

# Turcon® Excluder® S



---

Double-acting

---

Rubber-energized Double-acting Scraper

**Material:**

Turcon®, Zurcon®, Elastomer and Metal

---







## ■ Turcon® Excluder® S



### ■ Description

Turcon® Excluder® S is a double-acting scraper with scraper lip and sealing lip, positioned back-to-back. Excluder® S element is as standard always installed with a metal V-Spring and an O-Ring.

The V-Spring in the external part maintains a permanent pressure on the scraping edge. The internal O-Ring activates the sealing lip.

The V-Spring is filled with high temperature silicone to prevent contamination blocking the spring.

The conical front guides contamination away from the reciprocating rod. This is especially important when the piston rod is pointing upwards.

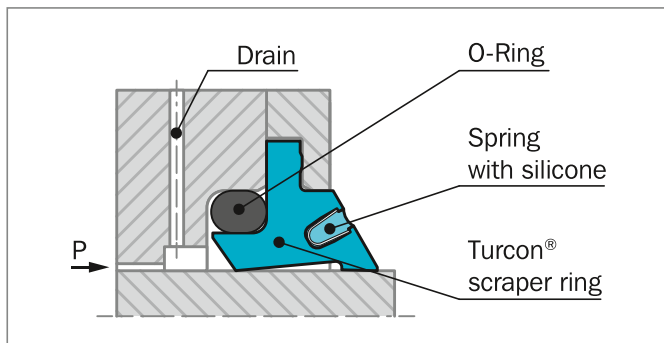


Figure 173: Turcon® Excluder® S with V-Spring activated lip

### EXCLUDER® S HAS TWO FUNCTIONS:

- Scrape contaminants from the retracting piston rod protecting the system from soiling
- Hold back the residual fluid film on the extending piston rod at the fluid side.

### APPLICATIONS

Excluder® S is preferably used in very dirty environments where it is mandatory to prevent moisture and contaminants from being trapped in front of the scraper element e.g. when the rod is pointing upwards, typically for bigger rod diameters in applications like:

- Mining equipment
- Hydraulic presses
- Steelworks
- Heavy construction machinery
- Marine constructions
- Offshore installations
- Water works

### ADVANTAGES

- No dirt trapping because of spring activated conical scraping lip
- Outstanding sliding properties
- Stick-slip-free, no sticking (for Turcon® materials)
- Good scraping effect even against firmly adhered dirt, etc.
- Good sealing effect from the inside against the residual fluid film adhering to the surface of the piston rod
- Clamped installation prevents particles and moisture to pass between Excluder® and cylinder head
- Very high resistance to hydraulic media
- Available for diameters from 40 up to 2,600 mm (Turcon®), up to 2,200 mm (Zurcon® Z53/Z54), up to 1,000 mm (Zurcon® Z82)



## OPERATING CONDITIONS

<b>Movement:</b>	Linear respectively low speed rotary service
<b>Back-Pressure:</b>	Up to 1.5 MPa drain line between rod seals and Excluder® is recommended
<b>Speed linear:</b>	15 m/s for Turcon® materials 2 m/s for Zurcon® Z80/Z82 materials 1 m/s for Zurcon® Z53/Z54 materials
<b>Temperature:</b>	-45 °C to +200 °C (Turcon®) -45 °C to +110 °C (Zurcon® Z53 / Z54) -60 °C to +80 °C (Zurcon® Z80/Z82) depending on O-Ring material
<b>Media:</b>	Mineral oil-based hydraulic fluids, flame retardant hydraulic fluids, environmentally friendly hydraulic fluids (bio-oils), phosphate ester, water, air and others, depending on scraper ring and O-Ring material compatibility.

### 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

Excluder® S is always installed in split housing grooves.

Housing dimensions, radial clearances and recommended Excluder® S series in relation to diameter are as illustrated in Table 163.

Installation should be performed in the following steps in order to ensure a concentric and stress-free fit:

- Insert the O-Ring in the groove
- Place the Excluder® Ring into the open groove
- Fit the cover loosely onto the housing
- Insert the rod - check whether rod has the recommended lead-in chamfer; if not, use a calibration mandrel - see Figure 174 **point 1**
- Tighten the cover - see Figure 174 **point 2**

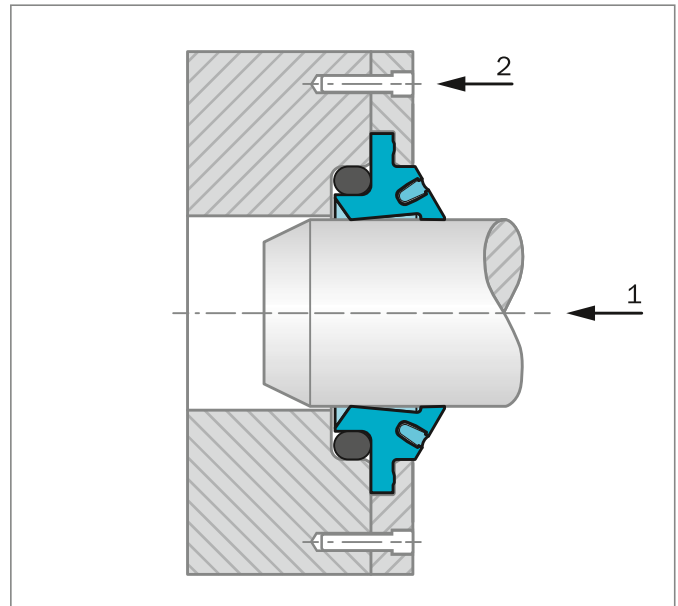


Figure 174: Installation and calibration of the Turcon® Excluder® S by the rod or a calibration mandrel

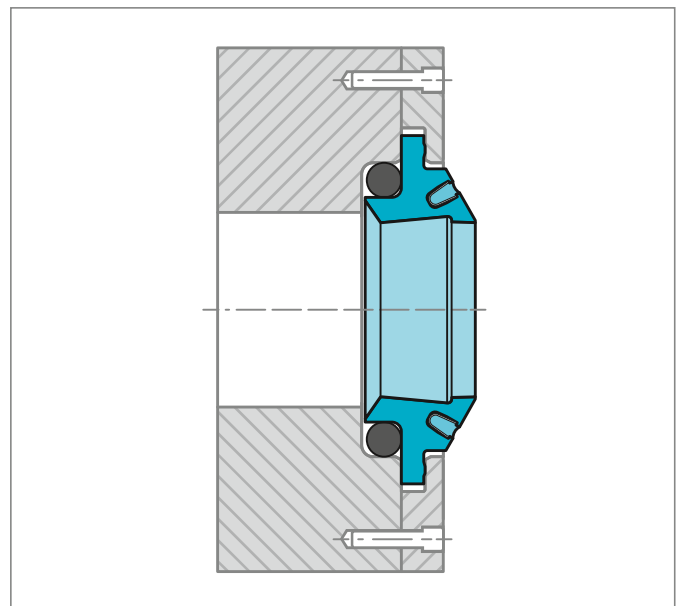


Figure 175: Turcon® Excluder® S installed in split groove



## RECOMMENDED MATERIALS

The following material combination has proven effective for most applications:

### Excluder® S in Turcon® M12

All round material for hydraulic applications with reciprocating, short stroke or helical movements in mineral oils, phosphate ester, bio-oils or fluids having less satisfactory lubricating properties:

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

Set code: M12N, M12V or M12E

### Excluder® S in Turcon® T46

For medium to heavy duty applications with reciprocating movements in mineral oils and other media with good lubrication:

O-Ring:	NBR 70 Shore A	N
	FKM 70 Shore A	V
	(depending on medium and temperature)	

Set code: T46N or T46V

### Excluder® S in Zurcon® Z80/Z82

For lubricating and non-lubricating fluids including water, air and gases:

O-Ring:	NBR 70 Shore A	N
	EPDM 70 Shore A	E
	(depending on medium and temperature)	

Set code: Z80N or Z80E

Other available material combinations are listed in Table 162.

For specific applications, all Turcon® materials are available.



**Table 162: Turcon® and Zurcon® Materials for Excluder® S**

Material, Applications, Properties	Code	O-Ring Material Shore A	Code	O-Ring Operating Temp. * °C	Mating Surface Material	Speed max. m/s
<b>Turcon® M12</b> First material choice for 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 Excluder® 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	15
		NBR 70 Low temp.	T	-45 to +80	Steel, hardened Steel, chrome-plated (rod) Cast iron	
		FKM 70	V	-10 to +200	Stainless steel Titanium	
<b>Turcon® T40</b> For lubricating and non-lubricating fluids Linear and rotary motion High frequency and short strokes Water hydraulics Surface texture not suitable for gas sealing Carbon fiber filled Color: Gray	T40	NBR 70	N	-30 to +100	Steel	15
		NBR 70 Low temp.	T	-45 to +80	Steel, chrome-plated (rod) Cast iron	
		FKM 70	V	-10 to +200	Stainless steel	
		EPDM 70	E**	-45 to +145	Aluminum Bronze Alloys	
<b>Turcon® T46</b> 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 (tubes)	15
		NBR 70 Low temp.	T	-45 to +80	Steel, hardened Steel, chrome-plated (rod)	
		FKM 70	V	-10 to +200	Cast iron	
<b>Zurcon® Z53***</b> For mineral oil based fluids Linear and slowly turning movement Very high abrasion and extrusion resistance For counter surface with rougher surface finish More difficult 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	1
		NBR 70 Low temp.	T	-45 to +80	Steel, hardened Steel chrome plated (rod) Cast iron Ceramic coating Stainless steel	

Table continues on next page



Material, Applications, Properties	Code	O-Ring Material Shore A	Code	O-Ring Operating Temp. * °C	Mating Surface Material	Speed max. m/s
<b>Zurcon® Z54***</b> For mineral oil based fluids Linear and slowly turning movements High abrasion resistance For counter surface with rougher surface finishes Good extrusion resistance Limited chemical resistance Max. working temperature +110 °C Cast polyurethane Color: Turquoise	Z54	NBR 70	N	-30 to +100	Steel	1
		NBR 70 Low temp.	T	-45 to +80	Steel, hardened Steel, chrome-plated (rod) Cast iron Stainless steel Aluminum Bronze Alloys Ceramic coating	
<b>Zurcon® Z80</b> For lubricating and non-lubricating fluids Water based fluids, air and gases Dry air pneumatics Linear and slowly turning movements High abrasion and extrusion resistance For service in abrasive conditions and media with particles Good chemical resistance Limited temperature capability (-60 to +80 °C) Not resistant to UV-light (sunlight), use Z82 instead UHMWPE (Ultra High Molecular Weight Polyethylene) Color: White to off white	Z80	NBR 70	N	-30 to (+100)	Steel	2
		NBR 70 Low temp.	T	-45 to +80	Steel, chrome-plated (rod) Stainless steel	
		EPDM 70	E**	-45 to (+145)	Aluminum Bronze Ceramic coating	
<b>Zurcon® Z82</b> Same as Z80 but resistant to UV-light (sunlight) UHMWPE (Ultra High Molecular Weight Polyethylene) Color: Black	Z82	NBR 70	N	-30 to (+100)	Steel	2
		NBR 70 Low temp.	T	-45 to +80	Steel, chrome-plated (rod) Stainless steel	
		EPDM 70	E**	-45 to (+145)	Aluminum Bronze Ceramic coating	

\* 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

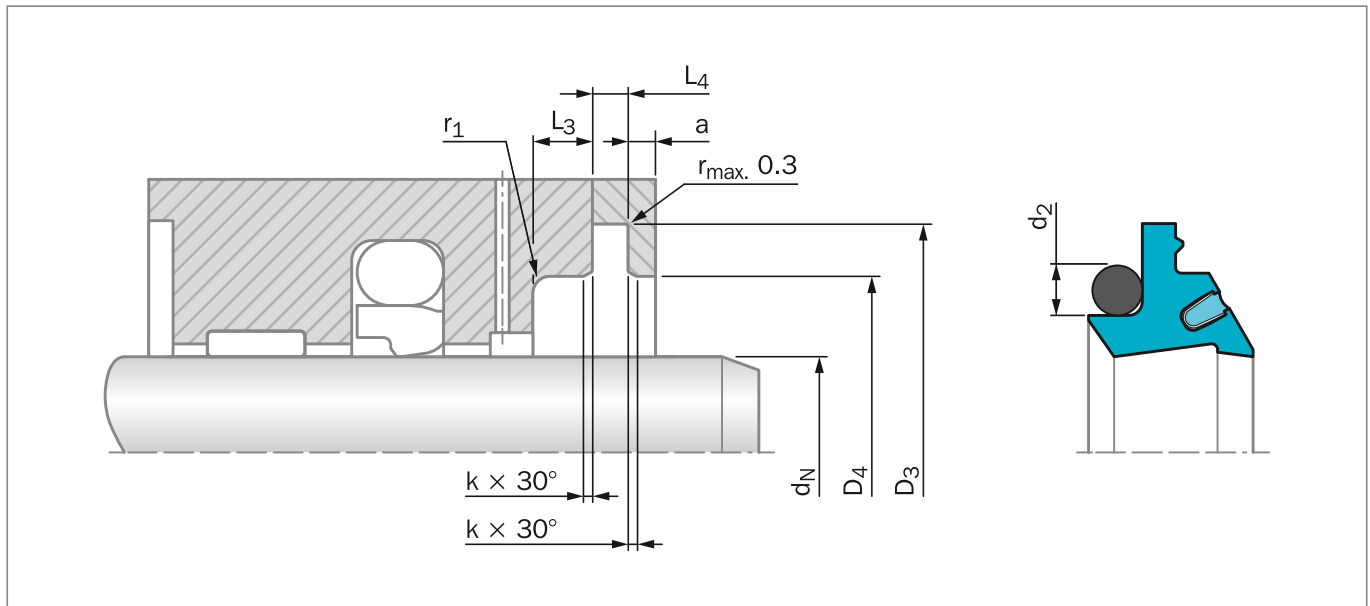


Figure 176: Installation Drawing

Table 163: Installation Dimensions

Series No.	Rod Diameter $d_N$ f8/h9		Groove Diameter	Groove Width	Groove Width	Groove Diameter	Radius	Step Width	Inlet Chamfer	O-Ring Cross Section
	Standard Application	Available Range	$D_3$ H10	$L_4$ $\pm 0.08$	$L_3$ $+0.2/-0.0$	$D_4$ H9	$r_1$ max	$a$ $+0.0/-0.1$	$k$	$d_2$
WES0	16 – 49.9	16 – 90	$d_N + 12.0$	1.80	2.20	$d_N + 7.3$	0.5	1.2	0.5	1.78
WES2	50 – 349.9	40 - 800	$d_N + 18.7$	2.50	4.20	$d_N + 11.3$	1.2	2.0	0.7	3.53
WES3	350 - 799.9	100 - 999.9	$d_N + 28.0$	4.00	6.30	$d_N + 17.0$	1.8	3.0	1.0	5.33
WES4	800 - 999.9	250 - 999.9	$d_N + 33.0$	4.50	8.25	$d_N + 21.0$	2.2	4.5	1.2	7.00
WES4X	1,000 – 2,600		$d_N + 33.0$	4.50	8.25	$d_N + 21.0$	2.2	4.5	1.2	7.00

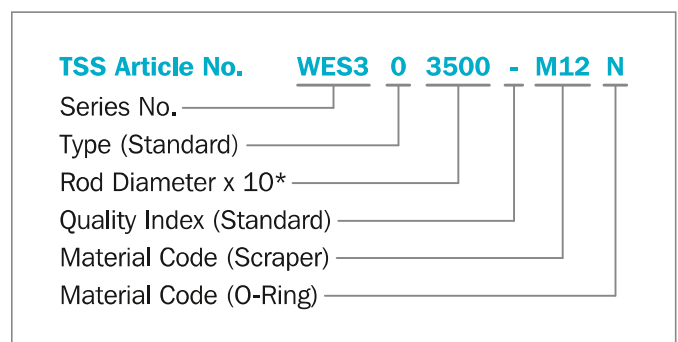
WES1 Series are not available

### ORDERING EXAMPLE

Excluder® S with V-Spring complete with O-Ring, standard application:

<b>Series:</b>	WES3 from Table 163
<b>Rod Diameter:</b>	$d_N = 350.0$ mm
<b>TSS Part No.:</b>	WES303500 from Table 164

Select the material from Table 162. The corresponding code numbers are appended to the TSS Part No. Together these form the TSS Article Number. The TSS Article No. 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: WES4 for diameter  $d_N = 1,200.0$  mm  
 TSS Article No.: WES4X1200-M12N





Table 164: Installation Dimensions / TSS Part No.

Rod Dia.	Groove Dia.	Groove Width	TSS Part No.	O-Ring Size	Rod Dia.	Groove Dia.	Groove Width	TSS Part No.	O-Ring Size
$d_N$ f8/h9	$D_3$ H10	$L_3$ +0.2			$d_N$ f8/h9	$D_3$ H10	$L_3$ +0.2		
<b>16.0</b>	<b>28.0</b>	<b>2.20</b>	<a href="#">WES000160</a>	<b>19.00 x 1.80</b>	440.0	468.0	6.30	<a href="#">WES304400</a>	430.66 x 5.33
<b>18.0</b>	<b>30.0</b>	<b>2.20</b>	<a href="#">WES000180</a>	<b>21.95 x 1.78</b>	450.0	478.0	6.30	<a href="#">WES304500</a>	456.06 x 5.33
<b>20.0</b>	<b>32.0</b>	<b>2.20</b>	<a href="#">WES000200</a>	<b>23.52 x 1.78</b>	480.0	508.0	6.30	<a href="#">WES304800</a>	481.38 x 5.33
<b>22.0</b>	<b>34.0</b>	<b>2.20</b>	<a href="#">WES000220</a>	<b>25.12 x 1.78</b>	500.0	528.0	6.30	<a href="#">WES305000</a>	506.78 x 5.33
<b>25.0</b>	<b>37.0</b>	<b>2.20</b>	<a href="#">WES000250</a>	<b>28.30 x 1.78</b>	550.0	578.0	6.30	<a href="#">WES305500</a>	532.18 x 5.33
<b>28.0</b>	<b>40.0</b>	<b>2.20</b>	<a href="#">WES000280</a>	<b>31.47 x 1.78</b>	600.0	628.0	6.30	<a href="#">WES306000</a>	582.68 x 5.33
30.0	42.0	2.20	<a href="#">WES000300</a>	33.05 x 1.78	650.0	678.0	6.30	<a href="#">WES306500</a>	633.48 x 5.33
<b>32.0</b>	<b>44.0</b>	<b>2.20</b>	<a href="#">WES000320</a>	<b>34.65 x 1.78</b>	680.0	708.0	6.30	<a href="#">WES306800</a>	658.88 x 5.33
<b>36.0</b>	<b>48.0</b>	<b>2.20</b>	<a href="#">WES000360</a>	<b>37.82 x 1.78</b>	700.0	728.0	6.30	<a href="#">WES307000</a>	658.88 x 5.33
<b>40.0</b>	<b>52.0</b>	<b>2.20</b>	<a href="#">WES000400</a>	<b>44.17 x 1.78</b>	750.0	778.0	6.30	<a href="#">WES307500</a>	658.88 x 5.33
<b>45.0</b>	<b>57.0</b>	<b>2.20</b>	<a href="#">WES000450</a>	<b>47.35 x 1.78</b>	800.0	833.0	8.25	<a href="#">WES408000</a>	809 x 7.00
<b>50.0</b>	<b>68.7</b>	<b>4.20</b>	<a href="#">WES200500</a>	<b>53.57 x 3.53</b>	850.0	883.0	8.25	<a href="#">WES408500</a>	859 x 7.00
<b>56.0</b>	<b>74.7</b>	<b>4.20</b>	<a href="#">WES200560</a>	<b>59.92 x 3.53</b>	900.0	933.0	8.25	<a href="#">WES409000</a>	909 x 7.00
<b>63.0</b>	<b>81.7</b>	<b>4.20</b>	<a href="#">WES200630</a>	<b>66.27 x 3.53</b>	950.0	983.0	8.25	<a href="#">WES409500</a>	959 x 7.00
<b>70.0</b>	<b>88.7</b>	<b>4.20</b>	<a href="#">WES200700</a>	<b>72.62 x 3.53</b>	1,000.0	1,033.0	8.25	<a href="#">WES4X1000</a>	1,009 x 7.00
<b>80.0</b>	<b>98.7</b>	<b>4.20</b>	<a href="#">WES200800</a>	<b>82.14 x 3.53</b>	1,200.0	1,233.0	8.25	<a href="#">WES4X1200</a>	1,209 x 7.00
<b>90.0</b>	<b>108.7</b>	<b>4.20</b>	<a href="#">WES200900</a>	<b>94.84 x 3.53</b>	1,500.0	1,533.0	8.25	<a href="#">WES4X1500</a>	1,509 x 7.00
<b>100.0</b>	<b>118.7</b>	<b>4.20</b>	<a href="#">WES201000</a>	<b>104.37 x 3.53</b>	1,800.0	1,833.0	8.25	<a href="#">WES4X1800</a>	1,809 x 7.00
<b>110.0</b>	<b>128.7</b>	<b>4.20</b>	<a href="#">WES201100</a>	<b>113.89 x 3.53</b>	2,000.0	2,033.0	8.25	<a href="#">WES4X2000</a>	2,009 x 7.00
120.0	138.7	4.20	<a href="#">WES201200</a>	123.42 x 3.53	2,200.0	2,233.0	8.25	<a href="#">WES4X2200</a>	2,209 x 7.00
<b>125.0</b>	<b>143.7</b>	<b>4.20</b>	<a href="#">WES201250</a>	<b>129.77 x 3.53</b>	2,600.0	2,633.0	8.25	<a href="#">WES4X2600</a>	2,609 x 7.00
130.0	148.7	4.20	<a href="#">WES201300</a>	132.94 x 3.53					
<b>140.0</b>	<b>158.7</b>	<b>4.20</b>	<a href="#">WES201400</a>	<b>142.47 x 3.53</b>					
150.0	168.7	4.20	<a href="#">WES201500</a>	151.99 x 3.53					
<b>160.0</b>	<b>178.7</b>	<b>4.20</b>	<a href="#">WES201600</a>	<b>164.69 x 3.53</b>					
170.0	188.7	4.20	<a href="#">WES201700</a>	171.04 x 3.53					
<b>180.0</b>	<b>198.7</b>	<b>4.20</b>	<a href="#">WES201800</a>	<b>183.74 x 3.53</b>					
190.0	208.7	4.20	<a href="#">WES201900</a>	190.09 x 3.53					
<b>200.0</b>	<b>218.7</b>	<b>4.20</b>	<a href="#">WES202000</a>	<b>202.79 x 3.53</b>					
210.0	228.7	4.20	<a href="#">WES202100</a>	209.14 x 3.53					
<b>220.0</b>	<b>238.7</b>	<b>4.20</b>	<a href="#">WES202200</a>	<b>221.84 x 3.53</b>					
230.0	248.7	4.20	<a href="#">WES202300</a>	234.54 x 3.53					
240.0	258.7	4.20	<a href="#">WES202400</a>	240.89 x 3.53					
<b>250.0</b>	<b>268.7</b>	<b>4.20</b>	<a href="#">WES202500</a>	<b>253.59 x 3.53</b>					
<b>280.0</b>	<b>298.7</b>	<b>4.20</b>	<a href="#">WES202800</a>	<b>278.99 x 3.53</b>					
300.0	318.7	4.20	<a href="#">WES203000</a>	304.39 x 3.53					
<b>320.0</b>	<b>338.7</b>	<b>4.20</b>	<a href="#">WES203200</a>	<b>304.39 x 3.53</b>					
350.0	378.0	6.30	<a href="#">WES303500</a>	354.97 x 5.33					
<b>360.0</b>	<b>388.0</b>	<b>6.30</b>	<a href="#">WES303600</a>	<b>365.00 x 5.30</b>					
380.0	408.0	6.30	<a href="#">WES303800</a>	380.37 x 5.33					
400.0	428.0	6.30	<a href="#">WES304000</a>	405.26 x 5.33					
420.0	448.0	6.30	<a href="#">WES304200</a>	405.26 x 5.33					

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



## Optional Designs

### Turcon® Excluder® SN

Optional, Turcon® Excluder® SN - Figure 177 the internal sealing lip has axial notch for applications where pressure trapping behind Excluder® S exceeds the allowed 1.5 MPa and a drain line not applicable.

The axial notch will lead the pressure to the scraping lip, which is lifted and relieving the pressure. This version is only delivered on TSS Standard Part Number with V-Spring Excluder® lip activation.

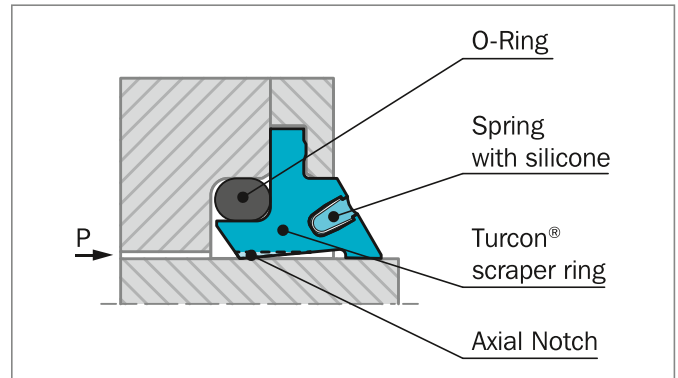


Figure 177: Optional Turcon® Excluder® SN where internal sealing lip has axial notch.

### ORDERING EXAMPLE

Optional Excluder® SN with V-Spring and Notch on internal sealing lip, complete with O-Ring, standard application:

<b>Series:</b>	WES3N from Table 163
<b>Rod Diameter:</b>	$d_N = 350.0$ mm
<b>TSS Part No.:</b>	WES3N3500 from Table 164

Select the material from Table 162. The corresponding code numbers are appended to the TSS Part No. Together these form the TSS Article Number. The TSS Article No. for all intermediate sizes can be determined by following the example:

<b>TSS Article No.</b>	<b>WES3</b>	<b>N</b>	<b>3500</b>	<b>-</b>	<b>M12</b>	<b>N</b>
Series No.						
Type (Standard)						
Rod Diameter x 10*						
Quality Index (Standard)						
Material Code (Scraper)						
Material Code (O-Ring)						

\* For diameters  $d_N \geq 1,000$  mm WES\_N is available on TSS Special Part No.



### Turcon® Excluder® SR

Optional Turcon® Excluder® SR - Figure 178 - with 2 O-Rings as elastic energizing elements.

The V-Spring is exchanged with an O-Ring for applications with less demanding service and situations where conditions or regulations eliminate applying metal V-Spring with silicone.

When Installing Excluder® SR with O-Ring scraper lip activation the O-Ring is mounted into the lip before the Excluder® Ring is placed in the groove.

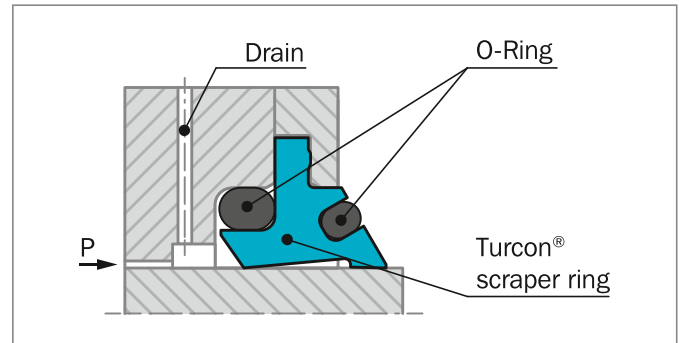


Figure 178: Optional Turcon® Excluder® SR with O-Ring activated Excluder® lip

### ORDERING EXAMPLE

Turcon® Excluder® SR complete with O-Rings, standard application:

<b>Series:</b>	WES3R from Table 163
<b>Rod Diameter:</b>	$d_N = 350.0$ mm
<b>TSS Part No.:</b>	WES3R3500 from Table 164

Select the material from Table 162. The corresponding code numbers are appended to the TSS Part No. Together these form the TSS Article Number. The TSS Article No. for all intermediate sizes can be determined by following the example:

<b>TSS Article No.</b>	<b>WES3</b>	<b>R</b>	<b>3500</b>	<b>-</b>	<b>M12</b>	<b>N</b>
Series No.						
Type (Standard)						
Rod Diameter x 10*						
Quality Index (Standard)						
Material Code (Scraper)						
Material Code (O-Ring)						

\* For diameters  $d_N \geq 1,000$  mm WES\_R is available on TSS Special Part No.