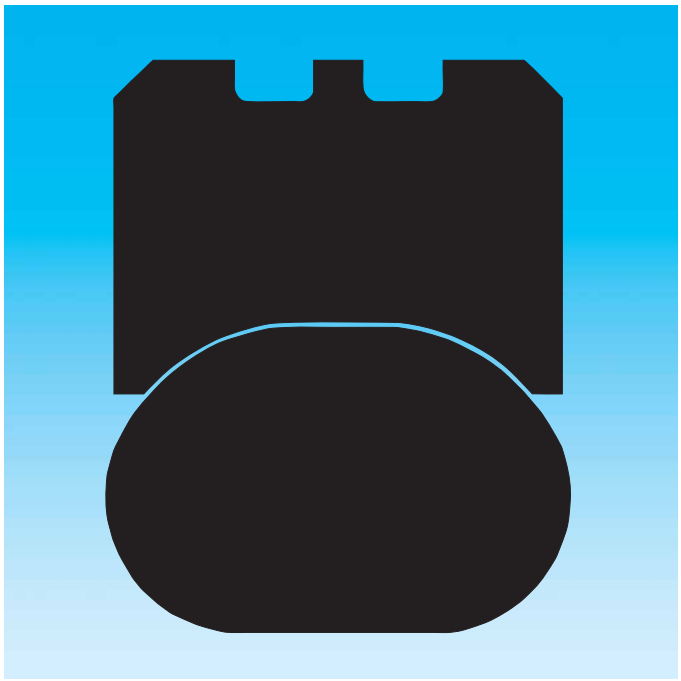
Turcon® Roto Glyd Ring®



■ TURCON® ROTARY SEALS - ELASTOMER ENERGIZED

■ Turcon® Roto Glyd Ring®

Description

The Turcon® Roto Glyd Ring® is used to seal rods, shafts, axles, bores, rotary transmission leadthroughs, journals, swivels etc. with rotary or oscillating movement.

The seal is double-acting and can be exposed to pressure from one, or from both sides.

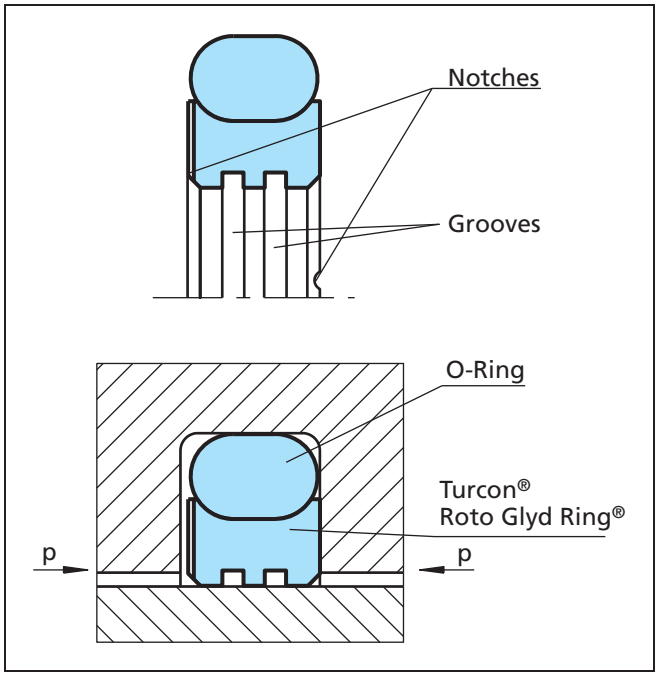


Figure 111 Turcon® Roto Glyd Ring®

It consists of a seal ring of Turcon® material and is activated by an O-Ring as an elastic energizing element.

The contact surface profile of the seal ring is specially designed for use under high pressures and at low sliding speeds.

Depending on the profile cross-section of the seal, the contact surface has one or two continuous machined grooves. These have the following functions:

- Improved seal efficiency by increasing the specific surface load pressure against the sealed surface
- Formation of lubricant reservoir and reduction in friction.

In order to improve the pressure activation of the O-Ring, the Roto Glyd Ring® has notched end faces as standard.

The rear face which holds the O-Ring has a concave form. This increases the contact surface and shall prevent the seal from turning with the rotating surface.

A standard diameter range for each profile size is assigned to the series numbers in Table LXXVI and LXXVIII. This recommendation applies to all new constructions. Different dimensions are available on request.

Advantages

- Available for internal and external sealing applications
- Low friction
- Stick-slip-free starting, no sticking
- High abrasion resistance and dimensional stability
- Simple groove design, small groove dimensions
- Lubricant reservoir
- Available in all sizes up to 2700 mm diameter (to 2600 mm for rod seals)

Technical data

Operating pressure:	Up to 30 MPa
Speed:	Up to 2 m/s
Temperature:	- 45°C to + 200 °C *) (depending on O-Ring material)
Media:	Mineral oil-based hydraulic fluids, flame retardant hydraulic fluids, environmentally safe hydraulic fluids (bio-oils), water, air and others, depending on O-Ring material.
Note:	For continuous operation at temperatures over +60 °C, pressure and speed must be limited.

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 and temperature.

***) Important Note:**
In the case of unpressurized applications in temperatures below 0°C please contact our application engineers for assistance!

Frictional power

Guide values for the frictional power can be determined from the graph in Figure 112. They are shown as a function of the sliding speed and operating pressure for a shaft diameter of 50 mm with an oil temperature of 60° C. At higher temperatures, these application limits must be reduced.

Guide values for other shaft diameters can be calculated using the formula:

$$P \simeq P_{50} \times \left(\frac{d}{50\ mm}\right)\ [W]$$

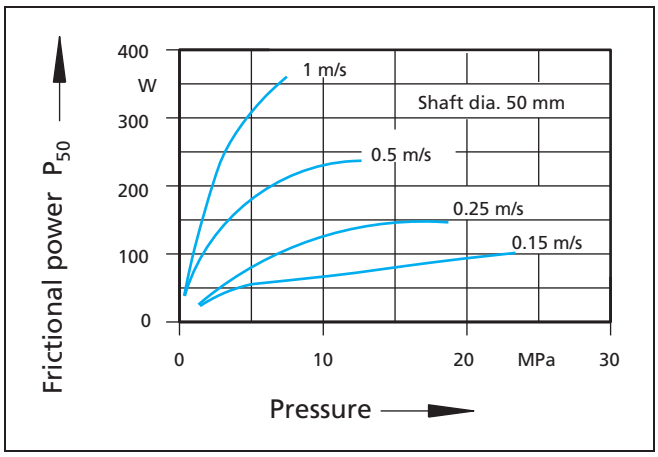


Figure 112 Frictional power for Turcon® Roto Glyd Ring®

The guide values apply for constant operating conditions. Changes in operating conditions such as pressure fluctuations or alternating directions of shaft rotation can result in considerably higher friction values.

Application examples

The Turcon® Roto Glyd Ring® is the preferably used as a double acting rotary seal for hydraulic and pneumatic equipment in sectors such as:

- Rotary distributors
- High pressure valve stems
- Manipulators
- Pivoting motors in mobile hydraulic and machine tools
- Hydraulic motors

Application limits

The maximum application data for temperature, pressure and speed given in this catalogue have a mutual effect on one another and can thus not be exploited simultaneously.

Seal performance is further influenced by such factors as lubrication capability of the sealed medium and heat dissipation in the hardware, it follows that testing should always be made.

With good lubrication, the following pv value can be assumed as guide:

Turcon® Roto Glyd Ring®: up to pv = 2.5 MPa · m/s

The value must be reduced for diameters < 50 mm.

Lead-in chamfers

In order to avoid damage during installation, lead-in chamfers and rounded edges must be provided on the housing and on the rod (Figures 124 and 125). If this is not possible for design reasons, a separate installation tool is recommended.

The minimum length of the lead-in chamfer depends on the profile size of the seal and can be seen from the following tables. If concentricity between the parts is not ensured during installation the lead-in chamfers must be increased correspondingly.

For the surface quality of the lead-in chamfer, the same recommendations apply as given for the sealing surfaces in Table LXXV.

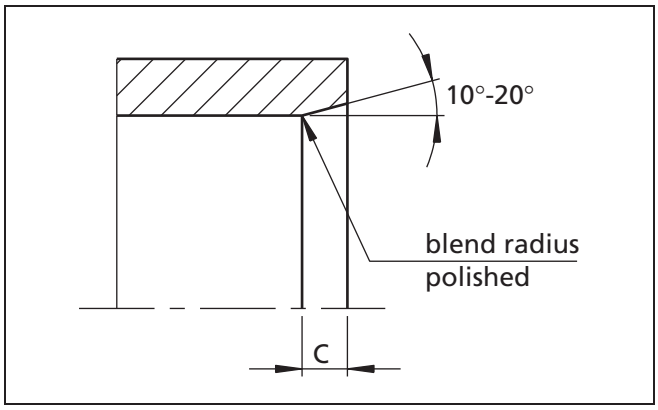


Figure 113 Lead-in chamfer on bore

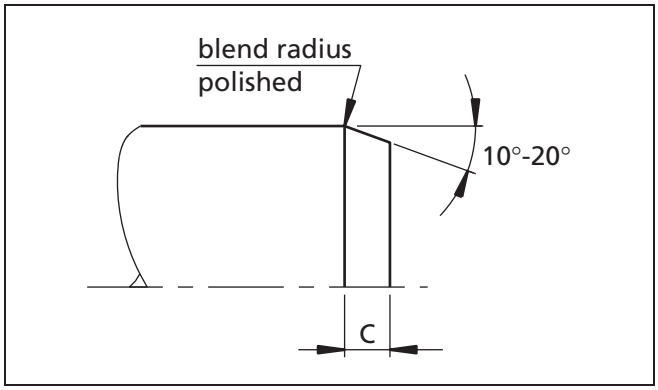


Figure 114 Lead-in chamfer on rod

Table LXXII Lead-in chamfers for Turcon® Roto Glyd Ring®

Series No.		Lead-in chamfers length C min.
Bore	Rod	
TG40	TG30	2.0
TG41	TG31	2.5
TG42	TG32	3.5
TG43	TG33	5.0
TG44	TG34	6.5
TG45	TG35	7.5

Table LXXIII Surface roughness

Surface roughness µm		
Parameter	Mating surface	Groove surface
	Turcon® materials	
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 approx. 50 to 70%, determined at a cut depth c = 0.25 x R_z, relative to a reference line of C_{ref}. 5%.

For ceramic coated surfaces, like plasma sprayed, additional focus on surface texture is necessary. Peaks and sharp edges from pores have to be polished away (e.g. with diamond paste on soft "pad") to avoid premature seal wear.

Closed grooves

Turcon® Roto Glyd Ring® for external and internal sealing can be installed in closed grooves at diameters from Ø 15 and Ø 12 respectively. Seal cross sections used outside of their recommended diameter range require split grooves according to table below.

Table LXXIV Groove type - closed or split

Series	Series	Split grooves required below	
Bore	Rod	Turcite® T40	Turcite® T10
TG40	-	ø 15	ø 25
TG41	-	ø 25	ø 38
TG42	-	ø 32	ø 50
TG43	-	ø 50	ø 75
-	TG30	ø 20	
-	TG31	ø 30	
-	TG32	ø 40	
-	TG33	ø 60	

Installation of Turcon® Roto Glyd Ring®

Installation instructions

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

- Check whether housing or rod has a lead-in chamfer; if not, use an installation sleeve
- Deburr and chamfer or round sharp edges, cover the tips of any screw threads
- Remove machining residues such as chips, dirt and other foreign particles and carefully clean all parts
- The seals can be installed more easily if they are 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 disulfide or zinc sulfide)
- Do not use installation tools with sharp edges

Installation of Turcon® Roto Glyd Ring® in split grooves

"Internal and external sealing"

Installation in split grooves is simple. During final assembly - insertion of the rod - the Turcon® Roto Glyd Ring® must be sized. The rod itself can be used for this purpose, provided it has a long lead-in chamfer. Alternatively a corresponding mandrel can be used.

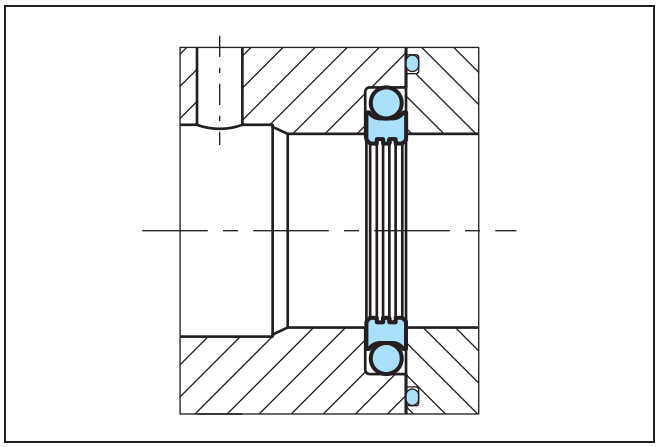


Figure 115 Installation in a split groove

The following installation sequence is recommended:

- Pull the O-Ring onto the Roto Glyd Ring®
- Press the seal element into the groove. The O-Ring must not be allowed to twist

Installation of Turcon® Roto Glyd Ring® in closed grooves

"Internal sealing"

The installation of our seal elements is unproblematic.

- Place the O-Ring into the groove (avoid twisting the ring!)
- Compress the Turcon® Roto Glyd Ring® into a kidney shape. The seal must have no sharp bends

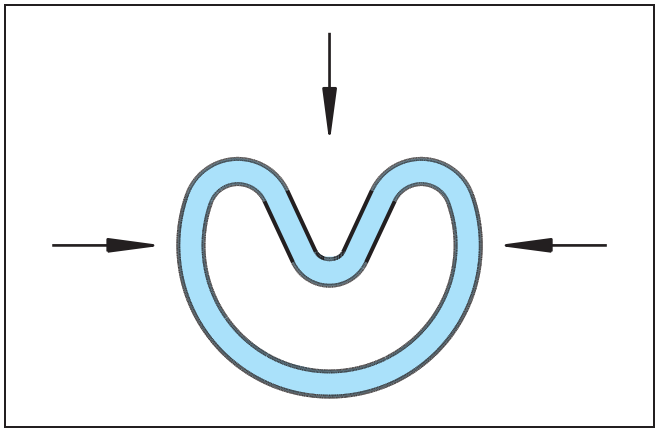


Figure 116 Kidney-shaped deformation of the seal ring

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

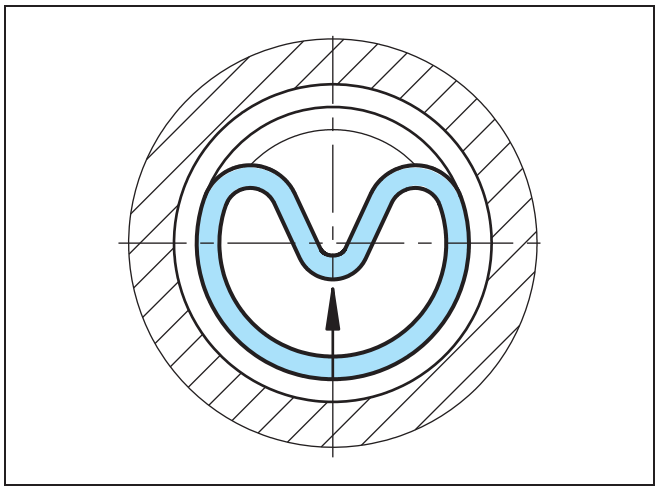


Figure 117 Inserting the seal ring into the closed groove

- Finally size the seal ring using a mandrel which should have a chamfer of 10° to 15° over a length of approx. 30 mm

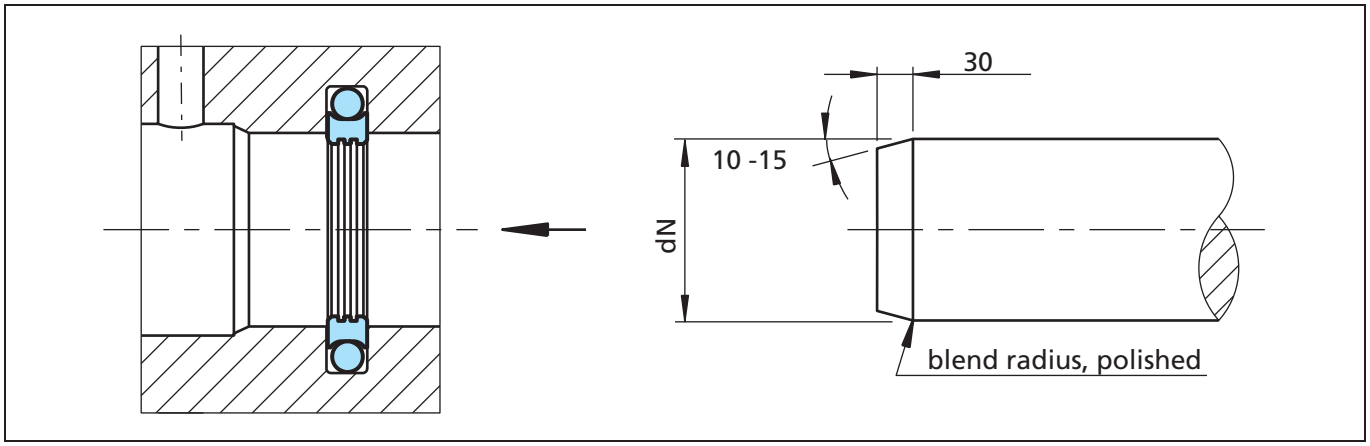


Figure 118 Sizing of the installed seal

The rod itself can also be used for sizing, provided that it has a sufficiently long lead-in chamfer as per our recommendations in Table LXXII.

Sizing mandrels should be made from a polymer material (e.g. polyamide). In order to avoid damage to the seals, a smooth surface with rounded and polished lead-in chamfer is necessary.

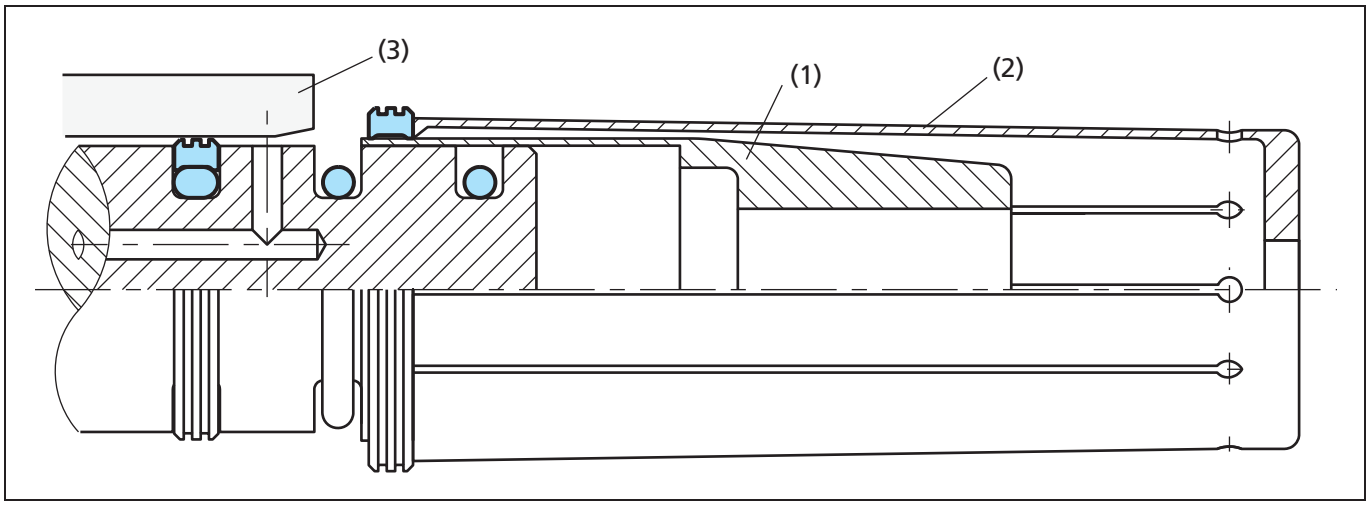


Figure 119 Expanding the Turcon® Roto Glyd Ring® over the installation sleeve using an expanding sleeve

Installation with installation tools (external sealing)

Use of a three-piece installation tool is recommended for series production installation of the Turcon® Roto Glyd Ring®.

The tool consists of:

- Installation sleeve (1)
- Expanding sleeve (2)
- Sizing sleeve (3).

All parts should be made of a polymer material (e.g. polyamide) with a good surface finish to avoid damage to the seals.

The O-Ring should be pulled over the piston into the groove (take care not to burst the O-Ring).

The Roto Glyd Ring® element should be expanded over the Installation sleeve using the Expanding sleeve using a fast but smooth movement.

After installation the Roto Glyd Ring® element should be sized using the Sizing sleeve.

In view of the large number of sizes and the application-specific installation conditions, this installation tool cannot be supplied as standard by Trelleborg Sealing Solutions.

Drawings for installation tools are available on request.

Installation without installation tools (external sealing)

If installation has to be performed without installation tools, however, the following points should be observed:

- The Roto Glyd Ring® can be installed more easily by heating in oil, water or using a hot air fan to approx. 80° C to 100° C (expanding and then sizing)
- Use no sharp edged tools to expand the seal rings
- Installation should be performed as quickly as possible so that an optimum snap-back of the seal element is assured
- Sizing of the seal ring can be carried out in the corresponding housing, provided that it has a long lead-in chamfer as per Table LXXII. Otherwise use a sizing sleeve.

Materials

Standard materials:

Turcon® seal ring: Turcon® T10 and Turcon® T40
O-Ring: NBR, 70 Shore A

For specific applications, other material combinations as listed in Table LXXV.

Table LXXV Standard Turcon® materials for Turcon® Roto Glyd Ring®

Material, applications, properties	Code	O-Ring material	Code	O-Ring operating temp.* °C	Mating surface material	MPa max.
Turcon® T10 Hydraulics and pneumatics for all lubricating and non-lubricating fluids, high extrusion resistance, good chemical resistance, BAM. Carbon, graphite filled Color: Black	T10	NBR - 70 Shore A	N	-30 to +100	Steel Steel, Chrome plated Stainless steel	30
		NBR - Low temp. 70 Shore A	T	-45 to +80		
		FKM - 70 Shore A	V	-10 to +200		
		EPDM-70 Shore A	E**	-45 to +145		
Turcon® T40 For all lubricating and non-lubricating hydraulic fluids, water hydraulics, soft mating surfaces. Carbon fiber filled Color: Grey	T40	NBR - 70 Shore A	N	-30 to +100	Steel Steel, Chrome plated Cast iron Stainless steel, Aluminum Bronze Alloys	20
		NBR - Low temp. 70 Shore A	T	-45 to +80		
		FKM - 70 Shore A	V	-10 to +200		
		EPDM-70 Shore A	E**	-45 to +145		

* The O-Ring Operation Temperature is only valid in mineral hydraulic oil.
** Material not suitable for mineral oils.
BAM: Approved by "Bundes Anstalt Materialprüfung, Germany".

Highlighted materials are standard.

■ Installation recommendation - external sealing

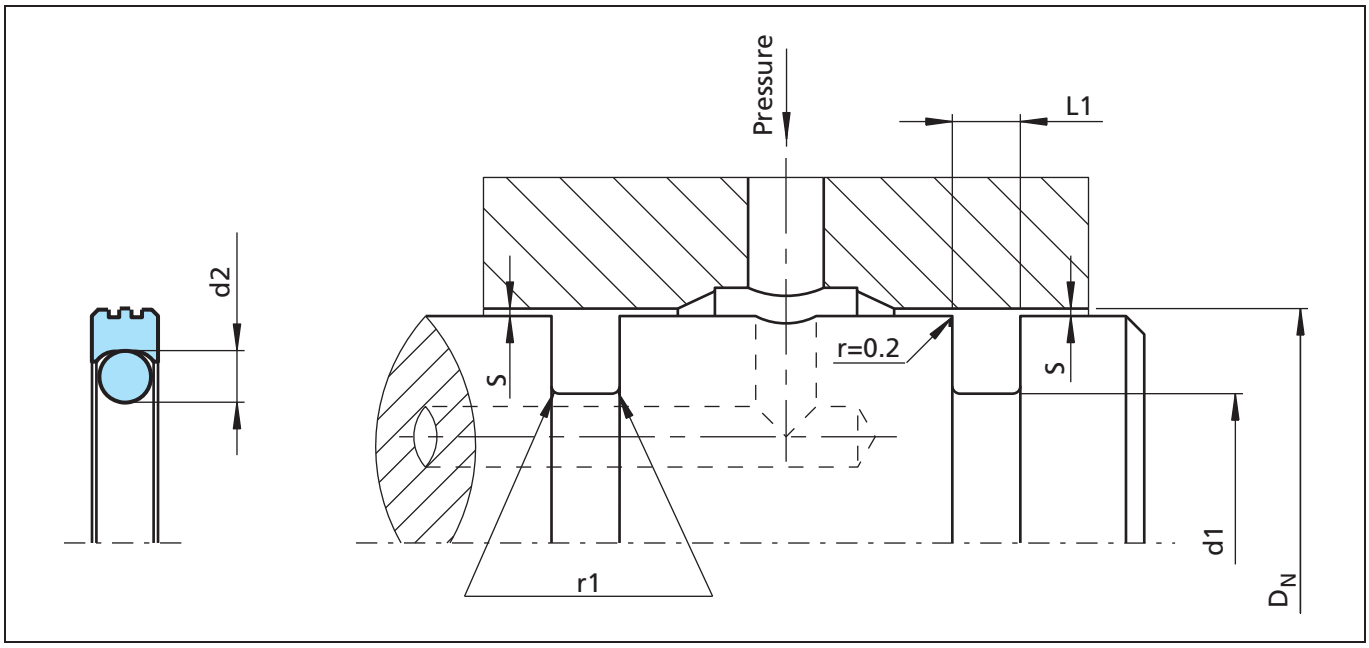


Figure 120 Installation drawing

Table LXXVI Installation dimensions

Series no.	Bore diameter D_N H9		Groove diameter	Groove width	Radial clearance S max. *		Radius	O-Ring cross sec.	Number of grooves in the sealing surface
	Standard range	Available range	d_1 h9	L_1 +0.2	10 MPa	20 MPa	r_1	d_2	
TG40	8 - 39.9	8 - 135.0	D_N- 4.9	2.20	0.15	0.10	0.40	1.78	0
TG41	40 - 79.9	14 - 250.0	D_N- 7.5	3.20	0.20	0.15	0.60	2.62	1
TG42	80 - 132.9	22 - 460.0	D_N- 11.0	4.20	0.25	0.20	1.00	3.53	1
TG43	133 - 329.9	40 - 675.0	D_N- 15.5	6.30	0.30	0.25	1.30	5.33	2
TG44	330 - 669.9	133 - 690.0	D_N- 21.0	8.10	0.30	0.25	1.80	7.00	2
TG45	670 - 999.9	670 - 999.9	D_N- 28.0	9.50	0.45	0.30	2.50	8.40	2

Provide split housing grooves according to diameter, see Table LXXIV.
At pressures > **10 MPa** it is recommended that for the cross section you choose the next larger profile according to the column "Available Range" i.e. for bore Ø80 mm: TG 43 00 800-.
* At pressures > **30 MPa**: Use diameter tolerance H8/f8 (bore / rod) in area of seal.

Ordering Example

Turcon® Roto Glyd Ring®, complete with O-Ring, external sealing, series TG42 (from Table LXXVI).

Bore diameter: D_N = 80.0 mm
TSS Part No.: TG4200800 (from Table LXXVII)

Select the material from Table LXXV. The corresponding code numbers are appended to the TSS Part No. (from Table LXXVII). Together they form the TSS Article No.

For all intermediate sizes not shown in Table LXXVIII, the Order No. can be determined from the example opposite.

** For diameters ≥ 1000.0 mm multiply only by factor 1.
Example: TG45 for diameter 1200.0 mm.
TSS Article No.: TG45**X1200** - T40N.

TSS Article No. TG42 0 0800 - T40 N

- TSS Series No.
- Type (Standard)
- Cylinder diameter x 10**
- Quality Index (Standard)
- Material code (Seal ring)
- Material code (O-Ring)

Table LXXVII Preferred Dimension / TSS Part No.

Bore diameter	Groove diameter	Groove width	TSS Part No.	O-Ring size
D_N H9	d_1 h9	L_1 +0.2		
8.0	**3.1**	**2.2**	**TG4000080**	**2.90 x 1.78**
10.0	**5.1**	**2.2**	**TG4000100**	**4.80 x 1.8**
12.0	**7.1**	**2.2**	**TG4000120**	**6.70 x 1.8**
14.0	9.1	2.2	TG4000140	8.75 x 1.8
15.0	10.1	2.2	TG4000150	9.25 x 1.78
16.0	**11.1**	**2.2**	**TG4000160**	**10.82 x 1.78**
18.0	13.1	2.2	TG4000180	12.42 x 1.78
20.0	**15.1**	**2.2**	**TG4000200**	**14.00 x 1.78**
22.0	17.1	2.2	TG4000220	17.17 x 1.78
25.0	**20.1**	**2.2**	**TG4000250**	**18.77 x 1.78**
28.0	23.1	2.2	TG4000280	21.95 x 1.78
30.0	25.1	2.2	TG4000300	25.12 x 1.78
32.0	**27.1**	**2.2**	**TG4000320**	**26.70 x 1.78**
35.0	30.1	2.2	TG4000350	29.87 x 1.78
40.0	**32.5**	**3.2**	**TG4100400**	**31.42 x 2.62**
42.0	34.5	3.2	TG4100420	32.99 x 2.62
45.0	37.5	3.2	TG4100450	36.17 x 2.62
48.0	40.5	3.2	TG4100480	39.34 x 2.62
50.0	**42.5**	**3.2**	**TG4100500**	**40.94 x 2.62**
52.0	44.5	3.2	TG4100520	44.12 x 2.62
55.0	47.5	3.2	TG4100550	45.69 x 2.62

The bore diameters printed in **bold** type conform to the recommendations of ISO 3320.
Other dimensions and all intermediate sizes up to 2.700 mm diameter including inch sizes can be supplied.

Turcon® Roto Glyd Ring®

Bore diameter	Groove diameter	Groove width	TSS Part No.	O-Ring size
D_N H9	d_1 h9	L_1 +0.2		
60.0	52.5	3.2	TG4100600	52.07 x 2.62
63.0	**55.5**	**3.2**	**TG4100630**	**53.64 x 2.62**
65.0	57.5	3.2	TG4100650	56.82 x 2.62
70.0	62.5	3.2	TG4100700	61.60 x 2.62
75.0	67.5	3.2	TG4100750	66.34 x 2.62
80.0	**69.0**	**4.2**	**TG4200800**	**66.27 x 3.53**
85.0	74.0	4.2	TG4200850	72.62 x 3.53
90.0	79.0	4.2	TG4200900	78.97 x 3.53
95.0	84.0	4.2	TG4200950	82.14 x 3.53
100.0	**89.0**	**4.2**	**TG4201000**	**88.49 x 3.53**
105.0	94.0	4.2	TG4201050	91.67 x 3.53
110.0	99.0	4.2	TG4201100	98.02 x 3.53
115.0	104.0	4.2	TG4201150	101.19 x 3.53
120.0	109.0	4.2	TG4201200	107.54 x 3.53
125.0	**114.0**	**4.2**	**TG4201250**	**113.89 x 3.53**
130.0	119.0	4.2	TG4201300	117.07 x 3.53
135.0	119.5	6.3	TG4301350	116.84 x 5.33
140.0	124.5	6.3	TG4301400	123.19 x 5.33
150.0	134.5	6.3	TG4301500	132.72 x 5.33
160.0	**144.5**	**6.3**	**TG4301600**	**142.24 x 5.33**
170.0	154.5	6.3	TG4301700	151.77 x 5.33
180.0	164.5	6.3	TG4301800	164.47 x 5.33
190.0	174.5	6.3	TG4301900	170.82 x 5.33
200.0	**184.5**	**6.3**	**TG4302000**	**183.52 x 5.33**
210.0	194.5	6.3	TG4302100	189.87 x 5.33
220.0	204.5	6.3	TG4302200	202.57 x 5.33
230.0	214.5	6.3	TG4302300	208.92 x 5.33
240.0	224.5	6.3	TG4302400	221.62 x 5.33
250.0	**234.5**	**6.3**	**TG4302500**	**234.32 x 5.33**
280.0	264.5	6.3	TG4302800	266.07 x 5.33
300.0	284.5	6.3	TG4303000	278.77 x 5.33
320.0	**304.5**	**6.3**	**TG4303200**	**304.17 x 5.33**
350.0	329.0	8.1	TG4403500	329.57 x 7.00
400.0	**379.0**	**8.1**	**TG4404000**	**267.67 x 7.00**
420.0	399.0	8.1	TG4404200	393.07 x 7.00
450.0	429.0	8.1	TG4404500	417.96 x 7.00

The bore diameters printed in **bold** type conform to the recommendations of ISO 3320.
Other dimensions and all intermediate sizes up to 2.700 mm diameter including inch sizes can be supplied.

Bore diameter	Groove diameter	Groove width	TSS Part No.	O-Ring size
D_N H9	d_1 h9	L_1 +0.2		
480.0	459.0	8.1	TG4404800	456.06 x 7.00
500.0	**479.0**	**8.1**	**TG4405000**	**468.76 x 7.00**
600.0	579.0	8.1	TG4406000	582.68 x 7.00
700.0	672.0	9.5	TG4507000	670.00 x 8.40

The bore diameters printed in **bold** type conform to the recommendations of ISO 3320.
Other dimensions and all intermediate sizes up to 2.700 mm diameter including inch sizes can be supplied.

■ Installation recommendation - internal sealing

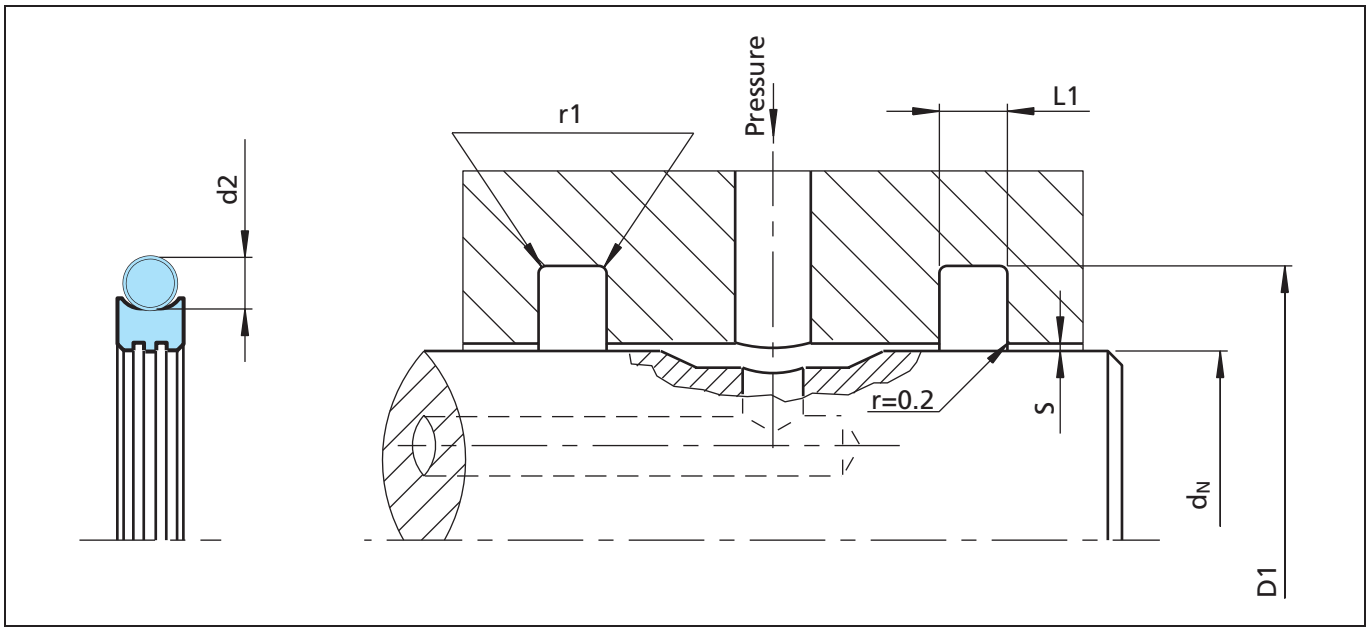


Figure 121 Installation drawing

Table LXXVIII Installation dimensions

Series no.	Rod diameter d_N f8/h9		Groove diameter	Groove width	Radial clearance S max. *		Radius	O-Ring cross sec.	Number of grooves in the sealing surface
	Standard range	Available[1)] range	D_1 H9	L_1 +0.2	10 MPa	20 MPa	r_1	d_2	
TG30	6 - 18.9	6 - 130.0	d_N+ 4.9	2.20	0.15	0.10	0.40	1.78	0
TG31	19 - 37.9	10 - 245.0	d_N+ 7.5	3.20	0.20	0.15	0.60	2.62	1
TG32	38 - 199.9	19 - 455.0	d_N+ 11.0	4.20	0.25	0.20	1.00	3.53	1
TG33	200 - 255.9	38 - 655.0	d_N+ 15.5	6.30	0.30	0.25	1.30	5.33	2
TG34	256 - 649.9	120 - 655.0	d_N+ 21.0	8.10	0.30	0.25	1.80	7.00	2
TG35	650 - 999.9	650 - 999.9	d_N+ 28.0	9.50	0.45	0.30	2.50	8.40	2

Provide split housing grooves according to diameter, see Table LXXIV.
At pressures > **10 MPa** it is recommendable that for the cross section you choose the next larger profile according to the column "Available range" i.e. for shaft Ø80 mm: TG 33 00 800-.
* At pressures > **30 MPa**: Use diameter tolerance H8/f8 (bore / rod) in area of seal.

Ordering example

Turcon® Roto Glyd Ring®, complete with O-Ring, internal sealing, series TG32 (from Table LXXVIII).

Rod diameter: d_N = 80.0 mm
TSS Part No.: TG3200800 (from Table LXXIX)

Select the material from Table LXXV. The corresponding code numbers are appended to the TSS Part No. Together they form the TSS Article No.

For all intermediate sizes not shown in Table LXXVIII, the TSS Article No. can be determined from the example below.

** For diameters ≥ 1000.0 mm multiply only by factor 1.
Example: TG35 for diameter 1200.0 mm.
TSS Article No.: TG35**X1200** - T40N.

TSS Article No. TG32 0 0800 - T40 N

- TG32 — TSS Series No.
- 0 — Type (Standard)
- 0800 — Rod diameter x 10**
- - — Quality Index (Standard)
- T40 — Material code (Seal ring)
- N — Material code (O-Ring)

Table LXXIX Preferred Dimension / TSS Part No.

Rod diameter	Groove diameter	Groove width	TSS Part No.	O-Ring size
d_N f8/h9	D_1 H9	L_1 +0.2		
6.0	**10.9**	**2.2**	**TG3000060**	**7.65 x 1.78**
8.0	**12.9**	**2.2**	**TG3000080**	**9.5 x 1.8**
10.0	**14.9**	**2.2**	**TG3000100**	**11.8 x 1.8**
12.0	**16.9**	**2.2**	**TG3000120**	**14.00 x 1.78**
14.0	**18.9**	**2.2**	**TG3000140**	**15.60 x 1.78**
15.0	19.9	2.2	TG3000150	17.17 x 1.78
16.0	**20.9**	**2.2**	**TG3000160**	**17.17 x 1.78**
18.0	**22.9**	**2.2**	**TG3000180**	**18.77 x 1.78**
20.0	**27.5**	**3.2**	**TG3100200**	**21.89 x 2.62**
22.0	**29.5**	**3.2**	**TG3100220**	**25.07 x 2.62**
25.0	**32.5**	**3.2**	**TG3100250**	**28.24 x 2.62**
28.0	**35.5**	**3.2**	**TG3100280**	**31.42 x 2.62**
30.0	37.5	3.2	TG3100300	32.99 x 2.62
32.0	**39.5**	**3.2**	**TG3100320**	**34.59 x 2.62**
35.0	42.5	3.2	TG3100350	37.77 x 2.62
36.0	**43.5**	**3.2**	**TG3100360**	**39.34 x 2.62**
40.0	**51.0**	**4.2**	**TG3200400**	**44.04 x 3.53**
42.0	53.0	4.2	TG3200420	47.22 x 3.53
45.0	**56.0**	**4.2**	**TG3200450**	**50.39 x 3.53**
48.0	59.0	4.2	TG3200480	53.57 x 3.53
50.0	**61.0**	**4.2**	**TG3200500**	**53.57 x 3.53**

The rod diameters printed in **bold** type conform to the recommendations of ISO 3320.
Other dimensions and all intermediate sizes up to 2.600 mm diameter including inch sizes can be supplied.

Turcon® Roto Glyd Ring®

Rod diameter	Groove diameter	Groove width	TSS Part No.	O-Ring size
d_N f8/h9	D_1 H9	L_1 +0.2		
52.0	63.0	4.2	TG3200520	56.74 x 3.53
55.0	66.0	4.2	TG3200550	59.92 x 3.53
56.0	**67.0**	**4.2**	**TG3200560**	**59.92 x 3.53**
60.0	71.0	4.2	TG3200600	63.09 x 3.53
63.0	**74.0**	**4.2**	**TG3200630**	**66.27 x 3.53**
65.0	76.0	4.2	TG3200650	69.44 x 3.53
70.0	**81.0**	**4.2**	**TG3200700**	**75.79 x 3.53**
75.0	86.0	4.2	TG3200750	78.97 x 3.53
80.0	**91.0**	**4.2**	**TG3200800**	**85.32 x 3.53**
85.0	96.0	4.2	TG3200850	88.49 x 3.53
90.0	**101.0**	**4.2**	**TG3200900**	**94.84 x 3.53**
95.0	106.0	4.2	TG3200950	101.19 x 3.53
100.0	**111.0**	**4.2**	**TG3201000**	**104.37 x 3.53**
105.0	116.0	4.2	TG3201050	110.72 x 3.53
110.0	**121.0**	**4.2**	**TG3201100**	**113.89 x 3.53**
115.0	126.0	4.2	TG3201150	120.24 x 3.53
120.0	131.0	4.2	TG3201200	123.42 x 3.53
125.0	**136.0**	**4.2**	**TG3201250**	**129.77 x 3.53**
130.0	141.0	4.2	TG3201300	136.12 x 3.53
135.0	146.0	4.2	TG3201350	139.29 x 3.53
140.0	**151.0**	**4.2**	**TG3201400**	**145.64 x 3.53**
150.0	161.0	4.2	TG3201500	151.99 x 3.53
160.0	**171.0**	**4.2**	**TG3201600**	**164.69 x 3.53**
170.0	181.0	4.2	TG3201700	177.39 x 3.53
180.0	**191.0**	**4.2**	**TG3201800**	**183.74 x 3.53**
190.0	201.0	4.2	TG3201900	196.44 x 3.53
200.0	**215.5**	**6.3**	**TG3302000**	**208.92 x 5.33**
210.0	225.5	6.3	TG3302100	215.27 x 5.33
220.0	**235.5**	**6.3**	**TG3302200**	**227.97 x 5.33**
240.0	255.5	6.3	TG3302400	247.02 x 5.33
250.0	**265.5**	**6.3**	**TG3302500**	**253.37 x 5.33**
280.0	**301.0**	**8.1**	**TG3402800**	**291.47 x 7.00**
300.0	321.0	8.1	TG3403000	304.17 x 7.00
320.0	**341.0**	**8.1**	**TG3403200**	**329.57 x 7.00**
350.0	371.0	8.1	TG3403500	354.97 x 7.00
360.0	**381.0**	**8.1**	**TG3403600**	**367.67 x 7.00**

The rod diameters printed in **bold** type conform to the recommendations of ISO 3320.
Other dimensions and all intermediate sizes up to 2.600 mm diameter including inch sizes can be supplied.

Rod diameter	Groove diameter	Groove width	TSS Part No.	O-Ring size
d_N f8/h9	D_1 H9	L_1 +0.2		
400.0	421.0	8.1	TG3404000	405.26 x 7.00
420.0	441.0	8.1	TG3404200	430.66 x 7.00
450.0	471.0	8.1	TG3404500	456.06 x 7.00
480.0	501.0	8.1	TG3404800	494.16 x 7.00
500.0	521.0	8.1	TG3405000	506.86 x 7.00
600.0	621.0	8.1	TG3406000	608.08 x 7.00
700.0	728.0	9.5	TG3507000	713.00 x 8.40

The rod diameters printed in **bold** type conform to the recommendations of ISO 3320.
Other dimensions and all intermediate sizes up to 2.600 mm diameter including inch sizes can be supplied.

Special solutions for rotary applications

The sealing of rotary movements in machine engineering and hydraulics often demands solutions which cannot be achieved using standard seal elements.

On request, we will be pleased to draw up specific seal proposals for your application.

Axial seals

Our extensive Turcon® seal range also permits solutions with modified standard seals.

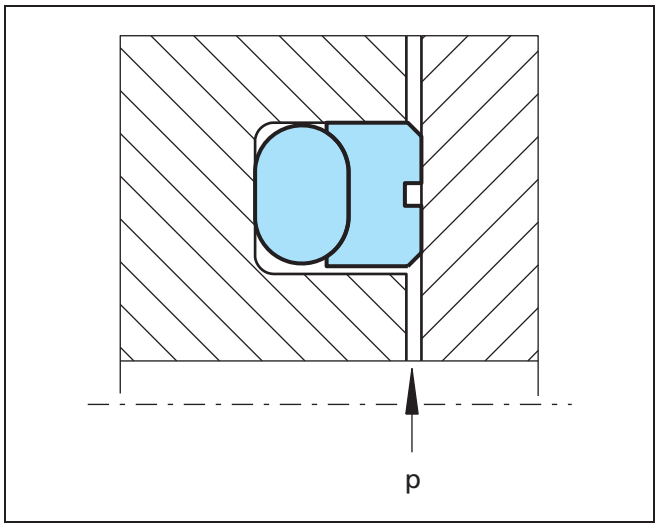


Figure 122 Axial acting Turcon® Roto Glyd Ring®

Figure 122 shows an axial acting Turcon® Roto Glyd Ring®. It is pressed axially against the mating surface by the O-Ring. In the same way, a Turcon® Stepseal® K can also be used here. The max. production diameter is 2700 mm.

The surface roughness of the mating surface must be as specified in Table LXXIII.

Special model with pressure relief

The Roto Glyd Ring® can also be supplied with pressure relief grooves. As can be seen in Figure 123 the continuous radial groove is linked on one side to the pressure chamber. The seal is thus relieved of pressure and can be used for higher pv values. The double-acting sealing function is maintained, but the relieved side should be installed on the side with the higher pressure.

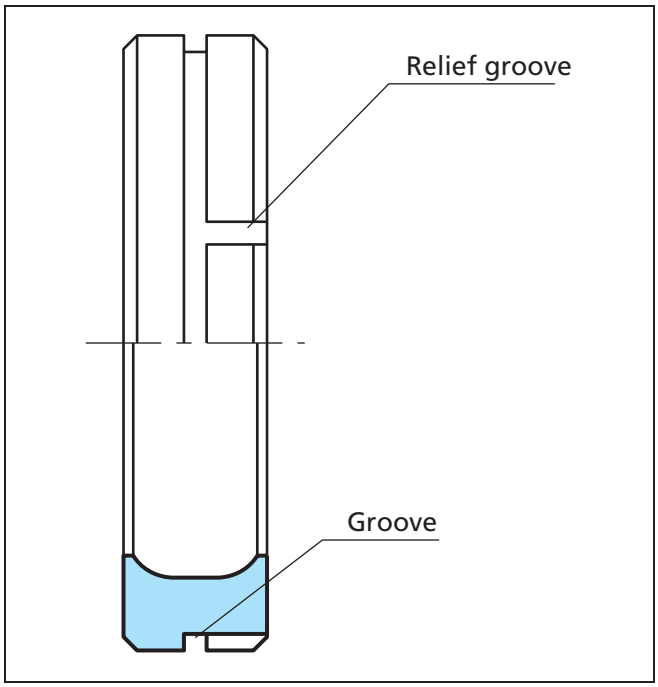
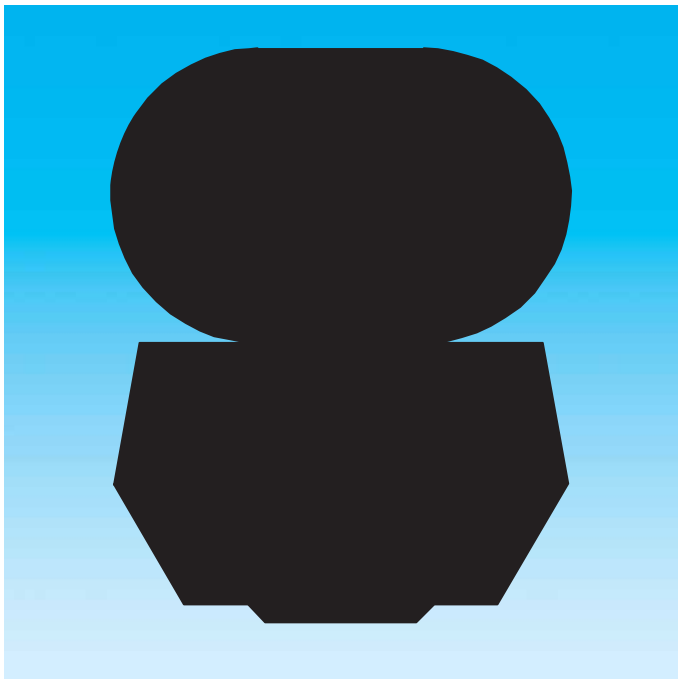


Figure 123 Turcon® Roto Glyd Ring® with pressure relief

The installation direction must be observed in this case. This version is identified in the article number by a “K” as the 5th digit.

Zurcon® Roto Glyd Ring® S



■ Zurcon® Roto Glyd Ring® S

Description

The Zurcon® Roto Glyd Ring® S is used to seal shafts, axles, bores, rotary transmission leadthroughs, journals, swivels etc. with rotary or oscillating movement.

The seal is double-acting and can be exposed to pressure from one, or from both sides.

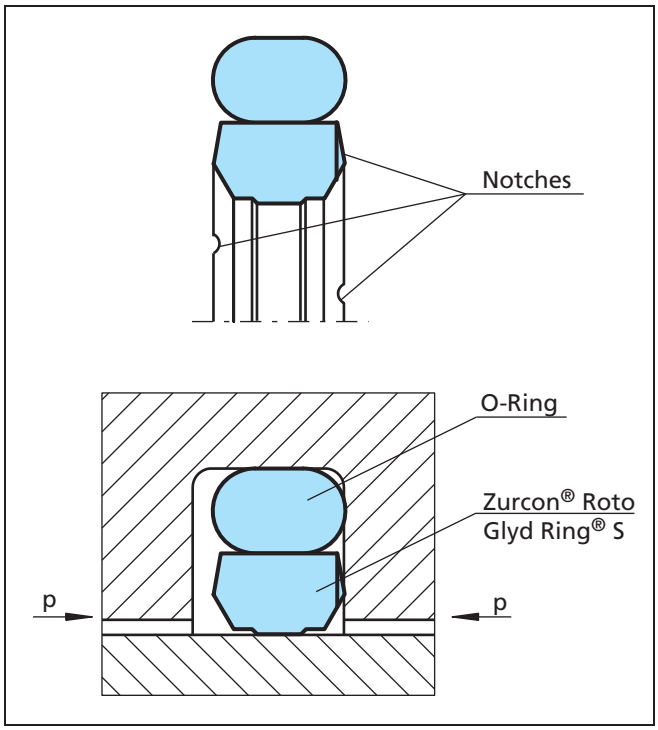


Figure 124 Zurcon® Roto Glyd Ring® S

It consists of a seal ring of Zurcon® material and is activated by an O-Ring as an elastic energizing element.

The contact surface profile of the seal ring is specially designed for use under high pressures and at low sliding speeds.

Pat. pending: DE 101 45914 A1
WO 03/027545 A1

Application examples

- For sealing shafts, axels and rotary transmission leadthroughs with slow rotary or oscillating movement
- Can also be used to seal rotary joints at increased rotating speeds even when exposed to pressure, e.g. rotary indexing tables
- Rotary connections with swivel movement, even when exposed to high pressure, e.g. damping units

Advantages

- Available for shaft and bore sealing applications
- Low friction
- Stick-slip-free starting, no sticking
- High abrasion resistance and dimensional stability
- Simple groove design, small groove dimensions
- Available in material Z51 and Z52 for all shaft sizes up to 2200 mm diameter and for all bore sizes up to 2300 mm
- Available in material Z80 for all shaft sizes up to 2600 mm diameter and for all bore sizes up to 2700 mm

Technical data

Operating pressure: Up to 40 MPa

Speed: Up to pv 6.5 MPa x m/s

Acceleration: Up to 0.9 m/s^2, in other cases contact our Technical Office

Temperature: - 30°C to + 100°C

Material	Pressure **p** [MPa]	**p x v** [MPa x m/s]	Temperature **t°** [°C]
Zurcon® Z51*	40	6.5	-30/+100
Zurcon® Z52	30	6.5	-30/+100
Zurcon® Z80	30	6.5	-30/+80

* Zurcon® Z51 only for p >30MPa

Media:
- Mineral oil base
- Synthetic and natural ester HEES, HETG up to +60°C
- Flame-retardant hydraulic fluids HFA, HFC up to +60°C
  Z80 is recommended for sealing e.g. coolants or air

Note: For continuous operation at temperatures over +60°C, pressure and speed must be limited.

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 medium.

Method of operation

Reduced contact surfaces under all operating conditions significantly improve friction and wear characteristics. When exposed to low pressure, only the central section of the seal comes into contact with the mating surface.

As the system pressure increases, the sealing ring is tilted slightly generating the hydrostatic pressure balance in the sealing gap. Tilting the ring under pressure optimizes the lubrication between the seal and the mating surface.

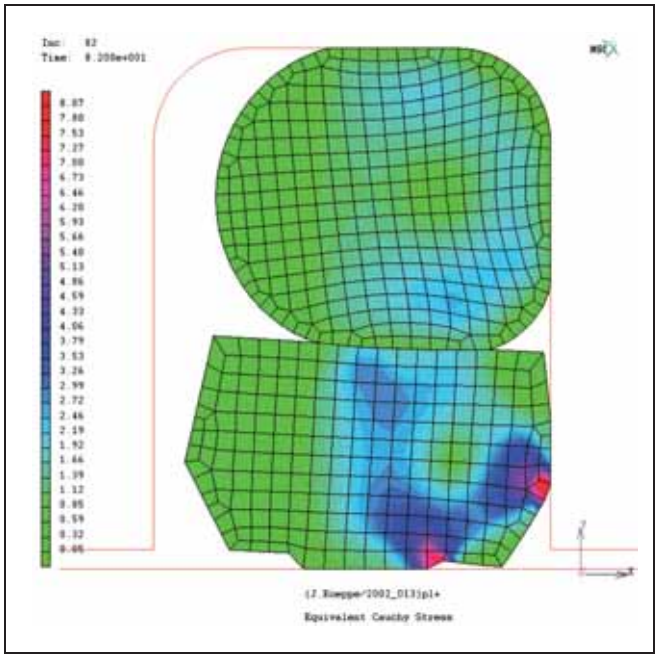


Figure 125 Zurcon® Roto Glyd Ring® S - Finite Element Analysis (FEA)

The fact that the profile is supported by a second edge restricts contact with the shaft, thereby significantly reducing friction and wear. The material used for the energizing ring can be adapted to suit operating conditions. The angle on both sides of the polyurethane ring prevents extrusion into the extrusion gap.

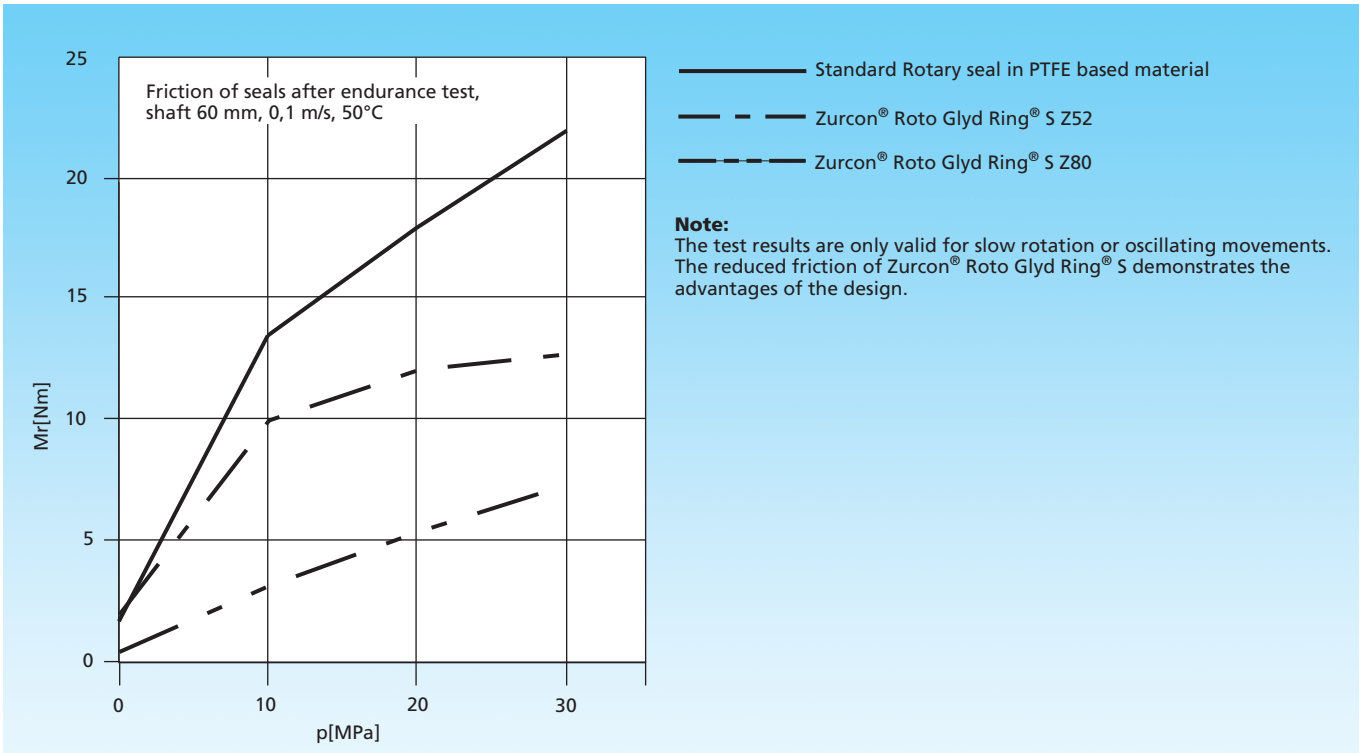


Figure 126 Friction of seals after endurance test

Table LXXX Zurcon® Materials for Roto Glyd Ring® S

Material, Applications, Properties	Code	O-Ring Material	Code	O-Ring Operating Temp.* °C	Mating Surface Material	MPa max.
Zurcon® Z51** For lubricating hydraulic fluids, **high abrasion resistance, high extrusion resistance,** limited chemical resistance. Cast polyurethane Color: Yellow to light-brown	Z51	NBR - 70 Shore A	N	-30 to +100	Steel Steel, chrome plated Cast iron Ceramic coating Stainless steel	40
		NBR - Low temp. 70 Shore A	T	-45 to +80		
Zurcon® Z52 For lubricating hydraulic fluids, **good abrasion resistance, good extrusion resistance,** limited chemical resistance. Cast polyurethane Color: Turquoise	Z52	NBR - 70 Shore A	N	-30 to +100	Steel Steel, chrome plated Cast iron Ceramic coating Stainless steel	30
		NBR - Low temp. 70 Shore A	T	-45 to +80		
Zurcon® Z80 For lubricating and non-lubricating hydraulic fluids***, high abrasion resistance, very good chemical resistance, limited temperature resistance. Ultra high molecular weight polyethylene Color: White to off-white	Z80	NBR - 70 Shore A	N	-30 to +80	Steel Steel, chrome plated Stainless steel Aluminum Bronze Ceramic coating	30
		NBR - Low temp. 70 Shore A	T	-45 to +80		
		FKM - 70 Shore A	V	-10 to +80		

* The O-Ring Operation Temperature is only valid in mineral hydraulic oil. ** max. Ø 2200 mm *** e.g. coolant fluids
Highlighted material is standard.

Lead-in chamfers

In order to avoid damage during installation, lead-in chamfers and rounded edges must be provided on the housing and on the shaft (Figures 127 and 128). If this is not possible for design reasons, a separate installation tool is recommended.

The minimum length of the lead-in chamfer depends on the profile size of the seal and can be seen from the following tables. If concentricity between the parts is not ensured during installation the lead-in chamfers must be increased correspondingly.

For the surface quality of the lead-in chamfer, the same recommendations apply as given for the sealing surfaces in Table I.

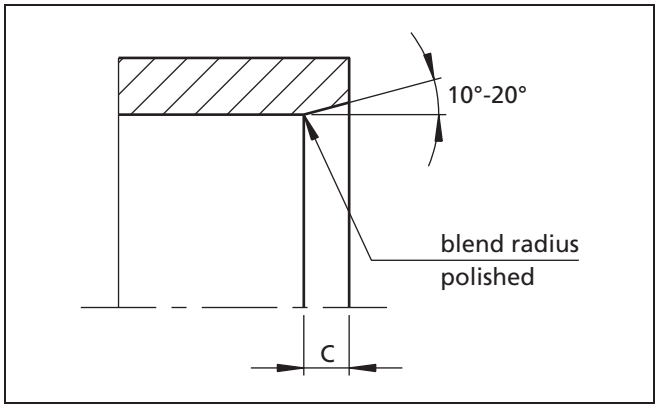


Figure 127 Lead-in chamfer on bore

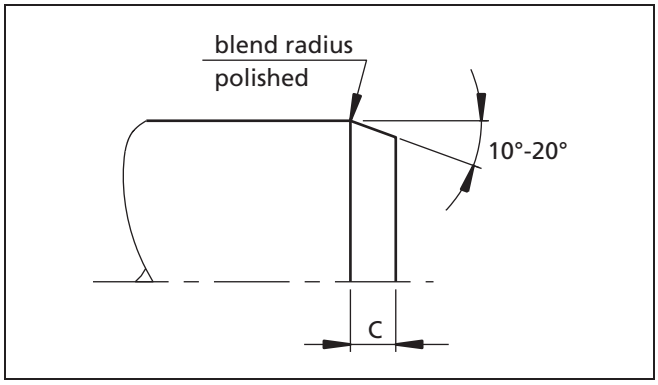


Figure 128 Lead-in chamfer on shaft

Table LXXXI Lead-in chamfers for Zurcon® Roto Glyd Ring® S

Series no.		Lead-in chamfers length C min.
Shaft	Bore	
TG50	TG60	2.0
TG51	TG61	2.5
TG52	TG62	3.5
TG53	TG63	5.0
TG54	TG64	6.5
TG55	TG65	7.5

Table LXXXII Surface roughness

Surface roughness µm		
Parameter	Mating surface	Groove surface
	Zurcon® materials	
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 approx. 50 to 70%, determined at a cut depth c = 0.25 x R_z, relative to a reference line of C_{ref}. 5%.

For ceramic coated surfaces, like plasma sprayed, additional focus on surface texture is necessary. Peaks and sharp edges from pores have to be polished away (e.g. with diamond paste on soft "pad") to avoid premature seal wear.

Closed grooves

Zurcon® Roto Glyd Ring® S for shaft and bore sealing can be installed in closed grooves at diameters from Ø 12. Seal cross sections used outside of their recommended diameter range require split grooves according to the table below.

Table LXXXIII Groove type - closed or split

Series no.		Split grooves required below		
Shaft	Bore	Zurcon® Z51	Zurcon® Z52	Zurcon® Z80
TG50	-	ø 18	ø 12	ø 18
TG51	-	ø 25	ø 19	ø 25
TG52	-	ø 33	ø 33	ø 33
TG53	-	ø 60	ø 60	ø 60
-	TG60	ø 25	ø 12	ø 25
-	TG61	ø 38	ø 25	ø 38
-	TG62	ø 50	ø 32	ø 50
-	TG63	ø 75	ø 50	ø 75

■ Installation of Zurcon® Roto Glyd Ring® S

Installation instructions

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

- Check whether housing or shaft has a lead-in chamfer; if not, use an installation sleeve
- Deburr and chamfer or round sharp edges, cover the tips of any screw threads
- Remove machining residues such as chips, dirt and other foreign particles and carefully clean all parts
- The seals can be installed more easily if they are 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 disulfide or zinc sulfide)
- Do not use installation tools with sharp edges

Installation of Zurcon®Roto Glyd Ring® S in split grooves

"shaft and bore sealing"

Installation in split grooves is simple. During final assembly - insertion of the shaft - the Zurcon®Roto Glyd Ring® S must be sized. The shaft itself can be used for this purpose, provided it has a long lead-in chamfer. Alternatively a corresponding mandrel can be used.

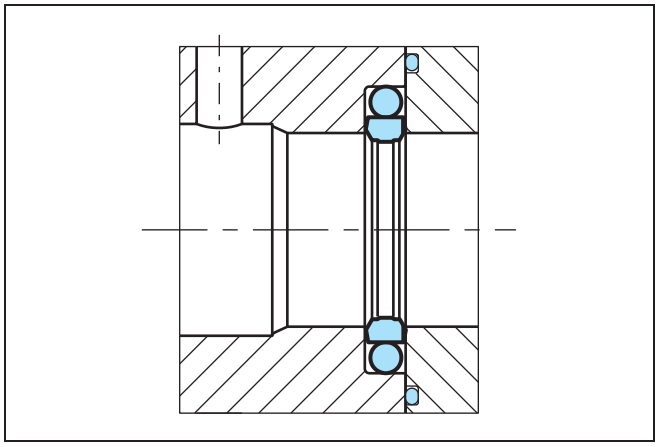


Figure 129 Installation in a split groove

The following installation sequence is recommended:

- Pull the O-Ring onto the Roto Glyd Ring® S
- Press the seal element into the groove. The O-Ring must not be allowed to twist

Installation of Zurcon® Roto Glyd Ring® S in closed grooves

"shaft sealing"

The installation of our seal elements is unproblematic.

- Place the O-Ring into the groove (avoid twisting the ring!)
- Compress the Zurcon® Roto Glyd Ring® S into a kidney shape. The seal must have no sharp bends

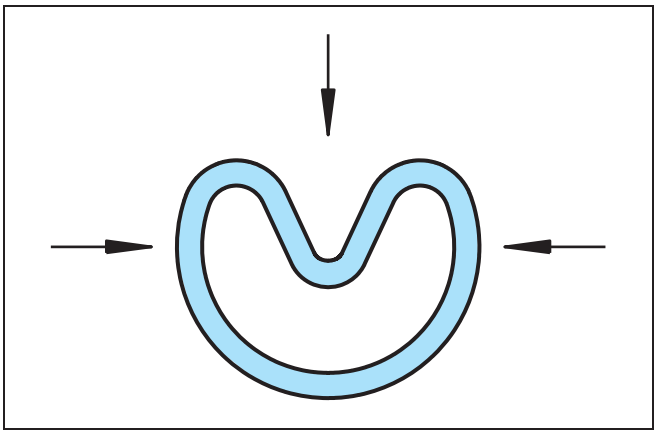


Figure 130 Kidney-shaped deformation of the seal ring

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

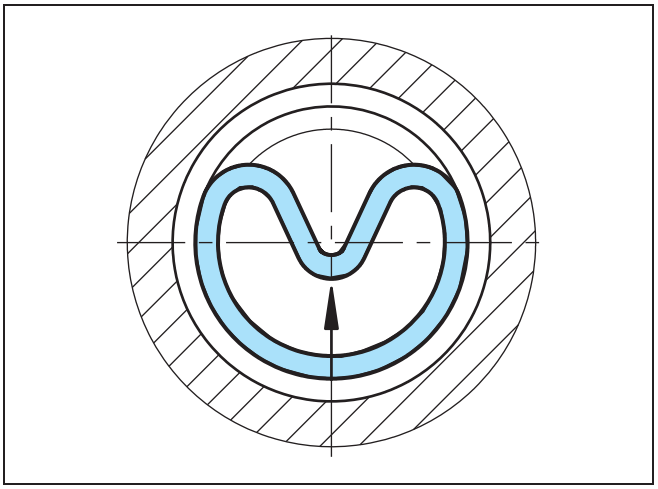


Figure 131 Inserting the seal ring into the closed groove

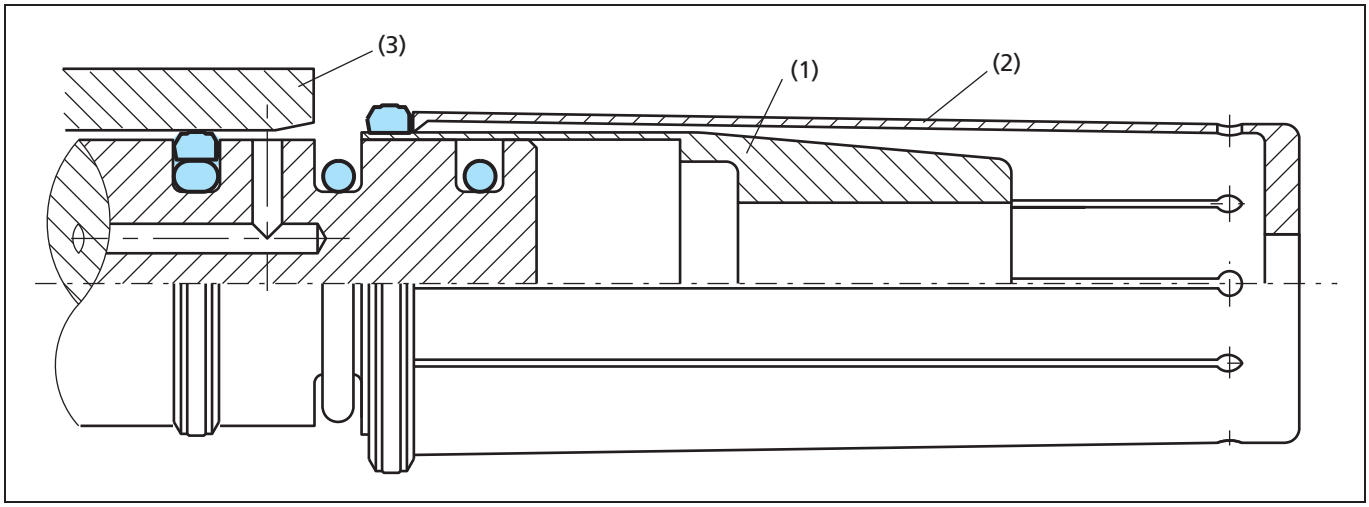


Figure 132 Expanding the Zurcon® Roto Glyd Ring® S over the installation sleeve using an expanding sleeve

Installation with installation tools (bore sealing)

Use of a three-piece installation tool is recommended for series production installation of the Zurcon® Roto Glyd Ring® S.

The tool consists of:

- Installation sleeve (1)
- Expanding sleeve (2)
- Sizing sleeve (3).

All parts should be made of a polymer material (e.g. polyamide) with a good surface finish to avoid damage to the seals.

The O-Ring should be pulled over the piston into the groove (take care not to burst the O-Ring).

The Roto Glyd Ring® S element should be expanded over the Installation sleeve using the Expanding sleeve with a fast but smooth movement.

If the cylinder bore has a sufficient lead-in chamfer, see Figure 127, it is in general possible to install Zurcon® Roto Glyd Ring® S in material Z51, Z52 and Z80 without using the Sizing sleeve shown in the figure above.

In view of the large number of sizes and the application-specific installation conditions, this installation tool cannot be supplied as standard by Trelleborg Sealing Solutions.

Drawings for installation tools are available on request.

Installation without installation tools (bore sealing)

If installation has to be performed without installation tools, however, the following points should be observed:

- The Roto Glyd Ring® S can be installed more easily by heating in oil or using a hot air fan to approx. 80°C
- Use no sharp edged tools to expand the seal rings
- Installation should be performed as quickly as possible so that an optimum snap-back of the seal element is assured

■ Installation recommendation - shaft sealing

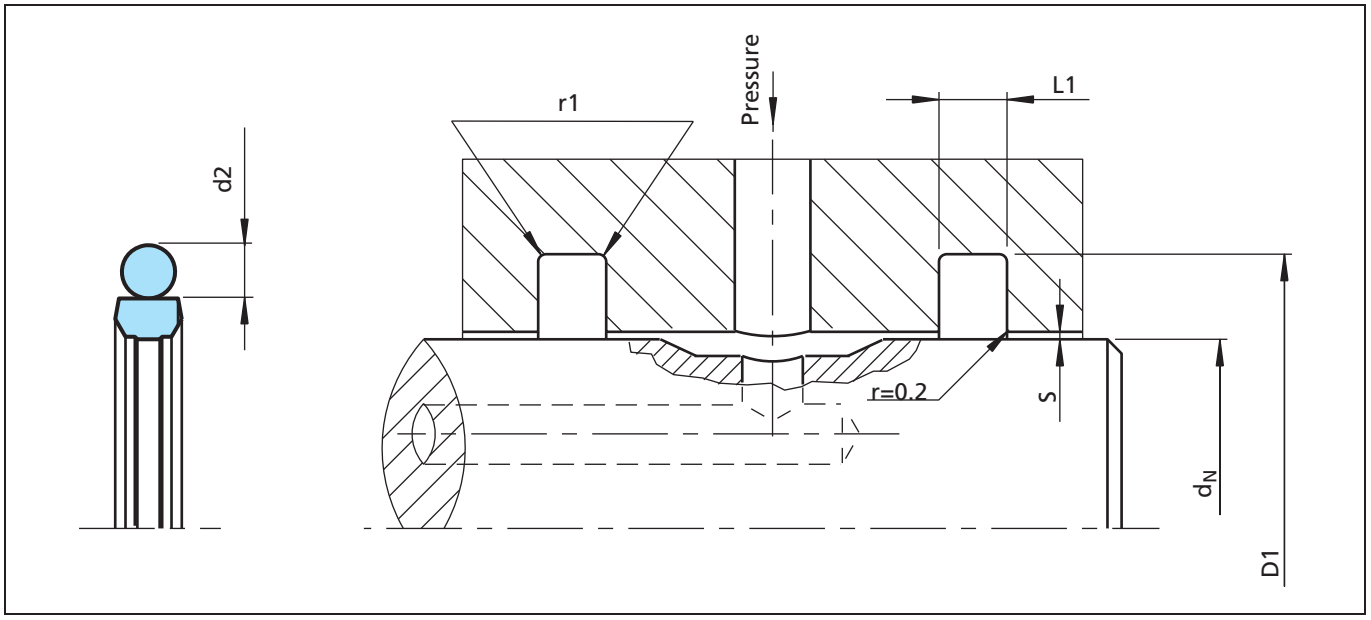


Figure 133 Installation drawing

Table LXXXIV Installation dimensions

Series No.	Shaft diameter d_N f8/h9		Groove diameter	Groove width	Radial clearance S max*		Radius	O-Ring cross sec.
	Standard range	Available range	D_1 H9	L_1 +0.2	10 MPa	30 MPa	r_1	d_2
TG50	12 - 18.9	10 - 18.9	d_N+ 4.9	2.20	0.20	0.10	0.40	1.78
TG51	19 - 37.9	12 - 59.9	d_N+ 7.5	3.20	0.25	0.15	0.60	2.62
TG52	38 - 132.9	19 - 199,9	d_N+ 11.0	4.20	0.30	0.20	1.00	3.53
TG53	133 - 255.9	38 - 329.9	d_N+ 15.5	6.30	0.35	0.25	1.30	5.33
TG54	256 - 649.9	120 - 655.0	d_N+ 21.0	8.10	0.40	0.25	1.80	7.00
TG55	650 - 999.9	650 - 999.9	d_N+ 28.0	9.50	0.50	0.30	2.50	8.40

* For max. temperature = 60° C at the seal.

Zurcon® Roto Glyd Ring® S

Zurcon®Roto Glyd Ring® S, complete with O-Ring, shaft sealing, series TG52.

Shaft diameter: d_N = 80.0 mm
TSS Part No.: TG5200800

Select the material from Table LXXX. The corresponding code numbers are appended to the TSS Part No. Together they form the TSS Article No.
For all intermediate sizes not shown in Table LXXXV, the TSS Article No. can be determined from the example below.
** For diameters ≥ 1000.0 mm multiply only by factor 1.
Example: TG55 for diamter 1200.0 mm.
TSS Article No.: TG55**X1200** - Z52N.

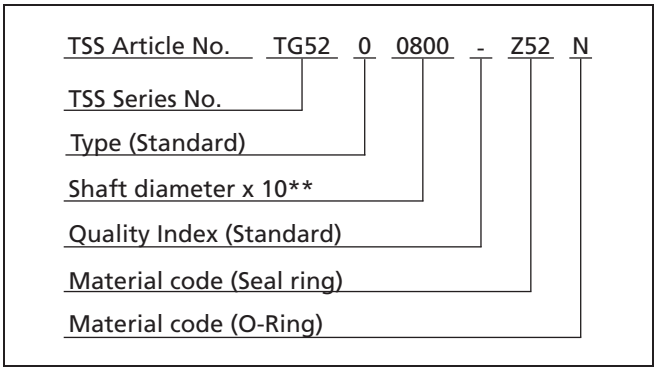


Table LXXXV Preferred dimensions / TSS Part No.

Shaft diameter	Groove diameter	Groove width	TSS Part No.	O-Ring size
d_N f8/h9	D_1 H9	L_1 +0.2		
10.0	**14.9**	**2.2**	**TG5000100**	**11.80 x 1.80**
12.0	**16.9**	**2.2**	**TG5000120**	**14.00 x 1.78**
14.0	**18.9**	**2.2**	**TG5000140**	**15.60 x 1.78**
15.0	19.9	2.2	TG5000150	17.17 x 1.78
16.0	**20.9**	**2.2**	**TG5000160**	**18.77 x 1.78**
16.0	**23.5**	**3.2**	**TG5100160**	**18.72 x 2.62**
18.0	**22.9**	**2.2**	**TG5000180**	**20.35 x 1.78**
18.0	**25.5**	**3.2**	**TG5100180**	**21.89 x 2.62**
20.0	**27.5**	**3.2**	**TG5100200**	**23.47 x 2.62**
22.0	**29.5**	**3.2**	**TG5100220**	**25.07 x 2.62**
25.0	**32.5**	**3.2**	**TG5100250**	**28.24 x 2.62**
28.0	**35.5**	**3.2**	**TG5100280**	**31.42 x 2.62**
30.0	37.5	3.2	TG5100300	32.99 x 2.62
32.0	**39.5**	**3.2**	**TG5100320**	**34.59 x 2.62**
32.0	**43.0**	**4.2**	**TG5200320**	**36.09 x 3.53**
35.0	42.5	3.2	TG5100350	37.77 x 2.62
36.0	**43.5**	**3.2**	**TG5100360**	**37.77 x 2.62**
36.0	**47.0**	**4.2**	**TG5200360**	**40.87 x 3.53**
38.0	**49.0**	**4.2**	**TG5200380**	**44.04 x 3.53**
40.0	**51.0**	**4.2**	**TG5200400**	**47.22 x 3.53**
42.0	53.0	4.2	TG5200420	47.22 x 3.53

The shaft diameters printed in **bold** type conform to the recommendations of ISO 3320.
Other dimensions and all intermediate sizes up to 2.200 mm diameter for Z51 and Z52 (2.600 mm for Z80) including inch sizes can be supplied.

Shaft diameter	Groove diameter	Groove width	TSS Part No.	O-Ring size
d_N f8/h9	D_1 H9	L_1 +0.2		
45.0	**56.0**	**4.2**	**TG5200450**	**50.39 x 3.53**
48.0	59.0	4.2	TG5200480	53.57 x 3.53
48.0	63.5	6.3	TG5300480	56.52 x 5.33
50.0	**61.0**	**4.2**	**TG5200500**	**56.74 x 3.53**
50.0	**65.5**	**6.3**	**TG5300500**	**56.52 x 5.33**
52.0	63.0	4.2	TG5200520	56.74 x 3.53
55.0	66.0	4.2	TG5200550	59.92 x 3.53
55.0	70.5	6.3	TG5300550	62.87 x 5.33
56.0	**67.0**	**4.2**	**TG5200560**	**59.92 x 3.53**
60.0	71.0	4.2	TG5200600	66.27 x 3.53
60.0	75.5	6.3	TG5300600	66.04 x 5.33
63.0	**74.0**	**4.2**	**TG5200630**	**69.44 x 3.53**
63.0	**78.5**	**6.3**	**TG5300630**	**69.22 x 5.33**
65.0	76.0	4.2	TG5200650	69.44 x 3.53
65.0	80.5	6.3	TG5300650	72.39 x 5.33
70.0	**81.0**	**4.2**	**TG5200700**	**75.79 x 3.53**
70.0	**85.5**	**6.3**	**TG5300700**	**75.57 x 3.53**
75.0	86.0	4.2	TG5200750	82.15 x 3.53
75.0	90.5	6.3	TG5300750	81.92 x 5.33
80.0	**91.0**	**4.2**	**TG5200800**	**85.32 x 3.53**
80.0	**95.5**	**6.3**	**TG5300800**	**88.27 x 5.33**
85.0	96.0	4.2	TG5200850	91.67 x 3.53
85.0	100.5	6.3	TG5300850	91.44 x 5.33
90.0	**101.0**	**4.2**	**TG5200900**	**94.84 x 3.53**
90.0	**105.5**	**6.3**	**TG5300900**	**97.79 x 5.33**
92.0	**103.0**	**4.2**	**TG5200920**	**98.02 x 5.33**
95.0	106.0	4.2	TG5200950	101.19 x 3.53
95.0	110.5	6.3	TG5300950	100.97 x 5.33
100.0	**111.0**	**4.2**	**TG5201000**	**107.54 x 3.53**
100.0	**115.5**	**6.3**	**TG5301000**	**107.32 x 5.33**
105.0	116.0	4.2	TG5201050	110.72 x 3.53
110.0	**121.0**	**4.2**	**TG5201100**	**117.07 x 3.53**
115.0	126.0	4.2	TG5201150	120.24 x 3.53

The shaft diameters printed in **bold** type conform to the recommendations of ISO 3320.
Other dimensions and all intermediate sizes up to 2.200 mm diameter for Z51 and Z52 (2.600 mm for Z80) including inch sizes can be supplied.

Shaft diameter	Groove diameter	Groove width	TSS Part No.	O-Ring size
d_N f8/h9	D_1 H9	L_1 +0.2		
120.0	131.0	4.2	TG5201200	126.59 x 3.53
125.0	**136.0**	**4.2**	**TG5201250**	**129.77 x 3.53**
130.0	141.0	4.2	TG5201300	136.12 x 3.53
130.0	145.5	6.3	TG5301300	139.07 x 5.33
135.0	150.5	6.3	TG5301350	142.24 x 5.33
138.0	153.5	6.3	TG5301380	145.42 x 5.33
140.0	**155.5**	**6.3**	**TG5301400**	**148.59 x 5.33**
145.0	160.5	6.3	TG5301450	151.77 x 5.33
150.0	165.5	6.3	TG5301500	158.12 x 5.33
160.0	**175.5**	**6.3**	**TG5301600**	**170.82 x 5.33**
170.0	185.5	6.3	TG5301700	177.17 x 5.33
180.0	**195.5**	**6.3**	**TG5301800**	**189.87 5.33**
190.0	205.5	6.3	TG5301900	202.57 x 5.33
200.0	**215.5**	**6.3**	**TG5302000**	**208.92 x 5.33**
210.0	225.5	6.3	TG5302100	221.62 x 5.33
220.0	**235.5**	**6.3**	**TG5302200**	**227.97 x 5.33**
240.0	255.5	6.3	TG5302400	247.02 x 5.33
250.0	**265.5**	**6.3**	**TG5302500**	**258.00 x 5.30**
280.0	**301.0**	**8.1**	**TG5402800**	**291.47 x 7.00**
300.0	321.0	8.1	TG5403000	310.00 x 7.00
320.0	**341.0**	**8.1**	**TG5403200**	**329.57 x 7.00**
350.0	371.0	8.1	TG5403500	365.00 x 7.00
360.0	**381.0**	**8.1**	**TG5403600**	**375.00 x 7.00**
400.0	421.0	8.1	TG5404000	412.00 x 7.00
420.0	441.0	8.1	TG5404200	430.66 x 7.00
450.0	471.0	8.1	TG5404500	462.00 x 7.00
480.0	501.0	8.1	TG5404800	494.16 x 7.00
500.0	521.0	8.1	TG5405000	515.00 x 7.00
600.0	621.0	8.1	TG5406000	615.00 x 7.00
700.0	728.0	9.5	TG5507000	713.00 x 8.40

The shaft diameters printed in **bold** type conform to the recommendations of ISO 3320.
Other dimensions and all intermediate sizes up to 2.200 mm diameter for Z51 and Z52 (2.600 mm for Z80) including inch sizes can be supplied.

■ Installation recommendation - bore sealing

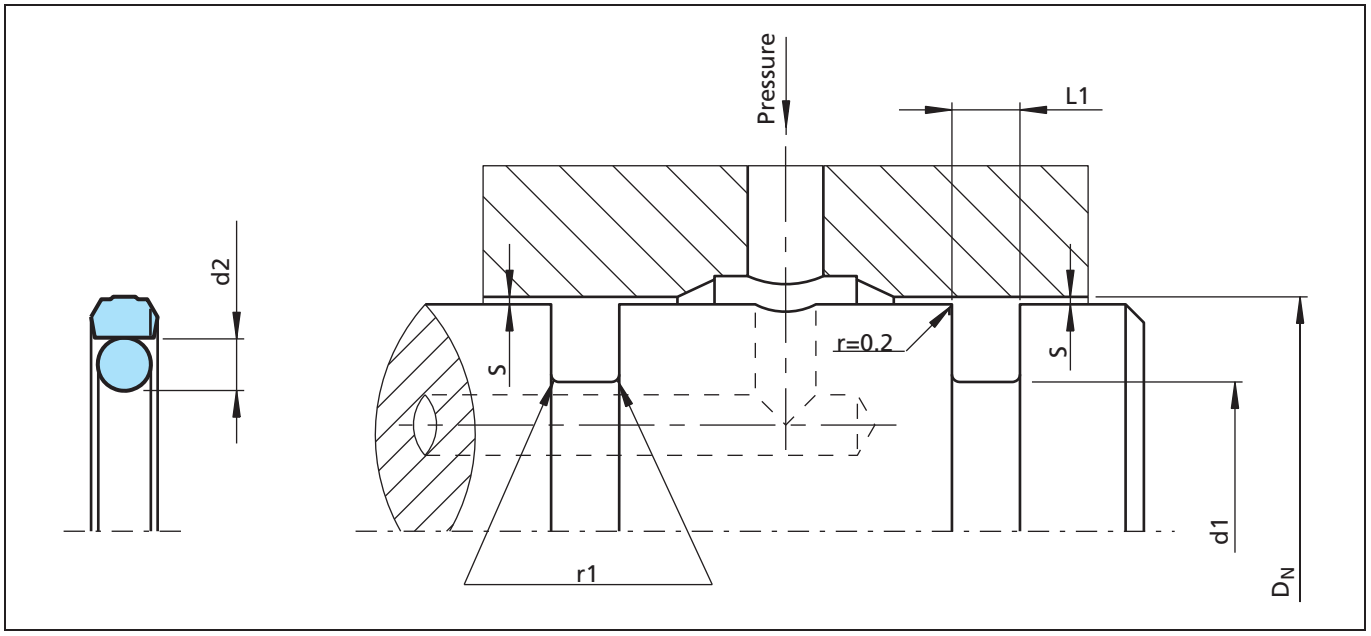


Figure 134 Installation drawing

Table LXXXVI Installation dimensions

Series No.	Bore diameter D_N H9		Groove diameter	Groove width	Radial clearance S max*		Radius	O-Ring cross sec.
	Standard range	Available range	d_1 h9	L_1 +0.2	10 MPa	30 MPa	r_1	d_2
TG60	12 - 19.9	10 - 24.9	D_N- 4.9	2.20	0.20	0.10	0.40	1.78
TG61	20 - 39.9	14 - 69.9	D_N- 7.5	3.20	0.25	0.15	0.60	2.62
TG62	40 - 132.9	22 - 199.9	D_N- 11.0	4.20	0.30	0.20	1.00	3.53
TG63	133 - 255.9	40 - 329.9	D_N- 15.5	6.30	0.35	0.25	1.30	5.33
TG64	256 - 669.9	133 - 690.0	D_N- 21.0	8.10	0.40	0.25	1.80	7.00
TG65	670 - 999.9	670 - 999.9	D_N- 28.0	9.50	0.50	0.30	2.50	8.40

* For max. temperature = 60° C at the seal.

Zurcon® Roto Glyd Ring® S

Zurcon®Roto Glyd Ring® S, complete with O-Ring, bore sealing, series TG62.

Bore diameter: D_N = 80.0 mm
TSS Part No.: TG6200800

Select the material from Table LXXX. The corresponding code numbers are appended to the TSS Part No. (from Table LXXXVII. Together they form the TSS Article No.
For all intermediate sizes not shown in Table LXXXVII, the TSS Article No. can be determined from the example opposite.
** For diameters ≥ 1000.0 mm multiply only by factor 1.
Example: TG65 for diamter 1200.0 mm.
TSS Article No.: TG65**X1200** - Z52N.

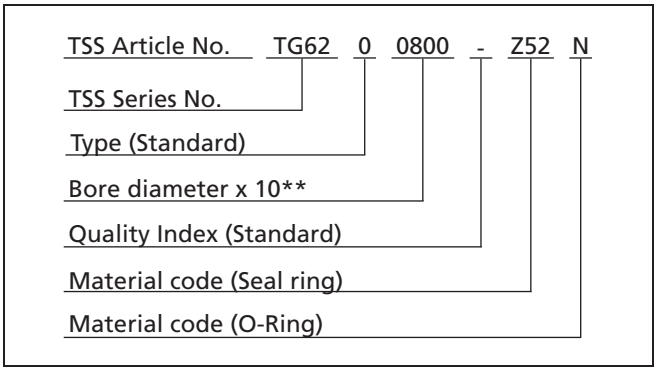


Table LXXXVII Installation Dimensions / TSS Part No.

Bore diameter	Groove diameter	Groove width	TSS Part No.	O-Ring size
D_N H9	d_1 h9	L_1 +0.2		
12.0	**7.1**	**2.2**	**TG6000120**	**7.65 x 1.78**
14.0	9.1	2.2	TG6000140	9.25 x 1.78
15.0	10.1	2.2	TG6000150	10.82 x 1.78
16.0	**11.1**	**2.2**	**TG6000160**	**10.82 x 1.78**
18.0	13.1	2.2	TG6000180	13.20 x 1.80
20.0	**12.5**	**3.2**	**TG6100200**	**12.37 x 2.62**
22.0	14.5	3.2	TG6100220	13.94 x 2.62
25.0	**17.5**	**3.2**	**TG6100250**	**17.12 x 2.62**
28.0	20.5	3.2	TG6100280	20.29 x 2.62
30.0	22.5	3.2	TG6100300	23.47 x 2.62
32.0	24.5	3.2	TG6100320	25.07 x 2.62
35.0	27.5	3.2	TG6100350	28.24 x 2.62
40.0	**29.0**	**4.2**	**TG6200400**	**29.74 x 3.53**
42.0	31.0	4.2	TG6200420	31.32 x 3.53
45.0	34.0	4.2	TG6200450	34.52 x 3.53
48.0	37.0	4.2	TG6200480	37.69 x 3.53
50.0	**39.0**	**4.2**	**TG6200500**	**40.87 x 3.53**
52.0	41.0	4.2	TG6200520	42.00 x 3.50
55.0	44.0	4.2	TG6200550	44.04 x 3.53
60.0	49.0	4.2	TG6200600	50.39 x 3.53
63.0	**52.0**	**4.2**	**TG6200630**	**53.34 x 3.53**
65.0	49.5	6.3	TG6300650	50.17 x 5.33
70.0	59.0	4.2	TG6200700	59.92 x 3.53
75.0	64.0	4.2	TG6200750	65.00 x 3.50

The bore diameters printed in **bold** type conform to the recommendations of ISO 3320.
Other dimensions and all intermediate sizes up to 2.300 mm diameter for Z51 and Z52 (2.700 mm for Z80) including inch sizes can be supplied.

Bore diameter	Groove diameter	Groove width	TSS Part No.	O-Ring size
D_N H9	d_1 h9	L_1 +0.2		
80.0	**64.5**	**6.3**	**TG6300800**	**66.04 x 5.33**
80.0	**69.0**	**4.2**	**TG6200800**	**69.44 x 3.53**
84.0	**73.0**	**4.2**	**TG6200840**	**72.62 x 3.53**
85.0	74.0	4.2	TG6200850	75.79 x 3.53
90.0	79.0	4.2	TG6200900	78.97 x 3.53
95.0	84.0	4.2	TG6200950	85.32 x 3.53
100.0	**89.0**	**4.2**	**TG6201000**	**91.67 x 3.53**
105.0	94.0	4.2	TG6201050	94.84 x 3.53
110.0	99.0	4.2	TG6201100	101.19 x 3.53
115.0	104.0	4.2	TG6201150	104.37 x 3.53
120.0	109.0	4.2	TG6201200	110.72 x 3.53
125.0	**114.0**	**4.2**	**TG6201250**	**113.89 x 3.53**
130.0	119.0	4.2	TG6201300	120.24 x 3.53
135.0	119.5	6.3	TG6301350	120.02 x 5.33
140.0	124.5	6.3	TG6301400	126.37 x 5.33
150.0	134.5	6.3	TG6301500	135.89 x 5.33
150.0	139.0	4.2	TG6201500	139.29 x 3.53
160.0	**144.5**	**6.3**	**TG6301600**	**145.42 x 5.33**
170.0	154.5	6.3	TG6301700	158.12 x 5.33
180.0	164.5	6.3	TG6301800	164.47 x 5.33
190.0	174.5	6.3	TG6301900	177.17 x 5.33
200.0	**184.5**	**6.3**	**TG6302000**	**189.87 x 5.33**
210.0	194.5	6.3	TG6302100	196.22 x 5.33
220.0	204.5	6.3	TG6302200	208.92 x 5.33
230.0	214.5	6.3	TG6302300	215.27 x 5.33
240.0	224.5	6.3	TG6302400	227.92 x 5.33
250.0	**234.5**	**6.3**	**TG6302500**	**240.67 x 5.33**
280.0	259.0	8.1	TG6402800	260.00 x 7.00
300.0	279.0	8.1	TG6403000	280.00 x 7.00
320.0	**299.0**	**8.1**	**TG6403200**	**300.00 x 7.00**
350.0	329.0	8.1	TG643500	329.57 x 7.00
400.0	**379.0**	**8.1**	**TG6404000**	**380.37 x 7.00**
420.0	399.0	8.1	TG6404200	400.00 x 7.00

The bore diameters printed in **bold** type conform to the recommendations of ISO 3320.
Other dimensions and all intermediate sizes up to 2.300 mm diameter for Z51 and Z52 (2.700 mm for Z80) including inch sizes can be supplied.

Bore diameter	Groove diameter	Groove width	TSS Part No.	O-Ring size
D_N H9	d_1 h9	L_1 +0.2		
450.0	429.0	8.1	TG6404500	430.66 x 7.00
480.0	459.0	8.1	TG6404800	462.00 x 7.00
500.0	**479.0**	**8.1**	**TG6405000**	**481.38 x 7.00**
600.0	579.0	8.1	TG6406000	582.68 x 7.00
700.0	672.0	9.5	TG6507000	670.00 x 8.40

The bore diameters printed in **bold** type conform to the recommendations of ISO 3320.
Other dimensions and all intermediate sizes up to 2.300 mm diameter for Z51 and Z52 (2.700 mm for Z80) including inch sizes can be supplied.