

# Turcon® Excluder® 1 and Excluder® 113



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Double-acting

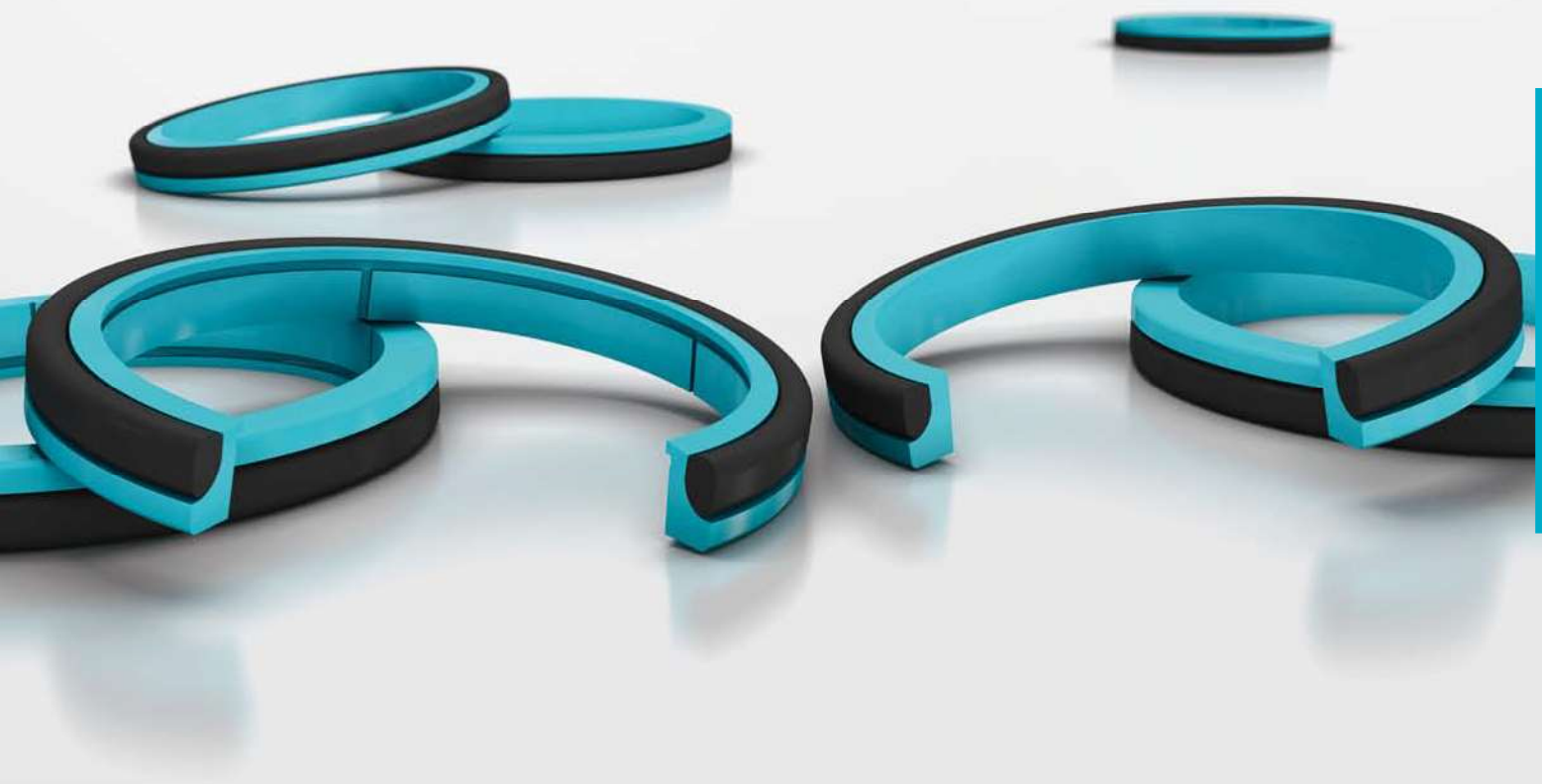
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Rubber-energized Double-acting Scraper

**Material:**

Turcon®, Zurcon® and Elastomer

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## Turcon® Excluder® 1



### Description

Turcon® Excluder® 1 is the classic single acting scraper both for rough, delicate, hot or cold environments. It consists of two components, a scraper ring and a flexible elastomer O-Ring which ensures a tight contact with surface to be scraped. The O-Ring also functions as static seal between the opposite side of the scraper ring and the groove bottom.

### APPLICATIONS

Excluder® 1 can be installed in a variety of rod sealing systems with linear movements.

A single acting scraper requires a very tight sealing system for minimising the fluid film, which will pass the scraper as leakage, and to prevent pressure activation, which can disturb the scraping function.

Produced in hard Turcon® or Zurcon® materials, the robust Excluder® 1 is able to scrape off difficult and persistent impurities such as dust, dirt, solid particles, ice, etc.

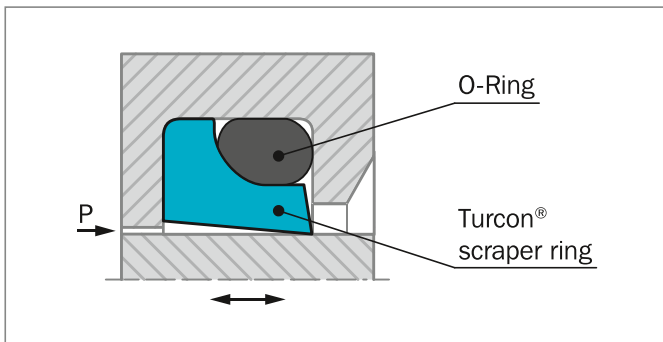


Figure 179: Turcon® Excluder® 1 an all-round single acting scraper

### ADVANTAGES

- Simple compact groove requirement, same as Turcon® Excluder® 2
- Excellent scraping performance
- Excellent wear resistant
- Compact robust design
- Compensates for deflection of the piston rod
- Low friction
- No stick-slip effect

- No vulcanising to counter surface
- High and low temperature capability
- Very high resistance to hydraulic media
- Available in all sizes from 6 mm to 999 mm. Sizes above 1,000 mm are available on TSS Special Part Number
- ISO 6195 Type D housing dimension up to diameter 63 mm

### OPERATING CONDITIONS

<b>Speed linear:</b>	Max. 15 m/s Turcon® materials Max. 5 m/s Zurcon® Z80 materials Max. 2 m/s Zurcon® Z53/Z54 materials
<b>Temperature:</b>	-45 °C to + 200 °C (Turcon® ) -45 °C to + 80 °C (Zurcon® Z80) -45 °C to + 110 °C (Zurcon® Z53/Z54) 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, environment, temperature and media.

### INSTALLATION INSTRUCTIONS

Excluder® 1 scraper can be installed in split and closed grooves. Installation in closed grooves is dependent on the rod diameter, profile cross-section of the scraper and on the cord cross-section of the corresponding O-Ring, see Table 165.

**Table 165: Installation in Closed Grooves**

Turcon® Excluder® 1 Series No.	Rod Diameter $d_N$ mm	O-Ring Cross Section $d_2$ mm
WEM3, WEL5	> 30	1.78
WEM3, WEL5, WEH1	> 30	2.62
WEM3, WEL5, WEH1	> 30	3.53
WEM3, WEL5, WEH1	> 40	5.33
WEM3, WEL5, WEH1	> 110	7.00
WEM3, WEH1	> 140	8.40

- 1) The O-Ring is installed in the groove.
- 2) The Excluder® ring is compressed into a kidney-shape and placed in the groove, see Figure 180.

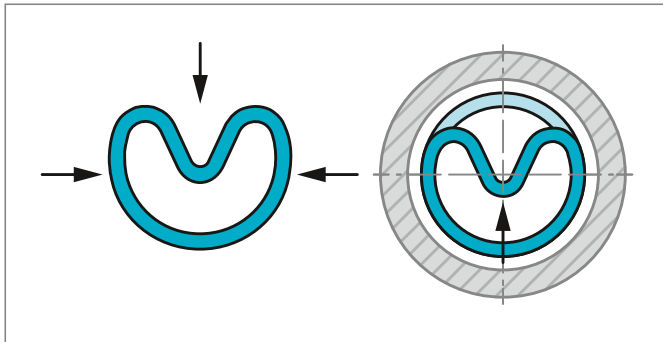


Figure 180: Place the Excluder® in compressed form into the groove behind the O-Ring and push Excluder® ring in the direction of the arrow

**RECOMMENDED MATERIALS**

The following material combinations have proven effective for hydraulic applications:

**Turcon® Excluder® 1 in Turcon® M12**

All round material for light to medium hydraulic applications 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® Excluder® 1 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 166.

**Table 166: Turcon® and Zurcon® Materials for Excluder® 1 and 113**

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 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	15
		NBR 70 Low temp.	T	-45 to +80	Steel, hardened Steel, chrome plated (rod)	
		FKM 70	V	-10 to +200	Steel plated (rod) Cast iron Stainless steel Titanium	
<b>Turcon® T40</b> 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	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	
<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, hardened	15
		NBR 70 Low temp.	T	-45 to +80	Steel, chrome plated (rod) Cast iron	
		FKM 70	V	-10 to +200		
<b>Zurcon® Z53***</b> For mineral oil based fluids Very high abrasion and extrusion resistance For counter surface with rougher surface finishes 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 Ceramic coating	
<b>Zurcon® Z80</b> 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)	Z80	NBR 70	N	-30 to (+100)	Steel	5
		NBR 70 Low temp.	T	-45 to +80	Steel, chrome plated (rod) Stainless steel	
		EPDM 70	E**	-45 to (+145)	Aluminum 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

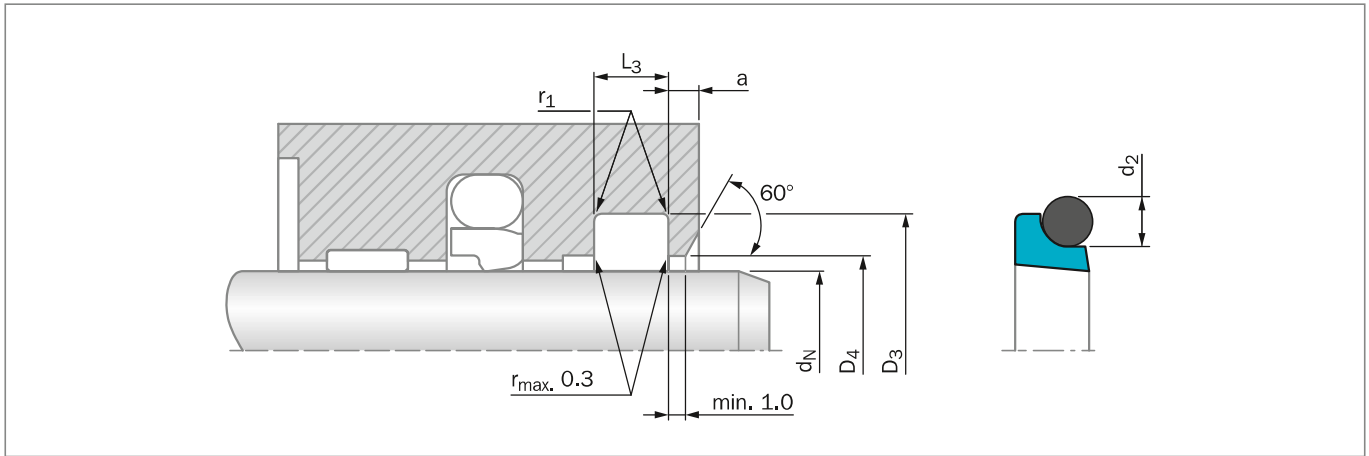


Figure 181: Installation Drawing

**Table 167: Installation Dimensions – Standard Recommendations**

Rod Diameter $d_N$ f8/h9			Groove Diameter	Groove Width	Bore Diameter	Step Width	Radius	O-Ring Cross Section
Serie No. WEM3 Standard Application	Serie No. WEL5 Light Application	Serie No. WEH1 Heavy Duty Application	$D_3$ H9	$L_3$ +0.2	$D_4$ H11	$a_{min}$	$r_1$ max	$d_2$
6 - 11.9	12 - 64.9	-	$d_N + 4.8$	3.7	$d_N + 1.5$	2.0	0.4	1.78
12 - 64.9	65 - 250.9	6 - 11.9	$d_N + 6.8$	5.0	$d_N + 1.5$	2.0	0.7	2.62
65 - 250.9	251 - 420.9	12 - 64.9	$d_N + 8.8$	6.0	$d_N + 1.5$	3.0	1.0	3.53
251 - 420.9	421 - 650.9	65 - 250.9	$d_N + 12.2$	8.4	$d_N + 2.0$	4.0	1.2	5.33
421 - 650.9	651 - 999.9	251 - 420.9	$d_N + 16.0$	11.0	$d_N + 2.0$	4.0	1.5	7.00
651 - 999.9		421 - 650.9	$d_N + 20.0$	14.0	$d_N + 2.5$	5.0	2.0	8.40

Sizes from  $d_N$  1,000.0 mm to  $d_N$  2,600.0 mm are available on TSS special part number

### ORDERING EXAMPLE

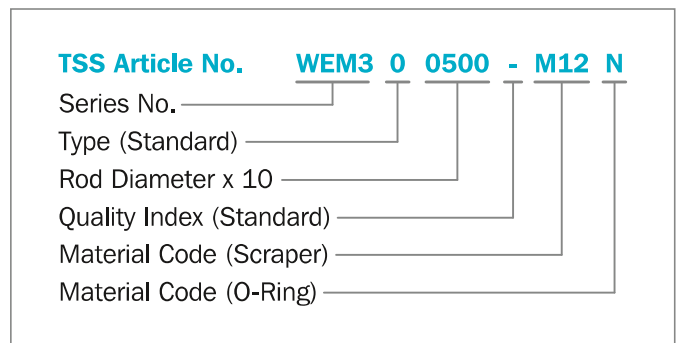
Turcon® Excluder® 1 complete with O-Ring, standard application:

**Series:** WEM3 from Table 167

**Rod Diameter:**  $d_N = 50.0$  mm

**TSS Part No.:** WEM300500 from Table 168

Select the material from Table 166. 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:





**Table 168: Installation Dimensions / TSS Part Numbers**

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 <sub>N</sub> f8/h9	D <sub>3</sub> H9	L <sub>3</sub> +0.2			d <sub>N</sub> f8/h9	D <sub>3</sub> H9	L <sub>3</sub> +0.2		
6.0*	10.8	3.7	<a href="#">WEM300060</a>	7.65 x 1.78	225.0	233.8	6.0	<a href="#">WEM302250</a>	228.19 x 3.53
8.0*	12.8	3.7	<a href="#">WEM300080</a>	9.50 x 1.80	250.0	258.8	6.0	<a href="#">WEM302500</a>	253.59 x 3.53
10.0*	14.8	3.7	<a href="#">WEM300100</a>	11.80 x 1.80	275.0	287.2	8.4	<a href="#">WEM302750</a>	278.77 x 5.33
12.0*	18.8	5.0	<a href="#">WEM300120</a>	13.94 x 2.62	300.0	312.2	8.4	<a href="#">WEM303000</a>	304.17 x 5.33
14.0*	20.8	5.0	<a href="#">WEM300140</a>	15.54 x 2.62	320.0	332.2	8.4	<a href="#">WEM303200</a>	304.17 x 5.33
16.0*	22.8	5.0	<a href="#">WEM300160</a>	18.00 x 2.65	380.0	392.2	8.4	<a href="#">WEM303800</a>	380.37 x 5.33
18.0*	24.8	5.0	<a href="#">WEM300180</a>	20.29 x 2.62	400.0	412.2	8.4	<a href="#">WEM304000</a>	405.26 x 5.33
19.0	25.8	5.0	<a href="#">WEM300190</a>	20.29 x 2.62	450.0	466.0	11.0	<a href="#">WEM304500</a>	443.36 x 7.00
20.0*	26.8	5.0	<a href="#">WEM300200</a>	21.89 x 2.62	480.0	496.0	11.0	<a href="#">WEM304800</a>	481.38 x 7.00
22.0*	28.8	5.0	<a href="#">WEM300220</a>	23.47 x 2.62	500.0	516.0	11.0	<a href="#">WEM305000</a>	494.16 x 7.00
25.0*	31.8	5.0	<a href="#">WEM300250</a>	26.64 x 2.62	550.0	566.0	11.0	<a href="#">WEM305500</a>	557.66 x 7.00
28.0*	34.8	5.0	<a href="#">WEM300280</a>	29.82 x 2.62	600.0	616.0	11.0	<a href="#">WEM306000</a>	608.08 x 7.00
30.0	36.8	5.0	<a href="#">WEM300300</a>	31.42 x 2.62	640.0	656.0	11.0	<a href="#">WEM306400</a>	633.48 x 7.00
32.0*	38.8	5.0	<a href="#">WEM300320</a>	34.59 x 2.62	680.0	700.0	14.0	<a href="#">WEM306800</a>	685 x 8.40
33.0	39.8	5.0	<a href="#">WEM300330</a>	34.59 x 2.62	700.0	720.0	14.0	<a href="#">WEM307000</a>	705 x 8.40
34.0	40.8	5.0	<a href="#">WEM300340</a>	36.17 x 2.62	750.0	770.0	14.0	<a href="#">WEM307500</a>	755 x 8.40
35.0	41.8	5.0	<a href="#">WEM300350</a>	36.17 x 2.62	800.0	820.0	14.0	<a href="#">WEM308000</a>	805 x 8.40
36.0*	42.8	5.0	<a href="#">WEM300360</a>	37.77 x 2.62	850.0	870.0	14.0	<a href="#">WEM308500</a>	855 x 8.40
40.0*	46.8	5.0	<a href="#">WEM300400</a>	42.52 x 2.62	900.0	920.0	14.0	<a href="#">WEM309000</a>	905 x 8.40
45.0*	51.8	5.0	<a href="#">WEM300450</a>	47.29 x 2.62	950.0	970.0	14.0	<a href="#">WEM309500</a>	955 x 8.40
48.0	54.8	5.0	<a href="#">WEM300480</a>	50.47 x 2.62					
50.0*	56.8	5.0	<a href="#">WEM300500</a>	52.07 x 2.62					
56.0*	62.8	5.0	<a href="#">WEM300560</a>	58.42 x 2.62					
60.0	66.8	5.0	<a href="#">WEM300600</a>	61.60 x 2.62					
63.0*	69.8	5.0	<a href="#">WEM300630</a>	64.77 x 2.62					
65.0	73.8	6.0	<a href="#">WEM300650</a>	66.27 x 3.53					
70.0	78.8	6.0	<a href="#">WEM300700</a>	72.62 x 3.53					
75.0	83.8	6.0	<a href="#">WEM300750</a>	75.79 x 3.53					
80.0	88.8	6.0	<a href="#">WEM300800</a>	82.14 x 3.53					
85.0	93.8	6.0	<a href="#">WEM300850</a>	85.32 x 3.53					
90.0	98.8	6.0	<a href="#">WEM300900</a>	91.67 x 3.53					
100.0	108.8	6.0	<a href="#">WEM301000</a>	101.19 x 3.53					
110.0	118.8	6.0	<a href="#">WEM301100</a>	110.72 x 3.53					
120.0	128.8	6.0	<a href="#">WEM301200</a>	120.24 x 3.53					
130.0	138.8	6.0	<a href="#">WEM301300</a>	132.94 x 3.53					
140.0	148.8	6.0	<a href="#">WEM301400</a>	142.47 x 3.53					
150.0	158.8	6.0	<a href="#">WEM301500</a>	151.99 x 3.53					
160.0	168.8	6.0	<a href="#">WEM301600</a>	158.34 x 3.53					
180.0	188.8	6.0	<a href="#">WEM301800</a>	177.39 x 3.53					
200.0	208.8	6.0	<a href="#">WEM302000</a>	202.79 x 3.53					

\* Installation in grooves according to ISO 6195 Type D





## Turcon® Excluder® 113

### Description

If Turcon® Excluder® 1 has been deformed or tilted by pressure activation, and acted as a seal, the pressure might have extruded and damaged the scraper lip.

To prevent this a one-way pressure relief version can be utilised where the pressure in all circumstances is channelled to a circumferential groove in Turcon® Excluder® 113 below the elastomers activation element. Should a high pressure appear, the scraping lip will shortly be lifted and the pressure released. Excluder® 113 is also applicable where the choice of seals would involve a risk of hydrodynamic pressure build-up between a seal and a double lip Excluder® .

Only available on TSS Standard Part No. in WEM3 series in all sizes from 6 mm to 999 mm. Sizes above 1,000 mm are available on TSS Special Part Number.

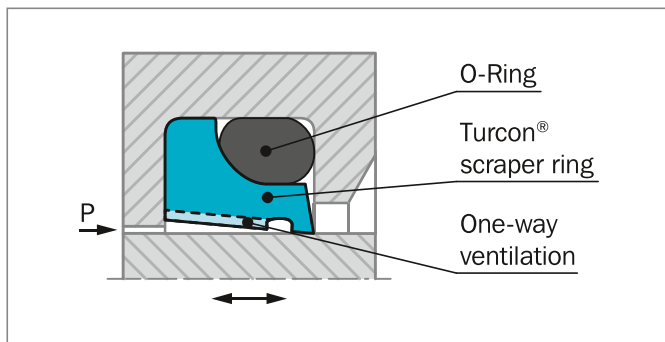


Figure 182: Turcon® Excluder® 113 with built-in one-way pressure relief

### OPERATING CONDITIONS

Identical to Turcon® Excluder® 1 see page 489.

### INSTALLATION INSTRUCTIONS

Excluder® 113 scrapers can be installed in split and closed grooves.

Installation in closed grooves is dependent on the rod diameter, profile cross-section of the scraper and on the cord cross-section of the corresponding O-Ring, see Table 169.

**Table 169: Installation in Closed Grooves**

Turcon® Excluder® 113 Series No.	Rod Diameter $d_N$ mm	O-Ring Cross Section- $\emptyset$ $d_2$ mm
WEM3E	> 30	1.78
WEM3E	> 30	2.62
WEM3E	> 30	3.53
WEM3E	> 40	5.33
WEM3E	> 110	7.00
WEM3E	> 140	8.40

Installation procedure is identical to Turcon® Excluder® 1

### MATERIALS

Identical to Turcon® Excluder® 1, see Table 166.



## ■ Installation Recommendation

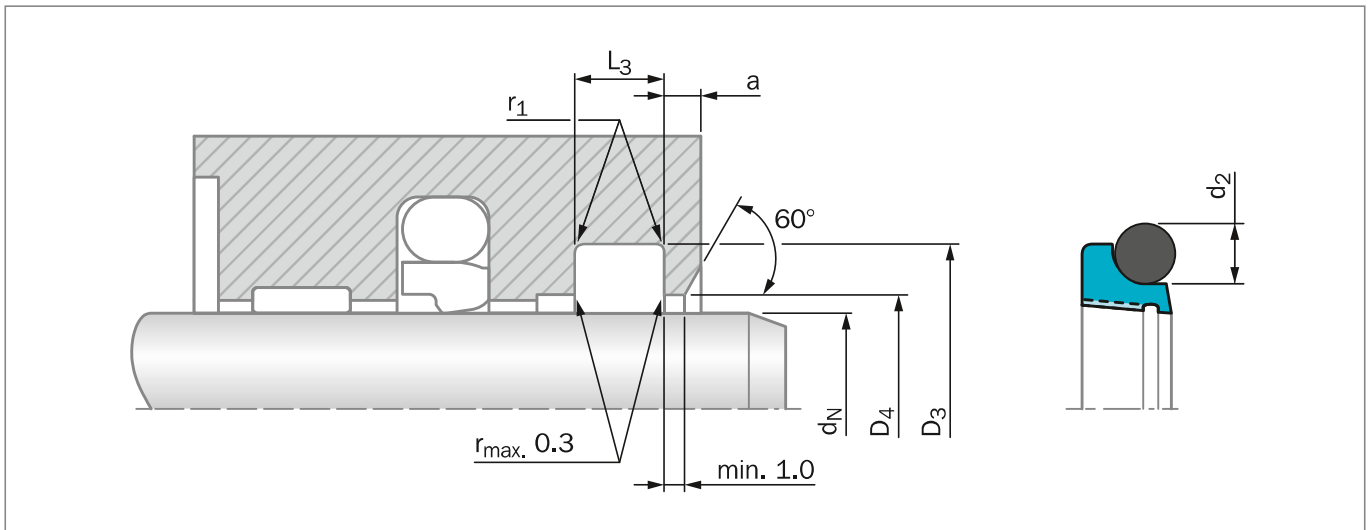


Figure 183: Installation Drawing

**Table 170: Installation Dimensions**

Series No.	Rod Diameter $d_N$ f8/h9	Groove Diameter	Groove Width	Bore Diameter	Step Width	Radius	O-Ring Cross Section
	Standard Application	$D_3$ H9	$L_3$ +0.2/-0.0	$D_4$ H11	$a_{min}$	$r_1$ max	$d_2$
WEM3E	6 – 11.9	$d_N + 4.8$	3.7	$d_N + 1.5$	2.0	0.4	1.78
WEM3E	12 – 64.9	$d_N + 6.8$	5.0	$d_N + 1.5$	2.0	0.7	2.62
WEM3E	65 – 250.9	$d_N + 8.8$	6.0	$d_N + 1.5$	3.0	1.0	3.53
WEM3E	251 – 420.9	$d_N + 12.2$	8.4	$d_N + 2.0$	4.0	1.2	5.33
WEM3E	421 – 650.9	$d_N + 16.0$	11.0	$d_N + 2.0$	4.0	1.5	7.00
WEM3E	651 – 999.9	$d_N + 20.0$	14.0	$d_N + 2.5$	5.0	2.0	8.40

Sizes from  $d_N$  1,000.0 mm to  $d_N$  2,600.0 mm are available on special part number.

### ORDERING EXAMPLE

Turcon® Excluder® 113 complete with O-Ring, standard application:

<b>Series:</b>	WEM3E from Table 170
<b>Rod Diameter:</b>	$d_N = 50.0$ mm
<b>TSS Part No.:</b>	WEM3E0500 from Table 168

Select the material from Table 166. 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:

