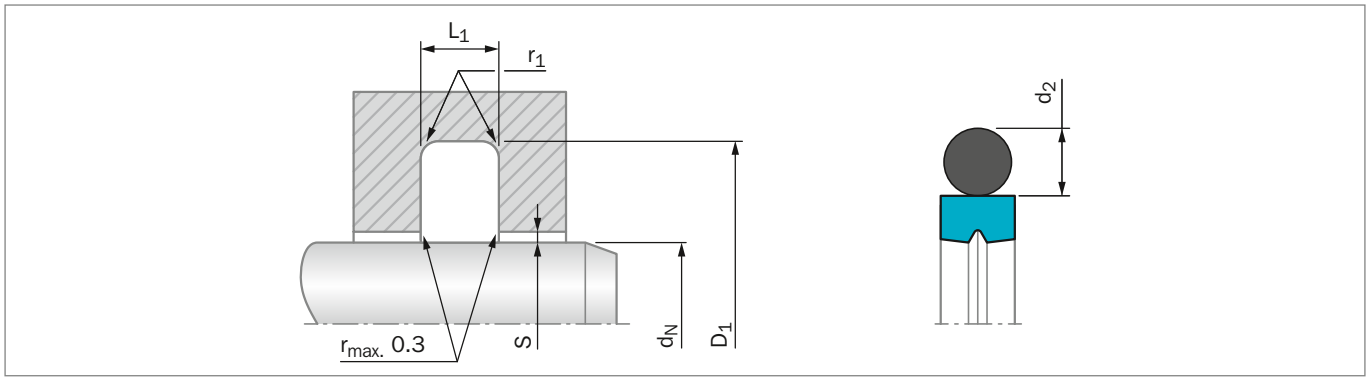


Figure 91: Installation Drawing

Table 72: Installation Dimensions – Standard Recommendations

Series No.	Rod Diameter d_N f8/h9		Groove Diameter	Groove Width	Radius	Radial Clearance S_{max}*			O-Ring Cross Section
	Standard Range	Available Range	D_1 H9	L_1 +0.2	r_1 max	10 MPa	20 MPa	30 MPa	d_2
RGS0	5 - 7.9	5 - 150.0	d_N + 5.0**	2.2	0.4	0.25	0.20	0.15	1.78
RGS1	8 - 18.9	8 - 260.0	d_N + 7.5	3.2	0.6	0.40	0.25	0.15	2.62
RGS2	19 - 37.9	19 - 480.0	d_N + 11.0	4.2	1.0	0.45	0.25	0.20	3.53
RGS3	38 - 199.9	19 - 750.0	d_N + 15.5	6.3	1.3	0.55	0.30	0.20	5.33
RGS4	200 - 255.9	38 - 750.0	d_N + 21.0	8.1	1.8	0.60	0.35	0.25	7.00
RGS8***	256 - 649.9	120 - 999.9	d_N + 24.5	8.1	1.8	0.60	0.35	0.25	7.00
RGS5***	650 - 999.9	256 - 999.9	d_N + 28.0	9.5	2.5	0.65	0.50	0.30	8.40

* At pressures > 30 MPa use diameter tolerance H8/f8 (bore/rod) in the area of the seal or consult your local Trelleborg Sealing Solutions marketing company for alternative material or profiles.
Slydring® / Wear Rings are not applicable at very small radial clearances please consult the Slydring® section in this catalog.
** Can also be used in Turcon® Glyd Ring® T groove d_N + 4.9 mm.
*** Grooves are not according to ISO 7425-2.

ORDERING EXAMPLE

Glyd Ring® Hz complete with O-Ring, Standard application:

Series:	RGS30 from Table 72
Rod diameter:	d_N = 80.0 mm
TSS Part No.:	RGS300800 from Table 73

Select the material from Table 71. The corresponding code numbers are appended to the TSS Part No. Together they form the TSS Article Number.
The TSS Article Number for all intermediate sizes can be determined by following the example:

TSS Article No. **RGS3 0 0800 - M12 N**

- RGS3 — Series No.
- 0 — Type (Standard)
- 0800 — Rod Diameter x 10****
- M12 — Quality Index (Standard)
- N — Material Code (Seal Ring)
- Material Code (O-Ring)

**** For diameters $d_N \geq$ 1,000 mm only with TSS Special Article Number.

IMPORTANT NOTE

Installation Dimensions: For rod sealing the groove diameters are **not** identical to diameters for Stepseal® 2K, Glyd Ring® T and Glyd Ring® PG43.

Table 73: Installation Dimensions / TSS Part No.

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
8.0	**13.0**	**2.2**	**RGS000080**	**9.50 x 1.80**
8.0	**15.5**	**3.2**	**RGS100080**	**10.77 x 2.62**
10.0	**15.0**	**2.2**	**RGS000100**	**11.80 x 1.80**
10.0	**17.5**	**3.2**	**RGS100100**	**12.37 x 2.62**
12.0	**17.0**	**2.2**	**RGS000120**	**14.00 x 1.78**
12.0	**19.5**	**3.2**	**RGS100120**	**14.50 x 2.65**
14.0	**19.0**	**2.2**	**RGS000140**	**15.60 x 1.78**
14.0	**21.5**	**3.2**	**RGS100140**	**17.12 x 2.62**
15.0	20.0	2.2	RGS000150	17.17 x 1.78
15.0	22.5	3.2	RGS100150	18.00 x 2.65
16.0	**21.0**	**2.2**	**RGS000160**	**17.17 x 1.78**
16.0	**23.5**	**3.2**	**RGS100160**	**18.72 x 2.62**
18.0	**23.0**	**2.2**	**RGS000180**	**20.35 x 1.78**
18.0	**25.5**	**3.2**	**RGS100180**	**20.29 x 2.62**
19.0	30.0	4.2	RGS200190	23.40 x 3.53
20.0	**27.5**	**3.2**	**RGS100200**	**21.89 x 2.62**
20.0	**31.0**	**4.2**	**RGS200200**	**25.00 x 3.53**
22.0	**29.5**	**3.2**	**RGS100220**	**25.07 x 2.62**
22.0	**33.0**	**4.2**	**RGS200220**	**26.58 x 3.53**
24.0	31.5	3.2	RGS100240	26.64 x 2.62
25.0	**32.5**	**3.2**	**RGS100250**	**28.24 x 2.62**
25.0	**36.0**	**4.2**	**RGS200250**	**29.75 x 3.53**
25.4	32.9	3.2	RGS100254	28.24 x 2.62
25.4	36.4	4.2	RGS200254	29.75 x 3.53
26.0	33.5	3.2	RGS100260	28.24 x 2.62
26.0	37.0	4.2	RGS200260	31.35 x 3.53
27.0	34.5	3.2	RGS100270	29.82 x 2.62
28.0	**35.5**	**3.2**	**RGS100280**	**31.42 x 2.62**
28.0	**39.0**	**4.2**	**RGS200280**	**32.92 x 3.53**
28.6	36.1	3.2	RGS100286	31.42 x 2.62
29.0	36.5	3.2	RGS100290	31.42 x 2.62
30.0	37.5	3.2	RGS100300	32.99 x 2.62
30.0	41.0	4.2	RGS200300	34.52 x 3.53
32.0	**43.0**	**4.2**	**RGS200320**	36.09 x 3.53
35.0	46.0	4.2	RGS200350	40.87 x 3.53
36.0	**43.5**	**3.2**	**RGS100360**	**39.34 x 2.62**
36.0	**47.0**	**4.2**	**RGS200360**	**40.87 x 3.53**
38.0	49.0	4.2	RGS200380	44.04 x 3.53
38.0	53.5	6.3	RGS300380	43.82 x 5.33
39.0	50.0	4.2	RGS200390	44.04 x 3.53
40.0	**51.0**	**4.2**	**RGS200400**	**44.04 x 3.53**

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
40.0	**55.5**	**6.3**	**RGS300400**	**46.99 x 5.33**
42.0	53.0	4.2	RGS200420	47.22 x 3.53
42.0	57.5	6.3	RGS300420	46.99 x 5.33
44.0	55.0	4.2	RGS200440	47.22 x 3.53
44.4	59.9	6.3	RGS300444	50.17 x 5.33
45.0	**56.0**	**4.2**	**RGS200450**	**50.39 x 3.53**
45.0	**60.5**	**6.3**	**RGS300450**	**50.17 x 5.33**
48.0	59.0	4.2	RGS200480	53.57 x 3.53
48.0	63.5	6.3	RGS300480	53.34 x 5.33
50.0	**61.0**	**4.2**	**RGS200500**	**53.57 x 3.53**
50.0	**65.5**	**6.3**	**RGS300500**	**56.52 x 5.33**
50.8	61.8	4.2	RGS200508	53.57 x 3.53
50.8	66.3	6.3	RGS300508	56.52 x 5.33
52.0	63.0	4.2	RGS200520	56.74 x 3.53
52.0	67.5	6.3	RGS300520	56.52 x 5.33
54.0	69.5	6.3	RGS300540	59.69 x 5.33
55.0	66.0	4.2	RGS200550	59.92 x 3.53
55.0	70.5	6.3	RGS300550	59.69 x 5.33
56.0	**67.0**	**4.2**	**RGS200560**	**59.92 x 3.53**
56.0	**71.5**	**6.3**	**RGS300560**	**62.87 x 5.33**
58.0	73.5	6.3	RGS300580	62.87 x 5.33
60.0	71.0	4.2	RGS200600	63.09 x 3.53
60.0	75.5	6.3	RGS300600	66.04 x 5.33
63.0	**74.0**	**4.2**	**RGS200630**	**66.27 x 3.53**
63.0	**78.5**	**6.3**	**RGS300630**	**69.22 x 5.33**
65.0	80.5	6.3	RGS300650	72.39 x 5.33
67.0	78.0	4.2	RGS200670	72.62 x 3.53
70.0	**81.0**	**4.2**	**RGS200700**	**75.79 x 3.53**
70.0	**85.5**	**6.3**	**RGS300700**	**75.57 x 5.33**
72.0	83.0	4.2	RGS200720	75.79 x 3.53
75.0	86.0	4.2	RGS200750	78.97 x 3.53
75.0	90.5	6.3	RGS300750	81.92 x 5.33
80.0	**91.0**	**4.2**	**RGS200800**	**85.32 x 3.53**
80.0	**95.5**	**6.3**	**RGS300800**	**85.09 x 5.33**
83.0	94.0	4.2	RGS200830	88.49 x 3.53
85.0	100.5	6.3	RGS300850	91.44 x 5.33
86.0	97.0	4.2	RGS200860	91.67 x 3.53
90.0	**101.0**	**4.2**	**RGS200900**	**94.84 x 3.53**
90.0	**105.5**	**6.3**	**RGS300900**	**97.79 x 5.33**
92.0	103.0	4.2	RGS200920	98.02 x 3.53
95.0	106.0	4.2	RGS200950	101.19 x 3.53

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
95.0	110.5	6.3	RGS300950	100.97 x 5.33
100.0	**111.0**	**4.2**	**RGS201000**	**104.37 x 3.53**
100.0	**115.5**	**6.3**	**RGS301000**	**107.32 x 5.33**
101.6	112.6	4.2	RGS201016	107.54 x 3.53
101.6	117.1	6.3	RGS301016	107.32 x 5.33
104.7	120.2	6.3	RGS301047	110.49 x 5.33
105.0	116.0	4.2	RGS201050	110.72 x 3.53
105.0	120.5	6.3	RGS301050	110.49 x 5.33
110.0	**121.0**	**4.2**	**RGS201100**	**113.89 x 3.53**
110.0	**125.5**	**6.3**	**RGS301100**	**116.84 x 5.33**
110.0	**131.0**	**8.1**	**RGS401100**	**120.02 x 7.00**
112.0	127.5	6.3	RGS301120	116.84 x 5.33
115.0	126.0	4.2	RGS201150	120.24 x 3.53
115.0	130.5	6.3	RGS301150	120.02 x 5.33
118.0	133.5	6.3	RGS301180	123.19 x 5.33
120.0	131.0	4.2	RGS201200	126.59 x 3.53
120.0	135.5	6.3	RGS301200	126.37 x 5.33
125.0	**136.0**	**4.2**	**RGS201250**	**129.77 x 3.53**
125.0	**140.5**	**6.3**	**RGS301250**	**132.72 x 5.33**
129.0	140.0	4.2	RGS201290	132.94 x 3.53
130.0	141.0	4.2	RGS201300	136.12 x 3.53
130.0	145.5	6.3	RGS301300	135.89 x 5.33
135.0	146.0	4.2	RGS201350	139.29 x 3.53
135.0	150.5	6.3	RGS301350	142.24 x 5.33
140.0	**151.0**	**4.2**	**RGS201400**	**145.64 x 3.53**
140.0	**155.5**	**6.3**	**RGS301400**	**145.42 x 5.33**
145.0	156.0	4.2	RGS201450	148.82 x 3.53
145.0	160.5	6.3	RGS301450	151.77 x 5.33
150.0	165.5	6.3	RGS301500	158.12 x 5.33
160.0	**175.5**	**6.3**	**RGS301600**	**164.47 x 5.33**
160.0	**181.0**	**8.1**	**RGS401600**	**170.82 x 7.00**
165.0	180.5	6.3	RGS301650	170.82 x 5.33
170.0	181.0	4.2	RGS201700	177.39 x 3.53
170.0	185.5	6.3	RGS301700	177.17 x 5.33
175.0	190.5	6.3	RGS301750	183.52 x 5.33
180.0	**191.0**	**4.2**	**RGS201800**	**183.74 x 3.53**
180.0	**195.5**	**6.3**	**RGS301800**	**189.87 x 5.33**
180.0	**201.0**	**8.1**	**RGS401800**	**189.87 x 7.00**
190.0	201.0	4.2	RGS201900	196.44 x 3.53
190.0	205.5	6.3	RGS301900	196.22 x 5.33
200.0	**215.5**	**6.3**	**RGS302000**	**208.92 x 5.33**
200.0	**221.0**	**8.1**	**RGS402000**	**208.90 x 7.00**

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
205.0	220.5	6.3	RGS302050	208.92 x 5.33
210.0	225.5	6.3	RGS302100	215.27 x 5.33
220.0	**235.5**	**6.3**	**RGS302200**	**227.97 x 5.33**
220.0	**241.0**	**8.1**	**RGS402200**	**227.97 x 7.00**
230.0	245.5	6.3	RGS302300	234.32 x 5.33
230.0	251.0	8.1	RGS402300	240.67 x 7.00
240.0	255.5	6.3	RGS302400	247.02 x 5.33
240.0	261.0	8.1	RGS402400	253.37 x 7.00
250.0	**271.0**	**8.1**	**RGS402500**	**266.07 x 7.00**
260.0	284.5	8.1	RGS802600	266.07 x 7.00
270.0	291.0	8.1	RGS402700	278.77 x 7.00
270.0	294.5	8.1	RGS802700	278.77 x 7.00
275.0	299.5	8.1	RGS802750	291.47 x 7.00
280.0	**301.0**	**8.1**	**RGS402800**	**291.47 x 7.00**
280.0	**304.5**	**8.1**	**RGS802800**	**291.47 x 7.00**
290.0	311.0	8.1	RGS402900	304.17 x 7.00
290.0	314.5	8.1	RGS802900	304.17 x 7.00
300.0	324.5	8.1	RGS803000	316.87 x 7.00
310.0	331.0	8.1	RGS403100	316.87 x 7.00
310.0	334.5	8.1	RGS803100	316.87 x 7.00
320.0	**344.5**	**8.1**	**RGS803200**	**329.57 x 7.00**
330.0	354.5	8.1	RGS803300	342.27 x 7.00
340.0	364.5	8.1	RGS803400	354.97 x 7.00
350.0	371.0	8.1	RGS403500	354.97 x 7.00
350.0	374.5	8.1	RGS803500	367.67 x 7.00
360.0	384.5	8.1	**RGS803600**	367.67 x 7.00
370.0	391.0	8.1	RGS403700	380.37 x 7.00
370.0	394.5	8.1	RGS803700	380.37 x 7.00
380.0	404.5	8.1	RGS803800	393.07 x 7.00
390.0	414.5	8.1	RGS803900	405.26 x 7.00
400.0	421.0	8.1	RGS404000	405.26 x 7.00
400.0	424.5	8.1	RGS804000	417.96 x 7.00
410.0	434.5	8.1	RGS804100	417.96 x 7.00
420.0	444.5	8.1	RGS804200	430.66 x 7.00
430.0	454.5	8.1	RGS804300	443.36 x 7.00
440.0	464.5	8.1	RGS804400	456.06 x 7.00
450.0	474.5	8.1	RGS804500	468.76 x 7.00
460.0	484.5	8.1	RGS804600	468.76 x 7.00
470.0	494.5	8.1	RGS804700	481.38 x 7.00
500.0	524.5	8.1	RGS805000	506.86 x 7.00
550.0	574.5	8.1	RGS805500	557.66 x 7.00
560.0	584.5	8.1	RGS805600	582.68 x 7.00

Rod Dia.	Groove Dia.	Groove Width	TSS Part No.	O-Ring Size
d_N f8/h9	D_1 H9	L_1 +0.2		
570.0	594.5	8.1	RGS805700	582.68 x 7.00
580.0	604.5	8.1	RGS805800	608.08 x 7.00
590.0	614.5	8.1	RGS805900	608.08 x 7.00
600.0	624.5	8.1	RGS806000	608.08 x 7.00
630.0	654.5	8.1	RGS806300	658.88 x 7.00
650.0	678.0	9.5	RGS506500	662.90 x 8.40
660.0	688.0	9.5	RGS506600	672.90 x 8.40
670.0	698.0	9.5	RGS506700	682.90 x 8.40
680.0	708.0	9.5	RGS506800	692.90 x 8.40
700.0	724.5	8.1	RGS807000	712.90 x 8.40
800.0	828.0	9.5	RGS508000	812.90 x 8.40
850.0	878.0	9.5	RGS508500	862.90 x 8.40
900.0	928.0	9.5	RGS509000	912.90 x 8.40
950.0	978.0	9.5	RGS509500	962.90 x 8.40
960.0	988.0	9.5	RGS509600	972.90 x 8.40

The rod diameters in **bold** type correspond to the recommendations of ISO 3320.

Part No. for other dimensions and **all** intermediate sizes up to 999.9 mm diameter including imperial (inch) sizes can be supplied.

Larger sizes up to 2,600 mm are available upon request.

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Turcon® AQ-Seal® with Bean Seal

Double-acting

Rubber-energized plastic-faced seal

Material:
Turcon®, and Zurcon® and Elastometer

■ Turcon® AQ-Seal® with Bean Seal*

■ Description

Turcon® AQ-Seal® with Bean Seal is a double-acting seal consisting of a seal ring of Turcon® material, a Bean Seal in Zurcon® Z54 and an O-Ring as energizing element.

The Turcon® seal ring and the Bean Seal together create the dynamic sealing function while the O-Ring performs the static sealing function.

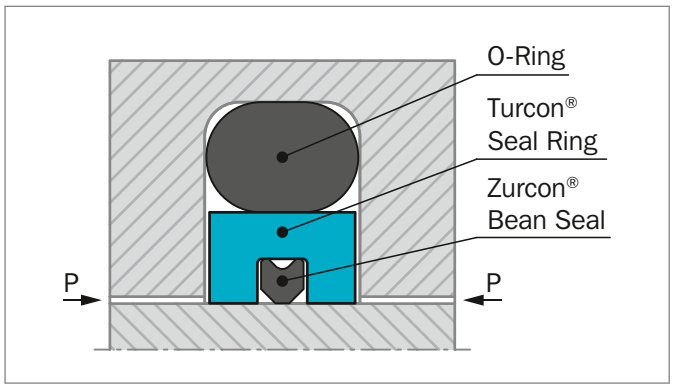

Figure 92: Turcon® AQ-Seal® with Bean Seal

AQ-Seal® with Bean Seal combines the benefits of a low-friction Turcon® slipper seal with the high sealing characteristics of an elastomeric seal by incorporating a limited foot print Bean Seal in the dynamic sealing face. This optimizes leakage control while minimizing friction.

ADVANTAGES

- High sealing effect in applications requiring media separation, e.g. fluid/fluid or fluid/gas
- Double security through the combination of low friction special materials with elastomer seals
- Higher pressure application, higher sliding speed compared to AQ-Seal® with Quad-Ring®
- Outstanding sliding properties, no stick-slip effect.
- Simple groove design, small installation space. Interchangeable with Turcon® Glyd Ring® , Turcon® Glyd Ring® T and Turcon® Stepseal® 2K groove. Installation according to ISO 7425-2 possible.
- Available for any rod diameters from 18 and up to 2,200 mm.

APPLICATION EXAMPLES

AQ-Seal® with Bean Seal is the recommended sealing element for double acting positioning and holding cylinders for:

- Mobile hydraulics
- Machine tools
- Presses
- Stabilizers
- Heavy duty suspension cylinders
- Medium separation of fluid /fluid or fluid/gas; please note that one of the media must be lubricating
- Hydro-pneumatic suspensions for heavy vehicles
- Cylinders with retaining function over longer periods such as jacks and support cylinders.

OPERATING CONDITIONS

Pressure:	Up to 50 MPa with mineral oil Up to 30 MPa for media with reduced lubricating properties
Speed:	Up to 2 m/s with linear movements
Temperature:	-45 °C to +110 °C depending on seal and O-Ring material
Media:	Mineral oil-based hydraulic fluids, flame retardant hydraulic fluids, phosphate ester and others, depending on temperature, seal, O-Ring and Bean Seal material compatibility see Table 74 and Table 75
Clearance:	The maximum permissible radial clearance S_{max} is shown in Table 76 as a function of the operating pressure and functional diameter.

IMPORTANT NOTE

The above data are maximum values and cannot be used at the same time, e.g. the maximum operating speed depends on material type, pressure, temperature and gap value. Temperature range also depends on media.

* Patent-No. EP 0 424 372

INSTALLATION INSTRUCTIONS

AQ-Seal® V is installed according to information on page 37 and 38.

Closed groove installation applies same dimensions as for Turcon® Stepseal® 2K in Table 6 page 38.

RECOMMENDED MATERIALS

The following material combinations have proven effective for hydraulic applications:

Turcon® AQ-Seal® in Turcon® M12
All round material for light to heavy hydraulic applications with linear, movements in mineral oils, flame retardant hydraulic fluids and phosphate ester:

Bean Seal: Zurcon® Z54

O-Ring: NBR 70 Shore A N
FKM 70 Shore A V

Set code: M12N or M12V

Turcon® AQ-Seal® in Turcon® T46
For medium to heavy applications with linear movements in mineral oils and other media with good lubrication:

Bean Seal: Zurcon® Z54

O-Ring: NBR 70 Shore A N
FKM 70 Shore A V

Set code: T46N or T46V

For specific applications, all Turcon® materials are available.

Other material combinations are listed in Table 74.

Table 74: Recommended Turcon® Materials for Turcon® AQ-Seal®

Material, Applications, Properties	Code	O–Ring Material Shore A	Code	O-Ring Operating Temp.* °C	Mating Surface Material	MPa max. Dyna-mic
Turcon® M12 First material choice for seals in linear motion Overall improved properties For new constructions and updating For all commonly applied hydraulic fluids including fluids with low lubrication performance Lowest friction and best sliding properties Lowest wear on selas Improved absorption of abrasion of counter surfcace BAM tested Mineal fiber and Additives filled Color: Dark gray	M12	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Steel plated (rod) Cast iron Stainless steel Titanium	40
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to (+200)		

Material, Applications, Properties	Code	O–Ring Material Shore A	Code	O-Ring Operating Temp.* °C	Mating Surface Material	MPa max. Dyna-mic
Turcon® T08 For lubricating fluids and linear motion Very high compressive strength and extrusion resistance Hard counter surfaces is recommended Bronze filled Color: Light to dark brown, which may have variations in shading	T08	NBR 70	N	-30 to +100	Steel hardened Steel chrome plated (rod) Cast iron	50
		NBR 70 Low temp.	T	-45 to +80		
		FMK 70	V	-10 to (+200)		
Turcon® T10 For hydraulic and pneumatic For linear motion in lubricating and non-lubricating fluids High extrusion resistance Good chemical resistance Not for electrically conducting fluids BAM tested Carbon, graphite filled Color: Black	T10	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Stainless steel	30
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to (+200)		
Turcon® T29 For lubricating and non-lubricating fluids Good extrusion resistance Surface texture is not suitable for gas sealin Not for electrically conducting fluids Carbon fiber filled Color: Gray	T29	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Cast iron Stainless steel	30
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to (+200)		
Turcon® T40 For lubricating and non-lubricating fluids High frequency and short strokes Water hydraulics Surface texture is not suitable for gas sealing Carbon fiber filled Color: Gray	T40	NBR 70	N	-30 to +100	Steel chrome plated (rod) Cast iron Stainless steel Aluminum	25
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to (+200)		
Turcon® T46 For lubricated hydraulics in linear motion High compressive strength High extrusion resistance Very good sliding and wear properties Bronze filled BAM tested Color: Light to dark brown, which may have variations in shading	T46	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Cast iron	40
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to (+200)		

Table continues on next page

Material, Applications, Properties	Code	O–Ring Material Shore A	Code	O-Ring Operating Temp.* °C	Mating Surface Material	MPa max. Dyna-mic
Zurcon® Z80 For lubricating and non-lubricating fluids Water based fluids, air and gases Dry air pneumatics High abrasion and extrusion resistance For service in abrasive conditions and media with particles Good chemical resistance Limited temperature capability (-60 to +80 °C) UHMWPE (Ultra High Molecular Weight Polyethylene) Color: White to off-white	Z80	NBR 70	N	-30 to (+100)	Steel Steel hardened Steel chrome plated (rod) Stainless steel Aluminum Ceramic coating	30
		NBR 70 Low temp.	T	-45 to +80		

* The O-Ring Operation Temperature is only valid in mineral hydraulic oil (except EPDM).

** Material not suitable for mineral oils.

BAM: Tested by “Bundesanstalt Materialprüfung, Germany”

Highlighted materials are recommended.

Table 75: Zurcon® Z54 for Bean Seal

Material, Applications, Properties	Code	O–Ring Material Shore A	Code	O-Ring Operating Temp.* °C	Mating Surface Material	MPa max. Dyna-mic
Turcon® Z54 For mineral oil based fluids Linear and slowly turning movements High sealing effect High abrasion resistance Good extrusion resistance Limited chemical resistance Max. working temperature +110°C Cast Polyurethane Color: Turquoise	Z54	-	-	-	Steel Steel hardened Steel chrome plated (rod) Cast iron Stainless steel Ceramic coating	-

Installation Recommendation

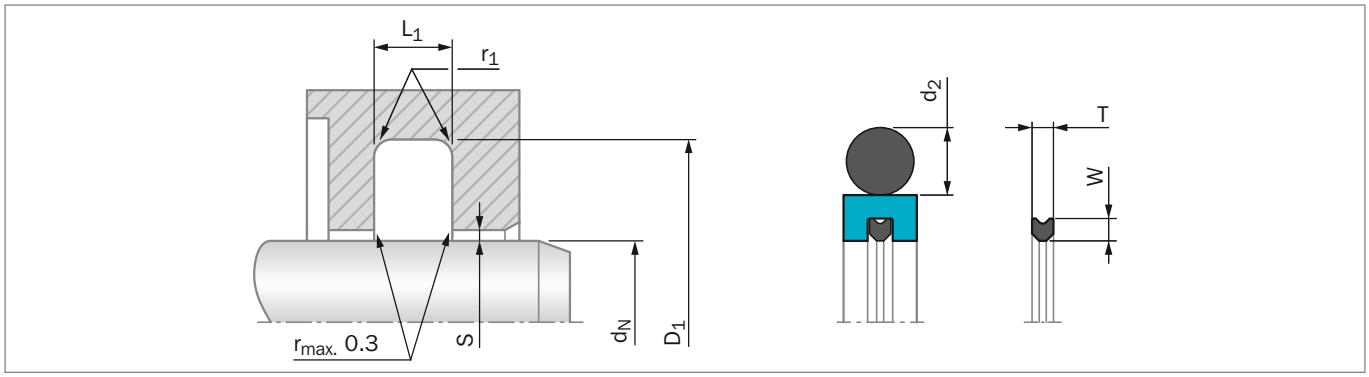

Figure 93: Installation Drawing

Table 76: Installation Dimensions – Standard Installation

Series No.	Rod Diameter d_N f8/h9		Groove Diameter	Groove Width	Radius	Radial Clearance S_{max}*			O-Ring Cross Section	Bean Seal Cross Section	
	Standard Application	Available Range	D_1 H9	L_1 +0.2	r_1 max	10 MPa	20 MPA	40 MPa	d_2	W	T
RQB20	19 - 37.9	18 - 450.0	d_N + 10.7	4.2	1.0	0.25	0.15	0.10	3.53	1.70	1.70
RQB30	38 - 199.9	30 - 650.0	d_N + 15.1	6.3	1.3	0.30	0.20	0.15	5.33	1.70	1.70
RQB40	200 - 255.9	105 - 999.9	d_N + 20.5	8.1	1.8	0.30	0.20	0.15	7.00	2.45	2.45
RQB80	256 - 649.9	120 - 999.9	d_N + 24.0	8.1	1.8	0.30	0.20	0.15	7.00	2.45	2.45
RQB50	650 - 999.9	285 - 999.9	d_N + 27.3	9.5	2.5	0.45	0.30	0.25	8.40	3.50	3.65
RQB5X	-	1,000 - 1,200.0	d_N + 27.3	9.5	2.5	0.45	0.40	0.35	8.40	3.50	3.65
RQB60**	-	650 - 999.9	d_N + 38.0	13.8	3.0	0.70	0.60	0.45	12.00	5.20	5.05
RQB6X**	1,000 - 2,200		d_N + 38.0	13.8	3.0	0.70	0.60	0.45	12.00	5.20	5.05

* At pressures > **40 MPa** use diameter tolerance H8/f8 (bore/rod) in the area of the seal use Turcon® AQ-Seal® 5 CR or consult your local Trelleborg Sealing Solutions marketing company for alternative material or profiles.
Slydring® / Wear Rings are not applicable at very small radial clearances please consult the Slydring® section in this catalog.
All AQ-Seal® supplied without Bean Seals must have "W" in the 5th character of the TSS Article Number.
** All O-Rings with 12 mm cross section are delivered as a special profile ring.

ORDERING EXAMPLE

Turcon® AQ-Seal® complete with Bean Seal and O-Ring, standard application:

Series:	RQB30 from Table 76
Rod diameter:	d_N = 80.0 mm
TSS Part No.:	RQB300800 from Table 77

Select the material from Table 74. The corresponding code numbers are appended to the TSS Part No. Together these form the TSS Article Number. The TSS Article Number for all intermediate sizes can be determined by following the example:

TSS Article No. **RQB3 0 0800 - M12 N**

- Series No. — RQB3
- Type (Standard) — 0
- Rod Diameter x 10*** — 0800
- Quality Index (Standard) — -
- Material Code (Seal Ring) — M12
- Material Code (O-Ring) — N

*** For diameters $d_N \geq$ 1,000.0 mm multiply only by factor 1.
Example: RQB5X for diameter d_N = 1,200.0 mm
TSS Article No.: RQB5X1200-M12N

Table 77: Installation Dimensions / TSS Part No

Rod Dia. d_N h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
18.0	**28.7**	**4.2**	**RQB200180**	**21.82 x 3.53**
20.0	**30.7**	**4.2**	**RQB200200**	**25.00 x 3.53**
22.0	**32.7**	**4.2**	**RQB200220**	**26.58 x 3.53**
25.0	**35.7**	**4.2**	**RQB200250**	**29.75 x 3.53**
28.0	**38.7**	**4.2**	**RQB200280**	**32.92 x 3.53**
30.0	40.7	4.2	RQB200300	34.52 x 3.53
32.0	**42.7**	**4.2**	**RQB200320**	**36.09 x 3.53**
35.0	45.7	4.2	RQB200350	40.87 x 3.53
36.0	**46.7**	**4.2**	**RQB200360**	**40.87 x 3.53**
40.0	**50.7**	**4.2**	**RQB200400**	**44.04 x 3.53**
40.0	**55.1**	**6.3**	**RQB300400**	**46.99 x 5.33**
42.0	52.7	4.2	RQB200420	47.22 x 3.53
42.0	57.1	6.3	RQB300420	46.99 x 5.33
45.0	**55.7**	**4.2**	**RQB200450**	**50.39 x 3.53**
45.0	**60.1**	**6.3**	**RQB300450**	**50.17 x 5.33**
48.0	58.70	4.2	RQB200480	53.57 x 3.55
48.0	63.1	6.3	RQB300480	53.34 x 5.33
50.0	**60.70**	**4.2**	**RQB200500**	**53.57 x 3.53**
50.0	**65.1**	**6.3**	**RQB300500**	**56.52 x 5.33**
52.0	62.7	4.2	RQB200520	56.74 x 3.53
52.0	67.1	6.3	RQB300520	56.52 x 5.33
55.0	65.7	4.2	RQB200550	59.92 x 3.53
55.0	70.1	6.3	RQB300550	59.69 x 5.33
56.0	**66.7**	**4.2**	**RQB200560**	**59.92 x 3.53**
56.0	**71.1**	**6.3**	**RQB300560**	**62.87 x 5.33**
60.0	70.7	4.2	RQB200600	63.09 x 3.53
60.0	75.1	6.3	RQB300600	66.04 x 5.33
63.0	**73.7**	**4.2**	**RQB200630**	**66.27 x 3.53**
63.0	**78.1**	**6.3**	**RQB300630**	**69.22 x 5.33**
65.0	80.1	6.3	RQB300650	72.39 x 5.33
70.0	**80.7**	**4.2**	**RQB200700**	**75.79 x 3.53**
70.0	**85.1**	**6.3**	**RQB300700**	**75.57 x 5.33**
75.0	85.7	4.2	RQB200750	78.97 x 3.53
75.0	90.1	6.3	RQB300750	81.92 x 5.33
80.0	**90.7**	**4.2**	**RQB200800**	**85.32 x 3.53**
80.0	**95.1**	**6.3**	**RQB300800**	**85.09 x 5.33**
85.0	100.1	6.3	RQB300850	91.44 x 5.33
90.0	**100.7**	**4.2**	**RQB200900**	**94.84 x 3.53**
90.0	**105.1**	**6.3**	**RQB300900**	**97.79 x 5.33**
95.0	105.7	4.2	RQB200950	101.19 x 3.53
95.0	110.1	6.3	RQB300950	100.97 x 5.33
100.0	**110.7**	**4.2**	**RQB201000**	**104.37 x 3.53**
100.0	**115.1**	**6.3**	**RQB301000**	**107.32 x 5.33**
105.0	115.7	4.2	RQB201050	110.72 x 3.53
105.0	120.1	6.3	RQB301050	110.49 x 5.33
110.0	**120.7**	**4.2**	**RQB201100**	**113.89 x 3.53**
110.0	**125.1**	**6.3**	**RQB301100**	**116.84 x 5.33**
110.0	**131.0**	**8.1**	**RQB401100**	**120.02 x 7.00**
115.0	125.7	4.2	RQB201150	120.24 x 3.53
115.0	130.1	6.3	RQB301150	120.02 x 5.33
120.0	130.7	4.2	RQB201200	126.59 x 3.53
120.0	135.1	6.3	RQB301200	126.37 x 5.33
125.0	**135.7**	**4.2**	**RQB201250**	**129.77 x 3.53**
125.0	**140.1**	**6.3**	**RQB301250**	**132.72 x 5.33**
130.0	140.7	4.2	RQB201300	136.12 x 3.53
130.0	145.1	6.3	RQB301300	135.89 x 5.33
135.0	145.7	4.2	RQB201350	139.29 x 3.53
135.0	150.1	6.3	RQB301350	142.24 x 5.33
140.0	**150.7**	**4.2**	**RQB201400**	**145.64 x 3.53**
140.0	**155.1**	**6.3**	**RQB301400**	**145.42 x 5.33**
145.0	155.7	4.2	RQB201450	148.82 x 3.53
145.0	160.1	6.3	RQB301450	151.77 x 5.33
150.0	165.1	6.3	RQB301500	158.12 x 5.33
160.0	**175.1**	**6.3**	**RQB301600**	**164.47 x 5.33**
160.0	**180.5**	**8.1**	**RQB401600**	**170.82 x 7.00**
165.0	180.1	6.3	RQB301650	170.82 x 5.33
170.0	180.7	4.2	RQB201700	177.39 x 3.53
170.0	185.1	6.3	RQB301700	177.17 x 5.33
175.0	190.1	6.3	RQB301750	183.52 x 5.33
180.0	**190.7**	**4.2**	**RQB201800**	**183.74 x 3.53**
180.0	**195.1**	**6.3**	**RQB301800**	**189.87 x 5.33**
180.0	**200.5**	**8.1**	**RQB401800**	**189.87 x 7.00**
190.0	201.0	4.2	RQB201900	196.44 x 3.53
190.0	205.1	6.3	RQB301900	196.22 x 5.33
200.0	**215.1**	**6.3**	**RQB302000**	**208.92 x 5.33**
200.0	**220.5**	**8.1**	**RQB402000**	**208.92 x 7.00**
210.0	225.1	6.3	RQB302100	215.27 x 5.33
220.0	**235.1**	**6.3**	**RQB302200**	**227.97 x 5.33**
220.0	**240.5**	**8.1**	**RQB402200**	**227.97 x 7.00**
230.0	245.1	6.3	RQB302300	234.32 x 5.33

Rod Dia. d_N h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
230.0	250.5	8.1	RQB402300	240.67 x 7.00
240.0	255.1	6.3	RQB302400	247.02 x 5.33
240.0	260.5	8.1	RQB402400	253.37 x 7.00
250.0	**270.5**	**8.1**	**RQB402500**	**266.07 x 7.00**
260.0	284.0	8.1	RQB802600	266.07 x 7.00
270.0	290.5	8.1	RQB402700	278.77 x 7.00
270.0	294.0	8.1	RQB802700	278.77 x 7.00
280.0	**300.5**	**8.1**	**RQB402800**	**291.47 x 7.00**
280.0	**304.0**	**8.1**	**RQB802800**	**291.47 x 7.00**
300.0	324.0	8.1	RQB803000	316.87 x 7.00
320.0	**344.0**	**8.1**	**RQB803200**	**329.57 x 7.00**
350.0	370.5	8.1	RQB403500	354.97 x 7.00
350.0	374.0	8.1	RQB803500	367.67 x 7.00
360.0	**384.0**	**8.1**	**RQB803600**	**367.67 x 7.00**
400.0	420.5	8.1	RQB404000	405.26 x 7.00
400.0	424.0	8.1	RQB804000	417.96 x 7.00
450.0	474.0	8.1	RQB804500	468.76 x 7.00
500.0	524.0	8.1	RQB805000	506.86 x 7.00
550.0	574.0	8.1	RQB805500	557.66 x 7.00
600.0	624.0	8.1	RQB806000	608.08 x 7.00
650.0	677.3	9.5	RQB506500	663.00 x 8.40
700.0	724.0	8.1	RQB807000	712.00 x 7.00
800.0	827.3	9.5	RQB508000	813.00 x 8.40
900.0	927.3	9.5	RQB509000	913.00 x 8.40
1,000.0	1,027.3	9.5	RQB5X1000	1,013.00 x 8.40
1,000.0	1,038.0	13.8	RQB6X1000	1,016.00 x 12.00
1,100.0	1,138.0	13.8	RQB6X1100	1,116.00 x 12.00
1,200.0	1,227.3	9.5	RQB5X1200	1,213.00 x 8.40
1,200.0	1,238.0	13.8	RQB6X1200	1,216.00 x 12.00
1,300.0	1,338.0	13.8	RQB6X1300	1,316.00 x 12.00
1,500.0	1,538.0	13.8	RQB6X1500	1,516.00 x 12.00
2,000.0	2,038.0	13.8	RQB6X2000	2,016.00 x 12.00
2,200.0	2,238.0	13.8	RQB6X2200	2,216.00 x 12.00

The rod diameters in **bold** type are in accordance with the recommendations of ISO 3320.

Other dimensions and all intermediate sizes up to 2,200 mm diameter, including imperial (inch) sizes converted to mm, can be supplied.

All O-Rings with 12 mm cross section are delivered as special profilring.

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Turcon® AQ-Seal® 5 with Bean Seal

Double-acting

Rubber-energized plastic-faced seal

Material:
Turcon®, Zurcon® and Elastomer

■ Turcon® AQ-Seal® 5 with Bean Seal*

■ Description

Turcon® AQ-Seal® 5 with Bean Seal is a patented development of the proven standard Turcon® AQ-Seal® .

The particular characteristics of AQ-Seal® 5 with Bean Seal are the seal profile with a defined seal edge and the use of two O-Rings as energizing elements to optimize the pressure profile and to reduce the gas permeability.

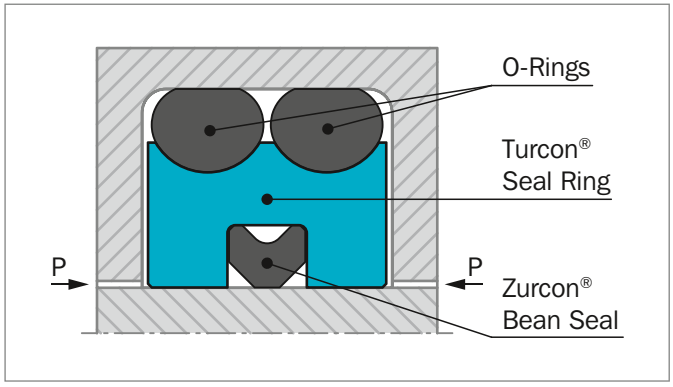

Figure 94: Turcon® AQ-Seal® 5 with Bean Seal

AQ-Seal® 5 with Bean Seal combines the benefits of a low-friction Turcon® slipper seal with the high sealing characteristics of an elastomeric seal by incorporating a limited foot print Bean Seal in the dynamic sealing face. This optimizes leakage control while minimizing friction.

ADVANTAGES

- High sealing effect in applications requiring media separation, e.g. fluid/fluid or fluid/gas
- Double security through the combination of low-friction special materials with elastomer seals
- Higher pressure application, higher sliding speed compared to AQ-Seal® 5 with Quad-Ring®
- Outstanding sliding properties, no stick-slip effect.
- Available for any rod diameters from 32 mm and up to 2,200 mm

* Patent-No. EP 0 424 372

APPLICATION EXAMPLES

TurconRAQ-Seal® 5 is mainly designed for heavy duty and large diameter applications and is recommended as double acting piston seal for hydraulic equipment such as:

- Mobile hydraulics
- Presses
- Stabilizers
- Heavy duty suspension cylinders
- Media separation of fluid /fluid or fluid/gas; please note that one of the media must be lubricating
- Hydro-pneumatic suspensions for heavy vehicles
- Cylinders with retaining function over longer periods such as jacks and support cylinders

OPERATING CONDITIONS

Pressure:	Up to 60 MPa with mineral oil Up to 40 MPa for media with low lubricating properties
Speed:	Up to 3 m/s with linear movements
Temperature:	-45 °C to +110 °C depending on seal, O-Ring and Bean Seal material
Media:	Mineral oil-based hydraulic fluids, flame retardant hydraulic fluids, phosphate ester and others, depending on temperature, seal, O-Ring and Bean Seal material compatibility see Table 78.
Clearance:	The maximum permissible radial clearance S_{max} is shown in Table 80 as a function of the operating pressure and functional diameter.

IMPORTANT NOTE

The above data are maximum values and cannot be used at the same time, e.g. the maximum operating speed depends on material type, pressure, temperature and gap value. Temperature range also depends on media.

INSTALLATION INSTRUCTIONS

AQ-Seal® 5 is installed according to information on page 37 and 38.

RECOMMENDED MATERIALS

The following material combinations have proven effective for hydraulic applications:

Turcon® AQ-Seal® 5 in Turcon® M12
All round material for light to heavy hydraulic applications with linear movements in mineral oils, flame retardant hydraulic fluids and phosphate ester.

Bean Seal:	Zurcon® Z54	
O-Ring:	NBR 70 Shore A	N
	FKM 70 Shore A	V
Set code:	M12N or M12V	

Turcon® AQ-Seal® 5 in Turcon® T46
For medium to heavy applications with linear movements in mineral oils and other media with good lubrication:

Bean Seal:	Zurcon® Z54	
O-Ring:	NBR 70 Shore A	N
	FKM 70 Shore A	V
Set code:	T46N or T46V	

For specific applications, all Turcon® materials are available. Other material combinations are listed in Table 78.

Table 78: Recommended Turcon® Materials for Turcon® AQ-Seal® 5

Material, Applications, Properties	Code	O–Ring Material Shore A	Code	O-Ring Operating Temp.* °C	Mating Surface Material	MPa max. Dyna-mic
Turcon® M12 First material choice for seals in linear motion Overall improved properties For new constructions and updating For all commonly applied hydraulic fluids including fluds with low lubrication performance Lowest friction and best sliding properties Loweset wear on seals Improved absorption of abrasive cintainments Low wear or abrasion of counter surfcae BAM tested Mineal fiber and Additives filled Color: Dark gray	M12	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Steel plated (rod) Cast iron Stainless steel Titanium	50
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to (+200)		
Turcon® T08 For lubricating fluids and linear motion Very high compressive strength and extrusion resistance Hard counter surfaces is recommended Bronze filled Color: Light to dark brown, which may have variations in shading	T08	NBR 70	N	-30 to +100	Steel hardened Steel chrome plated (rod) Cast iron	60
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to (+200)		
Turcon® T10 For hydraulic and pneumatic For linear motion in lubricating and non-lubricating fluids High extrusion resistance Good chemical resistance Not for electrically conducting fluids Carbon, graphite filled BAM tested Color: Black	T10	NBR 70	N	-30 to +100	Steel Steel chrome plated (rod) Stainless steel	40
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to (+200)		
Turcon® T29 For lubricating and non-lubricating fluids Good extrusion resistance Surface texture is not suitable for gas sealing Not for electrically conducting fluids Carbon fiber filled Color: Gray	T29	NBR 70	N	-30 to +100	Steel Steel chrome plated (rod) Cast iron Stainless steel	30
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to (+200)		

Table continues on next page

Material, Applications, Properties	Code	O–Ring Material Shore A	Code	O-Ring Operating Temp.* °C	Mating Surface Material	MPa max. Dyna-mic
Turcon® T40 For lubricating and non-lubricating fluids High frequency and short strokes Water hydraulics Surface texture is not suitable for gas sealing Carbon fiber filled Color: Gray	T40	NBR 70	N	-30 to +100	Steel Steel chrome plated (rod) Cast iron Stainless steel Aluminum	25
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to (+200)		
Turcon® T46 For lubricated hydraulics in linear motion High compressive strength High extrusion resistance Very good sliding and wear properties Bronze filled BAM tested Color: Light to dark brown, which may have variations in shading.	T46	NBR 70	N	-30 to +100	Steel hardened Steel chrome plated (rod) Cast iron	50
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to (+200)		
Zurcon® Z80 For lubrication and non-lubrication fluids Water based fluids, air and gases Dry air pneumatics High abrasion and extrusion resistance For service in abrasive conditions and media with particles Good chemical resistance Limited temperature capability (-60 to +80 °C) UHMWPE (Ultra High Molecular Weight Polyethylene) Color: White to off-white	Z80	NBR 70	N	-30 to (+100)	Steel Steel hardened Steel chrome plated (rod) Stainless steel Aluminum Ceramic coating	35
		NBR 70 Low temp.	T	-45 to +80		

* The O-Ring Operation Temperature is only valid in mineral hydraulic oil.

BAM: Tested by "Bundesanstalt Materialprüfung, Germany"

Highlighted materials are recommended.

Table 79: Zurcon® Z54 for Bean Seal

Material, Applications, Properties	Code	O–Ring Material Shore A	Code	O-Ring Operating Temp.* °C	Mating Surface Material
Zurcon® Z54 For mineral oil based fluids Linear and slowly turning movements High sealing effect High abrasion resistance Good extrusion resistance Limited chemical resistance Max. working temperature +110 °C Cast Polyurethane Color: Turquoise	Z54	-	-	-	Steel Steel hardened Steel chrome plated (rod) Cast iron Stainless steel Ceramic coating

Installation Recommendation

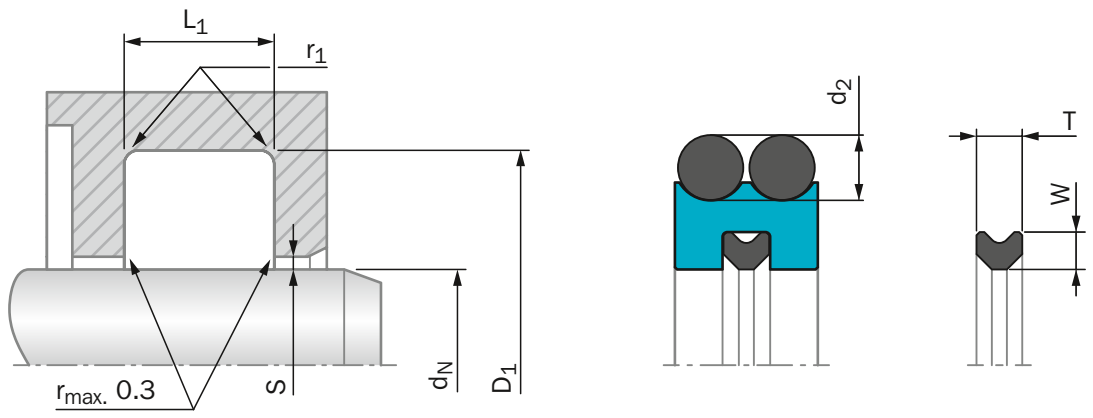

Figure 95: Installation Drawing

Table 80: Installation Dimensions – Standard installation

Series No.	Rod Diameter d_N f8/h9		Groove Diameter	Groove Width	Radius	Radial Clearance S_{max}*			O-Ring Cross Section	Bean Seal Cross Section	
	Standard Application	Available Range	D_1 H9	L_1 +0.2	r_{1max}	10 MPa	20 MPa	40 MPa	d_2	W	T
RQC10	40 - 79.9	32 - 250.0	d_N + 10.0	6.3	0.6	0.30	0.20	0.15	2.62	1.70	1.70
RQC20	80 - 132.9	50 - 450.0	d_N + 13.0	8.3	1.0	0.40	0.30	0.15	3.53	2.52	2.65
RQC30	133 - 462.9	80 - 650.0	d_N + 18.0	12.3	1.3	0.40	0.30	0.20	5.33	3.50	3.65
RQC40	463 - 999.9	180 - 999.9	d_N + 31.0	16.3	1.8	0.50	0.40	0.30	7.00	5.20	5.05
RQC4X	1,000 - 2,200.0	1,000 - 2,200.0	d_N + 31.0	16.3	1.8	0.50	0.40	0.30	7.00	5.20	5.05

*At pressures > **40 MPa** use diameter tolerance H8/f8 (bore/rod) in the area of the seal use Turcon® AQ-Seal® 5 CR or consult your local Trelleborg Sealing Solutions marketing company for alternative material or profiles.
Slydring® / Wear Rings are not applicable at very small radial clearances please consult the Slydring® section in this catalog.
All AQ-Seal® supplied without Bean Seals must have "W" in the 5th character of the TSS Article Number.

ORDERING EXAMPLE

AQ-Seal® 5 complete with Bean Seal and O-Rings, standard application:

Series:	RQC20 from Table 80
Rod diameter:	d_N = 80.0 mm
TSS Part No.:	RQC200800 from Table 81

Select the material from Table 78. The corresponding code numbers are appended to the TSS Part No. Together these form the TSS Article Number. The TSS Article Number for all intermediate sizes can be determined by following the example:

TSS Article No. RQC2 0 0800 - M12 N

- Series No.
- Type (Standard)
- Rod Diameter x 10**
- Quality Index (Standard)
- Material Code (Seal Ring)
- Material Code (O-Ring)

** For diameters $d_N \geq$ 1,000.0 mm multiply only by factor 1.
Example: RQC4X for diameter d_N = 1,200.0 mm
TSS Article No.: RQC4**X1200**-M12N

Table 81: Installation Dimensions / TSS Part No.

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size 2 of
40.0	**50.0**	**6.3**	**RQC100400**	**44.12 x 2.62**
42.0	52.0	6.3	RQC100420	47.29 x 2,62
45.0	**55.0**	**6.3**	**RQC100450**	**50.47 x 2.62**
48.0	58.0	6.3	RQC100480	52.07 x 2.62
50.0	**60.0**	**6.3**	**RQC100500**	**55.25 x 2.62**
50.0	**63.0**	**8.3**	**RQC200500**	**56.74 x 3.53**
52.0	62.0	6.3	RQC100520	56.82 x 2.62
55.0	65.0	6.3	RQC100550	59.99 x 2.62
56.0	**66.0**	**6.3**	**RQC100560**	**61.60 x 2.62**
56.0	**69.0**	**8.3**	**RGC200560**	**63.09 x 3.53**
60.0	70.0	6.3	RQC100600	64.77 x 2.62
60.0	73.0	8.3	RQC200600	66.27 x 3.53
63.0	**73.0**	**6.3**	**RQC100630**	**67.95 x 2.62**
63.0	**76.0**	**8.3**	**RQC200630**	**69.44 x 3.53**
65.0	75.0	6.3	RQC100650	69.52 X 2.62
70.0	**80.0**	**6.3**	**RQC100700**	**75.87 X 2.62**
70.0	**83.0**	**8.3**	**RQC200700**	**75.79 X 3.53**
75.0	85.0	6.3	RQC100750	82.22 X 2.62
75.0	88.0	8.3	RQC200750	82.14 X 3.53
80.0	**90.0**	**6.3**	**RQC100800**	**82.22 x 2.62**
80.0	**93.0**	**8.3**	**RQC200800**	**85.32 x 3.53**
85.0	98.0	8.3	RQC200850	91.67 x 3,53
90.0	**100.0**	**6.3**	**RQC100900**	**94.92 x 2.62**
90.0	**103.0**	**8.3**	**RQC200900**	**94.84 x 3.53**
95.0	108.0	8.3	RQC200950	101.19 x 3.53
100.0	**110.0**	**6.3**	**RQC101000**	**101.27 x 2.62**
100.0	**113.0**	**8.3**	**RQC201000**	**104.37 x 3.53**
105.0	118.0	8.3	RQC201050	110.72 x 3.53
110.0	**120.0**	**6.3**	**RQC101100**	**113.97 x 2.62**
110.0	**123.0**	**8.3**	**RQC201100**	**117.07 x 3.53**
115.0	128.0	8.3	RQC201150	120,24 x 3,53
120.0	133.0	8.3	RQC201200	126.59 x 3.53
120.0	138.0	12.3	RQC301200	126.37 x 5.33
125.0	**138.0**	**8.3**	**RQC201250**	**129.77 x 3.53**
125.0	**143.0**	**12.3**	**RQC301250**	**132.72 x 5.33**
130.0	143.0	8.3	RQC201300	136.12 x 3.53
130.0	148.0	12.3	RQC301300	135.89 x 5.33
135.0	148.0	8.3	RQC201350	139.29 x 3.53
135.0	153.0	12.3	RQC301350	142.24 x 5.33
140.0	158.0	12.3	RQC301400	145.42 x 5.33
150.0	168.0	12.3	RQC301500	158.12 x 5.33
160.0	**173.0**	**8.3**	**RQC201600**	**164.69 x 3.53**
160.0	**178.0**	**12.3**	**RQC301600**	**164.47 x 5.33**
170.0	188.0	12.3	RQC301700	177.17 x 5.33
180.0	**198.0**	**12.3**	**RQC301800**	**183.52 x 5.33**
190.0	208.0	12.3	RQC301900	196.22 x 5.33
200.0	**218.0**	**12.3**	**RQC302000**	**208.92 x 5.33**
220.0	**238.0**	**12.3**	**RQC302200**	**227.97 x 5.33**
230.0	248.0	12.3	RQC302300	234.32 x 5.33
240.0	258.0	12.3	RQC302400	247.02 x 5.33
250.0	**258.0**	**12.3**	**RQC302500**	**253.37 x 5.33**
280.0	298.0	12.3	RQC302800	291.47 x 5.33
300.0	318.0	12.3	RQC303000	304.17 x 5.33
320.0	**338.0**	**12.3**	**RQC303200**	**329.57 x 5.33**
350.0	368.0	12.3	RQC303500	354.97 x 5.33
400.0	418.0	12.3	RQC304000	405.26 x 5.33
420.0	438.0	12.3	RQC304200	430.66 x 5.33
450.0	468.0	12.3	RQC304500	456.06 x 5.33
465.0	496.0	16.3	RQC404650	481.38 x 7.00
480.0	511.0	16.3	RQC404800	494.16 x 7.00
500.0	531.0	16.3	RQC405000	506.86 x 7.00
550.0	581.0	16.3	RQC405500	557.66 x 7.00
600.0	631.0	16.3	RQC406000	608.08 x 7.00
650.0	681.0	16.3	RQC406500	668.00 x 7.00
700.0	731.0	16.3	RQC407000	718.00 x 7.00
750.0	781.0	16.3	RQC407500	768.00 x 7.00
800.0	831.0	16.3	RQC408000	818.00 x 7.00
850.0	881.0	16.3	RQC408500	868.00 x 7.00
900.0	931.0	16.3	RQC409000	918.00 x 7.00
950.0	981.0	16.3	RQC409500	968.00 x 7.00
1,000.0	1,031.0	16.3	RQC4X1000	1,018.00 x 7.00
1,050.0	1,081.0	16.3	RQC4X1050	1,068.00 x 7.00
1,200.0	1,231.0	16.3	RQC4X1200	1,218.00 x 7.00
1,300.0	1,331.0	16.3	RQC4X1300	1,318.00 x 7.00
1,400.0	1,431.0	16.3	RQC4X1400	1,418.00 x 7.00
1,500.0	1,531.0	16.3	RQC4X1500	1,518.00 x 7.00
2,000.0	2,031.0	16.3	RQC4X2000	2,018.00 x 7.00
2,200.0	2,231.0	16.3	RQC4X2200	2,218.00 x 7.00

The rod diameters in **bold** type are in accordance with the recommendations of ISO 3320.

Other dimensions and all intermediate sizes up to 2,200 mm diameter, including imperial (inch) sizes converted to mm, can be supplied.

Zurcon® Wynseal M

Double-acting

Rubber-energized plastic-faced seal

Material:
Turcon®, Zurcon® and Elastomer

■ Zurcon® Wynseal M

■ Description

Zurcon® Wynseal M for rod sealing is a modified machined version of the Zurcon® Wynseal design.

Zurcon® Wynseal M is a double-acting seal consisting of a Zurcon® or Turcon® seal ring and an O-Ring as energizing element - Figure 96.

The seal is designed with a seal edge profile. Two seal edges act as primary seal for pressures from both sides and prevent build-up of hydrodynamic pressure over the seal profile and the risk of blow-by effect. The central sealing and supporting rib increases the sealing effect*.

Radial notches are provided on both sides to provide activation of the energizing O-Ring. These ensure direct pressure loading of the seal under all operating conditions.

Installation groove is identical to that of Turcon® Glyd Ring® .

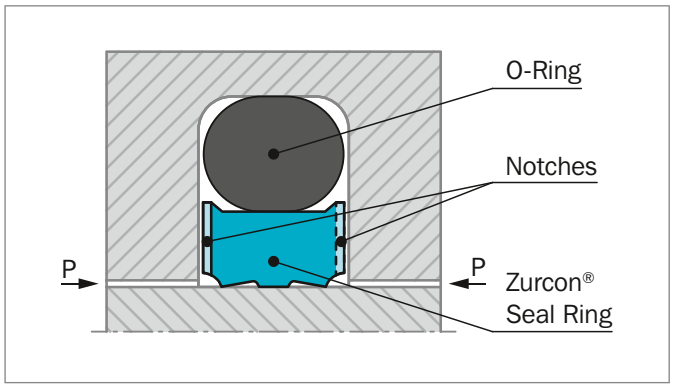

Figure 96: Zurcon® Wynseal M

* Only from RW52 and the following Series No.;
RW50 is without seal edge profile and RW51 is without supporting rib.

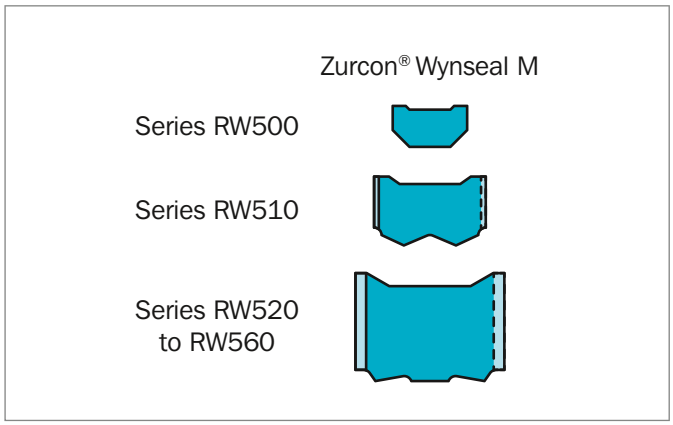

Figure 97: Zurcon® Wynseal M series profile

ADVANTAGES

- High static and dynamic sealing effect
- High abrasion resistance (Zurcon® materials)
- Simple groove design, one-piece piston possible
- Diameter range - from 3 to 2,600 mm
- Fits Stepseal® 2K groove as well as ISO 7425-2 seal housing
- Low friction
- Higher temperature (Turcon® materials)
- Higher pressure
- High chemical resistance

APPLICATION EXAMPLES

Zurcon® Wynseal M is used as double acting rod seal for hydraulic components in applications such as:

- Machine tools
- Forklifts & handling machinery
- Agriculture
- Industrial hydraulics light to medium duty

OPERATING CONDITIONS

Pressure:	Up to 50 MPa
Speed:	Up to 10 m/s
Temperature:	-45 °C to +200 °C depending on seal and O-Ring material
Media:	Mineral oil-based hydraulic fluids, flame retardant hydraulic fluids, environmentally friendly hydraulic fluids (bio-oils), phosphate ester, water and others, depending on temperature, seal and O-Ring material compatibility - see Table 82.
Clearance:	The maximum permissible radial clearance S_{max} is shown in Table 83, as a function of the operating pressure and functional diameter.

IMPORTANT NOTE

The above data are maximum values and cannot be used at the same time, e.g. the maximum operating speed depends on material type, pressure, temperature and gap value. Temperature range also depends on media.

INSTALLATION INSTRUCTIONS

Wynseal® M is installed according to information on page 37 to page 38.

Closed groove installation applies same dimensions as for Turcon® Stepseal® 2K in Table 6 page 38.

RECOMMENDED MATERIALS

The following material combinations have proven effective for hydraulic applications:

Turcon® Wynseal M in Zurcon® Z54
For light to medium hydraulic applications with linear movements in mineral oils and other media with good lubrication:

O-Ring:	NBR 70 Shore A N
Set code:	Z54N

Turcon® Wynseal M in Turcon® M12
All round material for light to heavy hydraulic applications with linear, short stroke or helical movements in mineral oils, flame retardant hydraulic fluids, phosphate ester, bio-oils or fluids having low lubricating properties:

O-Ring:	NBR 70 Shore A N FKM 70 Shore A V
Set code:	M12N or M12V

For specific applications, all Turcon® materials are available.

Other material combinations are listed in Table 82.

Table 82: Turcon® and Zurcon® Materials for Zurcon® Wynseal M

Material, Applications, Properties	Code	O-Ring Material Shore A	Code	O-Ring Operating Temp.* °C	Mating Surface Material	MPa max. Dyna-mic
Turcon® M12 First material choice for seals in linear motion Overall improved properties For new constructions and updating For all commonly applied hydraulic fluids including fluids with low lubrication performance Lowest friction and best sliding properties Lowest wear on seals Improved absorption of abrasive contaminants Low wear or abrasion of counter surface BAM tested Mineral fiber and Additives filled Color: Dark gray	M12	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Steel plated (rod) Cast iron Stainless steel Titanium	35
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
Turcon® T08 For lubricating fluids and linear motion Very high compressive strength and extrusion resistance Hard counter surfaces is recommended Bronze filled Color: Light to dark brown, which may have variations in shading	T08	NBR 70	N	-30 to +100	Steel hardened Steel chrome plated (rod) Cast iron	50
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
Turcon® T40 For lubricating and non-lubricating fluids High frequency and short strokes Water hydraulics Surface texture is not suitable for gas sealing Carbon fiber filled Color: Gray	T40	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Cast iron Stainless steel Aluminum	25
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
		EPDM 70	E**	-45 to +145		
Turcon® T46 For lubricated hydraulics in linear motion High compressive strength High extrusion resistance Very good sliding and wear properties BAM tested Bronze filled Color: Light to dark brown, which may have variations in shading.	T46	NBR 70	N	-30 to +100	Steel hardened Steel chrome plated (rod) Cast iron	35
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		

Table continues on next page

Material, Applications, Properties	Code	O-Ring Material Shore A	Code	O-Ring Operating Temp.* °C	Mating Surface Material	MPa max. Dyna-mic
Zurcon® Z53*** For mineral oil based fluids Very high abrasion and extrusion resistance For counter surface with rougher surface finish Limited chemical resistance Max. working temperature +110 °C Cast polyurethane Color: Yellow to light-brown	Z53	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Cast iron Stainless steel Ceramic coating	45
		NBR 70 Low temp.	T	-45 to +80		
Zurcon® Z54*** For mineral oil based fluids Linear and slowly turning movements High abrasion resistance For counter surface with rougher surface finish Good extrusion resistance Limited chemical resistance Max. working temperature +110 °C Cast polyurethane Color: Turquoise	Z54	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Cast iron Stainless steel Ceramic coating	25
		NBR 70 Low temp.	T	-45 to +80		
Zurcon® Z80 For lubricating and non-lubricating fluids Water based fluids, air and gases Dry air pneumatics High abrasion and extrusion resistance For service in abrasive conditions and media with particles Good chemical resistance Limited temperature capability (-60 to +80 °C) UHMWPE (Ultra High Molecular Weight Polyethylene) Color: White to off-white	Z80	NBR 70	N	-30 to (+100)	Steel Steel hardened Steel chrome plated (rod) Stainless steel Aluminum Bronze Ceramic coating	30
		NBR 70 Low temp.	T	-45 to +80		
		EPDM 70	E**	-45 to (+145)		

* The O-Ring Operation Temperature is only valid in mineral hydraulic oil - except EPDM.

** Material not suitable for mineral oils.

*** Max. diameter 2,200 mm

BAM Tested by “Bundesanstalt Materialprüfung, Germany”

Highlighted materials are recommended.

■ Installation Recommendation

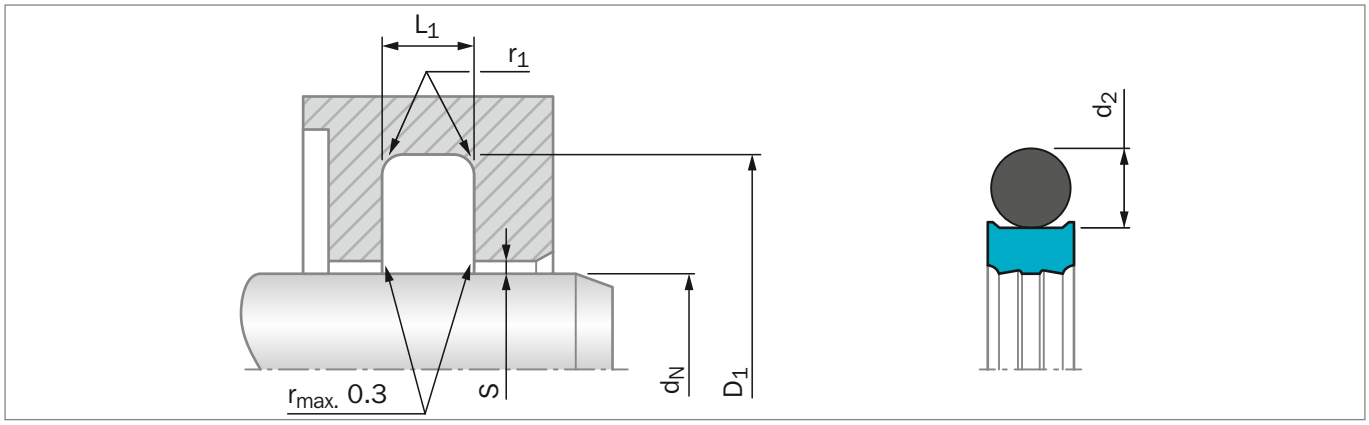

Figure 98: Installation Drawing

Table 83: Installation Dimensions - Standard Recommendations

Series No.	Rod Diameter d_N f8/h9		Groove Diameter*	Groove width	Radius	Radial Clearance S_{max}**			O-Ring Cross Section
	Standard Application	Available Range	D_1 H9	L_1 +0.2/-0	$r_{1\ max}$	10 MPa	20 MPa	40 MPa	d_2
RW500	3 - 7.9	3 - 130.0	d_N + 4.9	2.20	0.4	0.40	0.30	0.20	1.78
RW510	8 - 18.9	8 - 250.0	d_N + 7.3	3.20	0.6	0.60	0.50	0.30	2.62
RW520	19 - 37.9	8 - 450.0	d_N + 10.7	4.20	1.0	0.70	0.50	0.30	3.53
RW530	38 - 199.9	19 - 650.0	d_N + 15.1	6.30	1.3	0.80	0.60	0.40	5.33
RW540	200 - 255.9	38 - 650.0	d_N + 20.5	8.10	1.8	0.80	0.60	0.40	7.00
RW580	256 - 649.9	200 - 999.9	d_N + 24.0	8.10	1.8	0.90	0.70	0.50	7.00
RW550	650 - 999.9	256 - 999.9	d_N + 27.3	9.50	2.5	1.00	0.80	0.60	8.40
RW55X	1,000 - 1,200	-	d_N + 27.3	9.50	2.5	1.00	0.80	0.60	8.40
RW560***	-	650 - 999.9	d_N + 38.0	13.80	3.0	1.20	0.90	0.70	12.00
RW56X***	1,000 - 2,600****	-	d_N + 38.0	13.80	3.0	1.20	0.90	0.70	12.00

* Installation with groove dimensions to ISO 7425-2 is also recommended.
** At pressures > **40 MPa** use diameter tolerance H8/f8 (bore/rod) in the area of the seal or consult your local Trelleborg Sealing Solutions marketing company for alternative material or profiles.
Slydring® / Wear Rings are not applicable at very small radial clearances please consult the Slydring® section in this catalog.
*** O-Rings with 12 mm cross section are delivered as special profile ring.
**** Z53 and Z54 max diameter 2,200 mm

ORDERING EXAMPLE

Zurcon® Wynseal M complete with O-Ring, standard application:

Series:	RW540 from Table 83
Rod Diameter:	d_N = 250.0 mm
TSS Part No.:	RW5402500 from Table 84

Select the material from Table 82. The corresponding code numbers are appended to the TSS Part No. Together these form the TSS Article Number.
The TSS Article Number for all intermediate sizes can be determined by following the example:

TSS Article No. **RW54 0 2500 - M12 N**

- Series No.
- Type (Standard)
- Rod Diameter x 10*****
- Quality Index (Standard)
- Material Code (Seal Ring)
- Material Code (O-Ring)

***** For diameters $d_N \geq$ 1,000.0 mm multiply only by factor 1.
Example: RW56X for diameter d_N = 1,200.0 mm
TSS Article No.: RW56X1200 - M12N

Table 84: Installation Dimensions / TSS Part No.

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
3.0	7.9	2.2	RW5000030	4.47 x 1.78
4.0	**8.9**	**2.2**	**RW5000040**	**5.60 x 1.80**
5.0	**9.9**	**2.2**	**RW5000050**	**6.70 x 1.80**
6.0	**10.9**	**2.2**	**RW5000060**	**7.65 x 1.78**
8.0	**12.9**	**2.2**	**RW5000080**	**9.50 x 1.80**
8.0	**15.3**	**3.2**	**RW5100080**	**10.77 x 2.62**
10.0	**14.9**	**2.2**	**RW5000100**	**11.80 x 1.80**
10.0	**17.3**	**3.2**	**RW5100100**	**12.37 x 2.62**
12.0	**16.9**	**2.2**	**RW5000120**	**13.20 x 1.80**
12.0	**19.3**	**3.2**	**RW5100120**	**14.50 x 2.65**
14.0	**18.9**	**2.2**	**RW5000140**	**15.60 x 1.78**
14.0	**21.3**	**3.2**	**RW5100140**	**17.12 x 2.62**
15.0	19.9	2.2	RW5000150	17.17 x 1.78
15.0	22.3	3.2	RW5100150	17.12 x 2.62
16.0	20.9	2.2	RW5000160	17.17 x 1.78
16.0	**23.3**	**3.2**	**RW5100160**	**18.72 x 2.62**
18.0	**22.9**	**2.2**	**RW5000180**	**19.00 x 1.80**
18.0	**25.3**	**3.2**	**RW5100180**	**20.29 x 2.62**
20.0	**27.3**	**3.2**	**RW5100200**	**21.89 x 2.62**
20.0	**30.7**	**4.2**	**RW5200200**	**23.40 x 3.53**
22.0	**29.3**	**3.2**	**RW5100220**	**25.07 x 2.62**
22.0	**32.7**	**4.2**	**RW5200220**	**26.58 x 3.53**
25.0	**32.3**	**3.2**	**RW5100250**	**26.64 x 2.62**
25.0	**35.7**	**4.2**	**RW5200250**	**29.75 x 3.53**
28.0	**35.3**	**3.2**	**RW5100280**	**29.82 x 2.62**
28.0	**38.7**	**4.2**	**RW5200280**	**32.92 x 3.53**
30.0	37.3	3.2	RW5100300	32.99 x 2.62
30.0	40.7	4.2	RW5200300	34.52 x 3.53
32.0	**39.3**	**3.2**	**RW5100320**	**34.59 x 2.62**
32.0	**42.7**	**4.2**	**RW5200320**	**36.09 x 3.53**
35.0	42.3	3.2	RW5100350	37.77 x 2.62
35.0	45.7	4.2	RW5200350	37.69 x 3.53
36.0	**43.3**	**3.2**	**RW5100360**	**39.34 x 2.62**
36.0	**46.7**	**4.2**	**RW5200360**	**40.87 x 3.53**
40.0	**50.7**	**4.2**	**RW5200400**	**44.04 x 3.53**
40.0	**55.1**	**6.3**	**RW5300400**	**43.82 x 5.33**
42.0	52.7	4.2	RW5200420	47.22 x 3.53
42.0	57.1	6.3	RW5300420	46.99 x 5.33
45.0	**55.7**	**4.2**	**RW5200450**	**50.39 x 3.53**
45.0	**60.1**	**6.3**	**RW5300450**	**50.17 x 5.33**

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
48.0	58.7	4.2	RW5200480	51.50 x 3.55
48.0	63.1	6.3	RW5300480	53.34 x 5.33
50.0	**60.7**	**4.2**	**RW5200500**	**53.57 x 3.53**
50.0	**65.1**	**6.3**	**RW5300500**	**56.52 x 5.33**
52.0	62.7	4.2	RW5200520	56.74 x 3.53
52.0	67.1	6.3	RW5300520	56.52 x 5.33
55.0	65.7	4.2	RW5200550	59.92 x 3.53
55.0	70.1	6.3	RW5300550	59.69 x 5.33
56.0	**66.7**	**4.2**	**RW5200560**	**59.92 x 3.53**
56.0	**71.1**	**6.3**	**RW5300560**	**59.69 x 5.33**
60.0	70.7	4.2	RW5200600	63.09 x 3.53
60.0	75.1	6.3	RW5300600	66.04 x 5.33
63.0	**73.7**	**4.2**	**RW5200630**	**66.27 x 3.53**
63.0	**78.1**	**6.3**	**RW5300630**	**69.22 x 5.33**
65.0	80.1	6.3	RW5300650	69.22 x 5.33
70.0	80.7	4.2	RW5200700	75.79 x 3.53
70.0	**85.1**	**6.3**	**RW5300700**	**75.57 x 5.33**
75.0	85.7	4.2	RW5200750	78.97 x 3.53
75.0	90.1	6.3	RW5300750	81.92 x 5.33
80.0	**90.7**	**4.2**	**RW5200800**	**85.32 x 3.53**
80.0	**95.1**	**6.3**	**RW5300800**	**85.09 x 5.33**
85.0	100.1	6.3	RW5300850	91.44 x 5.33
90.0	**100.7**	**4.2**	**RW5200900**	**94.84 x 3.53**
90.0	**105.1**	**6.3**	**RW5300900**	**94.62 x 5.33**
95.0	105.7	4.2	RW5200950	101.19 x 3.53
95.0	110.1	6.3	RW5300950	100.97 x 5.33
100.0	**110.7**	**4.2**	**RW5201000**	**104.37 x 3.53**
100.0	**115.1**	**6.3**	**RW5301000**	**107.32 x 5.33**
105.0	115.7	4.2	RW5201050	110.72 x 3.53
105.0	120.1	6.3	RW5301050	110.49 x 5.33
110.0	**120.7**	**4.2**	**RW5201100**	**113.89 x 3.53**
110.0	**125.1**	**6.3**	**RW5301100**	**116.84 x 5.33**
110.0	**130.5**	**8.1**	**RW5401100**	**116.84 x 7.00**
115.0	125.7	4.2	RW5201150	120.24 x 3.53
115.0	130.1	6.3	RW5301150	120.02 x 5.33
120.0	130.7	4.2	RW5201200	123.42 x 3.53
120.0	135.1	6.3	RW5301200	126.37 x 5.33
125.0	**135.7**	**4.2**	**RW5201250**	**129.77 x 3.53**
125.0	**140.1**	**6.3**	**RW5301250**	**129.54 x 5.33**
130.0	140.7	4.2	RW5201300	136.12 x 3.53

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
130.0	145.1	6.3	RW5301300	135.89 x 5.33
135.0	145.7	4.2	RW5201350	139.29 x 3.53
135.0	150.1	6.3	RW5301350	139.07 x 5.33
140.0	**150.7**	**4.2**	**RW5201400**	**145.64 x 3.53**
140.0	**155.1**	**6.3**	**RW5301400**	**145.42 x 5.33**
145.0	155.7	4.2	RW5201450	148.82 x 3.53
145.0	160.1	6.3	RW5301450	151.77 x 5.33
150.0	165.1	6.3	RW5301500	158.12 x 5.33
160.0	**175.1**	**6.3**	**RW5301600**	**164.47 x 5.33**
160.0	**180.5**	**8.1**	**RW5401600**	**170.82 x 7.00**
165.0	180.1	6.3	RW5301650	170.82 x 5.33
170.0	180.7	4.2	RW5201700	177.39 x 3.53
170.0	185.1	6.3	RW5301700	177.17 x 5.33
175.0	190.1	6.3	RW5301750	183.52 x 5.33
180.0	**190.7**	**4.2**	**RW5201800**	**183.74 x 3.53**
180.0	**195.1**	**6.3**	**RW5301800**	**183.52 x 5.33**
180.0	**200.5**	**8.1**	**RW5401800**	**189.87 x 7.00**
190.0	200.7	4.2	RW5201900	196.44 x 3.53
190.0	205.1	6.3	RW5301900	196.22 x 5.33
200.0	215.1	6.3	RW5302000	208.92 x 5.33
200.0	**220.5**	**8.1**	**RW5402000**	**208.90 x 7.00**
210.0	225.1	6.3	RW5302100	215.27 x 5.33
220.0	**235.1**	**6.3**	**RW5302200**	**227.97 x 5.33**
220.0	**240.5**	**8.1**	**RW5402200**	**227.97 x 7.00**
230.0	245.1	6.3	RW5302300	234.32 x 5.33
230.0	250.5	8.1	RW5402300	240.67 x 7.00
240.0	255.1	6.3	RW5302400	247.02 x 5.33
240.0	260.5	8.1	RW5402400	253.37 x 7.00
250.0	**270.5**	**8.1**	**RW5402500**	**266.07 x 7.00**
260.0	284.0	8.1	RW5802600	266.07 x 7.00
270.0	290.5	8.1	RW5402700	278.77 x 7.00
270.0	294.0	8.1	RW5802700	278.77 x 7.00
280.0	300.5	8.1	RW5402800	291.47 x 7.00
280.0	**304.0**	**8.1**	**RW5802800**	**291.47 x 7.00**
300.0	324.0	8.1	RW5803000	316.87 x 7.00
320.0	**344.0**	**8.1**	**RW5803200**	**329.57 x 7.00**
350.0	370.5	8.1	RW5403500	354.97 x 7.00
350.0	374.0	8.1	RW5803500	367.67 x 7.00
360.0	**384.0**	**8.1**	**RW5803600**	**367.67 x 7.00**
400.0	420.5	8.1	RW5404000	405.26 x 7.00

Rod Dia. d_N f8/h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
400.0	424.0	8.1	RW5804000	417.96 x 7.00
450.0	474.0	8.1	RW5804500	468.76 x 7.00
500.0	524.0	8.1	RW5805000	506.86 x 7.00
550.0	574.0	8.1	RW5805500	557.66 x 7.00
600.0	624.0	8.1	RW5806000	608.08 x 7.00
650.0	677.3	9.5	RW5506500	663.00 x 8.40
700.0	724.0	8.1	RW5807000	712.00 x 8.40
800.0	827.3	9.5	RW5508000	813.00 x 8.40
900.0	927.3	9.5	RW5509000	913.00 x 8.40
1,000.0	1,027.3	9.5	RW55X1000	1,013.00 x 8.40
1,000.0	1,038.0	13.8	RW56X1000	1,016.00 x 12.00
1,100.0	1,138.0	13.8	RW56X1100	1,116.00 x 12.00
1,200.0	1,227.3	9.5	RW55X1200	1,213.00 x 8.40
1,200.0	1,238.0	13.8	RW56X1200	1,216.00 x 12.00
1,300.0	1,338.0	13.8	RW56X1300	1,316.00 x 12.00
1,500.0	1,538.0	13.8	RW56X1500	1,516.00 x 12.00
2,000.0	2,038.0	13.8	RW56X2000	2,016.00 x 12.00
2,600.0	2,638.0	13.8	RW56X2600	2,616.00 x 12.00

The rod diameters in **bold** type are in accordance with the recommendations of ISO 3320.

Other dimensions and all intermediate sizes up to 2,600 mm diameter including imperial (inch) sizes can be supplied.

All O-Rings with 12 mm cross section are delivered as special profile ring.

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Turcon® Double Delta®

Double-acting

Rubber-energized plastic-faced seal

For O-Ring Grooves

Material:
Turcon®, Zurcon® and Elastomer

■ Turcon® Double Delta®

■ Description

Turcon® Double Delta® is a rubber energized plastic faced seal, designed to expand and significantly improve the service parameters of O-Rings. Double Delta® can be installed in existing O-Ring grooves.

Double Delta® combines the flexibility and responsiveness of O-Rings with the wear and friction characteristics of the Turcon® materials in dynamic applications.

The double-acting performance of the seal follows from the symmetrical cross section which allows the seal to respond to pressure in both directions - Figure 99.

Initial contact pressure is provided by radial compression of the O-Ring. When the system pressure is increased the O-Ring transforms this into additional contact pressure, the contact pressure of the seal is thereby automatically adjusted so sealing is ensured under all service conditions.

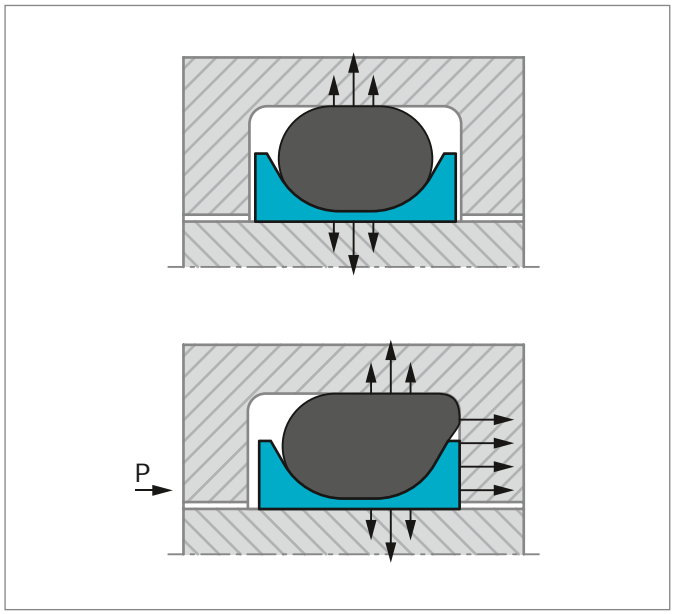


Figure 99: Turcon® Double Delta® without and with pressure

ADVANTAGES

- Compact groove dimensions and simple installation
- Low friction without stick-slip
- Resistance against wear and extrusion
- Rod seals available for all diameters from 2 to 999.9 mm
- Standard cross sections cover AS 568A and important metric O-Rings, other cross sections available on request.
- Fits also groove dimensions per ISO 6194 and AS 4716

APPLICATION EXAMPLES

Turcon® Double Delta® is used as double-acting seal for hydraulic and pneumatic components in applications such as:

- Machine tools
- Handling devices
- Valves
- Chemical processing equipment

It is particular recommended for light duty and small diameter applications.

OPERATING CONDITIONS

Pressure:	Up to 35 MPa
Speed:	Up to 15 m/s
Temperature:	-45 °C to +200 °C according to O-Ring material
Media:	Mineral oil-based hydraulic fluids, flame retardant hydraulic fluids, environmentally friendly hydraulic fluids (bio-oils), phosphate ester, water and others, depending on temperature, seal and O-Ring material compatibility - see Table 86
Clearance:	The maximum permissible radial clearance S_{max} is shown in Table 87, as a function of the operating pressure and functional diameter.

IMPORTANT NOTE

The above data are maximum values and cannot be used at the same time, e.g. the maximum operating speed depends on material type, pressure, temperature and gap value. Temperature range also depends on media.

NOTCH

Double Delta® is as standard supplied without radial notches, as the thin radial section of the seal gives good response to pressure variations.

For diameters from 2 mm, notches on both sides are optional. These ensure direct pressurizing of the seal under all operating conditions.

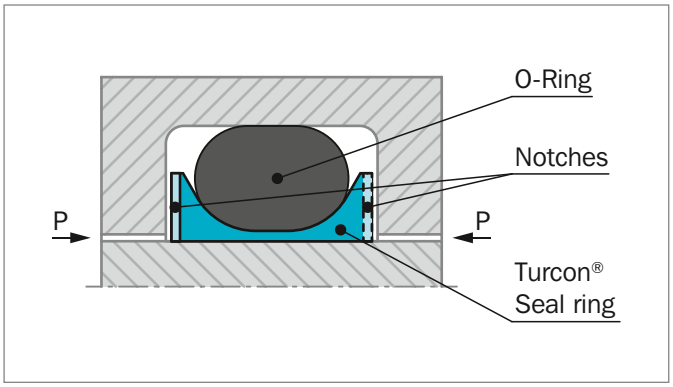


Figure 100: Turcon® Double Delta® with notches

INSTALLATION INSTRUCTIONS

Double Delta® is installed according to information on page 40.

RECOMMENDED MATERIALS

The following material combinations have proven effective for hydraulic applications:

Turcon® Double Delta ® in Turcon® M12
All round material for light to medium hydraulic applications with linear or helical movements in mineral oils, flame retardant hydraulic fluids, phosphate ester, bio-oils or fluids having low lubricating properties:

O-Ring:	NBR 70 Shore A	N
	FKM 70 Shore A	V
	EPDM 70 Shore A	E

Set code: M12N, M12V or M12E

Turcon® Double Delta® in Turcon® T46
For light to medium applications with linear movements in mineral oils and other media with good lubrication:

O-Ring:	NBR 70 Shore A	N
	FKM 70 Shore A	V

Set code: T46N or T46V

For specific applications, all Turcon® materials are available.

Other material combinations are listed in Table 85.

Table 85: Turcon® and Zurcon® Materials for Turcon® Double Delta®

Material, Applications, Properties	Code	O–Ring Material Shore A	Code	O-Ring Operating Temp.* °C	Mating Surface Material	MPa max. Dyna-mic
Turcon® M12 First material choice for seals in linear motion Overall improved properties For new constructions and updating For all commonly applpied hydraulic fluids including fluids with low lubrication performance Lowest friction and best sliding properties Lowest wear on seals Improved absorption of abrasive contaminants Low wear or abrasion of counter surface BAM tested Mineral fiber and Additives filled Color: Dark gray	M12	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod Steel plated (rod) Cast iron Stainless Steel Titanium	35
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
Turcon® T05 For lubricating fluids Also for gas service Very low friction Very good sliding and sealing properties Color: Turquoise	T05	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod)	20
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
Turcon® T24 For lubricating and non-lubricating hydraulic fluids Good sealing function Moderate extrusion resistance Carbon filled Color: Black	T24	NBR 70	N	-30 to +100	Steel Steel hardened Steel chrome plated (rod) Cast iron Stainless steel Aluminum	25
		NBR 70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		
		EPDM 70	E**	-45 to +145		
Turcon® T46 For lubricated hydraulics in linear motion High compressive strength High extrusion resistance Very good sliding and wear properties BAM tested Bronze filled Color: Light to dark brown, which may have variations in shading	T46	NBR 70	N	-30 to +100	Steel hardened Steel chrome plated (rod) Cast iron	35
		NBR-70 Low temp.	T	-45 to +80		
		FKM 70	V	-10 to +200		

Table continues on next page

Material, Applications, Properties	Code	O–Ring Material Shore A	Code	O-Ring Operating Temp.* °C	Mating Surface Material	MPa max. Dyna-mic
Zurcon® Z80 For lubricating and non-lubricating fluids Water based fluids, air and gases Dry air pneumatics High abrasion and extrusion resistance For service in abrasive conditions and media with particles Good chemical resistance Limited temperature capability (-60 to +80 °C) UHMWPE (Ultra High Molecular Weight PE) Color: White to off-white	Z80	NBR 70	N	-30 to (+100)	Steel Steel hardened Steel chrome plated (rod) Stainless steel Aluminum Ceramic coating	30
		NBR 70 Low temp.	T	-45 to +80		
		EPDM 70	E**	-45 to(+145)		

* The O-Ring Operation Temperature is only valid in mineral hydraulic oil (except EPDM).

** Material not suitable for mineral oils.

BAM: Tested by “Bundesanstalt Materialprüfung, Germany”

Highlighted materials are recommended.

■ Installation Recommendation

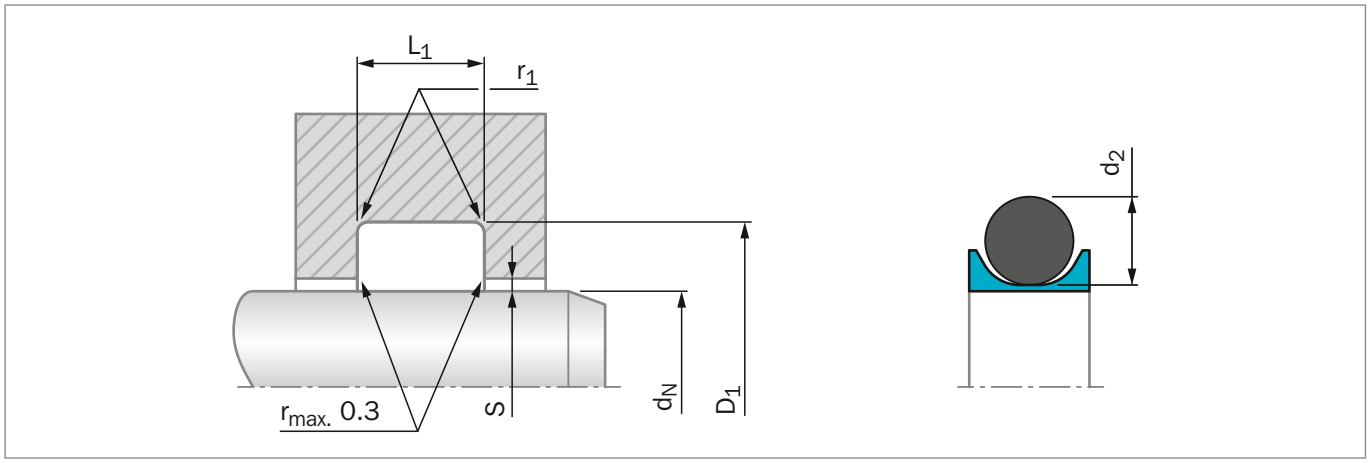


Figure 101: Installation Drawing

Table 86: Installation Dimensions

Series No.	Rod Diameter d_N f8/h9		Groove Diameter	Groove Width	Radius	Radial Clearance S_{max}*				O-Ring Cross Section
	Standard Application	Available Range	D_1 H9	L_1 +0.2	r_1 max	2 MPa	10 MPa	20 MPa	35 MPa	d_2
RDD0	4 - 9.9	2 - 129.9	d_N + 2.9	2.4	0.4	0.10	0.10	0.08	0.05	1.78
RDD1	10 - 19.9	5 - 249.9	d_N + 4.5	3.6	0.4	0.15	0.15	0.10	0.07	2.62
RDD2	20 - 39.9	5 - 449.9	d_N + 6.2	4.8	0.6	0.25	0.20	0.15	0.08	3.53
RDD3	40 - 119.9	12 - 649.9	d_N + 9.4	7.1	0.8	0.35	0.25	0.20	0.10	5.33
RDD4	120 - 649.9	60 - 999.9	d_N + 12.2	9.5	0.8	0.50	0.30	0.25	0.15	7.00
RDD5	650 - 999.9	110 - 999.9	d_N + 15.0	10.0	1.0	0.60	0.40	0.30	0.20	8.40

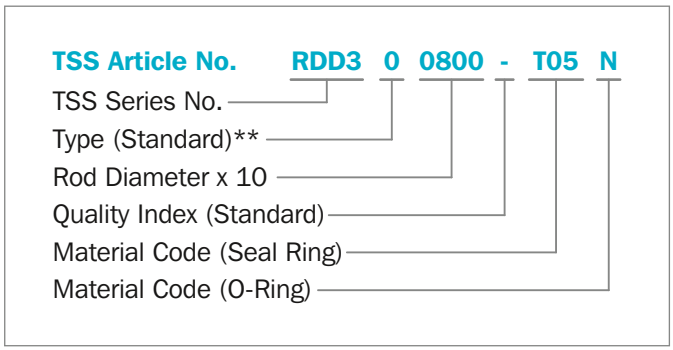
*Slydring® / Wear Rings are not applicable at very small radial clearances please consult the Slydring® section in this catalog.

ORDERING EXAMPLE

Double Delta® complete with O-Ring, standard application:

Series:	RDD3 from Table 86
Rod diameter:	d_N = 80.0 mm
TSS Part No.:	RDD300800 from Table 87

Select the material from Table 85. The corresponding code numbers are appended to the Part No. Together these form the TSS Article Number.
For seals for other groove widths/dimensions please refer to Table 78.
The TSS Article Numer for all intermediate sizes can be determined by following the example:



** "N" for seals with notches. Available at diameters from 2.0 mm.

Table 87: Installation Dimensions / TSS Part No.

Rod Dia. d_N h9	Groove Dia. D_1 H9	Groove Width L_1 +0.2	TSS Part No.	O-Ring Size
3.0	5.9	2.4	RDD000030	2.90 x 1.78
4.0	**6.9**	**2.4**	**RDD000040**	**3.68 x 1.78**
5.0	**7.9**	**2.4**	**RDD000050**	**4.80 x 1.80**
6.0	**8.9**	**2.4**	**RDD000060**	**5.60 x 1.80**
8.0	**10.9**	**2.4**	**RDD000080**	**7.65 x 1.78**
9.9	**12.8**	**2.4**	**RDD000099**	**9.50 x 1.80**
10.0	**14.5**	**3.6**	**RDD100100**	**10.77 x 2.62**
12.0	**16.5**	**3.6**	**RDD100120**	**12.37 x 2.62**
14.0	**18.5**	**3.6**	**RDD100140**	**13.94 x 2.62**
15.0	19.5	3.6	RDD100150	14.50 x 2.65
16.0	**20.5**	**3.6**	**RDD100160**	**15.54 x 2.62**
18.0	**22.5**	**3.6**	**RDD100180**	**18.00 x 2.65**
20.0	**26.2**	**4.8**	**RDD200200**	**20.22 x 3.53**
22.0	**28.2**	**4.8**	**RDD200220**	**21.82 x 3.53**
25.0	**31.2**	**4.8**	**RDD200250**	**25.00 x 3.53**
28.0	**34.2**	**4.8**	**RDD200280**	**28.17 x 3.53**
30.0	36.2	4.8	RDD200300	29.75 x 3.53
32.0	**38.2**	**4.8**	**RDD200320**	**31.35 x 3.53**
35.0	41.2	4.8	RDD200350	34.52 x 3.53
36.0	**42.2**	**4.8**	**RDD200360**	**36.09 x 3.53**
40.0	**49.4**	**7.1**	**RDD300400**	**40.64 x 5.33**
42.0	51.4	7.1	RDD300420	43.82 x 5.33
45.0	**54.4**	**7.1**	**RDD300450**	**43.82 x 5.33**
48.0	57.4	7.1	RDD300480	46.99 x 5.33
50.0	**59.4**	**7.1**	**RDD300500**	**50.17 x 5.33**
52.0	61.4	7.1	RDD300520	53.34 x 5.33
55.0	64.4	7.1	RDD300550	56.52 x 5.33
56.0	**65.4**	**7.1**	**RDD300560**	**56.52 x 5.33**
60.0	69.4	7.1	RDD300600	59.69 x 5.33
63.0	**72.4**	**7.1**	**RDD300630**	**62.87 x 5.33**
65.0	74.4	7.1	RDD300650	66.04 x 5.33
70.0	**79.4**	**7.1**	**RDD300700**	**69.22 x 5.33**
80.0	**89.4**	**7.1**	**RDD300800**	**78.74 x 5.33**
85.0	94.4	7.1	RDD300850	85.09 x 5.33
90.0	**99.4**	**7.1**	**RDD300900**	**91.44 x 5.33**
95.0	104.4	7.1	RDD300950	94.62 x 5.33
100.0	**109.4**	**7.1**	**RDD301000**	**100.97 x 5.33**
105.0	114.4	7.1	RDD301050	104.14 x 5.33
110.0	**119.4**	**7.1**	**RDD301100**	**110.49 x 5.33**
115.0	124.4	7.1	RDD301150	116.84 x 5.33
120.0	132.2	9.5	RDD401200	120.02 x 7.00
125.0	**137.2**	**9.5**	**RDD401250**	**126.37 x 7.00**
130.0	142.2	9.5	RDD401300	129.54 x 7.00
135.0	147.2	9.5	RDD401350	135.89 x 7.00
140.0	**152.2**	**9.5**	**RDD401400**	**139.07 x 7.00**
150.0	162.2	9.5	RDD401500	148.59 x 7.00
160.0	**172.2**	**9.5**	**RDD401600**	**164.47 x 7.00**
170.0	182.2	9.5	RDD401700	170.82 x 7.00
180.0	**192.2**	**9.5**	**RDD401800**	**183.52 x 7.00**
190.0	202.2	9.5	RDD401900	189.87 x 7.00
200.0	**212.2**	**9.5**	**RDD402000**	**202.57 x 7.00**
210.0	222.2	9.5	RDD402100	208.90 x 7.00
220.0	**232.2**	**9.5**	**RDD402200**	**227.97 x 7.00**
230.0	242.2	9.5	RDD402300	240.67 x 7.00
240.0	252.2	9.5	RDD402400	240.67 x 7.00
250.0	**262.2**	**9.5**	**RDD402500**	**253.37 x 7.00**
280.0	**292.2**	**9.5**	**RDD402800**	**278.77 x 7.00**
300.0	312.2	9.5	RDD403000	304.17 x 7.00
320.0	**332.2**	**9.5**	**RDD403200**	**329.57 x 7.00**
350.0	362.2	9.5	RDD403500	354.97 x 7.00
360.0	**372.2**	**9.5**	**RDD403600**	**367.67 x 7.00**
400.0	412.2	9.5	RDD404000	405.26 x 7.00
500.0	512.2	9.5	RDD405000	506.86 x 7.00
600.0	612.2	9.5	RDD406000	608.08 x 7.00
650.0	665.0	10.0	RDD506500	650.00 x 8.40
700.0	715.0	10.0	RDD507000	700.00 x 8.40
800.0	815.0	10.0	RDD508000	800.00 x 8.40
900.0	915.0	10.0	RDD509000	900.00 x 8.40
950.0	965.0	10.0	RDD509500	950.00 x 8.40

The rod diameters in **bold** type correspond to the recommendations of ISO 3320.

TSS Part No. for other dimensions and **all** intermediate sizes up to 999.9 mm diameter including imperial (inch) sizes can be supplied.

Larger sizes up to 2,600 mm available upon request.

■ Turcon® Double Delta® for one Back-up Ring groove

Double Delta® is available for designs where grooves for O-Ring with one Back-up Ring are used according to Table 88.

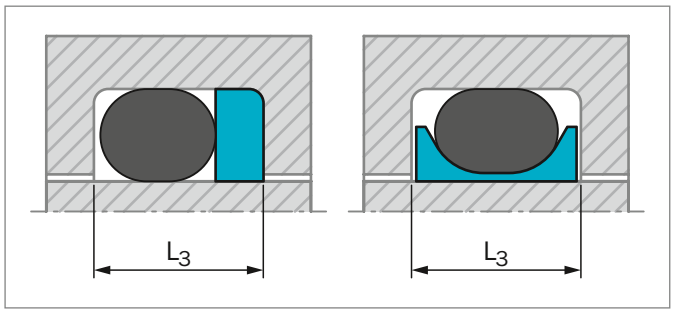


Figure 102: Groove width

Table 88: Seals for one Back-up Ring groove

Series No.	Groove Width	Execution Mark 5th digit		O-Ring Cross Section
	L_3	Without Notch	With Notch*	d_2
RDA0	3.80	0	N	1.78
RDA1	4.65	0	N	2.62
RDA2	5.70	0	N	3.53
RDA3	8.50	0	N	5.33
RDA4	11.20	0	N	7.00
RDA5	12.50	0	N	8.40

* Available for diameters from 8 mm

ORDERING EXAMPLE

Double Delta® complete with O-Ring, standard application:

Rod diameter:	d_N = 80.0 mm
Groove diameter:	89.4 mm
Groove width:	8.5 mm
TSS Article No.:	RDA300800-M12N

TSS Article No. RDA3 0 0800 - M12 N

- TSS Series No.**
- Type (Standard)***
- Rod Diameter x 10
- Quality Index (Standard)
- Material Code (Seal Ring)****
- Material Code (O-Ring)*****

** From Table 88 or Table 89
*** N for seals with notches, available from dia. 8 mm
**** From Table 85
***** From Table 85

■ Turcon® Double Delta® for Metric O-Rings

Double Delta® is available for installation in grooves for metric O-Rings as listed in Table 89.

Table 89: Rod Seals for Metric O-Ring Grooves

O-Ring Cross Section	Groove Diameter	Groove Width	Series No.	Execution Mark 5th digit		Available Range
d_2	D_1 H9	L_1 +0.2		Standard	Notch*	
2.00	d_N + 3.3	2.7	RD2A	0	N	3.0 - 100.0
2.40	d_N + 4.1	3.2	RD2E	0	N	5.0 - 160.0
2.50	d_N + 4.3	3.3	RD2F	0	N	5.0 - 160.0
3.00	d_N + 5.2	4.0	RD3A	0	N	6.0 - 200.0
4.00	d_N + 7.0	5.2	RD4A	0	N	8.0 - 300.0
5.00	d_N + 8.8	6.6	RD5A	0	N	12.0 - 400.0
5.70	d_N + 10.0	7.2	RD5H	0	N	12.0 - 649.9

* Available for diameters from 8 mm

Additional Seals

Available upon Request

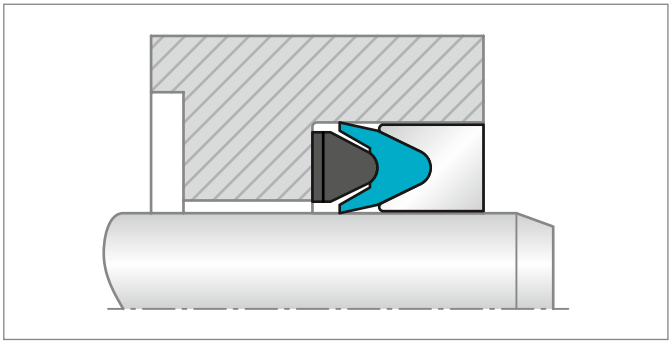
Old Series

Special Series

POLYPAC® VA

Seal for high pressure volumetric water pump. It's made with a special grade NBR+FABRIC. High sealing efficiency and wear resistance.

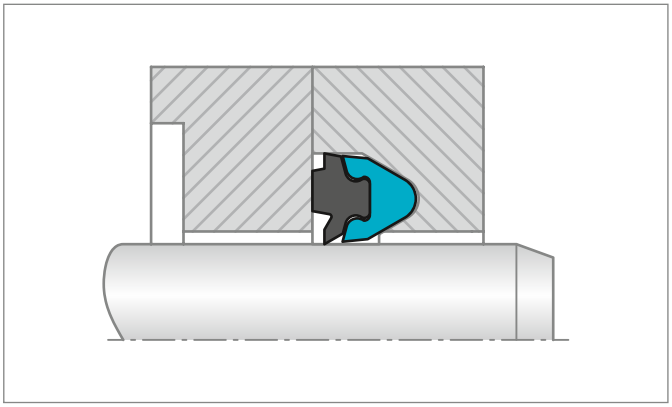
Diameter Range mm	Pressure Range MPa	Temperature Range °C	Velocity m/s
15 - 70	Up to 40	Up to +80	Up to 2



POLYPAC® VB

Seal for low pressure volumetric water pumps. It's made with a NBR rubber gasket clamped on a softer NBR+FABRIC V-ring shape. These seals in combination with VA seals for high pressure improve the performance of the sealing system in high pressure water pump applications.

Diameter Range mm	Pressure Range MPa	Temperature Range °C	Velocity m/s
13 - 60	-	Up to +80	Up to 2

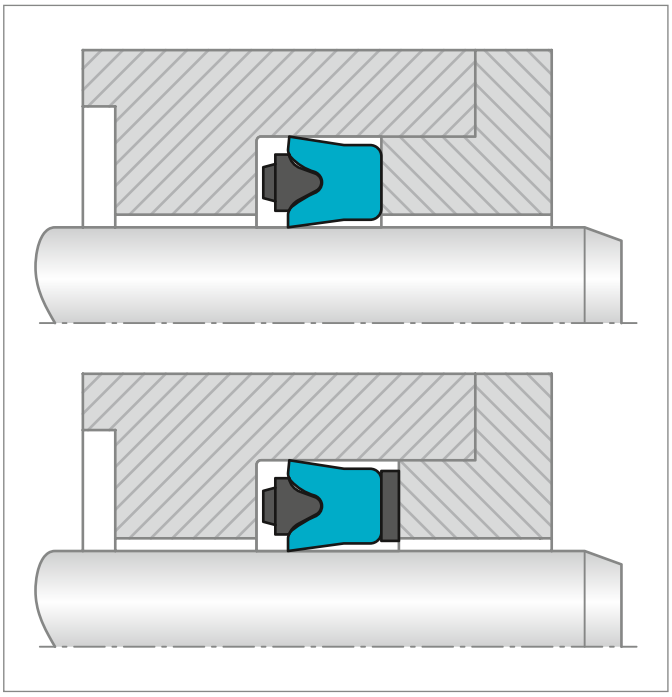


POLYPAC® DS - CX95 AND DS/TE - CX95

The seals DS and DS/TE are designed to improve the water cleaning equipment's performance.

The special profile can withstand the frequent pressure variations, high temperatures and critical lubrication. The U shaped sealing element is made out of cotton fabric reinforced NBR and provide with a NBR energizer ring a good sealing performance at high as low pressure working conditions. The version DS/TE with bronze filled PTFE Back-up Ring permits working at high pressures.

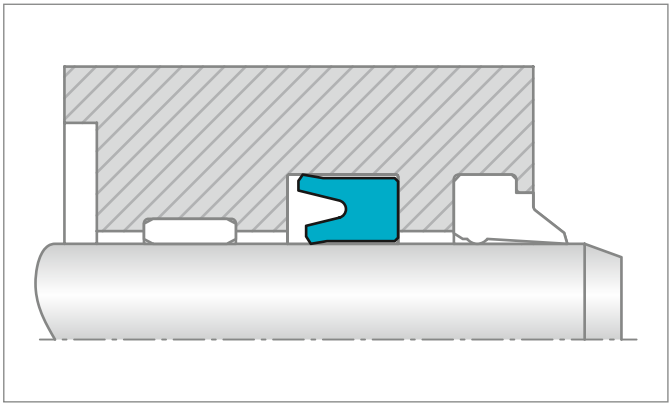
Diameter Range mm	Pressure Range MPa	Temperature Range °C	Velocity m/s
15 - 40	Up to 40 for DS/TE Up to 10 for DS	Up to +80	Up to 2



U-CUP RU0

Single lip U-Cup used as primarily seals for piston rods in hydraulic cylinders. U-Cups in polyurethane are proven elements, due to their good mechanical properties, for standard cylinder construction, particularly for mobile hydraulics under rough operating conditions.

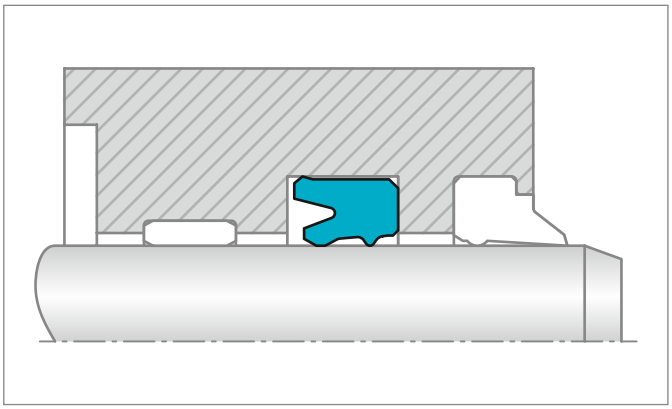
Diameter Range mm	**Pressure Range** MPa	**Temperature Range (Z20)** °C	**Velocity** m/s
6 - 280	Up to 40	-35 to +110	Up to 0.5



U-CUP RU3

Double lip U-Cup used as primarily seals for piston rods in hydraulic cylinders. U-Cups in polyurethane are proven elements, due to their good mechnical properties, for standard cylinder construction, particularily for mobile hydraulics under rough operating conditions.

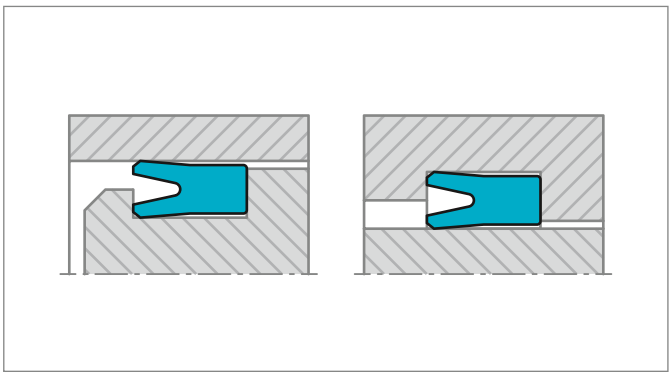
Diameter Range mm	**Pressure Range** MPa	**Temperature Range (Z20)** °C	**Velocity** m/s
12 - 200	Up to 40	-35 to +110	Up to 0.5



U-CUP RUB

These seals have a symmetrical configuration of the sealing lips and are mainly used in single acting or double acting standard hydraulic cylinders, particularily for mobile hydraulics under rough operating conditions.

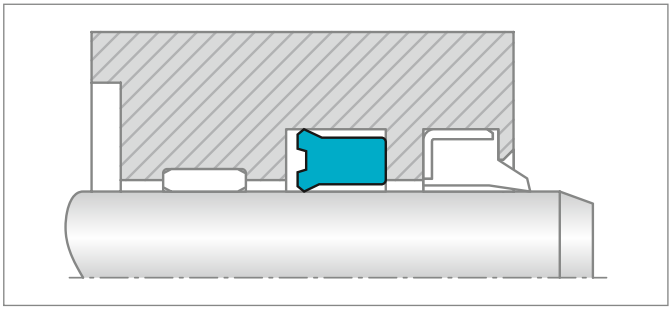
Diameter Range mm	**Pressure Range** MPa	**Temperature Range (Z20)** °C	**Velocity** m/s
5 - 290	Up to 40	-35 to +110	Up to 0.5



U-CUP RU1

Compact U-Cup of Zurcon® Polyurethane with only a dynamic sealing lip for small Installation Dimensions.

Diameter Range mm	Pressure Range MPa	Temperature Range (Z20) °C	Velocity m/s
10 - 170	Up to 40	-35 to +110	Up to 0.5

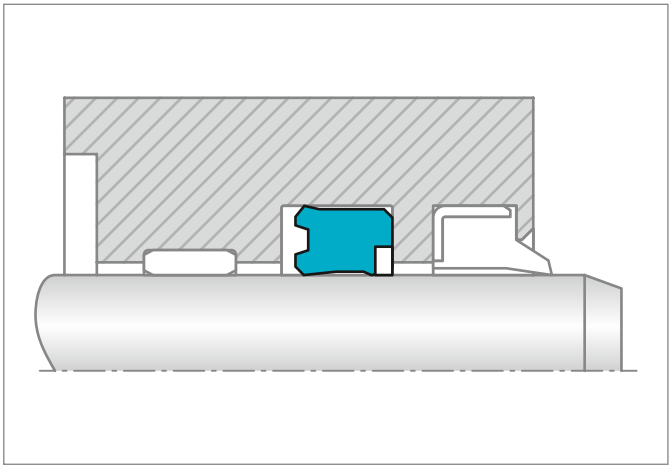


U-CUP RU2B

The compact U-Cup type RU2B is designed for small grooves. It is thus particularly suitable for use in space-saving designs. The compact form provides a high sealing effect even with low system pressures.

For larger gaps and high pressure peaks, the U-Cup RU2B has an integrated Back-up Ring.

Diameter Range mm	Pressure Range MPa	Temperature Range (Z20) °C	Velocity m/s
32 - 160	Up to 50	-35 to +110	Up to 0.5

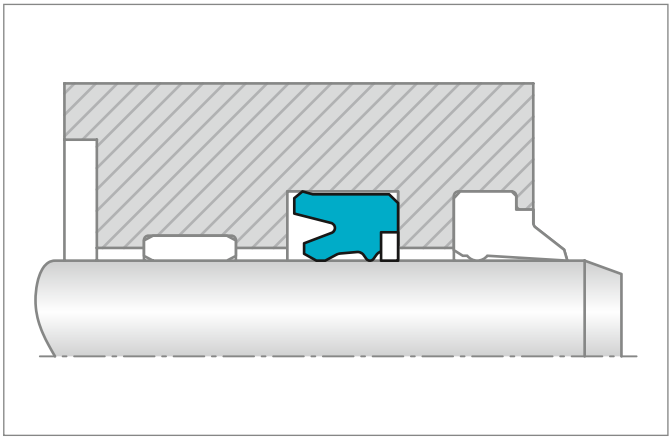


U-CUP RU3B

The U-Cup type RU3B is used as a rod seal for heavy-duty conditions in mobile and industrial hydraulics.

U-Cup RU3B has integrated Back-up Ring to prevent the seal material from extrusion at high temperatures and high peak pressures.

Diameter Range mm	Pressure Range MPa	Temperature Range (Z20) °C	Velocity m/s
40 - 171	Up to 50	-35 to +110	Up to 0.5



TURCON® STEPSEAL® 2A

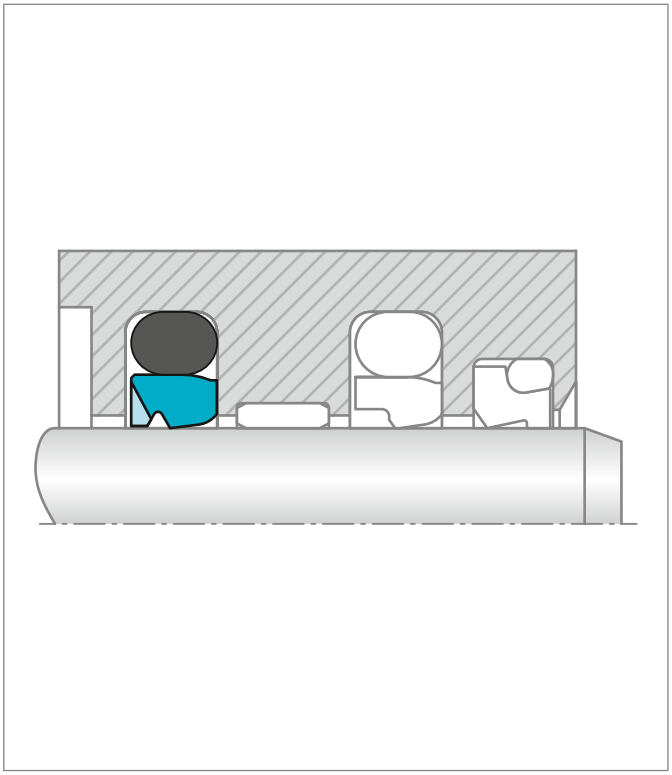
Single-acting primary seal for applications requiring stabilized seal position in the groove. A further development of Turcon® Stepseal® 2K by adding a stabilizing edge, which prevents the seal from “tilting”, cursed by seal-system pressure build-up between seals, in tandem configuration. It also increases assembly robustness through protection of the seal face during insertion of the rod.

Same high sealing properties as Stepseal® 2K.

Stepseal® 2A is used as primary seal in rod sealing systems preferably together with a secondary seal from the range of Turcon® and Zurcon® seals, a double-acting Excluder® or Scraper.

Installation in the same grooves as Turcon® Stepseal® 2K and grooves according to ISO 7425-2.

Diameter Range mm	**Pressure Range** MPa	**Temperature Range** °C	**Velocity** m/s
12 - 2,600	60	-45 to +200	Up to 15



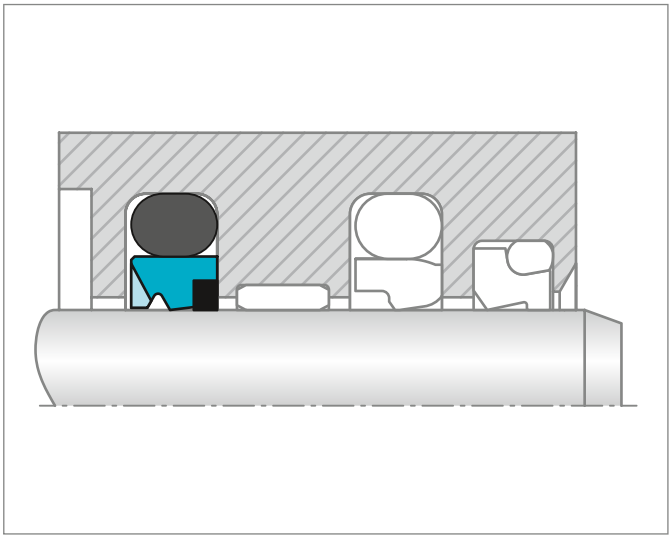
TURCON® STEPSEAL® 2A CR

Single-acting rubber energized rod seal with integrated Back-up Ring for higher pressure or bigger gaps for dynamic applications. High sealing efficiency, low friction with no stick-slip, minimal break out force and high wear resistance.

Installation in the same grooves as Turcon® Stepseal® 2K and grooves according to ISO 7425-2.

Standard TSS Part Numbers are available (RSB)

Diameter Range mm	**Pressure Range** MPa	**Temperature Range** °C	**Velocity** m/s
30 - 2,600	100	-45 to +200	Up to 5

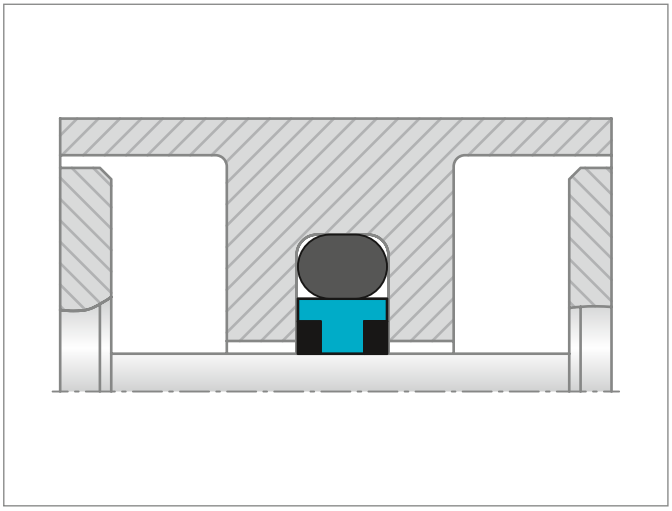


TURCON® GLYD RING® CR

Double-acting rubber energized rod seal for dynamic applications. Low friction with no stick-slip, minimal break out force and high wear resistance with integrated Back-up Rings for higher pressures or larger gaps. Installation in grooves with dimensions according to ISO 7425-2 (the same as for Turcon® Glyd Ring® for piston).

Standard TSS Part Numbers are available (RGR)

Diameter Range mm	Pressure Range MPa	Temperature Range °C	Velocity m/s
30 - 2,600	100	-45 to +200	5

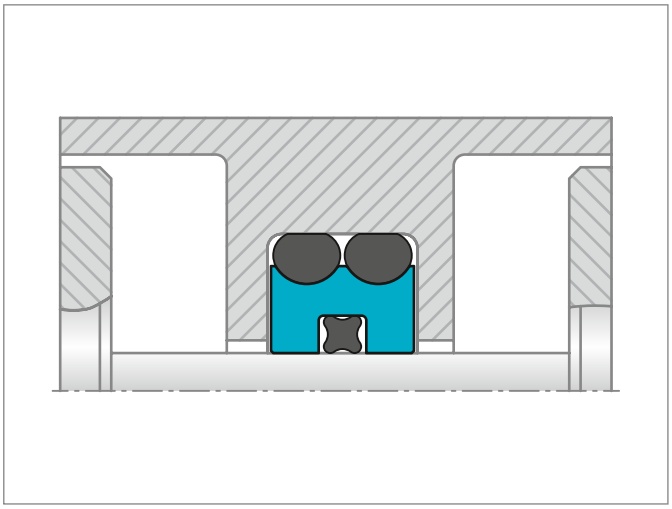


TURCON® AQ-SEAL® 5

A further development of the standard Turcon® AQ-Seal® double-acting seal for sealing between two media, e.g. fluid/gas separation by incorporating a limited footprint elastomer Quad-Ring® seal in the dynamic sealing face. Energized by two O-rings to improve sealing behaviour. Same groove dimensions as Turcon® AQ-Seal® 5 Bean Seal.

Standard TSS Part Numbers are available (RQ2)

Diameter Range mm	Pressure Range MPa	Temperature Range °C	Velocity m/s
40 - 700	60	-45 to +200	3

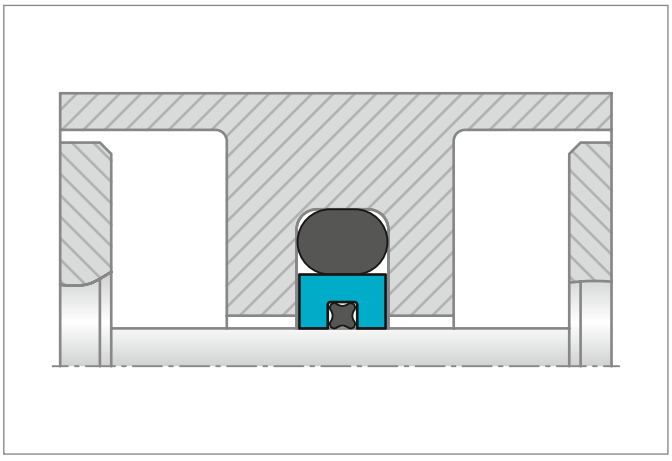


TURCON® AQ-SEAL®

A double-acting rubber energized seal for sealing between two media, e.g. fluid/gas seperation by incorporating a limited footprint elastomer Quad-Ring® seal inset into the dynamic sealing face. Installation in the same groove as Turcon® AQ-Seal® Bean Seal.

Standard TSS Part Numbers are available (RQ1)

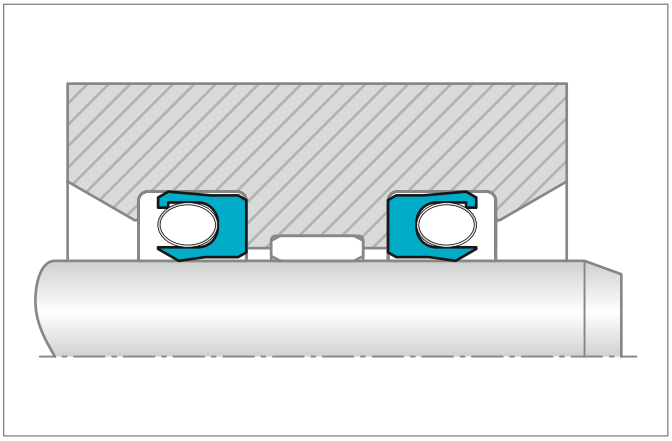
Diameter Range mm	Pressure Range MPa	Temperature Range °C	Velocity m/s
16 - 2,600	50	-45 to +200	2



TURCON® VARISEAL® W

The Turcon® Variseal® W is a single acting rod seal energized by a special helical spring. The advantage of the Turcon® Variseal® W lies in its low friction and constant preloading force over a relatively large deformation range. The Turcon® Variseal® W is used wherever friction has to be kept within a narrow tolerance zone.

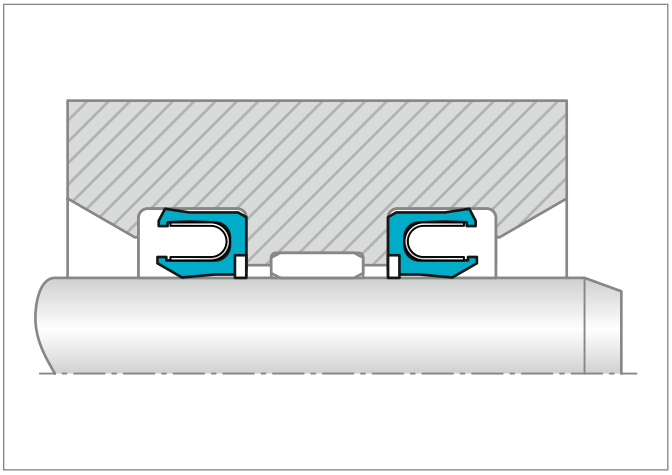
Diameter Range mm	Pressure Range MPa	Temperature Range °C	Velocity m/s
6 - 2,600	45	-70 to +200	15



TURCON® VARISEAL® M2 CR

Single-acting sealing element comprising a U-shaped Turcon® ring and stainless energising finger spring. Low friction with no stick-slip, minimal break out force and high wear resistance. Resistant to most liquids and chemical. Unlimited shelf life. For higher pressure applications or larger extrusion gaps the Variseal® M2 CR has an integrated Back-up Ring in material Zurcon® Z43.

Diameter Range mm	Pressure Range MPa	Temperature Range °C	Velocity m/s
8 - 300	100	-30 to +260	15

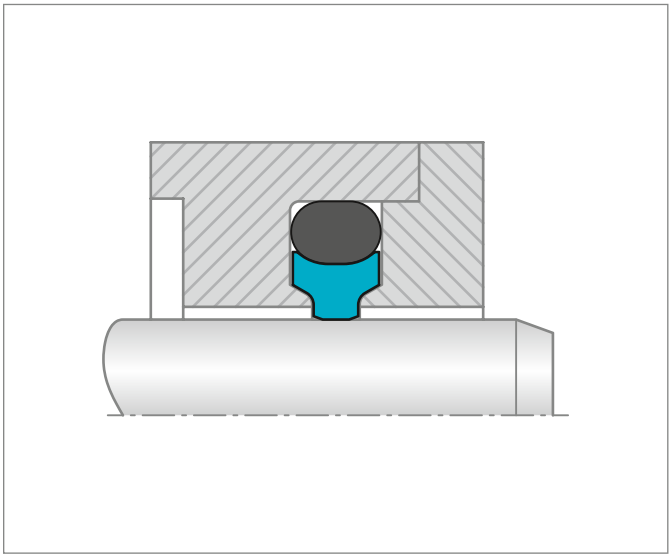


TURCON® CAPTIVE GLYD RING®

A double-acting seal recommended for linear applications. It is designed to pass over holes/ports in the counter surface or to slide across mating surfaces that have dimensional changes from a small diameter with sealing function over the seal to a large diameter with no sealing function or vice versa. Split hardware is required and prevents the seal from pulling out the groove while passing over ports or variable diameter counter parts.

Standard TSS Part Numbers are available (RGC)

Diameter Range mm	Pressure Range MPa	Temperature Range °C	Velocity m/s
6 - 2,600	Up to 60	-45 to +200	Up to 15



TURCON® BUFFER RING

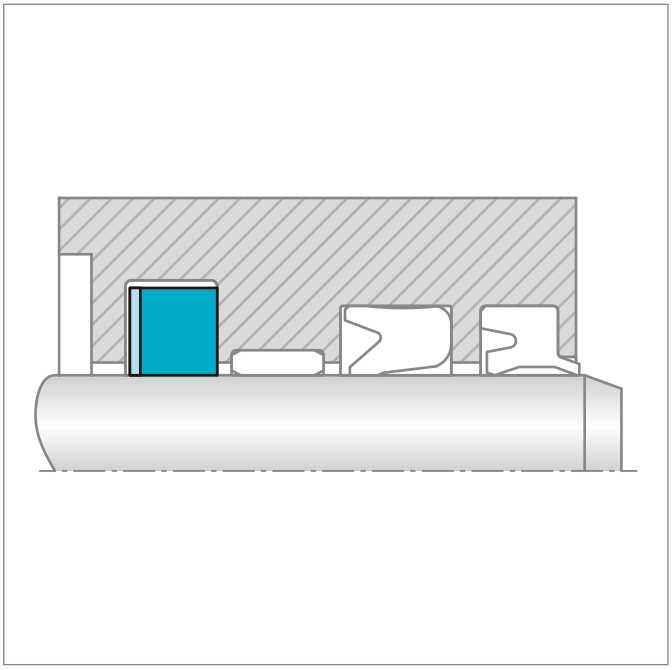
Turcon® Buffer Ring is an uncut “Piston Ring”, with notches on one side, the Ring is a single-acting seal often used as protector of a common rod sealing system against peak pressures where the notch prevents risk of pressure trap.

If double-acting sealing is required it is necessary to install two Buffer Rings, back to back, to take the pressure from both sides.

For linear, helical and rotary movements.

Standard TSS Part Numbers are available (RFB)

Diameter Range mm	**Pressure Range** MPa	**Temperature Range** °C	**Velocity** m/s
4 - 2,500	60	+30 to +160	Up to 15 (10 rotary)



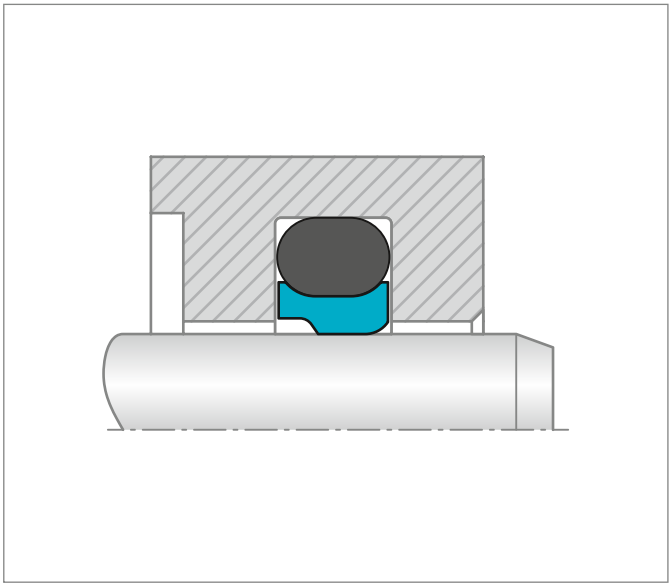
TURCON® STEPSEAL® SG

Single-acting O-Ring energized rod seal for dynamic applications. Generally applied as spare part or for heavy applications requiring seals in oversize cross section. Installation identical to ISO 7425-1 “Square Groove housings for pistons seals” (ISO for "Square Groove Housing" for rods does not exist) .

Turcon® materials provide low friction with no stick-slip, minimal break out force and high wear and pressure resistance.

Standard TSS Part Numbers are available (RSM)

Diameter Range mm	**Pressure Range** MPa	**Temperature Range** °C	**Velocity** m/s
20 - 2,600	Up to 60	-45 to +200	Up to 5



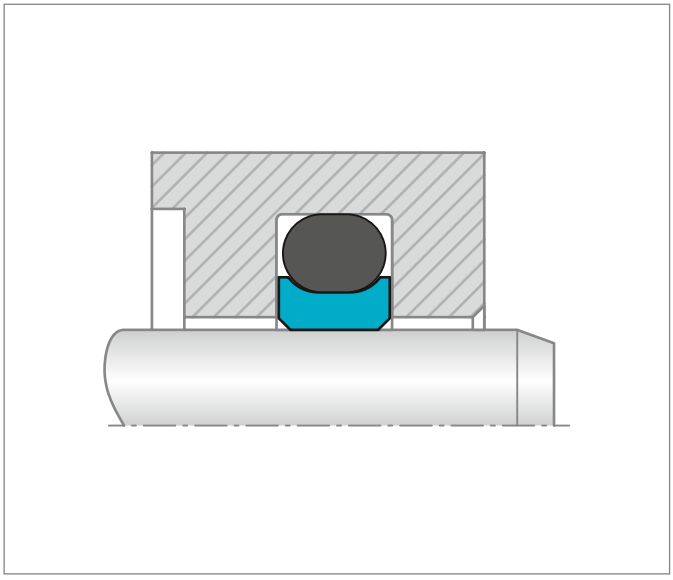
TURCON® GLYD RING® SG

Double-acting O-Ring energized rod seal for dynamic applications. Generally applied as spare part or for heavy applications requiring seals in oversize cross section. Installation identical to ISO 7425-1 “Square Groove housings for pistons seals”.

Turcon® materials provide low friction with no stick-slip, minimal break out force and high wear and pressure resistance.

Standard TSS Part Numbers are available (RSM)

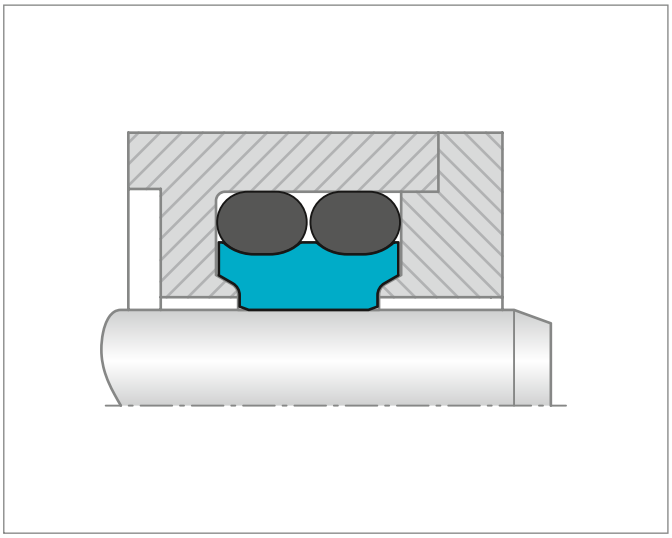
Diameter Range mm	**Pressure Range** MPa	**Temperature Range** °C	**Velocity** m/s
20 - 2,600	Up to 60	-45 to +200	Up to 5



TURCON® CAPTIVE GLYD RING® WITH DOUBLE O-RING

A double-acting seal for linear applications recommended for passing over larger holes/ports in the counter surface or to slide across mating surfaces that have dimensional changes from a small diameter with sealing function over the seal to a large diameter with no sealing function or vice versa. Split hardware is required and prevents the seal from pulling out the groove while passing over ports or variable diameter counter parts.

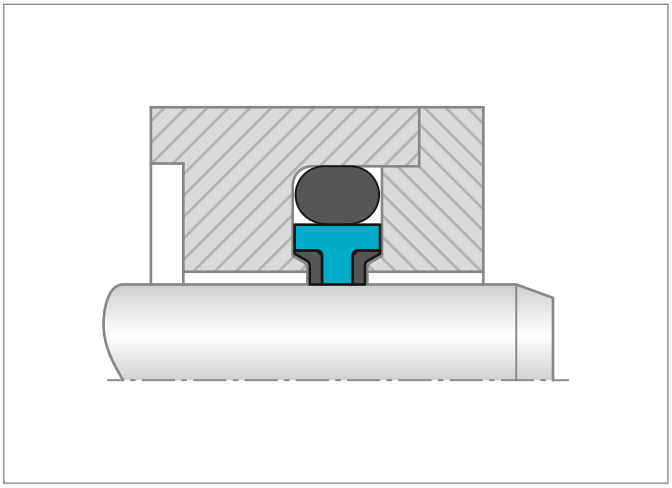
Diameter Range mm	**Pressure Range** MPa	**Temperature Range** °C	**Velocity** m/s
6 - 2,600	Up to 60	-45 to +200	Up to 15



TURCON® CAPTIVE GLYD RING® CR

A double-acting corner reinforced seal for higher pressure linear applications recommended for passing over larger holes/ports in the counter surface or to slide across mating surfaces that have dimensional changes from a small diameter with sealing function over the seal to a large diameter with no sealing function or vice versa. Split hardware is required and prevents the seal from pulling out the groove while passing over ports or variable diameter counter parts.

Diameter Range mm	**Pressure Range** MPa	**Temperature Range** °C	**Velocity** m/s
6 - 2,600	Up to 100	-45 to +200	Up to 15



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