TRELLEBORG

Trelleborg is a world leader in engineered polymer solutions that seal, damp and protect critical applications in demanding environments. Its innovative engineered solutions accelerate performance for customers in a sustainable way. The Trelleborg Group has local presence in over 40 countries around the world.

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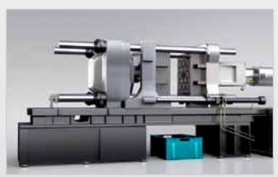
Turcon® Stepseal® V



Your Partner for Sealing Technology

Trelleborg Sealing Solutions is a major international developer, manufacturer and supplier of seals, bearings and molded components in polymers. We are uniquely placed to offer dedicated design and development from our market-leading product and material portfolio: a one-stop-shop providing the best in elastomer, silicone, thermoplastic, PTFE and composite technologies for applications in aerospace, industrial and automotive industries.

With 50 years of experience, Trelleborg Sealing Solutions engineers support customers with design, prototyping, production, test and installation using state-of-the-art design tools. An international network of over 70 facilities worldwide includes over 20 manufacturing sites, strategically-positioned research and development centers, including materials and development laboratories and locations specializing in design and applications.

Developing and formulating materials in-house, we utilize the resource of our material database, including over 2,000 proprietary compounds and a range of unique products. Trelleborg Sealing Solutions fulfills challenging service requirements, supplying standard parts in volume or a single custom-manufactured component, through our integrated logistical support, which effectively delivers over 40,000 sealing products to customers worldwide.

Facilities are certified to ISO 9001:2008 and ISO/TS 16949:2009. Trelleborg Sealing Solutions is backed by the experience and resources of Trelleborg Group, one of the world's foremost experts in polymer technology.

ISO 9001:2008

ISO/TS 16949:2009

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Contents

■ Overview

Characteristics of Turcon® Stepseal® V

- Primary seal with hydrostatic ventilation
- Check valve function
- Hydrodynamic back-pumping
- Stabilized position in the groove
- Fits existing Turcon® Stepseal® 2K groove
- Available for ISO 7425/2 seal housing
- Prolonged seal life
- Increased leakage control
- Low-friction operation over whole life of product
- Prevents undefined pressurization of secondary sealing element

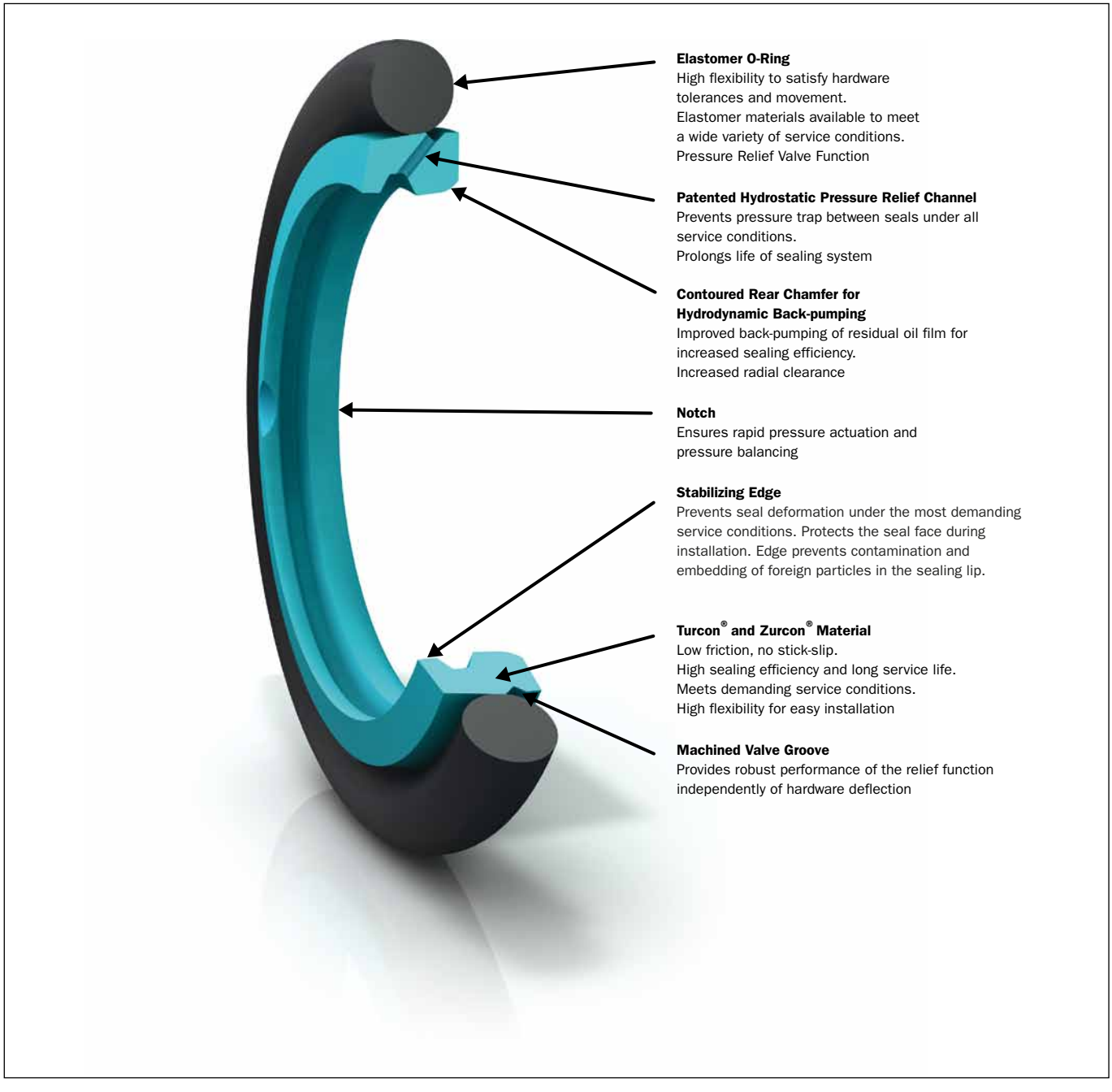


Figure 1 Turcon® Stepseal® V

Turcon® Stepseal® V

Features

Stepseal® V is developed to meet continuously increasing demands on sealing systems. Under extreme performance requirements, Stepseal® V offers improved leakage control, extended service life and increased reliability.

In dynamic applications, Stepseal® V provides efficient, reliable sealing performance even under the most demanding service conditions. The high seal efficiency and refined valve function of Stepseal® V eliminates seal system pressure build-up between its tandem rod seal configuration, eliminating buffer volume between the seals.

In rod seal systems, Stepseal® V is preferably used with a secondary Turcon® or Zurcon® rod seal, or with a double-acting Excluder® or Scraper.

As a piston seal, Stepseal® V is used with a double-acting Turcon® piston seal.

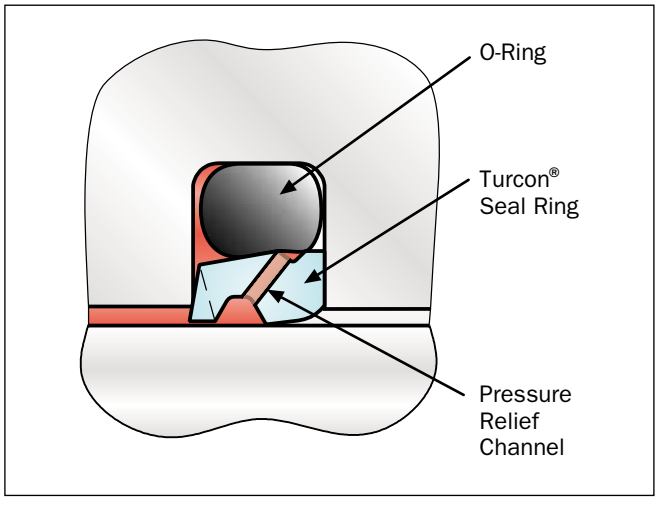


Figure 2 Turcon® Stepseal® V with tight axial groove fit

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 micro fluid-film formation 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 behind the primary seal. Pressure build-up in the seal system leads to leakage, increased friction and wear, and may ultimately lead to seal replacement. The usual precaution has been to provide space for a buffer volume behind the primary seal, or to install a drain line.

An innovation from Trelleborg Sealing Solutions, the built-in check valve function of Stepseal® eliminates pressure build-up and removes the need for buffer volumes and drain lines.

Stepseal® V is available in high-grade Turcon® or Zurcon® materials with outstanding sliding and wear resistance properties. It is installed in Trelleborg Sealing Solutions standard grooves and according to ISO 7425, using an O-Ring as an energizing element.

* Patented and patent pending geometry:
DE 19654357; 24.12.1996

Advantages

- Same advanced functions as Stepseal® 2K
- No system pressure on secondary sealing element and/or Scraper/Excluder®
- Check valve function of O-Ring eliminates risk of fluid bypassing the seal during pressure loading when pressurized
- Not restricted by speed in relation to counter surface, stroke length or deflection
- Minimum contribution of friction to secondary sealing element and/or Scraper/Excluder®
- Minimum wear of secondary sealing element and/or Scraper/Excluder®
- Increased leakage control
- Prolonged seal life
- Increased operational reliability
- Fits standard Stepseal® 2K groove dimensions as well as ISO 7425 seal housings

Technical Data

Operating conditions:

Pressure:	Up to 50 MPa (Turcon® M12) Up to 60 MPa (Turcon® T08 and Zurcon® Z51)
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 1.
Clearance:	The maximum permissible radial clearance S_{max} is shown in Table 2 and Table 4 as a function of the operating pressure and functional diameter.

Application Examples

- Mobile hydraulics
- Construction equipment
- Crane boom cylinders
- Presses
- Injection molding machines
- Used in cylinders for:
  - Clamps
  - Wind-power
  - Long stroke
  - Hydropower
  - Watergates
  - Tensioners
- Theater hydraulics

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.

*) **Important Note for the Piston Version:**
In the case of unpressurized applications in temperatures below 0 °C please contact our local Trelleborg Sealing Solutions marketing company for more information!

■ Test Procedure

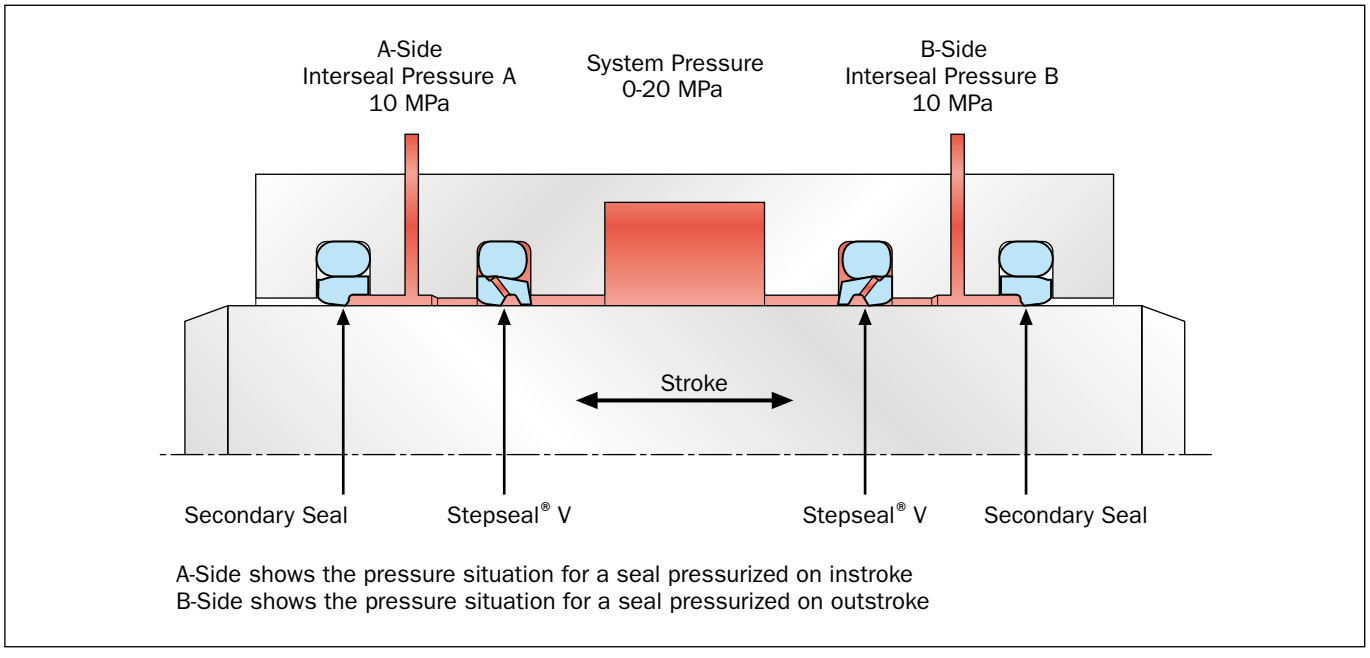


Figure 3 Test procedure:
Static pressure is applied between two seals in tandem installation to simulate a hydrodynamic pressure build-up.

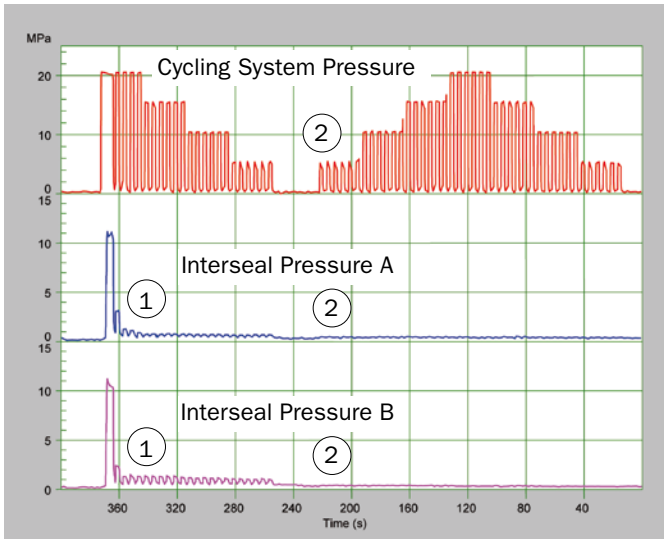


Figure 4 Efficiency of the pressure relief channel.
Enforced pressurization between primary seal (Stepseal® V) and secondary seal drops to zero within one stroke of the piston rod.

Note:
The Turcon® Stepseal® V is specially designed as the primary seal for two seals in a tandem installation where the innovative patented pressure release function efficiently prevents trapped fluid and pressure build-up between the primary and secondary seal (or double-acting Scraper).

(1) Relief of the interseal pressure at the first pressure cycle

(2) System pressure changes in 5 MPa steps from 20 MPa down to 0 MPa, then up again to 20 MPa and down to 0 MPa.
At the point where pressure increases, the check valve is closed effectively.

In operations where the back pumping is not sufficient to prevent pressure build-up between a Stepseal® 2K and the secondary seal, the integrated Check Valve Function in Stepseal® V automatically releases the inter-seal pressure when the system pressure drops.

Redundant Sealing System

In many applications, secondary seal systems are required. Figure 3 shows such a tandem configuration including the Stepseal® V.

When utilizing Stepseal® V with a valve function, there will be no pressure trap 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 the sealing efficiency and the service life of the system, e.g. in hydraulic cylinders subject to high loads and in demanding operating conditions, the primary seal should be made of Turcon® and the secondary seal of Zurcon® .

■ Materials

Table 1 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 and updated applications For all commonly used 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 Mineral fiber and additives fillers 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 Ideal 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 applications 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		
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 Aluminium	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. Dyna-mic
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® Z51*** 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.	Z51	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 Aluminium 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. ø 2200 mm for rod seals and ø 2300 mm for piston seals.
BAM: Tested by “Bundesanstalt Materialprüfung, Germany”.
Highlighted materials are recommended.

■ Installation recommendation – Rod

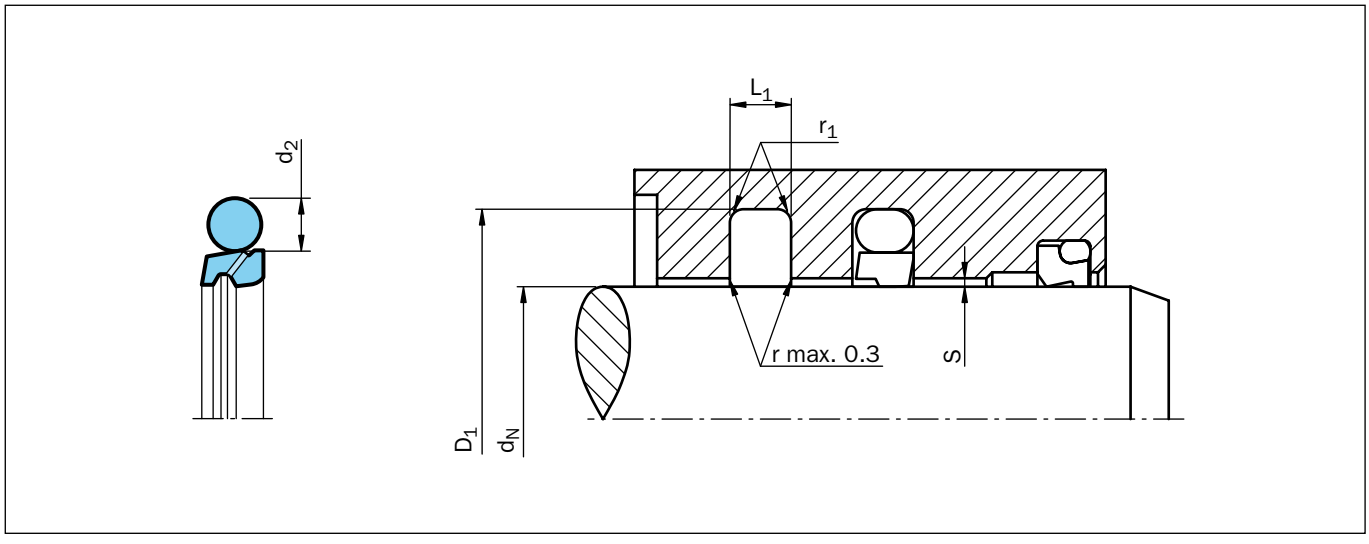


Figure 5 Installation drawing

Table 2 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	10 MPa	20 MPa	40 MPa	d_2
RSV2	12.0 - 37.9	38.0 - 199.9	-	d_N + 10.7	4.2	1.0	0.50	0.30	0.20	3.53
RSV3	38.0 - 199.9	200.0 - 255.9	19.0 - 37.9	d_N + 15.1	6.3	1.3	0.70	0.40	0.25	5.33
RSV4	200.0 - 255.9	256.0 - 649.9	38.0 - 199.9	d_N + 20.5	8.1	1.8	0.80	0.60	0.35	7.00
RSV8	256.0 - 649.9	650.0 - 999.9	200.0 - 255.9	d_N + 24.0	8.1	1.8	0.90	0.70	0.40	7.00
RSV5	650.0 - 999.9	-	256.0 - 649.9	d_N + 27.3	9.5	2.5	1.00	0.80	0.50	8.40
RSV5X	-	1000.0 - 1200.0	-	d_N + 27.3	9.5	2.5	1.00	0.80	0.50	8.40
RSV6**	-	-	650.0 - 999.9	d_N + 38.0	13.8	3.0	1.20	0.90	0.60	12.00
RSV6X**	1000 - 2600.0	-	-	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 the seal; or consult Trelleborg Sealing Solutions for alternative material or profiles.
Slydring® / Wear Rings are not applicable at very small radial clearance (S); please consult the Slydring® catalog.

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

Ordering example

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

Series RSV4 (from Table 2)

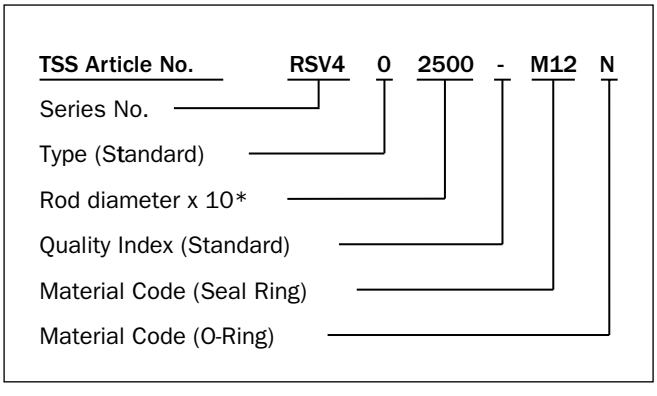
Rod diameter: dN = 250.0 mm

TSS Part No.: RSV402500 (from Table 3)

Select the material from Table 1.

The corresponding code numbers are appended to the Part No. Together these form the TSS Article Number.

The Article Number for all intermediate sizes not shown in Table 3 can be determined following the example opposite.



* For diameters $d_N \geq 1000.0$ mm multiply only by factor 1
Example: RSV6 for diameter d_N 1200.0 mm
TSS Article No.: RSV6**X1200** - M12

Table 3 Installation dimensions / Part No.

Rod	Groove Dia.	Groove Width	TSS Part No.	O-Ring Dimension
d_N f8/h9	D_1 H9	L_1 +0.2		
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**
57.0	72.1	6.3	RSV300570	62.87 x 5.33
59.0	69.7	4.2	RSV200590	63.09 x 3.53

Rod	Groove Dia.	Groove Width	TSS Part No.	O-Ring Dimension
d_N f8/h9	D_1 H9	L_1 +0.2		
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	64.00 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	Groove Dia.	Groove Width	TSS Part No.	O-Ring Dimension
d_N f8/h9	D_1 H9	L_1 +0.2		
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	Groove Dia.	Groove Width	TSS Part No.	O-Ring Dimension
d_N f8/h9	D_1 H9	L_1 +0.2		
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	Groove Dia.	Groove Width	TSS Part No.	O-Ring Dimension
d_N f8/h9	D_1 H9	L_1 +0.2		
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 x 8.40
656.0	683.3	9.5	RSV506560	669 x 8.40
660.0	687.3	9.5	RSV506600	673 x 8.40
680.0	707.3	9.5	RSV506800	693 x 8.40
685.0	712.3	9.5	RSV506850	698 x 8.40

Rod	Groove Dia.	Groove Width	TSS Part No.	O-Ring Dimension
d_N f8/h9	D_1 H9	L_1 +0.2		
700.0	724.0	8.1	RSV807000	712 x 7.00
700.0	727.3	9.5	RSV507000	713 x 8.40
710.0	737.3	9.5	RSV507100	723 x 8.40
730.0	757.3	9.5	RSV507300	743 x 8.40
760.0	787.3	9.5	RSV507600	773 x 8.40
765.0	792.3	9.5	RSV507650	778 x 8.40
780.0	807.3	9.5	RSV507800	793 x 8.40
790.0	817.3	9.5	RSV507900	803 x 8.40
800.0	827.3	9.5	RSV508000	813 x 8.40
810.0	837.3	9.5	RSV508100	823 x 8.40
820.0	847.3	9.5	RSV508200	833 x 8.40
830.0	857.3	9.5	RSV508300	843 x 8.40
850.0	877.3	9.5	RSV508500	863 x 8.40
870.0	897.3	9.5	RSV508700	883 x 8.40
880.0	907.3	9.5	RSV508800	893 x 8.40
885.0	912.3	9.5	RSV508850	898 x 8.40
890.0	917.3	9.5	RSV508900	903 x 8.40
930.0	957.3	9.5	RSV509300	943 x 8.40
955.0	982.3	9.5	RSV509550	968 x 8.40
1000.0	1038.0	13.8	RSV6X1000	1016 x 12.00
1035.0	1073.0	13.8	RSV6X1035	1051 x 12.00
1040.0	1067.3	9.5	RSV5X1040	1053 x 8.40
1040.0	1078.0	13.8	RSV6X1040	1056 x 12.00
1050.0	1077.3	9.5	RSV5X1050	1063 x 8.40
1050.0	1088.0	13.8	RSV6X1050	1066 x 12.00
1100.0	1138.0	13.8	RSV6X1100	1116 x 12.00
1120.0	1147.3	9.5	RSV5X1120	1133 x 8.40
1120.0	1158.0	13.8	RSV6X1120	1136 x 12.00
1200.0	1227.3	9.5	RSV5X1200	1213 x 8.40
1200.0	1238.0	13.8	RSV6X1200	1216 x 12.00
1330.0	1368.0	13.8	RSV6X1330	1346 x 12.00
1500.0	1538.0	13.8	RSV6X1500	1516 x 12.00
1600.0	1638.0	13.8	RSV6X1600	1616 x 12.00
2000.0	2038.0	13.8	RSV6X2000	2016 x 12.00
2600.0	2638.0	13.8	RSV6X2600	2616 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 2600 mm diameter including imperial (inch) sizes can be supplied.

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

■ Installation recommendation – Piston

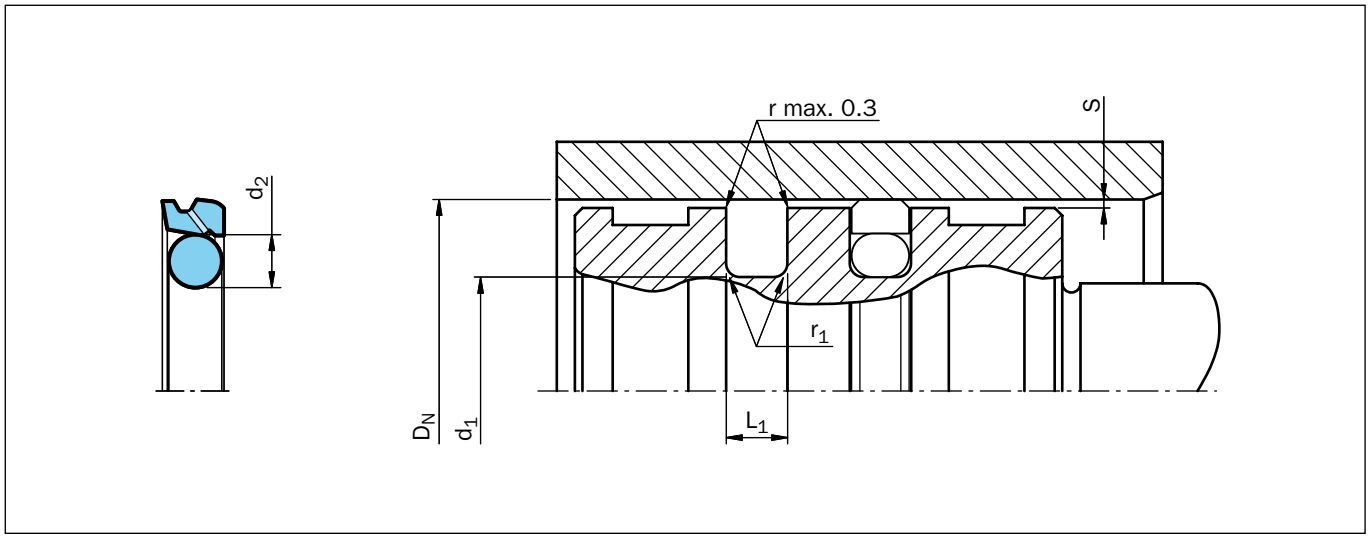


Figure 6 Installation drawing

Table 4 Installation dimensions – Standard recommendations

Series No.	Rod Diameter D_N 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	10 MPa	20 MPa	40 MPa	d_2
PSV2	25.0 - 59.9	60.0 - 199.9	17.0 - 24.9	DN - 10.7	4.2	1.0	0.50	0.30	0.20	3.53
PSV3	60.0 - 199.9	200.0 - 255.9	25.0 - 59.9	DN - 15.1	6.3	1.3	0.70	0.40	0.25	5.33
PSV4	200.0 - 255.9	256.0 - 669.9	60.0 - 199.9	DN - 20.5	8.1	1.8	0.80	0.60	0.35	7.00
PSV8	256.0 - 669.9	670.0 - 999.9	200.0 - 255.9	DN - 24.0	8.1	1.8	0.90	0.70	0.40	7.00
PSV5	670.0 - 999.9	-	256.0 - 669.9	DN - 27.3	9.5	2.5	1.00	0.80	0.50	8.40
PSV5X	-	1000.0 - 1200.0	-	DN - 27.3	9.5	2.5	1.00	0.80	0.50	8.40
PSV6**	-	-	670.0 - 999.9	DN - 38.0	13.8	3.0	1.20	0.90	0.60	12.00
PSV6X**	1000.0 - 2700.0	-	-	DN - 38.0	13.8	3.0	1.20	0.90	0.60	12.00

* At pressures > **40 MPa** use diameter tolerance H8/f8 (bore/piston) in area of seal or consult Trelleborg Sealing Solutions for alternative material or profiles.
Slydring® / Wear Rings are not applicable at very small radical clearance (S); please consult the Slydring® catalog.

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

Ordering example

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

Series: PSV3 (from Table 4)

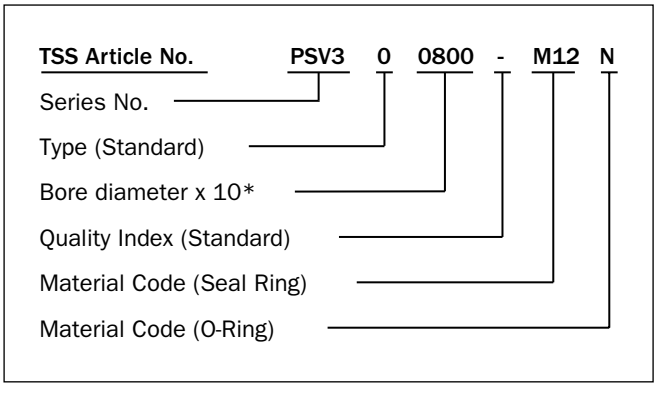
Bore diameter: D_N = 80.0 mm

TSS Part No. PSV300800 (from Table 5

Select the material from Table 1.

The corresponding code numbers are appended to the Part No. Together these form the TSS Article Number.

The Article Number for all intermediate sizes not shown in Table 5 can be determined following the example opposite.



* For diameters $D_N \geq$ 1000.0 mm multiply only by factor 1.
Example: PSVK6 for diameter D_N 1200.0 mm
TSS Article No.: PSV6**X1200** - M12

Table 5 Installation dimensions / TSS Part No.

Bore Dia.	Groove Dia.	Groove Width	TSS Part No.	O-Ring Dimensions
D_N f8/h9	**d1** H9	**L1** +0.2		
15.0	4.3	4.2	PSV200150	3.47 x 3.53
20.0	**9.3**	**4.2**	**PSV200200**	**8.47 x 3.53**
25.0	**14.3**	**4.2**	**PSV200250**	**13.87 x 3.53**
28.0	17.3	4.2	PSV200280	15.47 x 3.53
30.0	19.3	4.2	PSV200300	18.66 x 3.53
32.0	**21.3**	**4.2**	**PSV200320**	**20.22 x 3.53**
35.0	24.3	4.2	PSV200350	23.40 x 3.53
40.0	**29.3**	**4.2**	**PSV200400**	**28.17 x 3.53**
42.0	31.3	4.2	PSV200420	29.75 x 3.53
45.0	34.3	4.2	PSV200450	32.92 x 3.53
48.0	37.3	4.2	PSV200480	36.09 x 3.53
50.0	**39.3**	**4.2**	**PSV200500**	**37.69 x 3.53**
50.0	**34.9**	**6.3**	**PSV300500**	**32.69 x 5.33**
52.0	41.3	4.2	PSV200520	40.87 x 3.53
55.0	44.3	4.2	PSV200550	44.04 x 3.53
60.0	44.9	6.3	PSV300600	43.82 x 5.33
63.0	**52.3**	**4.2**	**PSV200630**	**50.39 x 3.53**
63.0	**47.9**	**6.3**	**PSV300630**	**46.99 x 5.33**
65.0	49.9	6.3	PSV300650	46.99 x 5.33
70.0	59.3	4.2	PSV200700	56.74 x 3.53
70.0	54.9	6.3	PSV300700	53.34 x 5.33
70.0	49.5	8.1	PSV400700	48.00 x 7.00
75.0	59.9	6.3	PSV300750	56.52 x 5.33
80.0	**64.9**	**6.3**	**PSV300800**	**62.87 x 5.33**
80.0	**59.5**	**8.1**	**PSV400800**	**58.00 x 7.00**
85.0	69.9	6.3	PSV300850	69.22 x 5.33
85.0	64.5	8.1	PSV400850	63.00 x 7.00
90.0	74.9	6.3	PSV300900	72.39 x 5.33
90.0	69.5	8.1	PSV400900	68.00 x 7.00
95.0	79.9	6.3	PSV300950	78.74 x 5.33
95.0	74.5	8.1	PSV400950	73.00 x 7.00
100.0	**84.9**	**6.3**	**PSV301000**	**81.92 x 5.33**
100.0	**79.5**	**8.1**	**PSV401000**	**78 .00x 7.00**
105.0	89.9	6.3	PSV301050	88.27 x 5.33
105.0	84.5	8.1	PSV401050	83.00 x 7.00
106.0	90.9	6.3	PSV301060	88.27 x 5.33
110.0	94.9	6.3	PSV301100	91.44 x 5.33
110.0	89.5	8.1	PSV401100	88.00 x 7.00
115.0	99.9	6.3	PSV301150	97.79 x 5.33

Bore Dia.	Groove Dia.	Groove Width	TSS Part No.	O-Ring Dimensions
D_N f8/h9	**d1** H9	**L1** +0.2		
115.0	94.5	8.1	PSV401150	93.00 x 7.00
120.0	104.9	6.3	PSV301200	104.14 x 5.33
120.0	99.5	8.1	PSV401200	98.00 x 7.00
125.0	**109.9**	**6.3**	**PSV301250**	**107.32 x 5.33**
125.0	**104.5**	**8.1**	**PSV401250**	**103.00 x 7.00**
130.0	114.9	6.3	PSV301300	113.67 x 5.33
130.0	109.5	8.1	PSV401300	108.00 x 7.00
135.0	114.5	8.1	PSV401350	113.67 x 7.00
140.0	119.5	8.1	PSV401400	116.84 x 7.00
145.0	124.5	8.1	PSV401450	123.19 x 7.00
150.0	129.5	8.1	PSV401500	126.37 x 7.00
155.0	139.9	6.3	PSV301550	135.89 x 5.33
160.0	**144.9**	**6.3**	**PSV301600**	**142.24 x 5.33**
160.0	**139.5**	**8.1**	**PSV401600**	**135.89 x 7.00**
165.0	149.9	6.3	PSV301650	148.49 x 5.33
165.0	144.5	8.1	PSV401650	142.24 x 7.00
170.0	149.5	8.1	PSV401700	145.42 x 7.00
175.0	159.9	6.3	PSV301750	158.12 x 5.33
180.0	164.9	6.3	PSV301800	164.47 x 5.33
180.0	159.5	8.1	PSV401800	158.12 x 7.00
190.0	174.9	6.3	PSV301900	170.82 x 5.33
190.0	169.5	8.1	PSV401900	164.47 x 7.00
200.0	**184.9**	**6.3**	**PSV302000**	**183.52 x 5.33**
200.0	**179.5**	**8.1**	**PSV402000**	**177.17 x 7.00**
205.0	184.5	8.1	PSV402050	183.52 x 7.00
210.0	189.5	8.1	PSV402100	183.52 x 7.00
220.0	204.9	6.3	PSV302200	202.57 x 5.33
220.0	199.5	8.1	PSV402200	196.22 x 7.00
230.0	209.5	8.1	PSV402300	208.90 x 7.00
240.0	219.5	8.1	PSV402400	215.27 x 7.00
250.0	**229.5**	**8.1**	**PSV402500**	**227.97 x 7.00**
250.0	**226.0**	**8.1**	**PSV802500**	**227.97 x 7.00**
260.0	236.0	8.1	PSV802600	227.97 x 7.00
270.0	246.0	8.1	PSV802700	240.67 x 7.00
280.0	256.0	8.1	PSV802800	253.37 x 7.00
300.0	276.0	8.1	PSV803000	266.07 x 7.00
306.0	285.5	8.1	PSV403060	278.77 x 7.00
310.0	286.0	8.1	PSV803100	278.77 x 7.00
320.0	**299.5**	**8.1**	**PSV403200**	**291.47 x 7.00**

Bore Dia.	Groove Dia.	Groove Width	TSS Part No.	O-Ring Dimensions
D_N f8/h9	**d1** H9	**L1** +0.2		
320.0	**296.0**	**8.1**	**PSV803200**	**291.47 x 7.00**
330.0	306.0	8.1	PSV803300	304.17 x 7.00
340.0	316.0	8.1	PSV803400	316.87 x 7.00
345.0	324.5	8.1	PSV403450	316.87 x 7.00
350.0	326.0	8.1	PSV803500	316.87 x 7.00
360.0	336.0	8.1	PSV803600	329.57 x 7.00
370.0	346.0	8.1	PSV803700	342.27 x 7.00
380.0	356.0	8.1	PSV803800	354.97 x 7.00
400.0	**376.0**	**8.1**	**PSV804000**	**367.67 x 7.00**
420.0	396.0	8.1	PSV804200	393.07 x 7.00
430.0	406.0	8.1	PSV804300	405.26 x 7.00
440.0	416.0	8.1	PSV804400	405.26 x 7.00
450.0	426.0	8.1	PSV804500	417.96 x 7.00
480.0	456.0	8.1	PSV804800	456.06 x 7.00
500.0	**476.0**	**8.1**	**PSV805000**	**468.76 x 7.00**
520.0	499.5	8.1	PSV405200	494.16 x 7.00
540.0	516.0	8.1	PSV805400	506.86 x 7.00
600.0	576.0	8.1	PSV806000	557.66 x 7.00
650.0	626.0	8.1	PSV806500	608.08 x 7.00
700.0	672.7	9.5	PSV507000	670 x 8.40
780.0	752.7	9.5	PSV507800	750 x 8.40
800.0	772.7	9.5	PSV508000	770 x 8.40
820.0	792.7	9.5	PSV508200	790 x 8.40
860.0	832.7	9.5	PSV508600	830 x 8.40
900.0	872.7	9.5	PSV509000	870 x 8.40
920.0	892.7	9.5	PSV509200	890 x 8.40
1000.0	972.7	9.5	PSV5X1000	970 x 8.40
1000.0	962.0	13.8	PSV6X1000	960 x 12.00
1200.0	1172.7	9.5	PSV5X1200	1170 x 8.40
1200.0	1162.0	13.8	PSV6X1200	1160 x 12.00
1500.0	1462.0	13.8	PSV6X1500	1460 x 12.00
2000.0	1962.0	13.8	PSV6X2000	1960 x 12.00
2650.0	2612.0	13.8	PSV6X2650	2610 x 12.00

The bore diameters in **bold** type comply with the recommendations of ISO 3320.

Other dimensions and all intermediate sizes up to 2700 mm diameter including imperial (inch) sizes can be supplied.

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