



■ Orkot® Slydring® for Piston and Rod

Description

Orkot® Slydring® of fabric reinforced composite materials is used in hydraulic cylinders exposed to high loads that can occur e.g. in mobile hydraulics and presses. The high compressive strength, good sliding behaviour and the exceptional wear resistant properties ensure a long service life.

Slydring® of Orkot® fabric composite materials is produced as standard preformed to the intended diameter and ready-to-fit. It is manufactured with a angle cut and already has the necessary gap "Z1".

For large diameters > 300 mm, rings can be cut from Orkot® C320, C380 strip material. This offers economical solutions for non-standard diameters or when quantities are limited. Strip material is coiled to a diameter of 200 to 300 mm and can be ordered either:

- cut and finished to length observing the minimum gap stated in figure 17 (page 49) and figure 19 (page 57).
- coils at full lengths of 2 m, 3 m or 5 m (see next page)

When cut from a coil it requires more care in fitting, in particular if the diameter is below 200 to 300 mm.

Advantages

- Dimensionally stable and vibration absorbing
- Even distribution of high radial forces
- Good sliding and dry running properties
- High wear resistance
- Good wiping effect
- Long service life.

Application Examples

Orkot® Slydring is widely used as a bearing element for heavy duty hydraulic equipment:

- Hydraulic actuators
- Mobile hydraulics
- Excavators
- Construction equipment
- Forrestry machinery
- Mining
- Steel mills
- Presses
- Water locks
- Marine engineering

Technical Data

Velocity: Up to 1 m/s, with reciprocating movements

Temperature: - 60 °C to + 120 °C

Pr under dynamic conditions (C380, C320, C932):
max. 100 N/mm² at 25 °C
max. 50 N/mm² >60 °C

Ultimate compressive strength (C380, C320): max. > 300 N/mm²
(C932): max. 260 N/mm²

When calculating the width of Orkot® Slydring® it is recommended to use a safety factor f=2 (see page 8).

Important Note:

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

Materials

Orkot® C320

Orkot® C320 is a fabric composite material made of a thermosetting polymer, reinforced by a fine plastic mesh and lubricant additives impregnated throughout the material. It has a very high resistance to wear, good dry-running properties and dampens vibrations. Colour: dark gray.

Orkot® C380

Orkot C380 is the standard material, this turquoise coloured composite is a further development of the proven C320. It is most versatile; suitable for all commonly used hydraulic fluids such as mineral or synthetic oils, as well as water based fluids. It is an excellent electrical insulator and features enhanced sliding properties in various media.

Orkot® C932

A composite of phenolic resin impregnated into a fine cotton fabric. The material stiffness is higher than C380 / C320. The use in water based fluids is not recommended. Colour: yellow-brown.



Table XL Serial Numbers for Orkot® Slydring®, ready-to-fit

Piston Serial No.	Rod Serial No.	Groove Width	Ring Thickness
GP41	GR41	2.5	1.55
GP43	GR43	4.0	1.55
GP47	GR47	6.3	1.55
GP48	GR48	8.1	2.00
GP49	GR49	9.7	2.00
GP51	GR51	10.0	2.00
GP53	GR53	15.0	2.00
GP64	GR64	4.2	2.50
GP65	GR65	5.6	2.50
GP67	GR67	6.3	2.50
GP68	GR68	8.1	2.50
GP69	GR69	9.7	2.50
GP73	GR73	15.0	2.50
GP74	GR74	20.0	2.50
GP75	GR75	25.0	2.50
GP76	GR76	30.0	2.50
GP77	GR77	35.0	2.50
GP93	GR93	15.0	3.00
GP94	GR94	20.0	3.00
GP95	GR95	25.0	3.00
GP96	GR96	30.0	3.00
GP99	GR99	9.7	4.00
GPL2	GRL2	15.0	4.00
GPL3	GRL3	20.0	4.00
GP98	GR98	25.0	4.00
GPL5	GRL5	30.0	4.00
GPL7	GRL7	40.0	4.00
GPL9	GRL9	50.0	4.00

Note that customer specific sizes can be supplied without tooling costs.

Serial Number	Coiled length	Groove Width	Ring Thickness
GM73A3000-C380	3 m	15.0	2.50
GM73A5000-C380	5 m	15.0	2.50
GM74A0000-C380	2 m	20.0	2.50
GM74A3000-C380	3 m	20.0	2.50
GM74A5000-C380	5 m	20.0	2.50
GM75A0000-C380	2 m	25.0	2.50
GM75A3000-C380	3 m	25.0	2.50
GM75A5000-C380	5 m	25.0	2.50
GM76A0000-C380	2 m	30.0	2.50
GM78A5000-C380	5 m	40.0	2.50
GM95A0000-C380	2 m	25.0	3.00
GM95A5000-C380	5 m	25.0	3.00
GM98A0000-C380	2 m *	25.0	4.00
GM98A3000-C380	3 m *	25.0	4.00
GM98A5000-C380	5 m *	25.0	4.00
GML7A3000-C380	3 m *	40.0	4.00
GML7A5000-C380	5 m *	40.0	4.00

Coils have an inside diameter of approximately 200 mm
* 4 mm strip is coiled at 700 mm diam. approximately

Installation Recommendation

In order to protect the seal and guide system against ingress of foreign particles, we recommend the use of Turcite® Slydring® in combination with Orkot® Slydring®. The larger face area of these rings (Series GP 99 from Table IV) embeds the contaminant particles when present in the system and keeps them away from the actual guides and seals (Figure 15). Reducing the piston diameter at both ends allows the particles to become embedded on the face side.

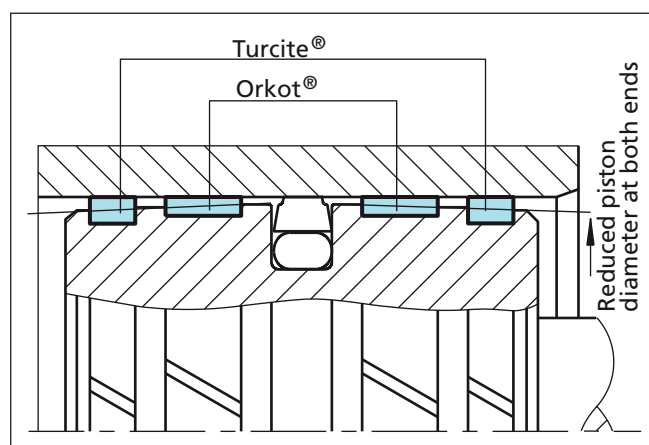


Figure 15 Arrangement of the Slydring® on the piston

Table XLI Serial Numbers for Orkot® Slydring®, Coiled Strip, to be cut to length

Serial Number	Coiled length	Groove Width	Ring Thickness
GM65A0000-C380	2 m	5.6	2.50
GM69A0000-C380	2 m	9.7	2.50
GM69A3000-C380	3 m	9.7	2.50
GM69A5000-C380	5 m	9.7	2.50
GM73A0000-C380	2 m	15.0	2.50



■ Installation Recommendation, Orkot® Slydring® for Piston According to ISO 10766 Groove Dimension

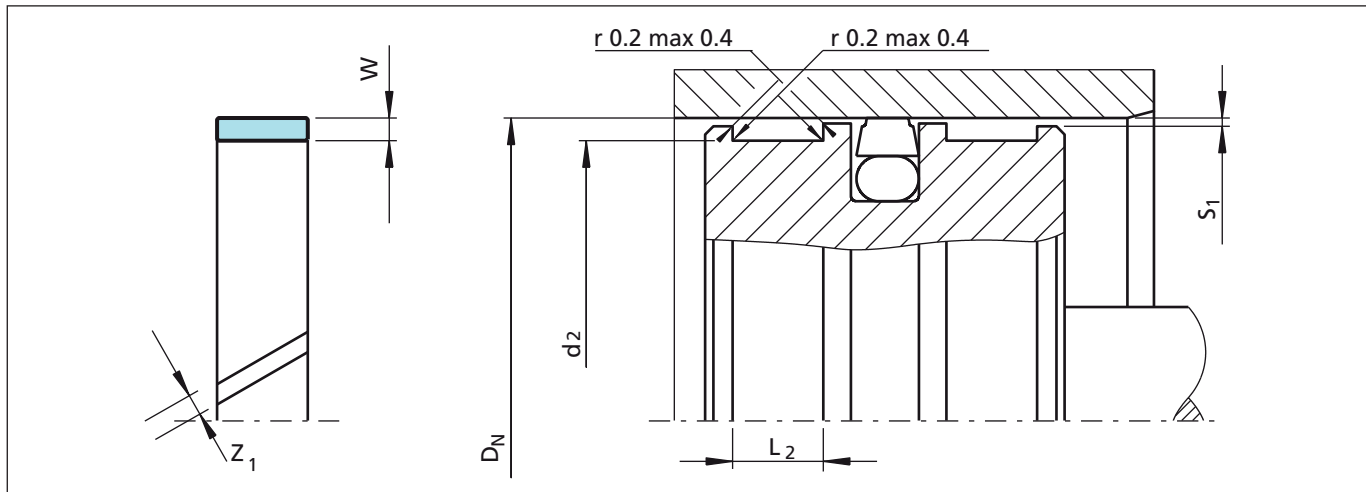


Figure 16 Installation drawing

Table XLII Installation dimensions

Serial No.	Bore Diameter ¹⁾	Groove Diameter	Groove Width	Ring Thickness	Ring Gap ²⁾
	D_N H9	d_2 h8	$L_2 + 0.2$	W	Z_1
GP43	16 - 50.0	$D_N - 3.10$	4.00	1.55	1 - 3
GP65	16 - 125.0	$D_N - 5.00$	5.60	2.50	2 - 6
GP69	25 - 250.0	$D_N - 5.00$	9.70	2.50	2 - 9
GP73	80 - 500.0	$D_N - 5.00$	15.00	2.50	4 - 17
GP75	125 - 999.9	$D_N - 5.00$	25.00	2.50	6 - 33
GP75X	1000 - 1500.0	$D_N - 5.00$	25.00	2.50	33 - 48
GP98	280 - 999.9	$D_N - 8.00$	25.00	4.00	10 - 33
GP98X	1000 - 1500.0	$D_N - 8.00$	25.00	4.00	33 - 48

¹⁾ Recommended diameter ranges.

²⁾ see Figure 17.

For Slydring® to other standards, e.g French standard NF E 48-037, please contact us.

Radial clearance S_1

The minimum radial gap is to be calculated taking into account;

- the fitting tolerances of the hardware
- the tolerance on the ring thickness
- an allowance for wear
- in case of high radial loads an allowance for elastic deformation
- a safety margin to avoid metal-to-metal contact

The gaps S_1 can be chosen larger than near to the seal (attention: take care of gap dimension for the seal) thus allowing slight tilting of the piston, still without metal-to-metal contact.

It also allows foreign particles to be wiped away by the Slydring® rather than being squeezed between the metal components. The slot 'Z₁' allows fluid to pass across the ring thus preventing fluid pressure build-up which might cause extrusion of the guide ring. To ensure the ring cannot escape out of the groove it is recommended to observe following radial gap sizes as maximum:

- 0.50 mm for GP43 (1.55 mm thickness)
- 0.90 mm for GP65 to GP75 (2.50 mm thickness)
- 1.50 mm for GP98 and GP98X (4.00 mm thickness)



Table XLIII Recommended Radii for Groove Dia.

D_N	r max.
8 - 250	0.2
> 250	0.4

Table XLIV Surface Roughness

Parameter	Mating Surface μm	Groove Surface μm
R_{max}	1.00 - 4.00	< 16.0
R_z DIN	0.63 - 2.50	< 10.0
R_a	0.10 - 0.40	< 2.5

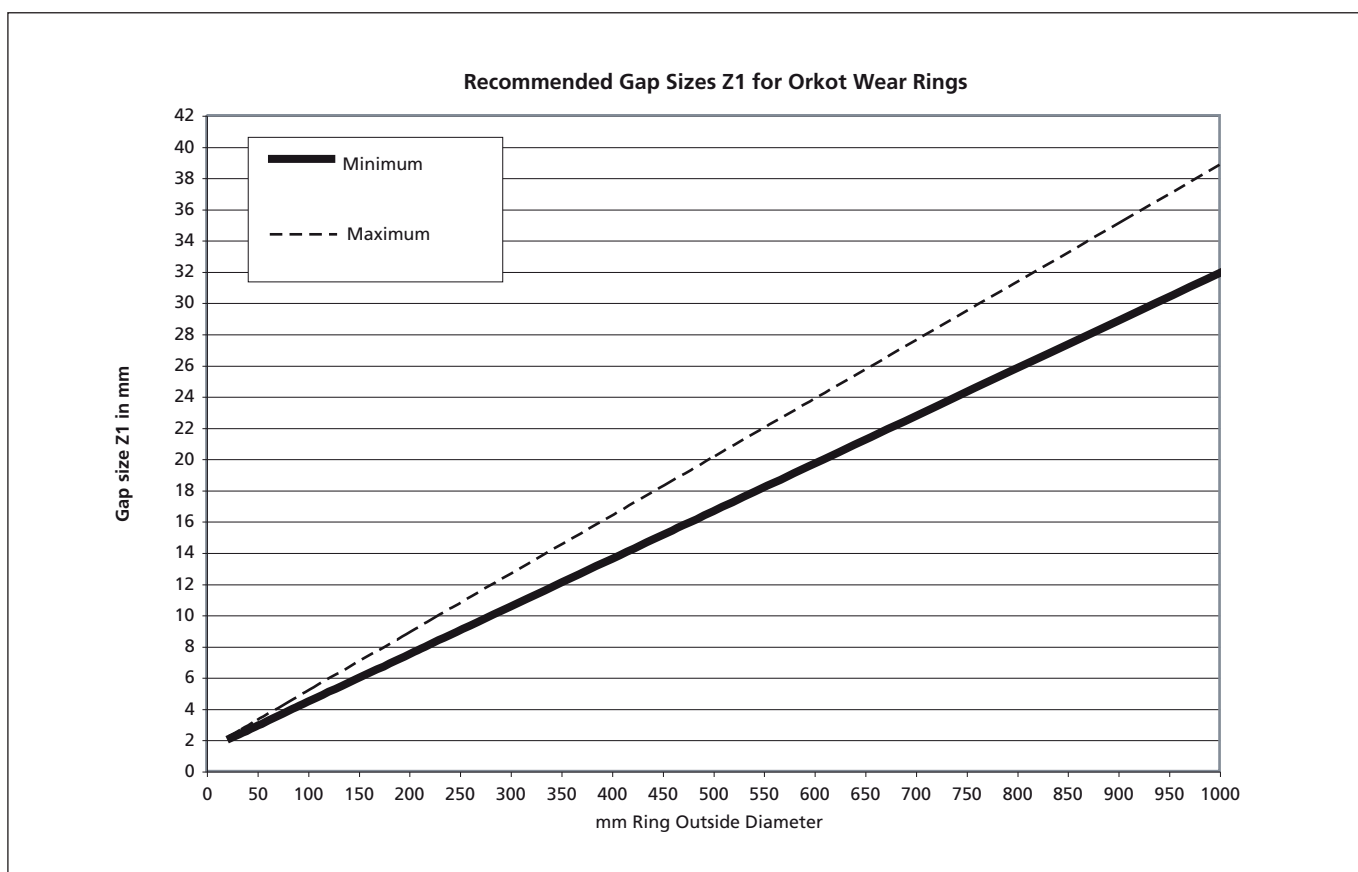


Figure 17 Recommended Gap Sizes Z1 for Orkot Wear Ring



Orkot® Slydring® - Wear Ring

Ordering Example

Slydring® for bore diameter $D_N = 100.0$ mm
 Series GP 69 from Table XLII
 Groove width: 9.7 mm, ring thickness: 2.50 mm

Material: Orkot® C380
 (other materials see Table I)
 Standard design: With angle cut
 Design code: 0
 TSS Part No.: GP6901000
 (from Table XLV)

TSS Article No.	GP69	0	1000	-	C380
TSS Series No.					
Design code, standard					
Bore diameter x 10					
Quality Index (Standard)					
Material No.					

The TSS Article No. can be formed from the example above.

Ordering Example for diameter > 1000 mm

Slydring® for bore diameter $D_N = 1200.0$ mm
 Series GP75X from Table XLII
 Groove width: 25.0 mm, ring thickness: 2.50 mm

Material: Orkot® C380
 TSS Part No.: GP75X1200
 (from Table XLV)

TSS Article No.	GP75	X	1200	-	C380
TSS Series No.					
Design code					
Bore diameter x 1*					
Quality Index (Standard)					
Material No.					

* For diameters ≥ 1000.0 mm multiply only by factor 1.

Please Note

Orkot® Slydring® for pistons can be used as rod guide ring, f.inst.

GP69 0 1000 - C380

is identical and can be replaced with

GR69 0 0950 - C380

Table XLV Slydring® for Pistons

Dimensions				TSS Part No.
Bore Diameter	Groove Diameter	Groove Width	Thickness	
D_N H9	d_2 h8	$L_2 +0.2$	W	
16.0	11.0	5.6	2.50	GP6500160
18.0	13.0	5.6	2.50	GP6500180
20.0	15.0	5.6	2.50	GP6500200
22.0	17.0	5.6	2.50	GP6500220
25.0	20.0	5.6	2.50	GP6500250
25.0	20.0	9.7	2.50	GP6900250
27.0	22.0	5.6	2.50	GP6500270
28.0	23.0	5.6	2.50	GP6500280
30.0	25.0	9.7	2.50	GP6900300

All sizes printed in **bold** type conform to ISO 10766 and should be preferred for use.
 Additional sizes not covered by this list are also held in stock. Also please note that customer specific sizes can be supplied without tooling costs.



Dimensions				TSS Part No.
Bore Diameter	Groove Diameter	Groove Width	Thickness	
D _N H9	d ₂ h8	L ₂ +0.2	W	
32.0	28.9	4.0	1.55	GP4300320
32.0	27.0	5.6	2.50	GP6500320
32.0	27.0	9.7	2.50	GP6900320
33.0	28.0	5.6	2.50	GP6500330
35.0	30.0	5.6	2.50	GP6500350
35.0	30.0	9.7	2.50	GP6900350
36.0	31.0	5.6	2.50	GP6500360
36.0	31.0	9.7	2.50	GP6900360
37.0	32.0	9.7	2.50	GP6900370
40.0	36.9	4.0	1.55	GP4300400
40.0	35.0	5.6	2.50	GP6500400
40.0	35.0	9.7	2.50	GP6900400
41.0	36.0	5.6	2.50	GP6500410
41.0	36.0	9.7	2.50	GP6900410
42.0	37.0	5.6	2.50	GP6500420
44.0	39.0	5.6	2.50	GP6500440
45.0	40.0	5.6	2.50	GP6500450
45.0	40.0	9.7	2.50	GP6900450
46.0	41.0	9.7	2.50	GP6900460
48.0	43.0	5.6	2.50	GP6500480
50.0	45.0	5.6	2.50	GP6500500
50.0	45.0	9.7	2.50	GP6900500
51.0	46.0	9.7	2.50	GP6900510
51.0	46.0	15.0	2.50	GP7300510
52.0	47.0	5.6	2.50	GP6500520
53.0	48.0	5.6	2.50	GP6500530
55.0	50.0	5.6	2.50	GP6500550
55.0	50.0	9.7	2.50	GP6900550
58.0	53.0	5.6	2.50	GP6500580
60.0	55.0	5.6	2.50	GP6500600
60.0	55.0	9.7	2.50	GP6900600
61.0	56.0	5.6	2.50	GP6500610
62.0	57.0	5.6	2.50	GP6500620

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Orkot® Slydring® - Wear Ring

Dimensions				TSS Part No.
Bore Diameter	Groove Diameter	Groove Width	Thickness	
D _N H9	d ₂ h8	L ₂ +0.2	W	
62.0	56.0	9.7	2.50	GP6900610
63.0	58.0	5.6	2.50	GP6500630
63.0	58.0	9.7	2.50	GP6900630
65.0	60.0	5.6	2.50	GP6500650
65.0	60.0	9.7	2.50	GP6900650
68.0	63.0	5.6	2.50	GP6500680
68.0	63.0	9.7	2.50	GP6900680
70.0	65.0	5.6	2.50	GP6500700
70.0	65.0	9.7	2.50	GP6900700
74.0	69.0	5.6	2.50	GP6500740
75.0	70.0	5.6	2.50	GP6500750
75.0	70.0	9.7	2.50	GP6900750
80.0	75.0	5.6	2.50	GP6500800
80.0	75.0	9.7	2.50	GP6900800
80.0	75.0	25.0	2.50	GP7500800
85.0	80.0	5.6	2.50	GP6500850
85.0	80.0	9.7	2.50	GP6900850
90.0	85.0	5.6	2.50	GP6500900
90.0	85.0	9.7	2.50	GP6900900
95.0	90.0	5.6	2.50	GP6500950
95.0	90.0	9.7	2.50	GP6900950
100.0	95.0	5.6	2.50	GP6501000
100.0	95.0	9.7	2.50	GP6901000
100.0	95.0	15.0	2.50	GP7301000
100.0	95.0	25.0	2.50	GP7501000
105.0	100.0	5.6	2.50	GP6501050
105.0	100.0	9.7	2.50	GP6901050
110.0	105.0	9.7	2.50	GP6901100
115.0	110.0	9.7	2.50	GP6901150
120.0	115.0	9.7	2.50	GP6901200
120.0	115.0	15.0	2.50	GP7301200
125.0	120.0	5.6	2.50	GP6501250
125.0	120.0	9.7	2.50	GP6901250

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Dimensions				TSS Part No.
Bore Diameter	Groove Diameter	Groove Width	Thickness	
D _N H9	d ₂ h8	L ₂ +0.2	W	
125.0	120.0	15.0	2.50	GP7301250
125.0	120.0	25.0	2.50	GP7501250
130.0	125.0	9.7	2.50	GP6901300
130.0	125.0	15.0	2.50	GP7301300
135.0	130.0	9.7	2.50	GP6901350
135.0	130.0	15.0	2.50	GP7301350
140.0	135.0	9.7	2.50	GP6901400
140.0	135.0	15.0	2.50	GP7301400
140.0	135.0	25.0	2.50	GP7501400
145.0	140.0	25.0	2.50	GP7501450
150.0	145.0	9.7	2.50	GP6901500
150.0	145.0	15.0	2.50	GP7301500
150.0	145.0	25.0	2.50	GP7501500
160.0	155.0	9.7	2.50	GP6901600
160.0	155.0	15.0	2.50	GP7301600
170.0	165.0	15.0	2.50	GP7301700
175.0	170.0	25.0	2.50	GP7501750
180.0	175.0	9.7	2.50	GP6901800
180.0	175.0	15.0	2.50	GP7301800
180.0	175.0	25.0	2.50	GP7501800
190.0	185.0	9.7	2.50	GP6901900
190.0	185.0	15.0	2.50	GP7301900
200.0	195.0	9.7	2.50	GP6902000
200.0	195.0	15.0	2.50	GP7302000
200.0	195.0	25.0	2.50	GP7502000
205.0	200.0	15.0	2.50	GP7302050
210.0	205.0	15.0	2.50	GP7302100
220.0	215.0	9.7	2.50	GP6902200
220.0	215.0	15.0	2.50	GP7302200
220.0	215.0	25.0	2.50	GP7502200
230.0	225.0	9.7	2.50	GP6902300
230.0	225.0	15.0	2.50	GP7302300
230.0	225.0	25.0	2.50	GP7502300

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Orkot® Slydring® - Wear Ring

Dimensions				TSS Part No.
Bore Diameter	Groove Diameter	Groove Width	Thickness	
D _N H9	d ₂ h8	L ₂ +0.2	W	
240.0	235.0	9.7	2.50	GP6902400
240.0	235.0	15.0	2.50	GP7302400
240.0	235.0	25.0	2.50	GP7502400
250.0	245.0	9.7	2.50	GP6902500
250.0	245.0	15.0	2.50	GP7302500
250.0	245.0	25.0	2.50	GP7502500
270.0	265.0	25.0	2.50	GP7502600
280.0	275.0	9.7	2.50	GP6902800
280.0	275.0	15.0	2.50	GP7302800
280.0	272.0	25.0	4.00	GP9802800
300.0	295.0	15.0	2.50	GP7303000
300.0	295.0	25.0	2.50	GP7503000
300.0	292.0	25.0	4.00	GP9803000
310.0	302.0	25.0	4.00	GP9803100
320.0	315.0	15.0	2.50	GP7303200
320.0	315.0	25.0	2.50	GP7503200
320.0	312.0	25.0	4.00	GP9803200
340.0	335.0	25.0	2.50	GP7503400
340.0	332.0	25.0	4.00	GP9803400
350.0	345.0	25.0	2.50	GP7503500
360.0	355.0	15.0	2.50	GP7303600
360.0	355.0	25.0	2.50	GP7503600
360.0	352.0	25.0	4.00	GP9803600
400.0	395.0	15.0	2.50	GP7304000
400.0	395.0	25.0	2.50	GP7504000
400.0	392.0	25.0	4.00	GP9804000
420.0	415.0	25.0	2.50	GP7504200
440.0	432.0	25.0	4.00	GP9804400
450.0	445.0	15.0	2.50	GP7304500
450.0	445.0	25.0	2.50	GP7504500
450.0	442.0	25.0	4.00	GP9804500
500.0	495.0	15.0	2.50	GP7305000
500.0	495.0	25.0	2.50	GP7505000

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Additional sizes not covered by this list are also held in stock. Also please note that customer specific sizes can be supplied without tooling costs.



Dimensions				TSS Part No.
Bore Diameter	Groove Diameter	Groove Width	Thickness	
D_N H9	d₂ h8	L₂ +0.2	W	
500.0	492.0	25.0	4.00	GP9805000
600.0	595.0	25.0	2.50	GP7506000
600.0	592.0	25.0	4.00	GP9806000
700.0	692.0	25.0	4.00	GP9807000
1000.0	995.0	25.0	2.50	GP75X1000
1000.0	992.0	25.0	4.00	GP98X1000
1200.0	1195.0	25.0	2.50	GP75X1200
1500.0	1495.0	25.0	2.50	GP75X1500

All sizes printed in **bold** type conform to ISO 10766 and should be preferred for use.

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■ Installation Recommendation, Orkot® Slydring® for Rod According to ISO 10766 Groove Dimension

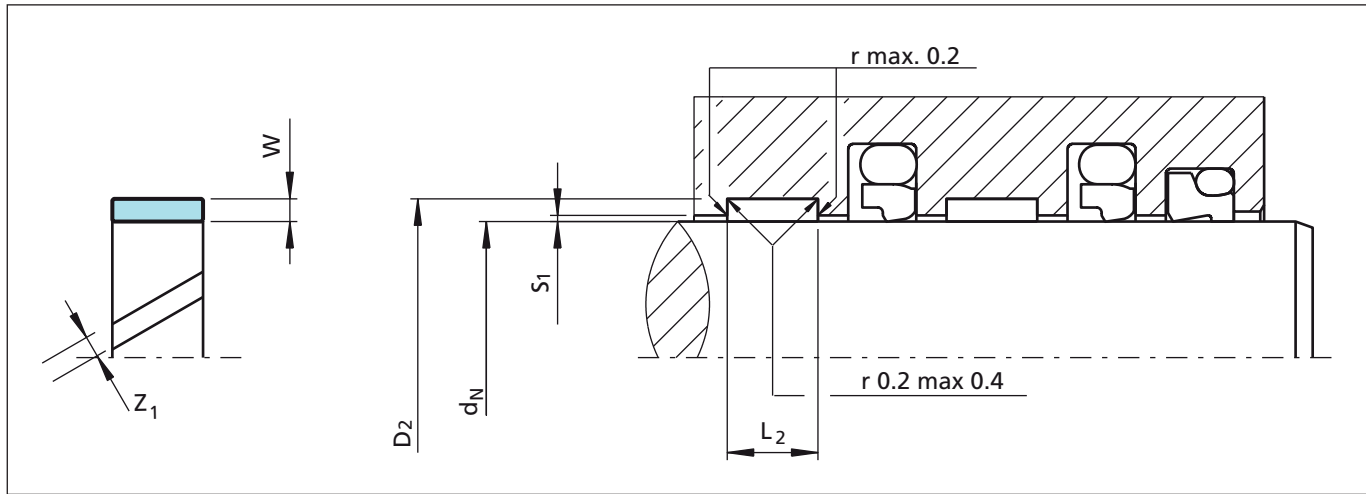


Figure 18 Installation drawing

Table XLVI Installation dimensions

Serial No.	Rod Diameter ¹⁾	Groove Diameter	Groove Width	Ring Thickness	Ring Gap ²⁾
	d_N f8/h9	D_2 H8	$L_2 +0.2$	W	Z_1
GR43	8 - 50.0	$d_N + 3.10$	4.00	1.55	1 - 3
GR65	16 - 120.0	$d_N + 5.00$	5.60	2.50	2 - 6
GR69	25 - 250.0	$d_N + 5.00$	9.70	2.50	2 - 9
GR73	75 - 500.0	$d_N + 5.00$	15.00	2.50	4 - 17
GR75	120 - 999.9	$d_N + 5.00$	25.00	2.50	5 - 33
GR75X	1000 - 1500.0	$d_N + 5.00$	25.00	2.50	33 - 49
GR98	280 - 999.9	$d_N + 8.00$	25.00	4.00	10 - 33
GR98X	1000 - 1500.0	$d_N + 8.00$	25.00	4.00	33 - 49

¹⁾ Recommended diameter ranges.

²⁾ see Figure 19.

For Slydring® to other standards, e.g French standard NF E 48-037, please contact us.

Radial clearance S_1

The minimum radial gap is to be calculated taking into account;

- the fitting tolerances of the hardware
- the tolerance on the ring thickness
- an allowance for wear
- in case of high radial loads an allowance for elastic deformation
- a safety margin to avoid metal-to-metal contact

The gaps S_1 can be chosen larger than near to the seal (attention: take care of gap dimension for the seal) thus allowing slight bending of the rod, still without metal-to-metal contact. It also allows foreign particles to be wiped away by the Slydring® rather than being squeezed between the metal components (see page 13). The slot "Z₁" allows fluid to pass across the ring thus preventing fluid pressure build-up which might cause extrusion of the guide ring. To ensure the ring cannot escape out of the groove it is recommended to observe following radial gap sizes as maximum:

- 0.50 mm for GR43 (1.55 mm thickness)
- 0.90 mm for GR65 to GR75 (2.50 mm thickness)
- 1.50 mm for GR98 and GR98X (4.00 mm thickness)



Table XLVII Recommended Radii for Groove Bottom.

d_N	r max.
8 - 250	0.2
> 250	0.4

Table XLVIII Surface Roughness

Parameter	Mating Surface μm	Groove Surface μm
R_{max}	1.00 - 4.00	< 16.0
R_z DIN	0.63 - 2.50	< 10.0
R_a	0.10 - 0.40	< 2.5

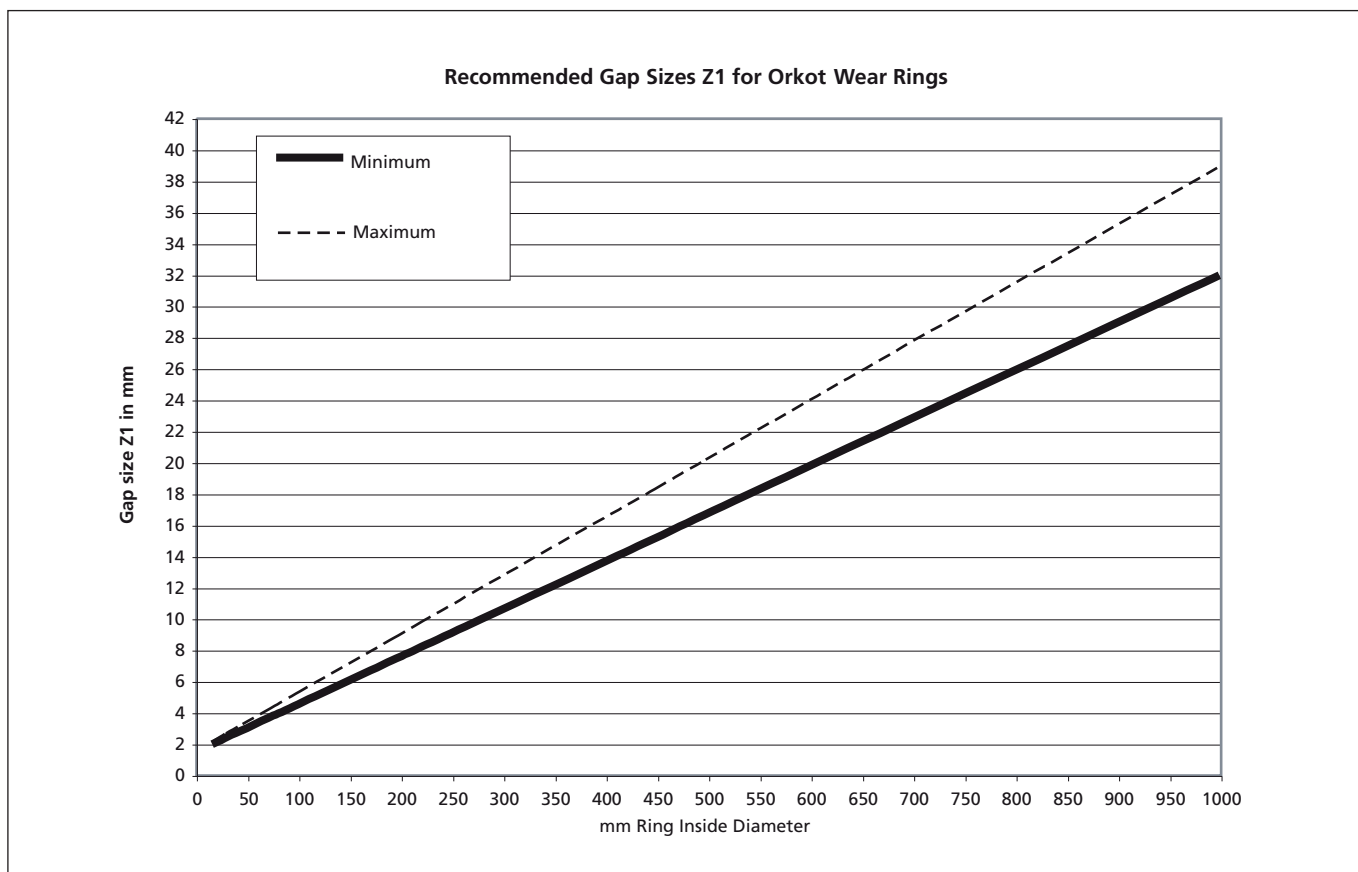


Figure 19 Recommended Gap Sizes Z1 for Orkot Wear Ring