

Seals Catalogue • Types and Dimensions



Concepts

Solutions

Services

Newest machinery, latest technique, approved raw materials and our expert knowledge form the basis for high quality.

The particulars given in this catalogue bear upon the cognition of experience gathered over years within the production and application of sealing components. Notwithstanding these experiences unknown factors may considerably confine the general statements in practical use.

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Seals for hydraulic systems and industry

Your advantages at a glance:

- High storage capacity of more than 34,000 different items and dimensions
- Standard seals in the prevalent materials available from stock
- Qualified advice and quick delivery
- Quality management according to DIN ISO EN 9001:2008
- We also offer prepackaging and stocking of seal kits.
- We apply high grade materials



Seal Concept's product media

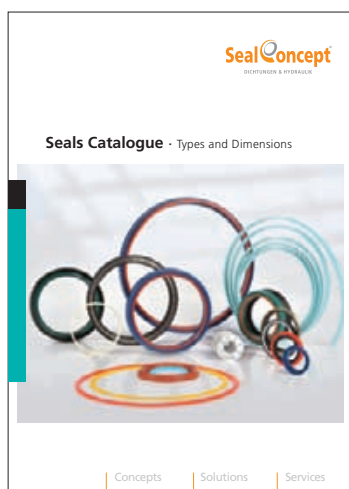


Non-standard solutions and 24-hour-service

As problem solver in the sealing sector, we will take action ourselves and “turn” the solution, which is appropriate for you.

- Individual manufacture of non-standard seals up to 710 mm. Up to 2,000 mm on request
- Latest CNC machinery and 2-shift operation guarantee top service
- Sustained economic life-time and load capacity (up to 700 bar) because of special geometries and materials
- Development, planning, design and manufacture of special seals
- We also manufacture special non-standard seals for the food industry, filling systems, motor sports, research and much more. Sealing materials with FDA conformity, Red Super Polymer, etc. are used.






Our seal catalogue and profile summary is also available as PDF on our internet page under “downloads”. www.sealconcept.com























	Piston Seals
	Rod Seals
	Wiper / Scraper Rings
	Guide Components Wear Bands
	Rotary Seals
	Back Up Rings O-Rings / X-Rings Static Seals
	Semifinished Products Individual Solutions Turning – Drilling – Milling
	Construction Parts Special Parts Seal Kits
	Installation Tools
	Survey of Material




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Piston Seals							
Profile	Type	Standard Material	Pressure (bar) ¹	Temperature (°C) ¹	Sliding Speed (m/sec) ¹	Description	Pages
	KGD	NBR Polyester Elastomer Polyacetal	400	-40 to 110	0,5	double-acting piston seal, 5-piece	46
	KD2	NBR Polyester Elastomer Polyacetal	700	-30 to 110	0,5	double-acting piston seal, 5-piece	52
	KD3	NBR-Fabric Polyacetal	500	-30 to 110	0,5	double-acting piston seal, 3-piece	56
	KD4	NBR-Fabric Polyacetal	350	-30 to 110	0,8	double-acting piston seal, 3-piece	60
	KD6	Polyurethane NBR Polyacetal	400	-30 to 110	0,6	compact piston seal, 4-piece	62
	KD8	PTFE-Compound NBR Polyacetal	400	-30 to 110	1,5	compact piston seal, 4-piece	64
	NPS	PTFE-Compound O-Ring NBR / FKM	800	-30 to 110 -30 to 200	15	double-acting piston seal, 2-piece	66
	KSO	PTFE-Compound O-Ring NBR / FKM X-Ring NBR / FKM	400	-30 to 200	2	double-acting piston seal, 3-piece	72
	KSO2	PTFE-Compound O-Ring NBR / FKM X-Ring NBR / FKM	600	-30 to 200	3	double-acting piston seal, 4-piece	76
	NPW KPD	Polyurethane O-Ring NBR	400	-30 to 100	0,5	double-acting piston seal, 2-piece	80
	KPR	Polyurethane Ring NBR	400	-30 to 100	0,5	double-acting piston seal, 2-piece	84
	KE1 KD	Polyurethane	400	-40 to 100	0,5	single-acting piston seal with asymmetric lip shape	86
	KE1/S KDA	Polyurethane	450	-40 to 100	0,5	single-acting piston seal with asymmetric lip shape and back-up ring	92
	T11 UP	Polyurethane Polyacetal	400	-40 to 100	0,5	single-acting piston groove ring with symmetric lip shape	172 ff.
	KE2 KDF	Polyurethane Polyacetal	400	-40 to 100	0,5	single-acting piston seal with guide ring	96
	KE3	NBR-Fabric Polyacetal-Support Ring	700	-30 to 110	0,5	single-acting piston seal, 2-piece	98















Piston Seals							
Profile	Type	Standard Material	Pressure (bar) ¹	Temperature (°C) ¹	Sliding Speed (m/sec) ¹	Description	Pages
	KE5	NBR-Fabric Polyacetal Support and Guide Ring	450	-30 to 110	0,5	single-acting piston seal, 2-piece with support and guide ring	100
	KE6	NBR-Fabric	700	-30 to 110	0,5	single-acting piston seal, 2-piece	104
	VP3	NBR-Fabric FKM-Fabric	400	-30 to 110 -30 to 140	0,5	single-acting piston seal, 3-piece chevron-type seal	106
	VP4	NBR-Fabric FKM-Fabric	400	-30 to 110 -30 to 140	0,5	single-acting piston seal, 4-piece chevron-type seal	106
	NPR	PTFE-Compound O-Ring NBR / FKM	800	-30 to 110 -30 to 200	15	single-acting piston seal, 2-piece	112



Rod Seals							
Profile	Type	Standard Material	Pressure (bar) ¹	Temperature (°C) ¹	Sliding Speed (m/sec) ¹	Description	Pages
	T1	NBR-Fabric FKM	250	-30 to 110 -30 to 140	0,5	Rod seal compact design	118
	T2	NBR-Fabric Polyacetal FKM / PGM	450	-30 to 110 -30 to 140	0,5	Rod seal compact design with support ring	122
	T3	NBR-Fabric FKM	250	-30 to 110 -30 to 140	0,5	Rod seal, compact design with groove ring	126
	T4 SGA	NBR Polyesterelastomer	700	-30 to 100	0,5	Rod seal, 2-piece with support ring	130
	VP5	NBR-Fabric/NBR FKM-Fabric/FKM	400	-30 to 110 -30 to 140	0,5	Rod seal, 5-piece chevron-type seal	134
	VP6	NBR-Fabric/NBR FKM-Fabric/FKM	400	-30 to 110 -30 to 140	0,5	Rod seal, 6-piece chevron-type seal	134
	VP7	NBR-Fabric/NBR FKM-Fabric/FKM	400	-30 to 110 -30 to 140	0,5	Rod seal, 7-piece chevron-type seal	134
	T7 S	Polyurethane	400	-40 to 100	0,5	Rod seal, compact groove ring	172 ff.
	T7/L SD	Polyurethane	400	-40 to 100	0,5	Rod seal, compact groove ring with secondary lip	172 ff.







Rod Seals							
Profile	Type	Standard Material	Pressure (bar) ¹	Temperature (°C) ¹	Sliding Speed (m/sec) ¹	Description	Pages
	T7/LS SDA	Polyurethane Polyacetal	450	-40 to 100	0,5	Rod seal, compact groove ring with secondary lip and support ring	173
	T10 A10	Polyurethane	400	-40 to 100	0,5	Groove ring with asymmetric lip shape	172 ff.
	T10/L A10/L	Polyurethane	400	-40 to 100	0,5	Groove ring with asymmetric lip shape and support ring	172 ff.
	T10/LS ADA	Polyurethane Polyacetal	450	-40 to 100	0,5	Groove ring with asymmetric lip shape, support ring and sec. lip	174
	T10/S	Polyurethane Polyacetal	450	-40 to 100	0,5	Groove ring with asymmetric lip shape and support ring	172 ff.
	T11 UP	Polyurethane	400	-40 to 100	0,5	Groove ring with symmetric lip shape	172 ff.
	SDAN	Polyurethane O-Ring NBR Polyacetal	500	-40 to 100	0,5	Groove ring with asymmetric lip shape, support ring and O-Ring	175
	UPN	Polyurethane O-Ring NBR	400	-40 to 100	0,5	Groove ring with symmetric lip shape and O-Ring	176
	T12	Polyurethane Polyacetal	450	-40 to 100	0,5	Groove ring, compact design with support ring	198
	NCR	PTFE-compound O-Ring NBR / FKM	800	-30 to 110 -30 to 200	15	single-acting Rod seal, 2-piece	202
	NCS	PTFE-compound O-Ring NBR / FKM	800	-30 to 110 -30 to 200	15	double-acting Rod Seal 2-piece	208







Wiper / Scraper Rings							
Profile	Type	Standard Material	Pressure (bar) ¹	Temperature (°C) ¹	Sliding Speed (m/sec) ¹	Description	Pages
	W1 SAF	Polyurethane Polyesterelastomer NBR / FKM	-	-40 to 100 -30 to 200	1	Wiper/Scraper ring single-acting	216
	SA SAP	Polyurethane Hytrel®	-	-40 to 100	1	Wiper/Scraper ring single-acting	222
	SAA	Polyurethane	-	-40 to 100	1	Wiper/Scraper ring single-acting	228
	W2 SAG	Polyurethane NBR FKM	-	-40 to 100 -30 to 200	1	Wiper/Scraper ring single-acting	230
	W3 SAB	Polyurethane	-	-40 to 100	1	Wiper/Scraper ring double-acting	234
	W3M	Polyurethane Metal cage	-	-30 to 100	1	Wiper/Scraper ring double-acting with metal cage	238
	W4	NBR FKM Metal cage	-	-30 to 110 -30 to 200	1	Wiper/Scraper ring single-acting with metal cage	242
	W4- PU	Polyurethane Metal cage	-	-30 to 110	1	Wiper/Scraper ring single-acting with metal cage	248
	W4- PUK	Polyurethane Metal cage	-	-30 to 110	1	Wiper/Scraper ring single-acting with metal cage	252
	W5	NBR FKM Metal reinforcement	-	-30 to 110 -30 to 200	1	Wiper/Scraper ring, single-acting with integral metal reinforcement	256
	W6	PTFE-compound O-Ring NBR / FKM	-	-30 to 110 -30 to 200	15	Wiper/Scraper ring double-acting	260
	W7	PTFE-compound O-Ring NBR / FKM	-	-30 to 110 -30 to 200	15	Wiper/Scraper ring single-acting	264
	W8	PTFE-compound O-Ring NBR / FKM	-	-30 to 110 -30 to 200	15	Wiper/Scraper ring double-acting	268
	W9 SAD	Polyurethane NBR FKM	-	-40 to 100 -30 to 200	1	Wiper/Scraper ring double-acting	272
	W10	PTFE-compound Metall wiper rings Metal cage	-	-60 to 200	15	Metal/ice wiper/scraper ring with metal cage, metal wiper rings and support ring	276
	W12	Polyamid	-	-30 to 120	1	Wiper/Scraper ring single-acting	280
	SFA	Polypropylen	-	-	-	Protective cover for wiper/scraper rings	284





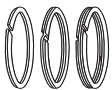

Guide Rings							
Profile	Type	Standard Material	Compressive strength (N/mm ²)	Temperature (°C) ¹	Sliding Speed (m/sec) ¹	Description	Pages
	FR	Polyacetal with glass fiber	20–40	-40 to 100	0,8	Guide ring, for piston and rod	288
	FRS	Polyacetal with glass fiber	20–40	-40 to 100	0,8	Guide ring, for plunger cylinder	298
	FHG	Phenolic resin Cotton fabric	310	-40 to 130	1	Guide ring, for piston and rod	302
	MFHG	Cotton Fabric Phenolic Resin MoS ₂	250	-40 to 120	1	Guide ring, for piston and rod	302
	FHM	Phenolic resin synthetic fiber	340	-40 to 130	1	Guide ring modified, for piston and rod	302
	FHO	Polyester resin fabric Polyester resin	345	-40 to 130	1	Guide ring for piston and rod	302
	FIL	Polyacetal with Glass Fibre	20–40	-40 to 100	0,8	Guide ring for rod	304
	FIT	Polyacetal with Glass Fibre	20–40	-40 to 100	0,8	Guide ring for rod	306
	FB	PTFE-compound PTFE-carbon PTFE-bronze	5–25	-80 to 200	15	PTFE-guide band cut to length, for piston and rod	310
	FHCB FHOB	Synthetic Fibre Polyester Resin	345	-40 to 130	1	guide band cut to length, for piston and rod	314

Rotary Seals							
Profile	Type	Standard Material	Pressure (bar) ¹	Temperature (°C) ¹	Sliding Speed (m/sec) ¹	Description	Pages
	NPG	PTFE-Compound O-Ring NBR / FKM	300	-30 to 110 -30 to 200	2	External rotary seal, double-acting	318
	NCG	PTFE-Compound O-Ring NBR / FKM	300	-30 to 110 -30 to 200	2	Internal rotary seal double-acting	322
	VA	NBR FKM	-	-30 to 110 -30 to 200	12	V-Rings, axially acting for shaft and bearing	326
	VS	NBR FKM	-	-30 to 110 -30 to 200	12	V-Rings, axially acting for shaft and bearing	330
	VL	NBR FKM	-	-30 to 110 -30 to 200	12	V-Rings, axially acting for shaft and bearing	334
	DV	PU	-	-40 to 100	-	V-Ring	336
	A	NBR FKM	0,5	-30 to 110 -30 to 200	12	Rotary shaft seal, standard shape A, DIN 3760	338
	AV	NBR FKM	8	-30 to 110 -30 to 200	12	Rotary shaft seal, standard shape A, DIN 3760	338
	AS	NBR FKM	0,5	-30 to 110 -30 to 200	12	Rotary shaft seal, standard shape A, DIN 3760 with dust lip	338
	ASV	NBR FKM	8	-30 to 110 -30 to 200	12	Rotary shaft seal, standard shape A, DIN 3760 with dust lip	338
	B	NBR FKM	0,5	-30 to 110 -30 to 200	12	Rotary shaft seal, standard shape B, DIN 3760	338
	BS	NBR FKM	0,5	-30 to 110 -30 to 200	12	Rotary shaft seal, standard shape B, DIN 3760 with dust lip	338
	C	NBR FKM	0,5	-30 to 110 -30 to 200	12	Rotary shaft seal, standard shape C, DIN 3760	338
	CS	NBR FKM	0,5	-30 to 110 -30 to 200	12	Rotary shaft seal, standard shape C, DIN 3760 with dust lip	338

Static Seals							
Profile	Type	Standard Material	Pressure (bar) ¹	Temperature (°C) ¹	Sliding Speed (m/sec) ¹	Description	Pages
	OP	Polyurethane	500	-40 to 100	static	Alternatives to combinations of O-Rings/Back Up Rings, 3 versions	340
	PFS	Polyurethane	500	-40 to 100	static	Flange seal for SAE-flanges	348

O-Rings / X-Rings / Profile Rings				
Profile	Standard Material ¹	Profile	Standard Material ¹	Pages
	NBR 70° / 80° / 90° Shore A FKM / EPDM / Silicone / Polyurethane		Round cord yard goods NBR/ FKM / EPDM / Silicone	352
	PTFE-O-Rings		O-Rings in FDA- and KTW-approved material	
	NBR 60 / 70 / 80° Shore A FKM / Polyurethane / PTFE		NBR 80° Shore A FKM / EPDM / Silicone	

Back Up Rings				
Profile	Type	Standard Material		Pages
	BRE-M	Polyester Elastomer Polyurethane	endless for metric size O-Rings	358
	BRE-I	Polyester Elastomer Polyurethane	endless for inch size O-Rings	364
	BRE-K	NBR Polyurethane PTFE	endless, concave	a. A.
	BRE	Polyester Elastomer Polyurethane PTFE	endless	
	BRG	Polyester Elastomer Polyurethane PTFE	split	
	BRS	Polyester Elastomer Polyurethane PTFE	spiral	

Special Parts			
Profile	Standard Material	Profile	Standard Material
	Screw packing NBR / FKM		Piston and rod seal PTFE-compound with metal spring
	Screw packing self-centering NBR / FKM		Single-acting shaft seal PTFE-compound with metal spring
	Metal rings of spring steel gap seal 15-1300 mm		Supplementary profiles, machined parts and special seals from our own fabrication

Construction Parts / Semifinished Products
Synthetic construction- and profile-parts, elastomere shapes, D-Rings according to ISO 2852, SMS- and clamp-Seals and further sealing elements up to drawings and samples are available on request.
Nearly all sealing types of conventional materials are also available as machined/turned parts within short lead-times. Please find profiles of machined parts on pages 16–27.
Semifinished products of PTFE, NBR, FKM, MVQ, EPDM, Polyurethane, POM, PA, glass-/MoS ₂ -filled materials, FDA-qualities as well as bronze- and carbon-filled PTFE-materials are available on request.

¹ Please find the exact limitations of use and technical data of the presented sealing types, wiper/scrapper rings, guide components, O-Rings / x-Rings / profiled rings in our main catalogue or our data sheets, which you may ask for under telephone/ 08234/9671-0. Above mentioned data are non-binding reference values, which may be exceeded or under-run. The liability in a precise case of operation is excluded. We will be glad to advise you in special applications.

Please note our general terms and conditions under: www.sealconcept.com- category "AGB" (General Terms & conditions for Sale and Supply). We take these as a basis for our consignments. Errors and misprints excepted.

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*As a problem solver
within the sealing
sector we are taking
matters into our own
hands and machine
your suitable solution.*



- Machined Seals²
- Individual Solutions
- Construction Parts
- Installation Tools
- Survey of Material

The seal geometries contained in these profileoverview are standard profiles.

Due to of our special manufacturing technology we are able to provide a swift, customised sealing solution, even in extraordinary cases of operation.

All seals up to 720 mm external diameter are available at short notice.


















Larger sizes up to 2.000 mm external diameter are available on request

All profiles may additionally be aligned to your particular operating conditions.





If you should have any queries, please do not hesitate to contact our application engineers.

Attention:












The given application parameter are maximum values of single material combinations. These should not be utilised coevally.











Piston Seals					
Profile	Type	Standard Material	Pressure (bar) ²	Temperature (°C) ²	Sliding Speed (m/sec) ²
	PS01	PU NBR FKM	400 160 160	-30 to 105 -25 to 100 -20 to 210	0,5
	PS01A	PU NBR FKM	25	-30 to 105 -25 to 100 -20 to 210	1
	PS01B	PU NBR FKM	400 160 160	-30 to 105 -25 to 100 -20 to 210	0,5
	PS02	PU/POM NBR/POM FKM/PGM	700 250 250	-30 to 100 -25 to 100 -20 to 210	0,5
	PS02A	PU/POM NBR/POM FKM/PGM	700 250 250	-30 to 100 -25 to 100 -20 to 210	0,5
	PS03	PU/NBR	400	-25 to 100	0,5
	PS04	PU/NBR/POM	700	-25 to 100	0,5
	PS05	NBR	25	-25 to 100	1
	PS08	PU/NBR PB, PK, PGM, PT, PEK/NBR PB, PK, PGM, PT, PEK/FKM	400 800 800	-25 to 100 -25 to 100 -20 to 210	1 15
	PS08B	PU/NBR PB, PK, PGM, PT, PEK/NBR PB, PK, PGM, PT, PEK/FKM	400 800 800	-25 to 100 -25 to 100 -20 to 210	1 15
	PS08C	PU/NBR PB, PK, PGM, PT, PEK/NBR PB, PK, PGM, PT, PEK/FKM	400 800 800	-25 to 100 -25 to 100 -20 to 210	2
	PS08D	PU/NBR PB, PK, PGM, PT, PEK/NBR PB, PK, PGM, PT, PEK/FKM	400 800 800	-25 to 100 -25 to 100 -20 to 210	2
	PS08E	PU/NBR PB, PK, PGM, PT, PEK/NBR PB, PK, PGM, PT, PEK/FKM	400 800 800	-25 to 100 -25 to 100 -20 to 210	1 15
	PS08F	PU/NBR PB, PK, PGM, PT, PEK/NBR PB, PK, PGM, PT, PEK/FKM	400 800 800	-25 to 100 -25 to 100 -20 to 210	1 15
	PS81	PU/NBR PB, PK, PGM, PT, PEK/NBR PB, PK, PGM, PT, PEK/FKM	400 800 800	-25 to 100 -25 to 100 -20 to 210	1 15
	PS09	PU/NBR/POM	400	-25 to 100	0,5
	PS16	NBR	160	-25 to 100	0,5






Piston Seals

Profile	Type	Standard Material	Pressure (bar) ²	Temperature (°C) ²	Sliding Speed (m/sec) ²
	PS17	PU/POM NBR/POM	400 250	-25 to 100	0,5
	PS19	PGM / 1.4310	160	-200 to 260	15
	PS23	PU/NBR/POM	400	-25 to 100	0,5
	PS35	PU	400	-30 to 105	0,5








Rod Seals

Profile	Type	Standard Material	Pressure (bar) ²	Temperature (°C) ²	Sliding Speed (m/sec) ²
	RS01	PU NBR FKM	400 160 160	-30 to 105 -25 to 100 -20 to 210	0,5
	RS01A	PU NBR FKM	25	-30 to 105 -25 to 100 -20 to 210	1
	RS01B	PU NBR FKM	400 160 160	-30 to 105 -25 to 100 -20 to 210	0,5
	RS02	PU/POM NBR/POM FKM/PGM	700 250 250	-30 to 100 -25 to 100 -20 to 210	0,5
	RS02A	PU/POM NBR/POM FKM/PGM	700 250 250	-30 to 100 -25 to 100 -20 to 210	0,5
	RS03	PU/NBR	400	-25 to 100	0,5
	RS04	PU/NBR/POM	700	-25 to 100	0,5
	RS05	NBR	25	-25 to 100	1
	RS08	PU NBR	400 160	-30 to 105 -25 to 100	0,3
	RS09A	PU/NBR PB, PK, PGM, PT, PEK/NBR PB, PK, PGM, PT, PEK/FKM	400 800 800	-25 to 100 -25 to 100 -20 to 210	1 15
	RS09B	PU/NBR PB, PK, PGM, PT, PEK/NBR PB, PK, PGM, PT, PEK/FKM	400 800 800	-25 to 100 -25 to 100 -20 to 210	1 15









Rod Seals					
Profile	Type	Standard Material	Pressure (bar) ²	Temperature (°C) ²	Sliding Speed (m/sec) ²
	RS91B	PU/NBR PB, PK, PGM, PT, PEK/NBR PB, PK, PGM, PT, PEK/FKM	400 800 800	-25 to 100 -25 to 100 -20 to 210	1 15
	RS16	NBR	160	-25 to 100	0,5
	RS17	PU	400	-30 to 105	0,5
	RS17A	PU/POM	700	-30 to 100	0,5
	RS17B	PU/NBR	400	-25 to 100	0,5
	RS17C	PU/NBR/POM	700	-25 to 100	0,5
	RS17D	PU NBR	400 160	-30 to 105 -25 to 100	0,3
	RS19	PGM / 1.4310	160	-200 to 260	15
	RS31	PU/POM	500 250 250	-30 to 100 -25 to 100 -20 to 210	0,5
	RS35	PU	400	-30 to 105	0,5

Symmetric Seals					
Profile	Type	Standard Material	Pressure (bar) ²	Temperature (°C) ²	Sliding Speed (m/sec) ²
	PRS06	PU NBR	400 160	-30 to 105 -25 to 100	0,5
	PRS06A	PU NBR	400 160	-30 to 105 -25 to 100	0,5
	PRS06B	PU NBR	400 160	-30 to 105 -25 to 100	0,5
	PRS06C	PU NBR	400 160	-30 to 105 -25 to 100	0,5
	PRS06E	PU NBR	400 160	-30 to 105 -25 to 100	0,5










Symmetric Seals

Profile	Type	Standard Material	Pressure (bar) ²	Temperature (°C) ²	Sliding Speed (m/sec) ²
	PRS07	PU/NBR	400	-25 to 100	0,5
	PRS13-15	PU/POM NBR/POM FKM/PGM	500 250 250	-30 to 100 -25 to 100 -20 to 210	0,5
	PRS18	PU/NBR	400	-25 to 100	0,5
	PRS19B	PGM/1.4310	150	-200 to 260	2
	PRS19D	PGM/1.4310	150	-200 to 260	2
	PRS22	PU/POM NBR/POM FKM/PGM	400 160 160	-30 to 100 -25 to 100 -20 to 210	0,5
	PRS10-12	PU/POM NBR/POM FKM/PGM	500 250 250	-30 to 100 -25 to 100 -20 to 210	0,5






Wiper / Scraper Rings
















Profile	Type	Standard Material	Pressure (bar) ²	Temperature (°C) ²	Sliding Speed (m/sec) ²
	WR01	PU NBR FKM	-	-30 to 105 -25 to 100 -20 to 210	1
	WR01A	PU NBR FKM	-	-30 to 105 -25 to 100 -20 to 210	1
	WR02	PU NBR FKM	-	-30 to 105 -25 to 100 -20 to 210	1
	WR02A	PU NBR FKM	-	-30 to 105 -25 to 100 -20 to 210	1
	WR02B	PU NBR FKM	-	-30 to 105 -25 to 100 -20 to 210	1
	WR02C	PU NBR FKM	-	-30 to 105 -25 to 100 -20 to 210	1
	WR03	PU/POM NBR/POM FKM/PGM	-	-30 to 100 -25 to 100 -20 to 210	1
	WR04	PU NBR FKM	-	-30 to 105 -25 to 100 -20 to 210	1















Wiper / Scraper Rings

Profile	Type	Standard Material	Pressure (bar) ²	Temperature (°C) ²	Sliding Speed (m/sec) ²
	WR07	PU POM	-	-30 to 105 -30 to 100	1
	WR08	PU POM	-	-30 to 105 -30 to 100	1
	WR11	PU NBR FKM	-	-30 to 105 -25 to 100 -20 to 210	1
	WR12	PU NBR FKM	-	-30 to 105 -25 to 100 -20 to 210	1
	WR17	PU NBR FKM	-	-30 to 105 -25 to 100 -20 to 210	1
	WR18	PU NBR FKM	-	-30 to 105 -25 to 100 -20 to 210	1
	WR13	PB, PK, PGM, PT, PEK/NBR PB, PK, PGM, PT, PEK/FKM	-	-25 to 100 -20 to 210	15
	WR14	PB, PK, PGM, PT, PEK/NBR PB, PK, PGM, PT, PEK/FKM	-	-25 to 100 -20 to 210	15
	WR15	PB, PK, PGM, PT, PEK/NBR PB, PK, PGM, PT, PEK/FKM	-	-25 to 100 -20 to 210	15

O-Rings / X-Rings and Flange Seals












Profile	Type	Standard Material	Pressure (bar) ²	Temperature (°C) ²	Sliding Speed (m/sec) ²
	OR	PU NBR FKM	600 160 160	-30 to 105 -25 to 100 -20 to 210	-
	SCQ-Ring	PU NBR FKM	400 160 160	-30 to 105 -25 to 100 -20 to 210	-
	FL01A	PU FKM EPDM	400 250 250	-30 to 100 -20 to 210 -50 to 130	-
	FL02B	PU FKM EPDM	400 250 250	-30 to 100 -20 to 210 -50 to 130	-
	SCOP	PU	500	-30 to 105	-

Rotary Seals					
Profile	Type	Standard Material	Pressure (bar) ²	Temperature (°C) ²	Sliding Speed (m/sec) ²
	OS01	PU/POM NBR/POM FKM/PGM	0,5 0,5 0,5	-30 to 100 -25 to 100 -20 to 210	5 10 15
	OS01A	PTFE PGM	0,5 0,5	-200 to 260 -200 to 260	15
	OS02	PU/POM NBR/POM FKM/PGM	0,5 0,5 0,5	-30 to 100 -25 to 100 -20 to 210	5 10 15
	OS02A	PTFE PGM	0,5 0,5	-200 to 260 -200 to 260	15
	OS08	NBR FKM	-	-25 to 100 -20 to 210	10
	R03	PU NBR/POM	400 250	-30 to 100 -25 to 100	0,2 0,2
	R04	PU NBR	160 100	-30 to 105 -25 to 100	0,2 0,2
	R05	PU NBR	160 100	-30 to 105 -25 to 100	0,2 0,2
	R06	NBR FKM	-	-25 to 100 -20 to 210	25
	R07	NBR FKM	-	-25 to 100 -20 to 210	25
	R08	PB, PK, PGM, PT, PEK/NBR PB, PK, PGM, PT, PEK/FKM	300	-25 to 100 -20 to 210	2
	R09	PB, PK, PGM, PT, PEK/NBR PB, PK, PGM, PT, PEK/FKM	300	-25 to 100 -20 to 210	2
	R10	PB, PK, PGM, PT, PEK/NBR PB, PK, PGM, PT, PEK/FKM	300	-25 to 100 -20 to 210	2
	RS19A	PGM / 1.4310	150	-200 to 260	2
	PS19A	PGM / 1.4310	150	-200 to 260	2

Back Up Rings / Wear Rings					
Profile	Type	Standard Material	Pressure (bar) ²	Temperature (°C) ²	Sliding Speed (m/sec) ²
	BUR08	PU POM PTFE	-	-30 to 105 -60 to 100 -200 to 260	-
	BUR09	PU POM PTFE	-	-30 to 105 -60 to 100 -200 to 260	-
	BUR10	PU POM PTFE	-	-30 to 105 -60 to 100 -200 to 260	-
	BUR11	PU POM PTFE	-	-30 to 105 -60 to 100 -200 to 260	-
	BUR12	PU POM PTFE	-	-30 to 105 -60 to 100 -200 to 260	-
	BUR13	PU POM PTFE	-	-30 to 105 -60 to 100 -200 to 260	-
	BWR01	POM PGM	-	-60 to 100 -200 to 260	4
	BWR02	POM PGM	-	-60 to 100 -200 to 260	4
	BWR03	POM PGM	-	-60 to 100 -200 to 260	4
	BWR04	POM PGM	-	-60 to 100 -200 to 260	4
	BWR05	POM PGM	-	-60 to 100 -200 to 260	4
	BWR06	POM PGM	-	-60 to 100 -200 to 260	4
	BWR07	POM PGM	-	-60 to 100 -200 to 260	4
	BWR08	POM PGM	-	-60 to 100 -200 to 260	4

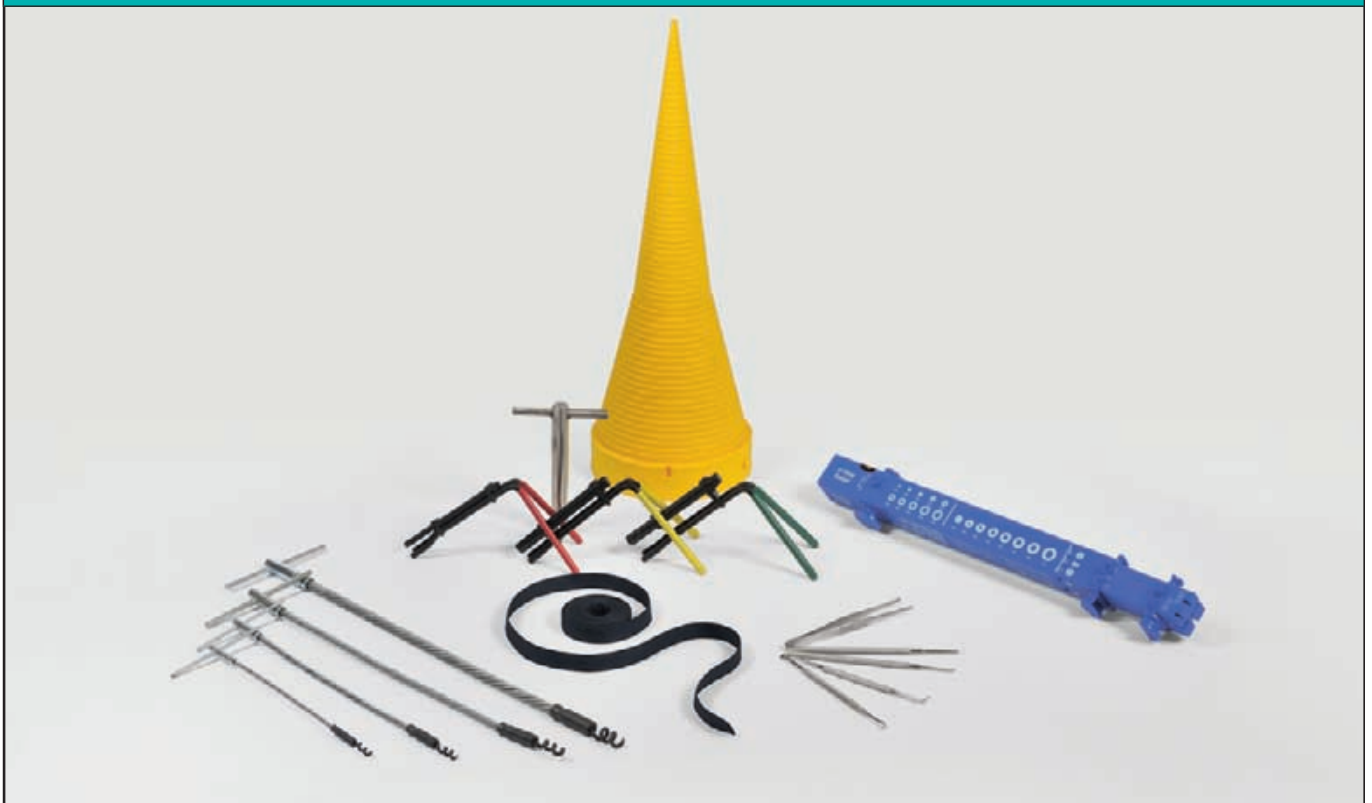
Mining Seals					
Profile	Type	Standard Material	Pressure (bar) ²	Temperature (°C) ²	Sliding Speed (m/sec) ²
	P50	PU/POM	400	-30 to 100	0,1
	P51	PU/NBR/POM	400	-25 to 100	0,5
	P52	PU/POM	700	-30 to 100	0,5
	P53	PU/NBR/POM	700	-25 to 100	0,5
	P54	PU/NBR/POM	400	-25 to 100	0,5
	P58	PU	400	-30 to 100	-
	R50	PU/NBR/POM	700	-25 to 100	0,5
	R51	PU/NBR	400	-25 to 100	0,5
	R52	PU/POM	700	-30 to 100	0,5
	R53	PU	400	-30 to 100	0,5
	W50	PU	-	-30 to 105	2
	W51	PU	-	-30 to 100	2
	W53	PU/POM	-	-30 to 100	2
	W54	PU	-	-30 to 105	2
	BWR01-P BWR01-R	POM PTFE	- -	-60 to 100 -200 to 260	4

Supplementary Profiles, Special Seals and Machined Parts

Besides the standard profiles mentioned above we also provide special profiles and machined parts according to customers drawings or geometries which are especially developed by Seal Concept GmbH according to the corresponding requirements.

Installation Tools



The Seal Concept - seal installation tools help to simplify the assembly and disassembly of various types of seals and sealing materials. Even difficult installations can be carried out easily and fast with the help of these installation tools.

² Please find the exact limitations of use and technical data of the presented sealing types, Wiper / Scraper Rings, O-Rings / X-Rings and Flange Seals, Back Up Rings and Guide Rings in our main catalogue or our data sheets, which you may ask for under telephone / 08234 / 9671-0. Above mentioned data are non-binding reference values, which may be exceeded or under-run. The liability in a precise case of operation is excluded. We will be glad to advise you in special applications.

Please note our general terms and conditions under: www.sealconcept.com- category "AGB" (General Terms & conditions for Sale and Supply). We take these as a basis for our consignments. Errors and misprints excepted.

Survey of Material

Appellation	Working Temperature ³	Hardness at 20°C ⁴	Main Application
PU red	from -30 to +105°C	Shore A 95 +/-2	Lip seals, wiper/scrapper rings and other sealing components, mineral oils, compressed air, water, consistent to hydrolysis
PU green	from -30 to +105°C	Shore A 95 +/-2	Lip seals, wiper/scrapper rings and other sealing components, mineral oils, compressed air, water, consistent to hydrolysis
PU blue (FDA)	from -30 to +105°C	Shore A 95 +/-2	Lip seals, wiper/scrapper rings and other sealing components, mineral oils, compressed air, water, consistent to hydrolysis
PU white (FDA)	from -30 to +100°C	Shore A 95 +/-2	Lip seals, wiper/scrapper rings and other sealing components in conjunction with comestibles, consistent to hydrolysis
PU grey (MoS2)	from -30 to +105°C	Shore A 95 +/-2	Lip seals, wiper/scrapper rings and other sealing components, mineral oils, compressed air, water, at harder working conditions
PU 57 Shore D blue (FDA)	from -30 to +90°C	Shore D 57 +/-2	Back up rings or guide rings with prestressed components, mineral oils, compressed air, water, consistent to hydrolysis
NBR black	from -25 to +100°C	Shore A 85 +/- 5	Lip seals, wiper/scrapper rings and other sealing components, mineral oils, water, compressed air
FPM brown	from -20 to +210°C	Shore A 85 +/-5	Lip seals, wiper/scrapper rings and other sealing components at high temperatures and aggressive media
FPM brown (FDA)	from -20 to +210°C	Shore A 85 +/-5	Lip seals, wiper/scrapper rings and other sealing components at high temperatures and aggressive media
FPM black	from -25 to +210°C	Shore A 85 +/-5	Lip seals, wiper/scrapper rings and other sealing components at high temperatures and aggressive media
EPDM black	from -50 to +130°C	Shore A 85 +/-5	Lip seals, wiper/scrapper rings and other sealing components at hot water and vapour as well as depleted acids and bases, EPDM is NOT consistent to mineral oil
EPDM white (FDA)	from -50 to +100°C	Shore A 85 +/-3	Lip seals, wiper/scrapper rings and other sealing components at hot water and vapour as well as depleted acids and bases, EPDM is NOT consistent to mineral oil
H-NBR black	from -25 to +150°C	Shore A 85 +/-5	Lip seals, wiper/scrapper rings and other sealing components, compressed air and mineral oils at heightened temperatures
NBR 95 Shore A	from -25 to +100°C	Shore A 95 +/-5	Lip seals, wiper/scrapper rings and other sealing components, mineral oils, water, compressed air
NBR white (FDA)	from -22 to +100°C	Shore A 85 +/-3	Lip seals, wiper/scrapper rings and other sealing components, mineral oils, water, compressed air
Silicone red (FDA)	from -55 to +210°C	Shore A 85 +/-5	Flange seals and other static sealing components in conjunction with comestibles Only contingently eligible for dynamic application
Silicone blue (FDA)	from -55 to +180°C	Shore A 85 +/-3	Flange seals and other static sealing components in conjunction with comestibles Only contingently eligible for dynamic application

Survey of Material

Appellation	Working Temperature ³	Hardness at 20°C ⁴	Main Application
Aflas black	from -15 to +180°C	Shore A 85 +/-5	Lip seals, wiper/scrapper rings and other sealing components, acid oils and gases, amine, hot water/vapour, high electrical isolation properties
POM white (FDA-Conformity)	from -60 to +100°C	-	Back up and guide components, machined parts
PA natural	from -30 to +105°C	-	Back up and guide components, machined parts
PVDF	from -50 to +140°C	Shore D 80	Wiper/Scrapper rings, construction Parts
PEEK	from -50 to +250°C	-	spring aided sealing components, bushings, machined parts, Wiper/Scrapper rings, precision parts
PE-UHMW (FDA-Conformity)	from -265 to +80°C	Shore D 61	Guide components with elastomer pre-stressing, spring aided sealing components, back up- and guide components, food industry
P white PTFE virginal	from -200 to +260°C	Shore D 51 - 60	Guide components with elastomer pre-stressing, spring aided sealing components, back up- and guide components, low friction, contact with comestibles, outstanding constistance to chemicals
PGM grey PTFE-Glass Fibre + MoS2	from -200 to +260°C	Shore D 55 - 64	Guide components with elastomer pre-stressing, spring aided sealing components, back up- and guide components, fibre glass-/molybdenum- reinforced
PB PTFE-bronze	from -200 to +260°C	Shore D 62 - 67	Guide components with elastomer pre-stressing, spring aided sealing components
PK PTFE-carbon	from -200 to +260°C	Shore D 62 - 67	Guide components with elastomer pre-stressing, spring aided sealing components
PT/FDA PTFE-turquoise (FDA-Conformity)	from -200 to +260°C	Shore D 59	Guide components with elastomer pre-stressing, spring aided sealing components
PEK PTFE-Ekonol	from -200 to +260°C	Shore D 53 - 66	Guide components with elastomer pre-stressing, food industry, aircraft construction

Furthermore we provide parts made from diverse PTFE compounds, PEEK, different polyamides and -imides, PETP etc. We kindly ask you to see particular information about our materials from our materials catalogue, or consult our application engineers.

³ The given sub-zero temperatures are to be regarded as a general principle, since function in the cold is dependent on the seals character, the working conditions and the ambient metal parts. The given plus-temperatures might be exceeded, however durability is reduced.

⁴ Please find the exact limitations of use and technical data in this survey of material in our main catalogue or our data sheets, which you may ask for under telephone: 08234/9671-0. Above mentioned data are non-binding reference values, which may be exceeded or under-run. The liability in a precise case of operation is excluded. We will be glad to advise you in special applications.

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Notes



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Materials and Media

Materials			
Appellation and Media according to ISO 1629	Range of hardness*	Range of temperature*	Chemical appellation / Attributes
N B R	55–90 Shore A	- 30 °C to + 110 °C	Acrylnitril-butadien-rubber - constant against mineral-oils and greases which do not contain aromatic or chlorinated additives - restricted ozone- and light-resistiveness - good mechanical attributes
H N B R	70–90 Shore A	- 30 °C to + 150 °C	Hydrogenated acrylnitril-butadien-rubber - very good mechanical attributes - high wearout-resistance - good ozone- and atmosphere resistiveness - good resistiveness against mineraloils, hot water and freezing agents
F K M	65–90 Shore A	- 20 °C to + 200 °C	Fluoroelastomer - very good resistiveness against oils and chemicals - wide operational range - small penetrability of gas - applicable for high temperatures
V M Q	50–75 Shore A	- 60 °C to + 200 °C	Silicone rubber - good high- and low-temperature-practice - moderate mechanical attributes - good ozone- and atmosphere resistiveness - very good resilience - inconstant to mineraloils
ACM	70–80 Shore A	- 20 °C to + 150 °C	Alkyl acrylate copolymer - moderate mechanical attributes - consistant against mineral oils and greases, ozone and fuels - absorption of water and steam
E P D M	60–80 Shore A	- 40 °C to + 140 °C	Ethylen-propylen-dien-monomer - good resistiveness to heat, ozone and aging - high resilience - high resistiveness to hot water and steam - good resistiveness to coldness and chemicals
P T F E	50–70 Shore D	- 200 °C to + 250 °C	Polytetrafluorethylene - preeminent chemical resistiveness - high thermic field of application - low coefficient of friction - insert for construction-parts (PTFE-pure), not elastic - PTFE-compound (e.g. bronze/carbon/glass fibre) as filled materials within sealing technology
P O M	40–55 Shore D	- 40 °C to + 100 °C	Polyoxymethylene - good shape-resistiveness at good resilience - compoundable with fillings - low absorption of water - high mechanical solidness
P U	85–95 Shore A	- 40 °C to + 100 °C	Polyurethane - thermoplastic material with good solidness to attrition - low pressure-deformations-residue, high extrusion-resistance - good resistiveness against mineral oils - good restiveness against aging and ozone+

* The given values are standard values, which are composit-dependent within the complying range of temperature and must be verified for the respective case of application.

Materials and Media

Compound Suitability for Hydraulic Fluids

DIN Class	ISO-Class	Type	Description	Continuous Operating Temp. (°C) with Seal Materials						
				NBR	FKM	PU	EPDM	POM	PTFE	PA
H	HH	Mineral Fluid	Mineral Oil without additives	100	150	100	NS	100	200	100
H-L	HL		Mineral Fluid with anti-corrosion and anti-aging additives	100	150	100	NS	100	200	100
H-LP	HM		As HL plus additives reducing wear and raising load capacity	100	150	100	NS	100	200	100
H-LPD	-		As H-LP but with detergents and dispersants	100	150	100	NS	100	200	100
H-V	HV		As H-LP but with improved viscosity temperature behaviour	100	150	100	NS	100	200	100
HFA E		Flame Retardant with Water	Emulsions of mineral oil in water Water content 80-95%	55	55	40	NS	55	55	55
HFA S			Synthetic oil in water Water content 80-95%	55	55	40	NS	55	55	55
HFB			Emulsions of water in mineral oil Water content 40%	60	60	40	NS	60	60	60
HFC			Aqueous polymer solutions Water content 35%	60	60	40	60	60	60	60
HFD R		Flame Retardant without Water	Phosphoric acid ester based	NS	150	NS	100	80	150	80
HFD S			Chlorinated hydrocarbon based	NS	150	NS	100	80	150	80
HFD T			Mixtures of HFD R and HFD S	NS	150	NS	100	80	150	80
HEPG		Bio-degradable	Polyglycol based	NS	100	40	NS	80	100	80
HETG			Vegetable oil based	60	60	60	NS	60	80	60
HEES			Fully synthetic ester based	NS	100	60	NS	60	100	80

NS = Not Suitable

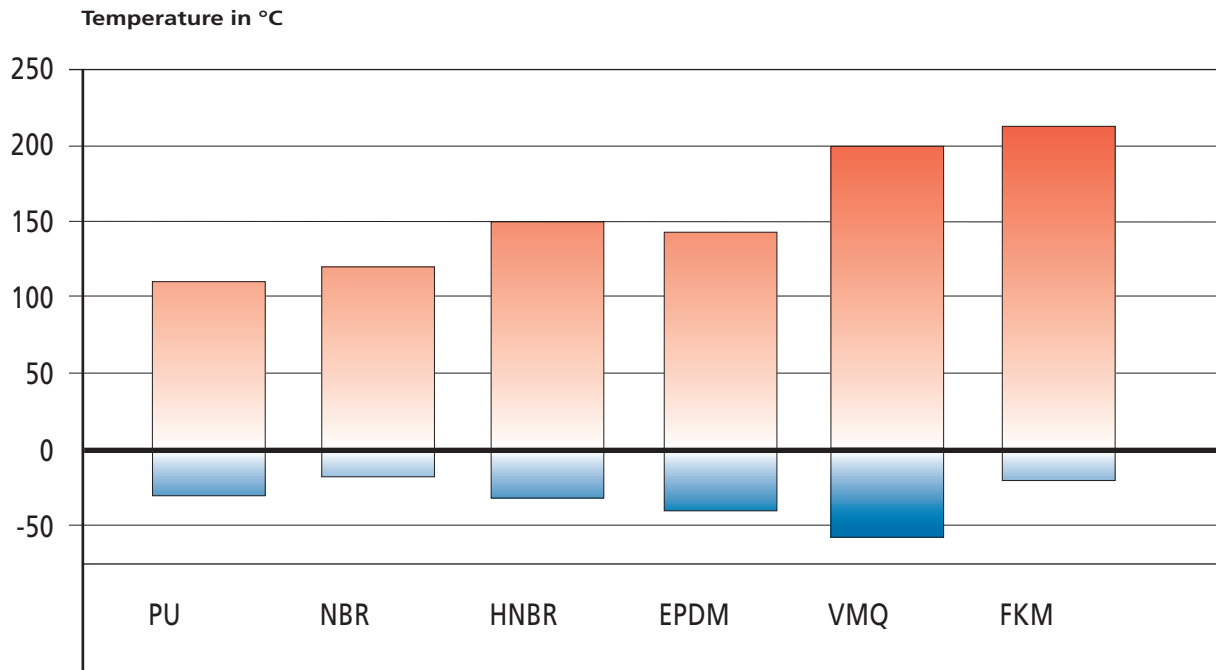
The large number of operating parameter in the standard-production application and their influence on the Seal Concept sealing systems make an approval of the function under working conditions prior to the installation essential. Both, the constant increase of the range of new or modified products for the use of hydraulic fluids, lubricants or purification liquids, as well as the additives in the source materials, can influence the compatibility characteristics and determine a constant compatibility test with the applied sealing system upon the user.

It is incumbent upon the user to verify the suitability of the sealing systems prior to installation, as we cannot simulate the conditions of the final application. The Seal Concept GmbH cannot take over any kind of guarantee and disclaims any liability in conjunction with the data on this compound suitability sheet.

Working temperatures

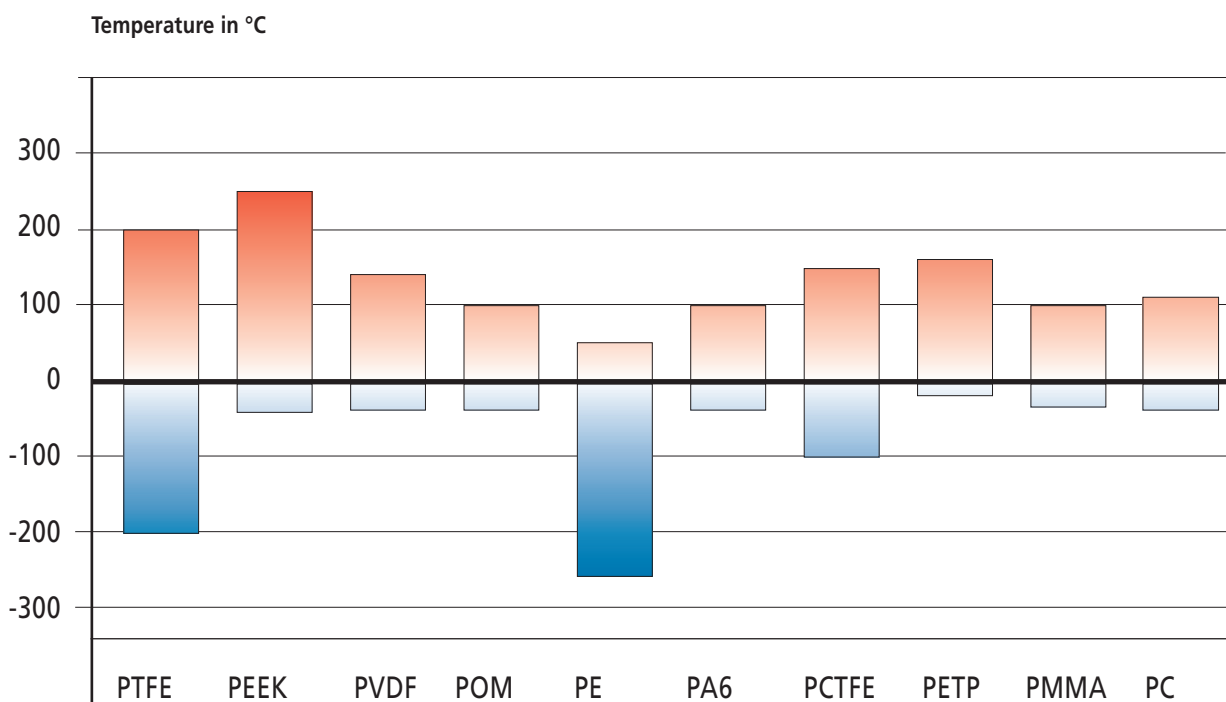
Working temperatures of elastomeres

The table shows the working temperatures of elastomers and is for orientation at the assortment of material. The temperature margin is dependent of the materials composition.



Working temperatures of thermoplastic resins

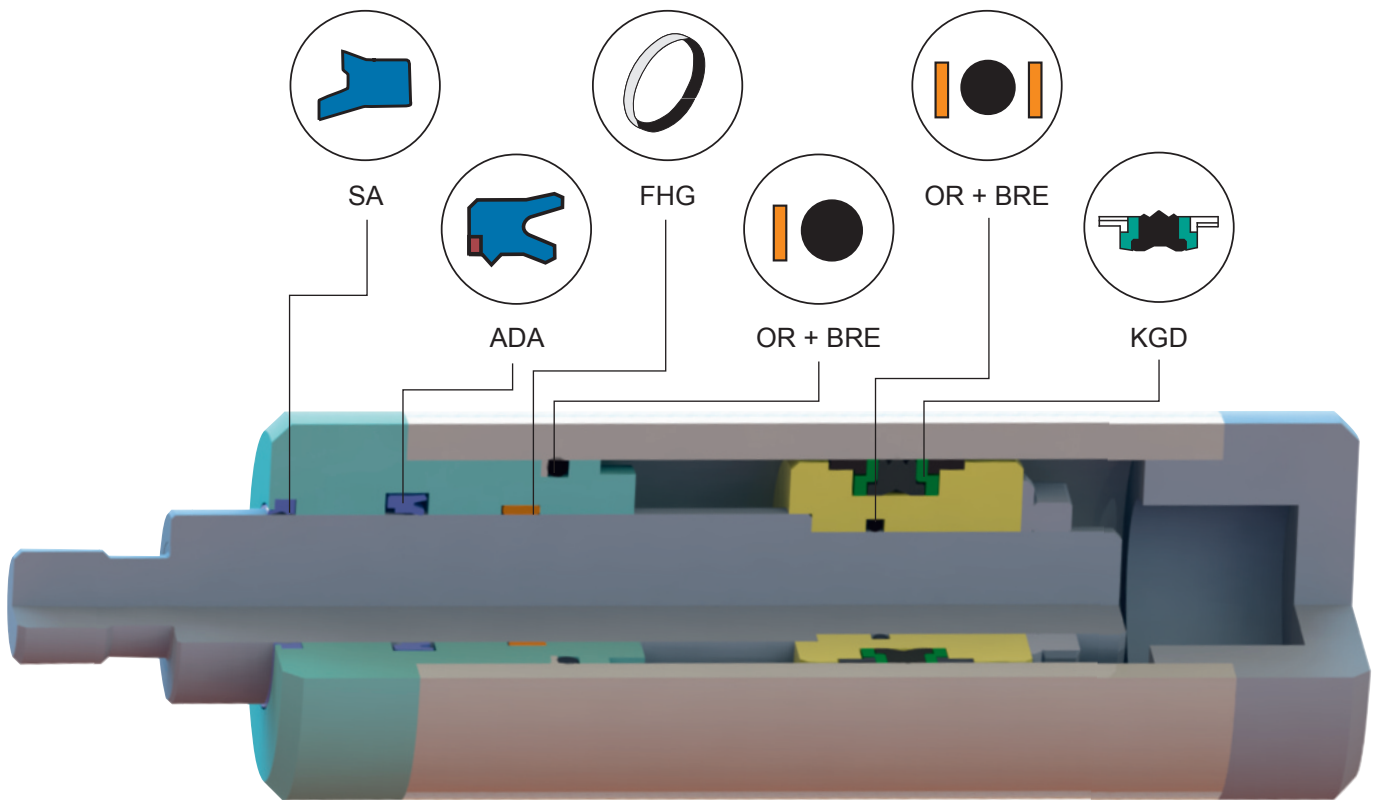
The table shows the working temperatures of thermoplastic resins and is for orientation at the assortment of material. The temperature margin is dependent of the materials composition



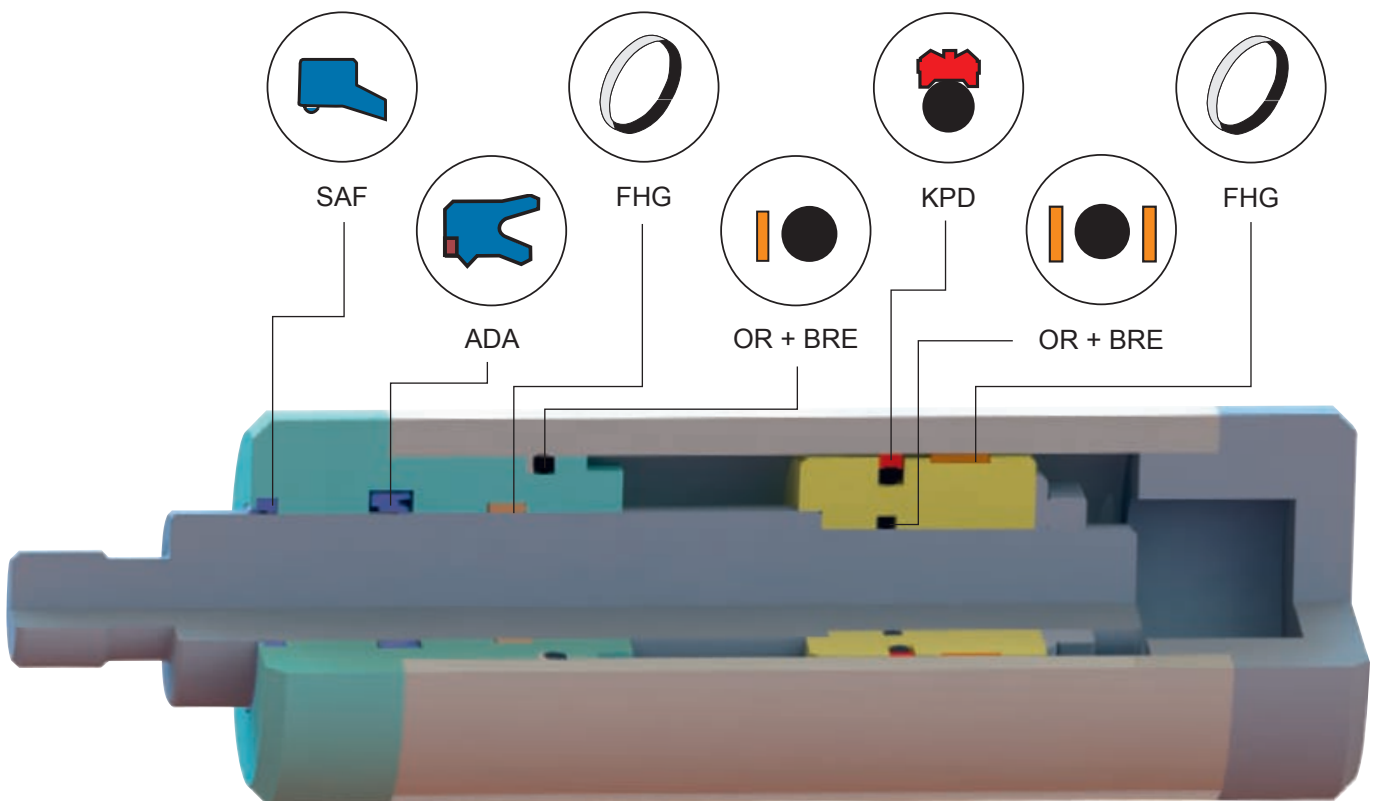
Working conditions within hydraulics

Application conditions	Application conditions Facile duty	Moderate duty	Heavy duty
Normal working pressure	up to 16 MPa (160 bar)	up to 25 MPa (250 bar)	up to 40 MPa (400 bar)
Maximum working pressure	up to 35 MPa (350 bar)	up to 50 MPa (500 bar)	up to 70 MPa (700 bar)
Pressure peaks	without pressure peaks	partial pressure peaks	prevalent pressure peaks
Encroachment of cylinders	- low impact when in service - low radial forces	- moderate impact when in service - casual pressure peaks and radial forces	- prevalent high impact when in service - high pressure peaks and radial forces
Hydraulic media	- low contamination of hydraulic liquids by good filtration	- light contermination of hydraulic liquids at filtration possible	- high contermination inspite of filtration through abrasion and intrusion of particles is possible
Application environment	- clean environment - low thermal fluctuations	- application in buildings and exterior area	- cragged field application or in polluted interiors - high thermal fluctuation
Exercise conditions	- continuous application at low pressures - erratic application under working pressure	- continuous application under working pressure	- prevalent application with high impacts and pressure peaks
Application area	- agricultural machines - hoisting devices - light dumptors - machine tools - dying machines - general engine building	- industrial trucks - agricultural machines - accessory equipment - light construction machinery - heavy hoisting devices - cranes - lifting platforms - heavy dumptors - heavy machine tools - mining devices - telescopic devices	- heavy constructions machines - compactors - mining devices - steel works

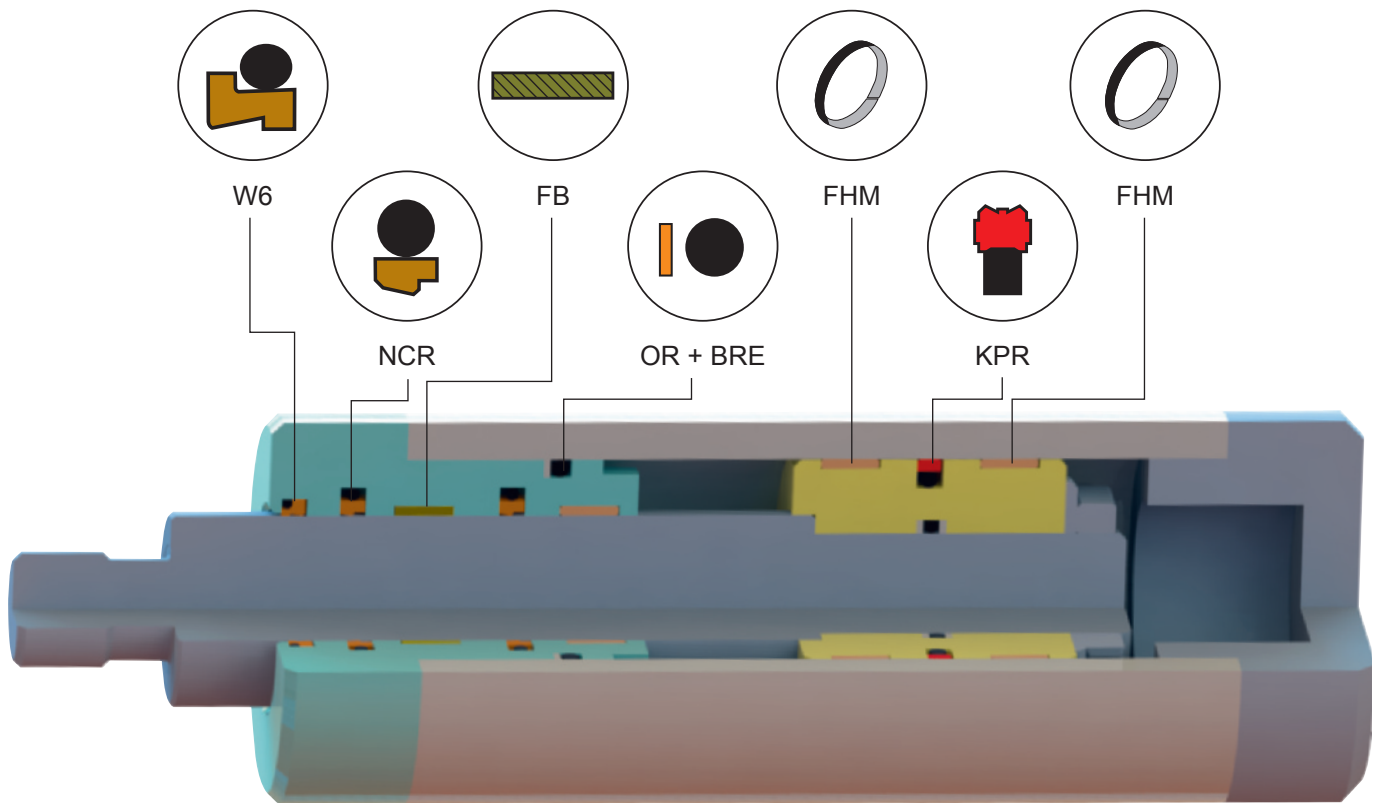
The assortment of the applicative sealing systems for the respective application area is dependent on the expected operation conditions. The application limits in this catalogue are standard values. Please call upon our advise for special applications. We recommend the assay of the sealing systems before application.



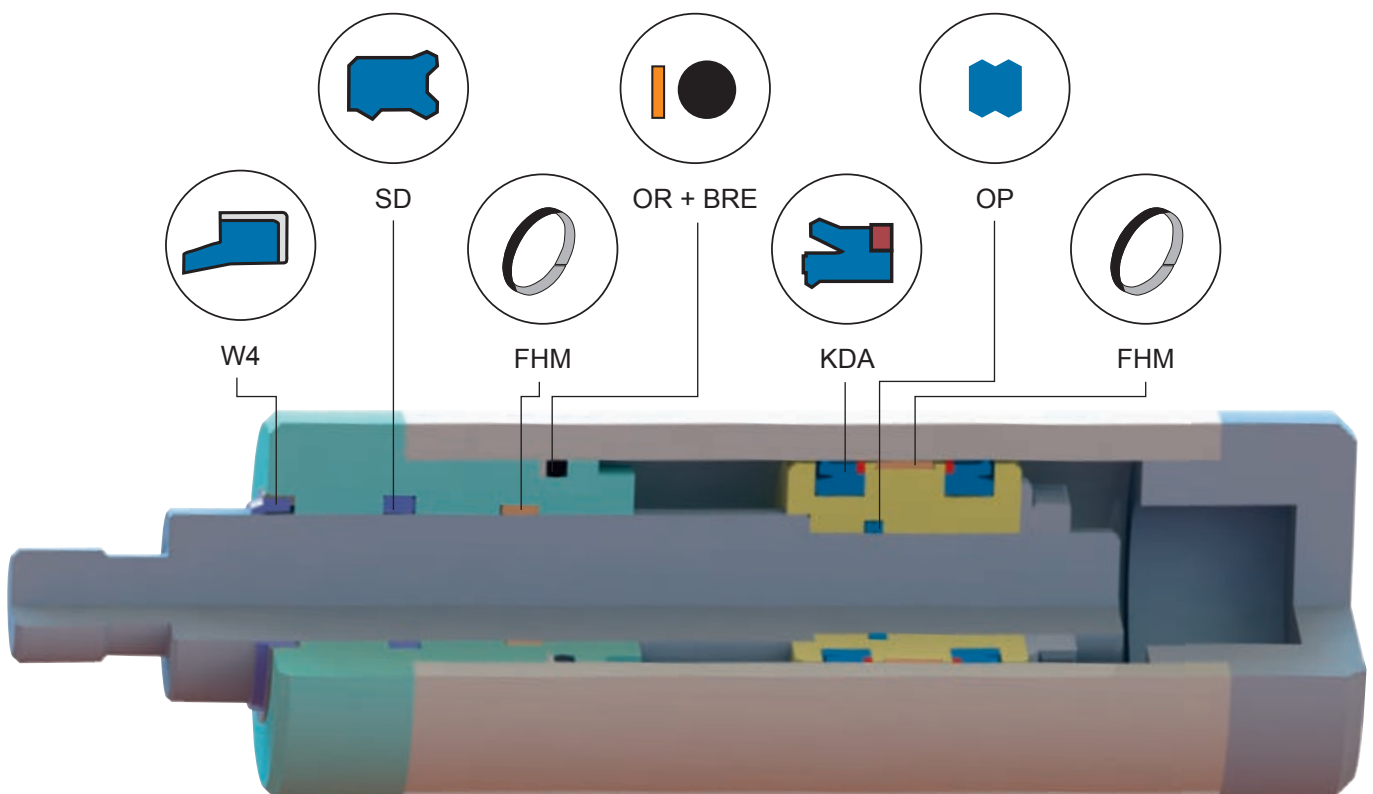
Suggested installation 1 for „easy“ application



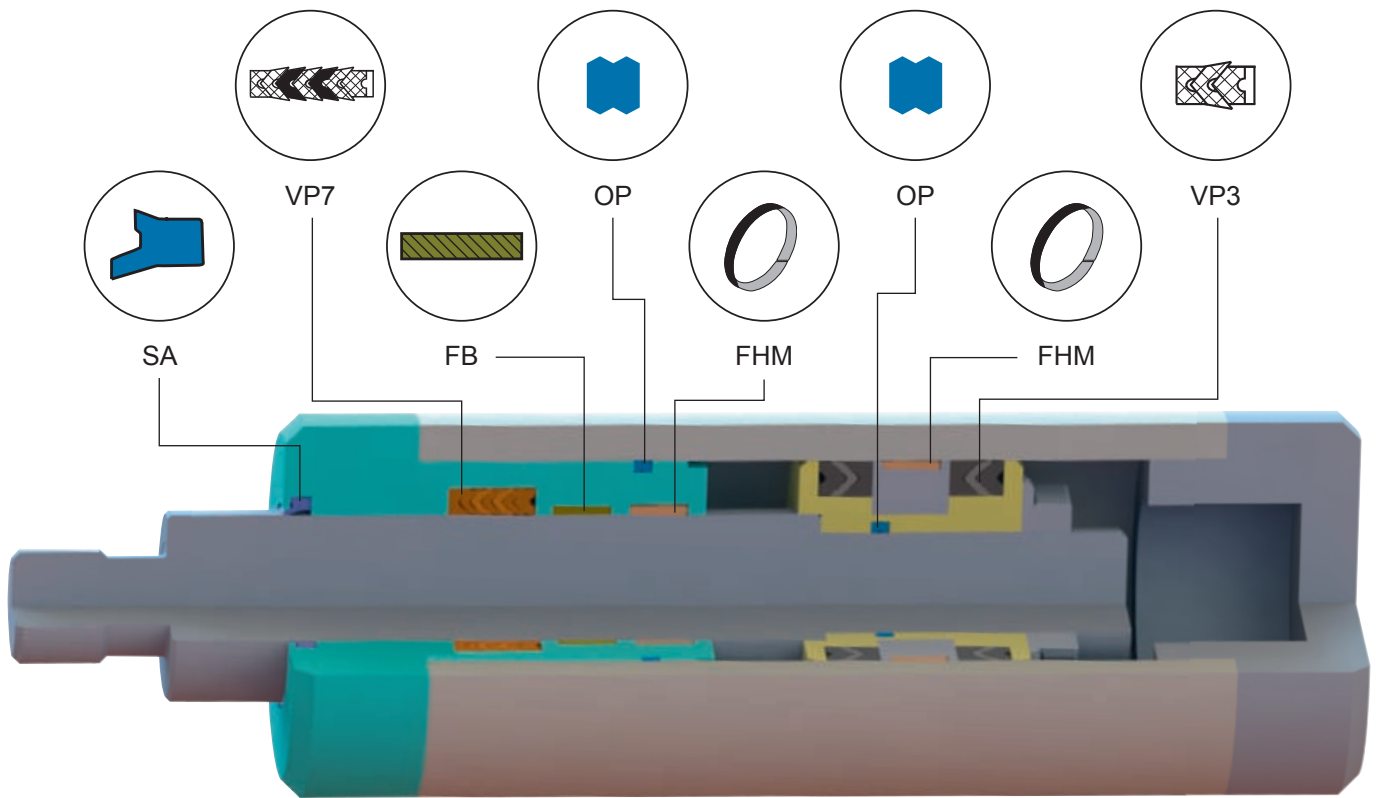
Suggested installation 2 for „easy“ application



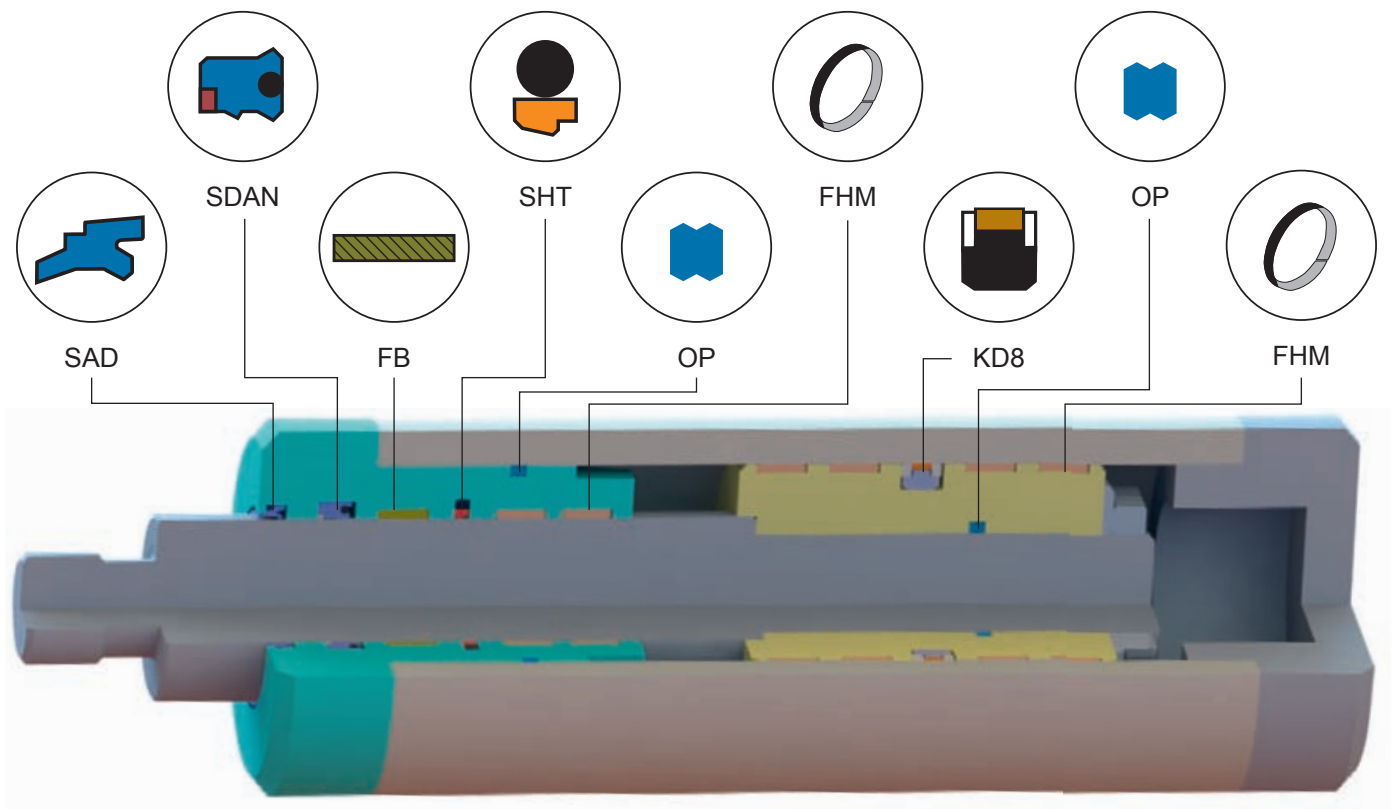
Suggested installation 1 for „medium“ application



Suggested installation 2 for „medium“ application



Suggested installation 1 for „heavy“ application



Suggested installation 2 for „heavy“ application

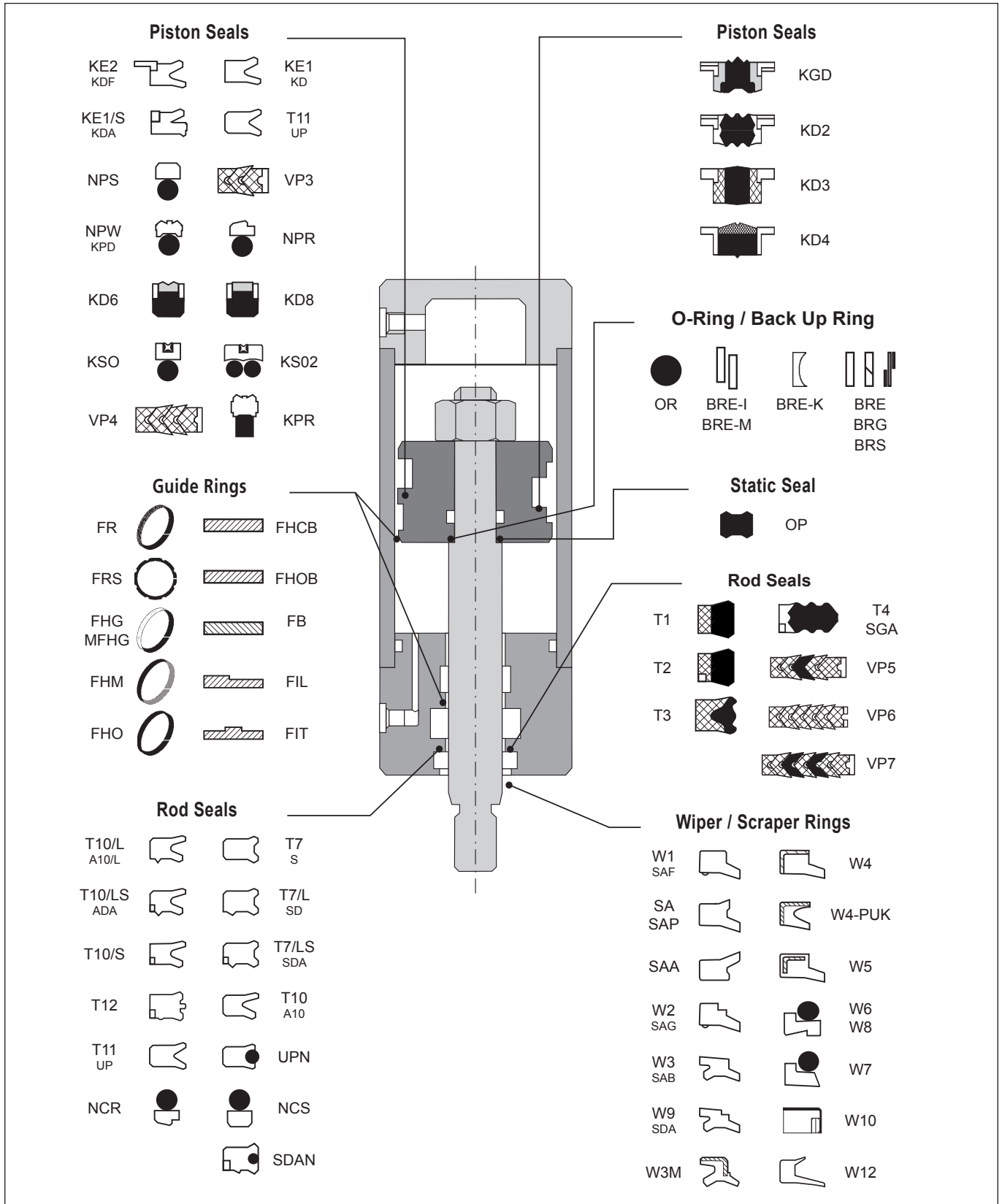
Tolerance and fits

Fit-assortment and Tolerances in μm (1 μm = 0,001 mm)

Declaration - \varnothing		Shaft - \varnothing							Drilling - \varnothing				
above	to	f7	f8	f9	h7	h8	h9	h10	H7	H8	H9	H10	H11
1,6	3	-6	-6	-6	0	0	0	0	+10	+14	+25	+40	+60
		-16	-20	-31	+10	-14	-25	-40	0	0	0	0	0
3	6	-10	-10	-10	0	0	0	-	+12	+18	+30	+48	+75
		-22	-28	-40	-12	-18	-30	-48	0	0	0	0	0
6	10	-13	-13	-13	0	0	0	0	+15	+22	+36	+58	+90
		-28	-35	-49	-15	-22	-36	-58	0	0	0	0	0
10	18	-16	-16	-16	0	0	0	0	+18	+27	+43	+70	+110
		-34	-46	-59	-18	-27	-43	-70	0	0	0	0	0
18	30	-20	-20	-20	0	0	0	0	+21	+33	+52	+84	+130
		-41	-53	-72	-21	-33	-52	-84	0	0	0	0	0
30	50	-25	-25	-25	0	0	0	0	+25	+39	+62	+100	+160
		-50	-64	-87	-25	-39	-62	-100	0	0	0	0	0
50	80	-30	-30	-30	0	0	0	0	+30	+46	+74	+120	+190
		-60	-76	-104	-30	-46	-74	-120	0	0	0	0	0
80	120	-36	-36	-36	0	0	0	0	+35	+54	+87	+140	+220
		-71	-90	-123	-35	-54	-87	-140	0	0	0	0	0
120	180	-43	-43	-43	0	0	0	0	+40	+63	+100	+160	+250
		-83	-106	-143	-40	-63	-100	-160	0	0	0	0	0
180	250	-50	-50	-50	0	0	0	0	+46	+72	+115	+185	+290
		-96	-122	-165	-46	-72	-115	-185	0	0	0	0	0
250	315	-56	-56	-56	0	0	0	0	+52	+81	+130	+210	+320
		-108	-137	-186	-52	-81	-130	-210	0	0	0	0	0
315	400	-62	-62	-62	0	0	0	0	+57	+89	+140	+230	+360
		-119	-151	-212	-57	-89	-140	-230	0	0	0	0	0
400	500	-68	-68	-68	0	0	0	0	+63	+97	+155	+250	+400
		-131	-165	-223	-63	-97	-155	-250	0	0	0	0	0
500	630	-	-76	-76	0	0	0	0	+70	+110	+175	+280	+440
		-	-186	-251	-70	-110	-175	-280	0	0	0	0	0
630	800	-	-80	-80	0	0	0	0	+80	+125	+200	+320	+500
		-	-205	-280	-80	-125	-200	-320	0	0	0	0	0
800	1000	-	-86	-86	0	0	0	0	+90	+140	+230	+360	+560
		-	-556	-316	-140	-90	-230	-360	0	0	0	0	0

Installation instruction

Table hydraulic cylinders (range of seals)



Surface roughness

The surface finish has enormous influence on the thickness of the lubricating film and on the operating life of the sealing element.

A rougher surface creates more friction and thus more abrasion of the sealing material. More friction also causes higher temperature, which may possibly lead to problems with the material.

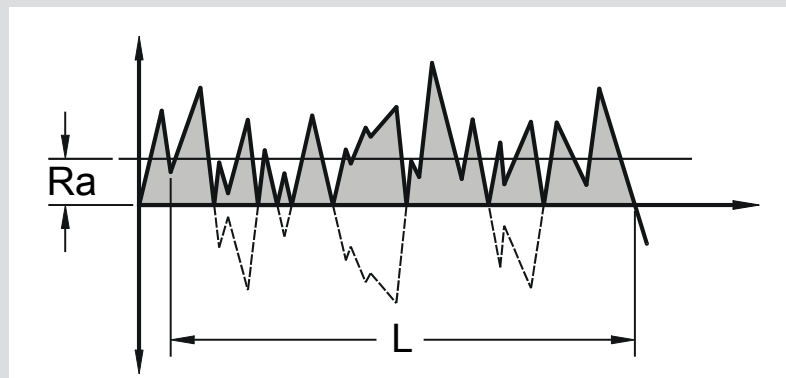
A clean and homogeneous surface is not only necessary in the dynamic field, but also in the static field, the installation slot.

The surface shouldn't be too plane, since otherwise the lubrication film, necessary for the operating life of the seal, breaks, and the seal may correspondingly suffer damage.

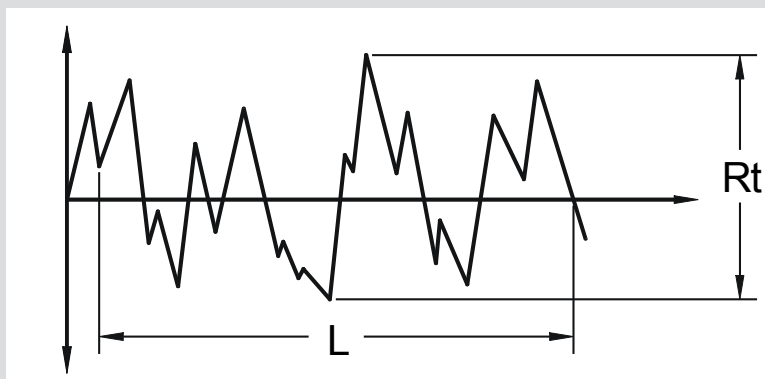
You will find information on surface quality in our catalogue .

In this connection we state the following values:

Average surface finish Ra in μm



Information on the maximum surface roughness Rt in μm



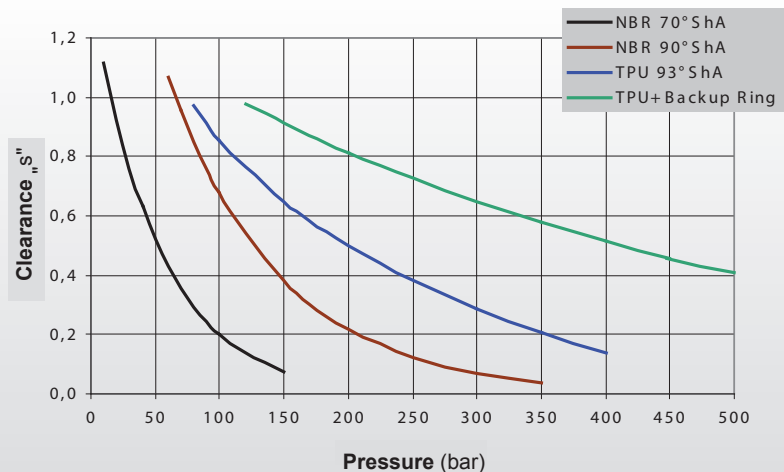
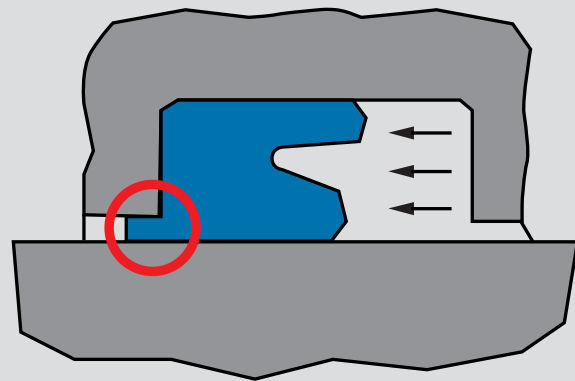
Clearance

The clearance "s" is the gap at the side opposite of the pressure of the sealing profile.

This seal gap has to be defined in a way, that the seal is not damaged. Here it has to be kept in mind, that the gap may differ in size compared to the pressure. Is the pressure only low, the gap may be larger, when the pressure increases, the gap has to become smaller. Is this not taken into consideration, the sealing material is pushed into the gap and it amounts to an extrusion of the gap.

Soft sealing materials are more susceptible to an extrusion of the gap than harder ones. When constructing the seal gap, the sealing profile, the sealing material and the highest pressure possible in the facility have to be considered. Information for this as a function of pressure you can find in the main catalogue for most of the sealing profiles. We always refer to the radial clearance provided that the gap is central. This has to be provided for by the piston rings.

If sealing profiles with integrated anti-extrusion ring are used, larger clearances may be bridged with equal pressure, or in the case of a still small gap higher pressures may be applied.



Installation of seals

Before installing the seals, the following points need to be checked:

●	It has to be checked, if there is a so-called lead-in chamfer at the cylinder tube or the piston rod. If this does not apply, an auxiliary tool (mounting sleeve) has to be used.
●	There must not be any non-burred, harp edges; in case there are such edges, the component has to be burred, or appropriately big radiuses and chamfers have to be provided.
●	If the seal has to be pushed over piston ring slots or thread turns, those have to be covered.
●	Possible operational residues, such as turnings or other foreign particle need to be removed carefully.
●	If auxiliary tools are used, they must not be sharp and sharp-edged, such as e.g. a screwdriver.

For an easier installation we recommend to warm the seals and to lubricate the components with oil. In order to take no risks it should be applied at the medium, which is used later. If this is not possible, the compatibility of the oil or the grease with the medium has to be checked. When warming the seals the maximum temperature of the material has to be considered.

The smaller the diameter of the respective seal, the harder will be the installation. The seals have to be expanded very much, expressed in percent, which may quickly lead to failure. The warp of small seals in the case of rod seals is also quite complicated, breaks often occur, which lead to failure. For a diameter smaller than 25 mm we recommend an open installation space. The installation in such slots is unproblematic.

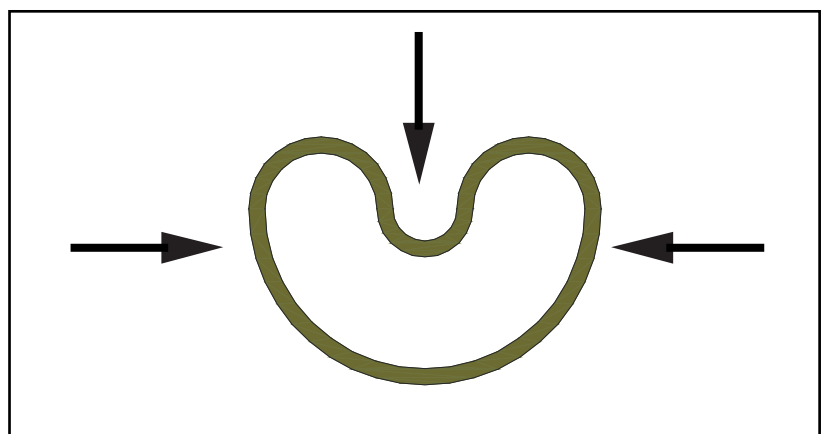
Expanded seals have to be calibrated before the final installation. This may be carried out by auxiliary tools or directly by the rod or the cylinder tube. For this a appropriately large and correctly dimensioned lead-in chamfer is required (information on this you will find in our catalogue).

When inserting the seals, their mode of operation has to be taken into account, i.e. single-acting seals have to be installed with the correct side to the pressure.

If the seals have to be installed in closed installation spaces, the following applies:

Installation of rod seals:

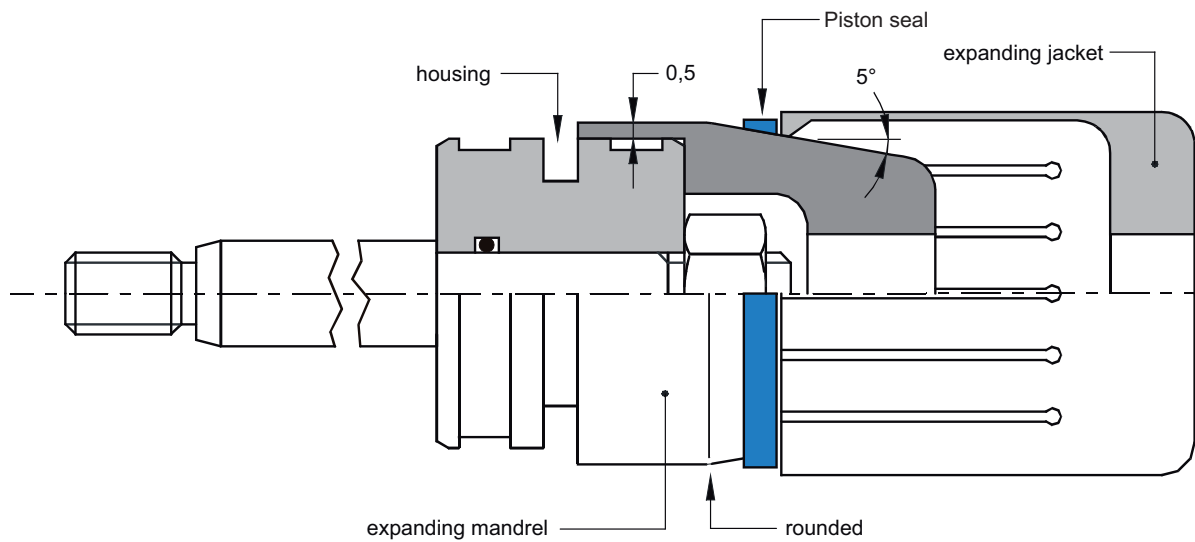
Rod seals may basically installed without special tool. However, for smaller diameters it is recommended to use appropriate circlip pliers. When inserting the seals they are warped in the form of a kidney by hand or by the tool. In the case of O-Ring prestressed seals, the O-Ring has to be installed first and subsequently the actual sealing element.



Installation of seals

Installation of piston seals:

Elastomeric piston seals can normally be installed without auxiliary materials. PTFE seals require a cone in order to widen the seal and a husk or a strap in order to subsequently calibrate the seal. The widening has to be carried out slowly and carefully, the calibration should not be conducted with sharp-edged hose clips.



Storage of seals

<p><u>In general:</u></p>	<p>The sealing and guide components of Seal Concept GmbH can be roughly divided into the following groups of highpolymere materials:</p> <ul style="list-style-type: none"> • elastomers (NBR, FKM, VMQ, HNBR, EPDM) • thermoplastic resins (PTFE, POM, PA, PE) • thermoplastic elastomers (TPU, TPE) • thermosets (EP, PF) <p>Goods made of the above mentioned materials could change their characters with unpropitious storage conditions or inappropriate care. Factors to be evited are e.g. ultraviolet rays, oxygen, ozone, warmth, humidity, dissolver or mechanic impact.</p>
<p>Temperature:</p>	<ul style="list-style-type: none"> • minimum value of temperature + 5°C • maximum value of temperature + 25°C <p>Heat sources like radiators and their feed lines in the storage room should be cushioned and reveal the clearance of at least 1 m to the stored good. Prevalent thermal fluctuation should be evited as well..</p>
<p>Air humidity:</p>	<p>The ideal air humidity is at about 65 %. Eminently harmful are values which are considerably higher.</p>
<p>Light:</p>	<p>When influenced by ultra-violet rays, primarily thermoplastic resins and thermoplastic elastomers are damaged. It is therefore recommended to keep the storage rooms dark or to preserve the products in photoresistant repositories.</p>
<p>Atmosphere:</p>	<p>The storage of solvents, fuels, lubricants, acids, disinfectants or other chemicals together with the seals and guide components should be evited, since leaking and sedimentation of vapours may cause damages. Devices with embedded sealing- and guide components may only be treated with preserving agents, which are compatible with all used sealing materials. By the same token, it is to be regarded, that these substances do not absorb any humidity.</p>
<p>Purification:</p>	<p>Should there be need of purification, the usage of a soft kerchief with lukewarm water is recommended. Solvents, benzine, turpentine or the like must not be used. Special details for storage of elastomers are to be taken from DIN 7716.</p> <p>In case of queries, please do not hesitate to contact us for our helpdesk.</p>

Guarantee and warranty

A warranty for seals and guide components as well as their detriments usually proves to be awkward and therefore is not customary in a trade. A sealing malfunction mostly may not be directly related to a defective seal.

Points of discussion in this case

- The adequate use of a sealing- or guide component according to manufacturers' instructions as well as the adherence and disclosure of all operating parameters, which, however, ultimately remain undefined in their effect, must be taken into consideration.
- It must be indicated, that the sealing- and guide components are so called expendable parts, which may, depending on the application, be inapplicable or also generate high lifetimes (cf. stanza mentioned above)
- A further point, which is very important, is the so called technical failure analysis. Causes of malfunction of seals often may only be comprehended fragmentarily and can be varified in only few cases.

Warranty for seals and guide components therefore solely allude to:

- canonic processing
- stipulated quality of material
- appropriate storage
- stipulated canvassing of goods issue.
Latter does not absolve the acquirer from an own canvassing of goods receipt.

In general:

Next to our general sales terms and delivery conditions no further guarantee for seals and guide components may be accepted. It is optional for Seal Concept GmbH to efface deficiencies by service or replacement. With regard to the fact, that seals and guide components are expendable parts, any liability for detriments – regardless of which legal ground – must be declined.

Assumption for the warranty by Seal Concept GmbH is a forthwith claim in terms of §§ 377, 378 HGB in written form, which must be effected before the goods installation resp. further processing. After installation resp. further processing of seals and guide components any warranty expires, impartial of expiration of the legal warranty obligation.

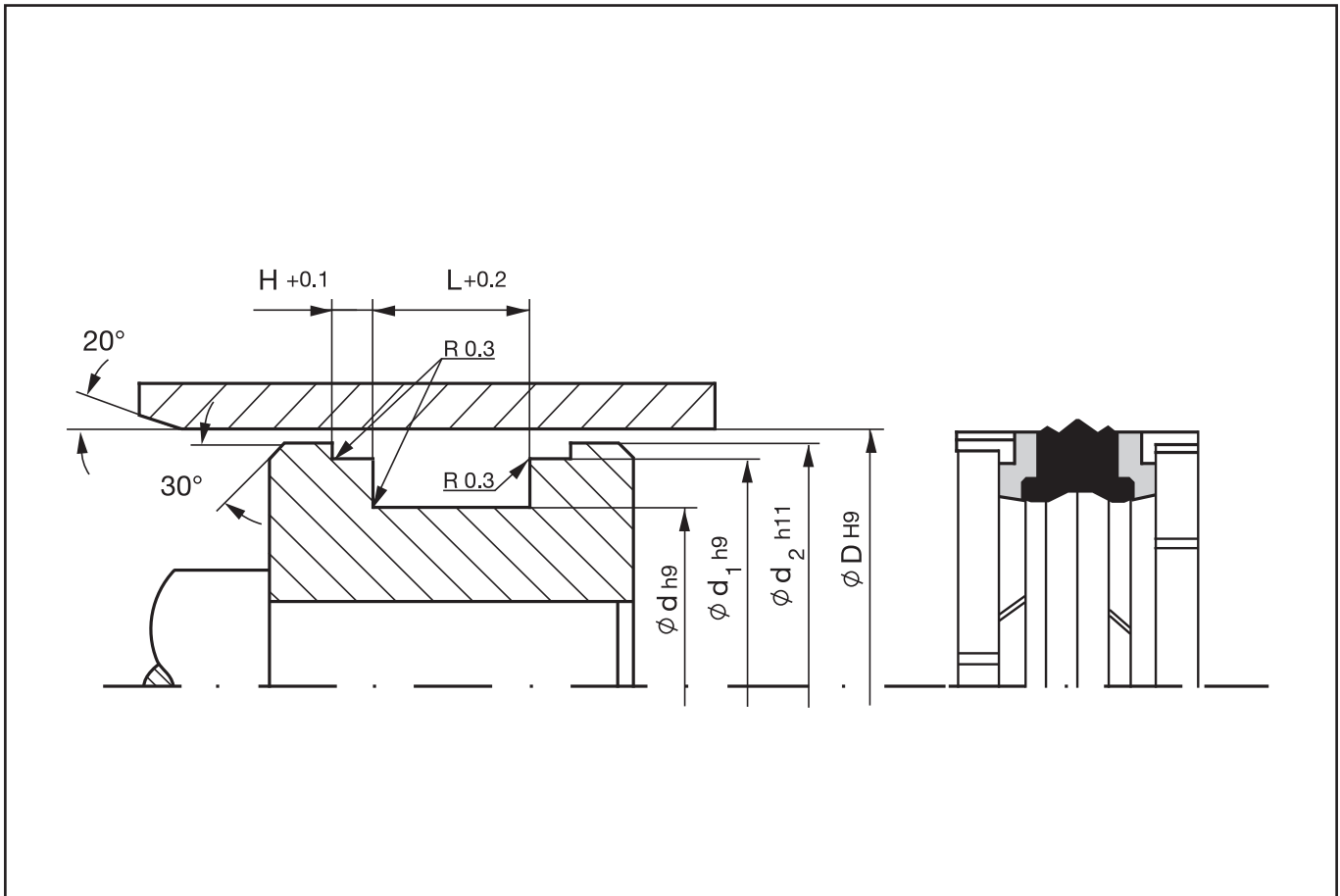
We have compiled and allegorated our experiences in this catalogue. Despite meticulous scrutinies erroneous data within this catalogue may not be excluded. We subject to alterations, which suit technical advancements.

The stated application limits are standard values. Depending on the operating conditions to be expected, the values may exceed. At constant application with extreme operation conditions it es recommended, to practise the standard values only partially. Since not all of the manifold applications of practice could be taken into consideration, warranty for accuracy of statement and commendation will not be accepted.

Please call upon our advise for special application and assortment of sealing systems.

We are pleased to send you our terms and conditions upon request.

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Max. Operating Conditions

Pressure (MPa)	≤ 40 (400 bar)
Temperature (°C)	- 40 / + 110
Speed (m/s)	$\leq 0,5$
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$
Groove flanks	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$
Running surface	$\leq 0,3 \mu\text{m}$	$\leq 3 \mu\text{m}$

Material

Guide Rings	POM
Dynamic sealing element	Polyester Elastomer
Elastomer element	NBR ca. 75° Shore A

Technical Description

The **KGD piston seal** consists of an elastomer element with bearing rings and guide rings.

As dynamic seal against the cylinder pipe the **elastomer element** also assumes the static sealing at the bottom of the piston's groove.

The **bearing ring** protects the elastomer element against extrusion and, due to its special shape, provides for an optimum distribution of force between the guide ring and the piston body.

The **guide ring** conducts occurring lateral forces from the piston to the cylinder pipe.

The **pressure compensating grooves** on the bearing and guide rings prevent pressure from building-up between the individual components of the seal.

The special design of the individual elements provides for high stability even upon fast load alternation and pressure peaks.

Items of Viton for temperatures up to 200 °C with back up rings of PTFE are available upon request.

Type designation	∅ D	∅ d	L	∅ d ₁	∅ d ₂	H
KGD - 20 - 11	20	11	13,50	17,00	19,00	2,10
KGD - 25 - 15	25	15	16,40	21,45	23,50	6,35
KGD - 25 - 15/1 *	25	15	12,50	22,00	24,00	4,00
KGD - 25 - 15/2	25	15	12,00	21,00	23,00	4,00
KGD - 25 - 16	25	16	13,50	22,00	24,00	2,10
KGD - 25 - 17 *	25	17	10,00	22,00	24,00	4,00
KGD - 25 - 17/1	25	17	13,50	21,00	24,00	3,20
KGD - 30 - 17	30	17	15,40	26,50	29,00	6,35
KGD - 30 - 21	30	21	13,50	27,00	29,00	2,10
KGD - 32 - 22	32	22	16,40	28,50	30,50	6,35
KGD - 32 - 22/1	32	22	15,50	28,00	31,00	2,60
KGD - 32 - 22/2 *	32	22	12,50	29,00	31,00	4,00
KGD - 32 - 24 *	32	24	10,00	29,00	31,00	4,00
KGD - 32 - 24/1	32	24	15,50	28,00	31,40	3,20
KGD - 35 - 25	35	25	16,40	31,40	33,50	6,35
KGD - 35 - 25/1 **	35	25	15,50	31,00	34,00	2,60
KGD - 40 - 24	40	24	18,40	35,40	38,50	6,35
KGD - 40 - 26	40	26	15,50	36,00	39,00	2,60
KGD - 40 - 30	40	30	16,40	35,40	38,50	6,35
KGD - 40 - 30/1 *	40	30	12,50	37,00	39,00	4,00
KGD - 40 - 30/2 *	40	30	12,50	36,00	38,00	4,00
KGD - 40 - 32	40	32	15,50	36,00	39,40	3,20
KGD - 40 - 32/1	40	32	10,00	37,00	39,00	4,00
KGD - 45 - 29 *	45	29	18,40	40,40	43,70	6,35
KGD - 45 - 31 **	45	31	15,50	41,00	44,00	2,60
KGD - 45 - 35	45	35	16,40	40,40	43,50	6,35
KGD - 50 - 34	50	34	18,40	45,40	48,50	6,35
KGD - 50 - 34/1	50	34	20,50	46,00	49,00	3,10
KGD - 50 - 35 *	50	35	20,00	46,00	48,50	5,00
KGD - 50 - 38	50	38	20,50	46,00	49,40	4,20

Piston seal type

Dimension

Material

Ordering example:

Piston seal

∅ D 80 x 60 x 22,4

NBR

Order designation:

KGD -

80 x 60 x 22,40

- N

Designation of material:

N - NBR

V - FKM (Viton®)

Type designation	∅ D	∅ d	L	∅ d ₁	∅ d ₂	H
KGD - 50 - 40 *	50	40	12,50	47,00	49,00	4,00
KGD - 55 - 39	55	39	18,40	50,36	53,50	6,35
KGD - 55 - 43	55	43	20,50	51,00	54,40	4,20
KGD - 55 - 39/1	55	39	20,50	51,00	54,00	3,10
KGD - 55 - 45 *	55	45	12,50	52,00	54,00	4,00
KGD - 60 - 44	60	44	18,40	55,40	58,50	6,35
KGD - 60 - 44/1	60	44	20,50	56,00	59,00	3,10
KGD - 60 - 48	60	48	20,50	56,00	59,40	4,20
KGD - 63 - 47	63	47	18,40	58,40	61,50	6,35
KGD - 63 - 47/2	63	47	19,40	58,40	61,50	6,35
KGD - 63 - 47/1	63	47	20,50	59,00	62,00	3,10
KGD - 63 - 48 *	63	48	20,00	59,00	61,50	5,00
KGD - 63 - 51	63	51	20,50	59,00	62,40	4,20
KGD - 63 - 53	63	53	12,50	60,00	62,00	4,00
KGD - 65 - 49	65	49	20,50	61,00	64,00	3,10
KGD - 65 - 50	65	50	18,40	60,40	63,50	6,35
KGD - 70 - 50	70	50	22,40	64,20	68,30	6,35
KGD - 70 - 54	70	54	20,50	66,00	69,00	3,10
KGD - 70 - 55 *	70	55	20,00	66,00	68,50	5,00
KGD - 70 - 58	70	58	20,50	66,00	69,40	4,20
KGD - 75 - 55	75	55	22,40	69,20	73,30	6,35
KGD - 75 - 59 **	75	59	20,50	71,00	74,00	3,10
KGD - 80 - 60	80	60	22,40	74,15	78,30	6,35
KGD - 80 - 60/1 *	80	60	25,00	75,00	78,00	6,35
KGD - 80 - 62	80	62	22,50	76,00	79,00	3,60
KGD - 80 - 65 *	80	65	20,00	76,00	78,50	5,00
KGD - 80 - 66	80	66	22,50	76,00	79,40	5,20
KGD - 85 - 65	85	65	22,40	79,15	83,30	6,35
KGD - 90 - 70	90	70	22,40	84,15	88,30	6,35
KGD - 90 - 72	90	72	22,50	86,00	89,00	3,60
KGD - 90 - 75	90	75	20,00	86,00	88,50	5,00
KGD - 90 - 76	90	76	22,50	86,00	89,40	5,20
KGD - 95 - 75	95	75	22,40	89,15	93,30	6,35
KGD - 100 - 75	100	75	22,40	93,15	98,00	6,35
KGD - 100 - 80 *	100	80	25,00	95,00	98,00	6,35
KGD - 100 - 80/1	100	80	25,40	94,15	98,30	6,35
KGD - 100 - 82	100	82	22,50	96,00	99,00	3,60
KGD - 100 - 85 *	100	85	20,00	96,00	98,50	5,00

Type designation	∅ D	∅ d	L	∅ d ₁	∅ d ₂	H
KGD - 100 - 86	100	86	22,50	96,00	99,40	5,20
KGD - 105 - 80	105	80	22,40	98,10	103,00	6,35
KGD - 110 - 85	110	85	22,40	103,10	108,00	6,35
KGD - 110 - 85/1	110	85	25,40	103,10	108,00	6,35
KGD - 110 - 90 *	110	90	25,30	104,10	108,30	6,40
KGD - 110 - 92	110	92	22,50	106,00	109,00	3,60
KGD - 110 - 95 *	110	95	20,00	105,00	108,00	5,00
KGD - 110 - 96	110	96	22,50	106,00	109,40	5,20
KGD - 115 - 90	115	90	22,40	108,10	113,00	6,35
KGD - 120 - 95	120	95	22,40	113,10	118,10	6,35
KGD - 120 - 106	120	106	22,50	116,00	119,40	5,20
KGD - 125 - 100	125	100	25,40	118,10	123,00	6,35
KGD - 125 - 100/1 *	125	100	32,00	119,00	123,00	10,00
KGD - 125 - 103 **	125	103	26,50	121,00	124,00	5,10
KGD - 125 - 105 *	125	105	25,00	120,00	123,00	6,35
KGD - 125 - 105/1	125	105	25,40	119,10	123,30	6,35
KGD - 125 - 108	125	108	26,50	121,00	124,40	7,20
KGD - 130 - 105	130	105	25,40	122,60	127,50	9,50
KGD - 130 - 105/1	130	105	25,40	123,10	128,00	6,35
KGD - 135 - 110	135	110	25,40	127,60	132,50	9,50
KGD - 135 - 110/1	135	110	25,40	128,10	133,00	6,35
KGD - 140 - 115	140	115	25,40	132,60	137,50	9,50
KGD - 140 - 115/1	140	115	25,40	133,00	138,00	6,35
KGD - 140 - 118	140	118	26,50	136,00	139,00	5,10
KGD - 140 - 120 *	140	120	25,00	135,00	138,00	6,35
KGD - 140 - 123	140	123	26,50	136,00	139,40	7,20
KGD - 145 - 120	145	120	25,40	137,60	142,50	9,50
KGD - 145 - 120/1	145	120	25,40	138,30	142,95	6,35
KGD - 150 - 125	150	125	25,40	142,60	147,50	9,50
KGD - 150 - 125/1	150	125	25,40	143,00	148,00	6,35
KGD - 150 - 128	150	128	25,40	146,00	149,00	5,10
KGD - 150 - 128/1	150	128	26,50	146,00	149,00	5,10
KGD - 155 - 130	155	130	25,40	147,60	152,50	9,52
KGD - 160 - 130	160	130	25,40	153,00	157,50	6,35
KGD - 160 - 130/1	160	130	25,40	152,60	157,50	9,50
KGD - 160 - 135	160	135	25,40	152,60	157,50	9,50
KGD - 160 - 138 **	160	138	26,50	156,00	159,00	5,10
KGD - 160 - 140 *	160	140	25,00	155,00	158,00	6,35

Type designation	∅ D	∅ d	L	∅ d ₁	∅ d ₂	H
KGD - 165 - 140	165	140	25,40	157,60	162,50	9,50
KGD - 170 - 145	170	145	25,40	161,70	167,10	12,70
KGD - 175 - 150	175	150	25,40	166,70	172,10	12,70
KGD - 180 - 150 *	180	150	35,40	172,90	177,90	6,35
KGD - 180 - 155	180	155	25,40	171,70	177,10	12,70
KGD - 185 - 160	185	160	25,40	176,70	182,10	12,70
KGD - 190 - 165	190	165	25,40	181,70	187,00	12,70
KGD - 195 - 170	195	170	25,40	186,72	192,00	12,70
KGD - 200 - 170 *	200	170	36,00	192,00	197,00	12,50
KGD - 200 - 170/1	200	170	35,40	193,00	198,00	6,35
KGD - 200 - 175	200	175	25,40	191,60	197,00	12,70
KGD - 210 - 185	210	185	25,40	201,60	207,00	12,70
KGD - 220 - 190 *	220	190	35,40	212,70	217,90	6,35
KGD - 220 - 195	220	195	25,40	211,60	217,00	12,70
KGD - 225 - 200/1	225	200	25,40	216,60	222,00	12,70
KGD - 230 - 205	230	205	25,40	221,60	227,00	12,70
KGD - 240 - 215	240	215	25,40	231,60	237,00	12,70
KGD - 250 - 220	250	220	35,40	242,90	247,90	6,35
KGD - 250 - 225	250	225	25,40	241,60	247,00	12,70
KGD - 320 - 290 *	320	290	36,00	312,00	317,00	12,50
KGD - 320 - 290/1	320	290	35,40	312,40	317,00	9,52

Further dimension and in-between sizes upon request.

* Seal housing ISO 6547 - NBR element, single-lipped.

** These sizes are available upon request only.

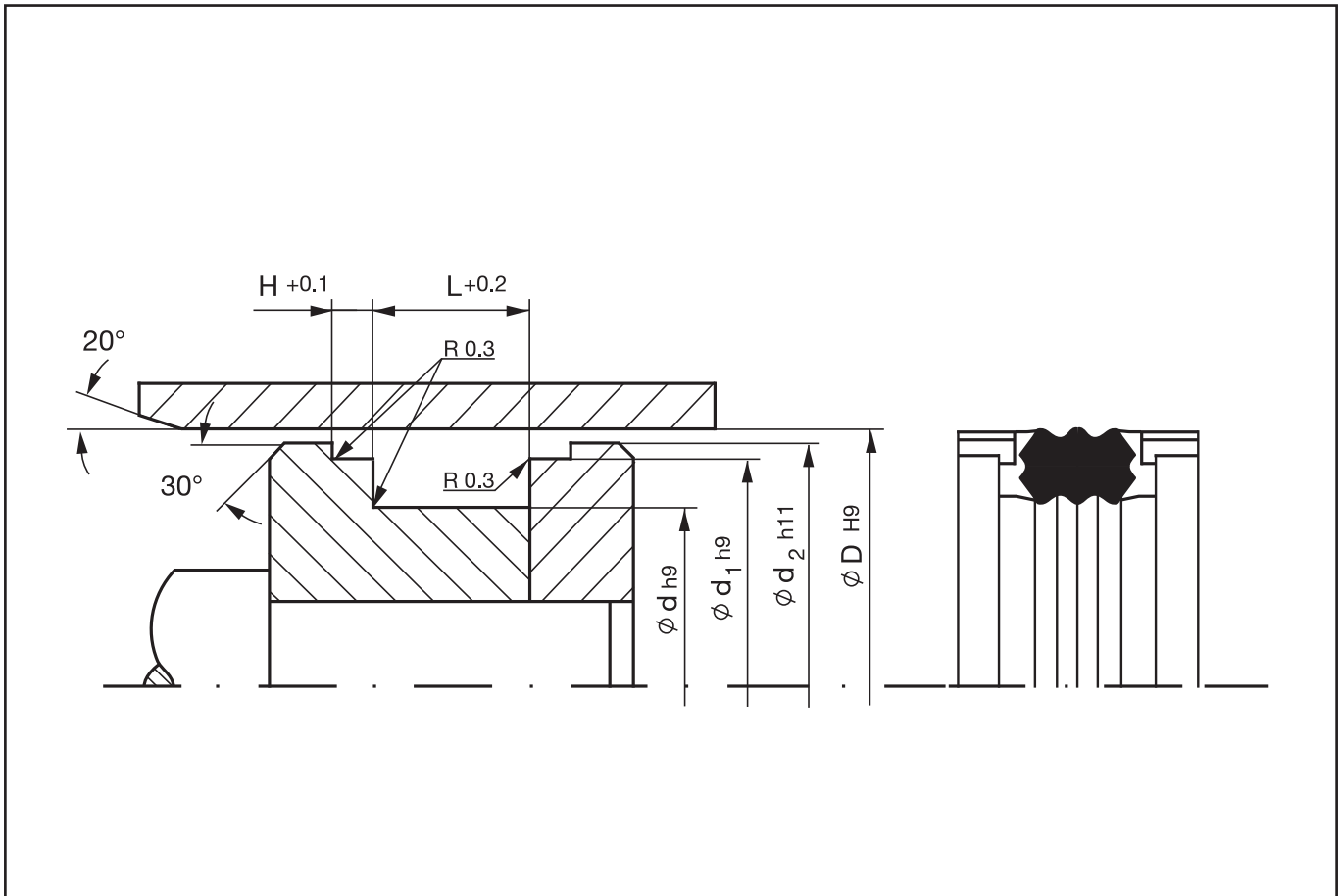
Inch-Dimensions

Type designation	D	Ø d	L	Ø d ₁	Ø d ₂	H
KGD - 38,10 - 28,57	38,10	28,57	11,48	33,55	36,83	6,35
KGD - 38,10 - 28,57/1	38,10	28,57	11,25	33,63	36,50	3,81
KGD - 50,80 - 34,92	50,80	34,92	19,05	46,23	49,48	6,35
KGD - 50,80 - 38,10	50,80	38,10	14,91	46,25	49,53	6,35
KGD - 50,80 - 41,27	50,80	41,27	11,10	46,27	49,19	3,81
KGD - 60,33 - 44,45	60,33	44,45	19,05	55,73	58,98	6,35
KGD - 63,50 - 47,62	63,50	47,62	19,05	58,90	62,12	6,35
KGD - 63,50 - 50,80	63,50	50,80	14,91	58,95	62,23	6,35
KGD - 63,50 - 53,97 **	63,50	53,97	11,10	59,00	62,12	3,81
KGD - 76,20 - 57,15	76,20	57,15	23,79	70,40	74,50	6,35
KGD - 76,20 - 63,50	76,20	63,50	14,91	70,46	74,68	6,35
KGD - 88,90 - 69,85	88,90	69,85	23,79	83,08	87,22	6,35
KGD - 101,60 - 82,55	101,60	82,55	23,79	95,78	99,92	6,35

Further dimension and in-between sizes upon request.
 * Seal housing ISO 6547 - NBR element, single-lipped.
 ** These sizes are available upon request only.

KD2

Double-acting Piston Seal



Max. Operating Conditions

Pressure (MPa)	≤ 70 (700 bar)
Temperature (°C)	- 30 / + 110
Speed (m/s)	$\leq 0,5$

Media: Hydraulic fluids upon oil-basis,
hardly inflaming hydraulic fluids,
HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$
Groove flanks	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$
Running surface	$\leq 0,3 \mu\text{m}$	$\leq 3 \mu\text{m}$

Material

NBR	N
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Technical Description

The double-acting piston seal **KD2** consists of a NBR sealing element, two Hytrel® supporting elements and two integrated angular guide rings made of cored polyamide.

The design and structural shape of the double-acting piston seal allows for the use in medium and heavy hydraulic operating conditions.

The voluminously designed sealing element is characterised by its low compression set and high tensile strength. The design of the profile provides for optimum sealing on the dynamic and static side as well as for a favourable frictional behaviour.

Secure sealing is also given upon operation by shocks, axially and radially occurring oscillations and rapid pressure alternation.

The piston seal type **KD2** is appropriate for the installation on split pistons.

Type designation	∅ D	∅ d	L	∅ d ₁	∅ d ₂	H
KD2 - 45 - 29 **	45	29	32	38,80	42,85	6,35
KD2 - 50 - 34 **	50	34	32	43,77	47,85	6,35
KD2 - 55 - 40	55	40	32	48,77	52,85	6,35
KD2 - 60 - 44 **	60	44	32	53,80	57,80	6,35
KD2 - 63 - 47 **	63	47	32	56,74	60,81	6,35
KD2 - 65 - 49 **	65	49	32	58,70	62,80	6,35
KD2 - 70 - 50	70	50	35	62,62	67,54	9,52
KD2 - 75 - 55	75	55	35	67,70	72,54	9,52
KD2 - 80 - 60	80	60	35	72,62	77,52	9,52
KD2 - 80 - 64 **	80	64	32	72,62	77,52	9,52
KD2 - 85 - 65	85	65	35	77,62	82,54	9,52
KD2 - 90 - 70	90	70	35	82,58	87,79	9,52
KD2 - 90 - 74 **	90	74	32	82,87	87,79	9,52
KD2 - 95 - 75 **	95	75	35	87,60	92,50	9,52
KD2 - 100 - 80	100	80	35	92,60	97,50	9,52
KD2 - 110 - 85	110	85	45	101,82	107,33	12,70
KD2 - 110 - 90	110	90	35	102,70	107,51	9,52
KD2 - 115 - 90	115	90	45	106,82	112,33	12,70
KD2 - 120 - 95	120	95	45	111,82	117,33	12,70
KD2 - 120 - 100	120	100	35	112,80	117,51	9,52
KD2 - 125 - 100	125	100	45	116,82	122,33	12,70
KD2 - 130 - 105	130	105	45	121,82	127,33	12,70
KD2 - 130 - 110	130	110	35	122,70	127,33	9,52
KD2 - 135 - 110	135	110	45	126,82	132,33	12,70
KD2 - 140 - 115	140	115	45	131,72	137,30	12,70
KD2 - 140 - 120	140	120	35	132,70	137,30	9,52
KD2 - 145 - 120 **	145	120	45	136,72	142,30	12,70
KD2 - 150 - 125	150	125	45	141,72	147,30	12,70
KD2 - 160 - 135	160	135	45	151,72	157,10	12,70
KD2 - 170 - 140	170	140	45	163,00	167,87	12,70

Piston seal Type

Dimension

Material

Ordering example:

Piston seal

∅ D 80 x 60 x 35

NBR

Order designation:

KD2 -

80 x 60 x 35

- N

Designation of material:

N - NBR

KD2

Double-acting Piston Seal

Type designation	∅ D	∅ d	L	∅ d ₁	∅ d ₂	H
KD2 - 180 - 155	180	155	45	171,60	177,10	12,70
KD2 - 185 - 160 **	185	160	45	176,72	182,10	12,70
KD2 - 190 - 165	190	165	45	181,72	187,10	12,70
KD2 - 200 - 175	200	175	45	191,72	197,10	12,70
KD2 - 210 - 185	210	185	45	201,60	207,10	12,70
KD2 - 220 - 195	220	195	45	211,60	217,10	12,70
KD2 - 230 - 205	230	205	45	221,72	227,10	12,70
KD2 - 240 - 215	240	215	45	231,72	237,10	12,70
KD2 - 250 - 225	250	225	45	241,72	247,10	12,70
KD2 - 260 - 235	260	235	45	251,72	257,10	12,70
KD2 - 270 - 245	270	245	45	261,72	267,10	12,70
KD2 - 280 - 255	280	255	45	271,72	277,10	12,70
KD2 - 290 - 265 **	290	265	45	281,72	287,10	12,70
KD2 - 300 - 275	300	275	45	291,72	297,10	12,70
KD2 - 350 - 325	350	325	45	341,72	347,10	12,70
KD2 - 360 - 335	360	335	44,5	351,72	357,33	12,70
KD2 - 380 - 355	380	355	45	371,75	377,33	12,70

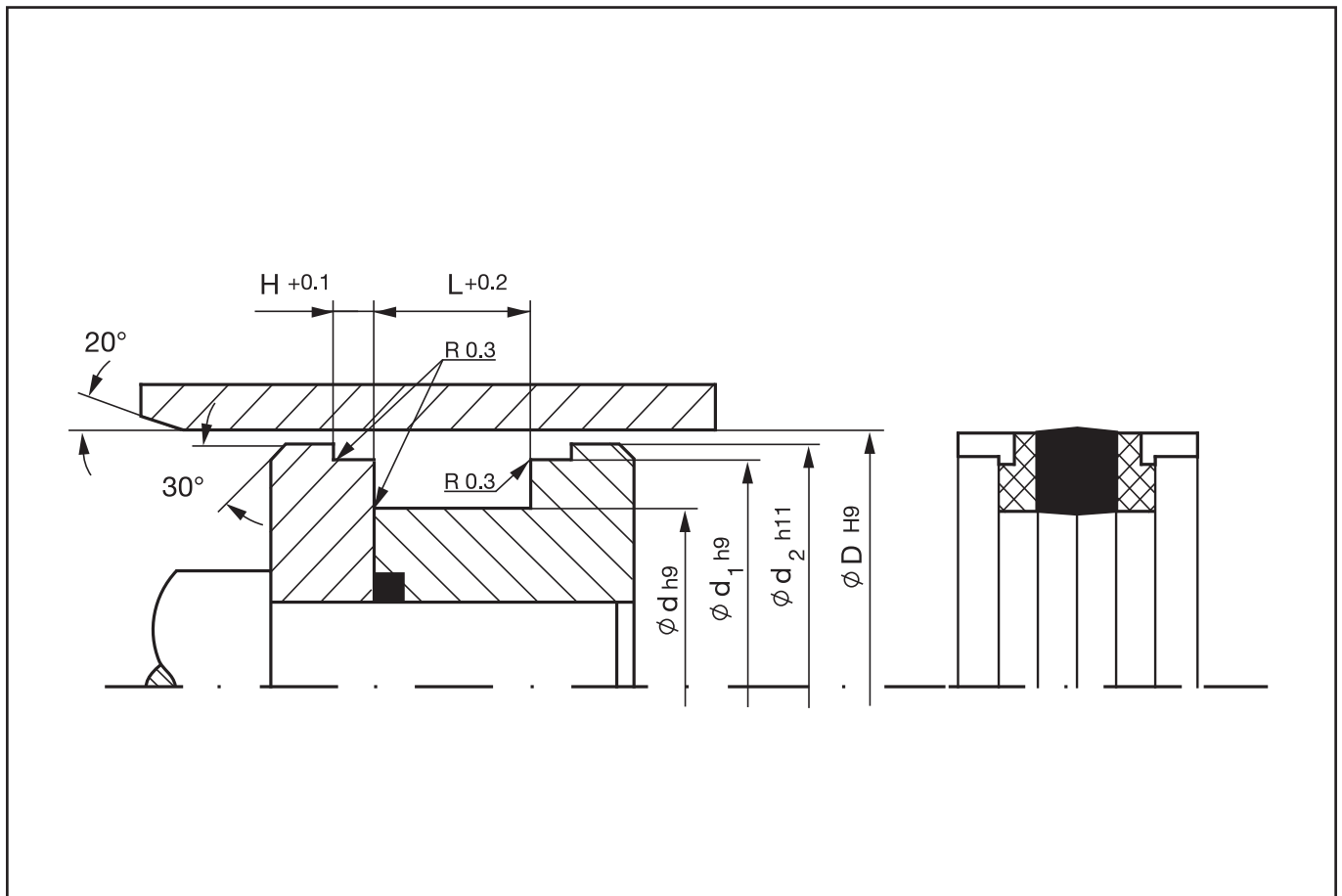
Further dimension and in-between sizes upon request.

** These sizes are available upon request only.

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.

KD3

Double-acting Piston Seal



Max. Operating Conditions

Pressure (MPa)	≤ 50 (500 bar)
Temperature (°C)	- 30 / + 110
Speed (m/s)	$\leq 0,5$

Media: Hydraulic fluids upon oil-basis,
hardly inflaming hydraulic fluids,
HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$
Groove flanks	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$
Running surface	$\leq 0,3 \mu\text{m}$	$\leq 3 \mu\text{m}$

Material

NBR-Fabric	N
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Technical Description

The double-acting piston seal **KD3** consists of a NBR sealing element with moulded fabric reinforcement, as well as two integrated angular guide rings made of polyacetal.

The design and structural shape of the double-acting piston seal allows for use in medium and heavy hydraulic operating conditions.

Secure sealing is also given upon operation by shocks, axially and radially occurring oscillations.

The piston seal type **KD3** is appropriate for the installation on split pistons.

Type designation	∅ D	∅ d	L	∅ d ₁	∅ d ₂	H
KD3 - 30 - 17	30	17	15,4	26,50	29,00	6,35
KD3 - 35 - 22	35	22	15,4	31,40	33,70	6,35
KD3 - 40 - 24	40	24	18,4	35,40	38,70	6,35
KD3 - 45 - 29	45	29	18,4	40,40	43,70	6,35
KD3 - 50 - 30	50	30	25,4	44,30	48,30	6,35
KD3 - 50 - 34	50	34	18,4	45,40	48,70	6,35
KD3 - 55 - 39	55	39	18,4	50,40	53,70	6,35
KD3 - 60 - 44	60	44	18,5	55,40	58,70	6,35
KD3 - 60 - 44/1	60	44	20,0	55,40	58,70	6,35
KD3 - 63 - 47	63	47	19,4	58,40	61,65	6,35
KD3 - 65 - 50	65	50	18,4	60,40	63,70	6,35
KD3 - 70 - 50	70	50	22,4	64,20	68,30	6,35
KD3 - 75 - 55	75	55	22,4	69,20	73,30	6,35
KD3 - 75 - 56	75	56	24,4	69,20	73,30	6,35
KD3 - 80 - 60	80	60	22,4	74,20	78,30	6,35
KD3 - 83 - 63	83	63	22,4	76,16	81,30	6,35
KD3 - 85 - 65	85	65	22,4	79,20	83,35	6,35
KD3 - 90 - 70	90	70	22,4	84,15	88,30	6,35
KD3 - 95 - 75	95	75	22,4	89,15	93,30	6,35
KD3 - 100 - 75	100	75	22,4	93,15	98,05	6,35
KD3 - 100 - 80	100	80	25,4	94,15	98,31	6,35
KD3 - 105 - 80	105	80	22,4	98,10	103,00	6,35
KD3 - 110 - 85	110	85	25,4	103,10	108,00	6,35
KD3 - 110 - 85/1	110	85	22,4	103,10	108,00	6,35
KD3 - 110 - 90	110	90	25,4	104,15	108,30	6,35
KD3 - 115 - 90	115	90	22,4	108,10	113,00	6,35
KD3 - 120 - 95	120	95	22,4	113,10	118,00	6,35
KD3 - 120 - 100	120	100	25,4	114,10	118,30	6,35

Piston seal Type

Dimension

Material

Ordering example:

Piston seal

∅ D 80 x 60 x 22,4

NBR-Fabric

Order designation:

KD3 -

80 x 60 x 22,4

- N

Designation of material:

N - NBR-Fabric

KD3

Double-acting Piston Seal

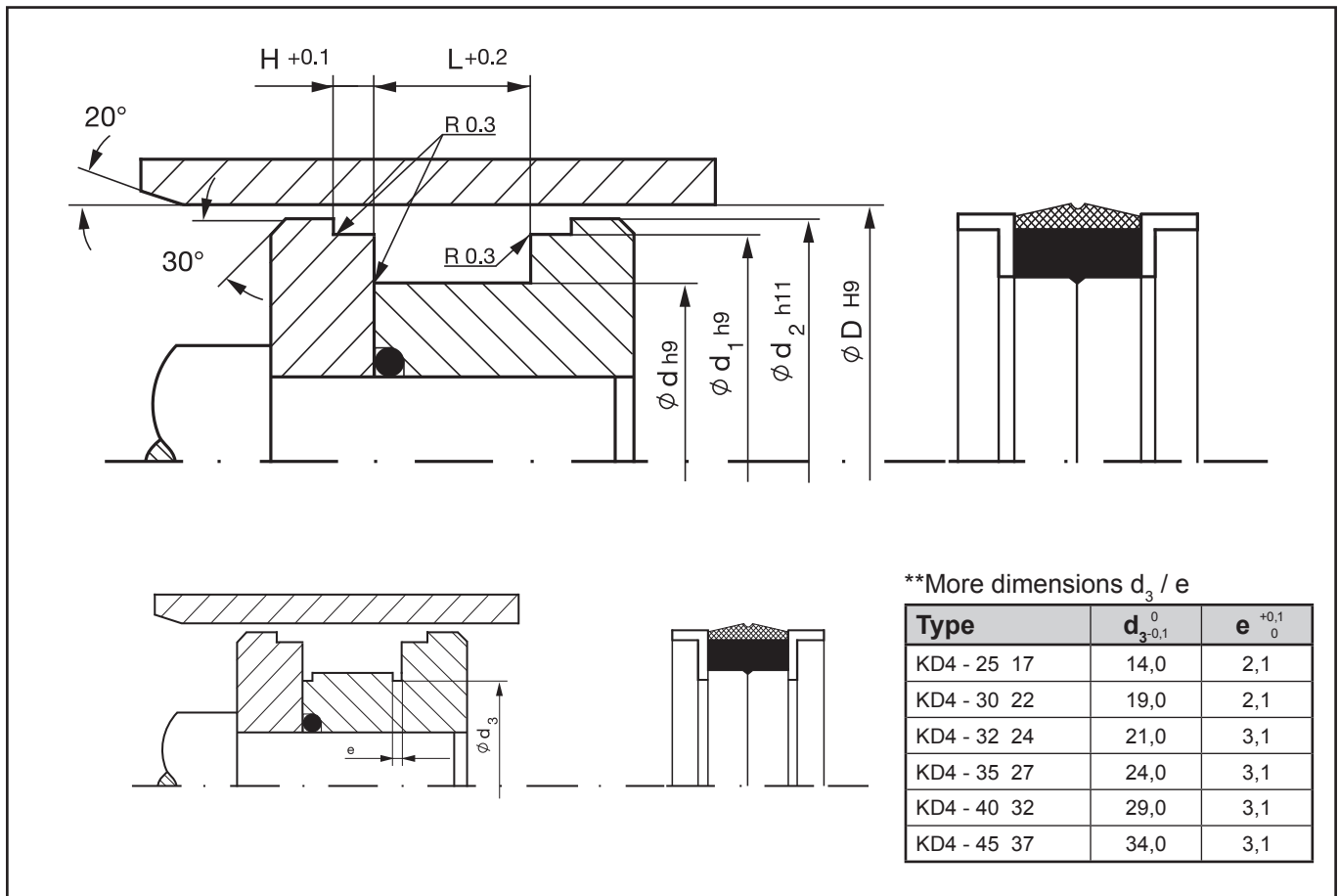
Type designation	∅ D	∅ d	L	∅ d ₁	∅ d ₂	H
KD3 - 125 - 100	125	100	25,4	118,10	123,00	6,35
KD3 - 125 - 100/1	125	100	32,4	118,10	123,00	6,35
KD3 - 125 - 105	125	105	25,4	119,15	123,00	6,35
KD3 - 130 - 105	130	105	25,4	123,10	128,00	6,35
KD3 - 135 - 110	135	110	25,4	128,10	133,00	6,35
KD3 - 140 - 115	140	115	25,4	133,00	138,00	6,35
KD3 - 140 - 120	140	120	25,4	134,10	138,30	6,35
KD3 - 145 - 120	145	120	25,4	138,30	142,95	6,35
KD3 - 150 - 120	150	120	38,4	143,00	148,00	6,35
KD3 - 150 - 125	150	125	25,4	143,00	148,00	6,35
KD3 - 155 - 130	155	130	25,4	148,00	153,00	6,35
KD3 - 160 - 130	160	130	25,4	153,00	157,90	6,35
KD3 - 170 - 140	170	140	25,4	162,95	167,87	6,35
KD3 - 180 - 150	180	150	35,4	172,95	177,87	6,35
KD3 - 180 - 160	180	160	31,4	172,95	177,87	6,35
KD3 - 190 - 160	190	160	35,4	182,93	187,87	6,35
KD3 - 200 - 170	200	170	35,4	192,96	197,84	6,35
KD3 - 210 - 180	210	180	32,4	202,72	207,87	6,35
KD3 - 220 - 190	220	190	35,4	212,70	217,90	6,35
KD3 - 250 - 220	250	220	35,4	242,90	247,86	6,35

Further dimension and in-between sizes upon request.

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.

KD4

Double-acting Piston Seal



Max. Operating Conditions	
Pressure (MPa)	≤ 35 (350 bar)
Temperature (°C)	- 30 / + 110
Speed (m/s)	$\leq 0,8$
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish		
Surface roughness	R_a	R_t
Groove bottom	$\leq 1,6 \mu m$	$\leq 16 \mu m$
Groove flanks	$\leq 1,6 \mu m$	$\leq 16 \mu m$
Running surface	$\leq 0,3 \mu m$	$\leq 3 \mu m$

Material	
NBR-Fabric	N

Technical Description

The double-acting piston seal **KD4** consists of a NBR fabric sealing element reinforced on the dynamic side, and two angular guide rings made of polyacetal and reaching down to the groove bottom.

The design and structural shape of the double-acting piston seal allows for the use in medium and heavy hydraulic operating conditions.

Due to the reinforced fabric on the running surface and the "lubricant pockets" therefore existing, the frictional behaviour and the stick-slip phenomena are reduced.

Secure sealing is also given upon operation by shocks, axially and radially occurring oscillations.

Type designation	∅ D	∅ d	L	∅ d ₁	∅ d ₂	H
KD4 - 25 - 17 **	25	17	13,5	26,0	29,4	3,20
KD4 - 30 - 22 **	30	22	13,5	26,0	29,4	3,20
KD4 - 32 - 24 **	32	24	15,5	28,0	31,4	3,20
KD4 - 35 - 27 **	35	27	15,5	31,0	34,4	3,20
KD4 - 40 - 32 **	40	32	15,5	36,0	39,4	3,20
KD4 - 45 - 37 **	45	37	15,5	41,0	44,4	3,20
KD4 - 50 - 38	50	38	20,5	46,0	49,4	4,20
KD4 - 55 - 43	55	43	20,5	51,0	54,9	4,20
KD4 - 60 - 48	60	48	20,5	56,0	59,4	4,20
KD4 - 63 - 51	63	51	20,5	59,0	62,4	4,20
KD4 - 65 - 53	65	53	20,5	61,0	64,9	4,20
KD4 - 70 - 58	70	58	20,5	66,0	69,4	4,20
KD4 - 75 - 63	75	63	20,5	71,0	74,4	4,20
KD4 - 80 - 66	80	66	22,5	76,0	79,4	5,20
KD4 - 85 - 71	85	71	22,5	81,0	84,4	5,20
KD4 - 90 - 76	90	76	22,5	86,0	89,4	5,20
KD4 - 100 - 86	100	86	22,5	96,0	99,4	5,20
KD4 - 110 - 96	110	96	22,5	106,0	109,4	5,20
KD4 - 120 - 106	120	106	22,5	116,0	119,4	5,20
KD4 - 125 - 108	125	108	26,5	121,0	124,4	7,20
KD4 - 140 - 123	140	123	26,5	136,0	139,4	7,20
KD4 - 150 - 130	150	130	26,5	146,0	149,4	7,20
KD4 - 160 - 143	160	143	26,5	156,0	159,4	7,20
KD4 - 180 - 163	180	163	26,5	176,0	179,4	7,20
KD4 - 200 - 180	200	180	31,5	196,0	199,4	9,20
KD4 - 220 - 200	220	200	31,5	216,0	219,4	9,20
KD4 - 250 - 230	250	230	31,5	246,0	249,4	9,20

Further dimension and in-between sizes upon request.

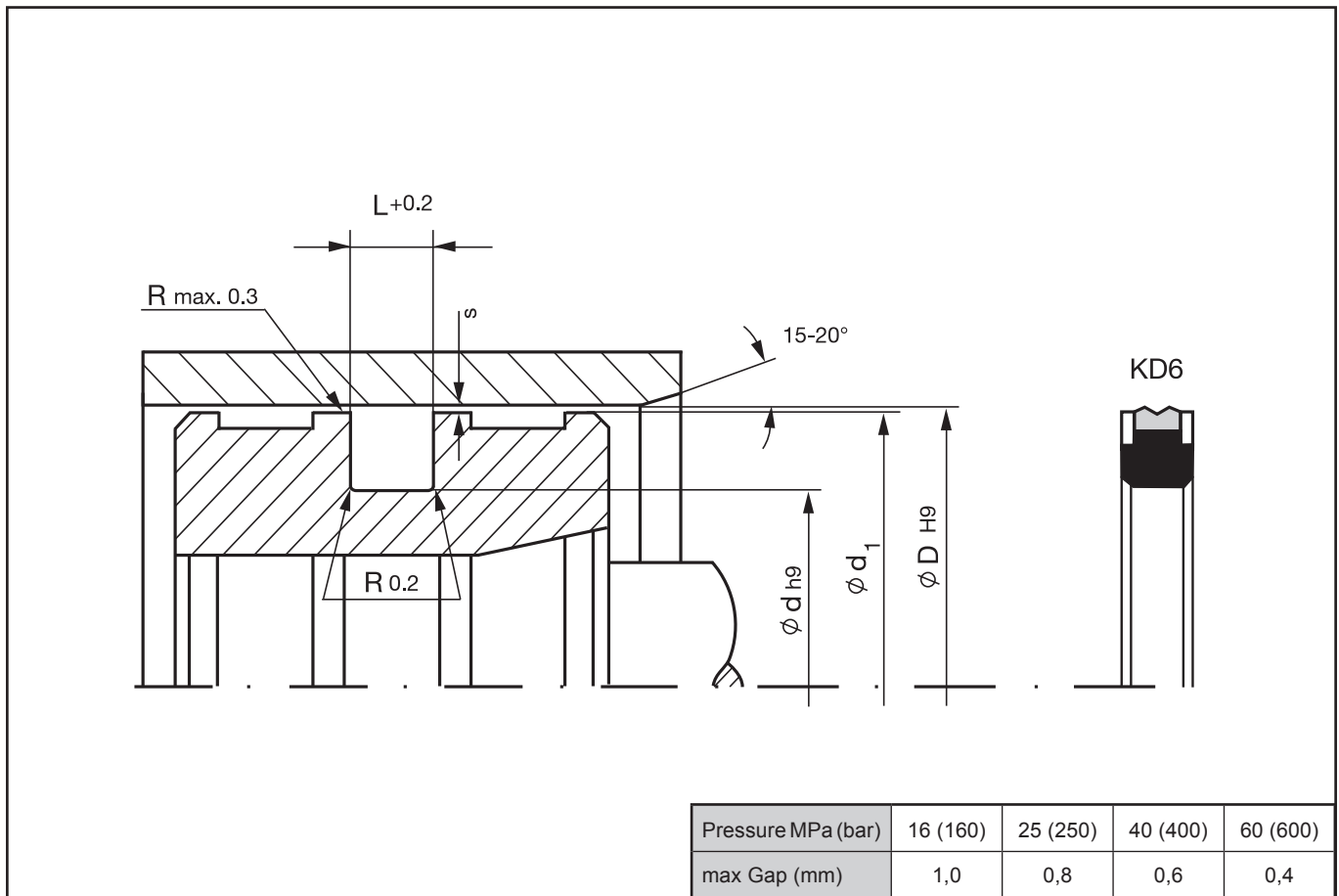
** These sizes are available upon request only.

	Piston seal Type	Dimension	Material
Ordering example:	Piston seal	∅ D 60 x 48 x 20,5	NBR-Fabric
Order designation:	KD4 -	60 x 48 x 20,5	- N

Designation of material: **N - NBR-Fabric**

KD6

Compact Piston Seal



Max. Operating Conditions

Pressure (MPa)	40 (400 bar) / 60 (600 bar)
Temperature (°C)	- 30 / + 110
Speed (m/s)	0,6 - 1,5
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$
Groove flanks	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$
Running surface	$\leq 0,3 \mu\text{m}$	$\leq 3 \mu\text{m}$

Material

Static Seal	NBR
Dynamic seal	PB / PU
Back up ring	POM

Technical Description

The piston seals of the types **KD6** and KD8 are designed for one-piece piston-constructions and are applicable for high and low pressures in average as well as in difficult applications.

The seal kit consists of a self-lubricating PTFE-bronze- (KD8), or a Polyurethane-bearing (KD6), which is prestressed to a NBR-profile ring.

The back-up-rings of polyacetate, which are disposed on both sides of the seal, protect the bearing as well as the prefix-element from extrusion and soil.

Ever on choice, the compact piston seal is suitable for operation in difficult applications as construction machines or agricultural machines.

Type designation	∅ D	∅ d	L	∅ d ₁
KD6 - 40 - 30	40	30	8,0	39,3
KD6 - 50 - 36	50	36	9,0	49,3
KD6 - 50 - 40	50	40	8,0	49,3
KD6 - 60 - 46 **	60	46	9,0	59,3
KD6 - 60 - 50	60	50	8,0	59,3
KD6 - 63 - 48	63	48	11,0	62,3
KD6 - 63 - 53	63	53	8,0	62,3
KD6 - 65 - 50	65	50	11,0	64,3
KD6 - 70 - 55	70	55	11,0	69,3
KD6 - 70 - 60	70	60	8,0	69,3
KD6 - 75 - 60	75	60	11,0	74,3
KD6 - 80 - 65	80	65	11,0	79,0
KD6 - 80 - 65/1	80	65	12,5	79,0
KD6 - 85 - 70	85	70	11,0	84,0
KD6 - 90 - 75	90	75	11,0	89,0
KD6 - 90 - 75/1	90	75	12,5	89,0
KD6 - 95 - 80	95	80	11,0	94,0
KD6 - 100 - 85	100	85	12,5	99,0
KD6 - 110 - 95	110	95	12,5	109,0
KD6 - 115 - 100	115	100	12,5	114,0
KD6 - 120 - 105	120	105	12,5	119,0
KD6 - 125 - 102	125	102	16,0	124,0
KD6 - 125 - 110	125	110	12,5	124,0
KD6 - 130 - 107	130	107	16,0	129,0
KD6 - 135 - 112	135	112	16,0	134,0
KD6 - 140 - 117	140	117	16,0	139,0
KD6 - 140 - 125	140	125	12,5	139,0
KD6 - 150 - 127	150	127	16,0	149,0
KD6 - 160 - 137	160	137	16,0	159,0
KD6 - 160 - 145 **	160	145	12,5	159,0

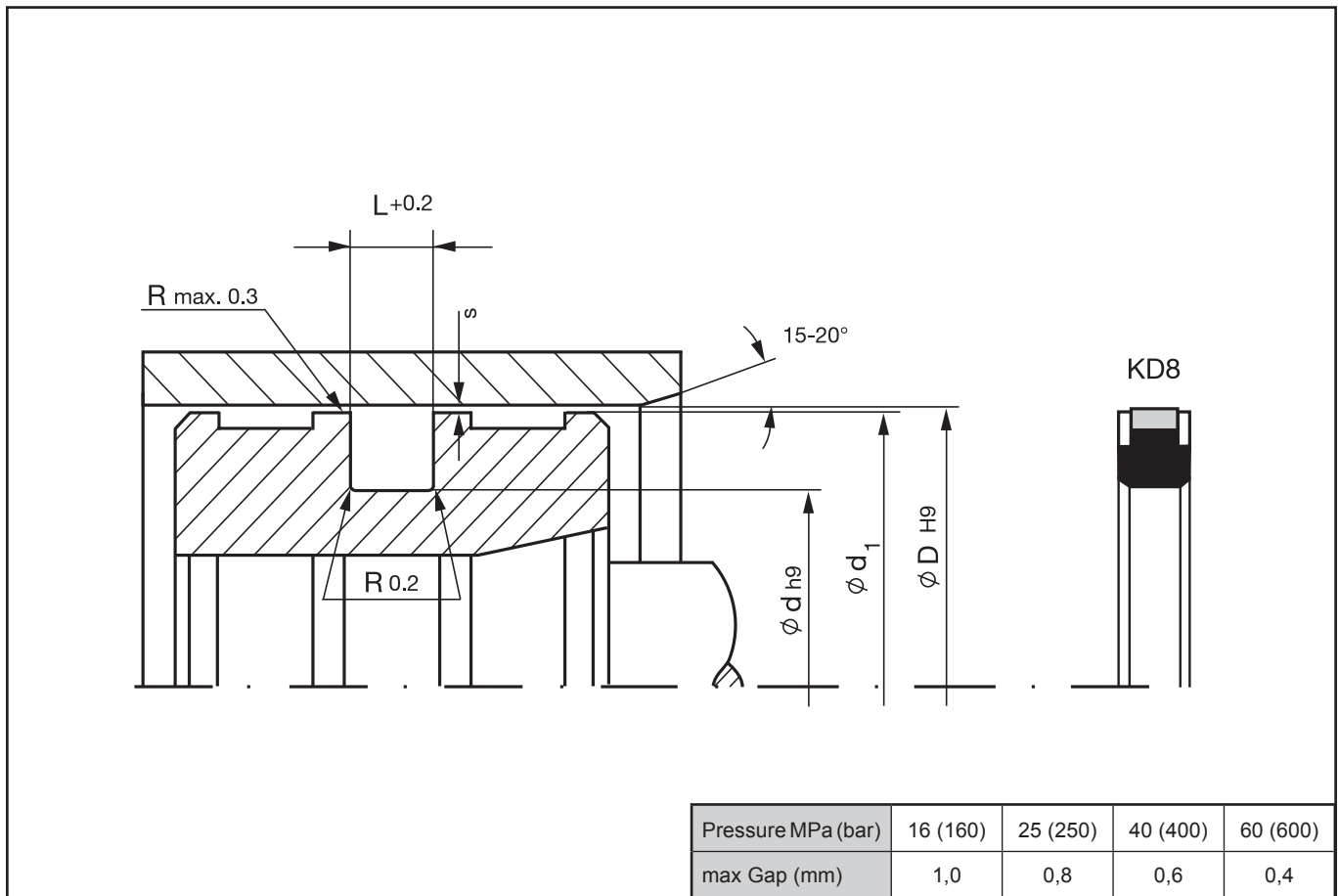
Further dimension and in-between sizes upon request. / ** These sizes are available upon request only.

	Piston seal Type	Dimension	Material
Ordering example:	Piston seal	∅ D 80 x 65 x 11,0	Polyurethane
Order designation:	KD6 -	80 x 65 x 11,0	- PU

Designation of material: **PU - Polyurethane**

KD8

Compact Piston Seal



Max. Operating Conditions

Pressure (MPa)	40 (400 bar) / 60 (600 bar)
Temperature (°C)	- 30 / + 110
Speed (m/s)	0,6 - 1,5
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$
Groove flanks	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$
Running surface	$\leq 0,3 \mu\text{m}$	$\leq 3 \mu\text{m}$

Material

Static Seal	NBR
Dynamic seal	PB / PU
Back up ring	POM

Technical Description

The piston seals of the types KD6 and **KD8** are designed for one-piece piston-constructions and are applicable for high and low pressures in average as well as in difficult applications.

The seal kit consists of a self-lubricating PTFE-bronze- (KD8), or a Polyurethane-bearing (KD6), which is prestressed to a NBR-profile ring.

The back-up-rings of polyacetate, which are disposed on both sides of the seal, protect the bearing as well as the prefix-element from extrusion and soil.

Ever on choice, the compact piston seal is suitable for operation in difficult applications as construction machines or agricultural machines.

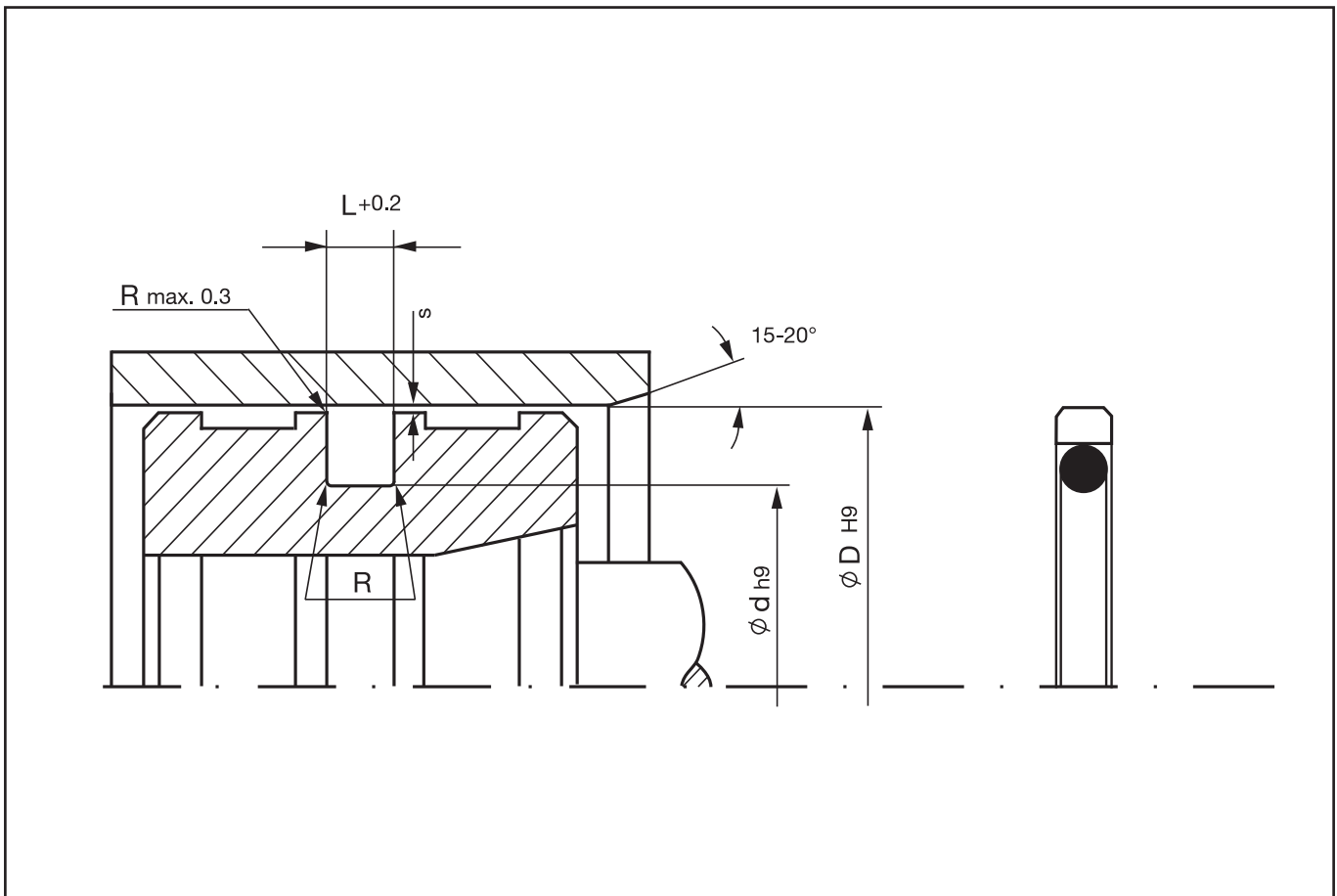
Type designation	∅ D	∅ d	L	∅ d ₁
KD8 - 50 - 36	50	36	9,0	49,3
KD8 - 50 - 40	50	40	8,0	49,3
KD8 - 60 - 50	60	50	8,0	59,3
KD8 - 65 - 50	65	50	11,0	64,3
KD8 - 70 - 55	70	55	11,0	69,3
KD8 - 70 - 60	70	60	8,0	69,3
KD8 - 75 - 60	75	60	11,0	74,3
KD8 - 80 - 65	80	65	11,0	79,0
KD8 - 85 - 70	85	70	11,0	84,0
KD8 - 90 - 75	90	75	11,0	89,0
KD8 - 95 - 80	95	80	11,0	94,0
KD8 - 100 - 85	100	85	12,5	99,0
KD8 - 105 - 90	105	90	12,5	104,0
KD8 - 110 - 95	110	95	12,5	109,0
KD8 - 115 - 100	115	100	12,5	114,0
KD8 - 120 - 105	120	105	12,5	119,0
KD8 - 125 - 102	125	102	16,0	124,0
KD8 - 130 - 107	130	107	16,0	129,0
KD8 - 135 - 112	135	112	16,0	134,0
KD8 - 140 - 117	140	117	16,0	139,0
KD8 - 145 - 122	145	122	16,0	144,0
KD8 - 150 - 127	150	127	16,0	149,0
KD8 - 165 - 142	165	142	16,0	164,0
KD8 - 170 - 147 **	170	147	16,0	169,0
KD8 - 180 - 157	180	157	16,0	179,0
KD8 - 185 - 162	185	162	16,0	184,0
KD8 - 200 - 177	200	177	16,0	198,8
KD8 - 225 - 202	225	202	16,0	223,8

Further dimension and in-between sizes upon request.

** These sizes are available upon request only.

	Piston seal Type	Dimension	Material
Ordering example:	Piston seal	∅ D 80 x 65 x 11,0	PTFE-bronze
Order designation:	KD8 -	80 x 65 x 11,0	- PB

Designation of material: **PB - PTFE-bronze**



Max. Operating Conditions *

Pressure (MPa)	≤ 80 (800 bar)
Temperature (°C)	- 30 / + 110 / + 200
Speed (m/s)	≤ 15 (0,5)**
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	≤ 1,6 µm	≤ 16 µm
Groove flanks	≤ 1,6 µm	≤ 16 µm
Running surface	≤ 0,3 µm	≤ 3 µm

Material

PTFE-bronze / -carbon / glass fiber (+MoS ₂)	PB/PK/PG(M)
PTFE-compound turquoise	PT
PTFE-Econol	PEK
Polyurethane	PU **

Technical Description

The piston seal of the **NPS** series consists of a PTFE compound piston seal ring preset by an O-Ring. The PTFE material stands out for excellent sliding characteristics, low attrition rate as well as high extrusion resistance.

The thermal and chemical stability of the PTFE material allows for the use in a wide range of applications. The selection of the PTFE compound and O-Ring material depends on the operating conditions.

*Max. operating conditions:

Higher values are permitted if the structural requirements are provided.

Higher operating pressures of up to 80 MPa, sliding speeds of up to 15 m/s are possible if these extreme conditions do not occur at the same time.

If operating pressure are higher up to 40 MPa, the gap dimensions „s“ have to be reduced.

The instance of application and service conditions are decisive for the choice of the PTFE-compound, respectively of the material qualities.

Temperature range and chemical stability depending on chosen O-Ring material.

Assembly dimensions

Diameter \varnothing D			Groove bottom \varnothing d	L.dim.	O-Ring \varnothing
Standard	Type___/1	Type___/2			
8 - 14,9		15 - 39,9	\varnothing D - 4,9	2,2	1,78
15 - 39,9		40 - 79,9	\varnothing D - 7,5	3,2	2,62
40 - 79,9	15 - 39,9	80 - 132,9	\varnothing D - 11,0	4,2	3,53
80 - 132,9	40 - 79,9	133 - 329,9	\varnothing D - 15,5	6,3	5,33
133 - 329,9	80 - 132,9	330 - 669,9	\varnothing D - 21,0	8,1	7,00
330 - 669,9	133 - 329,9	670 - 999,9	\varnothing D - 24,5	8,1	7,00
670 - 999,9	330 - 669,9		\varnothing D - 28,0	9,5	8,40

If the groove width (L dim.) differs from the standard series, the complementary number /1 or /2 is added to the order designation.

Subject to the diameter (D), the corresponding groove bottom diameters (d) and assembly dimensions (L dim.) are to be taken from the above table under type ---/1 and type ---/2.

Gap dim. s (mm)

L.dim.	0 - 20 MPa	20 - 40 MPa	Radius R
2,2	0,30 - 0,20	0,20 - 0,15	0,3 - 0,5
3,2	0,40 - 0,25	0,25 - 0,15	0,5 - 0,8
4,2	0,40 - 0,25	0,25 - 0,20	0,8 - 1,2
6,3	0,50 - 0,30	0,30 - 0,20	1,2 - 1,5
8,1	0,60 - 0,35	0,35 - 0,25	1,5 - 2,0
8,1	0,60 - 0,35	0,35 - 0,25	1,5 - 2,0
9,5	0,70 - 0,50	0,50 - 0,30	2,0 - 3,0

“For pressures more than 400 bar we recommend to choose a gap behind the seal of H8/F8 (hole/piston).”

	Piston seal Type	Dimension	Material
Ordering example:	Piston seal	\varnothing D 60 x 49,0 x 4,2	PTFE-bronze
Order designation:	NPS -	60 x 49,0 x 4,2	- PB

Designation of material:

- PB** - PTFE-bronze
- PK** - PTFE-carbon
- PG(M)** - PTFE-glass fiber +(MoS₂)
- PT** - PTFE compound turquoise
- PEK** - PTFE-Econol
- PU** - Polyurethane

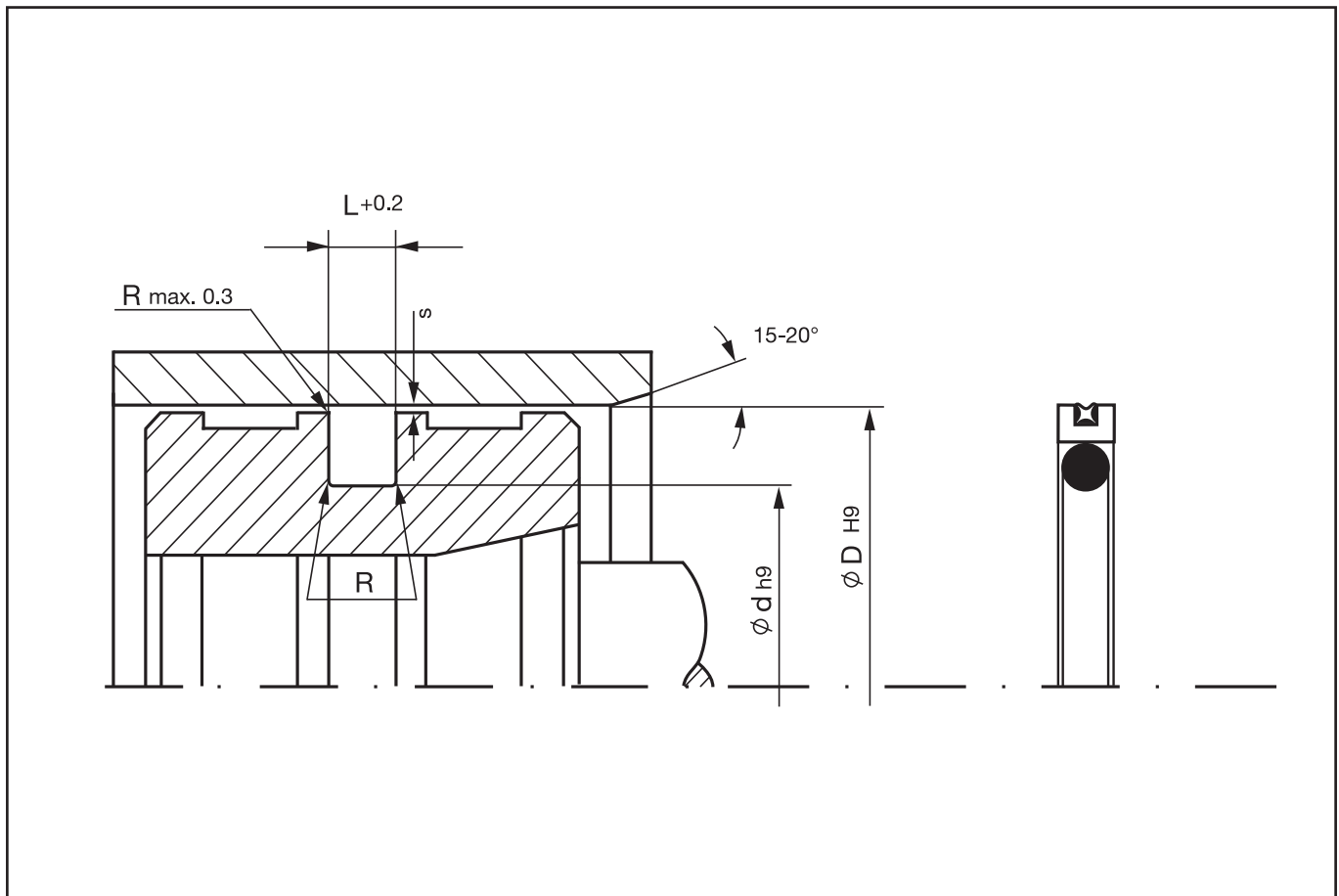
Type designation	∅ D	∅ d	L	O-Ring
NPS - 008 - PB	8	3,1	2,2	006
NPS - 010 - PB	10	5,1	2,2	009
NPS - 012 - PB	12	7,1	2,2	011
NPS - 014 - PB	14	9,1	2,2	012
NPS - 015 - PB	15	7,5	3,2	109
NPS - 016 - PB	16	8,5	3,2	109
NPS - 018 - PB	18	10,5	3,2	110
NPS - 020 - PB	20	12,5	3,2	112
NPS - 022 - PB	22	14,5	3,2	113
NPS - 024 - PB	24	16,5	3,2	114
NPS - 025 - PB	25	17,5	3,2	115
NPS - 025/1 - PB	25	14,0	4,2	207
NPS - 028 - PB	28	20,5	3,2	117
NPS - 030 - PB	30	22,5	3,2	118
NPS - 032 - PB	32	24,5	3,2	119
NPS - 032/1 - PB	32	21,0	4,2	211
NPS - 035 - PB	35	27,5	3,2	121
NPS - 036 - PB	36	28,5	3,2	122
NPS - 038 - PB	38	30,5	3,2	123
NPS - 039 - PB	39	31,5	3,2	124
NPS - 040 - PB	40	29,0	4,2	216
NPS - 042 - PB	42	31,0	4,2	217
NPS - 045 - PB	45	34,0	4,2	219
NPS - 048 - PB	48	37,0	4,2	221
NPS - 050 - PB	50	39,0	4,2	222
NPS - 050/1 - PB	50	34,5	6,3	324
NPS - 052 - PB	52	41,0	4,2	223
NPS - 055 - PB	55	44,0	4,2	224
NPS - 057 - PB	57	46,0	4,2	827
NPS - 060 - PB	60	49,0	4,2	225
NPS - 063 - PB	63	52,0	4,2	226
NPS - 063/1 - PB	63	47,5	6,3	328
NPS - 064 - PB	64	53,0	4,2	226
NPS - 065 - PB	65	54,0	4,2	227
NPS - 070 - PB	70	59,0	4,2	228
NPS - 070/1 - PB	70	54,5	6,3	330
NPS - 075 - PB	75	64,0	4,2	230
NPS - 080 - PB	80	64,5	6,3	333

Type designation	∅ D	∅ d	L	O-Ring
NPS - 080/1 - PB	80	59,0	8,1	58x7
NPS - 085 - PB	85	69,5	6,3	335
NPS - 085/1 - PB	85	64,0	8,1	64x7
NPS - 089 - PB	89	73,5	6,3	336
NPS - 090 - PB	90	74,5	6,3	336
NPS - 090/1 - PB	90	69,0	8,1	68x7
NPS - 095 - PB	95	79,5	6,3	338
NPS - 095/1 - PB	95	74,0	8,1	73x7
NPS - 100 - PB	100	84,5	6,3	339
NPS - 100/1 - PB	100	79,0	8,1	79x7
NPS - 105 - PB	105	89,5	6,3	341
NPS - 105/1 - PB	105	84,0	8,1	83x7
NPS - 110 - PB	110	94,5	6,3	343
NPS - 110/1 - PB	110	89,0	8,1	89x7
NPS - 115 - PB	115	99,5	6,3	344
NPS - 115/1 - PB	115	94,0	8,1	94x7
NPS - 120 - PB	120	104,5	6,3	346
NPS - 120/1 - PB	120	99,0	8,1	99x7
NPS - 125 - PB	125	109,5	6,3	347
NPS - 125/1 - PB	125	104,0	8,1	101x7
NPS - 127 - PB	127	111,5	6,3	348
NPS - 130 - PB	130	114,5	6,3	349
NPS - 130/1 - PB	130	109,0	8,1	106x7
NPS - 132 - PB	132	116,5	6,3	350
NPS - 133 - PB	133	112,0	8,1	425
NPS - 135 - PB	135	114,0	8,1	425
NPS - 140 - PB	140	119,0	8,1	426
NPS - 145 - PB	145	124,0	8,1	428
NPS - 150 - PB	150	129,0	8,1	430
NPS - 154 - PB	154	133,0	8,1	431
NPS - 155 - PB	155	134,0	8,1	431
NPS - 160 - PB	160	139,0	8,1	433
NPS - 165 - PB	165	144,0	8,1	434
NPS - 170 - PB	170	149,0	8,1	436
NPS - 175 - PB	175	154,0	8,1	437
NPS - 180 - PB	180	159,0	8,1	438
NPS - 185 - PB	185	164,0	8,1	874
NPS - 190 - PB	190	169,0	8,1	439

Type designation	∅ D	∅ d	L	O-Ring
NPS - 200 - PB	200	179,0	8,1	441
NPS - 210 - PB	210	189,0	8,1	443
NPS - 220 - PB	220	199,0	8,1	444
NPS - 230 - PB	230	209,0	8,1	445
NPS - 240 - PB	240	219,0	8,1	446
NPS - 250 - PB	250	229,0	8,1	447
NPS - 260 - PB	260	239,0	8,1	447
NPS - 270 - PB	270	249,0	8,1	448
NPS - 280 - PB	280	259,0	8,1	449
NPS - 290 - PB	290	269,0	8,1	450
NPS - 300 - PB	300	279,0	8,1	451
NPS - 310 - PB	310	289,0	8,1	451
NPS - 320 - PB	320	299,0	8,1	452
NPS - 330 - PB	330	305,5	8,1	453
NPS - 340 - PB	340	315,5	8,1	453
NPS - 350 - PB	350	325,5	8,1	454
NPS - 360 - PB	360	335,5	8,1	455
NPS - 370 - PB	370	345,5	8,1	456
NPS - 380 - PB	380	355,5	8,1	457
NPS - 390 - PB	390	365,5	8,1	457
NPS - 400 - PB	400	375,5	8,1	458
NPS - 410 - PB	410	385,5	8,1	459
NPS - 420 - PB	420	395,5	8,1	460
NPS - 430 - PB	430	405,5	8,1	461
NPS - 440 - PB	440	415,5	8,1	461
NPS - 450 - PB	450	425,5	8,1	462
NPS - 460 - PB	460	435,5	8,1	463
NPS - 470 - PB	470	445,5	8,1	464
NPS - 480 - PB	480	455,5	8,1	464
NPS - 490 - PB	490	465,5	8,1	465
NPS - 500 - PB	500	475,5	8,1	466
NPS - 510 - PB	510	485,5	8,1	467
NPS - 520 - PB	520	495,5	8,1	468
NPS - 530 - PB	530	505,5	8,1	468
NPS - 540 - PB	540	515,5	8,1	469
NPS - 550 - PB	550	525,5	8,1	469
NPS - 560 - PB	560	535,5	8,1	470
NPS - 570 - PB	570	545,5	8,1	470

Type designation	∅ D	∅ d	L	O-Ring
NPS - 580 - PB	580	555,5	8,1	471
NPS - 590 - PB	590	565,5	8,1	471

Further dimension and in-between sizes upon request.



Max. Operating Conditions *

Pressure (MPa)	≤ 40 (400 bar)
Temperature (°C)	- 30 / + 110 / + 200
Speed (m/s)	≤ 2
Media:	Mineral oil and Gases *

Recommended Surface Finish

Surface roughness	R _a	R _t
Groove bottom	≤ 1,6 µm	≤ 16 µm
Groove flanks	≤ 1,6 µm	≤ 16 µm
Running surface	≤ 0,3 µm	≤ 3 µm

Material

PTFE-bronze / -carbon	PB / PK
PTFE-compound turquoise	PT
PTFE-Econol	PEK
PTFE-glass fiber + MoS ₂	PGM

Technical Description

The **KSO** double-acting piston seal consists of a PTFE compound seal ring and X-Ring seal for dynamic sealing and a preset O-Ring for static sealing.

The benefits of this seal system are the high degree of sealing during medium separation, the exceptional sliding characteristics of the PTFE compound, which prevents sticking or slipping, and the simple groove design.

Higher values are permitted if the necessary structural requirements have been met.

Higher operating pressures of up to 80 MPa (800 bar) and sliding speeds of up to 15 m/s are possible if these extreme conditions do not occur at the same time. For pressures greater than 40 MPa (400 bar), the gap dimension „s“ must be reduced.

*Max. operating conditions:

The type of application and specific operating conditions involved must be taken into account when choosing the PTFE compound and/or material quality. The temperature range and chemical stability of the product depend on the O-Ring and X-Ring material selected.

Assembly dimensions

Diameter \varnothing D H9			L.dim.	O-Ring	X-Ring
Standard	Type_ _ _/1				
16 - 39,9	40 - 79,9	\varnothing D - 11,0	4,2	3,53	1,78
40 - 79,9	80 - 132,9	\varnothing D - 15,5	6,3	5,33	1,78
80 - 132,9	133 - 252,9	\varnothing D - 21,0	8,1	7,00	2,62
133 - 252,9		\varnothing D - 24,5	8,1	7,00	2,62
253 - 462,9		\varnothing D - 28,0	9,5	8,40	3,53
463 - 700,0		\varnothing D - 35,0	11,5	10,00	5,33

If the groove width (L dim.) differs from the standard series, the complementary number /1 is added to the order designation.

Subject to the diameter (D), the corresponding groove bottom diameters (d) and assembly dimensions (L dim.) are to be taken from the above table under type ---/1.

Gap dim. s (mm)

L.dim.	0 - 10 MPa	10 - 20 MPa	20 - 40 MPa	Radius R
4,2	0,25	0,15	0,10	1,0
6,3	0,30	0,20	0,15	1,3
8,1	0,30	0,20	0,15	1,8
8,1	0,30	0,20	0,15	1,8
9,5	0,45	0,30	0,25	2,5
11,5	0,55	0,40	0,35	3,0

“For pressures more than 400 bar we recommend to choose a gap behind the seal of H8/F8 (hole/piston).”

	Piston seal Type	Dimension	Material
Ordering example:	Piston seal	\varnothing D 60 x 49,0 x 4,2	PTFE-bronze
Order designation:	KSO -	60 x 49,0 x 4,2	- PB

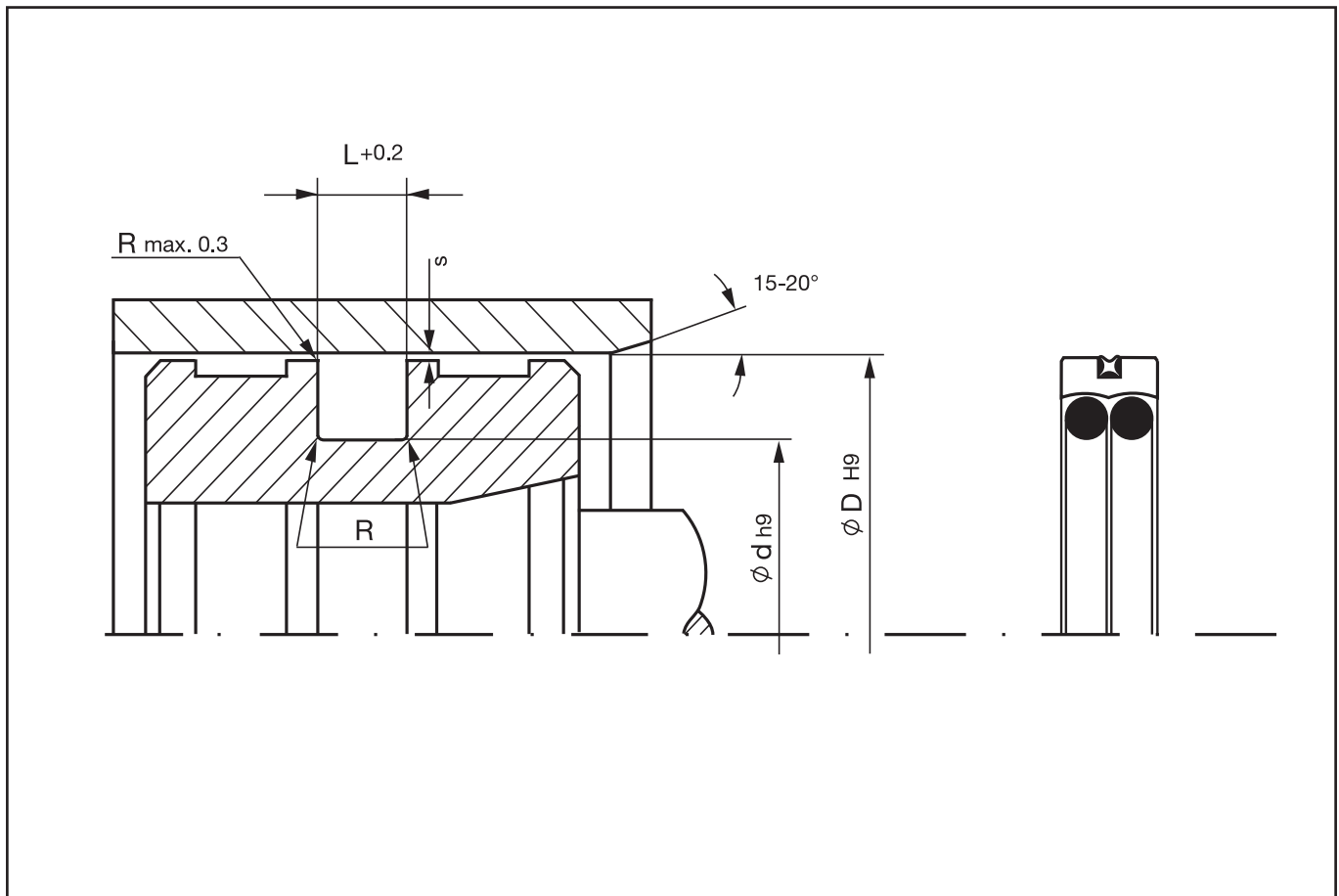
- Designation of material:**
- PB** - PTFE-bronze
 - PK** - PTFE-carbon
 - PG(M)** - PTFE-glass fiber +(MoS₂)
 - PT** - PTFE compound turquoise
 - PEK** - PTFE-Econol

Type designation	∅ D	∅ d	L	O-Ring	X-Ring
KSO - 016 - PB	16	5,0	4,2	4,34 x 3,53	12,42 x 1,78
KSO - 018 - PB	18	7,0	4,2	6,42 x 3,53	14,00 x 1,78
KSO - 020 - PB	20	9,0	4,2	8,42 x 3,53	15,60 x 1,78
KSO - 022 - PB	22	11,0	4,2	10,69 x 3,53	17,17 x 1,78
KSO - 025 - PB *	25	14,0	4,2	13,87 x 3,53	20,35 x 1,78
KSO - 028 - PB	28	17,0	4,2	15,47 x 3,53	23,52 x 1,78
KSO - 030 - PB	30	19,0	4,2	18,66 x 3,53	25,12 x 1,78
KSO - 032 - PB *	32	21,0	4,2	20,22 x 3,53	26,70 x 1,78
KSO - 035 - PB	35	24,0	4,2	23,40 x 3,53	29,87 x 1,78
KSO - 040/1 - PB *	40	29,0	4,2	28,17 x 3,53	34,65 x 1,78
KSO - 042/1 - PB	42	31,0	4,2	29,75 x 3,53	37,82 x 1,78
KSO - 045/1 - PB	45	34,0	4,2	32,92 x 3,53	37,82 x 1,78
KSO - 048/1 - PB	48	37,0	4,2	36,09 x 3,53	41,00 x 1,78
KSO - 050/1 - PB *	50	39,0	4,2	37,70 x 3,53	44,17 x 1,78
KSO - 050 - PB *	50	34,5	6,3	32,69 x 5,33	44,17 x 1,78
KSO - 052/1 - PB	52	41,0	4,2	40,87 x 3,53	47,35 x 1,78
KSO - 055/1 - PB	55	44,0	4,2	44,04 x 3,53	50,52 x 1,78
KSO - 060/1 - PB	60	49,0	4,2	47,22 x 3,53	53,70 x 1,78
KSO - 063/1 - PB *	63	52,0	4,2	50,39 x 3,53	56,87 x 1,78
KSO - 063 - PB *	63	47,5	6,3	46,99 x 5,33	56,87 x 1,78
KSO - 065/1 - PB	65	54,0	4,2	53,57 x 3,53	60,05 x 1,78
KSO - 070/1 - PB	70	59,0	4,2	56,74 x 3,53	63,22 x 1,78
KSO - 070 - PB	70	54,5	6,3	53,34 x 5,33	63,22 x 1,78
KSO - 075/1 - PB	75	64,0	4,2	63,09 x 3,53	69,57 x 1,78
KSO - 080/1 - PB *	80	64,5	6,3	53,34 x 5,33	72,75 x 1,78
KSO - 080 - PB	80	59,0	8,1	58 x 7,0	71,12 x 2,62
KSO - 085/1 - PB	85	69,5	6,3	69,22 x 5,33	75,92 x 1,78
KSO - 085 - PB	85	64,0	8,1	63 x 7,0	75,87 x 2,62
KSO - 090/1 - PB	90	74,5	6,3	72,39 x 5,33	82,27 x 1,78
KSO - 090 - PB	90	69,0	8,1	68 x 7,0	82,22 x 2,62
KSO - 095/1 - PB	95	79,5	6,3	78,74 x 5,33	88,62 x 1,78
KSO - 095 - PB	95	74,0	8,1	73 x 7,0	82,22 x 2,62
KSO - 100/1 - PB *	100	84,5	6,3	81,92 x 5,33	88,62 x 1,78
KSO - 100 - PB	100	79,0	8,1	78 x 7,0	88,57 x 2,62
KSO - 105/1 - PB	105	89,5	6,3	88,27 x 5,33	94,97 x 1,78
KSO - 105 - PB	105	84,0	8,1	83 x 7,0	94,92 x 2,62
KSO - 110/1 - PB	110	94,5	6,3	91,44 x 5,33	101,32 x 1,78
KSO - 110 - PB	110	89,0	8,1	88 x 7,0	101,27 x 2,62

Type designation	∅ D	∅ d	L	O-Ring	X-Ring
KSO - 115/1 - PB	115	99,5	6,3	97,79 x 5,33	107,67 x 1,78
KSO - 115 - PB	115	94,0	8,1	93 x 7,0	107,62 x 2,62
KSO - 120/1 - PB	120	104,5	6,3	100,97 x 5,33	114,02 x 1,78
KSO - 120 - PB	120	99,0	8,1	98 x 7,0	107,62 x 2,62
KSO - 125/1 - PB *	125	109,5	6,3	107,32 x 5,33	114,02 x 1,78
KSO - 125 - PB *	125	104,0	8,1	103 x 7,0	113,97 x 2,62
KSO - 130/1 - PB	130	114,5	6,3	113,67 x 5,33	120,37 x 1,78
KSO - 130 - PB	130	109,0	8,1	108 x 7,0	120,32 x 2,62
KSO - 135/1 - PB	135	114,0	8,1	113,67 x 7,0	126,67 x 2,62
KSO - 140/1 - PB	140	119,0	8,1	116,84 x 7,0	126,67 x 2,62
KSO - 150/1 - PB	150	129,0	8,1	126,37 x 7,0	139,37 x 2,62
KSO - 160/1 - PB *	160	139,0	8,1	135,89 x 7,0	145,72 x 2,62
KSO - 170/1 - PB	170	149,0	8,1	145,42 x 7,0	158,42 x 2,62
KSO - 180/1 - PB	180	159,0	8,1	158,12 x 7,0	171,11 x 2,62
KSO - 190/1 - PB	190	169,0	8,1	164,47 x 7,0	177,47 x 2,62
KSO - 200/1 - PB *	200	179,0	8,1	177,17 x 7,0	190,17 x 2,62
KSO - 210/1 - PB	210	189,0	8,1	183,52 x 7,0	196,52 x 2,62
KSO - 220/1 - PB	220	199,0	8,1	196,22 x 7,0	202,87 x 2,62
KSO - 230/1 - PB	230	209,0	8,1	202,57 x 7,0	215,57 x 2,62
KSO - 240/1 - PB	240	219,0	8,1	215,27 x 7,0	221,92 x 2,62
KSO - 250/1 - PB	250	229,0	8,1	227,97 x 7,0	234,62 x 2,62
KSO - 250 - PB *	250	225,5	8,1	227,97 x 7,0	234,62 x 2,62
KSO - 280 - PB	280	252,0	9,5	250 x 8,4	266,29 x 3,53
KSO - 300 - PB	300	272,0	9,5	270 x 8,4	278,99 x 3,53
KSO - 310 - PB	310	282,0	9,5	280 x 8,4	291,69 x 3,53
KSO - 320 - PB	320	292,0	9,5	290 x 8,4	304,39 x 3,53
KSO - 350 - PB	350	322,0	9,5	320 x 8,4	329,79 x 3,53
KSO - 400 - PB	400	372,0	9,5	370 x 8,4	380,59 x 3,53
KSO - 420 - PB	420	392,0	9,5	390 x 8,4	380,59 x 3,53
KSO - 450 - PB	450	422,0	9,5	420 x 8,4	430,66 x 3,53
KSO - 480 - PB	480	445,0	11,5	444 x 10,0	456,06 x 5,33
KSO - 500 - PB	500	465,0	11,5	464 x 10,0	456,06 x 5,33
KSO - 600 - PB	600	565,0	11,5	564 x 10,0	557,58 x 5,33
KSO - 700 - PB	700	665,0	11,5	664 x 10,0	658,88 x 5,33

* Indicated dimensions are according to housing sizes DIN/ISO 7425/1.

All intermediate sizes up to 700 mm in diameter are available upon request with short delivery times.



Max. Operating Conditions *

Pressure (MPa)	≤ 60 (600 bar)
Temperature (°C)	- 30 / + 110 / + 200
Speed (m/s)	≤ 3
Media:	Mineral oil and Gases *

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	≤ 1,6 µm	≤ 16 µm
Groove flanks	≤ 1,6 µm	≤ 16 µm
Running surface	≤ 0,3 µm	≤ 3 µm

Material

PTFE-bronze / -carbon / glass fiber	PB / PK / PG
PTFE-compound turquoise	PT
PTFE-Econol	PEK
PTFE-glass fiber + MoS ₂	PGM

Technical Description

The **KSO2** double-acting piston seal consists of a PTFE compound seal ring and X-Ring seal for dynamic sealing and two preset O-Rings for static sealing.

The benefits of this seal system are the high degree of sealing during medium separation and the exceptional sliding characteristics of the PTFE compound, which prevents sticking or slipping. The maximum operating pressure and sliding speed are higher than those of the KSO. The KSO2 is particularly suited to operation under heavy conditions and applications involving large diameters.

*Max. operating conditions:

The type of application and specific operating conditions involved must be taken into account when choosing the PTFE compound and/or material quality. The temperature range and chemical stability of the product depend on the O-Ring and X-Ring material selected.

Assembly dimensions

Diameter \varnothing D H9		Groove bottom \varnothing d	L.dim.	O-Ring	X-Ring
Standard	Type_ _ _/1				
40 - 79,9	25 - 140	\varnothing D - 10,0	6,3	2,62	1,78
80 - 132,9	50 - 250	\varnothing D - 13,0	8,3	3,53	2,62
133 - 462,9	100 - 480	\varnothing D - 18,0	12,3	5,33	3,53
463 - 700,0	425 - 700	\varnothing D - 31,0	16,3	7,00	5,33

If the groove width (L dim.) differs from the standard series, the complementary number /1 is added to the order designation.

Subject to the diameter (D), the corresponding groove bottom diameters (d) and assembly dimensions (L dim.) are to be taken from the above table under type ---/1.

Gap dim. s (mm)

L.dim.	0 - 10 MPa	10 - 20 MPa	20 - 30 MPa	Radius R
6,3	0,30	0,20	0,15	0,6
8,3	0,40	0,30	0,15	1,0
12,3	0,40	0,30	0,20	1,3
16,3	0,50	0,40	0,30	1,8

“For pressures more than 400 bar we recommend to choose a gap behind the seal of H8/F8 (hole/piston).”

	Piston seal Type	Dimension	Material
Ordering example:	Piston seal	\varnothing D 60 x 50,0 x 6,3	PTFE-bronze
Order designation:	KSO2 -	60 x 50,0 x 6,3	- PB

Designation of material:

- PB** - PTFE-bronze
- PK** - PTFE-carbon
- PG(M)** - PTFE-glass fiber +(MoS₂)
- PT** - PTFE compound turquoise
- PEK** - PTFE-Econol

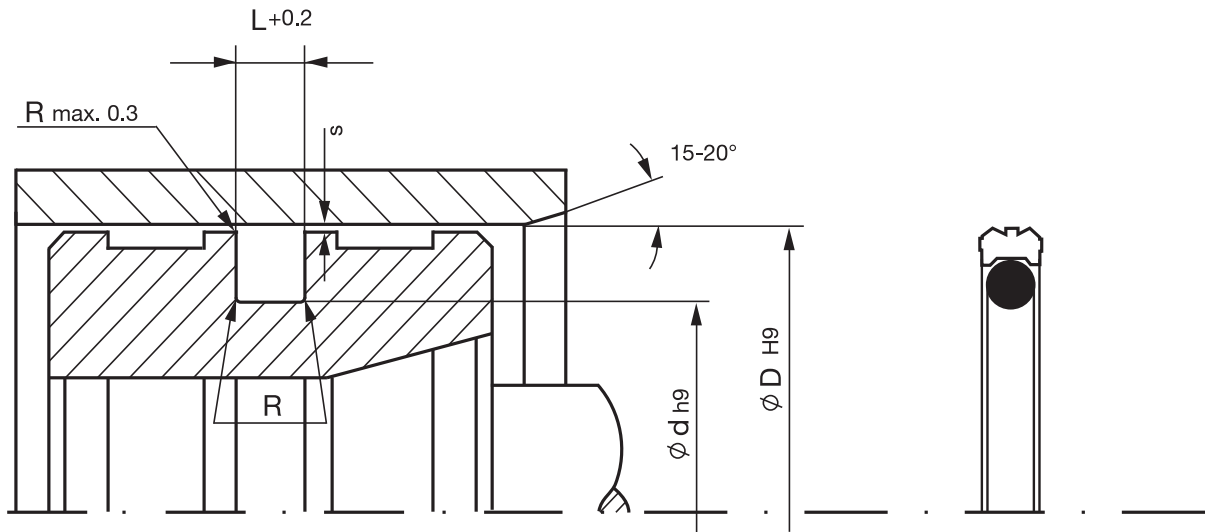
Type designation	∅ D	∅ d	L	O-Ring	X-Ring
KSO2 - 040 - PB	40	30	6,3	29,82 x 2,62	34,65 x 1,78
KSO2 - 042 - PB	42	32	6,3	31,42 x 2,62	37,82 x 1,78
KSO2 - 045 - PB	45	35	6,3	34,59 x 2,62	37,82 x 1,78
KSO2 - 048 - PB	48	38	6,3	37,77 x 2,62	41,00 x 1,78
KSO2 - 050 - PB	50	40	6,3	39,34 x 2,62	44,17 x 1,78
KSO2 - 052 - PB	52	42	6,3	40,94 x 2,62	47,35 x 1,78
KSO2 - 055 - PB	55	45	6,3	44,12 x 2,62	50,52 x 1,78
KSO2 - 060 - PB	60	50	6,3	48,90 x 2,62	53,70 x 1,78
KSO2 - 063 - PB	63	53	6,3	52,07 x 2,62	56,87 x 1,78
KSO2 - 065 - PB	65	55	6,3	53,64 x 2,62	60,05 x 1,78
KSO2 - 070 - PB	70	60	6,3	58,42 x 2,62	63,22 x 1,78
KSO2 - 075 - PB	75	65	6,3	63,17 x 2,62	69,57 x 1,78
KSO2 - 080 - PB	80	67	8,3	66,27 x 3,53	71,12 x 2,62
KSO2 - 085 - PB	85	72	8,3	69,44 x 3,53	75,87 x 2,62
KSO2 - 090 - PB	90	77	8,3	75,79 x 3,53	82,22 x 2,62
KSO2 - 095 - PB	95	82	8,3	78,97 x 3,53	82,22 x 2,62
KSO2 - 100 - PB	100	87	8,3	85,32 x 3,53	88,57 x 2,62
KSO2 - 105 - PB	105	92	8,3	91,67 x 3,53	94,92 x 2,62
KSO2 - 110 - PB	110	97	8,3	94,84 x 3,53	101,27 x 2,62
KSO2 - 115 - PB	115	102	8,3	101,19 x 3,53	107,62 x 2,62
KSO2 - 120 - PB	120	107	8,3	104,37 x 3,53	107,62 x 2,62
KSO2 - 125 - PB	125	112	8,3	110,72 x 3,53	113,97 x 2,62
KSO2 - 130 - PB	130	117	8,3	113,89 x 3,53	120,32 x 2,62
KSO2 - 135 - PB	135	117	12,3	113,67 x 5,33	123,42 x 3,53
KSO2 - 140 - PB	140	122	12,3	120,02 x 5,33	126,60 x 3,53
KSO2 - 150 - PB	150	132	12,3	129,54 x 5,33	136,12 x 3,53
KSO2 - 160 - PB	160	142	12,3	139,07 x 5,33	145,65 x 3,53
KSO2 - 170 - PB	170	152	12,3	148,49 x 5,33	158,35 x 3,53
KSO2 - 180 - PB	180	162	12,3	158,12 x 5,33	164,70 x 3,53
KSO2 - 190 - PB	190	172	12,3	170,82 x 5,33	177,40 x 3,53
KSO2 - 200 - PB	200	182	12,3	177,17 x 5,33	183,75 x 3,53
KSO2 - 210 - PB	210	192	12,3	189,87 x 5,33	196,45 x 3,53
KSO2 - 220 - PB	220	202	12,3	196,22 x 5,33	202,80 x 3,53
KSO2 - 230 - PB	230	212	12,3	208,92 x 5,33	215,50 x 3,53
KSO2 - 240 - PB	240	222	12,3	221,62 x 5,33	221,85 x 3,53
KSO2 - 250 - PB	250	232	12,3	227,97 x 5,33	234,54 x 3,53
KSO2 - 280 - PB	280	262	12,3	253,37 x 5,33	266,29 x 3,53
KSO2 - 300 - PB	300	282	12,3	278,77 x 5,33	278,99 x 3,53

Type designation	∅ D	∅ d	L	O-Ring	X-Ring
KSO2 - 320 - PB	320	302	12,3	291,47 x 5,33	304,39 x 3,53
KSO2 - 350 - PB	350	332	12,3	329,57 x 5,33	329,79 x 3,53
KSO2 - 400 - PB	400	382	12,3	380,37 x 5,33	380,59 x 3,53
KSO2 - 420 - PB	420	402	12,3	405,26 x 5,33	380,59 x 3,53
KSO2 - 450 - PB	450	432	16,3	430,66 x 5,33	430,66 x 3,53
KSO2 - 480 - PB	480	449	16,3	443,36 x 7,00	456,06 x 5,33
KSO2 - 500 - PB	500	469	16,3	468,76 x 7,00	456,06 x 5,33
KSO2 - 600 - PB	600	569	16,3	557,66 x 7,00	557,58 x 5,33
KSO2 - 700 - PB	700	669	16,3	658,88 x 7,00	658,88 x 5,33

Further dimension and in-between sizes upon request.
All intermediate sizes up to 700 mm in diameter are available upon request with short delivery times.

NPW/KPD

Double-acting Piston Seal



Pressure MPa (bar)	Gap dim. s (mm)
5 (50)	0,60
10 (100)	0,40
20 (200)	0,20
30 (300)	0,125
40 (400)	0,085

Max. Operating Conditions

Pressure (MPa)	≤ 40 (400 bar)
Temperature (°C)	- 30 / + 100
Speed (m/s)	≤ 0,5
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	≤ 1,6 µm	≤ 16 µm
Groove flanks	≤ 1,6 µm	≤ 16 µm
Running surface	≤ 0,3 µm	≤ 3 µm

Material

Polyurethane	PU
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Technical Description

The piston seals of the production series **NPW/KPD** consist of a polyurethane piston seal ring with a NBR-O-Ring as prefix element.

The special shape of the dynamic sealing element ensures high sealing power and a long life. Because of the compact finish of the sealing lips with very small dimensions, the contact surface is also small at higher pressures, which minimizes friction. In addition to this, because of this shape an area for the lubricant admission is created at the dynamic side which also minimizes friction and breakaway force. The centerpiece on the dynamic sealing surface stabilizes the system and reduces the liquid volume between the sealing lips.

Through its very positive tensile practice, the chosen polyurethane fetches advantages when mounted. Furthermore this material shows a low compression set and good sealing properties at lower temperatures.

There are no special tools and preparatives necessary for assembly.

Type designation	∅ D	∅ d	L	O-Ring
KPD - 015 - PU	15	7,5	3,2	108
KPD - 016 - PU *	16	8,5	3,2	109
KPD - 016/3 - PU	16	11,1	2,2	013
KPD - 020 - PU *	20	12,5	3,2	112
KPD - 022 - PU	22	14,5	3,2	113
KPD - 025 - PU *	25	17,5	3,2	115
KPD - 025/1 - PU *	25	14,0	4,2	207
KPD - 030 - PU	30	22,5	3,2	118
KPD - 030/1 - PU	30	25,1	2,2	021
KPD - 032 - PU *	32	24,5	3,2	119
KPD - 032/1 - PU *	32	21,0	4,2	211
KPD - 035 - PU	35	27,5	3,2	121
KPD - 035/1 - PU	35	24,0	4,2	213
KPD - 038 - PU	38	30,5	3,2	123
KPD - 040 - PU *	40	29,0	4,2	216
KPD - 040/1 - PU	40	24,5	6,3	318
KPD - 040/2 - PU	40	32,5	3,2	124
KPD - 042 - PU	42	31,0	4,2	217
KPD - 045 - PU	45	34,0	4,2	219
KPD - 045/1 - PU	45	29,5	6,3	320
KPD - 048 - PU	48	37,0	4,2	221

Assembly dimensions

Groove bottom ∅ d	L.dim.	Radius R	O-Ring ∅
∅ D - 4,9	2,2	0,4	1,78
∅ D - 7,5	3,2	0,6	2,62
∅ D - 11,0	4,2	1,0	3,53
∅ D - 15,5	6,3	1,3	5,33
∅ D - 21,0	8,1	1,8	7,00

	Piston seal Type	Dimension	Material
Ordering example:	Piston seal	∅ D 60 x 49,0 x 4,2	Polyurethane
Order designation:	NPW -	60 x 49,0 x 4,2	- PU

Designation of material: PU - Polyurethane

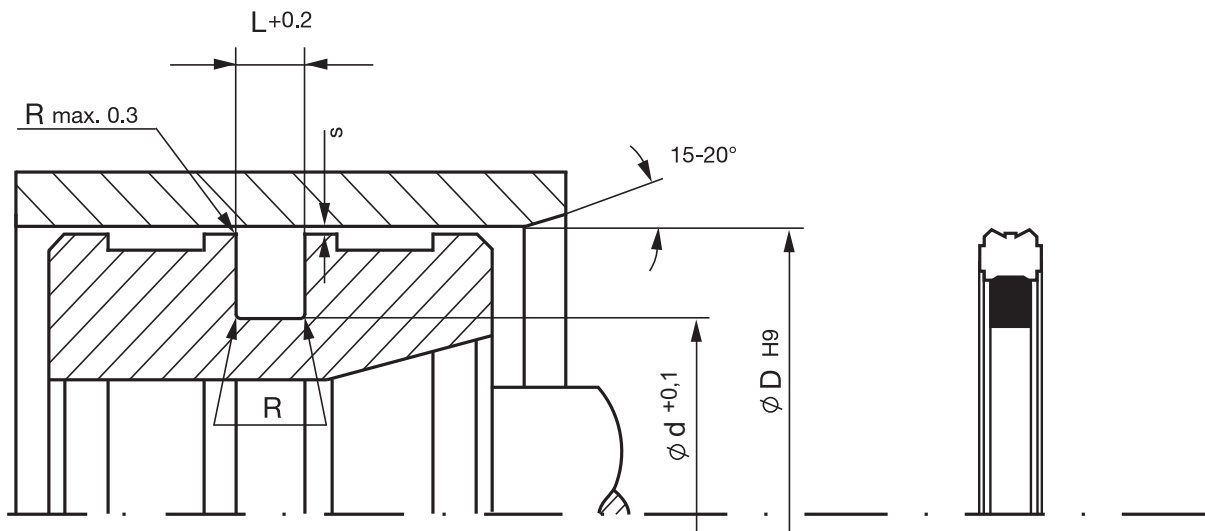
NPW/KPD

Double-acting Piston Seal

Type designation	∅ D	∅ d	L	O-Ring
KPD - 049 - PU	49	38,0	4,2	222
KPD - 050 - PU *	50	39,0	4,2	222
KPD - 050/1 - PU *	50	34,5	6,3	324
KPD - 052/1 - PU	52	36,5	6,3	324
KPD - 054 - PU	54	43,0	4,2	826
KPD - 055 - PU	55	44,0	4,2	224
KPD - 055/1 - PU	55	39,5	6,3	325
KPD - 057 - PU	57	46,0	4,2	827
KPD - 57,16 - PU	57,16	47,6	4,8	47x4
KPD - 060 - PU	60	49,0	4,2	225
KPD - 060/1 - PU	60	44,5	6,3	327
KPD - 063 - PU *	63	52,0	4,2	226
KPD - 063/1 - PU *	63	47,5	6,3	328
KPD - 065 - PU	65	54,0	4,2	227
KPD - 065/1 - PU	65	49,5	6,3	328
KPD - 070 - PU	70	59,0	4,2	228
KPD - 070/1 - PU	70	54,5	6,3	330
KPD - 075 - PU	75	64,0	4,2	230
KPD - 075/1 - PU	75	59,5	6,3	331
KPD - 080/2 - PU *	80	69,0	4,2	842
KPD - 080 - PU *	80	64,5	6,3	333
KPD - 085 - PU	85	69,5	6,3	335
KPD - 090/1 - PU	90	69,0	8,1	68x7
KPD - 090 - PU	90	74,5	6,3	336
KPD - 095 - PU	95	79,5	6,3	338
KPD - 100 - PU *	100	84,5	6,3	339
KPD - 105 - PU	105	89,5	6,3	341
KPD - 110 - PU	110	94,5	6,3	343
KPD - 115 - PU	115	94,0	8,1	94x7
KPD - 120 - PU	120	104,5	6,3	346
KPD - 125 - PU *	125	109,5	6,3	347
KPD - 130 - PU	130	114,5	6,3	349
KPD - 140 - PU	140	119,0	8,1	426
KPD - 140/2 - PU	140	124,5	6,3	352
KPD - 150 - PU	150	129,0	8,1	429
KPD - 160 - PU *	160	139,0	8,1	433
KPD - 170 - PU	170	149,0	8,1	436
KPD - 180 - PU	180	159,0	8,1	438

Type designation	∅ D	∅ d	L	O-Ring
KPD - 200 - PU *	200	179,0	8,1	441
KPD - 220 - PU	220	199,0	8,1	444
KPD - 250 - PU *	250	229,0	8,1	447

Further dimension and in-between sizes upon request.
* Dimensions append to ISO



Pressure MPa (bar)	Gap dim. s (mm)
5 (50)	0,60
10 (100)	0,40
20 (200)	0,20
30 (300)	0,125
40 (400)	0,085

Max. Operating Conditions

Pressure (MPa)	≤ 40 (400 bar)
Temperature (°C)	- 30 / + 100
Speed (m/s)	≤ 0,5
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R _a	R _t
Groove bottom	≤ 1,6 µm	≤ 6,3 µm
Groove flanks	≤ 1,6 µm	≤ 6,3 µm
Running surface	≤ 0,3 µm	≤ 2,5 µm

Material

Polyurethane 97 Shore A	PU
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Technical Description

The double acting piston seal type **KPR** is composed of a dynamic 97 Shore A polyurethane seal element with exceptional high sealing performance and an 80 Shore A nitril rubber energizing component on the static side. The hardness and the rectangular cross-section prevent twisting of the static element in the groove.

Two compact and small seal edges ensure perfect fluid control and concentrate the load against the dynamic surface. The cavity between the two external seal edges keeps a small quantity of fluid, which reduces friction and wear. Side grooves ensure that pressure loads the energizing element in all working conditions.

The seals of the **KPR** type ensure high sealing performance up to 400 bars, as well as in low pressure conditions.

The used polyurethane ensures easy installation procedures, high extrusion resistance, excellent wear resistance and very good sealing function in low temperature, too.

The groove design is simple and for the installation are no special preparation and tools required.

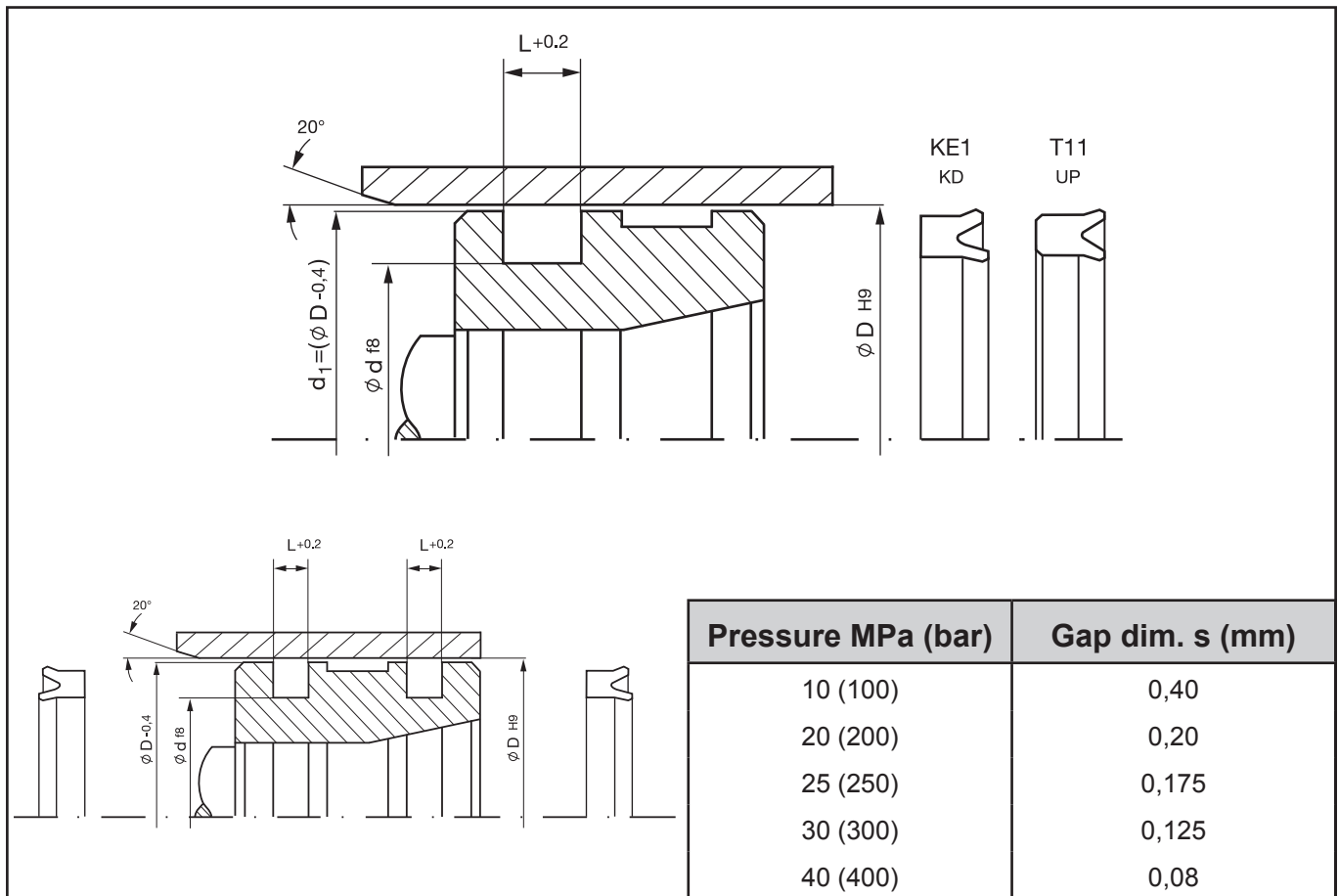
Type designation	∅ D	∅ d	L
KPR - 55 - PU	55	44,0	4,2
KPR - 63 - PU	63	52,0	4,2
KPR - 70 - PU	70	59,0	4,2
KPR - 80 - PU	80	64,5	6,3
KPR - 90/1 - PU	90	69,0	8,1
KPR - 90 - PU	90	74,5	6,3
KPR - 100 - PU	100	84,5	6,3
KPR - 110 - PU	110	94,5	6,3
KPR - 120 - PU	120	104,5	6,3
KPR - 125 - PU	125	109,5	6,3

	Piston seal Type	Dimension	Material
Ordering example:	Piston seal	∅ D 70 x 59 x 4,2	Polyurethane
Order designation:	KPR -	70 x 59,0 x 4,2	- PU

Designation of material: **PU** - Polyurethane

KE1/KD | T11/UP

Single-acting Piston Seal



Pressure MPa (bar)	Gap dim. s (mm)
10 (100)	0,40
20 (200)	0,20
25 (250)	0,175
30 (300)	0,125
40 (400)	0,08

Max. Operating Conditions	
Pressure (MPa)	≤ 40 (400 bar)
Temperature (°C)	- 40 / + 100
Speed (m/s)	≤ 0,5
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish		
Surface roughness	R _a	R _t
Groove bottom	≤ 1,6 μm	≤ 16 μm
Groove flanks	≤ 1,6 μm	≤ 16 μm
Running surface	≤ 0,3 μm	≤ 3 μm

Material	
Polyurethane	PU

Technical Description

The single-acting piston seal of the **KE1** series is made of highly wear-resistant, hydrolysis-proof polyurethane.


The geometry of the single-acting piston seal is that of a traditional piston groove ring with shortened outer lip, and may be used as piston seal only. The piston seal **KE1/S** is furnished with a back-up ring.

The seal is mainly used under light and medium duty operating conditions.

The **T11** series is a seal made of highly wear-resistant, hydrolysis-proof polyurethane with a symmetric lip shape, and may be used as piston and rod seal.

The groove rings can be installed by simple snap-on mounting.

For the dimension of the rod seals type T11/UP/UPN please refer to the dimension sheet on page 177.


Type designation	∅ D	∅ d	L
 KE1/KD			
KE1 - 12 - 5	12	5	6,0
KE1 - 14 - 8	14	8	6,8
KE1 - 16 - 8	16	8	6,3
KE1 - 16 - 10	16	10	9,0
KE1 - 16 - 10/1	16	10	6,5
KE1 - 20 - 10	20	10	8,5
KE1 - 20 - 12	20	12	5,8
KE1 - 20 - 12/1	20	12	7,5
KE1 - 20 - 14	20	14	6,0
KE1 - 22 - 12	22	12	9,0
KE1 - 24 - 18	24	18	6,0
KE1 - 25 - 10	25	10	11,0
KE1 - 25 - 13	25	13	8,0
KE1 - 25 - 15	25	15	9,0
KE1 - 30 - 15	30	15	11,0
KE1 - 30 - 20	30	20	9,0
KE1 - 30 - 22	30	22	7,0
KE1 - 31,75 - 19	31,75	19	8,0
KE1 - 32 - 17	32	17	11,0
KE1 - 32 - 22	32	22	11,0
KE1 - 32 - 22/1	32	22	9,0
KE1 - 32 - 26	32	26	6,0
KE1 - 32 - 26/1	32	26	7,0
KE1 - 34 - 22	34	22	10,0
KE1 - 34 - 22/1	34	22	9,4
KE1 - 35 - 20	35	20	11,0
KE1 - 35 - 22,5	35	22,5	7,0
KE1 - 35 - 25	35	25	9,0


	Piston seal Type	Dimension	Material
Ordering example:	Piston seal	∅ D 16 x 10 x 6,5	Polyurethan
Order designation:	KE1 -	16 x 10 x 6,5	- PU

Designation of material: PU - Polyurethan

KE1/KD


Single-acting Piston Seal


Type designation	∅ D	∅ d	L
 KE1/KD			
KE1 - 35 - 27	35	27	11,0
KE1 - 36,5 - 24	36,5	24	7,0
KE1 - 37 - 21	37	21	13,0
KE1 - 38 - 31	38	31	5,2
KE1 - 40 - 25	40	25	11,0
KE1 - 40 - 30	40	30	11,0
KE1 - 40 - 30/1	40	30	7,5
KE1 - 40 - 32	40	32	9,0
KE1 - 40 - 33	40	33	9,0
KE1 - 42 - 32	42	32	11,0
KE1 - 42 - 34,5	42	34,5	4,7
KE1 - 43 - 25	43	25	10,0
KE1 - 44 - 20	44	20	12,0
KE1 - 45 - 28,5	45	28,5	13,0
KE1 - 45 - 30	45	30	11,0
KE1 - 45 - 35	45	35	9,0
KE1 - 46 - 39,4	46	39,4	4,5
KE1 - 50 - 30	50	30	13,0
KE1 - 50 - 32	50	32	11,0
KE1 - 50 - 35	50	35	11,0
KE1 - 50 - 35/1	50	35	9,5
KE1 - 50 - 40	50	40	11,0
KE1 - 50 - 40/1	50	40	5,5
KE1 - 50 - 42/1	50	42	9,0
KE1 - 50 - 42/2	50	42	6,0
KE1 - 50 - 42/3	50	42	4,0
KE1 - 50,8 - 40,8	50,8	40,8	8,0
KE1 - 52 - 42	52	42	10,6
KE1 - 55 - 40	55	40	11,0
KE1 - 55 - 45	55	45	7,5
KE1 - 55 - 47	55	47	6,3
KE1 - 56 - 46	56	46	8,0
KE1 - 60 - 40	60	40	13,0
KE1 - 60 - 40/1	60	40	14,5
KE1 - 60 - 45	60	45	11,0
KE1 - 60 - 50	60	50	8,0

Type designation	∅ D	∅ d	L
 KE1/KD			
KE1 - 60 - 50/1	60	50	5,5
KE1 - 60 - 50/2	60	50	11,0
KE1 - 60 - 52	60	52	9,0
KE1 - 63 - 43	63	43	13,0
KE1 - 63 - 45	63	45	11,0
KE1 - 63 - 48 **	63	48	13,0
KE1 - 63 - 48/1	63	48	11,0
KE1 - 63 - 53	63	53	8,0
KE1 - 63 - 53/1	63	53	13,0
KE1 - 63 - 55	63	55	6,3
KE1 - 65 - 45	65	45	14,5
KE1 - 65 - 45/1	65	45	13,0
KE1 - 65 - 50	65	50	11,0
KE1 - 65 - 50/1	65	50	12,5
KE1 - 65 - 55	65	55	14,5
KE1 - 65 - 55/1	65	55	11,0
KE1 - 68 - 48	68	48	11,0
KE1 - 70 - 50	70	50	13,0
KE1 - 70 - 50/1	70	50	14,5
KE1 - 70 - 50/2	70	50	16,0
KE1 - 70 - 55	70	55	13,0
KE1 - 70 - 55/1	70	55	10,5
KE1 - 70 - 60	70	60	8,0
KE1 - 70 - 60/1	70	60	13,0
KE1 - 70 - 60/2	70	60	14,5
KE1 - 70 - 62	70	62	8,5
KE1 - 70 - 62/1	70	62	6,0
KE1 - 72 - 58	72	58	13,0
KE1 - 75 - 50	75	50	15,0
KE1 - 75 - 55	75	55	14,5
KE1 - 75 - 65	75	65	14,5
KE1 - 75 - 65/1	75	65	5,5
KE1 - 75 - 65/2	75	65	11,0
KE1 - 75 - 65/3	75	65	7,5
KE1 - 75 - 65/4	75	65	8,0
KE1 - 75 - 65/5	75	65	13,0

KE1/KD

Single-acting Piston Seal

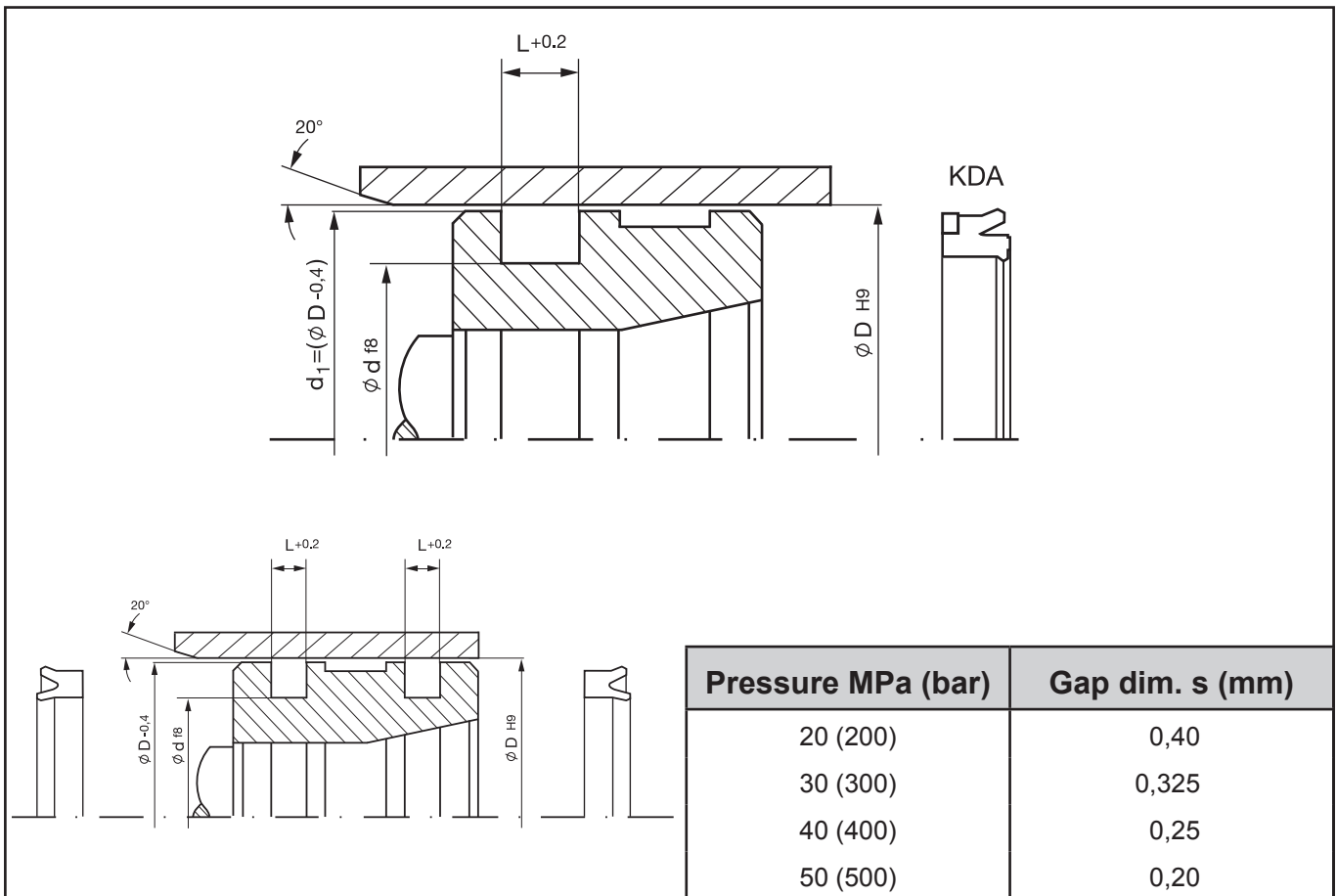
Type designation	∅ D	∅ d	L
 KE1/KD			
KE1 - 80 - 60	80	60	13,0
KE1 - 80 - 60/1	80	60	14,5
KE1 - 80 - 65	80	65	13,0
KE1 - 80 - 70	80	70	8,0
KE1 - 80 - 70/1	80	70	13,0
KE1 - 80 - 72	80	72	13,0
KE1 - 85 - 65	85	65	14,5
KE1 - 85 - 75	85	75	13,0
KE1 - 85 - 75/1	85	75	11,0
KE1 - 90 - 70	90	70	13,0
KE1 - 90 - 70/1	90	70	14,5
KE1 - 90 - 75/1	90	75	11,0
KE1 - 90 - 75	90	75	13,0
KE1 - 90 - 80	90	80	14,0
KE1 - 90 - 80/1	90	80	11,0
KE1 - 90 - 80/2 **	90	80	5,5
KE1 - 90 - 80/3	90	80	13,0
KE1 - 95 - 75	95	75	14,5
KE1 - 95 - 85	95	85	8,0
KE1 - 95 - 85/1	95	85	9,5
KE1 - 95 - 85/2	95	85	7,5
KE1 - 95 - 85/3	95	85	14,5
KE1 - 95 - 87	95	87	4,5
KE1 - 100 - 80	100	80	13,0
KE1 - 100 - 80/1	100	80	14,5
KE1 - 100 - 80/2	100	80	11,0
KE1 - 100 - 80/3	100	80	8,0
KE1 - 100 - 85	100	85	13,0
KE1 - 100 - 86	100	86	13,0
KE1 - 100 - 90	100	90	8,0
KE1 - 100 - 90/1	100	90	11,5
KE1 - 100 - 90/2	100	90	9,0
KE1 - 101,6 - 80	101,6	80	13,0
KE1 - 105 - 85	105	85	13,0
KE1 - 105 - 90	105	90	13,0
KE1 - 110 - 90	110	90	13,0

Type designation	∅ D	∅ d	L
 KE1/KD			
KE1 - 110 - 95	110	95	13,0
KE1 - 110 - 100	110	100	8,0
KE1 - 110 - 100/1	110	100	14,5
KE1 - 115 - 100	115	100	11,5
KE1 - 115 - 105	115	105	14,5
KE1 - 120 - 95	120	95	13,0
KE1 - 120 - 100	120	100	13,0
KE1 - 120 - 100/1	120	100	14,5
KE1 - 120 - 103	120	103	17,0
KE1 - 125 - 105	125	105	13,0
KE1 - 125 - 105/1	125	105	16,0
KE1 - 125 - 115	125	115	8,0
KE1 - 125 - 115/1	125	115	16,0
KE1 - 130 - 110	130	110	13,0
KE1 - 130 - 110/1	130	110	16,0
KE1 - 130 - 120	130	120	14,5
KE1 - 140 - 114	140	114	13,0
KE1 - 140 - 120	140	120	13,0
KE1 - 140 - 120/1	140	120	16,0
KE1 - 150 - 125	150	125	14,5
KE1 - 150 - 130	150	130	16,0
KE1 - 150 - 140	150	140	8,0
KE1 - 160 - 140	160	140	14,5
KE1 - 160 - 140/1	160	140	16,0
KE1 - 160 - 140/2	160	140	8,5
KE1 - 160 - 148	160	148	7,5
KE1 - 170 - 150	170	150	16,0
KE1 - 170 - 152	170	152	8,0
KE1 - 174,8 - 165,2	174,8	165,2	7,5
KE1 - 180 - 160	180	160	14,5
KE1 - 180 - 166	180	166	16,5
KE1 - 190 - 170	190	170	16,0
KE1 - 190 - 172	190	172	8,0
KE1 - 200 - 180	200	180	16,0
KE1 - 220 - 200	220	200	16,0
KE1 - 280 - 250	280	250	19,0

Further dimension and in-between sizes upon request. / ** These sizes are available upon request only.

KE1/S | KDA

Single-acting Piston Seal



Max. Operating Conditions

Pressure (MPa)	≤ 50 (500 bar)
Temperature (°C)	- 40 / + 100
Speed (m/s)	≤ 0,5
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

	R _a	R _t
Nutgrund	≤ 1,6 μm	≤ 16 μm
Nutflanken	≤ 1,6 μm	≤ 16 μm
Lauffläche	≤ 0,3 μm	≤ 3 μm

Material

Polyurethan / Polyacetal	PU/POM
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Technical Description

The single-acting piston seal of the **KDA** series is made of highly wear-resistant, hydrolysis-proof polyurethane and is furnished with an polyacetal back-up ring.

The geometry of the single-acting piston seal is that of a traditional piston groove ring with shortened outer lip, and may be used as piston seal only.


The seal is mainly used under light and medium duty operating conditions.

The groove rings can be installed by simple snap-on mounting.

Type designation	∅ D	∅ d	L
 KDA			
KDA - 40 - 25	40	25	9,5
KDA - 45 - 30	45	30	9,5
KDA - 45 - 35	45	35	9,5
KDA - 50 - 35	50	35	9,5
KDA - 50 - 40	50	40	9,5
KDA - 55 - 40	55	40	9,5
KDA - 60 - 40	60	40	14,5
KDA - 60 - 45	60	45	9,5
KDA - 63 - 48	63	48	9,5
KDA - 65 - 50	65	50	9,5
KDA - 70 - 50	70	50	12,5
KDA - 70 - 55	70	55	9,5
KDA - 80 - 60	80	60	12,5
KDA - 80 - 65	80	65	9,5
KDA - 85 - 70	85	70	9,5
KDA - 90 - 70	90	70	12,5
KDA - 90 - 75	90	75	9,5
KDA - 100 - 80	100	80	12,5
KDA - 100 - 85/1	100	85	9,5
KDA - 100 - 85	100	85	14,5
KDA - 105 - 85	105	85	12,5
KDA - 110 - 90	110	90	12,5
KDA - 115 - 95	115	95	12,5
KDA - 120 - 105	120	105	9,5
KDA - 125 - 100	125	100	15,5
KDA - 125 - 105	125	105	12,5
KDA - 130 - 110	130	110	12,5
KDA - 140 - 115	140	115	15,5
KDA - 140 - 120	140	120	12,5
KDA - 150 - 120	150	120	19,0
KDA - 150 - 130	150	130	12,5
KDA - 160 - 130	160	130	19,0
KDA - 160 - 140	160	140	12,5
KDA - 170 - 150	170	150	12,5
KDA - 180 - 150	180	150	19,0
KDA - 180 - 160	180	160	12,5

KE1/S | KDA

Single-acting Piston Seal

Type designation	∅ D	∅ d	L
 KDA			
KDA - 190 - 170	190	170	12,5
KDA - 198 - 178	198	178	13,0
KDA - 200 - 170	200	170	19,0
KDA - 200 - 175	200	175	16,0
KDA - 220 - 200	220	200	16,0
KDA - 250 - 220	250	220	19,0
KDA - 250 - 225	250	225	15,5

Further dimension and in-between sizes upon request.

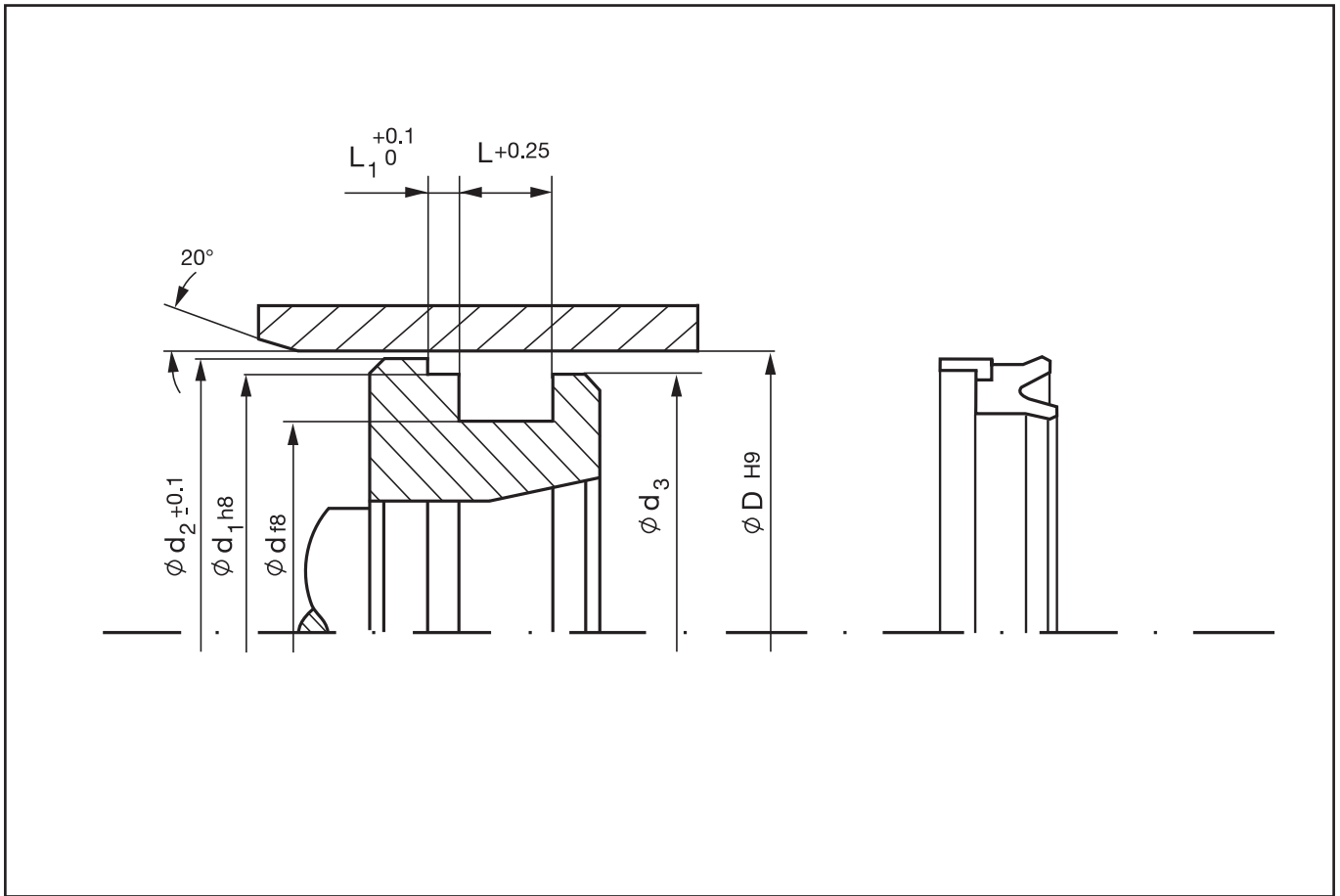
	Piston seal Type	Dimension	Material
Ordering example:	Piston seal	∅ D 40 x 25 x 9,5	Polyurethane
Order designation:	KDA -	40 x 25 x 9,5	- PU

Designation of material: **PU - Polyurethane**

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.

KE2/KDF

Single-acting Piston Seal



Max. Operating Conditions

Pressure (MPa)	≤ 40 (400 bar)
Temperature (°C)	- 40 / + 100
Speed (m/s)	≤ 0,5

Media: Hydraulic fluids upon oil-basis,
hardly inflaming hydraulic fluids,
HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	≤ 1,6 μm	≤ 16 μm
Groove flanks	≤ 1,6 μm	≤ 16 μm
Running surface	≤ 0,3 μm	≤ 3 μm

Material

Polyurethane	PU
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Technical Description

The single-acting piston seal of the **KE2 /KDF** series is made of highly wear-resistant, hydrolysis-proof polyurethane.

The geometry of the single-acting piston seal is that of a traditional piston groove ring with shortened outer lip and an additional form-fitted guide ring.

The shape assures a rapid response of the groove ring even in the low pressure range.

The seal can be installed by simple snap-on mounting. The slotted guide ring is snapped into the designated groove.

Type designation	∅ D	∅ d	L	∅ d ₁	∅ d ₂	∅ d ₃	L ₁
KDF - 32 - 20	32	20	9,0	28,50	30,5	24,0	6,35
KDF - 35 - 22	35	22	10,0	31,40	33,5	27,0	6,35
KDF - 40 - 25	40	25	9,5	35,40	38,5	30,0	6,35
KDF - 40 - 26	40	26	9,5	35,40	38,5	31,0	6,35
KDF - 40 - 30	40	30	9,0	35,40	38,5	34,0	6,35
KDF - 45 - 30	45	30	10,0	40,40	43,7	35,0	6,35
KDF - 45 - 35	45	35	9,5	40,40	43,7	39,0	6,35
KDF - 50 - 30	50	30	14,5	44,30	48,5	35,0	6,35
KDF - 50 - 35	50	35	11,0	45,35	48,5	40,0	6,35
KDF - 50 - 40	50	40	11,0	45,40	48,5	44,0	6,35
KDF - 55 - 40	55	40	11,0	50,35	53,5	45,0	6,35
KDF - 60 - 40	60	40	14,5	55,40	58,5	45,0	6,35
KDF - 60 - 45	60	45	11,0	55,40	58,5	50,0	6,35
KDF - 63 - 45	63	45	11,0	58,40	61,5	50,0	6,35
KDF - 65 - 50	65	50	11,0	60,40	63,5	55,0	6,35
KDF - 70 - 50	70	50	14,5	64,20	68,3	55,0	6,35
KDF - 80 - 60	80	60	13,0	74,15	78,3	65,0	6,35
KDF - 80 - 60/1	80	60	14,5	74,15	78,3	65,0	6,35
KDF - 90 - 70	90	70	13,0	84,15	88,3	75,0	6,35
KDF - 100 - 80	100	80	14,5	93,15	98,0	85,0	6,35
KDF - 100 - 80/1	100	80	14,5	94,15	98,3	85,0	6,35
KDF - 110 - 95	110	95	13,0	103,10	108,0	100,0	6,35
KDF - 120 - 100	120	100	14,5	113,10	118,1	105,0	6,35

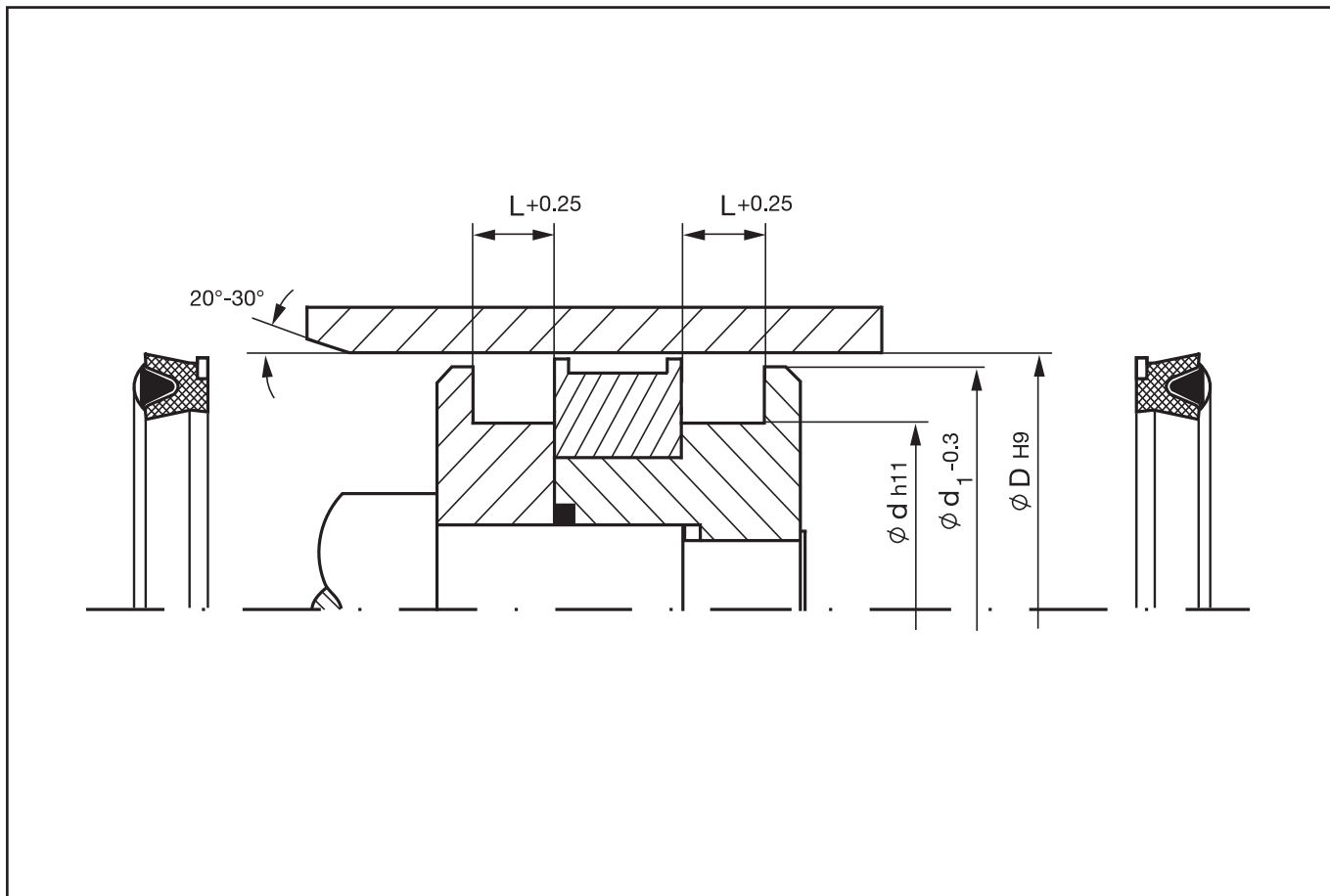
Further dimension and in-between sizes upon request.

	Seal Type	Dimension	Material
Ordering example:	Piston Seal	∅ D 80 x 60 x 13	Polyurethane
Order designation:	KDF -	80 x 60 x 13,0	- PU

Designation of material: **PU - Polyurethane**

KE3

Single-acting Piston Seal



Max. Operating Conditions

Pressure (MPa)	≤ 70 (700 bar)*
Temperature (°C)	- 30 / + 110
Speed (m/s)	≤ 0,5

Media: Hydraulic fluids upon oil-basis,
hardly inflaming hydraulic fluids,
HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	≤ 1,6 μm	≤ 16 μm
Groove flanks	≤ 1,6 μm	≤ 16 μm
Running surface	≤ 0,3 μm	≤ 3 μm

Material

NBR-Fabric	N
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Technical Description

The **KE3** single-acting piston seal is made of NBR fabric with a polyacetal anti-extrusion ring (AE)* partially on the dynamic side.

The design and construction of the single-acting piston seal ensure reliable functioning even under very heavy operating conditions.

The seal can be installed on the split piston by slide-on mounting.

Type designation	∅ D	∅ d	L	∅ d ₁
KE3 - 40 - 25	40	25	10,0	38,5
KE3 - 45 - 30	45	30	10,0	43,5
KE3 - 50 - 35	50	35	10,0	48,5
KE3 - 55 - 40	55	40	12,0	53,5
KE3 - 63 - 45	63	45	14,4	61,5
KE3 - 65 - 45	65	45	14,4	63,5
KE3 - 70 - 50	70	50	14,4	68,5
KE3 - 75 - 55	75	55	14,4	73,5
KE3 - 80 - 60	80	60	14,6	78,5
KE3 - 90 - 70	90	70	14,6	88,5
KE3 - 95 - 75	95	75	14,6	93,5
KE3 - 100 - 80	100	80	14,6	98,5
KE3 - 105 - 85	105	85	14,6	103,5
KE3 - 110 - 90	110	90	14,6	108,5
KE3 - 115 - 90	115	90	14,6	113,5
KE3 - 115 - 95	115	95	14,6	113,5
KE3 - 120 - 100	120	100	14,6	118,5
KE3 - 125 - 100	125	100	16,8	123,5
KE3 - 140 - 115	140	115	16,8	138,5
KE3 - 150 - 120	150	120	18,8	148,5
KE3 - 160 - 130	160	130	18,8	158,5
KE3 - 180 - 150	180	150	19,8	178,5
KE3 - 190 - 160	190	160	19,8	188,5
KE3 - 200 - 170	200	170	19,8	198,5
KE3 - 200 - 180	200	180	17,0	198,5
KE3 - 220 - 190	220	190	19,8	218,5
KE3 - 250 - 220	250	220	19,8	248,5
KE3 - 280 - 250	280	250	19,8	278,5

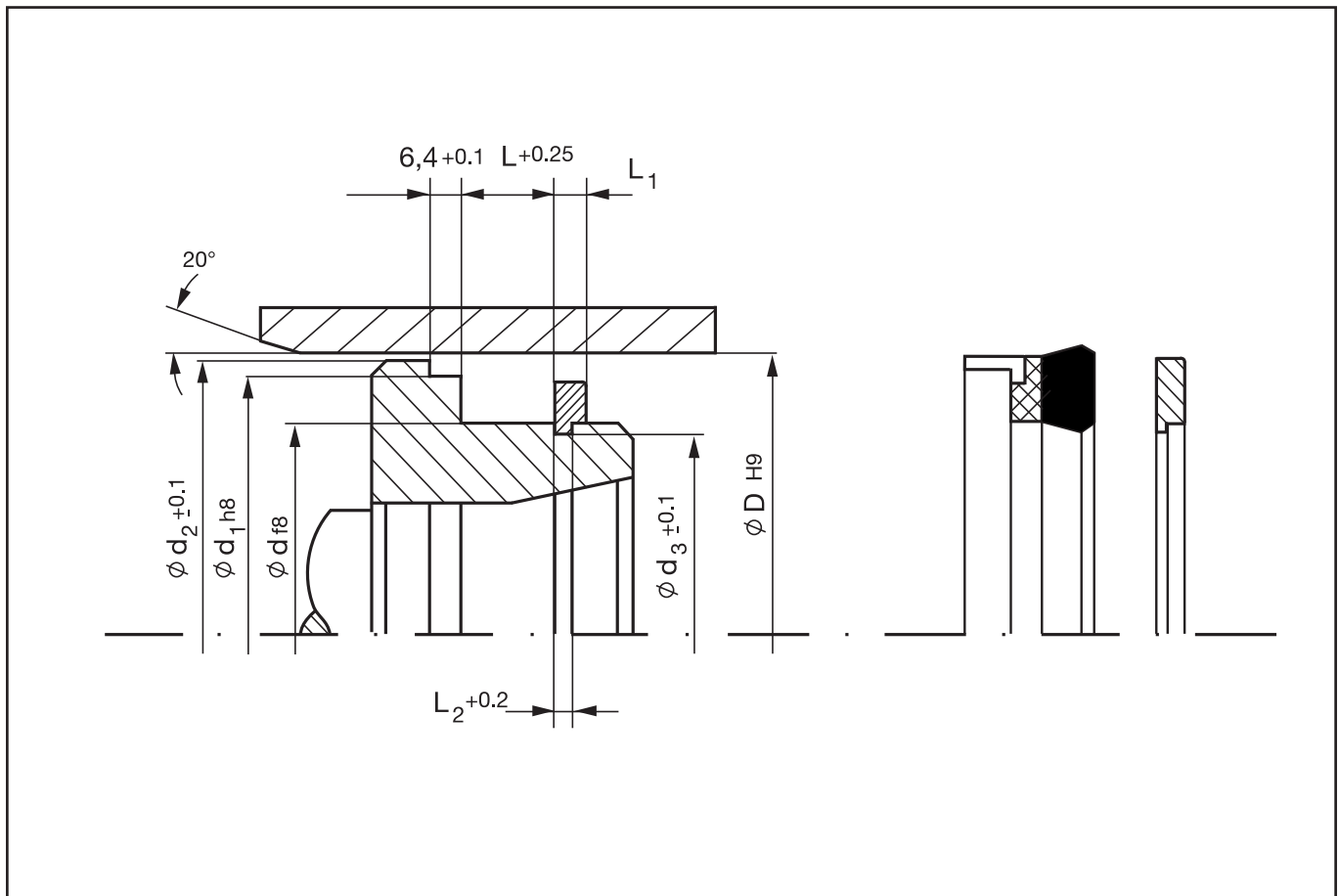
Further dimension and in-between sizes upon request.
 ** These sizes are available upon request only.

	Seal Type	Dimension	Material
Ordering example:	Piston Seal	∅ D 80 x 60 x 14,6	NBR-Fabric
Order designation:	KE3 -	80 x 60 x 14,6	- N

Designation of material: **N - NBR-Fabric**

KE5

Single-acting Piston Seal



Max. Operating Conditions

Pressure (MPa)	≤ 45 (450 bar)
Temperature (°C)	- 30 / + 110
Speed (m/s)	≤ 0,5

Media: Hydraulic fluids upon oil-basis,
hardly inflaming hydraulic fluids,
HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	≤ 1,6 μm	≤ 16 μm
Groove flanks	≤ 1,6 μm	≤ 16 μm
Running surface	≤ 0,3 μm	≤ 3 μm

Material

NBR-Fabric	N
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Technical Description

The **KE5** series single-acting piston seal consists of an NBR sealing element with an additional fabric reinforced back depending on the size.

A polyacetal guide ring is integrated into the seal in order to guide the piston. The seal is also supplied with a split safety ring that retains the piston seal.

The seal can be installed by simple slide-on mounting.

Type designation	∅ D	∅ d	L	∅ d ₁	∅ d ₂	∅ d ₃	L ₂
KE5 - 45 - 35 - D	45	35	8,5	42,0	43,99	30,6	3,1
KE5 - 50 - 30 - S	50	30	14,5	44,3	48,30	25,6	3,3
KE5 - 50 - 30 - D	50	30	14,0	44,3	48,30	25,6	3,3
KE5 - 50 - 40 - S	50	40	10,5	46,2	48,70	35,6	2,6
KE5 - 55 - 40 - D	55	40	10,5	50,4	53,65	35,6	3,1
KE5 - 60 - 40 - S	60	40	14,5	54,5	58,30	35,6	3,3
KE5 - 60 - 40 - D	60	40	14,0	54,2	58,06	35,6	3,3
KE5 - 63 - 45 - S	63	45	11,0	58,4	61,60	40,6	3,1
KE5 - 65 - 45 - D	65	45	14,0	59,3	63,07	40,6	3,3
KE5 - 65 - 45 - S	65	45	14,5	59,3	63,10	40,6	3,3
KE5 - 65 - 50 - D	65	50	10,0	60,1	63,22	45,6	3,1
KE5 - 65 - 50 - D/1	65	50	10,5	60,4	63,22	45,6	3,1
KE5 - 70 - 50 - D	70	50	14,0	64,3	68,05	45,6	3,3
KE5 - 70 - 50 - S	70	50	14,5	64,2	68,30	45,6	3,3
KE5 - 80 - 60 - D	80	60	14,0	74,2	78,34	55,6	3,3
KE5 - 80 - 60 - S	80	60	14,5	74,2	78,30	55,6	3,3
KE5 - 80 - 65 - S	80	65	11,5	75,4	78,60	60,6	3,1
KE5 - 85 - 70 - S	85	70	12,5	80,3	83,60	65,6	3,1
KE5 - 90 - 70 - D	90	70	14,0	84,2	88,30	65,6	3,3
KE5 - 90 - 70 - S	90	70	14,5	84,2	88,30	65,6	3,3
KE5 - 95 - 75 - D	95	75	14,0	89,1	93,30	70,6	3,3
KE5 - 95 - 75 - S	95	75	14,5	89,2	93,30	70,6	3,3
KE5 - 100 - 80 - D	100	80	14,0	94,2	98,30	75,6	3,3
KE5 - 100 - 80 - S	100	80	14,5	94,2	98,30	75,6	3,3
KE5 - 104,5 - 85 - S	104,5	85	13,0	98,8	102,60	80,6	3,1
KE5 - 104,5 - 85 - D	104,5	85	14,0	98,8	102,47	80,6	3,3

Seal Type

Dimension

Model

Material

Ordering example: **Piston Seal** **∅ D 80 x 60 x 14,5** **S** **NBR-Fabric**

Order designation: **KE5 - 80 x 60 x 14,5 - S N**

Designation of material: **N - NBR-Fabric**

KE5

Single-acting Piston Seal

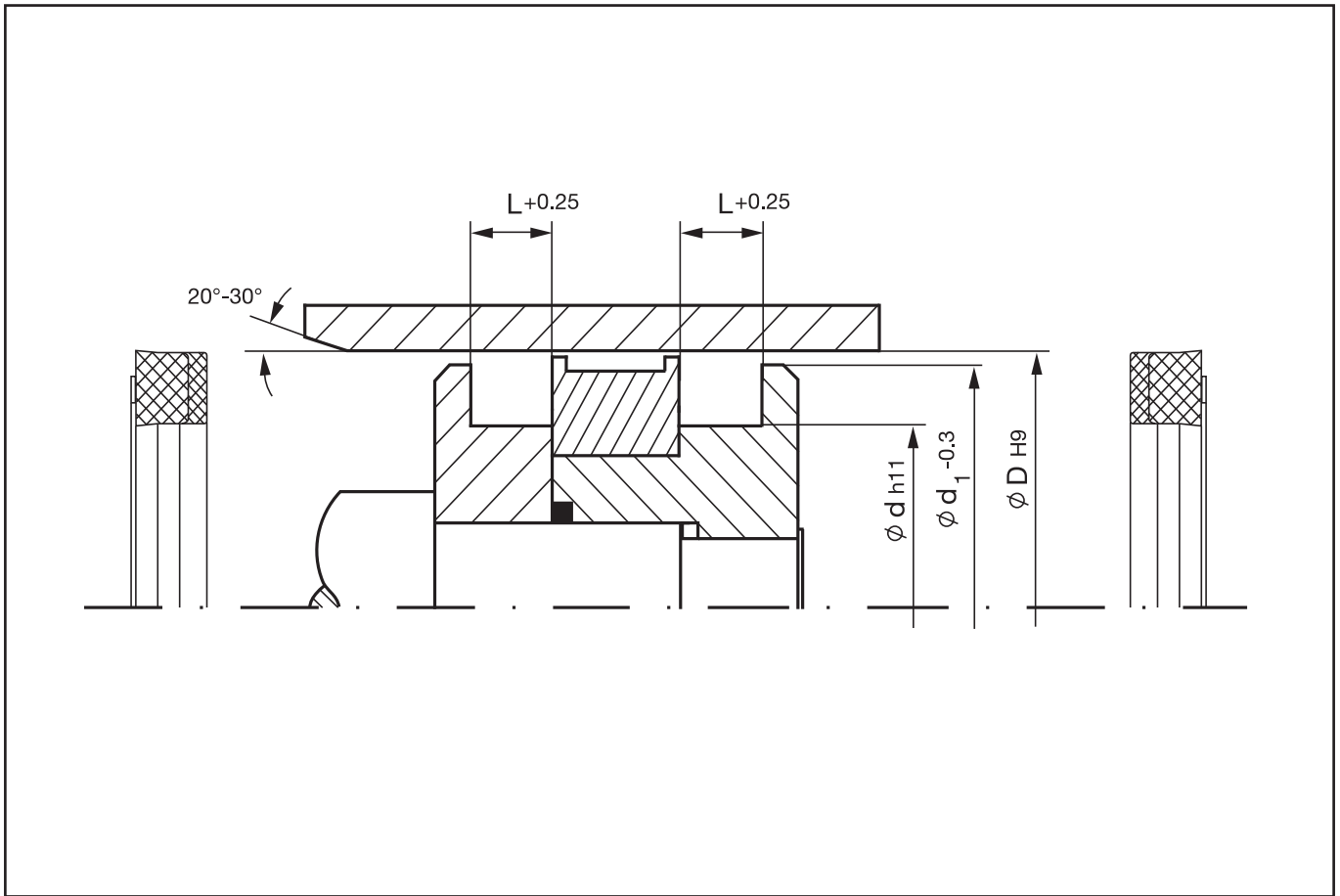
Type designation	∅ D	∅ d	L	∅ d ₁	∅ d ₂	∅ d ₃	L ₂
KE5 - 105 - 85 - D	105	85	14,0	99,42	102,97	80,6	3,3
KE5 - 105 - 85 - S	105	85	14,5	99,1	103,30	80,6	3,3
KE5 - 110 - 90 - D	110	90	12,5	104,1	108,33	85,6	3,3
KE5 - 110 - 90 - S	110	90	13,0	104,1	108,30	85,6	3,3
KE5 - 115 - 95 - D	115	95	14,0	109,0	112,85	90,6	3,3
KE5 - 115 - 95 - S	115	95	14,5	109,0	113,30	90,6	3,3
KE5 - 120 - 100 - D	120	100	12,5	114,1	118,33	95,6	3,3
KE5 - 120 - 100 - S	120	100	13,0	114,1	118,30	95,6	3,3
KE5 - 125 - 105 - D	125	105	12,0	119,3	123,31	100,6	3,3
KE5 - 125 - 105 - S	125	105	13,0	119,1	123,30	100,6	3,3
KE5 - 130 - 110 - D	130	110	12,0	123,24	127,96	105,6	3,3

Further dimension and in-between sizes upon request.

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.

KE6

Single-acting Piston Seal



Max. Operating Conditions

Pressure (MPa)	≤ 70 (700 bar)
Temperature (°C)	- 30 / + 110
Speed (m/s)	≤ 0,5

Media: Hydraulic fluids upon oil-basis,
hardly inflaming hydraulic fluids,
HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	≤ 1,6 μm	≤ 16 μm
Groove flanks	≤ 1,6 μm	≤ 16 μm
Running surface	≤ 0,3 μm	≤ 3 μm

Material

NBR-Fabric	N
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Technical Description

The single-acting piston seal **KE6** is made of NBR fabric with an additional NBR fabric support element. The entire surface of the support element borders on the back of the seal and secures it from extrusion.

The design and layout of the single-acting piston seal assure secure performance even under very heavy operating conditions.

The seal can be installed on the split piston by slide-on mounting.

Type designation	∅ D	∅ d	L
KE6 - 63 - 48	63	48	10,0
KE6 - 80 - 60	80	60	12,5
KE6 - 100 - 80	100	80	12,5
KE6 - 110 - 90	110	90	12,5
KE6 - 115 - 90	115	90	15,3
KE6 - 125 - 100	125	100	15,5
KE6 - 140 - 120	140	120	15,3
KE6 - 160 - 130	160	130	19,0
KE6 - 180 - 150	180	150	19,0
KE6 - 190 - 160	190	160	19,0
KE6 - 220 - 190	220	190	19,0

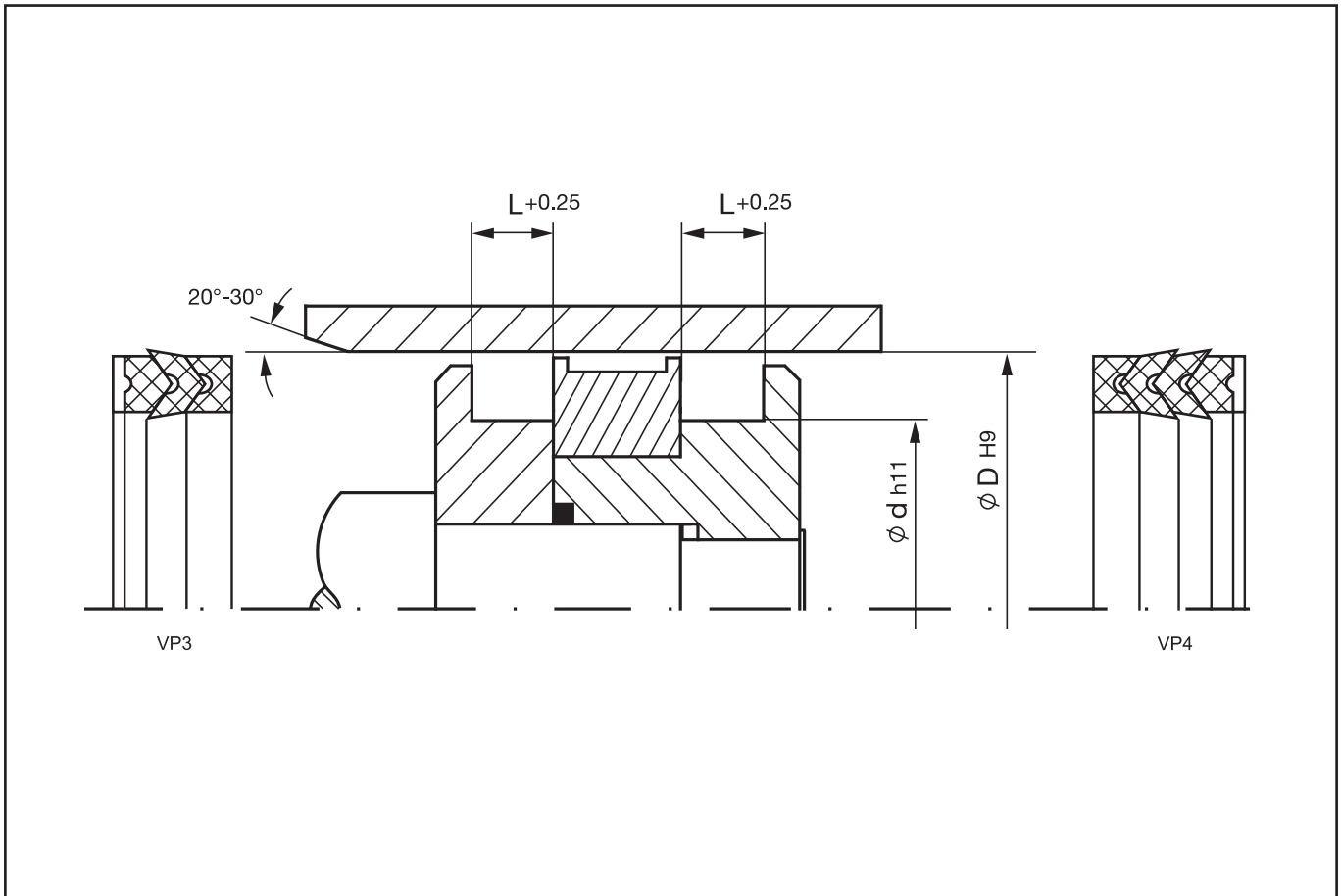
Further dimension and in-between sizes upon request.

	Seal Type	Dimension	Material
Ordering example:	Piston Seal	∅ D 115 x 90 x 15,3	NBR-Fabric
Order designation:	KE6 -	115 x 90 x 15,3	- N

Designation of material: **N - NBR-Fabric**

VP3 | VP4

Single-acting Piston Seal



Max. Operating Conditions

Pressure (MPa)	≤ 40 (400 bar)
Temperature (°C)	- 30 / + 110 / + 140
Speed (m/s)	≤ 0,5
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	≤ 1,6 µm	≤ 16 µm
Groove flanks	≤ 1,6 µm	≤ 16 µm
Running surface	≤ 0,3 µm	≤ 3 µm

Material

NBR-Fabric	N
FKM-Fabric (Viton [®])	V

Technical Description

The piston seal of the **VP3 / VP4** series is a three- / four-piece chevron-type seal for use with pistons pressurized on both sides.

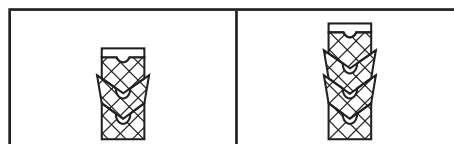
For decades, this sealing combination has proven outstandingly successful even in heavy duty applications.

The seal consists of one/two chevron-type fabric seals, a pressure ring and a support ring.

The installation takes place inside a seal housing with axial access, without axially tightening the seal kit.

The seal type **VP3 / VP4** is also available in FPM (Viton[®]) and therefore suitable for temperatures of up to +140 °C. Revolved V-packing seal kits of polyurethane could be produced as well.

For temperatures above 140 °C we kindly request your enquiries for a specific offer.



Dimensions				VP-type	
∅ D	∅ d	H	L	VP3	VP4
20	10	8,9	9,3	x	
22	12	8,9	9,3	x	
25	15	8,9	9,3	x	
28	18	8,9	9,3	x	
30	20	8,9	9,3	x	
32	20	10,4	10,9	x	
35	23	10,4	10,9	x	
36	24	10,4	10,9	x	
40	25	11,0	11,5	x	
42	27	11,0	11,5	x	
45	30	11,0	11,5	x	
50	35	11,0	11,5	x	
55	40	11,0	11,5	x	
56	41	11,0	11,5	x	
60	45	11,0	11,5	x	
63	48	12,5	13,0	x	
65	50	12,5	13,0	x	
70	50	14,6	15,2	x	
75	55	14,6	15,2	x	
80	60	14,6	15,2	x	
85	65	20,6	21,2	x	
90	70	20,6	21,2	x	
100	80	20,6	21,2	x	
110	90	20,6	21,2	x	
115	95	20,6	21,2	x	

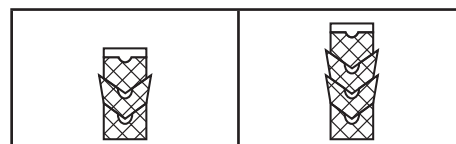
Seal Type	Dimension	Material / Model
Ordering example:	Piston Seal	∅ D 63 x 48 x 13
Order designation:	VP3 -	63 x 48 x 13,0 - N

Designation of material:

- N** - NBR-Fabric
- V** - FKM (Viton®)

VP3 | VP4

Single-acting Piston Seal



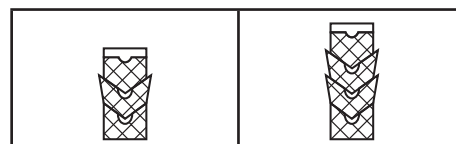
Dimensions				VP-type	
∅ D	∅ d	H	L	VP3	VP4
125	100	25,0	25,8	x	
140	115	25,0	25,8	x	
150	120	28,0	29,0	x	
160	130	28,0	29,0	x	
180	150	30,5	31,5	x	
200	170	32,5	33,5	x	
200	170	40,0	41,2		x
220	190	30,0	31,0	x	
220	190	37,5	38,7		x
225	195	32,5	33,5	x	
225	195	40,0	41,2		x
250	220	32,5	33,5	x	
250	220	40,0	41,2		x
275	245	32,5	33,5	x	
275	245	40,0	41,2		x
280	250	33,0	34,0	x	
280	250	41,0	42,2		x
300	270	32,5	33,5	x	
300	270	40,0	41,2		x
310	280	30,0	31,0	x	
310	280	37,5	38,7		x
320	280	38,0	39,5	x	
320	280	48,0	49,8		x
320	280	40,0	41,5	x	
320	280	50,0	51,8		x
320	290	27,5	28,5	x	
320	290	35,0	36,2		x
320	290	32,5	33,5	x	
320	290	40,0	41,2		x
330	300	30,0	31,0	x	
330	300	37,5	38,7		x
340	300	35,0	36,5	x	
340	300	45,0	46,8		x
340	310	30,0	31,0	x	



Dimensions				VP-type	
∅ D	∅ d	H	L	VP3	VP4
340	310	37,5	38,7		x
350	320	30,0	31,0	x	
350	320	37,5	38,7		x
360	320	35,0	36,5	x	
360	320	45,0	46,8		x
380	340	35,0	36,5	x	
380	340	45,0	46,8		x
380	350	30,0	31,0	x	
380	350	37,5	38,7		x
400	360	35,0	36,5	x	
400	360	45,0	46,8		x
410	370	40,0	41,5	x	
410	370	50,0	51,8		x
420	380	40,0	41,5	x	
420	380	50,0	51,8		x
430	390	35,0	36,5	x	
430	390	45,0	46,8		x
440	400	35,0	36,5	x	
440	400	45,0	46,8		x
450	410	35,0	36,5	x	
450	410	45,0	46,8		x
460	420	40,0	41,5	x	
460	420	50,0	51,8		x
480	440	40,0	41,5	x	
480	440	50,0	51,8		x
490	450	35,0	36,5	x	
490	450	45,0	46,8		x
500	460	40,0	41,5	x	
500	460	50,0	51,8		x
520	480	40,0	41,5	x	
520	480	50,0	51,8		x
540	500	35,0	36,5	x	
540	500	45,0	46,8		x
560	520	40,0	41,5	x	

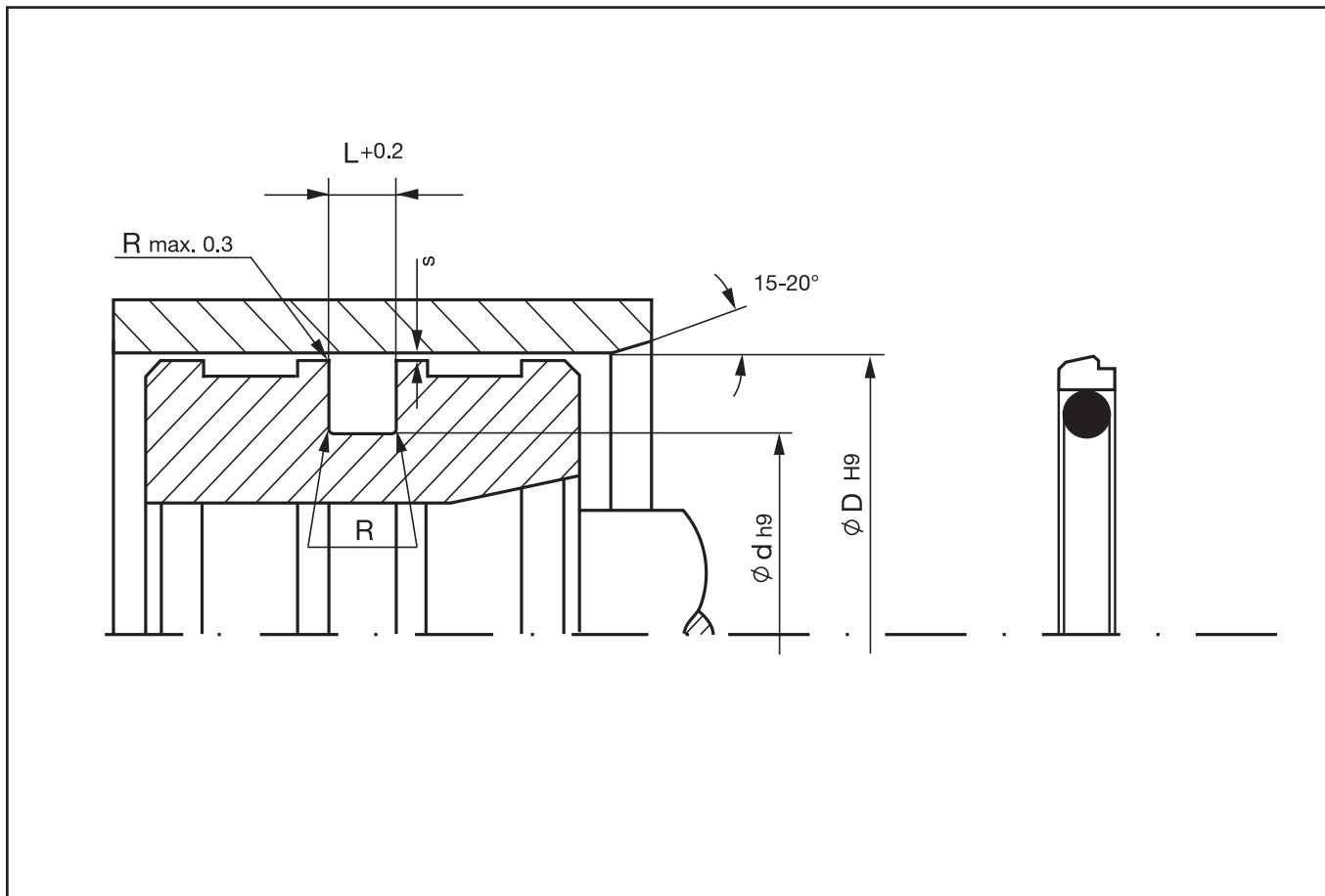
VP3 | VP4

Single-acting Piston Seal



Dimensions				VP-type	
∅ D	∅ d	H	L	VP3	VP4
560	520	50,0	51,8		X
570	530	40,0	41,5	X	
570	530	50,0	51,8		X
600	550	50,0	51,8	X	
600	550	62,5	64,5		X
610	560	50,0	51,8	X	
610	560	62,5	64,5		X
630	590	40,0	41,5	X	
630	590	50,0	51,8		X
640	600	40,0	41,5	X	
640	600	50,0	51,8		X
650	610	40,0	41,5	X	
650	610	50,0	51,8		X
680	640	40,0	41,5	X	
680	640	50,0	51,8		X
700	660	40,0	41,5	X	
700	660	50,0	51,8		X
720	680	40,0	41,5	X	
720	680	50,0	51,8		X
740	700	40,0	41,5	X	
740	700	50,0	51,8		X
750	700	50,0	51,8	X	
750	700	62,5	64,5		X
850	800	50,0	51,8	X	
850	800	62,5	64,5		X
900	850	50,0	51,8	X	
900	850	62,5	64,5		X
1050	1000	50,0	51,8	X	
1050	1000	62,5	64,5		X

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.



Max. Operating Conditions *

Pressure (MPa)	≤ 80 (800 bar)
Temperature (°C)	- 30 / + 110 / + 200
Speed (m/s)	≤ 15 (0,5) **

Media: Hydraulic fluids upon oil-basis,
hardly inflaming hydraulic fluids,
HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	≤ 1,6 µm	≤ 16 µm
Groove flanks	≤ 1,6 µm	≤ 16 µm
Running surface	≤ 0,3 µm	≤ 3 µm

Material

PTFE-bronze / -carbon / glass fiber (+MoS ₂)	PB/PK/PG(M)
PTFE-compound turquoise	PT
PTFE-Econol	PEK
Polyurethane	PU **

Technical Description

The single-acting piston seal of the **NPR** series consists of a PTFE compound piston seal ring preset by a O-Ring.

The PTFE material stands out for excellent sliding characteristics, low attrition rate as well as high extrusion resistance.

The thermal and chemical stability of the PTFE material allows for the use in a wide range of applications.

*Max. operating conditions:

Higher values are permitted if the structural requirements are provided.

Higher operating pressures of up to 80 MPa, sliding speeds of up to 15 m/s are possible if these extreme conditions do not occur at the same time.

If operating pressure are higher up to 40 MPa, the gap dimensions „s“ have to be reduced.

Field of application and service conditions are decisive for the selection of the PTFE-compounds, respectively the material qualities. Temperature range and chemical stability depending on chosen O-Ring material.

Assembly dimensions

Diameter \varnothing D			Groove bottom \varnothing d	L.dim.	O-Ring
Standard	Type_ _ _/1	Type_ _ _/2			
8 - 16,9		17 - 26,9	\varnothing D - 4,9	2,2	1,78
17 - 26,9		27 - 59,9	\varnothing D - 7,3	3,2	2,62
27 - 59,9	17 - 26,9	60 - 199,9	\varnothing D - 10,7	4,2	3,53
60 - 199,9	27 - 59,9	200 - 255,9	\varnothing D - 15,1	6,3	5,33
200 - 255,9	60 - 199,9	256 - 669,9	\varnothing D - 20,5	8,1	7,00
256 - 669,9	200 - 255,9	670 - 999,9	\varnothing D - 24,0	8,1	7,00
670 - 999,9	256 - 669,9		\varnothing D - 27,3	9,5	8,40

If the groove width (L dim.) differs from the standard series, the complementary number /1 or /2 is added to the order designation.

Subject to the diameter (D), the corresponding groove bottom diameters (d) and assembly dimensions (L dim.) are to be taken from the above table under type ---/1 and type ---/2.

Gap dim. s (mm)

L.dim.	0 - 20 MPa	20 - 40 MPa	Radius R
2,2	0,30 - 0,20	0,20 - 0,15	0,3 - 0,5
3,2	0,40 - 0,25	0,25 - 0,15	0,5 - 0,8
4,2	0,40 - 0,25	0,25 - 0,20	0,8 - 1,2
6,3	0,50 - 0,30	0,30 - 0,20	1,2 - 1,5
8,1	0,60 - 0,35	0,35 - 0,25	1,5 - 2,0
8,1	0,60 - 0,35	0,35 - 0,25	1,5 - 2,0
9,5	0,70 - 0,50	0,50 - 0,30	2,0 - 3,0

“For pressures more than 400 bar we recommend to choose a gap behind the seal of H8/F8 (hole/piston).”

	Piston seal Type	Dimension	Material
Ordering example:	Piston seal	\varnothing D 60 x 44,9 x 6,3	PTFE-bronze
Order designation:	NPR -	60 x 44,9 x 6,3	- PB

- Designation of material:**
- PB** - PTFE-bronze
 - PK** - PTFE-carbon
 - PG(M)** - PTFE-glass fiber + (MoS₂)
 - PT** - PTFE compound turquoise
 - PEK** - PTFE-Econol
 - PU** - Polyurethane

Type designation	∅ D	∅ d	L	O-Ring
NPR - 008 - PB	8	3,1	2,2	006
NPR - 010 - PB	10	5,1	2,2	009
NPR - 012 - PB	12	7,1	2,2	011
NPR - 014 - PB	14	9,1	2,2	012
NPR - 015 - PB	15	10,1	2,2	012
NPR - 016 - PB	16	11,1	2,2	013
NPR - 018 - PB	18	10,7	3,2	111
NPR - 020 - PB	20	12,7	3,2	112
NPR - 020/2 - PB	20	15,1	2,2	016
NPR - 022 - PB	22	14,7	3,2	113
NPR - 024 - PB	24	16,7	3,2	114
NPR - 025 - PB	25	17,7	3,2	115
NPR - 025/1 - PB	25	14,3	4,2	207
NPR - 028 - PB	28	17,3	4,2	209
NPR - 030 - PB	30	19,3	4,2	210
NPR - 032 - PB	32	21,3	4,2	211
NPR - 032/2 - PB	32	24,7	3,2	120
NPR - 035 - PB	35	24,3	4,2	213
NPR - 038 - PB	38	27,3	4,2	215
NPR - 039 - PB	39	28,3	4,2	215
NPR - 040 - PB	40	29,3	4,2	216
NPR - 040/2 - PB	40	32,7	3,2	124
NPR - 042 - PB	42	31,3	4,2	217
NPR - 045 - PB	45	34,3	4,2	219
NPR - 048 - PB	48	37,3	4,2	221
NPR - 050 - PB	50	39,3	4,2	222
NPR - 050/1 - PB	50	34,9	6,3	324
NPR - 052 - PB	52	41,3	4,2	223
NPR - 055 - PB	55	44,3	4,2	224
NPR - 060 - PB	60	44,9	6,3	327
NPR - 063 - PB	63	47,9	6,3	328
NPR - 063/2 - PB	63	52,3	4,2	832
NPR - 064 - PB	64	48,9	6,3	328
NPR - 065 - PB	65	49,9	6,3	328
NPR - 070 - PB	70	54,9	6,3	330
NPR - 070/2 - PB	70	59,3	4,2	836
NPR - 075 - PB	75	59,9	6,3	332
NPR - 080 - PB	80	64,9	6,3	333

Type designation	∅ D	∅ d	L	O-Ring
NPR - 080/1 - PB	80	59,5	8,1	60x7
NPR - 085 - PB	85	69,9	6,3	335
NPR - 085/1 - PB	85	64,5	8,1	65x7
NPR - 089 - PB	89	73,9	6,3	336
NPR - 090 - PB	90	74,9	6,3	336
NPR - 090/1 - PB	90	69,5	8,1	70x7
NPR - 095 - PB	95	79,9	6,3	338
NPR - 095/1 - PB	95	74,5	8,1	75x7
NPR - 100 - PB	100	84,9	6,3	339
NPR - 100/1 - PB	100	79,5	8,1	80x7
NPR - 105 - PB	105	89,9	6,3	341
NPR - 105/1 - PB	105	84,5	8,1	85x7
NPR - 110 - PB	110	94,9	6,3	343
NPR - 110/1 - PB	110	89,5	8,1	90x7
NPR - 115 - PB	115	99,9	6,3	344
NPR - 115/1 - PB	115	94,5	8,1	95x7
NPR - 120 - PB	120	104,9	6,3	346
NPR - 120/1 - PB	120	99,5	8,1	100x7
NPR - 125 - PB	125	109,9	6,3	347
NPR - 125/1 - PB	125	104,5	8,1	105x7
NPR - 127 - PB	127	111,9	6,3	348
NPR - 130 - PB	130	114,9	6,3	349
NPR - 130/1 - PB	130	109,5	8,1	110x7
NPR - 132 - PB	132	116,9	6,3	349
NPR - 133 - PB	133	117,9	6,3	350
NPR - 135 - PB	135	119,9	6,3	351
NPR - 140 - PB	140	124,9	6,3	352
NPR - 145 - PB	145	129,9	6,3	353
NPR - 150 - PB	150	134,9	6,3	355
NPR - 154 - PB	154	138,9	6,3	356
NPR - 155 - PB	155	139,9	6,3	356
NPR - 160 - PB	160	144,9	6,3	358
NPR - 160/1 - PB	160	139,5	8,1	433
NPR - 165 - PB	165	149,9	6,3	360
NPR - 170 - PB	170	154,9	6,3	361
NPR - 175 - PB	175	159,9	6,3	362
NPR - 180 - PB	180	164,9	6,3	363
NPR - 190 - PB	190	174,9	6,3	364

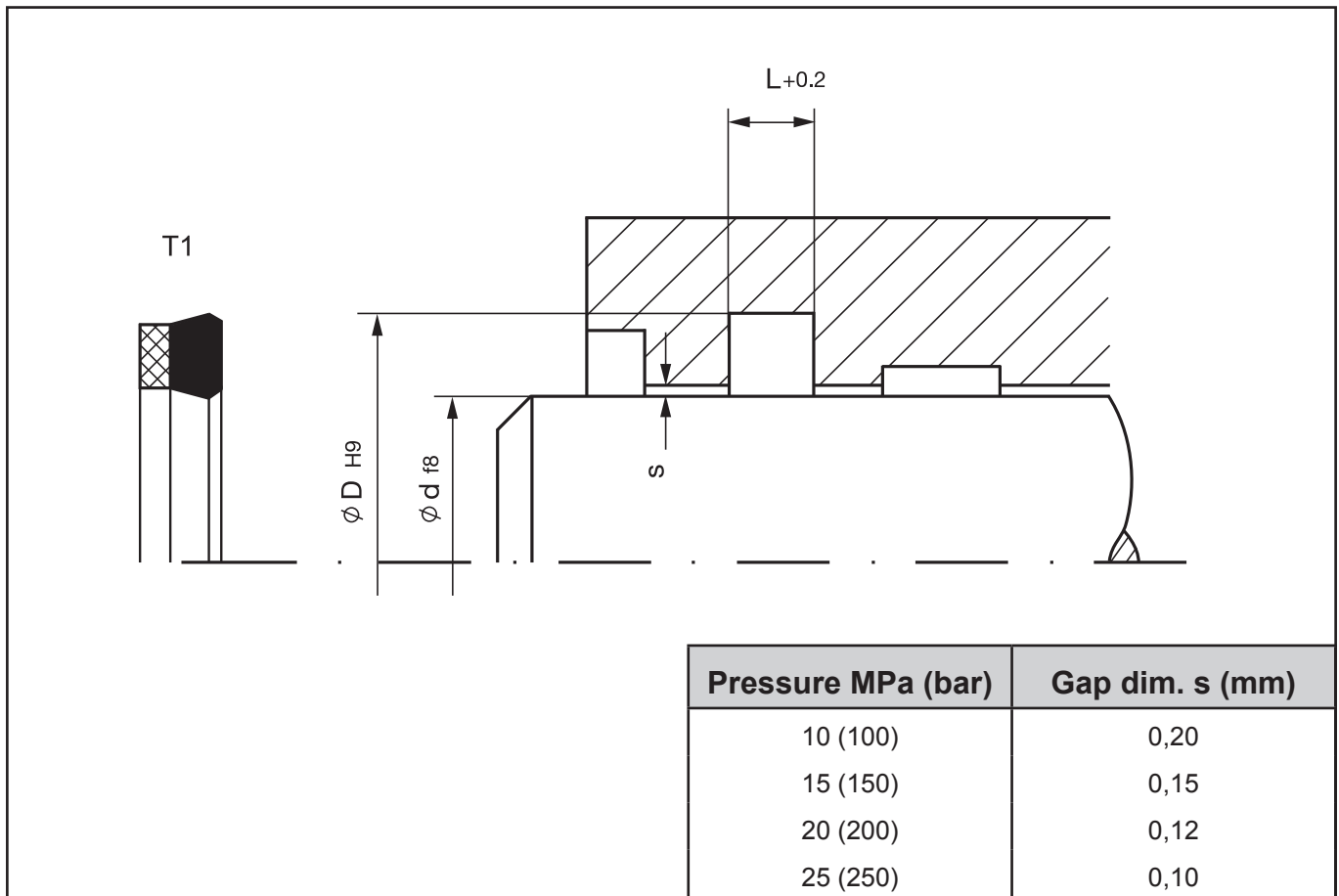
Type designation	Ø D	Ø d	L	O-Ring
NPR - 200 - PB	200	179,5	8,1	441
NPR - 200/2 - PB	200	184,9	6,3	366
NPR - 210 - PB	210	189,5	8,1	443
NPR - 220 - PB	220	199,5	8,1	444
NPR - 230 - PB	230	209,5	8,1	445
NPR - 240 - PB	240	219,5	8,1	446
NPR - 250 - PB	250	229,5	8,1	447
NPR - 260 - PB	260	236,0	8,1	447
NPR - 270 - PB	270	246,0	8,1	448
NPR - 280 - PB	280	256,0	8,1	449
NPR - 290 - PB	290	266,0	8,1	450
NPR - 300 - PB	300	276,0	8,1	451
NPR - 310 - PB	310	286,0	8,1	451
NPR - 320 - PB	320	296,0	8,1	452
NPR - 330 - PB	330	306,0	8,1	453
NPR - 340 - PB	340	316,0	8,1	453
NPR - 350 - PB	350	326,0	8,1	454
NPR - 400 - PB	400	376,0	8,1	458
NPR - 420 - PB	420	396,0	8,1	460
NPR - 450 - PB	450	426,0	8,1	463
NPR - 480 - PB	480	456,0	8,1	465
NPR - 500 - PB	500	476,0	8,1	467
NPR - 600 - PB	600	576,0	8,1	472

Further dimension and in-between sizes upon request.

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T1

Rod Seal



Max. Operating Conditions

Pressure (MPa)	25 (250 bar)
Temperature (°C)	- 30 / + 110 / + 140
Speed (m/s)	≤ 0,5
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	≤ 1,6 μm	≤ 16 μm
Groove flanks	≤ 1,6 μm	≤ 16 μm
Running surface	≤ 0,3 μm	≤ 3 μm

Material

NBR-Fabric	N
FKM (Viton [®])	V

Technical Description

The rod seal of the **T1** series is a compact groove ring for the sealing of piston rods and plungers.

The seal **T1** is made of NBR fabric with an elastomer element integrated by vulcanization. The fabric reinforcement protects the seals against gap extrusion. Its fine surface structure forms small repositories to store lubricant. The constructive layout of the seal profile results in secure sealing in the low pressure range already.

The rod seal **T1** is also available in FPM (Viton[®]), appropriate for temperatures of up to +140 °C.

Type designation	∅ d	∅ D	H	L
T1 -	20	28	5,7	6,2
T1 -	20	28	6,5	7,0
T1 -	20	30	7,3	8,0
T1 -	20	30	7,6	8,1
T1 -	20	35	10,5	11,4
T1 -	22	30	6,0	6,5
T1 -	25	32	6,0	6,5
T1 -	25	33	6,0	6,5
T1 -	25	35	8,4	9,0
T1 -	28	36	5,8	6,4
T1 -	28	38	7,3	8,0
T1 -	30	40	6,5	7,0
T1 -	32	40	8,5	9,0
T1 -	35	45	7,5	8,0
T1 -	36	44	6,0	6,5
T1 -	36	48	8,7	9,5
T1 -	36	48	9,5	10,5
T1 -	38	50	8,8	9,4
T1 -	40	48	6,0	6,5
T1 -	40	50	7,5	8,0
T1 -	40	50	10,3	11,0
T1 -	40	50	12,8	13,0
T1 -	40	55	10,3	11,0
T1 -	45	55	7,3	8,0
T1 -	50	58	7,5	8,0
T1 -	50	60	7,3	8,0
T1 -	50	60	9,3	10,3
T1 -	50	62	8,5	9,5

	Rod Seal Type	Dimension	Material
Ordering example:	Rod Seal	∅ d 20 x 28 x 6,2	NBR-Fabric
Order designation:	T 1 -	20 x 28 x 6,2	- N

Designation of material:
N - NBR-Fabric
V - FKM (Viton®)

T1

Rod Seal

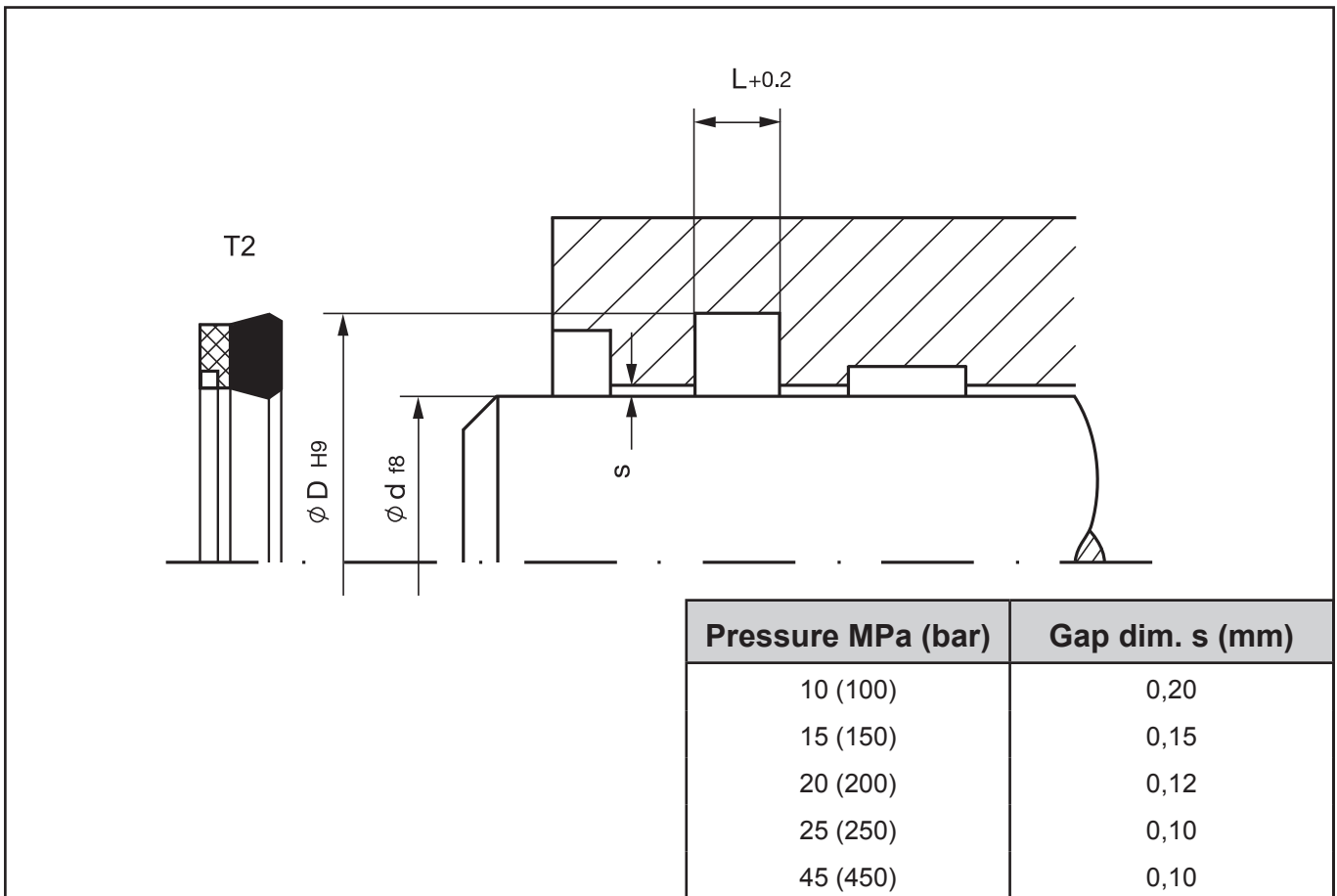
Type designation	∅ d	∅ D	H	L
T1 -	55	65	7,3	8,0
T1 -	55	70	9,6	10,5
T1 -	56	66	7,3	8,0
T1 -	60	72	9,2	10,0
T1 -	60	80	13,5	14,5
T1 -	70	80	7,4	8,3
T1 -	70	82	8,7	9,4
T1 -	75	87	6,5	7,0
T1 -	75	87	7,5	8,0
T1 -	77	87	7,5	8,0
T1 -	80	92	8,7	9,5
T1 -	90	100	9,6	10,5
T1 -	100	120	11,2	12,0
T1 -	140	160	13,5	14,5
T1 -	140	160	15,0	16,0
T1 -	150	170	13,5	14,5
T1 -	200	220	15,0	16,0

Further dimension and in-between sizes upon request.

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.

T2

Rod Seal



Max. Operating Conditions

Pressure (MPa)	25 (250 bar) / 45 (450 bar)
Temperature (°C)	- 30 / + 110 / + 140
Speed (m/s)	≤ 0,5
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	≤ 1,6 μm	≤ 16 μm
Groove flanks	≤ 1,6 μm	≤ 16 μm
Running surface	≤ 0,3 μm	≤ 3 μm

Material

NBR-Fabric	N
FKM (Viton [®])	V

Technical Description

The rod seal of the **T2** series is a compact groove ring for the sealing of piston rods and plungers.

The seal **T2** is made of NBR fabric with an elastomer element integrated by vulcanization. The fabric reinforcement protects the seals against gap extrusion. Its fine surface structure forms small repositories to store lubricant. The constructive layout of the seal profile results in secure sealing in the low pressure range already.

The rod seal type **T2** is identical with the **T1** series. However, the **T2** is equipped with an additional bearing ring as anti-extrusion ring on the internal diameter in order to meet the requirements in the higher pressure range.

The rod seal **T2** with a back up ring in PTFE-compound is also available in FPM (Viton[®]), appropriate for temperatures of up to +140 °C.

Type designation	∅ d	∅ D	H	L
T2 -	20	27	6,0	6,5
T2 -	20	28	6,5	7,0
T2 -	22	34	8,5	9,0
T2 -	22	35	9,2	10,0
T2 -	25	35	8,5	9,2
T2 -	25	38	9,2	10,0
T2 -	28	36	5,8	6,4
T2 -	28	38	7,5	8,0
T2 -	28	40	8,5	9,0
T2 -	30	38	6,0	6,4
T2 -	30	40	6,8	7,5
T2 -	30	45	8,5	9,0
T2 -	30	50	13,5	14,5
T2 -	32	40	6,0	6,4
T2 -	32	40	8,5	9,0
T2 -	35	43	6,0	6,5
T2 -	35	50	10,0	11,0
T2 -	36	43	6,0	6,5
T2 -	36	46	7,6	8,2
T2 -	36	46	8,0	8,7
T2 -	36	48	10,3	11,0
T2 -	36	48	8,5	9,0
T2 -	40	48	6,0	6,5
T2 -	40	48	8,5	9,2
T2 -	40	50	9,3	10,0
T2 -	40	50	7,3	8,0
T2 -	40	50	10,3	11,0
T2 -	40	55	6,8	7,5

	Rod Seal Type	Dimension	Material
Ordering example:	Rod Seal	∅ d 20 x 28 x 7,0	NBR-Fabric
Order designation:	T 1 -	20 x 28 x 7,0	- N

Designation of material:
N - NBR-Fabric
V - FKM (Viton®)

T2

Rod Seal

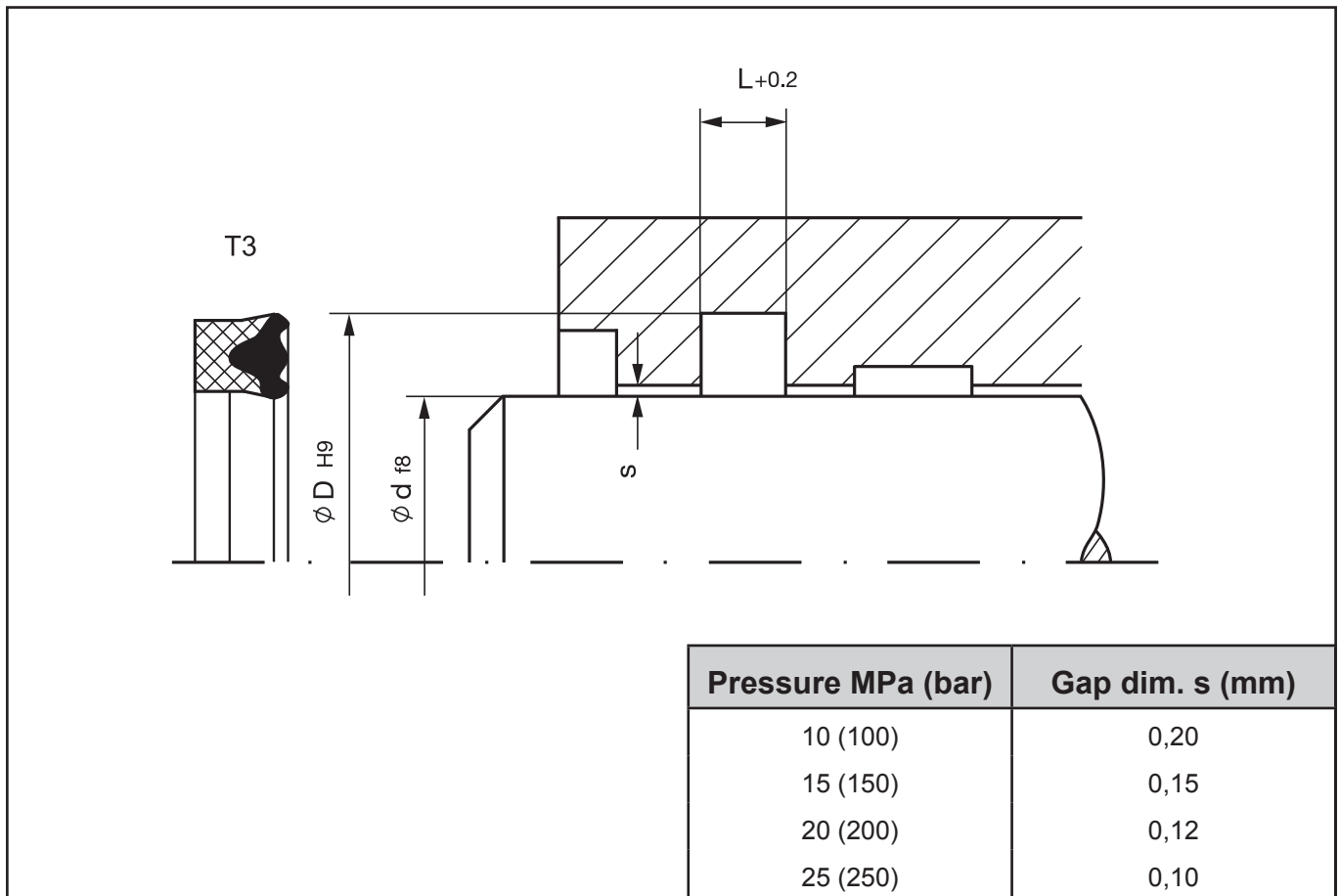
Type designation	∅ d	∅ D	H	L
T2 -	40	55	10,0	11,0
T2 -	40	60	13,5	14,5
T2 -	45	55	7,3	8,0
T2 -	50	60	7,3	8,0
T2 -	50	60	9,3	10,0
T2 -	50	62	8,5	9,5
T2 -	50	65	10,0	11,0
T2 -	50	70	13,5	14,5
T2 -	55	65	7,3	8,0
T2 -	56	71	9,6	10,5
T2 -	60	75	12,0	13,0
T2 -	60	80	13,0	14,0
T2 -	63	83	13,5	14,5
T2 -	65	85	13,5	14,5
T2 -	70	80	7,3	8,0
T2 -	70	80	12,3	13,0
T2 -	70	82	9,6	10,5
T2 -	70	85	11,5	12,5
T2 -	80	95	12,0	13,0
T2 -	80	96	9,6	10,5
T2 -	80	100	13,5	14,5
T2 -	85	100	11,5	12,5
T2 -	90	105	8,5	9,5
T2 -	90	105	12,0	13,0
T2 -	110	125	11,2	12,0
T2 -	110	130	11,5	12,5
T2 -	120	140	11,5	12,5
T2 -	140	160	11,5	12,5

Further dimension and in-between sizes upon request.

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.

T3

Rod Seal



Max. Operating Conditions

Pressure (MPa)	25 (250 bar)
Temperature (°C)	- 30 / + 110 / + 140
Speed (m/s)	≤ 0,5
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	≤ 1,6 μm	≤ 16 μm
Groove flanks	≤ 1,6 μm	≤ 16 μm
Running surface	≤ 0,3 μm	≤ 3 μm

Material

NBR-Fabric	N
FKM (Viton [®])	V

Technical Description

The rod seal of the **T3** series is a compact groove ring for the sealing of piston rods and plungers.

The seal is made of NBR fabric with an elastomer element integrated by vulcanization. The fabric reinforcement protects the seals against gap extrusion. Its fine surface structure forms small repositories to store lubricant. The constructive layout of the seal profile results in secure sealing in the low pressure range already.

The rod seal **T3** is also available in FPM (Viton[®]), appropriate for temperatures of up to +140 °C.

Type designation	∅ d	∅ D	H	L
T3 -	5	12	6,0	6,4
T3 -	6	13	6,0	6,4
T3 -	8	15	6,0	6,4
T3 -	10	17	6,0	6,4
T3 -	12	19	6,0	6,4
T3 -	14	22	6,0	6,4
T3 -	15	23	6,0	6,4
T3 -	16	24	6,0	6,4
T3 -	18	26	6,0	6,4
T3 -	20	28	6,0	6,4
T3 -	22	30	6,0	6,4
T3 -	25	33	6,0	6,4
T3 -	28	26	6,0	6,4
T3 -	30	38	6,0	6,4
T3 -	32	40	6,0	6,4
T3 -	35	43	6,0	6,4
T3 -	36	44	6,0	6,4
T3 -	40	48	6,0	6,4
T3 -	42	50	6,0	6,4
T3 -	45	55	7,5	8,0
T3 -	50	60	7,5	8,0
T3 -	55	65	7,5	8,0
T3 -	56	66	7,5	8,0
T3 -	60	70	7,5	8,0
T3 -	63	75	9,0	9,6
T3 -	65	77	9,0	9,6
T3 -	70	82	9,0	9,6
T3 -	75	87	9,0	9,6

	Rod Seal Type	Dimension	Material
Ordering example:	Rod Seal	∅ d 20 x 28 x 6,4	NBR-Fabric
Order designation:	T 3 -	20 x 28 x 6,4	- N

Designation of material:

- N** - NBR-Fabric
- V** - FKM (Viton®)

T3

Rod Seal

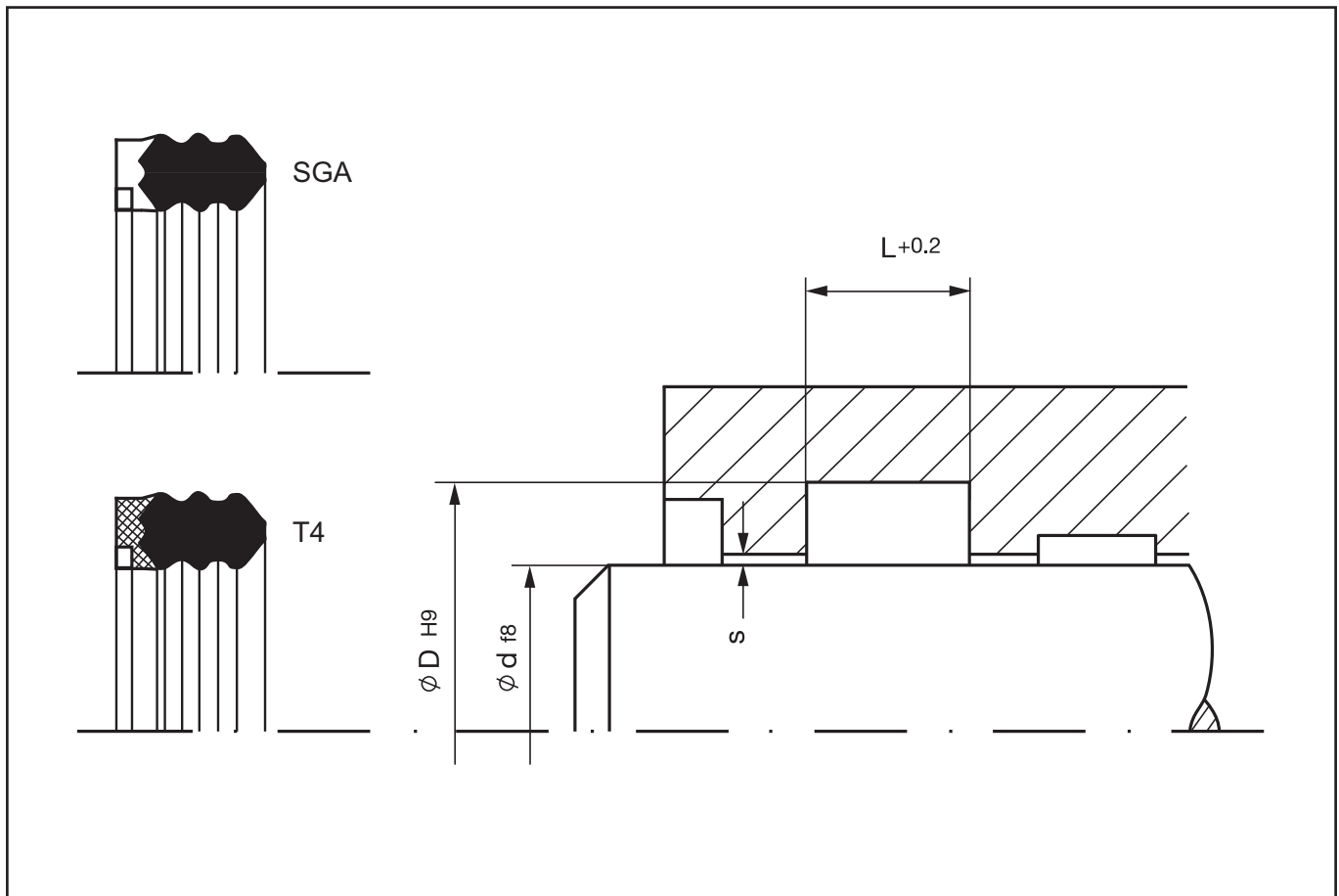
Type designation	∅ d	∅ D	H	L
T3 -	80	92	9,0	9,6
T3 -	85	97	9,0	9,6
T3 -	90	102	9,0	9,6
T3 -	100	115	11,3	12,0
T3 -	110	125	11,3	12,0
T3 -	115	130	11,3	12,0
T3 -	125	140	11,3	12,0
T3 -	140	160	15,0	16,0
T3 -	150	170	15,0	16,0
T3 -	160	180	15,0	16,0
T3 -	180	200	15,0	16,0

Further dimension and in-between sizes upon request.

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.

T4/SGA

Rod Seal



Max. Operating Conditions

Pressure (MPa)	≤ 70 (700 bar)
Temperature (°C)	- 30 / + 100
Speed (m/s)	$\leq 0,5$

Media: Hydraulic fluids upon oil-basis,
hardly inflaming hydraulic fluids,
HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$
Groove flanks	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$
Running surface	$\leq 0,3 \mu\text{m}$	$\leq 3 \mu\text{m}$

Material

NBR	N
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Technical Description

The rod seal type **T4/SGA** series consists of a NBR sealing element and a supporting element of NBR-Fabric or Hytrel[®] (SGA), with integrated support ring in POM.

The NBR sealing element made of highly wear-resistant nitrile rubber has a high tensile strength and a low compression set.

This sealing element is designed for heavy duties.

The 3-piece design allows the installation in solid seal housings.

Pressure MPa (bar)	Gap dim. s (mm)
20 (200)	0,40
25 (250)	0,30
40 (400)	0,25
50 (500)	0,20

Type designation	∅ d	∅ D	L
T4 - 18	18	30	22,50
T4 - 20	20	33	20,00
T4 - 22	22	35	20,00
T4 - 25	25	38	20,00
T4 - 28	28	41	20,00
T4 - 30	30	43	20,00
T4 - 32	32	47	22,50
T4 - 35	35	47	22,50
T4 - 35/1	35	50	22,50
T4 - 40	40	52	22,50
T4 - 40/1	40	60	30,00
T4 - 45	45	60	22,50
T4 - 45/1	45	65	28,00
T4 - 50	50	65	22,50
T4 - 50/1	50	63	20,00
T4 - 50/2	50	70	30,00
T4 - 50/3	50	65	24,50
T4 - 50/4	50	70	31,90
T4 - 55	55	70	22,50
T4 - 55/1	55	70	25,00
T4 - 55/2	55	75	30,00
T4 - 55/3	55	75	32,00
T4 - 56	56	71	25,00
T4 - 60	60	75	22,50
T4 - 60/1	60	77	27,00
T4 - 60/4	60	80	34,90
T4 - 60/6	60	80	30,00

	Rod Seal Type	Dimension	Material
Ordering example:	Rod Seal	∅ d 50 x 63 x 20	NBR
Order designation:	T4/SGA -	50 x 63 x 20,00	- N

Designation of material: N - NBR

T4/SGA

Rod Seal

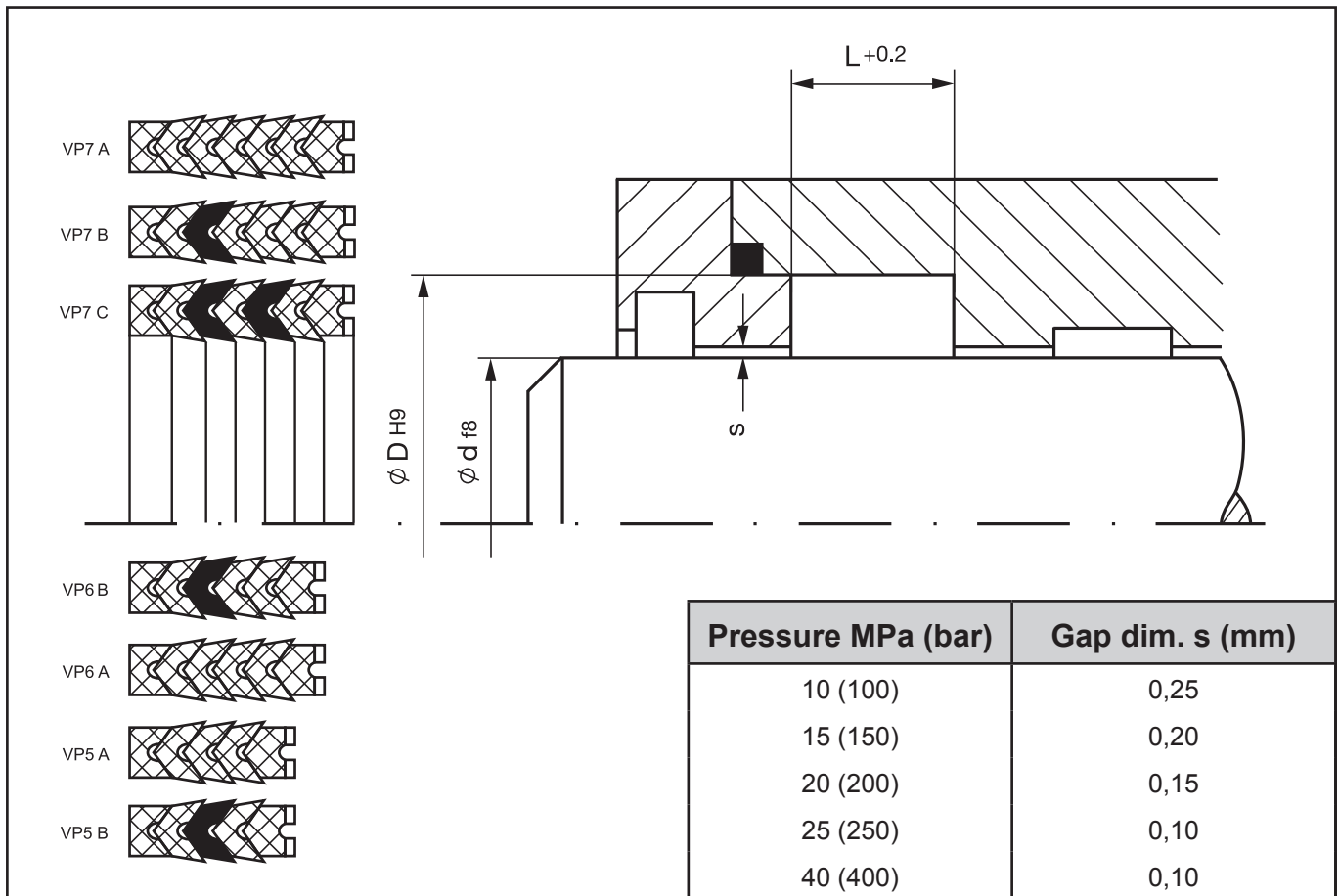
Type designation	$\varnothing d$	$\varnothing D$	L
T4 - 63	63	83	28,00
T4 - 63/1	63	83	29,00
T4 - 65	65	85	29,00
T4 - 70	70	85	22,50
T4 - 70/2	70	90	30,00
T4 - 70/3	70	90	31,90
T4 - 75	75	95	28,00
T4 - 75/1	75	95	30,00
T4 - 76,5	76,5	96,5	32,50
T4 - 80	80	95	22,50
T4 - 80/1	80	100	30,00
T4 - 85/2	85	100	22,50
T4 - 90	90	105	22,50
T4 - 90/1	90	110	30,00
T4 - 90/2	90	105	25,00
T4 - 90/4	90	110	32,50
T4 - 95	95	110	22,50
T4 - 95/1	95	115	28,00
T4 - 100	100	114,3	24,21
T4 - 100/1	100	120	30,00
T4 - 110	110	130	32,50
T4 - 110/1	110	125	22,50
T4 - 115	115	130	22,50
T4 - 120	120	140	30,00
T4 - 125	125	145	29,62
T4 - 127	127	142	22,50
T4 - 135/1	135	150	22,50
T4 - 140	140	160	28,00
T4 - 140/1	140	155	22,50
T4 - 150	150	170	28,00
T4 - 160	160	180	28,00
T4 - 170/1	170	185	22,50
T4 - 180	180	205	35,00
T4 - 185/1	185	200	22,50
T4 - 190	190	215	35,00
T4 - 200	200	225	35,00
T4 - 200/1	200	215	22,50
T4 - 210	210	235	35,00

Type designation	∅ d	∅ D	L
T4 - 220	220	245	35,00
T4 - 230/1	230	250	22,50
T4 - 240	240	265	35,00
T4 - 250	250	275	35,00
T4 - 260	260	280	22,50

Further dimension and in-between sizes upon request.

VP5 | VP6 | VP7

Rod Seal



Max. Operating Conditions

Pressure (MPa)	≤ 40 (400 bar)
Temperature (°C)	- 30 / + 110 / + 140
Speed (m/s)	$\leq 0,5$
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$
Groove flanks	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$
Running surface	$\leq 0,3 \mu\text{m}$	$\leq 3 \mu\text{m}$

Material

NBR-Fabric/NBR	N
FKM-Fabric (Viton®)/FKM	V

Technical Description

The rod seal type **VP5 / VP6 / VP7** is a five-, six- or seven-piece chevron-type seal used for sealing on piston rods and plungers.

Usually, the sealing kit consists of a Hytrel® or fabric pressure ring, 3, 4 or 5 chevron-type fabric intermediate rings and an acetal or fabric support ring. Due to the variable number of chevron rings as well as material compositions (fabric/elastomer-chevron) **VP5/VP6/VP7** series can be adapted to multiple types of seal housings.

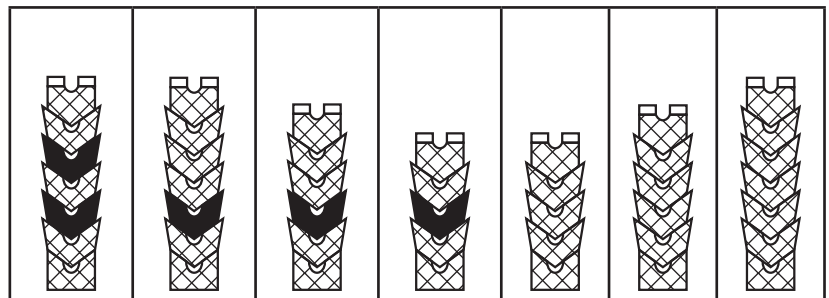
For decades, the chevron-type seal as a multipart sealing kit has proven highly successful even under extreme operating conditions. The capacity to store lubricant in the area of the running surface, to dampen oscillations and to absorb eccentric loads, even upon frequent pressure and temperature alternations, makes this seal a system of high functional security and long service life.

The rod seal type **VP5 / VP6 / VP7** is also available in FPM (Viton®) and appropriate for temperatures of up to +140 °C. Revolved V-packing seal kits of polyurethane could be produced as well.

For temperatures above 140 °C we kindly request your enquiries for a specific offer.

Note:

In the case of pressures of <50 bar we recommend the types B + C. Please tell us your desired types in every order.



Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 5 -	16	28	16,5					1.3.1		
VP 6 -	16	28	19,5						1.4.1	
VP 7 -	16	28	22,5							1.5.1
VP 7 -	18	28	18,5	1.3.2.1						
VP 5 -	18	30	16,5					1.3.1		
VP 6 -	18	30	19,5						1.4.1	
VP 7 -	18	30	22,5							1.5.1
VP 5 -	20	28	14,5				1.2.1.1			
VP 6 -	20	28	17,0			1.3.1.1				
VP 7 -	20	28	19,5	1.3.2.1						
VP 5 -	20	30	13,5				1.2.1.1			
VP 6 -	20	30	16,0			1.3.1.1				
VP 7 -	20	30	18,5	1.3.2.1						
VP 5 -	20	30	21,5				1.2.1.1			
VP 6 -	20	30	25,5			1.3.1.1				
VP 7 -	20	30	29,5	1.3.2.1						
VP 5 -	20	32	16,5				1.2.1.1			
VP 6 -	20	32	19,5			1.3.1.1				
VP 7 -	20	32	22,5	1.3.2.1						
VP 5 -	20	35	16,5					1.3.1		
VP 6 -	20	35	19,5						1.4.1	
VP 7 -	20	35	22,5							1.5.1

Rod Seal Type

Dimension

Material / Model

Ordering example:

Rod Seal

∅ d 50 x 65 x 22,5

NBR-Fabric

Order designation:

VP7 -

50 x 65 x 22,5

- N - C

Designation of material:

N - NBR-Fabric

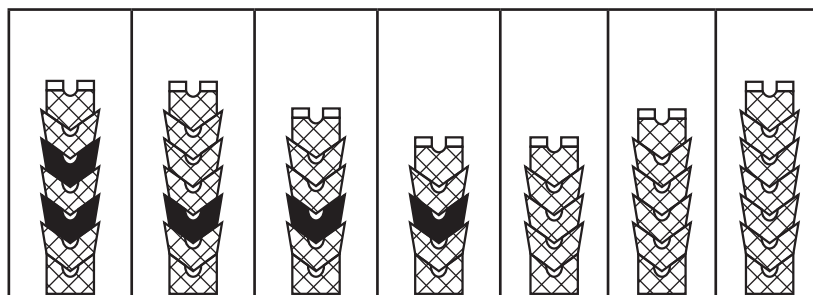
V - FKM (Viton®)

VP5 | VP6 | VP7

Rod Seal

Note:

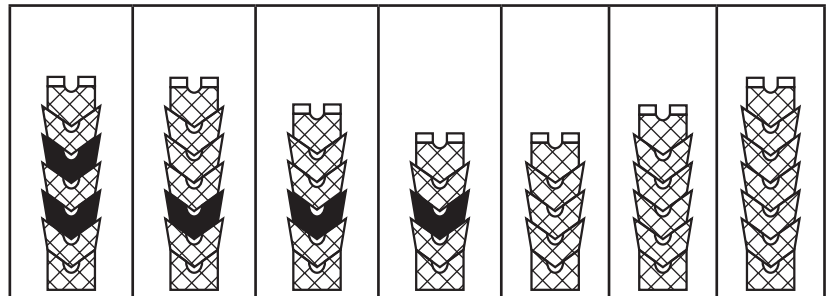
In the case of pressures of < 50 bar we recommend the types B + C. Please tell us your desired types in every order.



Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 5 -	22	32	13,5				1.2.1.1			
VP 6 -	22	32	16,0			1.3.1.1				
VP 7 -	22	32	18,5	1.3.2.1						
VP 5 -	22	34	16,5				1.2.1.1			
VP 6 -	22	34	19,5			1.3.1.1				
VP 7 -	22	34	22,5	1.3.2.1						
VP 5 -	22,22	38,10	19,00					1.3.1		
VP 6 -	22,22	38,10	22,50						1.4.1	
VP 7 -	22,22	38,10	26,00							1.5.1
VP 5 -	25	35	17,3				1.2.1.1			
VP 5 -	25	37	16,5				1.2.1.1			
VP 6 -	25	37	19,5			1.3.1.1				
VP 7 -	25	37	22,5	1.3.2.1						
VP 5 -	25	40	16,5				1.2.1.1			
VP 6 -	25	40	19,5			1.3.1.1				
VP 7 -	25	40	22,5	1.3.2.1						
VP 5 -	25,40	34,92	16,0					1.3.1		
VP 6 -	25,40	34,92	19,0						1.4.1	
VP 7 -	25,40	34,92	22,0							1.5.1
VP 5 -	25,40	38,10	15,87					1.3.1		
VP 6 -	25,40	38,10	19,05						1.4.1	
VP 7 -	25,40	38,10	22,22							1.5.1
VP 5 -	28,57	41,27	18,7					1.3.1		
VP 6 -	28,57	41,27	21,7						1.4.1	
VP 7 -	28,57	41,27	24,7							1.5.1
VP 5 -	30	40	21,8					1.3.1		
VP 6 -	30	40	24,8						1.4.1	
VP 7 -	30	40	27,8							1.5.1
VP 5 -	30	40	21,8				1.2.1.1			
VP 6 -	30	40	24,8			1.3.1.1				
VP 7 -	30	40	27,8	1.3.2.1						

Note:

In the case of pressures of <50 bar we recommend the types B + C. Please tell us your desired types in every order.



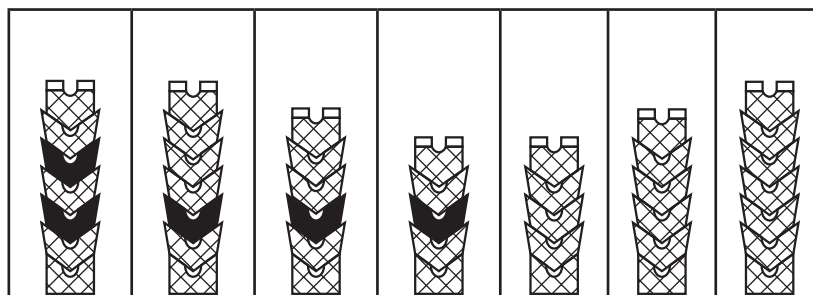
Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 5 -	30	42	16,5				1.2.1.1			
VP 6 -	30	42	19,5			1.3.1.1				
VP 7 -	30	42	22,5	1.3.2.1						
VP 5 -	30	45	16,5				1.2.1.1			
VP 6 -	30	45	19,5			1.3.1.1				
VP 7 -	30	45	22,5	1.3.2.1						
VP 5 -	30	45	22,5					1.3.1		
VP 6 -	30	45	26,5						1.4.1	
VP 7 -	30	45	30,5							1.5.1
VP 5 -	30	45	27,5					1.3.1		
VP 6 -	30	45	31,5						1.4.1	
VP 7 -	30	45	35,5							1.5.1
VP 5 -	30	46	20,0					1.3.1		
VP 6 -	30	46	23,5						1.4.1	
VP 7 -	30	46	27,0							1.5.1
VP 5 -	30	50	28,0					1.3.1		
VP 6 -	30	50	33,0						1.4.1	
VP 7 -	30	50	38,0							1.5.1
VP 5 -	31,75	44,45	16,5					1.3.1		
VP 6 -	31,75	44,45	19,5						1.4.1	
VP 7 -	31,75	44,45	22,5							1.5.1
VP 5 -	32	42	17,5					1.3.1		
VP 6 -	32	42	20,5						1.4.1	
VP 7 -	32	42	23,5							1.5.1
VP 5 -	32	42	17,5				1.2.1.1			
VP 6 -	32	42	20,5			1.3.1.1				
VP 7 -	32	42	23,5	1.3.2.1						
VP 5 -	32	44	16,5				1.2.1.1			
VP 6 -	32	44	19,5			1.3.1.1				
VP 7 -	32	44	22,5	1.3.2.1						
VP 5 -	32	47	16,5				1.2.1.1			

VP5 | VP6 | VP7

Rod Seal

Note:

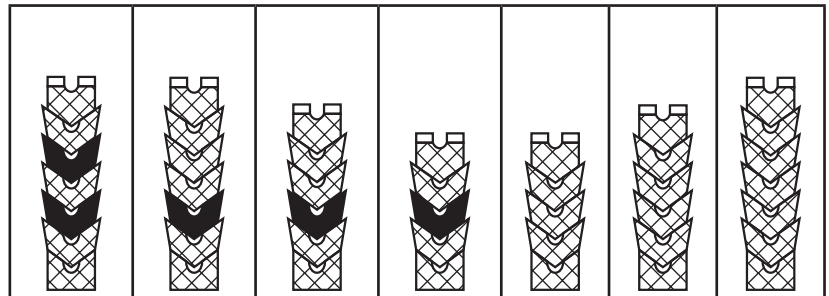
In the case of pressures of <50 bar we recommend the types B + C. Please tell us your desired types in every order.



Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 6 -	32	47	19,5			1.3.1.1				
VP 7 -	32	47	22,5	1.3.2.1						
VP 5 -	34,92	50,80	19,80					1.3.1		
VP 6 -	34,92	50,80	23,60						1.4.1	
VP 7 -	34,92	50,80	27,40							1.5.1
VP 5 -	35	47	16,5				1.2.1.1			
VP 6 -	35	47	19,5			1.3.1.1				
VP 7 -	35	47	22,5	1.3.2.1						
VP 5 -	35	50	16,5				1.2.1.1			
VP 6 -	35	50	19,5			1.3.1.1				
VP 7 -	35	50	22,5	1.3.2.1						
VP 5 -	35	55	20,5					1.3.1		
VP 6 -	35	55	24,0						1.4.1	
VP 7 -	35	55	27,5							1.5.1
VP 5 -	36	46	16,0					1.3.1		
VP 6 -	36	46	19,0						1.4.1	
VP 7 -	36	46	22,0							1.5.1
VP 5 -	36	48	16,5				1.2.1.1			
VP 6 -	36	48	19,5			1.3.1.1				
VP 7 -	36	48	22,5	1.3.2.1						
VP 5 -	36	51	16,5				1.2.1.1			
VP 6 -	36	51	19,5			1.3.1.1				
VP 7 -	36	51	22,5	1.3.2.1						
VP 5 -	36	52	24,0					1.3.1		
VP 6 -	36	52	28,0						1.4.1	
VP 7 -	36	52	32,0							1.5.1
VP 5 -	36	52	17,4					1.3.1		
VP 6 -	36	52	20,2						1.4.1	
VP 7 -	36	52	23,0							1.5.1
VP 5 -	38,1	50,8	16,5					1.3.1		
VP 6 -	38,1	50,8	19,5						1.4.1	

Note:

In the case of pressures of <50 bar we recommend the types B + C. Please tell us your desired types in every order.



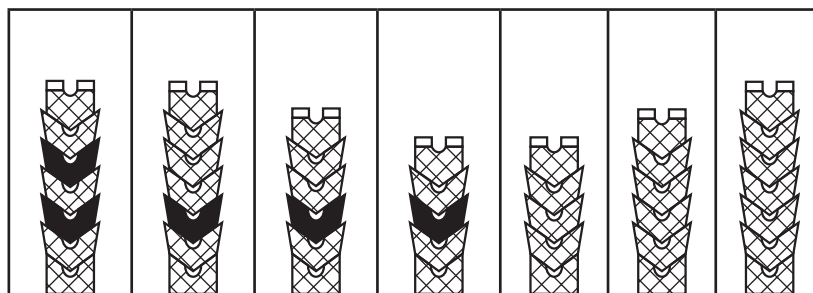
Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 7 -	38,10	50,80	22,50							1.5.1
VP 5 -	38,10	53,97	23,90					1.3.1		
VP 6 -	38,10	53,97	27,90						1.4.1	
VP 7 -	38,10	53,97	31,90							1.5.1
VP 5 -	38,10	57,15	25,00					1.3.1		
VP 6 -	38,10	57,15	29,00						1.4.1	
VP 7 -	38,10	57,15	33,00							1.5.1
VP 5 -	40	50	15,0					1.3.1		
VP 6 -	40	50	17,5						1.4.1	
VP 7 -	40	50	20,0							1.5.1
VP 5 -	40	50	17,4				1.2.1.1			
VP 6 -	40	50	20,7			1.3.1.1				
VP 7 -	40	50	24,0	1.3.2.1						
VP 5 -	40	51	17,3					1.3.1		
VP 6 -	40	51	20,5						1.4.1	
VP 7 -	40	51	23,7							1.5.1
VP 5 -	40	52	16,5				1.2.1.1			
VP 6 -	40	52	19,5			1.3.1.1				
VP 7 -	40	52	22,5	1.3.2.1						
VP 5 -	40	53	16,5					1.3.1		
VP 6 -	40	53	19,5						1.4.1	
VP 7 -	40	53	22,5							1.5.1
VP 5 -	40	55	16,5				1.2.1.1			
VP 6 -	40	55	19,5			1.3.1.1				
VP 7 -	40	55	22,5	1.3.2.1						
VP 5 -	40	55	22,5				1.2.1.1			
VP 6 -	40	55	26,5			1.3.1.1				
VP 7 -	40	55	30,5	1.3.2.1						
VP 5 -	40	60	27,0					1.3.1		
VP 6 -	40	60	32,0						1.4.1	
VP 7 -	40	60	37,0							1.5.1

VP5 | VP6 | VP7

Rod Seal

Note:

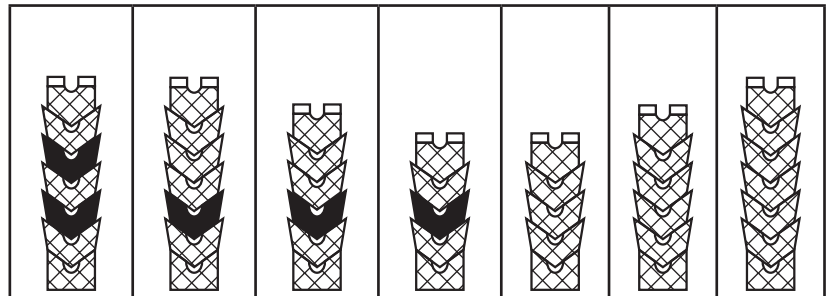
In the case of pressures of <50 bar we recommend the types B + C. Please tell us your desired types in every order.



Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 5 -	41,27	53,97	16,50					1.3.1		
VP 6 -	41,27	53,97	19,50						1.4.1	
VP 7 -	41,27	53,97	22,50							1.5.1
VP 5 -	42	54	16,5				1.2.1.1			
VP 6 -	42	54	19,5			1.3.1.1				
VP 7 -	42	54	22,5	1.3.2.1						
VP 5 -	42	57	16,5				1.2.1.1			
VP 6 -	42	57	19,5			1.3.1.1				
VP 7 -	42	57	22,5	1.3.2.1						
VP 5 -	44,45	57,15	16,50					1.3.1		
VP 6 -	44,45	57,15	19,50						1.4.1	
VP 7 -	44,45	57,15	22,50							1.5.1
VP 5 -	44,45	60,32	16,50				1.2.1.1			
VP 6 -	44,45	60,32	19,50			1.3.1.1				
VP 7 -	44,45	60,32	22,50	1.3.2.1						
VP 5 -	44,45	63,50	24,50					1.3.1		
VP 6 -	44,45	63,50	29,00						1.4.1	
VP 7 -	44,45	63,50	33,50							1.5.1
VP 5 -	45	55	16,0				1.2.1.1			
VP 6 -	45	55	19,0			1.3.1.1				
VP 7 -	45	55	22,0	1.3.2.1						
VP 5 -	45	60	16,5				1.2.1.1			
VP 6 -	45	60	19,5			1.3.1.1				
VP 7 -	45	60	22,5	1.3.2.1						
VP 5 -	45	60	22,2				1.2.1.1			
VP 6 -	45	60	26,2			1.3.1.1				
VP 7 -	45	60	30,2	1.3.2.1						
VP 5 -	45	60	25,0				1.2.1.1			
VP 6 -	45	60	29,0			1.3.1.1				
VP 7 -	45	60	33,0	1.3.2.1						
VP 5 -	45	61	18,0					1.3.1		

Note:

In the case of pressures of <50 bar we recommend the types B + C. Please tell us your desired types in every order.



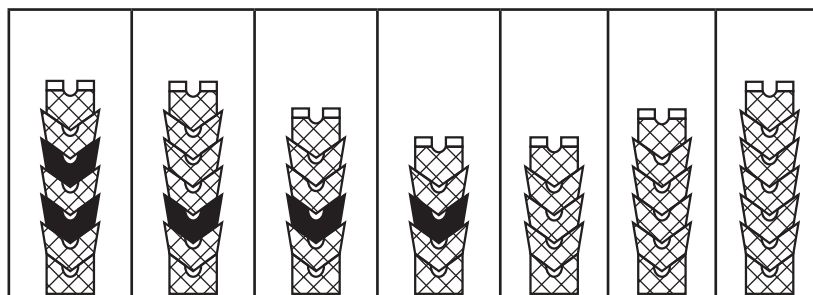
Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 6 -	45	61	21,0						1.4.1	
VP 7 -	45	61	24,0							1.5.1
VP 5 -	45	65	20,5				1.2.1.1			
VP 6 -	45	65	24,0			1.3.1.1				
VP 7 -	45	65	27,5	1.3.2.1						
VP 5 -	45	65	16,5				1.2.1.1			
VP 6 -	45	65	19,5			1.3.1.1				
VP 7 -	45	65	22,5	1.3.2.1						
VP 5 -	50	60	17,0				1.2.1.1			
VP 6 -	50	60	20,0			1.3.1.1				
VP 7 -	50	60	23,0	1.3.2.1						
VP 5 -	50	62	19,0					1.3.1		
VP 6 -	50	62	22,5						1.4.1	
VP 7 -	50	62	26,0							1.5.1
VP 5 -	50	65	16,5				1.2.1.1			
VP 6 -	50	65	19,5			1.3.1.1				
VP 7 -	50	65	22,5	1.3.2.1						
VP 5 -	50	65	25,0					1.3.1		
VP 6 -	50	65	29,0						1.4.1	
VP 7 -	50	65	33,0							1.5.1
VP 5 -	50	65	23,5					1.3.1		
VP 6 -	50	65	27,0						1.4.1	
VP 7 -	50	65	30,5							1.5.1
VP 5 -	50	70	22,0				1.2.1.1			
VP 6 -	50	70	26,0			1.3.1.1				
VP 7 -	50	70	30,0	1.3.2.1						
VP 5 -	50	70	30,0					1.3.1		
VP 6 -	50	70	35,0						1.4.1	
VP 7 -	50	70	40,0							1.5.1
VP 5 -	50	80	43,0					1.3.1		
VP 6 -	50	80	50,0						1.4.1	

VP5 | VP6 | VP7

Rod Seal

Note:

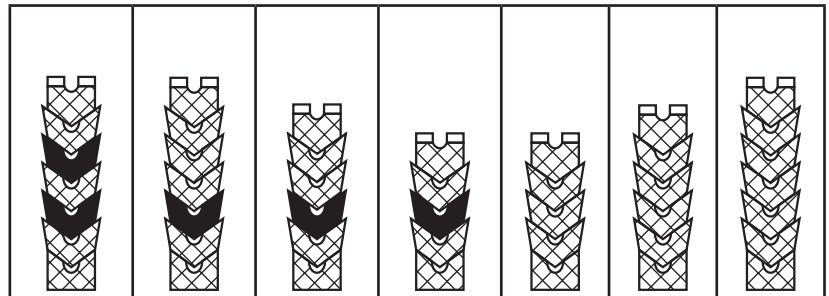
In the case of pressures of <50 bar we recommend the types B + C. Please tell us your desired types in every order.



Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 7 -	50	80	57							1.5.1
VP 5 -	50,80	63,50	16,50					1.3.1		
VP 6 -	50,80	63,50	19,50						1.4.1	
VP 7 -	50,80	63,50	22,50							1.5.1
VP 5 -	50,80	66,70	26,75					1.3.1		
VP 6 -	50,80	66,70	31,75						1.4.1	
VP 7 -	50,80	66,70	36,75							1.5.1
VP 5 -	50,80	69,85	22,00					1.3.1		
VP 6 -	50,80	69,85	26,00						1.4.1	
VP 7 -	50,80	69,85	30,00							1.5.1
VP 5 -	53,97	66,67	16,50					1.3.1		
VP 6 -	53,97	66,67	19,50						1.4.1	
VP 7 -	53,97	66,67	22,50							1.5.1
VP 5 -	55	70	16,5				1.2.1.1			
VP 6 -	55	70	19,5			1.3.1.1				
VP 7 -	55	70	22,5	1.3.2.1						
VP 5 -	55	70	26,5				1.2.1.1			
VP 6 -	55	70	30,5			1.3.1.1				
VP 7 -	55	70	34,5	1.3.2.1						
VP 5 -	55	75	22,0				1.2.1.1			
VP 6 -	55	75	26,0			1.3.1.1				
VP 7 -	55	75	30,0	1.3.2.1						
VP 5 -	56	71	16,5				1.2.1.1			
VP 6 -	56	71	19,5			1.3.1.1				
VP 7 -	56	71	22,5	1.3.2.1						
VP 5 -	56	71	25,0					1.3.1		
VP 6 -	56	71	29,0						1.4.1	
VP 7 -	56	71	33,0							1.5.1
VP 5 -	56	76	27,0				1.2.1.1			
VP 6 -	56	76	32,0			1.3.1.1				
VP 7 -	56	76	37,0	1.3.2.1						

Note:

In the case of pressures of < 50 bar we recommend the types B + C. Please tell us your desired types in every order.



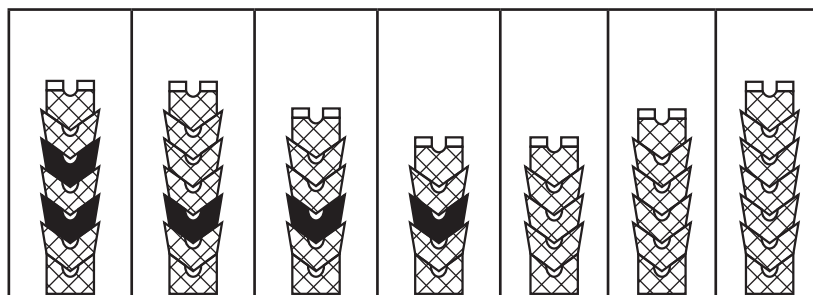
Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 5 -	57,15	73,02	19,20					1.3.1		
VP 6 -	57,15	73,02	22,50						1.4.1	
VP 7 -	57,15	73,02	25,80							1.5.1
VP 5 -	57,15	76,20	26,00					1.3.1		
VP 6 -	57,15	76,20	30,50						1.4.1	
VP 7 -	57,15	76,20	35,00							1.5.1
VP 5 -	57,15	79,37	32,00					1.3.1		
VP 6 -	57,15	79,37	36,50						1.4.1	
VP 7 -	57,15	79,37	41,00							1.5.1
VP 5 -	60	75	16,5				1.2.1.1			
VP 6 -	60	75	19,5			1.3.1.1				
VP 7 -	60	75	22,5	1.3.2.1						
VP 5 -	60	80	27,0				1.2.1.1			
VP 6 -	60	80	32,0			1.3.1.1				
VP 7 -	60	80	37,0	1.3.2.1						
VP 5 -	60	80	22,5				1.2.1.1			
VP 6 -	60	80	26,0			1.3.1.1				
VP 7 -	60	80	29,5	1.3.2.1						
VP 5 -	60	85	27,0					1.3.1		
VP 6 -	60	85	32,0						1.4.1	
VP 7 -	60	85	37,0							1.5.1
VP 5 -	63	75	18,0					1.3.1		
VP 6 -	63	75	21,5						1.4.1	
VP 7 -	63	75	25,0							1.5.1
VP 5 -	63	78	16,5				1.2.1.1			
VP 6 -	63	78	19,5			1.3.1.1				
VP 7 -	63	78	22,5	1.3.2.1						
VP 5 -	63	83	27,0				1.2.1.1			
VP 6 -	63	83	32,0			1.3.1.1				
VP 7 -	63	83	37,0	1.3.2.1						
VP 5 -	63	83	21,5				1.2.1.1			

VP5 | VP6 | VP7

Rod Seal

Note:

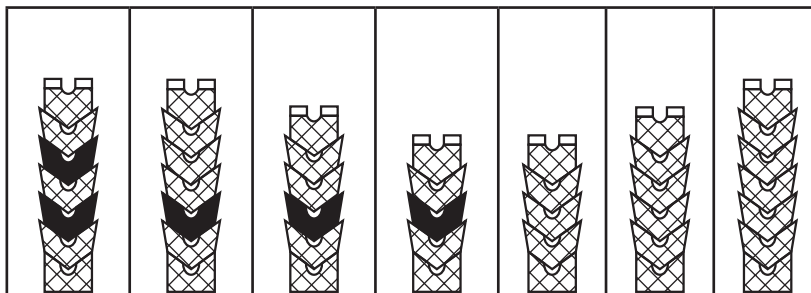
In the case of pressures of < 50 bar we recommend the types B + C. Please tell us your desired types in every order.



Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 6 -	63	83	25,0			1.3.1.1				
VP 7 -	63	83	28,5	1.3.2.1						
VP 5 -	65	80	16,5				1.2.1.1			
VP 6 -	65	80	19,5			1.3.1.1				
VP 7 -	65	80	22,5	1.3.2.1						
VP 5 -	65	85	30,0				1.2.1.1			
VP 6 -	65	85	35,0			1.3.1.1				
VP 7 -	65	85	40,0	1.3.2.1						
VP 5 -	65	90	34,0					1.3.1		
VP 6 -	65	90	40,0						1.4.1	
VP 7 -	65	90	46,0							1.5.1
VP 5 -	66,67	85,72	22,00					1.3.1		
VP 6 -	66,67	85,72	26,00						1.4.1	
VP 7 -	66,67	85,72	30,00							1.5.1
VP 5 -	66,67	88,90	37,50					1.3.1		
VP 6 -	66,67	88,90	43,50						1.4.1	
VP 7 -	66,67	88,90	49,50							1.5.1
VP 5 -	69,85	88,90	24,35					1.3.1		
VP 6 -	69,85	88,90	28,70						1.4.1	
VP 7 -	69,85	88,90	33,20							1.5.1
VP 5 -	70	85	16,5				1.2.1.1			
VP 6 -	70	85	19,5			1.3.1.1				
VP 7 -	70	85	22,5	1.3.2.1						
VP 5 -	70	85	28,0				1.2.1.1			
VP 6 -	70	85	32,0			1.3.1.1				
VP 7 -	70	85	36,0	1.3.2.1						
VP 5 -	70	90	30,0				1.2.1.1			
VP 6 -	70	90	35,0			1.3.1.1				
VP 7 -	70	90	40,0	1.3.2.1						
VP 5 -	70	90	22,0				1.2.1.1			
VP 5 -	70	95	36,5					1.3.1		

Note:

In the case of pressures of < 50 bar we recommend the types B + C. Please tell us your desired types in every order.



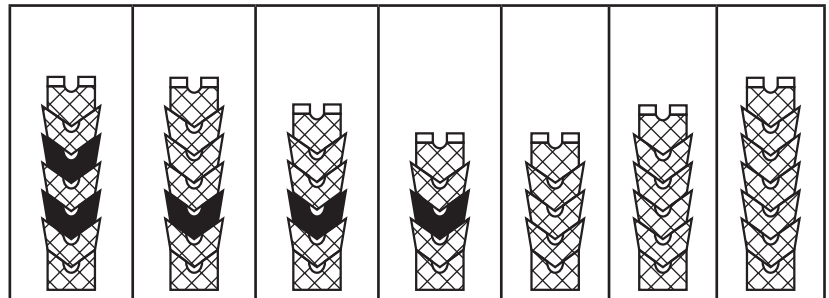
Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 6 -	70	95	42,5						1.4.1	
VP 7 -	70	95	48,5							1.5.1
VP 5 -	75	90	16,5				1.2.1.1			
VP 6 -	75	90	19,5			1.3.1.1				
VP 7 -	75	90	22,5	1.3.2.1						
VP 5 -	75	95	30,0				1.2.1.1			
VP 6 -	75	95	35,0			1.3.1.1				
VP 7 -	75	95	40,0	1.3.2.1						
VP 5 -	75	100	34,0				1.2.1.1			
VP 6 -	75	100	40,0			1.3.1.1				
VP 7 -	75	100	46,0	1.3.2.1						
VP 5 -	76,20	88,90	19,00					1.3.1		
VP 6 -	76,20	88,90	22,50						1.4.1	
VP 7 -	76,20	88,90	26,00							1.5.1
VP 5 -	76,20	95,25	26,00					1.3.1		
VP 6 -	76,20	95,25	30,50						1.4.1	
VP 7 -	76,20	95,25	35,00							1.5.1
VP 5 -	79,37	101,60	25,50					1.3.1		
VP 6 -	79,37	101,60	30,00						1.4.1	
VP 7 -	79,37	101,60	34,50							1.5.1
VP 5 -	80	95	16,5				1.2.1.1			
VP 6 -	80	95	19,5			1.3.1.1				
VP 7 -	80	95	22,5	1.3.2.1						
VP 5 -	80	95	25,0				1.2.1.1			
VP 6 -	80	95	29,0			1.3.1.1				
VP 7 -	80	95	33,0	1.3.2.1						
VP 5 -	80	100	30,0				1.2.1.1			
VP 6 -	80	100	35,0			1.3.1.1				
VP 7 -	80	100	40,0	1.3.2.1						
VP 5 -	80	105	34,5					1.3.1		
VP 6 -	80	105	40,0						1.4.1	

VP5 | VP6 | VP7

Rod Seal

Note:

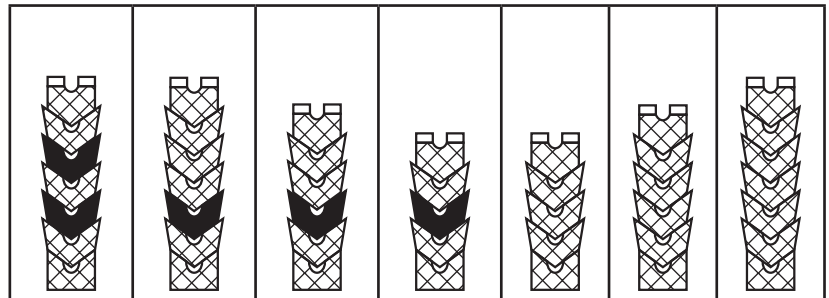
In the case of pressures of <50 bar we recommend the types B + C. Please tell us your desired types in every order.



Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 7 -	80	105	45,5							1.5.1
VP 5 -	82,55	98,42	22,50					1.3.1		
VP 6 -	82,55	98,42	26,00						1.4.1	
VP 7 -	82,55	98,42	29,50							1.5.1
VP 5 -	82,55	101,60	25,40					1.3.1		
VP 6 -	82,55	101,60	30,16						1.4.1	
VP 7 -	82,55	101,60	34,92							1.5.1
VP 5 -	85	100	16,5				1.2.1.1			
VP 6 -	85	100	19,5			1.3.1.1				
VP 7 -	85	100	22,5	1.3.2.1						
VP 5 -	85	105	30,0				1.2.1.1			
VP 6 -	85	105	35,0			1.3.1.1				
VP 7 -	85	105	40,0	1.3.2.1						
VP 5 -	85	110	27,5					1.3.1		
VP 6 -	85	110	32,5						1.4.1	
VP 7 -	85	110	37,5							1.5.1
VP 5 -	88,90	107,95	26,30					1.3.1		
VP 6 -	88,90	107,95	30,80						1.4.1	
VP 7 -	88,90	107,95	35,30							1.5.1
VP 5 -	90	105	16,5				1.2.1.1			
VP 6 -	90	105	19,5			1.3.1.1				
VP 7 -	90	105	22,5	1.3.2.1						
VP 5 -	90	105	33,0					1.3.1		
VP 6 -	90	105	38,0						1.4.1	
VP 7 -	90	105	43,0							1.5.1
VP 5 -	90	110	30,0				1.2.1.1			
VP 6 -	90	110	35,0			1.3.1.1				
VP 7 -	90	110	40,0	1.3.2.1						
VP 5 -	90	110	25,0				1.2.1.1			
VP 6 -	90	110	29,0			1.3.1.1				
VP 7 -	90	110	33,0	1.3.2.1						

Note:

In the case of pressures of < 50 bar we recommend the types B + C. Please tell us your desired types in every order.



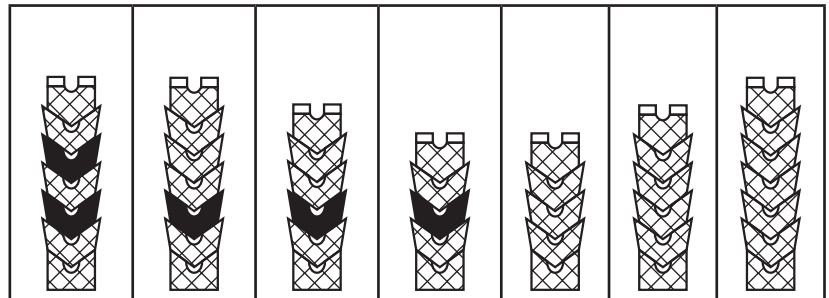
Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 5 -	90	115	36,5					1.3.1		
VP 6 -	90	115	42,5						1.4.1	
VP 7 -	90	115	48,5							1.5.1
VP 5 -	90	120	42,5					1.3.1		
VP 6 -	90	120	50,0						1.4.1	
VP 7 -	90	120	57,5							1.5.1
VP 5 -	95	110	16,5					1.3.1		
VP 6 -	95	110	19,5						1.4.1	
VP 7 -	95	110	22,5							1.5.1
VP 5 -	95	120	36,5					1.3.1		
VP 6 -	95	120	42,5						1.4.1	
VP 7 -	95	120	48,5							1.5.1
VP 5 -	95,25	114,30	26,00					1.3.1		
VP 6 -	95,25	114,30	30,50						1.4.1	
VP 7 -	95,25	114,30	35,00							1.5.1
VP 5 -	98,42	114,30	16,50					1.3.1		
VP 6 -	98,42	114,30	19,50						1.4.1	
VP 7 -	98,42	114,30	22,50							1.5.1
VP 5 -	100	115	22,0				1.2.1.1			
VP 6 -	100	115	26,0			1.3.1.1				
VP 7 -	100	115	30,0		1.4.1.1					
VP 5 -	100	120	30,0				1.2.1.1			
VP 6 -	100	120	35,0			1.3.1.1				
VP 7 -	100	120	40,0		1.4.1.1					
VP 5 -	100	120	45,0					1.3.1		
VP 6 -	100	120	52,5						1.4.1	
VP 7 -	100	120	60,0							1.5.1
VP 5 -	100	120	28,0					1.3.1		
VP 6 -	100	120	33,0						1.4.1	
VP 7 -	100	120	38,0							1.5.1
VP 5 -	100	120	26,0					1.3.1		

VP5 | VP6 | VP7

Rod Seal

Note:

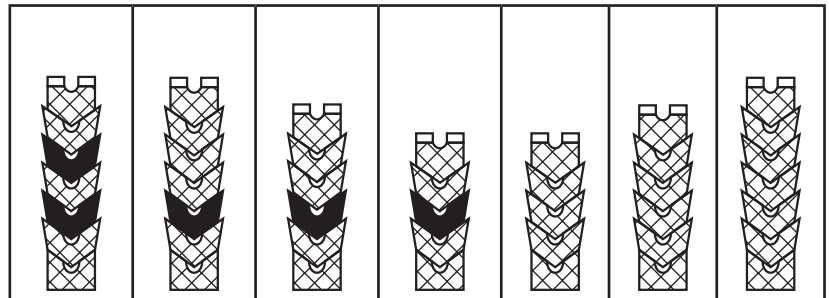
In the case of pressures of < 50 bar we recommend the types B + C. Please tell us your desired types in every order.



Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 6 -	100	120	31,0						1.4.1	
VP 7 -	100	120	36,0							1.5.1
VP 5 -	100	125	32,5					1.3.1		
VP 6 -	100	125	37,0						1.4.1	
VP 7 -	100	125	41,5							1.5.1
VP 5 -	100	125	40,0					1.3.1		
VP 5 -	100	130	45,0					1.3.1		
VP 6 -	100	130	52,5						1.4.1	
VP 7 -	100	130	60,0							1.5.1
VP 5 -	101,60	117,47	23,80					1.3.1		
VP 6 -	101,60	117,47	27,78						1.4.1	
VP 7 -	101,60	117,47	31,75							1.5.1
VP 5 -	101,60	120,65	28,56					1.3.1		
VP 6 -	101,60	120,65	33,30						1.4.1	
VP 7 -	101,60	120,65	38,10							1.5.1
VP 5 -	105	120	22,6					1.3.1		
VP 6 -	105	120	26,6						1.4.1	
VP 7 -	105	120	30,6							1.5.1
VP 5 -	105	125	26,0					1.3.1		
VP 6 -	105	125	31,0						1.4.1	
VP 7 -	105	125	36,0							1.5.1
VP 5 -	105	125	26,0				1.2.1.1			
VP 6 -	105	125	31,0			1.3.1.1				
VP 7 -	105	125	36,0	1.3.2.1						
VP 5 -	105	125	30,0				1.2.1.1			
VP 6 -	105	125	35,0			1.3.1.1				
VP 7 -	105	125	40,0	1.3.2.1						
VP 5 -	105	130	32,0					1.3.1		
VP 6 -	105	130	37,0						1.4.1	
VP 7 -	105	130	42,0							1.5.1
VP 5 -	106	121	22,6					1.3.1		

Note:

In the case of pressures of < 50 bar we recommend the types B + C. Please tell us your desired types in every order.



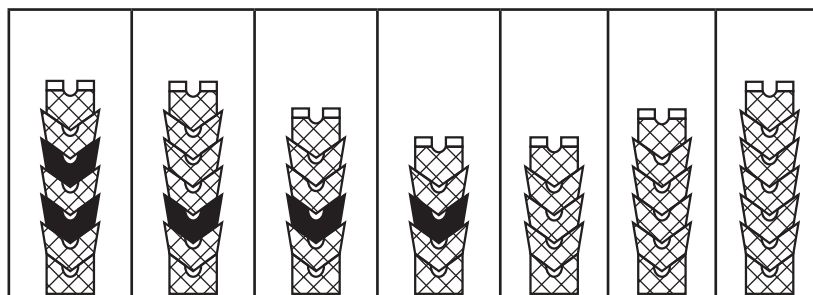
Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 6 -	106	121	26,6						1.4.1	
VP 7 -	106	121	30,6							1.5.1
VP 5 -	106	121	22,6				1.2.1.1			
VP 6 -	106	121	26,6			1.3.1.1				
VP 7 -	106	121	30,6	1.3.2.1						
VP 5 -	107,95	120,65	19,03					1.3.1		
VP 6 -	107,95	120,65	22,20						1.4.1	
VP 7 -	107,95	120,65	25,37							1.5.1
VP 5 -	110	125	22,0				1.2.1.1			
VP 6 -	110	125	26,0			1.3.1.1				
VP 7 -	110	125	30,0		1.4.1.1					
VP 5 -	110	130	30,0				1.2.1.1			
VP 6 -	110	130	35,0			1.3.1.1				
VP 7 -	110	130	40,0		1.4.1.1					
VP 5 -	110	132	36,5				1.2.1.1			
VP 5 -	110	132	42,5				1.2.1.1			
VP 5 -	110	132	48,5				1.2.1.1			
VP 5 -	110	135	34,0					1.3.1		
VP 6 -	110	135	40,0						1.4.1	
VP 7 -	110	135	46,0							1.5.1
VP 5 -	110	140	45,0					1.3.1		
VP 6 -	110	140	52,5						1.4.1	
VP 7 -	110	140	60,0							1.5.1
VP 7 -	112	132	40,0							1.5.1
VP 5 -	112	132	29,0				1.2.1.1			
VP 7 -	112	132	38,0	1.3.2.1						
VP 5 -	114,30	133,36	23,80					1.3.1		
VP 6 -	114,30	133,36	27,75						1.4.1	
VP 7 -	114,30	133,36	31,70							1.5.1
VP 5 -	114,30	136,52	30,16					1.3.1		
VP 6 -	114,30	136,52	34,92						1.4.1	

VP5 | VP6 | VP7

Rod Seal

Note:

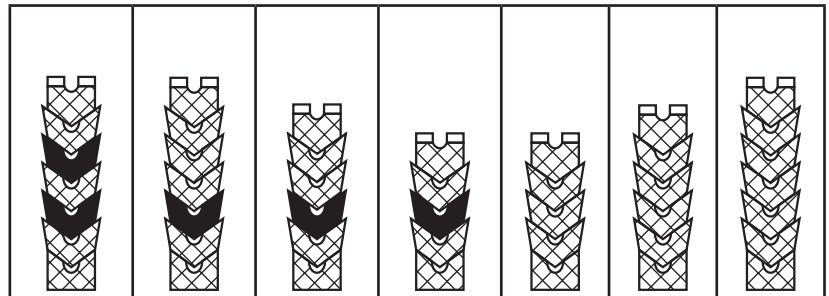
In the case of pressures of <50 bar we recommend the types B + C. Please tell us your desired types in every order.



Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 7 -	114,30	136,52	39,69							1.5.1
VP 5 -	114,30	139,70	36,51					1.3.1		
VP 6 -	114,30	139,70	42,86						1.4.1	
VP 7 -	114,30	139,70	49,80							1.5.1
VP 5 -	115	130	22,0				1.2.1.1			
VP 6 -	115	130	26,0			1.3.1.1				
VP 7 -	115	130	30,0		1.4.1.1					
VP 5 -	115	135	26,0					1.3.1		
VP 6 -	115	135	31,0						1.4.1	
VP 7 -	115	135	36,0							1.5.1
VP 5 -	115	140	34,0				1.2.1.1			
VP 6 -	115	140	40,0			1.3.1.1				
VP 7 -	115	140	46,0		1.4.1.1					
VP 5 -	117,47	130,17	19,05					1.3.1		
VP 6 -	117,47	130,17	22,22						1.4.1	
VP 7 -	117,47	130,17	25,40							1.5.1
VP 5 -	120	135	22,0				1.2.1.1			
VP 6 -	120	135	26,0			1.3.1.1				
VP 7 -	120	135	30,0		1.4.1.1					
VP 5 -	120	140	30,0					1.3.1		
VP 6 -	120	140	35,0						1.4.1	
VP 7 -	120	140	40,0							1.5.1
VP 5 -	120	140	30,0				1.2.1.1			
VP 6 -	120	140	35,0			1.3.1.1				
VP 7 -	120	140	40,0	1.3.2.1						
VP 5 -	120	145	34,0				1.2.1.1			
VP 6 -	120	145	40,0			1.3.1.1				
VP 7 -	120	145	46,0		1.4.1.1					
VP 5 -	120	150	46,0					1.3.1		
VP 6 -	120	150	53,5						1.4.1	
VP 7 -	120	150	61,0							1.5.1

Note:

In the case of pressures of < 50 bar we recommend the types B + C. Please tell us your desired types in every order.



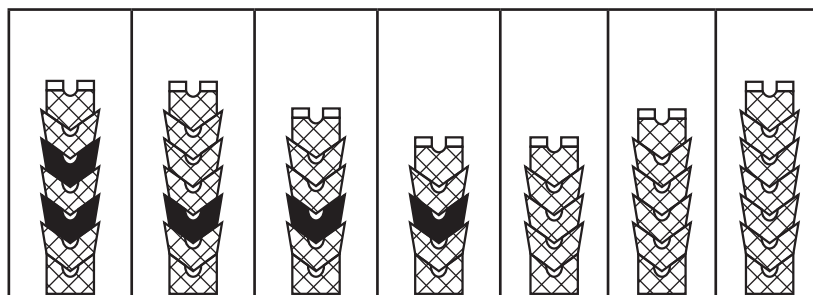
Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 5 -	120,65	139,70	36,51					1.3.1		
VP 6 -	120,65	139,70	42,80						1.4.1	
VP 7 -	120,65	139,70	49,21							1.5.1
VP 5 -	125	140	26,0				1.2.1.1			
VP 6 -	125	140	30,0			1.3.1.1				
VP 7 -	125	140	34,0		1.4.1.1					
VP 5 -	125	145	32,5					1.3.1		
VP 6 -	125	145	38,0						1.4.1	
VP 7 -	125	145	43,5							1.5.1
VP 5 -	125	145	30,0				1.2.1.1			
VP 6 -	125	145	35,5			1.3.1.1				
VP 7 -	125	145	40,5	1.3.2.1						
VP 5 -	125	150	34,0				1.2.1.1			
VP 6 -	125	150	40,0			1.3.1.1				
VP 7 -	125	150	46,0		1.4.1.1					
VP 5 -	125	155	45,0					1.3.1		
VP 6 -	125	155	52,5						1.4.1	
VP 7 -	125	155	60,0							1.5.1
VP 5 -	127	139,70	22,22					1.3.1		
VP 6 -	127	139,70	25,39						1.4.1	
VP 7 -	127	139,70	28,56							1.5.1
VP 5 -	127	142,87	20,00					1.3.1		
VP 6 -	127	142,87	23,50						1.4.1	
VP 7 -	127	142,87	27,00							1.5.1
VP 5 -	127	146,05	28,57					1.3.1		
VP 6 -	127	146,05	33,32						1.4.1	
VP 7 -	127	146,05	38,08							1.5.1
VP 5 -	127	149,22	29,20					1.3.1		
VP 6 -	127	149,22	34,20						1.4.1	
VP 7 -	127	149,22	39,20							1.5.1
VP 5 -	127	152,40	33,32					1.3.1		

VP5 | VP6 | VP7

Rod Seal

Note:

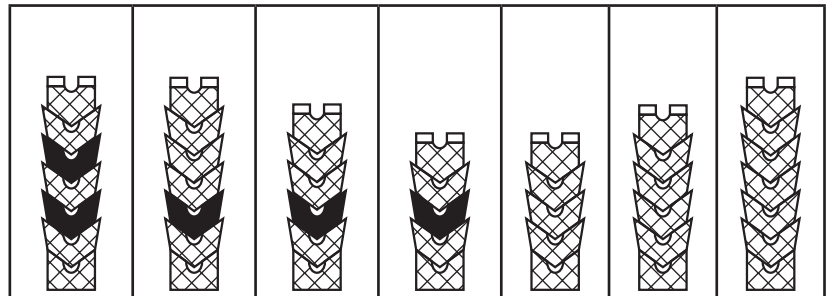
In the case of pressures of < 50 bar we recommend the types B + C. Please tell us your desired types in every order.



Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 6 -	127	152,40	39,27						1.4.1	
VP 7 -	127	152,40	45,22							1.5.1
VP 5 -	128	148,00	35,50				1.2.1.1			
VP 6 -	128	148,00	41,75			1.3.1.1				
VP 7 -	128	148	48,0		1.4.1.1					
VP 5 -	130	145	26,0					1.3.1		
VP 6 -	130	145	30,0						1.4.1	
VP 7 -	130	145	34,0							1.5.1
VP 5 -	130	150	24,0					1.3.1		
VP 6 -	130	150	28,0						1.4.1	
VP 7 -	130	150	32,0							1.5.1
VP 5 -	130	155	36,5					1.3.1		
VP 6 -	130	155	42,5						1.4.1	
VP 7 -	130	155	48,5							1.5.1
VP 5 -	130	160	38,2					1.3.1		
VP 6 -	130	160	44,1						1.4.1	
VP 7 -	130	160	50,0							1.5.1
VP 5 -	135	160	35,0					1.3.1		
VP 6 -	135	160	41,0						1.4.1	
VP 7 -	135	160	47,0							1.5.1
VP 5 -	135	160	35,0				1.2.1.1			
VP 6 -	135	160	41,0			1.3.1.1				
VP 7 -	135	160	47,0	1.3.2.1						
VP 5 -	135	165	40,0					1.3.1		
VP 6 -	135	165	47,5						1.4.1	
VP 7 -	135	165	55,0							1.5.1
VP 5 -	139,70	152,40	19,05					1.3.1		
VP 6 -	139,70	152,40	22,22						1.4.1	
VP 7 -	139,70	152,40	25,40							1.5.1
VP 5 -	139,70	165,10	32,50					1.3.1		
VP 6 -	139,70	165,10	38,50						1.4.1	

Note:

In the case of pressures of < 50 bar we recommend the types B + C. Please tell us your desired types in every order.



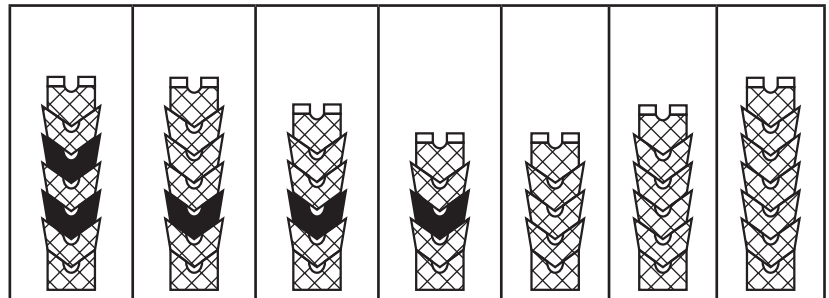
Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 7 -	139,70	165,10	44,50							1.5.1
VP 5 -	140	155	26,0				1.2.1.1			
VP 6 -	140	155	30,0			1.3.1.1				
VP 7 -	140	155	34,0		1.4.1.1					
VP 5 -	140	160	31,5					1.3.1		
VP 6 -	140	160	37,0						1.4.1	
VP 7 -	140	160	42,5							1.5.1
VP 5 -	140	160	31,5				1.2.1.1			
VP 6 -	140	160	37,0			1.3.1.1				
VP 7 -	140	160	42,5	1.3.2.1						
VP 5 -	140	160	28,5				1.2.1.1			
VP 6 -	140	160	33,5			1.3.1.1				
VP 7 -	140	160	38,5	1.3.2.1						
VP 5 -	140	165	34,0				1.2.1.1			
VP 6 -	140	165	40,0			1.3.1.1				
VP 7 -	140	165	46,0		1.4.1.1					
VP 5 -	140	170	44,5					1.3.1		
VP 6 -	140	170	52,0						1.4.1	
VP 7 -	140	170	59,5							1.5.1
VP 5 -	140	175	50,0					1.3.1		
VP 6 -	140	175	59,0						1.4.1	
VP 7 -	140	175	68,0							1.5.1
VP 5 -	145	170	35,0					1.3.1		
VP 6 -	145	170	41,0						1.4.1	
VP 7 -	145	170	47,0							1.5.1
VP 5 -	145	170	35,0				1.2.1.1			
VP 6 -	145	170	41,0			1.3.1.1				
VP 7 -	145	170	47,0	1.3.2.1						
VP 5 -	145	170	38,0				1.2.1.1			
VP 6 -	145	170	44,0			1.3.1.1				
VP 7 -	145	170	50,0	1.3.2.1						

VP5 | VP6 | VP7

Rod Seal

Note:

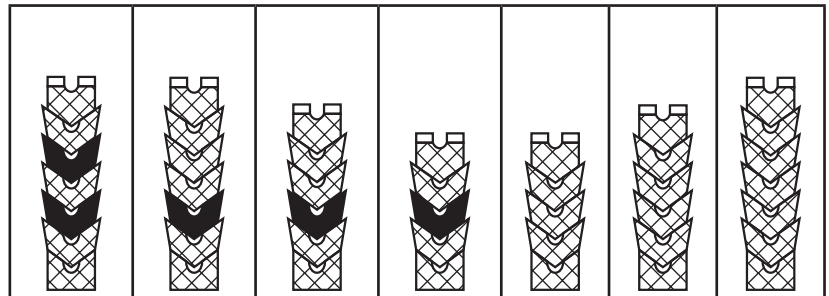
In the case of pressures of <50 bar we recommend the types B + C. Please tell us your desired types in every order.



Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 5 -	145	175	42,5					1.3.1		
VP 6 -	145	175	50,0						1.4.1	
VP 7 -	145	175	57,5							1.5.1
VP 5 -	146,05	168,27	31,75					1.3.1		
VP 6 -	146,05	168,27	36,50						1.4.1	
VP 7 -	146,05	168,27	41,27							1.5.1
VP 5 -	150	170	30,0				1.2.1.1			
VP 6 -	150	170	35,0			1.3.1.1				
VP 7 -	150	170	40,0		1.4.1.1					
VP 5 -	150	175	36,5					1.3.1		
VP 6 -	150	175	42,5						1.4.1	
VP 7 -	150	175	48,5							1.5.1
VP 5 -	150	180	45,0				1.2.1.1			
VP 6 -	150	180	52,5			1.3.1.1				
VP 7 -	150	180	60,0		1.4.1.1					
VP 5 -	151,60	165,10	22,22					1.3.1		
VP 6 -	151,60	165,10	26,19						1.4.1	
VP 7 -	151,60	165,10	30,16							1.5.1
VP 5 -	152,40	165,10	22,22					1.3.1		
VP 6 -	152,40	165,10	25,40						1.4.1	
VP 7 -	152,40	165,10	28,57							1.5.1
VP 5 -	152,40	177,80	39,69					1.3.1		
VP 6 -	152,40	177,80	46,83						1.4.1	
VP 7 -	152,40	177,80	53,97							1.5.1
VP 5 -	153,19	172,24	25,40					1.3.1		
VP 6 -	153,19	172,24	30,16						1.4.1	
VP 7 -	153,19	172,24	34,92							1.5.1
VP 5 -	155	175	30,0					1.3.1		
VP 6 -	155	175	35,0						1.4.1	
VP 7 -	155	175	40,0							1.5.1
VP 5 -	155	175	22,5					1.3.1		

Note:

In the case of pressures of < 50 bar we recommend the types B + C. Please tell us your desired types in every order.



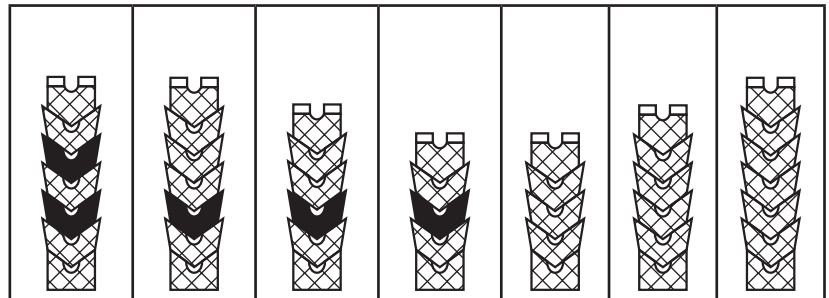
Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 6 -	155	175	26,0						1.4.1	
VP 7 -	155	175	29,5							1.5.1
VP 5 -	155	175	22,5				1.2.1.1			
VP 6 -	155	175	26,0			1.3.1.1				
VP 7 -	155	175	29,5	1.3.2.1						
VP 5 -	155	180	30,5					1.3.1		
VP 6 -	155	180	36,5						1.4.1	
VP 7 -	155	180	42,5							1.5.1
VP 5 -	155	185	40,0					1.3.1		
VP 6 -	155	185	47,0						1.4.1	
VP 7 -	155	185	54,0							1.5.1
VP 5 -	158,75	171,45	27,78					1.3.1		
VP 6 -	158,75	171,45	32,14						1.4.1	
VP 7 -	158,75	171,45	36,51							1.5.1
VP 5 -	160	170	28,0					1.3.1		
VP 6 -	160	170	31,0						1.4.1	
VP 7 -	160	170	34,0							1.5.1
VP 5 -	160	180	30,0				1.2.1.1			
VP 6 -	160	180	35,0			1.3.1.1				
VP 7 -	160	180	40,0		1.4.1.1					
VP 5 -	160	185	40,0					1.3.1		
VP 6 -	160	185	47,5						1.4.1	
VP 7 -	160	185	55,0							1.5.1
VP 5 -	160	190	45,0				1.2.1.1			
VP 6 -	160	190	52,5			1.3.1.1				
VP 7 -	160	190	60,0		1.4.1.1					
VP 5 -	160	190	33,0					1.3.1		
VP 6 -	160	190	39,0						1.4.1	
VP 7 -	160	190	45,0							1.5.1
VP 5 -	163	183	35,0					1.3.1		
VP 6 -	163	183	41,25						1.4.1	

VP5 | VP6 | VP7

Rod Seal

Note:

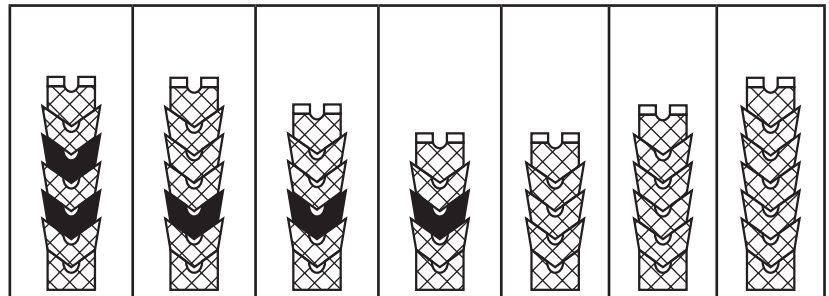
In the case of pressures of < 50 bar we recommend the types B + C. Please tell us your desired types in every order.



Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 7 -	163	183	47,5							1.5.1
VP 5 -	165	185	33,0					1.3.1		
VP 6 -	165	185	39,0						1.4.1	
VP 7 -	165	185	45,0							1.5.1
VP 5 -	165	195	47,5					1.3.1		
VP 6 -	165	195	55,0						1.4.1	
VP 7 -	165	195	62,5							1.5.1
VP 5 -	165,10	177,80	19,05					1.3.1		
VP 6 -	165,10	177,80	22,22						1.4.1	
VP 7 -	165,10	177,80	25,40							1.5.1
VP 5 -	170	185	34,0					1.3.1		
VP 6 -	170	185	40,0						1.4.1	
VP 7 -	170	185	46,0							1.5.1
VP 5 -	170	190	28,0					1.3.1		
VP 6 -	170	190	33,0						1.4.1	
VP 7 -	170	190	38,0							1.5.1
VP 5 -	170	195	36,5					1.3.1		
VP 6 -	170	195	42,5						1.4.1	
VP 7 -	170	195	48,5							1.5.1
VP 5 -	175	200	36,5					1.3.1		
VP 6 -	175	200	42,5						1.4.1	
VP 7 -	175	200	48,5							1.5.1
VP 5 -	175	205	45,0					1.3.1		
VP 6 -	175	205	52,5						1.4.1	
VP 7 -	175	205	60,0							1.5.1
VP 5 -	177,80	190,50	22,22					1.3.1		
VP 6 -	177,80	190,50	26,19						1.4.1	
VP 7 -	177,80	190,50	30,16							1.5.1
VP 5 -	177,80	196,85	28,57					1.3.1		
VP 6 -	177,80	196,85	33,33						1.4.1	
VP 7 -	177,80	196,85	38,10							1.5.1

Note:

In the case of pressures of <50 bar we recommend the types B + C. Please tell us your desired types in every order.



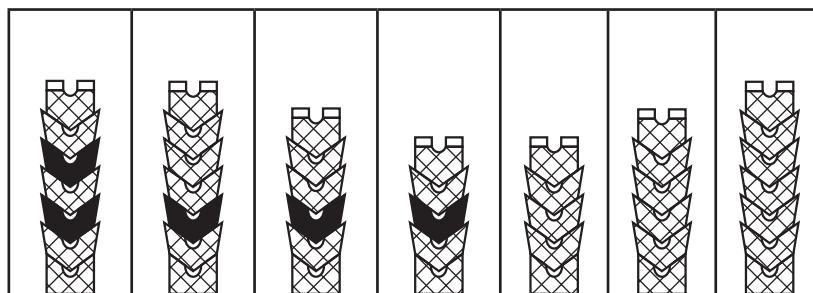
Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 5 -	177,80	203,20	38,05					1.3.1		
VP 6 -	177,80	203,20	44,50						1.4.1	
VP 7 -	177,80	203,20	50,95							1.5.1
VP 5 -	180	200	30,0				1.2.1.1			
VP 6 -	180	200	35,0			1.3.1.1				
VP 7 -	180	200	40,0		1.4.1.1					
VP 5 -	180	205	32,0					1.3.1		
VP 6 -	180	205	37,5						1.4.1	
VP 7 -	180	205	43,0							1.5.1
VP 5 -	180	210	45,0				1.2.1.1			
VP 6 -	180	210	52,5			1.3.1.1				
VP 7 -	180	210	60,0		1.4.1.1					
VP 5 -	185	205	27,0					1.3.1		
VP 6 -	185	205	32,0						1.4.1	
VP 7 -	185	205	37,0							1.5.1
VP 5 -	185	210	24,0					1.3.1		
VP 6 -	185	210	28,5						1.4.1	
VP 7 -	185	210	33,0							1.5.1
VP 5 -	190	210	30,0					1.3.1		
VP 6 -	190	210	35,0						1.4.1	
VP 7 -	190	210	40,0							1.5.1
VP 5 -	190	210	30,0				1.2.1.1			
VP 6 -	190	210	35,0			1.3.1.1				
VP 7 -	190	210	40,0	1.3.2.1						
VP 5 -	190	215	36,9					1.3.1		
VP 6 -	190	215	43,2						1.4.1	
VP 7 -	190	215	49,5							1.5.1
VP 5 -	190	220	45,0					1.3.1		
VP 6 -	190	220	52,5						1.4.1	
VP 7 -	190	220	60,0							1.5.1
VP 5 -	190,50	203,20	19,05					1.3.1		

VP5 | VP6 | VP7

Rod Seal

Note:

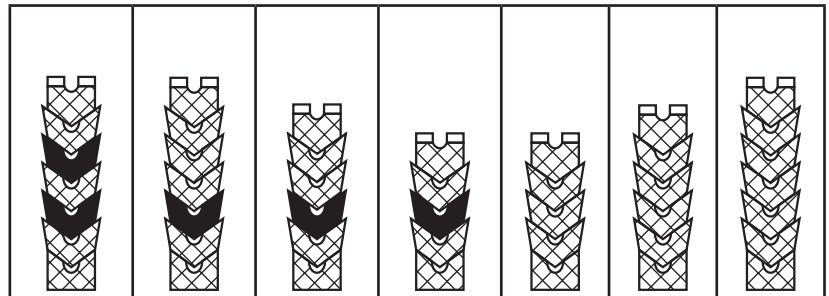
In the case of pressures of <50 bar we recommend the types B + C. Please tell us your desired types in every order.



Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 6 -	190,50	203,20	22,22						1.4.1	
VP 7 -	190,50	203,20	25,40							1.5.1
VP 5 -	200	220	30,0				1.2.1.1			
VP 6 -	200	220	35,0			1.3.1.1				
VP 7 -	200	220	40,0		1.4.1.1					
VP 5 -	200	225	40,0					1.3.1		
VP 6 -	200	225	47,0						1.4.1	
VP 7 -	200	225	54,0							1.5.1
VP 5 -	200	230	45,0					1.3.1		
VP 6 -	200	230	52,5						1.4.1	
VP 7 -	200	230	60,0							1.5.1
VP 5 -	200	235	45,0					1.3.1		
VP 6 -	200	235	52,5						1.4.1	
VP 7 -	200	235	60,0							1.5.1
VP 5 -	203,20	228,60	38,10					1.3.1		
VP 6 -	203,20	228,60	44,45						1.4.1	
VP 7 -	203,20	228,60	50,80							1.5.1
VP 5 -	204	224	36,5					1.3.1		
VP 6 -	204	224	43,0						1.4.1	
VP 7 -	204	224	49,5							1.5.1
VP 5 -	210	230	30,0					1.3.1		
VP 6 -	210	230	35,0						1.4.1	
VP 7 -	210	230	40,0							1.5.1
VP 5 -	210	235	30,0					1.3.1		
VP 6 -	210	235	35,0						1.4.1	
VP 7 -	210	235	40,0							1.5.1
VP 5 -	210	240	45,0				1.2.1.1			
VP 6 -	210	240	52,5			1.3.1.1				
VP 7 -	210	240	60,0		1.4.1.1					
VP 5 -	210	250	47,0					1.3.1		
VP 6 -	210	250	54,5						1.4.1	

Note:

In the case of pressures of < 50 bar we recommend the types B + C. Please tell us your desired types in every order.



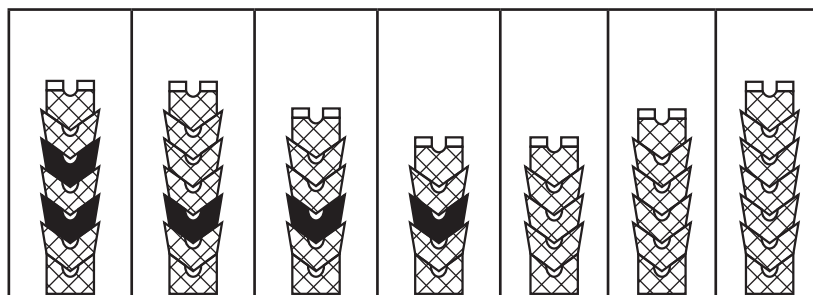
Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 7 -	210	250	62,0							1.5.1
VP 5 -	215	235	34,0					1.3.1		
VP 6 -	215	235	40,0						1.4.1	
VP 7 -	215	235	46,0							1.5.1
VP 5 -	215	245	45,0					1.3.1		
VP 6 -	215	245	52,5						1.4.1	
VP 7 -	215	245	60,0							1.5.1
VP 5 -	220	240	30,0					1.3.1		
VP 6 -	220	240	35,0						1.4.1	
VP 7 -	220	240	40,0							1.5.1
VP 5 -	220	250	47,5				1.2.1.1			
VP 6 -	220	250	55,0			1.3.1.1				
VP 7 -	220	250	62,5		1.4.1.1					
VP 5 -	222,20	254,00	47,62					1.3.1		
VP 6 -	222,20	254,00	55,55						1.4.1	
VP 7 -	222,20	254,00	63,48							1.5.1
VP 5 -	225	255	45,0					1.3.1		
VP 6 -	225	255	52,5						1.4.1	
VP 7 -	225	255	60,0							1.5.1
VP 5 -	230	260	45,0					1.3.1		
VP 6 -	230	260	52,5						1.4.1	
VP 7 -	230	260	60,0							1.5.1
VP 5 -	235	255	36,25					1.3.1		
VP 6 -	235	255	42,50						1.4.1	
VP 7 -	235	255	48,75							1.5.1
VP 5 -	235	265	49,0					1.3.1		
VP 6 -	235	265	57,0						1.4.1	
VP 7 -	235	265	65,0							1.5.1
VP 5 -	240	260	34,0					1.3.1		
VP 6 -	240	260	40,0						1.4.1	
VP 7 -	240	260	46,0							1.5.1

VP5 | VP6 | VP7

Rod Seal

Note:

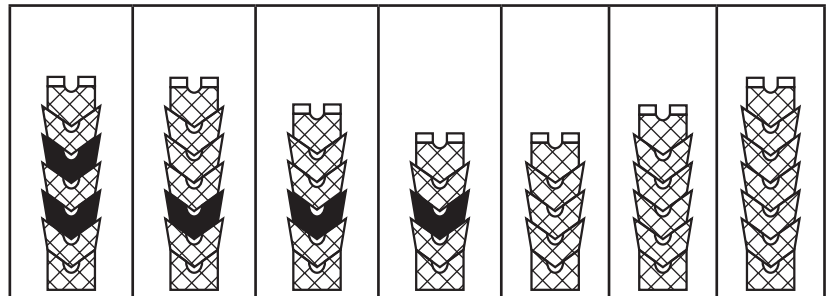
In the case of pressures of < 50 bar we recommend the types B + C. Please tell us your desired types in every order.



Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 5 -	240	270	45,0				1.2.1.1			
VP 6 -	240	270	52,5			1.3.1.1				
VP 7 -	240	270	60,0		1.4.1.1					
VP 5 -	245	280	45,0					1.3.1		
VP 6 -	245	280	52,5						1.4.1	
VP 7 -	245	280	60,0							1.5.1
VP 5 -	250	270	30,0					1.3.1		
VP 6 -	250	270	35,0						1.4.1	
VP 7 -	250	270	40,0							1.5.1
VP 5 -	250	280	49,0					1.3.1		
VP 6 -	250	280	57,0						1.4.1	
VP 7 -	250	280	65,0							1.5.1
VP 5 -	250	280	31,5					1.3.1		
VP 6 -	250	280	36,5						1.4.1	
VP 7 -	250	280	41,5							1.5.1
VP 5 -	250	285	45,0					1.3.1		
VP 6 -	250	285	52,5						1.4.1	
VP 7 -	250	285	60,0							1.5.1
VP 7 -	250	290	49,0							1.5.1
VP 7 -	250	290	57,0							1.5.1
VP 7 -	250	290	65,0							1.5.1
VP 5 -	255	285	50,0					1.3.1		
VP 6 -	255	285	58,5						1.4.1	
VP 7 -	255	285	67,0							1.5.1
VP 5 -	260	280	28,0					1.3.1		
VP 6 -	260	280	33,0						1.4.1	
VP 7 -	260	280	38,0							1.5.1
VP 5 -	260	290	45,0					1.3.1		
VP 6 -	260	290	52,5						1.4.1	
VP 7 -	260	290	60,0							1.5.1
VP 7 -	263	283	47,5							1.5.1

Note:

In the case of pressures of < 50 bar we recommend the types B + C. Please tell us your desired types in every order.



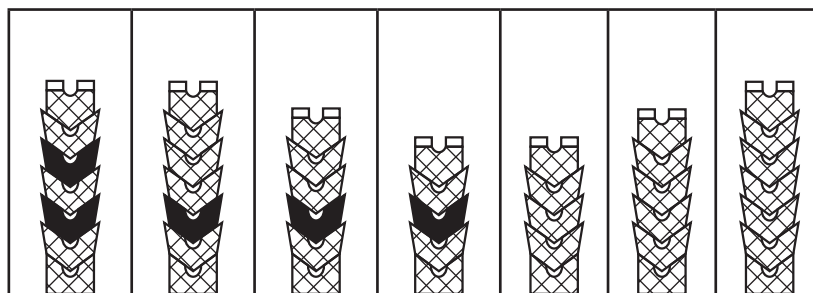
Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 6 -	265	297	54,0						1.4.1	
VP 5 -	266,70	298,40	40,00					1.3.1		
VP 7 -	269,87	295,27	50,80							1.5.1
VP 5 -	275	305	45,0					1.3.1		
VP 6 -	275	305	52,5						1.4.1	
VP 7 -	275	305	60,0							1.5.1
VP 5 -	280	300	30,0					1.3.1		
VP 6 -	280	300	35,0						1.4.1	
VP 7 -	280	300	40,0							1.5.1
VP 5 -	280	310	45,0					1.3.1		
VP 6 -	280	310	52,5						1.4.1	
VP 7 -	280	310	60,0							1.5.1
VP 5 -	280	312	45,0					1.3.1		
VP 5 -	280	312	52,5					1.3.1		
VP 5 -	280	312	60,0					1.3.1		
VP 5 -	280	320	58,0					1.3.1		
VP 6 -	280	320	68,0						1.4.1	
VP 7 -	280	320	78,0							1.5.1
VP 5 -	285	310	36,5					1.3.1		
VP 6 -	285	310	43,0						1.4.1	
VP 7 -	285	310	49,5							1.5.1
VP 5 -	285	325	55,0					1.3.1		
VP 6 -	285	325	65,0						1.4.1	
VP 7 -	285	325	75,0							1.5.1
VP 5 -	290	320	42,5					1.3.1		
VP 6 -	290	320	50,0						1.4.1	
VP 7 -	290	320	57,5							1.5.1
VP 5 -	290	320	47,5				1.2.1.1			
VP 6 -	290	320	55,0			1.3.1.1				
VP 7 -	290	320	62,5		1.4.1.1					
VP 5 -	295	325	47,5					1.3.1		

VP5 | VP6 | VP7

Rod Seal

Note:

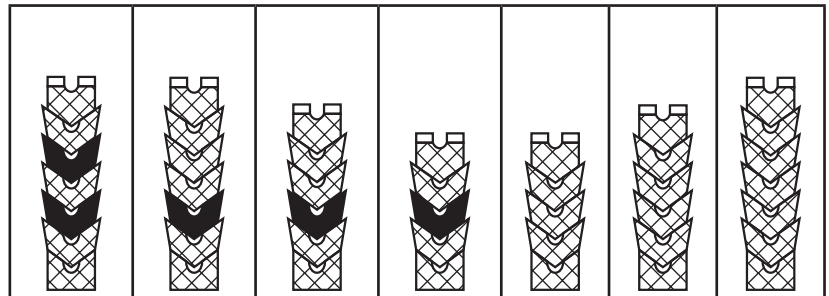
In the case of pressures of < 50 bar we recommend the types B + C. Please tell us your desired types in every order.



Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 6 -	295	325	55,0						1.4.1	
VP 7 -	295	325	62,5							1.5.1
VP 5 -	300	330	45,0					1.3.1		
VP 6 -	300	330	52,5						1.4.1	
VP 7 -	300	330	60,0							1.5.1
VP 5 -	300	340	55,0					1.3.1		
VP 6 -	300	340	65,0						1.4.1	
VP 7 -	300	340	75,0							1.5.1
VP 6 -	304,80	342,90	54,76						1.4.1	
VP 5 -	310	340	45,0					1.3.1		
VP 6 -	310	340	52,5						1.4.1	
VP 7 -	310	340	60,0							1.5.1
VP 5 -	310	350	55,0					1.3.1		
VP 6 -	310	350	65,0						1.4.1	
VP 7 -	310	350	75,0							1.5.1
VP 5 -	320	350	45,0					1.3.1		
VP 6 -	320	350	52,5						1.4.1	
VP 7 -	320	350	60,0							1.5.1
VP 5 -	320	360	55,0					1.3.1		
VP 6 -	320	360	65,0						1.4.1	
VP 7 -	320	360	75,0							1.5.1
VP 5 -	320	360	60,0					1.3.1		
VP 6 -	320	360	70,0						1.4.1	
VP 7 -	320	360	80,0							1.5.1
VP 5 -	325	355	45,0					1.3.1		
VP 6 -	325	355	52,5						1.4.1	
VP 7 -	325	355	60,0							1.5.1
VP 5 -	330	360	40,0					1.3.1		
VP 6 -	330	360	47,5						1.4.1	
VP 7 -	330	360	55,0							1.5.1
VP 5 -	330	370	55,0					1.3.1		

Note:

In the case of pressures of <50 bar we recommend the types B + C. Please tell us your desired types in every order.



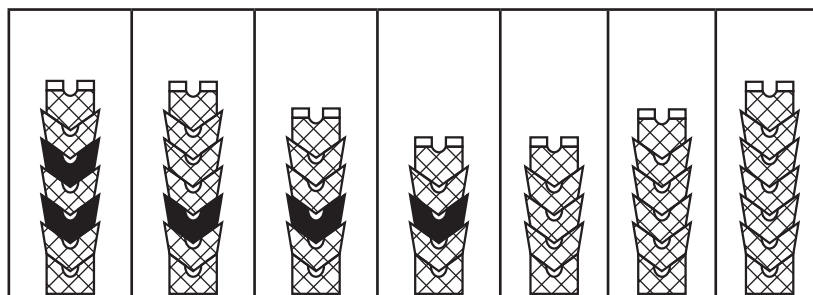
Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 6 -	330	370	65,0						1.4.1	
VP 7 -	330	370	75,0							1.5.1
VP 5 -	330,20	387,35	82,50					1.3.1		
VP 6 -	330,20	387,35	96,50						1.4.1	
VP 7 -	330,20	387,35	110,50							1.5.1
VP 5 -	335	365	45,0					1.3.1		
VP 6 -	335	365	52,5						1.4.1	
VP 7 -	335	365	60,0							1.5.1
VP 5 -	338	358	36,0					1.3.1		
VP 6 -	338	358	42,0						1.4.1	
VP 7 -	338	358	48,0							1.5.1
VP 5 -	340	370	45,0					1.3.1		
VP 6 -	340	370	52,5						1.4.1	
VP 7 -	340	370	60,0							1.5.1
VP 5 -	340	380	55,0					1.3.1		
VP 6 -	340	380	65,0						1.4.1	
VP 7 -	340	380	75,0							1.5.1
VP 7 -	349,25	387,35	63,00							1.5.1
VP 5 -	350	380	45,0					1.3.1		
VP 6 -	350	380	52,5						1.4.1	
VP 7 -	350	380	60,0							1.5.1
VP 5 -	350	390	55,0					1.3.1		
VP 6 -	350	390	65,0						1.4.1	
VP 7 -	350	390	75,0							1.5.1
VP 5 -	355	400	54,0					1.3.1		
VP 6 -	355	400	62,0						1.4.1	
VP 7 -	355	400	70,0							1.5.1
VP 5 -	360	385	42,5					1.3.1		
VP 6 -	360	385	50,0						1.4.1	
VP 7 -	360	385	57,5							1.5.1
VP 5 -	360	390	45,0					1.3.1		

VP5 | VP6 | VP7

Rod Seal

Note:

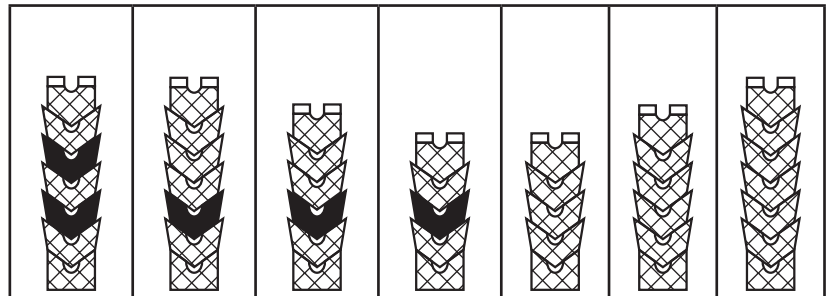
In the case of pressures of < 50 bar we recommend the types B + C. Please tell us your desired types in every order.



Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 6 -	360	390	52,5						1.4.1	
VP 7 -	360	390	60,0							1.5.1
VP 5 -	360	400	55,0					1.3.1		
VP 6 -	360	400	65,0						1.4.1	
VP 7 -	360	400	75,0							1.5.1
VP 5 -	368,30	406,40	57,11					1.3.1		
VP 6 -	368,30	406,40	67,81						1.4.1	
VP 7 -	368,30	406,40	78,51							1.5.1
VP 5 -	370	400	45,0					1.3.1		
VP 6 -	370	400	52,5						1.4.1	
VP 7 -	370	400	60,0							1.5.1
VP 5 -	370	410	60,0					1.3.1		
VP 6 -	370	410	70,0						1.4.1	
VP 7 -	370	410	80,0							1.5.1
VP 5 -	375	405	45,0					1.3.1		
VP 6 -	375	405	52,5						1.4.1	
VP 7 -	375	405	60,0							1.5.1
VP 6 -	375	407	50,0						1.4.1	
VP 5 -	380	410	45,0					1.3.1		
VP 6 -	380	410	52,5						1.4.1	
VP 7 -	380	410	60,0							1.5.1
VP 5 -	380	420	55,0					1.3.1		
VP 6 -	380	420	65,0						1.4.1	
VP 7 -	380	420	75,0							1.5.1
VP 5 -	380	420	60,0					1.3.1		
VP 6 -	380	420	70,0						1.4.1	
VP 7 -	380	420	80,0							1.5.1
VP 5 -	390	430	55,0					1.3.1		
VP 6 -	390	430	65,0						1.4.1	
VP 7 -	390	430	75,0							1.5.1
VP 5 -	395	425	50,0					1.3.1		

Note:

In the case of pressures of < 50 bar we recommend the types B + C. Please tell us your desired types in every order.



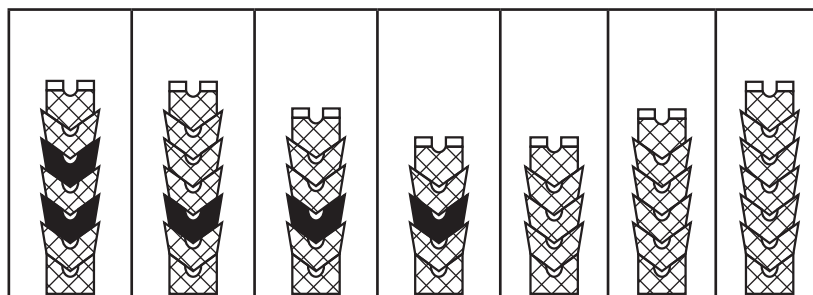
Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 6 -	395	425	60,0						1.4.1	
VP 7 -	395	425	70,0							1.5.1
VP 5 -	400	430	54,0					1.3.1		
VP 6 -	400	430	62,0						1.4.1	
VP 7 -	400	430	70,0							1.5.1
VP 5 -	400	440	55,0					1.3.1		
VP 6 -	400	440	65,0						1.4.1	
VP 7 -	400	440	75,0							1.5.1
VP 5 -	410	450	55,0					1.3.1		
VP 6 -	410	450	65,0						1.4.1	
VP 7 -	410	450	75,0							1.5.1
VP 5 -	414,50	456,50	60,00					1.3.1		
VP 6 -	414,50	456,50	70,00						1.4.1	
VP 7 -	414,50	456,50	80,00							1.5.1
VP 5 -	420	460	60,0					1.3.1		
VP 6 -	420	460	70,0						1.4.1	
VP 7 -	420	460	80,0							1.5.1
VP 5 -	425	465	56,0					1.3.1		
VP 6 -	425	465	65,0						1.4.1	
VP 7 -	425	465	74,0							1.5.1
VP 5 -	440	480	60,0					1.3.1		
VP 6 -	440	480	70,0						1.4.1	
VP 7 -	440	480	80,0							1.5.1
VP 5 -	450	485	50,0					1.3.1		
VP 6 -	450	485	57,5						1.4.1	
VP 7 -	450	485	65,0							1.5.1
VP 5 -	450	490	55,0					1.3.1		
VP 6 -	450	490	65,0						1.4.1	
VP 7 -	450	490	75,0							1.5.1
VP 5 -	455	500	60,0					1.3.1		
VP 6 -	455	500	70,0						1.4.1	

VP5 | VP6 | VP7

Rod Seal

Note:

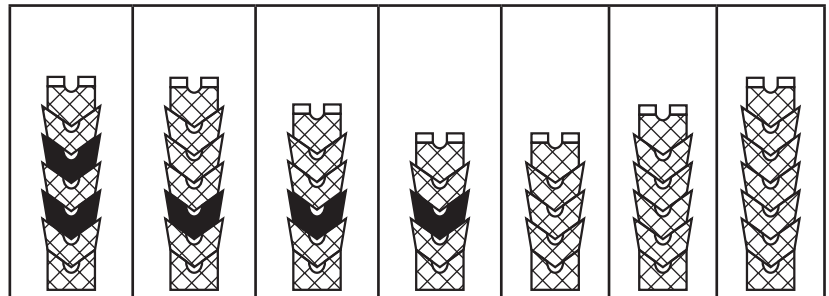
In the case of pressures of < 50 bar we recommend the types B + C. Please tell us your desired types in every order.



Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 7 -	455	500	80,0							1.5.1
VP 5 -	460	500	60,0					1.3.1		
VP 6 -	460	500	70,0						1.4.1	
VP 7 -	460	500	80,0							1.5.1
VP 5 -	470	510	55,0					1.3.1		
VP 6 -	470	510	65,0						1.4.1	
VP 7 -	470	510	75,0							1.5.1
VP 5 -	480	510	45,0					1.3.1		
VP 6 -	480	510	52,5						1.4.1	
VP 7 -	480	510	60,0							1.5.1
VP 5 -	480	512	40,0					1.3.1		
VP 6 -	480	512	47,0						1.4.1	
VP 7 -	480	512	54,0							1.5.1
VP 5 -	480	520	60,0					1.3.1		
VP 6 -	480	520	70,0						1.4.1	
VP 7 -	480	520	80,0							1.5.1
VP 5 -	492	532	55,0					1.3.1		
VP 6 -	492	532	65,0						1.4.1	
VP 7 -	492	532	75,0							1.5.1
VP 5 -	500	540	55,0					1.3.1		
VP 6 -	500	540	65,0						1.4.1	
VP 7 -	500	540	75,0							1.5.1
VP 5 -	520	560	60,0					1.3.1		
VP 6 -	520	560	70,0						1.4.1	
VP 7 -	520	560	80,0							1.5.1
VP 5 -	530	570	45,0					1.3.1		
VP 6 -	530	570	55,0						1.4.1	
VP 7 -	530	570	65,0							1.5.1
VP 5 -	535	575	57,1					1.3.1		
VP 6 -	535	575	67,8						1.4.1	
VP 7 -	535	575	78,5							1.5.1

Note:

In the case of pressures of < 50 bar we recommend the types B + C. Please tell us your desired types in every order.



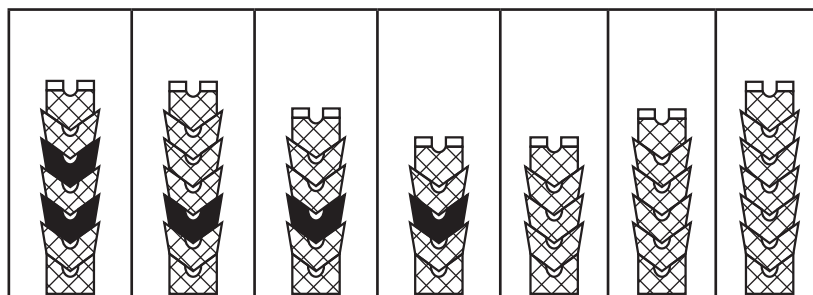
Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 5 -	540	580	60,0					1.3.1		
VP 6 -	540	580	70,0						1.4.1	
VP 7 -	540	580	80,0							1.5.1
VP 5 -	550	590	60,0					1.3.1		
VP 6 -	550	590	70,0						1.4.1	
VP 5 -	550	600	75,0					1.3.1		
VP 6 -	550	600	87,5						1.4.1	
VP 7 -	550	600	100,0							1.5.1
VP 5 -	560	600	57,0					1.3.1		
VP 6 -	560	600	66,0						1.4.1	
VP 7 -	560	600	75,0							1.5.1
VP 5 -	560	610	75,0					1.3.1		
VP 6 -	560	610	87,5						1.4.1	
VP 7 -	560	610	100,0							1.5.1
VP 5 -	570	610	60,0					1.3.1		
VP 6 -	570	610	70,0						1.4.1	
VP 7 -	570	610	80,0							1.5.1
VP 5 -	585	625	60,0					1.3.1		
VP 6 -	585	625	70,0						1.4.1	
VP 7 -	585	625	80,0							1.5.1
VP 5 -	590	630	60,0					1.3.1		
VP 6 -	590	630	70,0						1.4.1	
VP 7 -	590	630	80,0							1.5.1
VP 5 -	600	630	45,0					1.3.1		
VP 5 -	600	630	52,5					1.3.1		
VP 5 -	600	630	60,0					1.3.1		
VP 5 -	600	640	55,0					1.3.1		
VP 6 -	600	640	65,0						1.4.1	
VP 7 -	600	640	75,0							1.5.1
VP 5 -	610	650	60,0					1.3.1		
VP 6 -	610	650	70,0						1.4.1	

VP5 | VP6 | VP7

Rod Seal

Note:

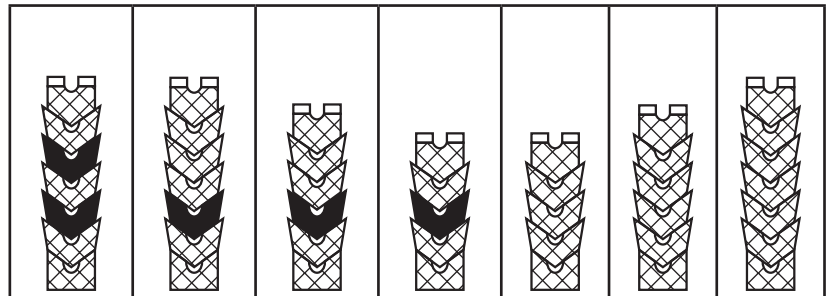
In the case of pressures of < 50 bar we recommend the types B + C. Please tell us your desired types in every order.



Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 7 -	610	650	80,0							1.5.1
VP 5 -	630	670	60,0					1.3.1		
VP 6 -	630	670	70,0						1.4.1	
VP 7 -	630	670	80,0							1.5.1
VP 5 -	640	680	55,0					1.3.1		
VP 6 -	640	680	65,0						1.4.1	
VP 7 -	640	680	75,0							1.5.1
VP 5 -	640	680	60,0					1.3.1		
VP 6 -	640	680	70,0						1.4.1	
VP 7 -	640	680	80,0							1.5.1
VP 5 -	650	690	60,0					1.3.1		
VP 6 -	650	690	70,0						1.4.1	
VP 7 -	650	690	80,0							1.5.1
VP 5 -	660	700	60,0					1.3.1		
VP 6 -	660	700	70,0						1.4.1	
VP 7 -	660	700	80,0							1.5.1
VP 5 -	670	710	60,0					1.3.1		
VP 6 -	670	710	70,0						1.4.1	
VP 7 -	670	710	80,0							1.5.1
VP 5 -	680	720	60,0					1.3.1		
VP 6 -	680	720	70,0						1.4.1	
VP 7 -	680	720	80,0							1.5.1
VP 5 -	700	740	60,0					1.3.1		
VP 6 -	700	740	70,0						1.4.1	
VP 7 -	700	740	80,0							1.5.1
VP 5 -	700	750	75,0					1.3.1		
VP 6 -	700	750	87,5						1.4.1	
VP 7 -	700	750	100,0							1.5.1
VP 5 -	720	770	75,0					1.3.1		
VP 6 -	720	770	87,5						1.4.1	
VP 7 -	720	770	100,0							1.5.1

Note:

In the case of pressures of < 50 bar we recommend the types B + C. Please tell us your desired types in every order.



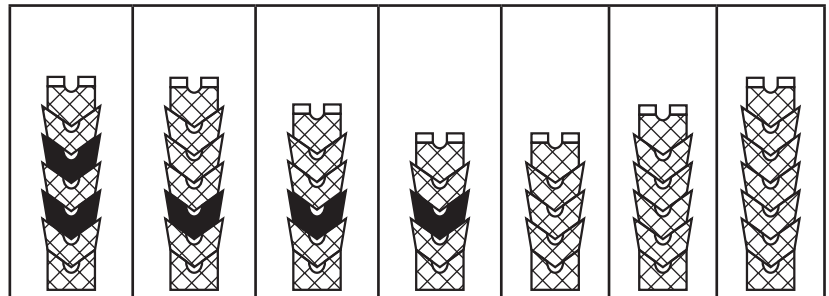
Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 5 -	750	790	60,0					1.3.1		
VP 6 -	750	790	70,0						1.4.1	
VP 7 -	750	790	80,0							1.5.1
VP 5 -	800	840	60,0					1.3.1		
VP 6 -	800	840	70,0						1.4.1	
VP 7 -	800	840	80,0							1.5.1
VP 5 -	800	850	75,0					1.3.1		
VP 6 -	800	850	87,5						1.4.1	
VP 7 -	800	850	100,0							1.5.1
VP 5 -	820	870	75,0					1.3.1		
VP 6 -	820	870	87,5						1.4.1	
VP 7 -	820	870	100,0							1.5.1
VP 5 -	840	890	75,0					1.3.1		
VP 6 -	840	890	87,5						1.4.1	
VP 7 -	840	890	100,0							1.5.1
VP 5 -	850	890	56,0					1.3.1		
VP 6 -	850	890	66,0						1.4.1	
VP 7 -	850	890	76,0							1.5.1
VP 5 -	850	900	75,0					1.3.1		
VP 6 -	850	900	87,5						1.4.1	
VP 7 -	850	900	100,0							1.5.1
VP 5 -	870	920	75,0					1.3.1		
VP 6 -	870	920	87,5						1.4.1	
VP 7 -	870	920	100,0							1.5.1
VP 5 -	900	960	90,0					1.3.1		
VP 6 -	900	960	105,0						1.4.1	
VP 7 -	900	960	120,0							1.5.1
VP 5 -	950	1010	90,0					1.3.1		
VP 6 -	950	1010	105,0						1.4.1	
VP 7 -	950	1010	120,0							1.5.1
VP 5 -	1000	1040	60,0					1.3.1		

VP5 | VP6 | VP7

Rod Seal

Note:

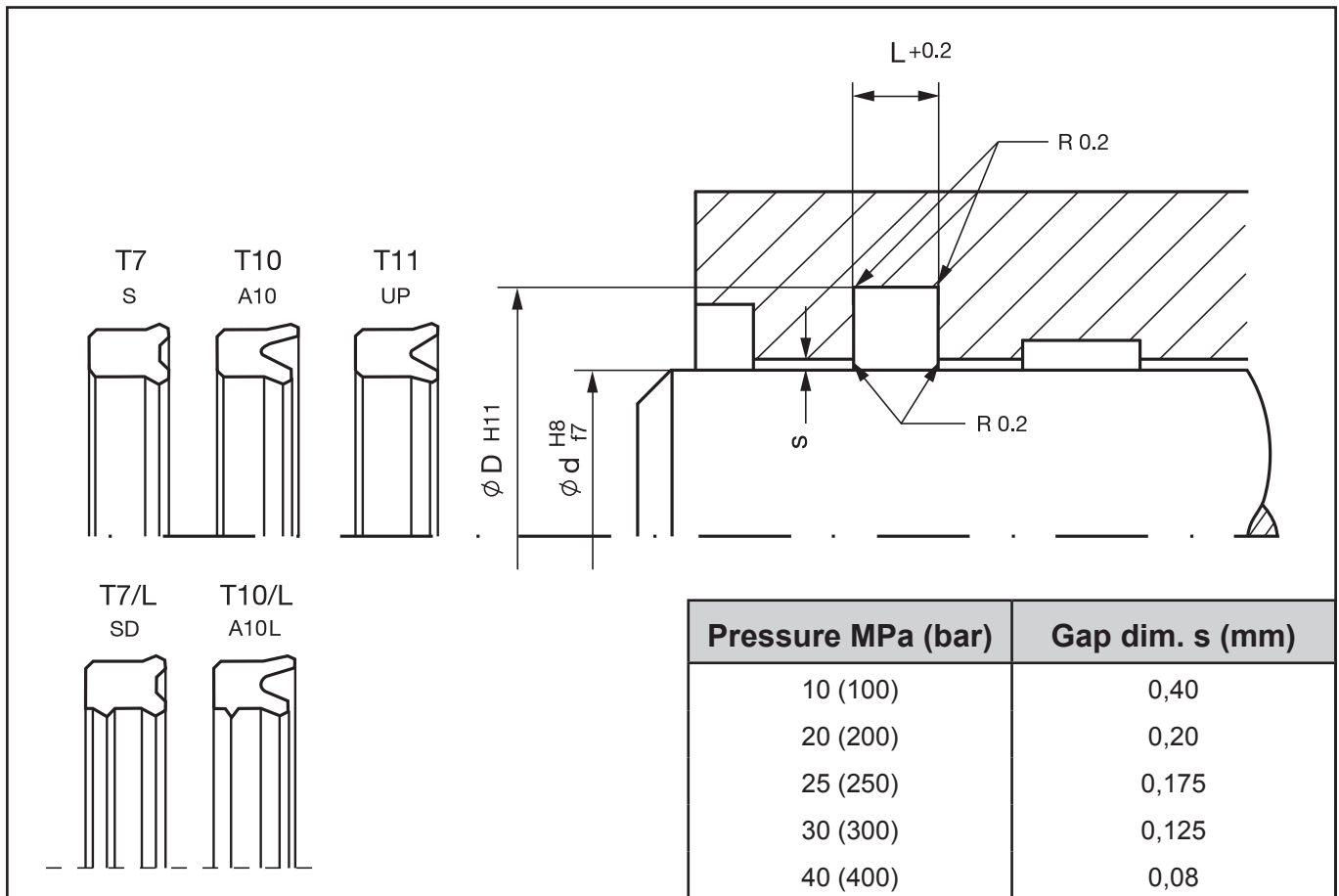
In the case of pressures of <50 bar we recommend the types B + C. Please tell us your desired types in every order.



Type	∅ d (f8)	∅ D (H9)	H/L	7 C (1.3.2.1)	7 B (1.4.1.1)	6 B (1.3.1.1)	5 B (1.2.1.1)	5 A (1.3.1)	6 A (1.4.1)	7 A (1.5.1)
VP 6 -	1000	1040	70,0						1.4.1	
VP 7 -	1000	1040	80,0							1.5.1
VP 5 -	1000	1050	75,0					1.3.1		
VP 6 -	1000	1050	87,5						1.4.1	
VP 7 -	1000	1050	100,0							1.5.1

Further dimension and in-between sizes upon request.

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.



Max. Operating Conditions

Pressure (MPa)	≤ 40 (400 bar)
Temperature (°C)	- 40 / + 100
Speed (m/s)	$\leq 0,5$
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$
Groove flanks	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$
Running surface	$\leq 0,3 \mu\text{m}$	$\leq 3 \mu\text{m}$

Material

Polyurethane	PU
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Technical Description

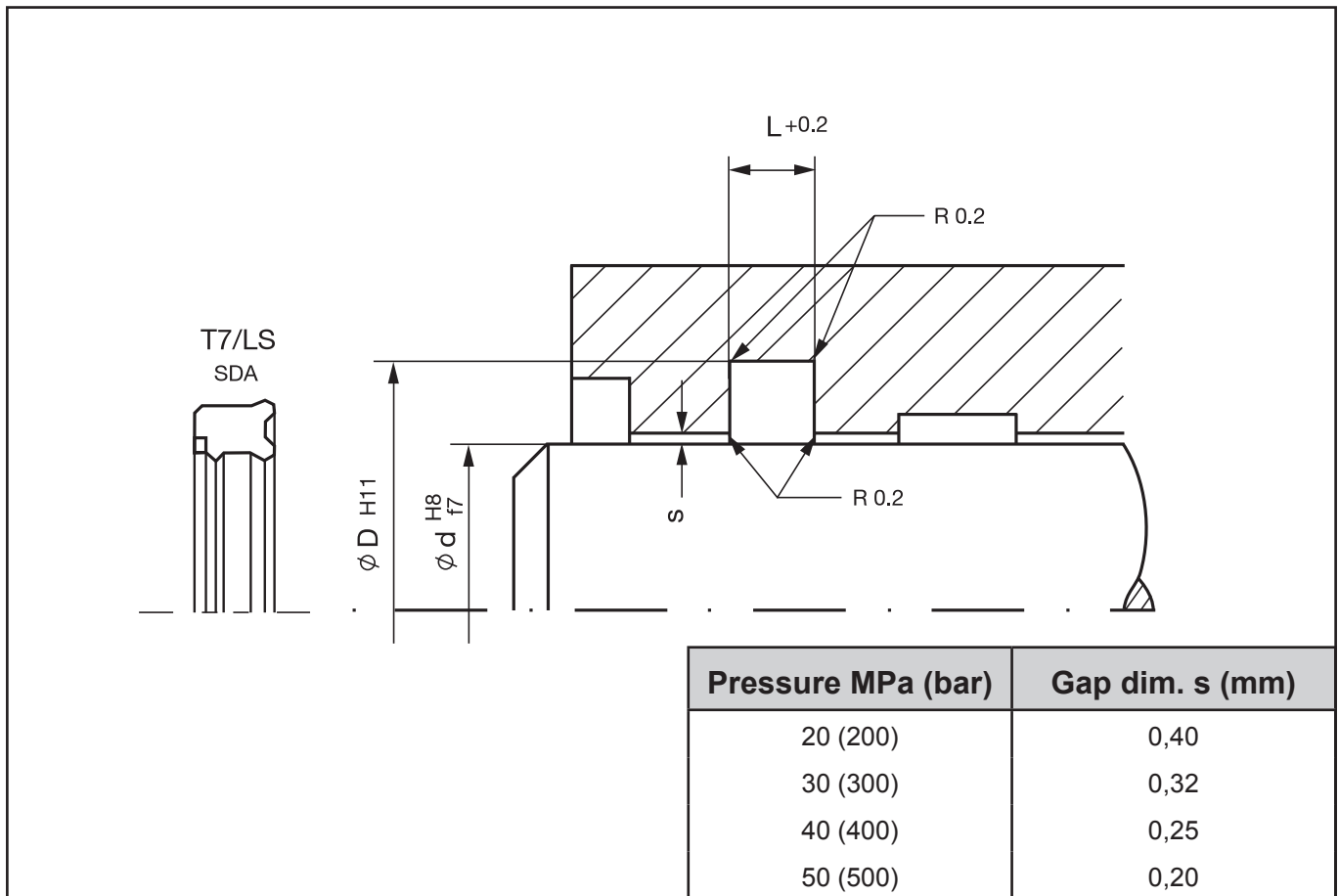
The rod seal of the type series **T7** is a compact polyurethane ring with a symmetric profile. It is the all-purpose standard seal for small seal housings.

The rod seal of the type series **T10** is a polyurethane groove ring with an asymmetrical profile. The profile of the groove ring can be used for a wide application range in standard cylinders for mobile and industrial hydraulics.

The rod seal of the type series **T11** is a polyurethane groove ring with an asymmetrical profile, and is used for the same application range as the type series T10. These groove ring dimensions are mainly designed for the use as spare parts. Types **T10** or **T7** should be used for new constructions. Type **T11** may also be used as single-acting piston seal.

Types **T7** and **T10** are also available as "L" model with a secondary lip. Due to the lubricant repository between the lips, the rod seal is secured against inclining inside the seal housing, has a lower friction and has a reduced stick-slip tendency.

On request some dimensions are also available with two lips and back-up ring as **T7/LS** and **T10/LS** for pressures up to 45 MPa.



Max. Operating Conditions

Pressure (MPa)	≤ 50 (500 bar)
Temperature (°C)	- 40 / + 100
Speed (m/s)	≤ 0,5
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R _a	R _t
Groove bottom	≤ 1,6 µm	≤ 6,3 µm
Groove flanks	≤ 1,6 µm	≤ 6,3 µm
Running surface	≤ 0,3 µm	≤ 2,5 µm

Material

Groovering	PU
Antiextrusionring	POM + Glass fiber

Technical Description

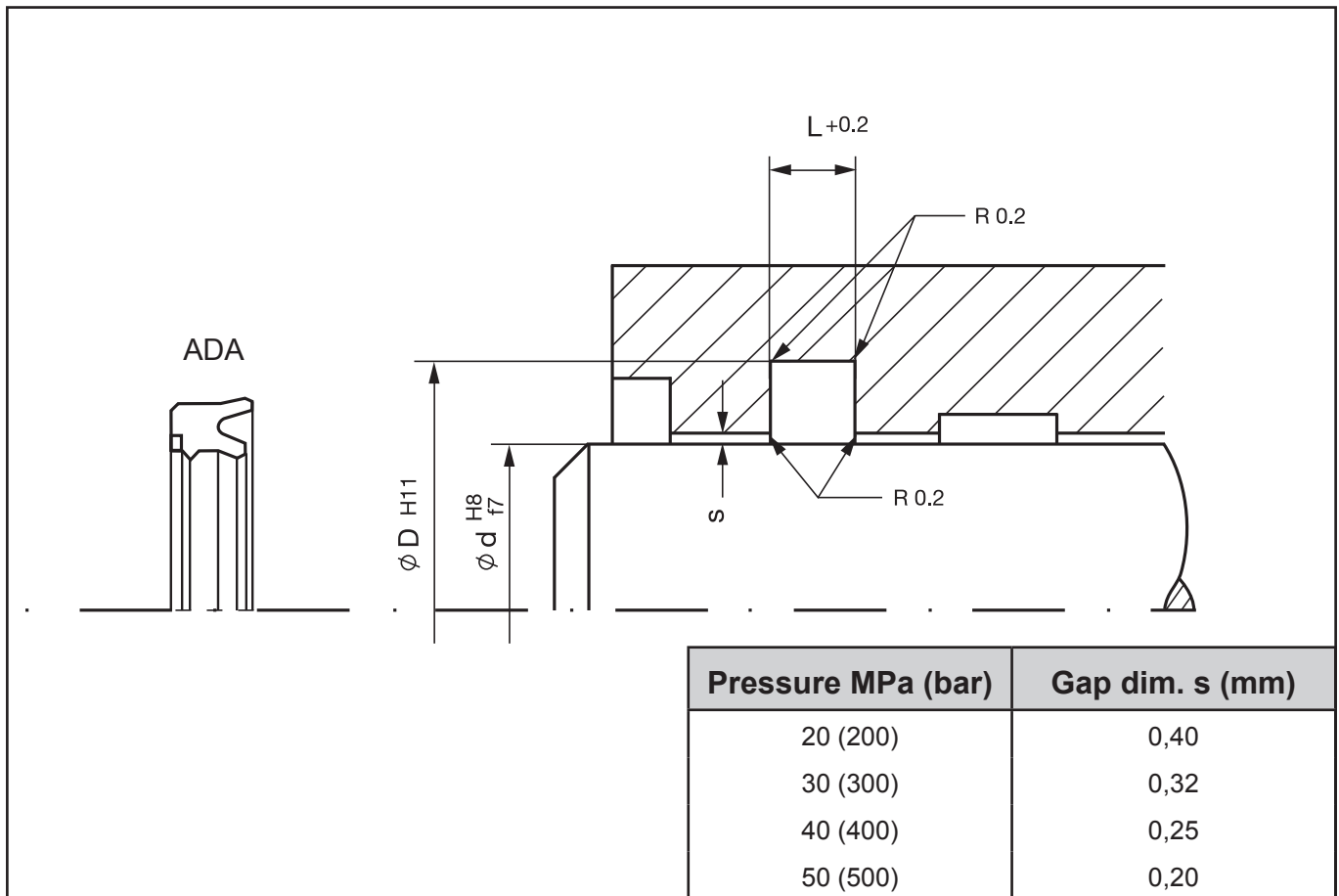
The rod seal of the **SDA** series is a compact polyurethane ring with a secondary lip and back-up ring.

The seal is mainly used at high pressure and the back-up ring admits of larger clearances without the risk of extrusion.

The material, used for the groove ring, is a polyurethane compound, which ensures excellent properties regarding wear resistance, extended service life and resistance against extrusion of the clearance.

T10/LS – ADA

Rod Seal



Max. Operating Conditions

Pressure (MPa)	≤ 50 (500 bar)
Temperature (°C)	- 40 / + 100
Speed (m/s)	≤ 0,5
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R _a	R _t
Groove bottom	≤ 1,6 µm	≤ 6,3 µm
Groove flanks	≤ 1,6 µm	≤ 6,3 µm
Running surface	≤ 0,3 µm	≤ 2,5 µm

Material

Groovering	PU
Antiextrusionring	POM + Glasfaser

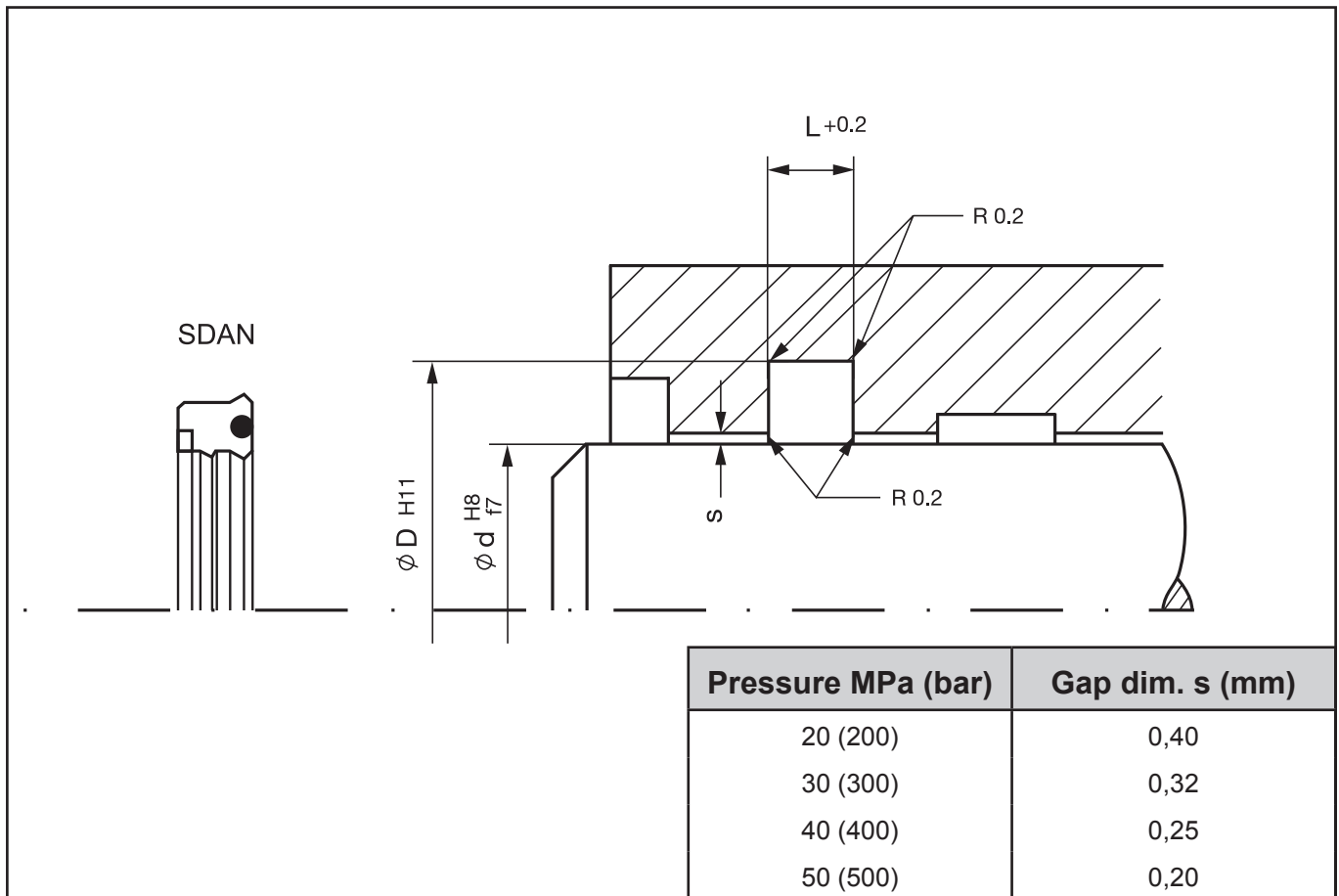
Technical Description

The rod seal of the **ADA** series is a compact polyurethane ring with a secondary lip, back-up ring.

The rod seal of the type series **ADA** is a polyurethane groove ring with an asymmetrical profile. The profile of the groove ring can be used for a wide application range in standard cylinders for mobile and industrial hydraulics.

It is mainly used at high pressure and the back-up ring admits larger clearances without the risk of extrusion.

The material, used for the groove ring, is a polyurethane compound, which ensures excellent properties regarding wear-resistance, extended operating life and resistance against extrusion of the clearance.



Max. Operating Conditions

Pressure (MPa)	≤ 50 (500 bar)
Temperature (°C)	- 40 / + 100
Speed (m/s)	≤ 0,5
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R _a	R _t
Groove bottom	≤ 1,6 µm	≤ 6,3 µm
Groove flanks	≤ 1,6 µm	≤ 6,3 µm
Running surface	≤ 0,3 µm	≤ 2,5 µm

Material

Grooving	PU
O-Ring	NBR
Antiextrusionring	POM + Glass fiber

Technical Description

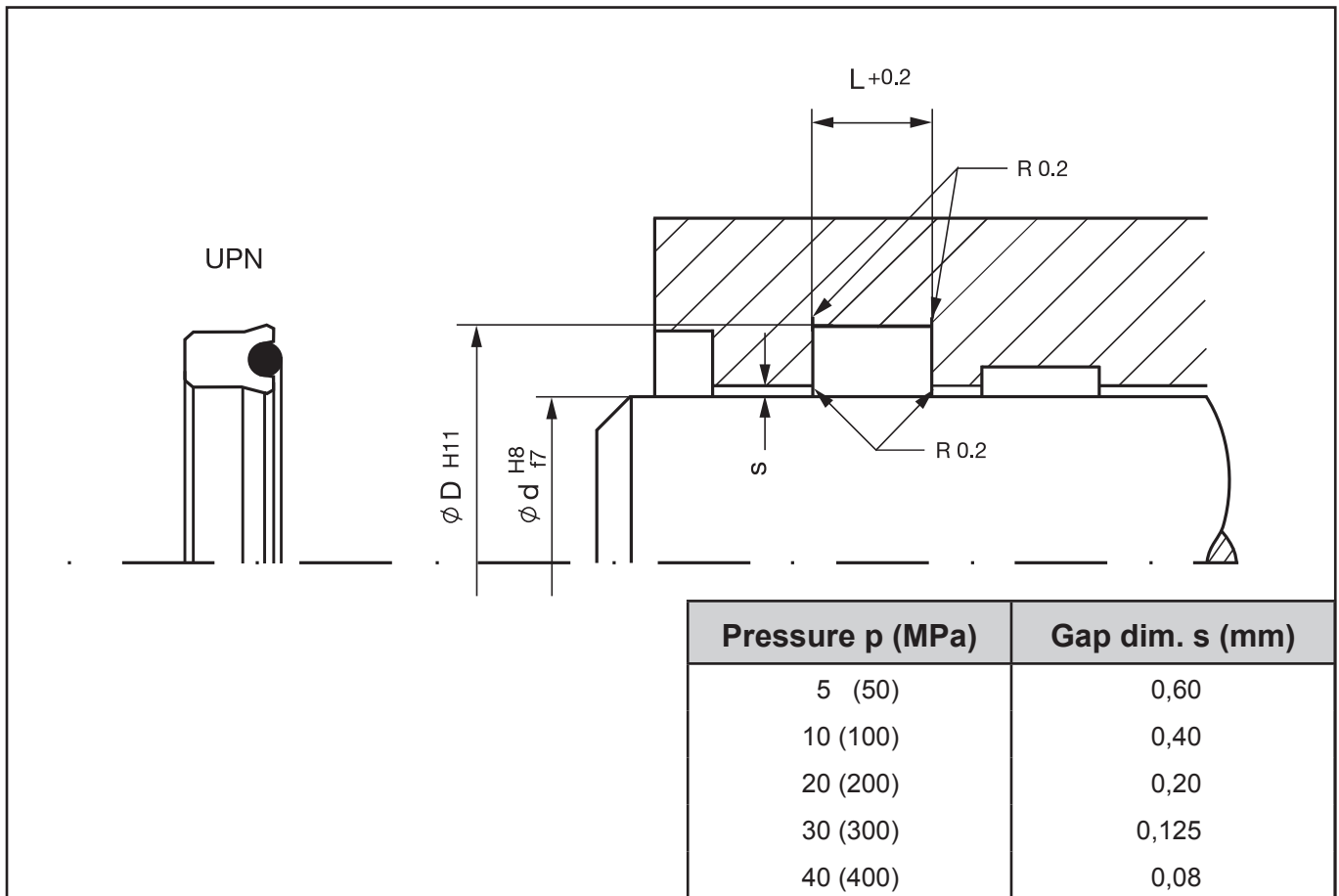
The rod seal of the **SDAN** series is a compact polyurethane ring with a secondary lip, back-up ring and an energizing O-Ring.

This type is a further development of the **SDA** seal. It is a versatile high performance lip seal, which combines the advantage of high elastic rubber with the abrasion resistance of polyurethane.

It is mainly used at high pressure and the back-up ring admits larger clearances without the risk of extrusion.

The energizing O-Ring ensures an excellent sealing performance, even at low pressure.

The material, used for the groove ring, is a polyurethane compound, which ensures excellent properties regarding wear-resistance, extended operating life and resistance against extrusion of the clearance.



Max. Operating Conditions

Pressure (MPa)	≤ 40 (400 bar)
Temperature (°C)	- 40 / + 100
Speed (m/s)	≤ 0,5
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R _a	R _t
Groove bottom	≤ 1,6 µm	≤ 6,3 µm
Groove flanks	≤ 1,6 µm	≤ 6,3 µm
Running surface	≤ 0,3 µm	≤ 2,5 µm

Material

Lip seal	PU
O-Ring	NBR

Technical Description










The **UPN** type is the consequent further development of the UP series. It is a high performance lip seal, which is applicable for the rod as well as the piston, combining the advantages of elastomers and its high resilience with the abrasion resistance of polyurethane.

The **UPN** profile ensures an excellent sealing performance in the case of pressure peaks and very good surface slip under all operating conditions. The O-Ring as a pretension element ensures a good sealing performance, even at low pressures.

The material used for the groove ring is a polyurethane compound, which ensures excellent properties regarding wear-resistance, resistance against extrusion of the clearance, and therefore an extended operating life.

The advantages of the UPN profile are:

- applicable for rod and piston
- excellent sealing performance
- high abrasion resistance
- high resistance against extrusion of the clearance
- extended operating life
- easy installation

∅ d	∅ D	L	Type designation								
			 T7/S	 T7 L/SD	 T7 LS/SDA	 SDAN	 T10/A10	 T10 L/A10 L	 ADA	 T11/UP	 UPN
3	8	4,5								X	
3	9	5,0								X	
4	8	3,5					X				
4	10	4,5								X	
4	10	5,0								X	
4,5	11	5,5								X	
4,5	12,5	5,0								X	
5	10	4						X			
5	12	5,5								X	
5	12	6,5								X	
5	12	7,0								X	
5	17	10,0								X	X
6	11	4						X			
6	11	4,5						X			
6	11	6					X				
6	12	4,5								X	
6	12	5,8								X	
6	12	6,0								X	
6	12	6,5								X	
6	12,7	6,5								X	
6	14	6,3		X							
6	15	9,0								X	

We recommend divided installation spaces for diameters < 20mm.










Rod Seals Order designation						
Type:	T7	T7 L	T7 LS	T10	T10 L	T11
Equivalent to:	S	SD	SDA	A10	A10 L	UP

	Rod Seal Type	Dimension	Material
Ordering example:	Rod Seal SD	∅ d 6 x 14 x 6,3	Polyurethane
Order designation:	SD -	6 x 14 x 6,3	- PU










Designation of material: **PU** - Polyurethane

T7 | T10 | T11 | SDAN | UPN

Rod Seal

∅ d	∅ D	L	Type designation								
			 T7/S	 T7 L/SD	 T7 LS/SDA	 SDAN	 T10/A10	 T10L/A10L	 ADA	 T11/UP	 UPN
7	12	4,5						X			
7	14	4,2								X	
7	15	8,0								X	
8	12	3,5								X	
8	14	3,2					X				
8	14	7,0								X	
8	15	6,3		X							
8	15	9,0								X	
8	16	6,3		X			X			X	
8	18	10,0								X	X
10	16	4,5								X	
10	16	5,4		X							
10	16	6,2								X	
10	16	6,5								X	
10	18	6,0								X	X
10	18	6,3		X			X				
10	18	7,0								X	
10	18	9,0								X	
10	20	8,0					X				
10	20	9,0								X	X
10	22	9,0								X	X
11	17	5,0					X				
12	17	4,0	X				X				
12	18	5,0	X	X						X	
12	18	5,5								X	
12	18	7,0								X	
12	19	6,1		X							
12	19	6,3		X							
12	20	6,3		X			X				
12	20	9,0								X	
12	22	6,0								X	X
12	22	8,0					X			X	X
12	22	9,0						X		X	X
12	23	7,5		X							
12	24	9,0								X	X
14	19	5,3	X								










We recommend divided installation spaces for diameters < 20mm.

∅ d	∅ D	L	Type designation								
			 T7/S	 T7 L/SD	 T7 LS/SDA	 SDAN	 T10/A10	 T10L/A10L	 ADA	 T11/UP	 UPN
14	20	5,3								X	
14	21	5,5					X				
14	22	6,3					X				
14	22	7,0								X	
14	24	9,0								X	X
14	27	8,0								X	X
15	21,5	5,0		X						X	X
15	23	6,3		X			X				
15	25	9,0								X	X
15	25	11,0								X	X
16	20	3,8	X								
16	20,6	3,6					X				
16	22	4,0					X				
16	22	4,5	X							X	
16	22	5,5								X	
16	22	6,0					X			X	
16	24	6,0								X	
16	24	6,3		X			X				
16	24	7,0						X			
16	24	10,0								X	
16	26	6,0								X	X
16	26	9,0								X	X
16	28	7,0								X	X
16	28	10,0								X	X
17	25	4,5									X
17	25	7,0								X	
17	25	11,0								X	
17	27	7,6								X	X
18	24	5,2		X			X				
18	25	5,5								X	
18	25	5,7		X							
18	25	6,0								X	
18	26	6,3		X			X				
18	26	7,5								X	
18	26	9,0		X						X	
18	26	9,5								X	










We recommend divided installation spaces for diameters < 20mm.

T7 | T10 | T11 | SDAN | UPN

Rod Seal










∅ d	∅ D	L	Type designation									
			 T7/S	 T7 L/SD	 T7 LS/SDA	 SDAN	 T10/A10	 T10L/A10L	 ADA	 T11/UP	 UPN	
18	28	6,3		X								
18	28	8,0		X			X					
18	28	9,0									X	X
18	30	9,0									X	X
19	25	7,0									X	
20	25	4,5	X									
20	26	5,5		X			X	X			X	
20	26	6,0		X								
20	27	6,3		X								
20	27	6,5		X								
20	28	5,0									X	
20	28	5,5									X	
20	28	6,3		X			X	X				
20	28	7,0					X	X				
20	28	8,0		X			X					
20	28	9,0									X	
20	29	5,5									X	X
20	30	5,0		X								
20	30	8,0		X			X					
20	30	9,0									X	X
20	30	11,0									X	X
20	32	8,5									X	X
20	35	10,0									X	X
20	40	11,0									X	X
20	40	13,0									X	
22	28	5,5	X									
22	28	6,3						X				
22	28	9,0									X	
22	30	6,3	X	X			X	X				
22	30	7,0		X				X			X	
22	30	8,0		X								
22	32	8,0		X								
22	32	9,0	X	X							X	X
22	32	11,0									X	X
22	35	11,0									X	X
22	40	11,0									X	X










We recommend divided installation spaces for diameters < 20mm.

∅ d	∅ D	L	Type designation								
			 T7/S	 T7 L/SD	 T7 LS/SDA	 SDAN	 T10/A10	 T10L/A10L	 ADA	 T11/UP	 UPN
24	30	5,0					X				
24	32	8,0								X	
24	34	5,5								X	
24	34	6,5		X							
24	34	8,0					X				
24	34	9,5					X				
25	32	5,0	X								
25	33	5,5								X	
25	33	6,0						X			
25	33	6,3	X	X	X		X	X			
25	33	7,0					X				
25	33	7,5		X				X			
25	33	8,0		X			X				
25	33	9,0		X							
25	35	5,5									X
25	35	6,0								X	
25	35	6,3		X							
25	35	8,0		X			X	X			
25	35	9,0		X						X	X
25	35	11,0								X	X
25	36	6,0		X							
25	38	9,0								X	X
25	38	11,0								X	X
25	40	11,0								X	X
26	36	11,0						X			
27	35	6,3					X				
27	36,5	7,8								X	X
27	37	6,3		X							
28	35	4,5	X								
28	35	5,5								X	
28	35,5	5,5								X	
28	36	6,3		X			X				
28	36	7,5								X	
28	36	9,0		X							
28	38	6,3		X							
28	38	8,0		X			X			X	X










We recommend divided installation spaces for diameters < 20mm.










Rod Seal

∅ d	∅ D	L	Type designation								
			 T7/S	 T7 L/SD	 T7 LS/SDA	 SDAN	 T10/A10	 T10L/A10L	 ADA	 T11/UP	 UPN
28	38	9,0								X	X
28	38	11,0								X	X
28	38,7	4,2						X			
28	40	9,5					X				
28	40	11,0								X	X
28	50	11,0								X	
30	36	4,5								X	
30	37	7,0								X	
30	38	4,5								X	
30	38	6,3					X				
30	38	7,0								X	
30	38	8,0		X						X	
30	38	9,0		X			X				
30	40	5,5								X	X
30	40	6,3					X				
30	40	7,0						X		X	X
30	40	7,5		X							
30	40	8,0		X			X	X			
30	40	10,5					X				
30	40	11,0		X				X		X	X
30	42	10,0								X	X
30	42	11,0								X	X
30	42	12,0						X			
30	43	10,0					X				
30	45	9,0					X				
30	45	11,0								X	X
30	50	11,0								X	X
30	50	13,0								X	X
31,75	44,45	7,0						X			
32	40	5,0					X				
32	40	6,0								X	X
32	40	6,3		X			X				
32	40	7,7		X				X			
32	40	9,0		X			X			X	X
32	40	11,0								X	
32	41,5	8,9						X			

∅ d	∅ D	L	Type designation								
			 T7/S	 T7 L/SD	 T7 LS/SDA	 SDAN	 T10/A10	 T10L/A10L	 ADA	 T11/UP	 UPN
32	42	8,0		X			X				
32	42	8,3						X			
32	42	9,0		X							
32	42	11,0		X			X			X	X
32	45	11,0					X			X	X
32	47	11,0		X			X				
32	50	13,0								X	
33	43	11,0					X				
34	41	5,5		X			X				
34	45	8,0								X	X
34	45	10,0								X	X
35	42	5,0	X								
35	43	6,3		X			X				
35	43	7,0		X						X	X
35	43	8,0						X			
35	43	9,0		X			X				
35	43	11,0		X							
35	44	8,0		X							
35	45	6,3		X							
35	45	7,0								X	X
35	45	8,0		X			X	X		X	X
35	45	9,0								X	X
35	45	11,0		X			X	X		X	X
35	45	13,5		X							
35	45,7	4,2						X			
35	46	9,0					X				
35	48	11,0								X	X
35	50	11,0		X						X	X
35	55	11,0								X	X
35	55	13,0								X	X
36	44	6,3		X							
36	44	7,0		X				X			
36	44	9,0		X							
36	46	8,0		X			X	X		X	X
36	46	11,0		X				X			
36	48	9,0					X				










Rod Seal










∅ d	∅ D	L	Type designation								
			 T7/S	 T7 L/SD	 T7 LS/SDA	 SDAN	 T10/A10	 T10L/A10L	 ADA	 T11/UP	 UPN
36	48	12,0					X				
36	51	11,0					X				
37	47	9,0		X							
37	47	11,0		X							
38	44,5	5,3					X				
38	45	5,5					X			X	
38	45	7,0		X							
38	46	7,5								X	X
38	48	9,0						X			
38	50	9,5		X							
38	50	10,0								X	X
38,1	50,8	9,5						X			
38	55	11,0								X	X
38	58	11,0								X	X
39	50	11,0					X				
40	48	4,5					X				
40	48	6,3		X			X	X		X	X
40	48	7,0		X							
40	48	9,0		X	X		X			X	X
40	49,52	10,5						X			
40	50	5,5								X	X
40	50	6,3		X							
40	50	7,0	X							X	X
40	50	7,5								X	X
40	50	8,0		X			X	X			
40	50	9,0						X		X	X
40	50	11,0		X	X		X	X		X	X
40	50	13,5					X				
40	52	9,0					X				
40	52	11,0			X						
40	52	12,0						X			
40	55	11,0		X	X			X		X	X
40	55	12,5					X				
40	55,1	6,3						X			
40	60	11,0					X			X	X
40	60	14,0								X	X

∅ d	∅ D	L	Type designation								
			 T7/S	 T7 L/SD	 T7 LS/SDA	 SDAN	 T10/A10	 T10L/A10L	 ADA	 T11/UP	 UPN
40	60	19,0								X	
40	65	13,0								X	
42	50	6,3					X				
42	50	7,0		X			X			X	X
42	50	9,0								X	X
42	52	9,0		X							
42	52	10,0								X	X
42	53	10,0		X							
42	62	13,0								X	X
45	53	5,7		X							
45	53	6,3		X			X				
45	53	7,5								X	X
45	53	8,0		X							
45	53	9,0		X							
45	53	10,5			X						
45	53	12,5						X			
45	55	6,3		X							
45	55	6,5		X							
45	55	7,0								X	X
45	55	7,5								X	X
45	55	8,0					X	X			
45	55	11,0		X	X		X	X		X	X
45	56	8,0								X	X
45	57	10,0		X							
45	58	10,0					X				
45	60	11,0		X	X					X	X
45	60	12,5		X			X	X			
45	60,1	6,3						X			
45	63	11,0								X	X
45	65	11,0								X	X
45	65	13,0								X	X
46	54	8,5		X							
46	56	8,0					X				
48	58	11,0								X	X
48	60	7,0		X							
50	57	11,0						X			










T7 | T10 | T11 | SDAN | UPN










Rod Seal

∅ d	∅ D	L	Type designation									
			 T7/S	 T7 L/SD	 T7 LS/SDA	 SDAN	 T10/A10	 T10L/A10L	 ADA	 T11/UP	 UPN	
50	58	9,0		X								
50	58	12,5						X				
50	59	11,0				X						
50	60	6,0									X	X
50	60	7,0									X	X
50	60	8,0		X			X	X			X	X
50	60	10,0		X								
50	60	11,0		X	X		X	X			X	X
50	60	12,0									X	X
50	62	9,0		X								
50	62	10,0									X	X
50	62	11,0		X								
50	63	7,0									X	X
50	65	11,0		X	X		X				X	X
50	65	12,5		X			X					
50	65	16,5					X					
50	65,1	6,3						X				
50	68	10,0					X					
50	70	11,0									X	X
50	70	13,0									X	X
50	70	14,5		X								
52	62	13,0									X	X
53	63	6,0					X					
53	63	7,5									X	X
55	63	9,0		X								
55	63	12,5						X				
55	65	7,0									X	X
55	65	8,0		X			X					
55	65	9,5						X				
55	65	11,0		X	X		X	X			X	X
55	65	13,0		X			X				X	X
55	67	11,0					X					
55	70	10,5		X	X		X					
55	70	13,0									X	X
55	75	13,0									X	X
55	80	13,0									X	X

∅ d	∅ D	L	Type designation								
			 T7/S	 T7 L/SD	 T7 LS/SDA	 SDAN	 T10/A10	 T10L/A10L	 ADA	 T11/UP	 UPN
56	66	6,0								X	X
56	66	7,0								X	X
56	66	7,5	X	X							
56	66	8,0					X				
56	66	11,0		X			X				
56	71	9,5						X			
56	71	10,5		X							
56	71	11,0					X				
56	71	12,5		X	X			X			
56	76	13,0					X				
60	65,5	6,3					X				
60	68	7,0		X							
60	68	8,0		X							
60	68	9,0		X							
60	68	12,5						X			
60	68	14,0							X		
60	69,3	6,2						X			
60	70	6,0								X	X
60	70	7,0								X	X
60	70	8,0		X			X	X			
60	70	9,0								X	X
60	70	11,0		X			X			X	X
60	70	12,5		X							
60	70	13,0		X						X	X
60	70	13,5			X						
60	70	15,0						X			
60	71	8,0								X	X
60	72	9,0					X				
60	72	10,0		X			X				
60	75	11,0		X			X			X	X
60	75	13,0		X	X		X			X	X
60	75	16,5						X			
60	80	11,0								X	X
60	80	13,0			X					X	X
60	80	19,0								X	X
61	69	8,5		X							










Rod Seal










∅ d	∅ D	L	Type designation									
			 T7/S	 T7 L/SD	 T7 LS/SDA	 SDAN	 T10/A10	 T10 L/A10 L	 ADA	 T11/UP	 UPN	
63	71	9,0		X								
63	73	7,0									X	X
63	73	11,0		X								
63	73	13,0						X				
63	75	9,5		X								
63	75	11,0		X							X	X
63	75	13,0			X							
63	78	11,0									X	X
63	78	12,5		X	X							
63	83	13,0			X							
63	83	14,5							X			
65	71	9,0		X								
65	73	12,5							X			
65	73	9,0		X					X			
65	75	7,0									X	X
65	75	11,0						X				
65	75	13,0		X	X						X	X
65	77	10,0							X			
65	77	9,5		X								
65	80	11,0						X			X	X
65	80	12,0									X	X
65	80	12,5			X							
65	80	13,0							X		X	X
65	85	13,0									X	X
67	77	11,0									X	X
67,3	80	7,5									X	
68	76	9,0		X								
68	92,4	15,0									X	X
70	75	4,1									X	
70	78	9,0		X								
70	80	6,0									X	X
70	80	6,5						X				
70	80	7,0									X	X
70	80	7,5		X								
70	80	8,0		X	X			X				
70	80	9,0									X	X

∅ d	∅ D	L	Type designation								
			 T7/S	 T7 L/SD	 T7 LS/SDA	 SDAN	 T10/A10	 T10L/A10L	 ADA	 T11/UP	 UPN
70	80	11,0		X			X			X	X
70	80	13,0		X				X		X	X
70	82	10,0		X							
70	85	11,0					X				
70	85	12,0		X			X			X	X
70	85	12,5						X			
70	85	13,0			X		X			X	X
70	90	13,0								X	X
70	90	14,5			X					X	
70	90	19,0								X	
73	82,5	8,0					X				
75	83	9,0		X							
75	83	12,5						X			
75	85	7,0								X	X
75	85	8,0		X							
75	85	12,5						X			
75	85	13,0		X						X	X
75	90	8,5								X	X
75	90	11,0					X		X	X	X
75	90	11,5		X							
75	90	13,0			X					X	X
75	95	13,0								X	X
75	95	14,5			X					X	X
75	95	15,5								X	X
76	84	8,5		X							
78	86	12,5						X			
78	86	14,0							X		
78	88	13,0						X			
78	88	15,0						X			
78	90	13,0		X							
80	88	9,0		X							
80	88	10,0			X						
80	88	12,5		X							
80	89	11,0		X							
80	90	6,0								X	X
80	90	7,0								X	X

T7 | T10 | T11 | SDAN | UPN









Rod Seal










∅ d	∅ D	L	Type designation								
			 T7/S	 T7 L/SD	 T7 LS/SDA	 SDAN	 T10/A10	 T10L/A10L	 ADA	 T11/UP	 UPN
80	90	8,0		X			X	X			
80	90	9,0								X	X
80	90	11,0								X	X
80	90	13,0		X			X			X	X
80	92	9,6		X							
80	95	11,0					X				
80	95	12,0		X	X						
80	95	12,5				X		X			
80	95	13,0								X	X
80	96	10,5		X	X						
80	100	10,5								X	X
80	100	11,0								X	
80	100	12,5			X						
80	100	13,0								X	X
80	100	14,5			X						
82	94	9,0		X							
85	93	7,5		X							
85	93	9,0		X							
85	93	11,0						X			
85	93	12,5						X			
85	95	8,0		X			X				
85	95	9,5								X	X
85	95	13,0		X						X	X
85	97	9,5		X							
85	100	10,0								X	X
85	100	11,0								X	X
85	100	12,5		X							
85	100	13,0					X			X	X
85	105	13,0								X	X
85	105	14,5					X				
88	96	8,5		X							
88,9	101,6	10,5		X				X			
90	98	8,0		X							
90	98	9,0		X							
90	98	12,5						X			
90	100	6,0					X				

∅ d	∅ D	L	Type designation								
			 T7/S	 T7 L/SD	 T7 LS/SDA	 SDAN	 T10/A10	 T10L/A10L	 ADA	 T11/UP	 UPN
90	100	9,0								X	X
90	100	11,0		X							
90	100	12,5						X			
90	100	13,0					X			X	X
90	102	10,0		X							
90	105	9,5			X						
90	105	12,5		X		X		X			
90	105	13,0			X		X			X	X
90	110	11,0								X	
90	110	13,0			X		X			X	X
90	110	15,0						X			
90	115	13,0									X
90	115	16,0								X	X
90	115	23,0								X	
91	99	8,5		X							
92	101,3	8,7		X							
95	103	9,0		X							
95	103	12,5						X			
95	104	11,0		X							
95	105	5,7					X				
95	105	11,0					X				
95	105	13,0						X			
95	110	10,0								X	X
95	110	13,0								X	X
95	112	12,0		X							
95	115	13,0								X	X
95	115	14,5			X						
97	105	12,5						X			
97	105	14,0							X		
97	107	11,0		X							
99	109	15,0						X			
100	108	8,0		X							
100	108	9,0		X	X						
100	108	12,5		X							
100	109,3	6,2					X				
100	110	11,0						X			










T7 | T10 | T11 | SDAN | UPN










Rod Seal

∅ d	∅ D	L	Type designation							
			 T7/S	 T7 L/SD	 T7 LS/SDA	 SDAN	 T10/A10	 T10L/A10L	 ADA	 T11/UP
100	110	12,5						X		
100	110	13,5			X					
100	113	13,5			X					
100	115	10,0					X		X	X
100	115	11,5					X			
100	115	12,5		X						
100	115	13,0					X	X	X	X
100	120	13,0					X	X	X	X
100	120	14,5			X					
100	120	16,0					X			
100	125	13,0							X	X
100	125	16,0							X	X
100	130	13,0							X	
101,6	114,3	7,0							X	
101,6	114,3	10,5		X						
104	116	9,0		X						
105	113	9,0		X						
105	113	12,5						X		
105	115	6,2					X			
105	115	11,0					X			
105	115	12,5						X		
105	120	9,0							X	X
105	120	11,0						X		
105	120	16,0							X	X
105	125	13,0							X	X
105	125	15,0							X	
105	125	15,5						X		
105	125	16,0							X	X
107	115	8,5		X						
107	115	9,0		X						
110	118	12,5						X		
110	119	11,0		X						
110	120	11,5						X		
110	120	13,0					X			
110	120	14,5			X					
110	125	10,0							X	X

∅ d	∅ D	L	Type designation								
			 T7/S	 T7 L/SD	 T7 LS/SDA	 SDAN	 T10/A10	 T10L/A10L	 ADA	 T11/UP	 UPN
110	125	10,6					X				
110	125	12,0		X							
110	125	13,0			X					X	X
110	125	16,0								X	X
110	130	12,5			X						
110	130	13,0					X				
110	130	15,5				X					
110	130	16,0								X	X
110	135	20,0					X				
112	122	11,5		X							
114,3	127	10,5		X							
115	123	12,5						X			
115	125	13,0						X			
115	130	11,0						X			
115	130	12,0					X				
115	135	16,0								X	X
115	140	16,0							X	X	
118	126	14,0							X		
118	128	11,0		X							
118	133	10,8						X			
120	128	12,5		X							
120	130	8,0		X							
120	130	12,5						X			
120	130	15,0		X				X			
120	135	12,5			X						
120	135	16,0					X				
120	140	12,5			X						
120	140	13,0		X							
120	140	16,0			X		X			X	X
125	133	7,5		X							
125	133	12,5						X			
125	135	11,0						X			
125	135	12,0						X			
125	140	10,0								X	X
125	140	12,0								X	X
125	140	16,0								X	X










Rod Seal

∅ d	∅ D	L	Type designation								
			 T7/S	 T7 L/SD	 T7 LS/SDA	 SDAN	 T10/A10	 T10L/A10L	 ADA	 T11/UP	 UPN
125	145	13,0					X				
125	145	16,0								X	X
126	134	8,5		X							
127	140	12,5						X			
128	136	12,5						X			
129	141	9,0		X							
130	138	12,5						X			
130	145	13,0			X					X	X
130	145	15,0					X				
130	145	16,0					X				
130	150	13,0		X							
130	150	16,0								X	X
135	143	12,5						X			
135	145	13,0		X							
135	150	12,5						X			
135	150	13,0			X						
135	150	16,0								X	
140	148	12,5		X							
140	150	11,0		X							
140	150	12,5					X				
140	155	9,0		X							
140	155	10,0								X	X
140	155	13,0			X						
140	155,5	6,3	X								
140	160	12,5		X							
140	160	13,0								X	X
140	160	16,0								X	X
140	165	16,0								X	
141	151	13,0						X			
141	151	15,0						X			
143	151	12,5						X			
143	151	14,0							X		
145	153	8,5		X							
145	160	13,0						X			
145	165	16,0								X	X
150	160	12,0						X			

∅ d	∅ D	L	Type designation									
			 T7/S	 T7 L/SD	 T7 LS/SDA	 SDAN	 T10/A10	 T10L/A10L	 ADA	 T11/UP	 UPN	
150	160	13,5		X								
150	170	13,0		X								
150	170	16,0									X	X
154	166	11,0		X								
155	163	12,5							X			
155	165	7,0					X					
160	168	12,5							X			
160	170	12,5							X			
160	170	13,0		X								
160	175	13,0									X	X
160	180	13,0					X					
160	180	16,0									X	X
160	185	20,0					X					
162	172	15,0							X			
170	180	11,0		X								
170	180	13,0							X			
170	190	13,0									X	X
170	190	16,0									X	X
171	179	12,5							X			
175	185	12,0							X			
175	185	13,0		X								
175	200	16,0									X	X
180	188	14,5							X			
180	190	11,0							X			
180	190	13,5		X								
180	192	11,0		X								
180	195	15,0							X			
180	200	13,0		X								
180	200	16,0					X				X	X
180	200	20,0					X					
180	205	19,0									X	X
183	193	15,0							X			
190	210	13,0		X								
190	210	16,0									X	X
200	220	13,0									X	X
200	220	15,5					X					

T7 | T10 | T11 | SDAN | UPN









Rod Seal

∅ d	∅ D	L	Type designation								
			 T7/S	 T7 L/SD	 T7 LS/SDA	 SDAN	 T10/A10	 T10L/A10L	 ADA	 T11/UP	 UPN
200	220	16,0					X			X	X
200	225	19,0								X	X
207	217	15,0						X			
210	230	16,0		X							
216	226	7,0					X				
220	250	19,0								X	X
238	258	16,0					X				
240	260	16,0					X				

Further dimension and in-between sizes upon request.

We recommend divided installation spaces for diameters < 20mm.

Inch-Dimensions

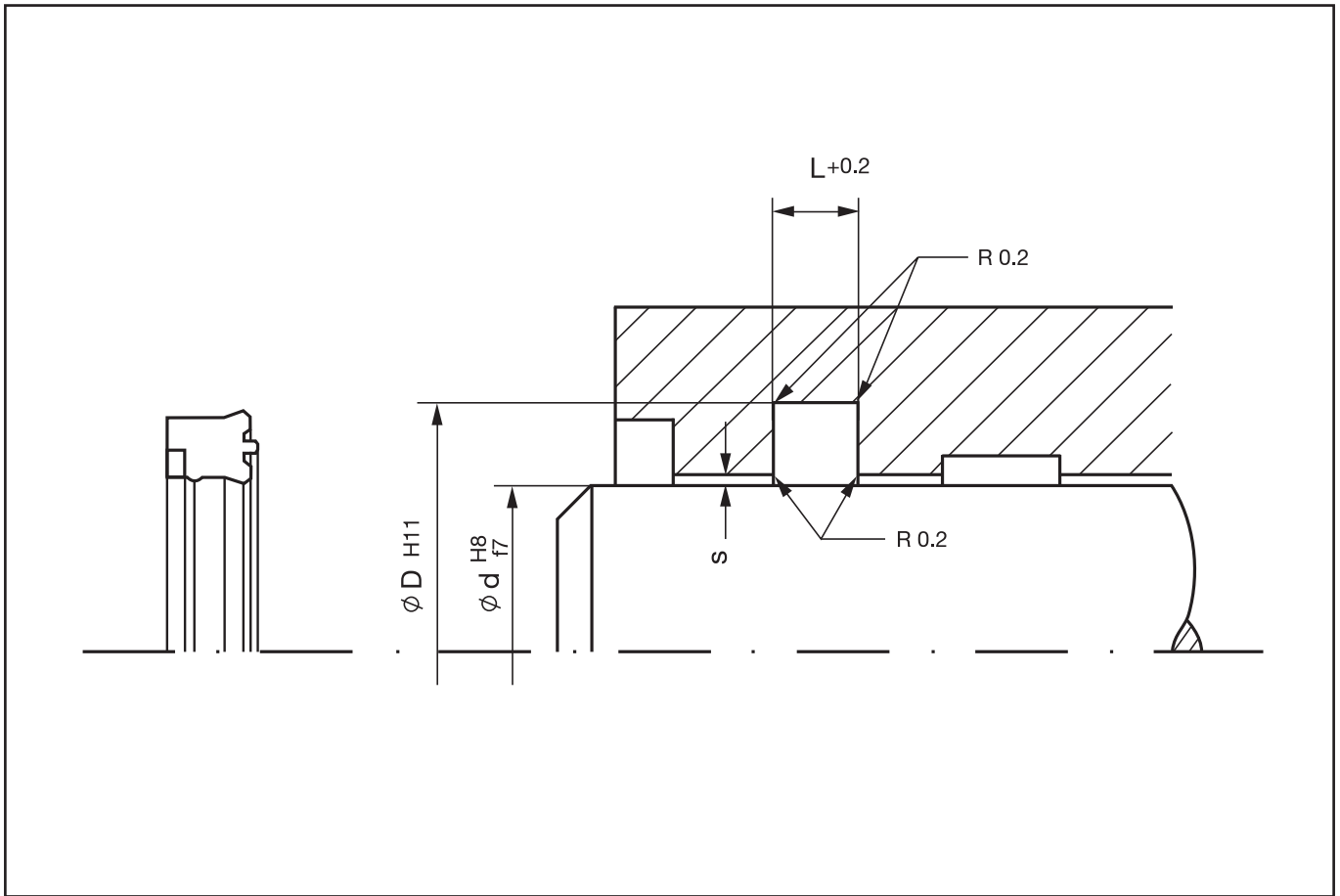
∅ d	∅ D	L	Type designation								
			 T7/S	 T7 L/SD	 T7 LS/SDA	 SDAN	 T10/A10	 T10L/A10L	 T11/UP	 UPN	
31,75	44,45	7,00						X			
38,10	50,80	7,35							X	X	
38,10	50,80	9,50						X			
50,80	63,50	7,35							X	X	
53,90	66,75	11,00							X	X	
57,15	66,68	10,50						X	X	X	
63,50	82,55	16,75							X	X	
66,68	76,20	5,25							X	X	
76,20	95,25	16,75							X	X	
88,90	98,43	10,50							X	X	
88,90	101,60	10,50							X	X	
89,90	107,95	16,75								X	
98,43	107,95	5,25							X	X	
101,60	114,30	10,50		X							
114,30	127,00	10,50		X							
133,36	152,40	16,75							X	X	
158,75	177,80	16,75							X	X	
165,10	190,50	20,40							X	X	
177,80	203,20	20,10					X		X	X	

Further dimension and in-between sizes upon request.

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.

T12

Rod Seal



Max. Operating Conditions

Pressure (MPa)	≤ 45 (450 bar)
Temperature (°C)	- 40 / + 100
Speed (m/s)	≤ 0,5
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	≤ 1,6 µm	≤ 16 µm
Groove flanks	≤ 1,6 µm	≤ 16 µm
Running surface	≤ 0,3 µm	≤ 3 µm

Material

Polyurethane	PU
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Technical Description

The rod seal of the **T12** series is a specially shaped compact polyurethane groove ring.

The geometric layout of the seal and the additional supporting edge on inside diameter provide for secure performance of the compact groove ring with low frictional losses.

The extrusion of the seal into the gap is prevented by the fitted anti-extrusion ring.

The rod seal is designed for the wide range of applications in mobile and stationary hydraulics.

Pressure MPa (bar)	Gap dim. s (mm)
10 (100)	0,50
20 (200)	0,40
25 (250)	0,35
30 (300)	0,25
40 (400)	0,20

Type designation	∅ d	∅ D	L
T12 - 40 - 50	40	50,0	8,0
T12 - 45 - 55	45	55,0	8,0
T12 - 50 - 65	50	65,0	12,5
T12 - 56 - 71	56	71,0	12,5
T12 - 60 - 75	60	75,0	13,0
T12 - 63 - 78/1	63	78,0	6,3
T12 - 63 - 78	63	78,0	12,5
T12 - 70 - 85	70	85,0	12,5
T12 - 75 - 90	75	90,0	13,0
T12 - 75 - 90,5	75	90,5	6,3
T12 - 80 - 95	80	95,0	12,5
T12 - 80 - 95	80	95,0	6,3
T12 - 82,55 - 98,2	82,55	98,2	13,0
T12 - 85 - 100	85	100,0	13,0
T12 - 85 - 100,5	85	100,5	6,3
T12 - 90 - 105,5	90	105,5	6,3
T12 - 90 - 105/1	90	105,0	13,0
T12 - 95 - 110	95	110,0	13,0
T12 - 100 - 120	100	120,0	16,0
T12 - 106 - 121,5	106	121,5	6,3
T12 - 110 - 130	110	130,0	16,0
T12 - 117 - 132	117	132,0	10,0
T12 - 120 - 135	120	135,0	16,0
T12 - 125 - 140,5	125	140,5	6,3
T12 - 125 - 145	125	145,0	16,0
T12 - 130 - 150,6	130	150,6	7,9
T12 - 140 - 160	140	160,0	16,0
T12 - 145 - 165,6	145	165,6	7,9

	Rod Seal Type	Dimension	Material
Ordering example:	Rod Seal	∅ d 40 x 50 x 8	Polyurethane
Order designation:	T12 -	40 x 50,0 x 8,0	- PU

Designation of material: PU - Polyurethane

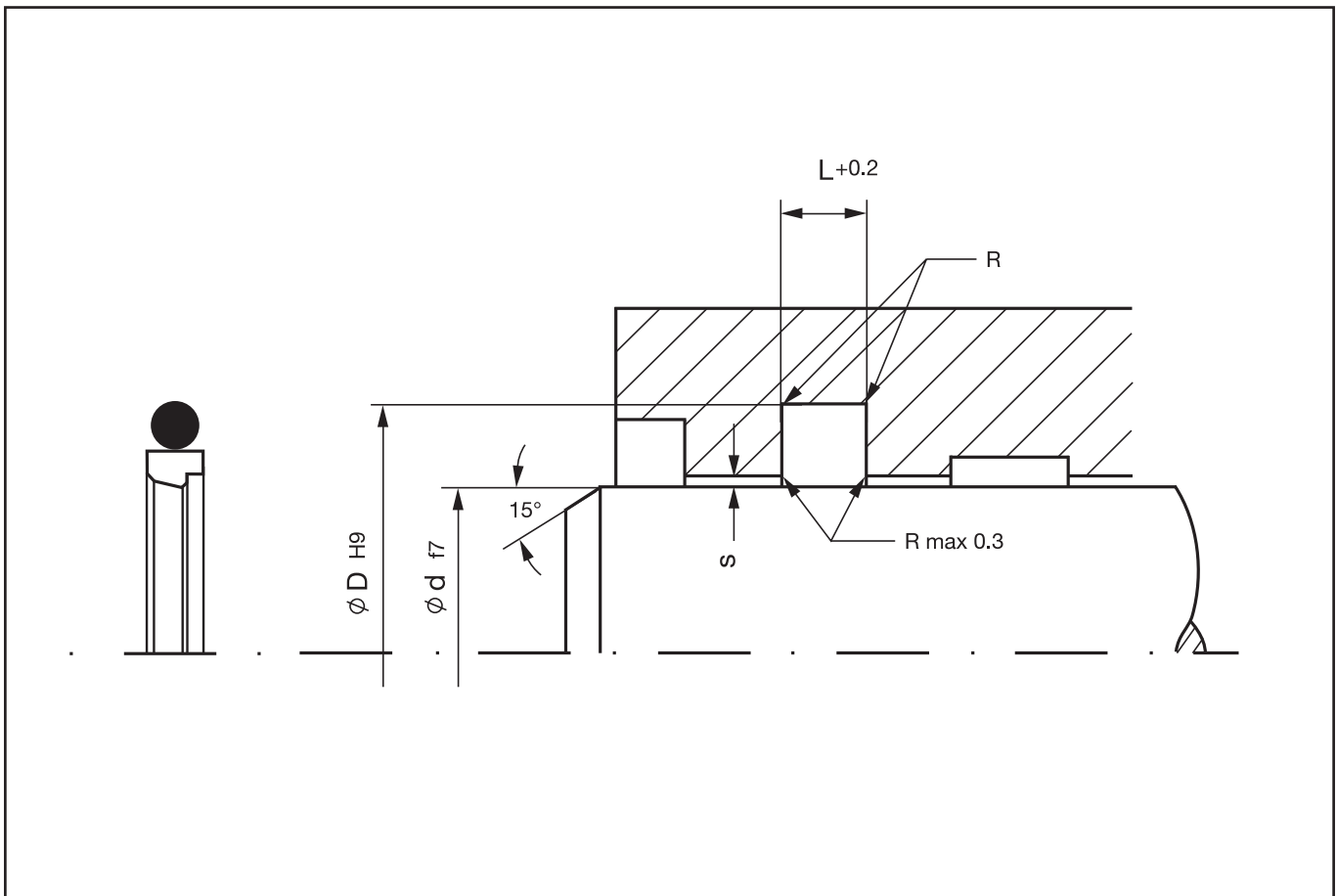
T12

Rod Seal

Type designation	Ø d	Ø D	L
T12 - 160 - 180,5	160	180,5	7,5
T12 - 180 - 205	180	205,0	20,0

Further dimension and in-between sizes upon request.

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.



Max. Operating Conditions *

Pressure (MPa)	≤ 80 (800 bar)
Temperature (°C)	- 30 / + 110 / + 200
Speed (m/s)	≤ 15 (0,5) **

Media: Hydraulic fluids upon oil-basis,
hardly inflaming hydraulic fluids,
HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	$\leq 1,6 \mu m$	$\leq 16 \mu m$
Groove flanks	$\leq 1,6 \mu m$	$\leq 16 \mu m$
Running surface	$\leq 0,3 \mu m$	$\leq 3 \mu m$

Material

PTFE-bronze / -carbon / glass fiber (+MoS ₂)	PB/PK/PG(M)
PTFE-compound turquoise	PT
PTFE-Econol	PEK
Polyurethane	PU **

Technical Description

The rod seal of the **NCR** series consists of a PTFE bearing ring preset by a O-Ring.

The sealing edge of the rod seal **NCR** is designed to achieve a good scraping effect and to enable the recirculation of the oil film.

The PTFE material stands out for very good sliding characteristics, low attrition rate as well as high extrusion resistance.

The thermal and chemical stability of the PTFE material allows for the use in a wide range of applications.

The selection of the PTFE compound and O-Ring material depends on the operating conditions.

*Max. operating conditions:

Higher values are permitted if the structural requirements are provided.

Higher operating pressures of up to 80 MPa, sliding speeds of up to 15 m/s are possible if these extreme conditions do not occur at the same time.

If operating pressure are higher up to 40 MPa, the gap dimensions „s“ have to be reduced.

Temperature range and chemical stability depending on chosen O-Ring material.

Assembly dimensions

Diameter $\varnothing d$			Groove bottom $\varnothing d$	L.dim.	O-Ring
Standard	Type ___/1	Type ___/2			
3 - 7,9		8 - 18,9	$\varnothing d + 4,9$	2,2	1,78
8 - 18,9		19 - 37,9	$\varnothing d + 7,3$	3,2	2,62
19 - 37,9	8 - 18,9	38 - 199,9	$\varnothing d + 10,7$	4,2	3,53
38 - 199,9	19 - 37,9	200 - 255,9	$\varnothing d + 15,1$	6,3	5,33
200 - 255,9	38 - 199,9	256 - 649,9	$\varnothing d + 20,5$	8,1	7,00
256 - 649,9	200 - 255,9	650 - 999,9	$\varnothing d + 24,0$	8,1	7,00
650 - 999,9	256 - 649,9		$\varnothing d + 27,3$	9,5	8,40

If the groove width (L dim.) differs from the standard series, the complementary number /1 or /2 is added to the order designation.

Subject to the diameter (D), the corresponding groove bottom diameters (d) and assembly dimensions (L dim.) are to be taken from the above table under type ---/1 and type ---/2.

Gap dim. s (mm)

L.dim.	0 - 20 MPa	20 - 40 MPa	Radius R
2,2	0,30 - 0,20	0,20 - 0,15	0,3 - 0,5
3,2	0,40 - 0,25	0,25 - 0,15	0,5 - 0,8
4,2	0,40 - 0,25	0,25 - 0,20	0,8 - 1,2
6,3	0,50 - 0,30	0,30 - 0,20	1,2 - 1,5
8,1	0,60 - 0,35	0,35 - 0,25	1,5 - 2,0
8,1	0,60 - 0,35	0,35 - 0,25	1,5 - 2,0
9,5	0,70 - 0,50	0,50 - 0,30	2,0 - 3,0

“For pressures more than 400 bar we recommend to choose a gap behind the seal of H8/F8 (hole/piston).”

	Rod Seal Type	Dimension	Material
Ordering example:	Rod Seal	$\varnothing d 50 \times 65,1 \times 6,3$	PTFE-bronze
Order designation:	NCR -	50 x 65,1 x 6,3	- PB

Designation of material:

- PB** - PTFE-bronze
- PK** - PTFE-carbon
- PG(M)** - PTFE-glass fiber +(MoS₂)
- PT** - PTFE compound turquoise
- PEK** - PTFE-Econol
- PU** - Polyurethane

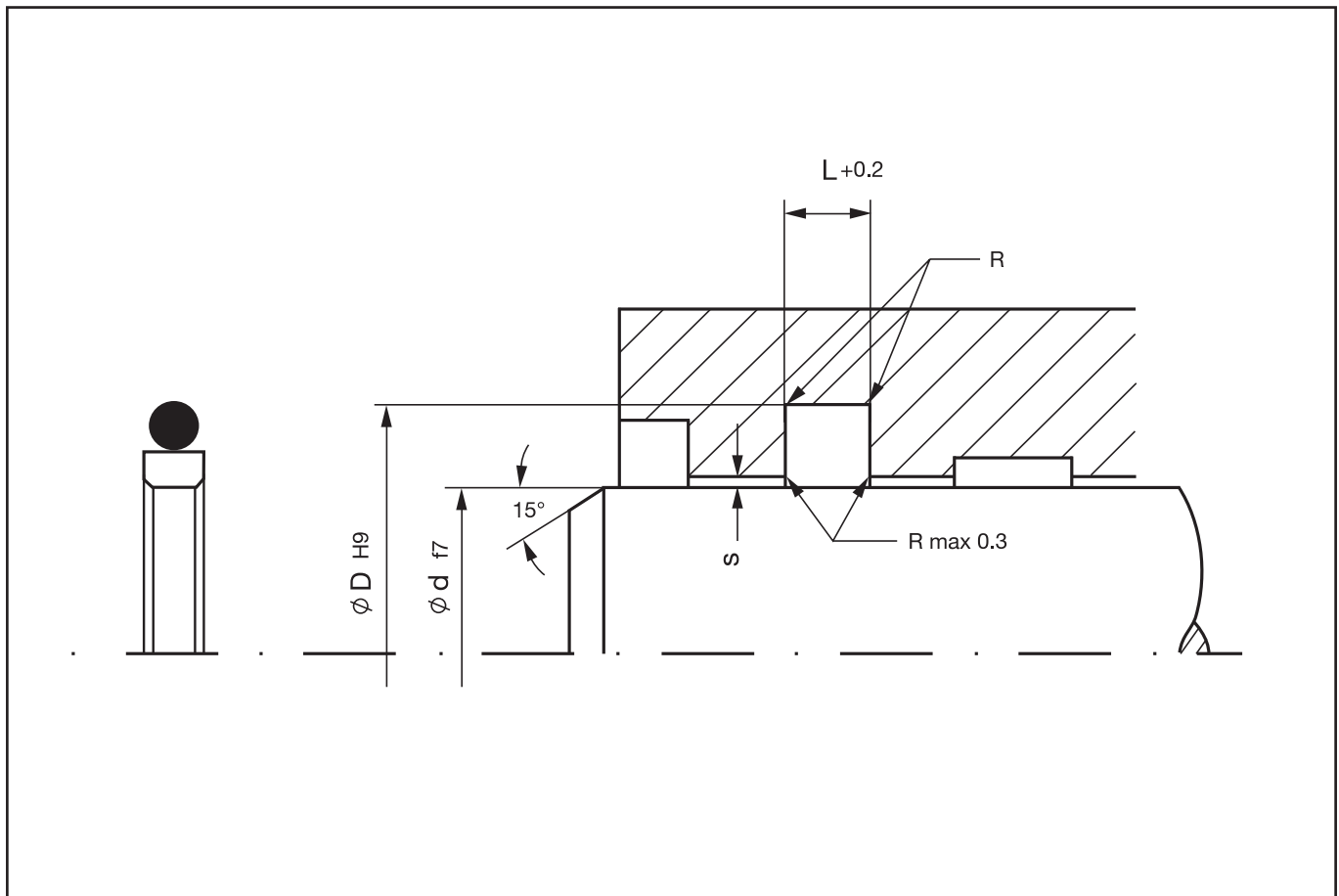
Type designation	∅ d	∅ D	L	O-Ring
NCR - 004 - PB	4	8,9	2,2	010
NCR - 005 - PB	5	9,9	2,2	011
NCR - 006 - PB	6	10,9	2,2	011
NCR - 007 - PB	7	11,9	2,2	012
NCR - 008 - PB	8	15,3	3,2	111
NCR - 008/2 - PB	8	12,9	2,2	012
NCR - 010 - PB	10	17,3	3,2	113
NCR - 010/2 - PB	10	14,9	2,2	014
NCR - 012 - PB	12	19,3	3,2	114
NCR - 012/2 - PB	12	16,9	2,2	015
NCR - 014 - PB	14	21,3	3,2	115
NCR - 014/2 - PB	14	18,9	2,2	016
NCR - 015 - PB	15	22,3	3,2	116
NCR - 015/2 - PB	15	19,9	2,2	017
NCR - 016 - PB	16	23,3	3,2	116
NCR - 016/2 - PB	16	20,9	2,2	017
NCR - 018 - PB	18	25,3	3,2	118
NCR - 018/2 - PB	18	22,9	2,2	019
NCR - 020 - PB	20	30,7	4,2	214
NCR - 020/2 - PB	20	27,3	3,2	119
NCR - 022 - PB	22	32,7	4,2	215
NCR - 022/2 - PB	22	29,3	3,2	120
NCR - 025 - PB	25	35,7	4,2	217
NCR - 025/2 - PB	25	32,3	3,2	122
NCR - 028 - PB	28	38,7	4,2	219
NCR - 028/2 - PB	28	35,3	3,2	124
NCR - 030 - PB	30	40,7	4,2	220
NCR - 030/2 - PB	30	37,3	3,2	125
NCR - 032 - PB	32	42,7	4,2	221
NCR - 032/2 - PB	32	39,3	3,2	126
NCR - 035 - PB	35	45,7	4,2	222
NCR - 035/2 - PB	35	42,3	3,2	128
NCR - 036 - PB	36	46,7	4,2	223
NCR - 036/2 - PB	36	43,3	3,2	129
NCR - 038 - PB	38	53,1	6,3	327
NCR - 038/2 - PB	38	48,7	4,2	224
NCR - 040 - PB	40	55,1	6,3	328
NCR - 040/2 - PB	40	50,7	4,2	224

Type designation	∅ d	∅ D	L	O-Ring
NCR - 042 - PB	42	57,1	6,3	328
NCR - 042/2 - PB	42	52,7	4,2	225
NCR - 045 - PB	45	60,1	6,3	329
NCR - 045/2 - PB	45	55,7	4,2	226
NCR - 048 - PB	48	63,1	6,3	330
NCR - 048/2 - PB	48	58,7	4,2	832
NCR - 050 - PB	50	65,1	6,3	331
NCR - 050/2 - PB	50	60,7	4,2	227
NCR - 052 - PB	52	67,1	6,3	331
NCR - 052/2 - PB	52	62,7	4,2	834
NCR - 055 - PB	55	70,1	6,3	332
NCR - 055/2 - PB	55	65,7	4,2	836
NCR - 056 - PB	56	71,1	6,3	333
NCR - 056/2 - PB	56	66,7	4,2	229
NCR - 060 - PB	60	75,1	6,3	334
NCR - 060/2 - PB	60	70,7	4,2	230
NCR - 063 - PB	63	78,1	6,3	335
NCR - 063/2 - PB	63	73,7	4,2	231
NCR - 065 - PB	65	80,1	6,3	336
NCR - 070 - PB	70	85,1	6,3	337
NCR - 075 - PB	75	90,1	6,3	339
NCR - 080 - PB	80	95,1	6,3	340
NCR - 085 - PB	85	100,1	6,3	342
NCR - 090 - PB	90	105,1	6,3	344
NCR - 095 - PB	95	110,1	6,3	345
NCR - 100 - PB	100	115,1	6,3	347
NCR - 105 - PB	105	120,1	6,3	348
NCR - 110 - PB	110	125,1	6,3	350
NCR - 115 - PB	115	130,1	6,3	351
NCR - 120 - PB	120	135,1	6,3	353
NCR - 125 - PB	125	140,1	6,3	355
NCR - 130 - PB	130	145,1	6,3	356
NCR - 135 - PB	135	150,1	6,3	358
NCR - 140 - PB	140	155,1	6,3	359
NCR - 150 - PB	150	165,1	6,3	362
NCR - 160 - PB	160	175,1	6,3	363
NCR - 170 - PB	170	185,1	6,3	365
NCR - 180 - PB	180	195,1	6,3	366

Type designation	∅ d	∅ D	L	O-Ring
NCR - 190 - PB	190	205,1	6,3	368
NCR - 200 - PB	200	220,5	8,1	445
NCR - 210 - PB	210	230,5	8,1	446
NCR - 220 - PB	220	240,5	8,1	447
NCR - 230 - PB	230	250,5	8,1	448
NCR - 240 - PB	240	260,5	8,1	449
NCR - 250 - PB	250	270,5	8,1	449
NCR - 260 - PB	260	284,0	8,1	450
NCR - 270 - PB	270	294,0	8,1	451
NCR - 280 - PB	280	304,0	8,1	452
NCR - 290 - PB	290	314,0	8,1	453
NCR - 300 - PB	300	324,0	8,1	454
NCR - 310 - PB	310	334,0	8,1	454
NCR - 320 - PB	320	344,0	8,1	455
NCR - 330 - PB	330	354,0	8,1	456
NCR - 340 - PB	340	364,0	8,1	457
NCR - 350 - PB	350	374,0	8,1	458
NCR - 360 - PB	360	384,0	8,1	458
NCR - 370 - PB	370	394,0	8,1	459
NCR - 380 - PB	380	404,0	8,1	460
NCR - 390 - PB	390	414,0	8,1	461
NCR - 400 - PB	400	424,0	8,1	461
NCR - 410 - PB	410	434,0	8,1	462
NCR - 420 - PB	420	444,0	8,1	463
NCR - 430 - PB	430	454,0	8,1	464
NCR - 440 - PB	440	464,0	8,1	464
NCR - 450 - PB	450	474,0	8,1	465
NCR - 460 - PB	460	484,0	8,1	466
NCR - 470 - PB	470	494,0	8,1	467
NCR - 480 - PB	480	504,0	8,1	468
NCR - 490 - PB	490	514,0	8,1	469
NCR - 500 - PB	500	524,0	8,1	469
NCR - 510 - PB	510	534,0	8,1	469
NCR - 520 - PB	520	544,0	8,1	470
NCR - 530 - PB	530	554,0	8,1	470
NCR - 540 - PB	540	564,0	8,1	471
NCR - 550 - PB	550	574,0	8,1	471
NCR - 560 - PB	560	584,0	8,1	471

Type designation	∅ d	∅ D	L	O-Ring
NCR - 570 - PB	570	594,0	8,1	472
NCR - 580 - PB	580	604,0	8,1	472
NCR - 590 - PB	590	614,0	8,1	473
NCR - 600 - PB	600	624,0	8,1	473
NCR - 610 - PB	610	634,0	8,1	473

Further dimension and in-between sizes upon request.



Max. Operating Conditions *

Pressure (MPa)	≤ 80 (800 bar)
Temperature (°C)	- 30 / + 110 / + 200
Speed (m/s)	≤ 15 (0,5) **
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R _a	R _t
Groove bottom	≤ 1,6 µm	≤ 16 µm
Groove flanks	≤ 1,6 µm	≤ 16 µm
Running surface	≤ 0,3 µm	≤ 3 µm

Material

PTFE-bronze / -carbon / glass fiber (+MoS ₂)	PB/PK/PG(M)
PTFE-compound turquoise	PT
PTFE-Econol	PEK
Polyurethane	PU **

Technical Description

The rod seal of the **NCS** series consists of a PTFE compound bearing ring preset by a O-Ring. The PTFE material stands out for very good sliding characteristics, low attrition rate as well as high extrusion resistance. The thermal and chemical stability of the PTFE material allows for the use in a wide range of applications. The selection of the PTFE compound and O-Ring material depends on the operating conditions.

***Max. operating conditions:**

Higher values are permitted if the structural requirements are provided.

Higher operating pressures of up to 80 MPa, sliding speeds of up to 15 m/s are possible if these extreme conditions do not occur at the same time. If operating pressure are higher up to 40 MPa, the gap dimensions „s“ have to be reduced.

Temperature range and chemical stability depending on chosen O-Ring material.

Assembly dimensions

Diameter $\varnothing d$			Groove bottom $\varnothing D$	L.dim.	O-Ring
Standard	Type___/1	Type___/2			
		8 - 18,9	$\varnothing d + 4,9$	2,2	1,78
8 - 18,9		19 - 37,9	$\varnothing d + 7,3$	3,2	2,62
19 - 37,9	8 - 18,9	38 - 199,9	$\varnothing d + 10,7$	4,2	3,53
38 - 199,9	19 - 37,9	200 - 255,9	$\varnothing d + 15,1$	6,3	5,33
200 - 255,9	38 - 199,9	256 - 649,9	$\varnothing d + 20,5$	8,1	7,00
256 - 649,9	200 - 255,9	650 - 999,9	$\varnothing d + 24,0$	8,1	7,00
650 - 999,9	256 - 649,9		$\varnothing d + 27,3$	9,5	8,40

If the groove width (L dim.) differs from the standard series, the complementary number /1 or /2 is added to the order designation.

Subject to the diameter (D), the corresponding groove bottom diameters (d) and assembly dimensions (L dim.) are to be taken from the above table under type ---/1 and type ---/2.

Gap dim. s (mm)

L.dim.	0 - 20 MPa	20 - 40 MPa	Radius R
2,2	0,30 - 0,20	0,20 - 0,15	0,3 - 0,5
3,2	0,40 - 0,25	0,25 - 0,15	0,5 - 0,8
4,2	0,40 - 0,25	0,25 - 0,20	0,8 - 1,2
6,3	0,50 - 0,30	0,30 - 0,20	1,2 - 1,5
8,1	0,60 - 0,35	0,35 - 0,25	1,5 - 2,0
8,1	0,60 - 0,35	0,35 - 0,25	1,5 - 2,0
9,5	0,70 - 0,50	0,50 - 0,30	2,0 - 3,0

"For pressures more than 400 bar we recommend to choose a gap behind the seal of H8/F8 (hole/piston)."

	Rod Seal Type	Dimension	Material
Ordering example:	Rod Seal	$\varnothing d 50 \times 65,1 \times 6,3$	PTFE-bronze
Order designation:	NCS -	50 x 65,1 x 6,3	- PB

- Designation of material:**
- PB** - PTFE-bronze
 - PK** - PTFE-carbon
 - PG(M)** - PTFE-glass fiber +(MoS₂)
 - PT** - PTFE compound turquoise
 - PEK** - PTFE-Econol
 - PU** - Polyurethane

Type designation	∅ d	∅ D	L	O-Ring
NCS - 004 - PB	4	8,9	2,2	010
NCS - 005 - PB	5	9,9	2,2	011
NCS - 006 - PB	6	10,9	2,2	011
NCS - 007 - PB	7	11,9	2,2	012
NCS - 008 - PB	8	15,3	3,2	111
NCS - 008/2 - PB	8	12,9	2,2	012
NCS - 010 - PB	10	17,3	3,2	113
NCS - 010/2 - PB	10	14,9	2,2	014
NCS - 012 - PB	12	19,3	3,2	114
NCS - 012/2 - PB	12	16,9	2,2	015
NCS - 014 - PB	14	21,3	3,2	115
NCS - 014/2 - PB	14	18,9	2,2	016
NCS - 015 - PB	15	22,3	3,2	116
NCS - 016 - PB	16	23,3	3,2	116
NCS - 016/2 - PB	16	20,9	2,2	017
NCS - 018 - PB	18	25,3	3,2	118
NCS - 018/2 - PB	18	22,9	2,2	019
NCS - 020 - PB	20	30,7	4,2	214
NCS - 020/2 - PB	20	27,3	3,2	119
NCS - 022 - PB	22	32,7	4,2	215
NCS - 022/2 - PB	22	29,3	3,2	120
NCS - 025 - PB	25	35,7	4,2	217
NCS - 025/2 - PB	25	32,3	3,2	122
NCS - 028 - PB	28	38,7	4,2	219
NCS - 030 - PB	30	40,7	4,2	220
NCS - 030/2 - PB	30	37,3	3,2	125
NCS - 032 - PB	32	42,7	4,2	221
NCS - 032/2 - PB	32	39,3	3,2	126
NCS - 036 - PB	36	46,7	4,2	223
NCS - 036/2 - PB	36	43,3	3,2	129
NCS - 040 - PB	40	55,1	6,3	328
NCS - 040/2 - PB	40	50,7	4,2	224
NCS - 042 - PB	42	57,1	6,3	328
NCS - 042/2 - PB	42	52,7	4,2	226
NCS - 045 - PB	45	60,1	6,3	329
NCS - 045/2 - PB	45	55,7	4,2	226
NCS - 048 - PB	48	63,1	6,3	330
NCS - 048/2 - PB	48	58,7	4,2	832

Type designation	∅ d	∅ D	L	O-Ring
NCS - 050 - PB	50	65,1	6,3	331
NCS - 050/2 - PB	50	60,7	4,2	227
NCS - 052 - PB	52	67,1	6,3	331
NCS - 052/2 - PB	52	62,7	4,2	834
NCS - 055 - PB	55	70,1	6,3	332
NCS - 055/2 - PB	55	65,7	4,2	836
NCS - 056 - PB	56	71,1	6,3	333
NCS - 056/2 - PB	56	66,7	4,2	229
NCS - 060 - PB	60	75,1	6,3	334
NCS - 060/2 - PB	60	70,7	4,2	230
NCS - 063 - PB	63	78,1	6,3	335
NCS - 063/2 - PB	63	73,7	4,2	231
NCS - 065 - PB	65	80,1	6,3	336
NCS - 070 - PB	70	85,1	6,3	337
NCS - 075 - PB	75	90,1	6,3	339
NCS - 080 - PB	80	95,1	6,3	340
NCS - 085 - PB	85	100,1	6,3	342
NCS - 090 - PB	90	105,1	6,3	344
NCS - 095 - PB	95	110,1	6,3	345
NCS - 100 - PB	100	115,1	6,3	347
NCS - 105 - PB	105	120,1	6,3	348
NCS - 110 - PB	110	125,1	6,3	350
NCS - 115 - PB	115	130,1	6,3	351
NCS - 120 - PB	120	135,1	6,3	353
NCS - 125 - PB	125	140,1	6,3	355
NCS - 130 - PB	130	145,1	6,3	356
NCS - 135 - PB	135	150,1	6,3	358
NCS - 140 - PB	140	155,1	6,3	359
NCS - 150 - PB	150	165,1	6,3	362
NCS - 160 - PB	160	175,1	6,3	363
NCS - 160/1 - PB	160	180,5	8,1	628
NCS - 170 - PB	170	185,1	6,3	365
NCS - 180 - PB	180	195,1	6,3	366
NCS - 180/1 - PB	180	200,5	8,1	882
NCS - 190 - PB	190	205,1	6,3	368
NCS - 200 - PB	200	220,5	8,1	445
NCS - 210 - PB	210	230,5	8,1	446
NCS - 220 - PB	220	240,5	8,1	447

Type designation	∅ d	∅ D	L	O-Ring
NCS - 230 - PB	230	250,5	8,1	448
NCS - 240 - PB	240	260,5	8,1	449
NCS - 250 - PB	250	270,5	8,1	449
NCS - 260 - PB	260	284,0	8,1	450
NCS - 270 - PB	270	294,0	8,1	451
NCS - 280 - PB	280	304,0	8,1	452
NCS - 290 - PB	290	314,0	8,1	453
NCS - 300 - PB	300	324,0	8,1	454
NCS - 310 - PB	310	334,0	8,1	454
NCS - 320 - PB	320	344,0	8,1	455
NCS - 330 - PB	330	354,0	8,1	456
NCS - 340 - PB	340	364,0	8,1	457
NCS - 350 - PB	350	374,0	8,1	458
NCS - 360 - PB	360	384,0	8,1	458
NCS - 370 - PB	370	394,0	8,1	459
NCS - 380 - PB	380	404,0	8,1	460
NCS - 390 - PB	390	414,0	8,1	461
NCS - 400 - PB	400	424,0	8,1	461
NCS - 410 - PB	410	434,0	8,1	462
NCS - 420 - PB	420	444,0	8,1	463
NCS - 430 - PB	430	454,0	8,1	464
NCS - 440 - PB	440	464,0	8,1	464
NCS - 450 - PB	450	474,0	8,1	466
NCS - 460 - PB	460	484,0	8,1	466
NCS - 470 - PB	470	494,0	8,1	467
NCS - 480 - PB	480	504,0	8,1	468
NCS - 490 - PB	490	514,0	8,1	469
NCS - 500 - PB	500	524,0	8,1	469
NCS - 510 - PB	510	534,0	8,1	469
NCS - 520 - PB	520	544,0	8,1	470
NCS - 530 - PB	530	554,0	8,1	470
NCS - 540 - PB	540	564,0	8,1	471
NCS - 550 - PB	550	574,0	8,1	471
NCS - 560 - PB	560	584,0	8,1	471
NCS - 570 - PB	570	594,0	8,1	472
NCS - 580 - PB	580	604,0	8,1	472
NCS - 590 - PB	590	614,0	8,1	473
NCS - 600 - PB	600	624,0	8,1	473

Type designation	∅ d	∅ D	L	O-Ring
NCS - 610 - PB	610	634,0	8,1	473
NCS - 620 - PB	620	644,0	8,1	474
NCS - 630 - PB	630	654,0	8,1	474
NCS - 640 - PB	640	664,0	8,1	475
NCS - 650 - PB	650	677,3	9,5	650 x 8,4
NCS - 660 - PB	660	687,3	9,5	660 x 8,4
NCS - 670 - PB	670	697,3	9,5	670 x 8,4

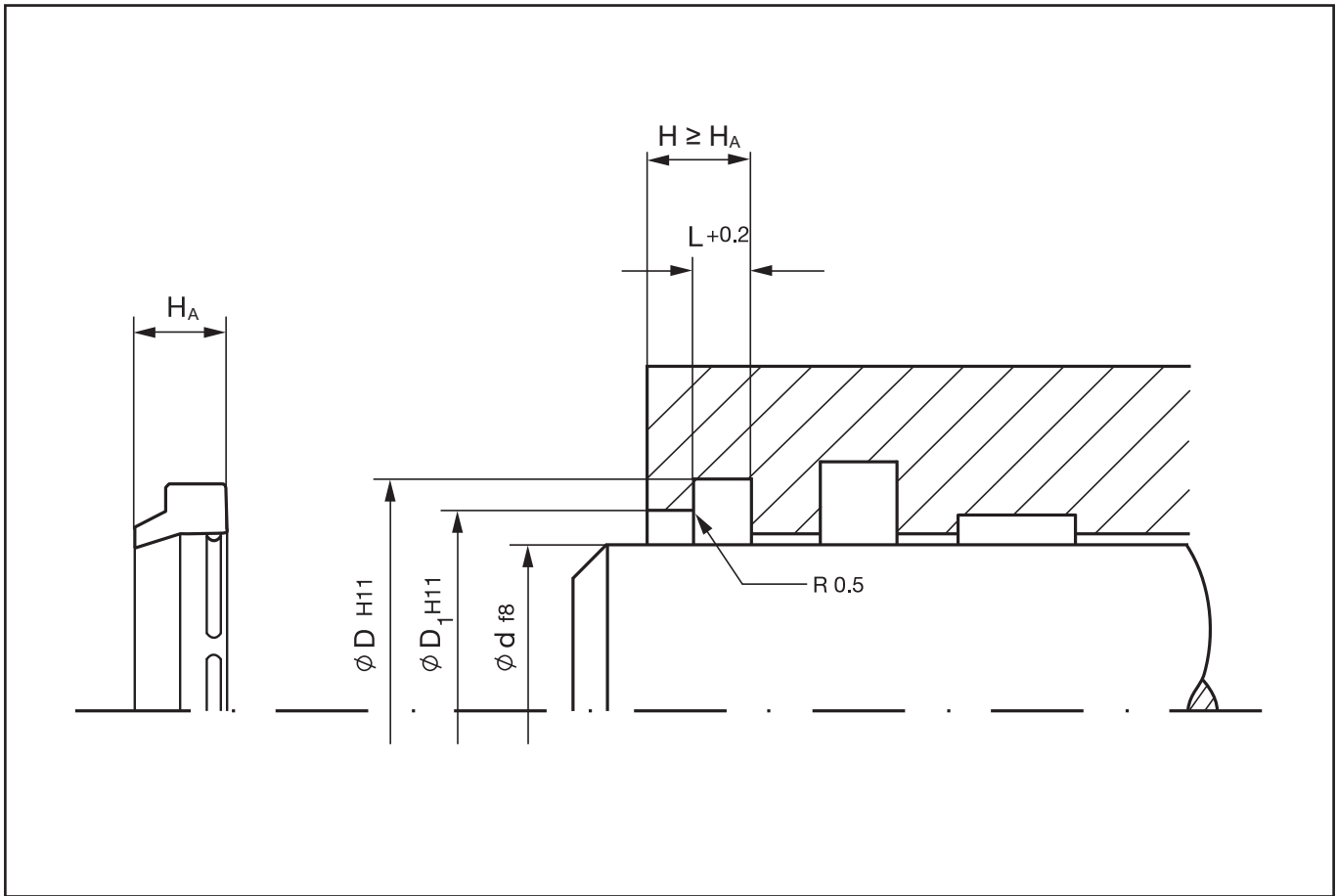
Further dimension and in-between sizes upon request.



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W1/SAF

Wiper/Scraper Ring



Max. Operating Conditions

Temperature (°C)	- 40 / + 100 / + 200
Speed (m/s)	≤ 1
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R _a	R _t
Groove bottom	≤ 1,6 µm	≤ 16 µm
Groove flanks	≤ 1,6 µm	≤ 16 µm
Running surface	≤ 0,3 µm	≤ 3 µm

Material

Polyurethane	PU
NBR	N
FKM (Viton [®])	V
Hytre [®]	HY

Technical Description

The wiper/scraper ring **W1/SAF** is manufactured in polyurethane as standard.

The wiping edge lying on the piston rod prevents the penetration of foreign matters and water.

The swelling fitted on the inside diameter guarantees the exact seating of the wiper/scraper ring inside the seal housing, for effective performance of the wiping edge.

The wiper/scraper ring can be installed in the groove without using auxiliary devices.

Among others, the polyurethane material stands out for increased abrasion resistance and good resistance to ozone.

The wiper/scraper ring **W1/SAF** is available in FPM (Viton[®]) and appropriate for temperatures of up to +200 °C.

Type designation	∅ d	∅ D	∅ D ₁	H	L
W1 - 8 - PU	8	14,6	11	5,0	3,8
W1 - 12/1 - PU	12	17,0	15	5,0	2,9
W1 - 12 - PU	12	18,6	15	5,0	3,8
W1 - 13 - PU	13	19,6	16	5,0	3,8
W1 - 14 - PU	14	20,6	17	5,0	3,8
W1 - 15 - PU	15	21,6	18	5,3	3,8
W1 - 16/D - PU	16	21,0	19	5,3	3,8
W1 - 16 - PU	16	22,6	19	5,3	3,8
W1 - 16/C - PU	16	25,0	19	6,0	4,5
W1 - 17 - PU	17	23,6	20	5,0	3,8
W1 - 18 - PU	18	24,6	21	5,3	3,8
W1 - 19 - PU	19	28,6	22	5,0	5,3
W1 - 20 - PU	20	28,6	23	7,0	5,3
W1 - 20/1 - PU	20	26,6	23	5,5	3,4
W1 - 20/B - PU	20	29,0	23	5,0	3,5
W1 - 20/C - PU	20	29,0	23	6,0	4,5
W1 - 22 - PU	22	30,6	25	7,0	5,3
W1 - 22/A - PU	22	31,0	25	6,0	4,5
W1 - 24 - PU	24	32,6	27	7,0	5,3
W1 - 25 - PU	25	33,6	28	7,0	5,3
W1 - 25,4 - PU	25,4	34,93	28,4	5,6	4,75
W1 - 25/A - PU	25	34,2	28,2	6,9	4,5
W1 - 25/S - PU	25	33,6	28	6,9	5,0
W1 - 25/1 - PU	25,4	33,02	28,4	5,6	4,1
W1 - 26 - PU	26	34,6	29	7,0	5,3
W1 - 27 - PU	27	35,6	30	7,0	5,3
W1 - 28 - PU	28	36,6	31	7,0	5,3
W1 - 28/A - PU	28	33,0	30,6	5,5	3,0

Wiper/Scraper ring Type

Dimension

Material/Type

Ordering example: **Wiper/Scraper Ring** ∅ d 20 x 28,6 x 5,3 **Polyurethane**

Order designation: **W1 - 20 x 28,6 x 5,3 / 7 - PU**

Designation of material:

- PU** - Polyurethane
- N** - NBR
- V** - FKM (Viton®)
- HY** - Hytrel®

W1/SAF

Wiper/Scraper Ring

Type designation	∅ d	∅ D	∅ D ₁	H	L
W1 - 30 - PU	30	38,6	33	7,0	5,3
W1 - 30/C - PU	30	40,0	33,2	6,9	5,0
W1 - 30/B - PU	30	42,0	34,4	5,5	3,2
W1 - 32 - PU	32	40,6	35	7,0	5,3
W1 - 33 - PU	33	41,6	36	7,0	5,3
W1 - 35 - PU	35	43,6	38	7,0	5,3
W1 - 35/B - PU	35	43,9	38	7,9	6,3
W1 - 36 - PU	36	44,6	39	7,0	5,3
W1 - 38 - PU	38	46,6	41	7,0	5,3
W1 - 40 - PU	40	48,6	43	7,0	5,3
W1 - 40/A - PU	40	52,0	45	5,5	3,2
W1 - 42 - PU	42	50,6	45	7,0	5,3
W1 - 45 - PU	45	53,6	48	7,0	5,3
W1 - 45/1 - PU	45	55,6	48	7,0	5,3
W1 - 45/B - PU	45	56,0	50	5,5	3,5
W1 - 46 - PU	46	54,6	49	7,0	5,3
W1 - 48 - PU	48	56,6	51	7,0	5,3
W1 - 48/1 - PU	48	60,6	54	10,0	5,3
W1 - 48/A - PU	48	60,0	54	10,0	5,0
W1 - 50 - PU	50	58,6	53	7,0	5,3
W1 - 50/B - PU	50	58,6	53	8,3	6,3
W1 - 50/1 - PU	50	60,6	54	7,0	5,3
W1 - 53 - PU	53	61,6	56	7,0	5,3
W1 - 55 - PU	55	63,6	58	7,0	5,3
W1 - 55/B - PU	55	63,6	58	5,9	4,3
W1 - 55/1 - PU	55	65,6	59	7,0	5,3
W1 - 56 - PU	56	64,6	59	7,0	5,3
W1 - 56/1 - PU	56	66,6	60	7,0	5,3
W1 - 60 - PU	60	68,6	63	7,0	5,3
W1 - 60/1 - PU	60	70,6	63	7,0	5,3
W1 - 61 - PU	61	69,6	64	7,0	5,3
W1 - 63 - PU	63	71,6	66	7,0	5,3
W1 - 63/1 - PU	63	73,6	67	7,0	5,3
W1 - 63/B - PU	63	73,6	70	8,3	6,3
W1 - 65 - PU	65	73,6	68	7,0	5,3
W1 - 65/1 - PU	65	75,6	69	7,0	5,3
W1 - 65/B - PU	65	72,6	68	3,8	2,3
W1 - 65/C - PU	65	77,0	70	5,5	3,2

Type designation	∅ d	∅ D	∅ D ₁	H	L
W1 - 65/D - PU	65	77,6	70	9,6	7,3
W1 - 70 - PU	70	78,6	73	7,0	5,3
W1 - 70/C - PU	70	78,6	73	8,6	6,3
W1 - 70/1 - PU	70	80,6	72	7,0	5,3
W1 - 70/2 - PU	70	82,6	76	12,0	7,1
W1 - 75 - PU	75	83,6	78	7,0	5,3
W1 - 75/1 - PU	75	87,2	81	12,0	7,1
W1 - 76 - PU	76	84,6	79	7,0	5,3
W1 - 78 - PU	78	86,6	81	12,0	7,1
W1 - 78/B - PU	78	86,0	81	6,4	5,0
W1 - 80 - PU	80	88,6	83	7,0	5,3
W1 - 80/1 - PU	80	92,2	86	12,0	7,1
W1 - 85 - PU	85	93,6	88	7,0	5,3
W1 - 85/1 - PU	85	97,2	91	12,0	7,1
W1 - 88 - PU	88	96,6	91	7,0	5,3
W1 - 90 - PU	90	98,6	93	7,0	5,3
W1 - 90/1 - PU	90	102,2	96	12,0	7,1
W1 - 91 - PU	91	99,6	94	7,0	5,3
W1 - 95 - PU	95	107,2	101	12,0	7,1
W1 - 97 - PU	97	105,6	100	7,0	5,3
W1 - 100 - PU	100	112,2	106	12,0	7,1
W1 - 105 - PU	105	117,2	111	12,0	7,1
W1 - 105/1 - PU	105	113,6	108	7,0	5,3
W1 - 107 - PU	107	115,6	110	7,0	5,3
W1 - 110 - PU	110	122,2	116	12,0	7,1
W1 - 111 - PU	111	126,6	118	10,2	6,8
W1 - 115 - PU	115	127,2	121	12,0	7,1
W1 - 118 - PU	118	126,6	121	7,0	5,3
W1 - 118/B - PU	118	126,0	121	6,4	5,0
W1 - 120 - PU	120	132,2	126	12,0	7,1
W1 - 120/1 - PU	120	128,6	123	7,0	5,3
W1 - 124 - PU	124	139,6	131	10,2	6,8
W1 - 124/A - PU	124	139,0	131	10,3	6,8
W1 - 125 - PU	125	137,2	131	12,0	7,1
W1 - 125/1 - PU	125	140,2	132,6	16,0	10,1
W1 - 126 - PU	126	134,6	129	7,0	5,3
W1 - 130 - PU	130	142,2	136	12,0	7,1
W1 - 135 - PU	135	147,2	141	12,0	7,1

W1/SAF

Wiper/Scraper Ring

Type designation	∅ d	∅ D	∅ D ₁	H	L
W1 - 135/A - PU	135	150,0	145	12,4	9,5
W1 - 140 - PU	140	152,2	146	12,0	7,1
W1 - 140/B - PU	140	155,0	147	10,2	6,8
W1 - 140/1 - PU	140	155,2	147,6	16,0	10,1
W1 - 142/A - PU	142	151,6	146	6,8	5,3
W1 - 142/B - PU	142	153,6	147	8,0	6,3
W1 - 143 - PU	143	151,6	146	7,0	5,3
W1 - 143/B - PU	143	151,0	146	7,0	5,5
W1 - 145 - PU	145	157,2	151	12,0	7,1
W1 - 145/B - PU	145	160,0	155	12,3	9,5
W1 - 150 - PU	150	162,2	156	12,0	7,1
W1 - 150/1 - PU	150	165,2	157,6	16,0	10,1
W1 - 150/C - PU	150	165,0	160	12,3	9,5
W1 - 155/A - PU	155	170,0	162	10,3	6,8
W1 - 160 - PU	160	175,2	168	16,0	10,1
W1 - 160/A - PU	160	175,0	170	12,4	9,5
W1 - 165 - PU	165	177,2	170	12,0	7,1
W1 - 170/A - PU	170	185,0	177	10,2	6,8
W1 - 170 - PU	170	185,2	178	16,0	10,1
W1 - 171 - PU	171	179,6	174	7,0	5,3
W1 - 180 - PU	180	200,2	190	18,0	10,2
W1 - 180/1 - PU	180	195,2	188	16,0	10,1
W1 - 186/A - PU	186	201,0	193	10,3	6,8
W1 - 190 - PU	190	210,2	200	18,0	10,2
W1 - 200 - PU	200	220,2	210	18,0	10,2
W1 - 200/A - PU	200	215,0	210	14,0	9,5
W1 - 216/A - PU	216	231,0	223	10,3	6,8
W1 - 220 - PU	220	240,0	230	18,0	10,2
W1 - 235 - PU	235	255,0	245	18,0	10,2
W1 - 238 - PU	238	258,0	248	18,0	10,2

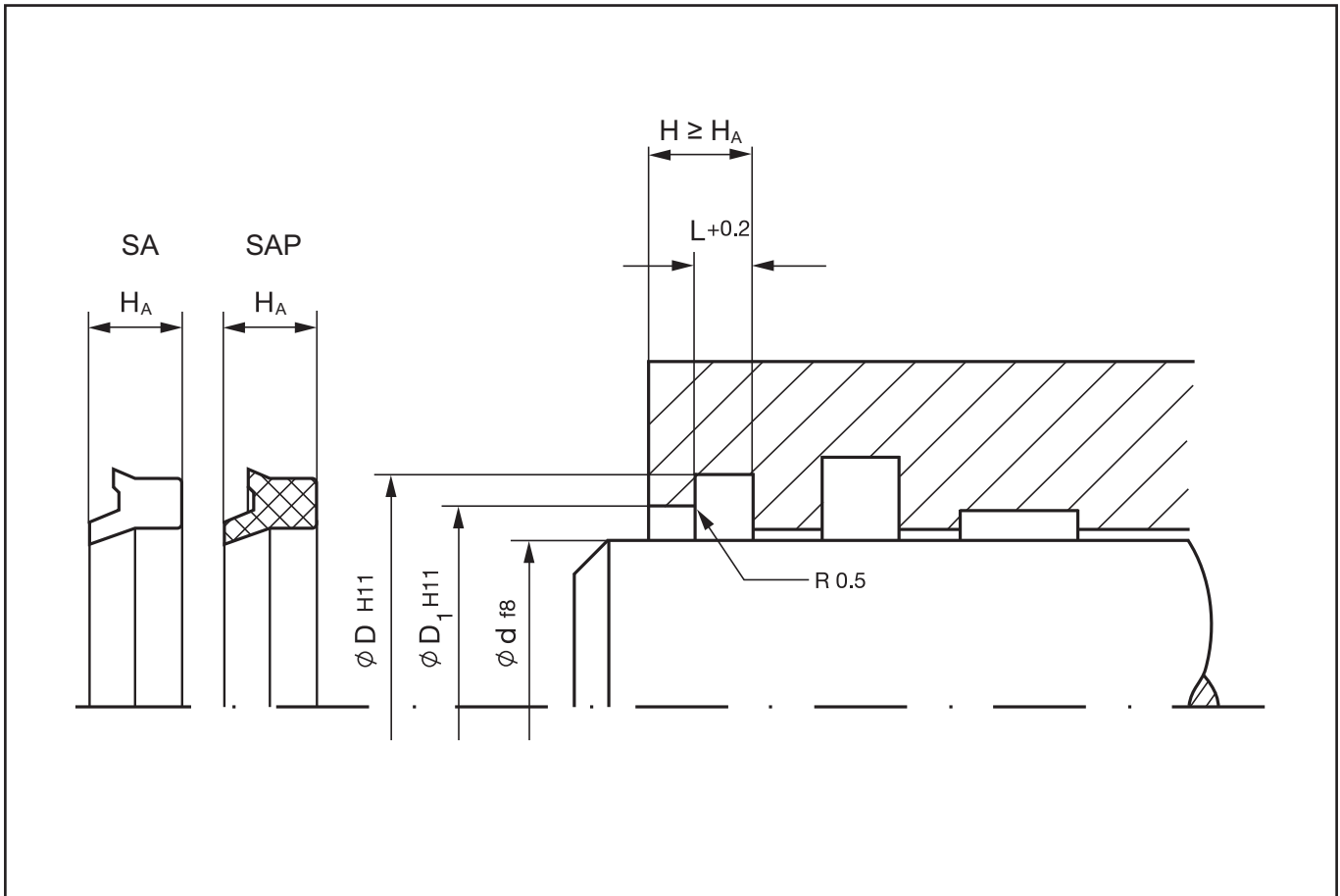
Further dimension and in-between sizes upon request.

Type designation	∅ d	∅ D	∅ D ₁	H	L
W1 - 230 - N	230	250	240	18,0	10,2
W1 - 250 - N	250	270	260	18,0	10,2
W1 - 260 - N	260	280	270	18,0	10,2
W1 - 270 - N	270	290	280	18,0	10,2
W1 - 300 - N	300	320	310	18,0	10,2
W1 - 310 - N	310	330	320	18,0	10,2
W1 - 320 - N	320	340	330	18,0	10,2
W1 - 360 - N	360	380	370	18,0	10,2
W1 - 400 - N	400	420	410	18,0	10,2
W1 - 450 - N	450	470	460	18,0	10,2
W1 - 505 - N	505	525	515	18,0	10,2
W1 - 600 - N	600	620	610	18,0	10,2
W1 - 640 - N	640	660	650	18,0	10,2

Further dimension and in-between sizes upon request.

	Wiper/Scraper ring Type	Dimension	Material/Type
Ordering example:	Wiper/Scraper Ring	∅ d 230 x 250 x 10,2	NBR
Order designation:	W1 -	230 x 250 x 10,2 / 18	- N

Designation of material: N - NBR



Max. Operating Conditions

Temperature (°C)	- 40 / + 100	
Speed (m/s)	≤ 1	
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids	

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	≤ 1,6 µm	≤ 16 µm
Groove flanks	≤ 1,6 µm	≤ 16 µm
Running surface	≤ 0,3 µm	≤ 3 µm

Material

Polyurethane	PU
Hytrel®	HY

Technical Description

The wiper/scraper ring **SA** is manufactured in polyurethane as standard.

The wiping edge lying on the piston rod prevents the penetration of foreign matters and water.

The swelling fitted on the inside diameter guarantees the exact seating of the wiper/scraper ring inside the seal housing, for effective performance of the wiping edge.

The wiper/scraper ring can be installed in the groove without using auxiliary devices.

Among others, the polyurethane material stands out for increased abrasion resistance and good resistance to ozone.

The wiper/scraper ring **SA** is available in Hytrel®

For wiper/scraper ring **SAP** we provide special sizes/moulds which are available for material Hytrel® only.

Type designation	∅ d	∅ D	∅ D ₁	H	L
SAP - 100 - HY	100	112,2	106,0	12,0	7,2
SAP - 100 - HY	100	115,0	110,0	14,0	9,5
SAP - 110 - HY	110	122,2	116,0	12,0	7,2

Further dimension and in-between sizes upon request.

Type designation	∅ d	∅ D	∅ D ₁	H	L
SA - 4 - PU	4	12,0	9,0	4,6	3,0
SA - 5/S - PU	5	12,0	9,0	4,1	2,8
SA - 6/S - PU	6	12,0	9,0	4,2	3,0
SA - 8 - PU	8	14,6	11,0	5,0	3,8
SA - 9/S - PU	9	13,0	12,0	5,5	2,5
SA - 10 - PU	10	16,6	13,8	5,0	3,8
SA - 10/S - PU	10	15,0	13,0	2,4	1,0
SA - 12 - PU	12	18,6	15,0	5,0	3,8
SA - 13 - PU	13	19,6	16,0	5,0	3,8
SA - 14 - PU	14	20,6	17,0	5,0	3,8
SA - 15 - PU	15	21,6	18,0	5,0	3,8
SA - 16 - PU	16	22,6	19,0	5,0	3,8
SA - 16/A - PU	16	22,5	19,0	4,2	3,0
SA - 17 - PU	17	23,6	20,0	5,0	3,8
SA - 18 - PU	18	24,6	21,0	5,0	3,8
SA - 20 - PU	20	28,6	23,0	7,0	5,3
SA - 20/A - PU	20	26,0	23,0	4,7	3,4
SA - 22 - PU	22	30,6	25,0	7,0	5,3
SA - 22/A2 - PU	22	30,6	25,0	4,0	2,2
SA - 24 - PU	24	32,6	27,0	7,0	5,3
SA - 24/A2 - PU	24	32,6	27,0	4,0	2,2
SA - 25 - PU	25	33,6	28,0	7,0	5,3
SA - 25/H - PU	25	32,5	27,9	3,6	1,6
SA - 28 - PU	28	36,6	31,0	7,0	5,3
SA - 30 - PU	30	38,6	33,0	7,0	5,3
SA - 30/A2 - PU	30	40,0	34,5	4,6	3,0
SA - 32 - PU	32	40,6	35,0	7,0	5,3
SA - 32/H - PU	32	39,5	34,9	3,6	1,6
SA - 35 - PU	35	43,6	38,0	7,0	5,3
SA - 35/A - PU	35	43,6	38,0	6,6	5,0
SA - 35/A2 - PU	35	45,0	39,0	5,6	4,0
SA - 36 - PU	36	44,6	39,0	7,0	5,3
SA - 38 - PU	38	46,6	41,0	7,0	5,3
SA - 40 - PU	40	48,6	43,0	7,0	5,3
AS - 40/H - PU	40	47,5	42,9	3,6	1,6
SA - 42 - PU	42	50,6	45,0	7,0	5,3
SA - 45 - PU	45	53,6	48,0	7,0	5,3
SA - 45/A - PU	45	55,6	48,0	6,9	5,3

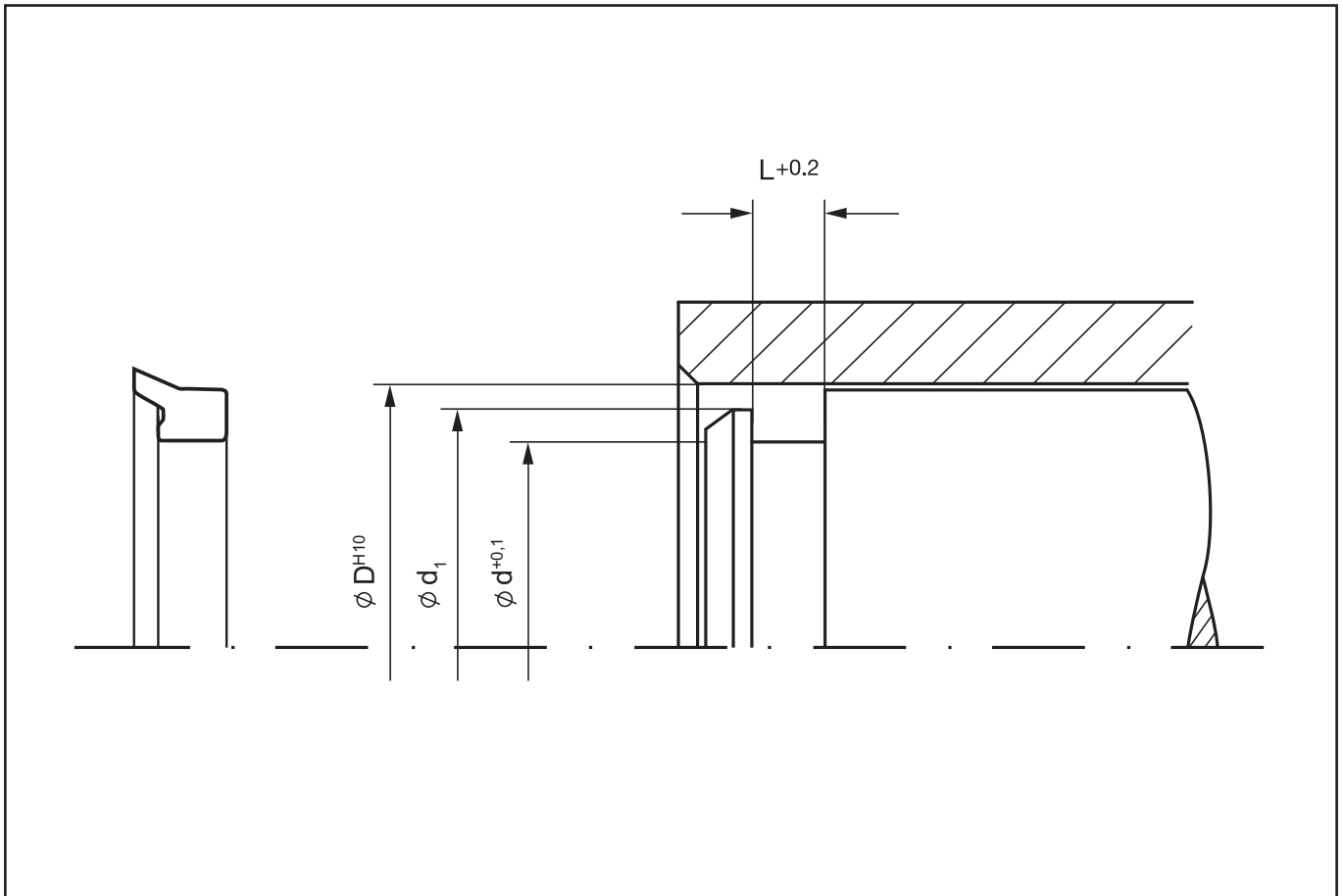
Type designation	∅ d	∅ D	∅ D ₁	H	L
SA - 45/A2 - PU	45	60,0	53,0	6,8	4,2
SA - 50 - PU	50	58,6	53,0	7,0	5,3
SA - 50/A - PU	50	60,6	53,0	6,9	5,3
SA - 50/A2 - PU	50	65,5	58,0	7,0	4,2
SA - 55 - PU	55	63,6	58,0	7,0	5,3
SA - 55/A - PU	55	65,6	58,0	6,9	5,3
SA - 56 - PU	56	64,6	59,0	7,0	5,3
SA - 56/A - PU	56	66,6	59,0	6,9	5,3
SA - 60 - PU	60	68,6	63,0	7,0	5,3
SA - 60/A - PU	60	70,6	63,0	6,9	5,3
SA - 60/S - PU	60	70,6	66,0	7,5	5,5
SA - 63 - PU	63	71,6	66,0	7,0	5,3
SA - 63/A - PU	63	73,6	66,0	6,9	5,3
SA - 65 - PU	65	73,6	68,0	7,0	5,3
SA - 65/A - PU	65	75,6	68,0	6,9	5,3
SA - 70 - PU	70	78,6	73,0	7,0	5,3
SA - 70/A - PU	70	82,6	76,0	10,0	7,1
SA - 70/B - PU	70	80,6	73,0	6,9	5,3
SA - 73/A - PU	73	83,6	76,0	8,9	7,3
SA - 75 - PU	75	83,6	78,0	7,0	5,3
SA - 75/A - PU	75	87,2	81,0	10,0	7,1
SA - 78/A - PU	78	90,0	83,0	12,0	7,5
SA - 78/S - PU	78	88,6	84,0	7,5	5,5
SA - 80 - PU	80	88,6	83,0	7,0	5,3
SA - 80/A - PU	80	92,6	86,0	10,0	7,1
SA - 85 - PU	85	97,2	91,0	10,0	7,1
SA - 85/A - PU	85	93,6	88,0	6,9	5,3
SA - 90 - PU	90	102,2	96,0	10,0	7,1
SA - 90/C - PU	90	98,2	93,0	7,0	5,3
SA - 90/D - PU	90	98,6	93,0	7,0	5,3
SA - 95 - PU	95	107,2	101,0	10,0	7,1
SA - 99/S - PU	99	109,6	105,0	7,5	5,5
SA - 100 - PU	100	112,2	106,0	10,0	7,1
SA - 105 - PU	105	117,2	111,0	10,0	7,1
SA - 105/A - PU	105	113,6	108,0	7,0	5,3
SA - 110 - PU	110	122,2	116,0	10,0	7,1
SA - 115 - PU	115	127,2	121,0	10,0	7,1
SA - 115/B - PU	115	123,2	118,0	7,0	5,3

Type designation	∅ d	∅ D	∅ D ₁	H	L
SA - 120 - PU	120	132,2	126,0	10,0	7,1
SA - 120/A - PU	120	128,6	123,0	7,0	5,3
SA - 120/S - PU	120	130,6	126,0	7,5	5,5
SA - 125 - PU	125	137,2	131,0	10,0	7,1
SA - 125/A - PU	125	140,2	132,6	14,4	10,1
SA - 130 - PU	130	142,2	136,0	10,0	7,1
SA - 135 - PU	135	147,2	141,0	10,0	7,1
SA - 140 - PU	140	152,2	146,0	10,0	7,1
SA - 140/A - PU	140	148,6	143,0	7,0	5,3
SA - 141/S - PU	141	151,6	147,0	7,5	5,5
SA - 145 - PU	145	157,2	151,0	10,0	7,1
SA - 150 - PU	150	162,2	156,0	10,0	7,1
SA - 150/B - PU	150	158,2	153,0	7,0	5,3
SA - 160 - PU	160	175,2	168,0	14,3	10,1
SA - 162/S - PU	162	172,6	168,0	7,5	5,5
SA - 170 - PU	170	185,2	178,0	14,3	10,1
SA - 180 - PU	180	195,2	188,0	14,3	10,1
SA - 183/S - PU	183	193,6	189,0	7,5	5,5
SA - 190 - PU	190	205,2	198,0	14,3	10,1
SA - 190/A - PU	190	210,0	200,0	14,8	10,1
SA - 200 - PU	200	215,2	208,0	14,3	10,1
SA 207/S - PU	207	217,6	213,0	7,5	5,5
SA - 210 - PU	210	225,2	218,0	14,3	10,1
SA - 220 - PU	220	235,2	228,0	14,3	10,1
SA - 230 - PU	230	245,2	238,0	14,3	10,1
SA - 240 - PU	240	255,2	248,0	14,3	10,1
SA - 250 - PU	250	265,2	258,0	14,3	10,1

Further dimension and in-between sizes upon request.

SAA

Wiper/Scraper Ring



Max. Operating Conditions

Temperature (°C)	- 40 / + 100
Speed (m/s)	≤ 1
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	≤ 1,6 μm	≤ 16 μm
Groove flanks	≤ 1,6 μm	≤ 16 μm
Running surface	≤ 0,3 μm	≤ 3 μm

Material

Polyurethane	PU
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Technical Description

The wiper/scraper ring **SAA** is manufactured in polyurethane as standard.

The wiper/scraper ring can be installed in the groove without using auxiliary devices.

Among others, the polyurethane material stands out for increased abrasion resistance and good resistance to ozone.

Type designation	∅ D	∅ d	∅ d ₁	L
SAA - 30 - PU	30	21,4	27	5,3
SAA - 40 - PU	40	31,4	37	5,3
SAA - 50 - PU	50	41,4	47	5,3
SAA - 60 - PU	60	51,4	57	5,3
SAA - 63 - PU	63	54,4	60	5,3
SAA - 70 - PU	70	61,4	67	5,3
SAA - 80 - PU	80	71,4	77	5,3
SAA - 90 - PU	90	81,4	87	5,3
SAA - 95 - PU	95	86,4	92	5,3
SAA - 100 - PU	100	91,4	97	5,3
SAA - 100/B - PU	100	88,0	94	7,5
SAA - 110 - PU	110	101,4	107	5,3
SAA - 115 - PU	115	106,4	112	5,3
SAA - 115/A - PU	115	107,0	111	5,0
SAA - 115/B - PU	115	100,0	107,5	10,0
SAA - 120 - PU	120	111,4	117	5,3
SAA - 125 - PU	125	116,4	122	5,3
SAA - 130 - PU	130	121,4	127	5,3
SAA - 140 - PU	140	131,4	137	5,3

Wiper/Scraper ring Type

Dimension

Material/Type

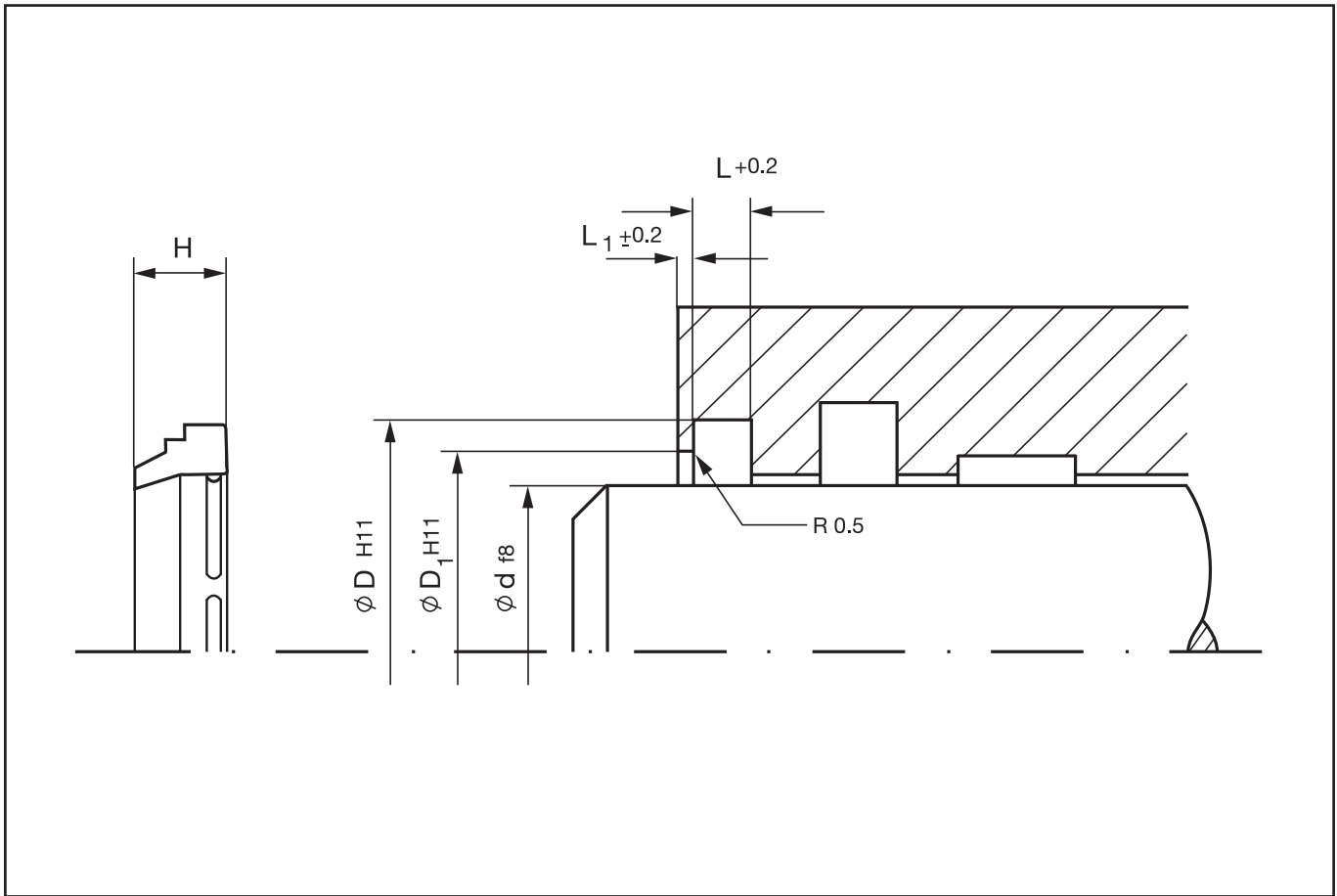
Ordering example: **Wiper/Scraper Ring** **∅ D 80 x 71,4 x 5,3** **Polyurethane**

Order designation: **SAA - 80 x 71,4 x 5,3 - PU**

Designation of material: **PU - Polyurethane**

W2/SAG

Wiper/Scraper Ring



Max. Operating Conditions

Temperature (°C)	- 40 / + 100 / + 200
Speed (m/s)	≤ 1
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R _a	R _t
Groove bottom	≤ 1,6 µm	≤ 16 µm
Groove flanks	≤ 1,6 µm	≤ 16 µm
Running surface	≤ 0,3 µm	≤ 3 µm

Material

Polyurethane	PU
NBR	N
FKM (Viton®)	V

Technical Description

The wiper/scraper ring **W2/SAG** is manufactured in polyurethane as standard.

The preset wiping edge lying on the piston rod prevents the penetration of foreign matters and water.

The swelling fitted on the inside diameter guarantees the exact seating of the wiper/scraper ring inside the seal housing, for effective performance of the wiping edge.

The wiper/scraper ring **W2** is available in FPM (Viton®) and appropriate for temperatures of up to +200 °C.

The wiper/scraper ring can be installed in the groove without using auxiliary devices.

Among others, the polyurethane material stands out for increased abrasion resistance and good resistance to ozone.

Type designation	∅ d	∅ D	H	L	∅ D ₁	L ₁
W2 - 6 - PU	6	10	3,9	2,0	9	1,0
W2 - 7 - PU	7	11	3,9	2,0	10	1,0
W2 - 10/A - PU	10	16	5,0	2,6	14	1,0
W2 - 12 - PU	12	20	7,0	4,0	18	1,0
W2 - 14/A - PU	14	20	5,0	2,6	18	1,0
W2 - 16/A - PU	16	20,7	5,5	3,7	19	0,8
W2 - 16/B - PU	16	20,7	4,0	2,2	19	0,8
W2 - 16 - PU	16	24	7,0	4,0	22	1,0
W2 - 18 - PU	18	26	7,0	4,0	24	1,0
W2 - 20 - PU	20	28	7,0	4,0	26	1,0
W2 - 22 - PU	22	30	7,0	4,0	28	1,0
W2 - 24 - PU	24	32	7,0	4,0	30	1,0
W2 - 25 - PU	25	33	7,0	4,0	31	1,0
W2 - 25/A - PU	25	33,6	11,5	5,5	31,4	4,0
W2 - 28 - PU	28	36	7,0	4,0	34	1,0
W2 - 30 - PU	30	38	7,0	4,0	36	1,0
W2 - 30/A - PU	30	36	6,4	4,0	34	1,0
W2 - 30/B - PU	30	47,5	5,75	3,0	45,5	1,5
W2 - 32 - PU	32	40	7,0	4,0	38	1,0
W2 - 35 - PU	35	43	7,0	4,0	41	1,0
W2 - 36 - PU	36	44	7,0	4,0	42	1,0
W2 - 38 - PU	38	46	7,0	4,0	44	1,0
W2 - 40 - PU	40	48	7,0	4,0	46	1,0
W2 - 42 - PU	42	50	7,0	4,0	48	1,0
W2 - 45 - PU	45	53	7,0	4,0	51	1,0
W2 - 50 - PU	50	58	7,0	4,0	56	1,0
W2 - 54 - PU	54	62	7,0	4,0	60	1,0
W2 - 55 - PU	55	63	7,0	4,0	61	1,0

Wiper/Scraper ring Type

Dimension

Material/Type

Ordering example: Wiper/Scraper Ring ∅ d 20 x 28 4 / 7 Polyurethane

Order designation: W2 - 20 x 28 x 4,0 / 7 - PU

Designation of material:
PU - Polyurethane
N - NBR
V - FKM (Viton®)

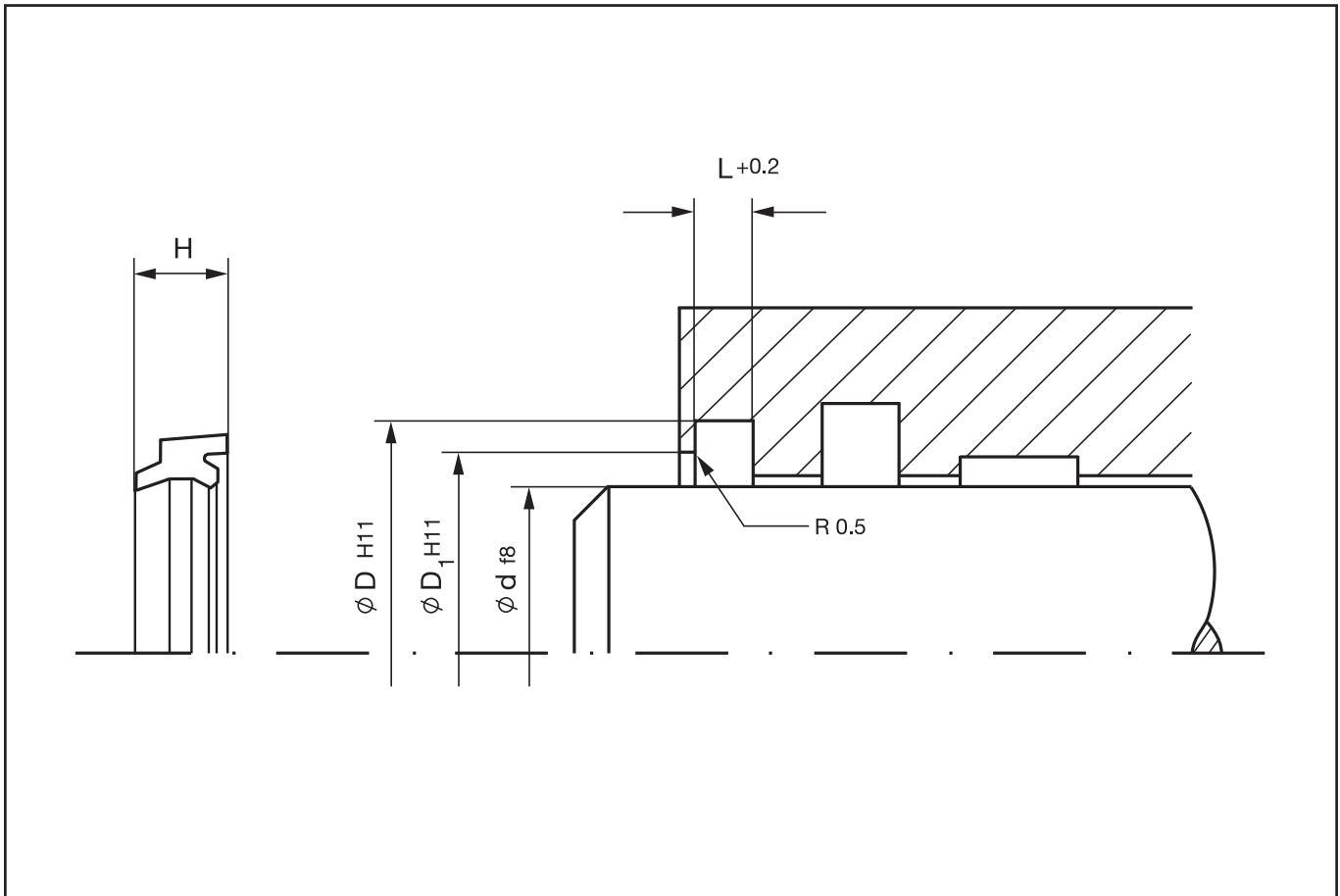
Type designation	∅ d	∅ D	H	L	∅ D ₁	L ₁
W2 - 56 - PU	56	64	7,0	4,0	62	1,0
W2 - 60 - PU	60	68	7,0	4,0	66	1,0
W2 - 63 - PU	63	71	7,0	4,0	69	1,0
W2 - 65 - PU	65	73	7,0	4,0	71	1,0
W2 - 70 - PU	70	78	7,0	4,0	76	1,0
W2 - 75 - PU	75	83	7,0	4,0	81	1,0
W2 - 80 - PU	80	88	7,0	4,0	86	1,0
W2 - 85 - PU	85	93	7,0	4,0	91	1,0
W2 - 90 - PU	90	98	7,0	4,0	96	1,0
W2 - 90/A - PU	90	100	8,9	5,5	96	2,0
W2 - 97/B - PU	97	107	10,4	7,0	103	2,0
W2 - 100 - PU	100	108	7,0	4,0	106	1,0
W2 - 100/A - PU	100	108	10,0	6,0	103,5	2,0
W2 - 110 - PU	110	122	10,1	5,5	119	1,5
W2 - 110/A - PU	110	120	8,9	5,5	116	2,0
W2 - 118/B - PU	118	128	10,4	7,0	124	2,0
W2 - 120/A - PU	120	132	13,0	8,2	125	2,5
W2 - 132/A - PU	132	142	8,9	5,5	138	2,0
W2 - 140 - PU	140	150	10,4	7,0	146	2,0
W2 - 140/A - PU	140	152	13,0	8,2	145	2,5
W2 - 152/A - PU	152	162	8,9	5,5	158	2,0
W2 - 172/A - PU	172	182	8,9	5,5	178	2,0
W2 - 194/A - PU	194	204	8,9	5,5	200	2,0

Further dimension and in-between sizes upon request.

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.

W3/SAB

Wiper/Scraper Ring



Max. Operating Conditions

Temperature (°C)	- 40 / + 100
Speed (m/s)	≤ 1
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	≤ 1,6 µm	≤ 16 µm
Groove flanks	≤ 1,6 µm	≤ 16 µm
Running surface	≤ 0,3 µm	≤ 3 µm

Material

Polyurethane	PU
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Technical Description

The double lipped wiper/scraper ring **W3/SAB** is manufactured in polyurethane as standard.

The wiper/scraper ring prevents the penetration of foreign matters and water.

Additional tightness is provided through the wiping edge on the inside, towards the fluid side, and the sweeping oil is retained in the system. It has to be assured that the fluid is recirculated over the rod seal or through other constructive measures.

The wiper/scraper ring can be installed in the groove without using auxiliary devices.

Among others, the polyurethane material stands out for increased abrasion resistance and good resistance to ozone.

Type designation	∅ d	∅ D	∅ D ₁	H	L
W3 - 10 - PU	10	20,0	14,0	8,4	6,5
W3 - 12 - PU	12	18,6	15,0	4,8	3,8
W3 - 14 - PU	14	20,0	16,5	4,8	4,0
W3 - 18 - PU	18	24,6	21,0	4,8	3,8
W3 - 20 - PU	20	28,6	23,0	6,7	5,3
W3 - 22 - PU	22	30,6	25,0	6,7	5,3
W3 - 22/1 - PU	22	28,0	24,5	4,8	4,0
W3 - 25 - PU	25	33,6	28,0	6,7	5,3
W3 - 28 - PU	28	36,6	31,0	6,7	5,3
W3 - 28/1 - PU	28	36,0	31,0	5,8	5,0
W3 - 30 - PU	30	38,6	33,0	6,7	5,3
W3 - 30/1 - PU	30	38,0	33,0	6,3	5,0
W3 - 32 - PU	32	40,6	35,0	6,7	5,3
W3 - 35 - PU	35	43,6	38,0	6,7	5,3
W3 - 36 - PU	36	44,6	39,0	6,7	5,3
W3 - 36 ISO - PU	36	44,0	39,0	5,8	5,0
W3 - 38 - PU	38	46,6	41,0	6,7	5,3
W3 - 40 - PU	40	48,6	43,0	6,7	5,3
W3 - 40 ISO - PU	40	48,0	43,0	5,8	5,0
W3 - 42 - PU	42	50,6	45,0	6,7	5,3
W3 - 45 - PU	45	53,6	48,0	6,7	5,3
W3 - 45 ISO - PU	45	53,0	48,0	5,8	5,0
W3 - 50/A - PU	50	58,0	53,0	5,0	4,0
W3 - 50 - PU	50	58,6	53,0	6,7	5,3
W3 - 50 ISO - PU	50	58,0	53,0	5,8	5,0
W3 - 55 - PU	55	63,6	58,0	6,7	5,3
W3 - 55/A - PU	55	65,0	58,0	6,8	6,0
W3 - 60 - PU	60	68,6	63,0	6,7	5,3

Wiper/Scraper ring Type

Dimension

Material/Type

Ordering example: Wiper/Scraper Ring ∅ d 20 x 28,6 x 5,3 Polyurethane

Order designation: W3 - 20 x 28,6 x 5,3 / 7 - PU

Designation of material: PU - Polyurethane

W3/SAB

Wiper/Scraper Ring

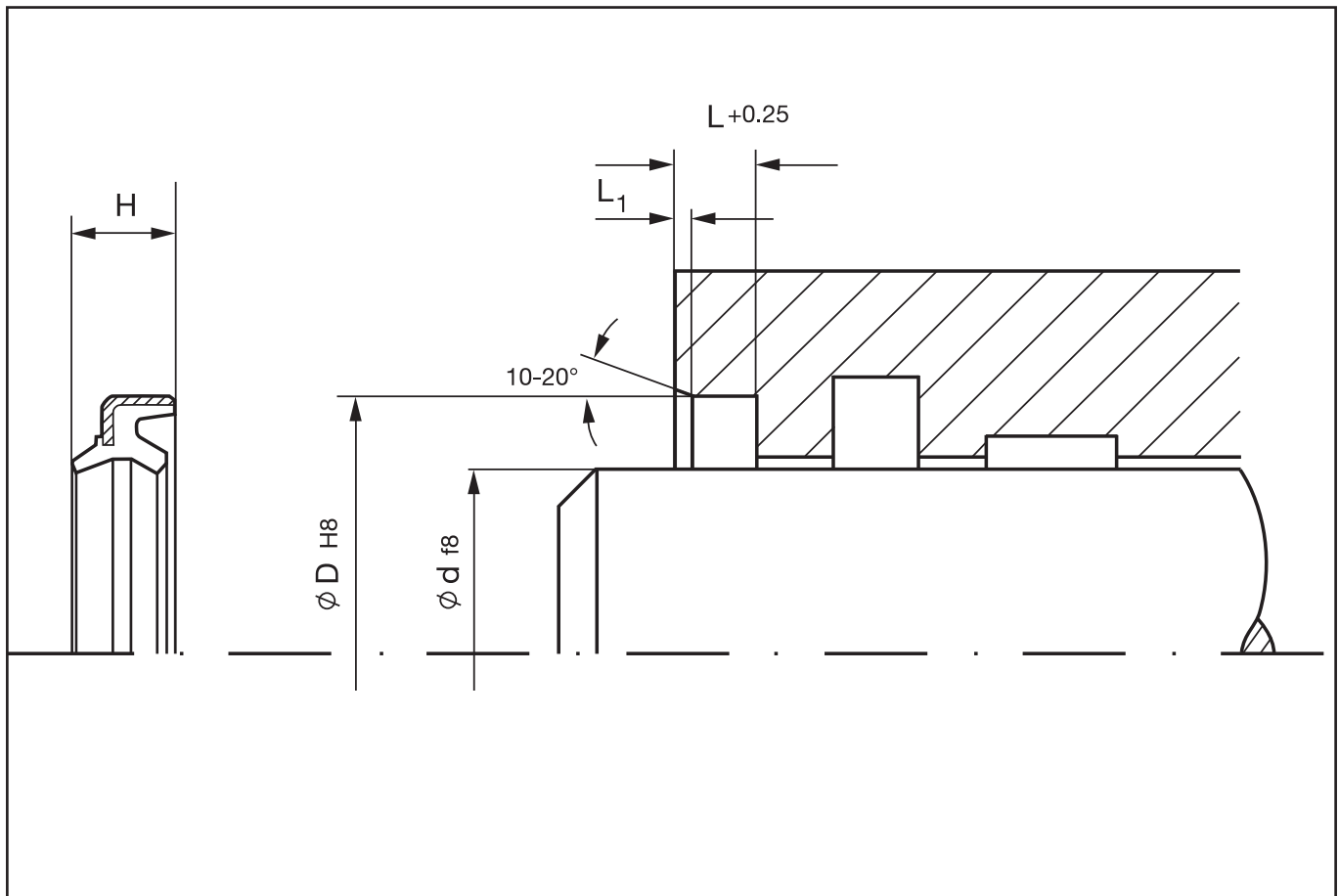
Type designation	∅ d	∅ D	∅ D ₁	H	L
W3 - 63 - PU	63	71,6	66,0	6,7	5,3
W3 - 63 ISO - PU	63	73,0	66,0	6,8	6,0
W3 - 65 - PU	65	73,6	68,0	6,7	5,3
W3 - 65/A - PU	65	75,0	68,0	6,8	6,0
W3 - 70 - PU	70	78,6	73,0	6,7	5,3
W3 - 75 - PU	75	83,6	78,0	6,7	5,3
W3 - 78/A - PU	78	88,2	84,0	8,8	7,1
W3 - 80 - PU	80	88,6	83,0	6,7	5,3
W3 - 82/A - PU	82	94,2	88,0	8,8	7,1
W3 - 85 - PU	85	97,2	91,0	8,8	7,1
W3 - 90 - PU	90	102,2	96,0	8,8	7,1
W3 - 100 - PU	100	112,2	106,0	8,8	7,1
W3 - 104 - PU	104	116,2	110,0	8,8	7,1
W3 - 110 - PU	110	122,2	116,0	8,8	7,1
W3 - 129 - PU	129	141,2	135,0	8,8	7,1
W3 - 154 - PU	154	166,2	160,0	8,8	7,1
W3 - 180 - PU	180	192,2	186,0	8,8	7,1

Further dimension and in-between sizes upon request.

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.

W3M

Wiper/Scraper Ring



Max. Operating Conditions

Temperature (°C)	- 30 / + 100	
Speed (m/s)	≤ 1	
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids	

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	≤ 1,6 µm	≤ 16 µm
Groove flanks	≤ 1,6 µm	≤ 16 µm
Running surface	≤ 0,3 µm	≤ 3 µm

Material

Polyurethane	PU
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Technical Description

The wiper/scraper ring **W3M** is manufactured in polyurethane by default.

This wiper/scraper ring has a metal cage on the outside diameter. The oversize on the outside diameter of the wiper/scraper ring provides a tight fit in the groove.

The energized wiping edge on the piston rod prevents from the infiltration of impurities and water.

The wiper/scraper is suitable for heavy duty applications, e.g. earth-movement machines

Additional tightness is provided through the geometry and shape of the wiper/scraper ring. The wiper/scraper lip towards the fluid side retains the oil drag flow within the system. It has to be assured that the fluid is recirculated by means of the rod seal or other constructive measures.

The polyurethane material stands for increased abrasion resistance and good durability to ozone.

Type designation	∅ d	∅ D	H	L
W3M - 10 - 20 - 5 - PU	10,0	20,0	7,0	5,0
W3M - 16 - 26 - 5 - PU	16,0	26,0	7,0	5,0
W3M - 18 - 30 - 6 - PU	18,0	30,0	9,0	6,0
W3M - 20 - 32 - 6 - PU	20,0	32,0	9,0	6,0
W3M - 22 - 32 - 6 - PU	22,0	32,0	9,0	6,0
W3M - 22 - 34 - 6 - PU	22,0	34,0	9,0	6,0
W3M - 25 - 37 - 6 - PU	25,0	37,0	9,0	6,0
W3M - 30 - 42 - 6 - PU	30,0	42,0	9,0	6,0
W3M - 32 - 52 - 8 - PU	32,0	52,0	11,0	8,0
W3M - 34 - 46 - 7 - PU	34,0	46,0	10,0	7,0
W3M - 35 - 47 - 7 - PU	35,0	47,0	10,0	7,0
W3M - 35 - 55 - 7 - PU	35,0	55,0	10,0	7,0
W3M - 40 - 52 - 7 - PU	40,0	52,0	10,0	7,0
W3M - 40 - 60 - 7 - PU	40,0	60,0	10,0	7,0
W3M - 45 - 55 - 7 - PU	45,0	55,0	10,0	7,0
W3M - 45 - 57 - 7 - PU	45,0	57,0	10,0	7,0
W3M - 45 - 65 - 7 - PU	45,0	65,0	10,0	7,0
W3M - 50 - 62 - 7 - PU	50,0	62,0	10,0	7,0
W3M - 55 - 65 - 7 - PU	55,0	65,0	10,0	7,0
W3M - 55 - 69 - 8 - PU	55,0	69,0	11,0	8,0
W3M - 55 - 75 - 7 - PU	55,0	75,0	10,0	7,0
W3M - 60 - 70 - 5 - PU	60,0	70,0	7,0	5,0
W3M - 60 - 70 - 7 - PU	60,0	70,0	10,0	7,0
W3M - 60 - 74 - 8 - PU	60,0	74,0	11,0	8,0
W3M - 65 - 79 - 8 - PU	65,0	79,0	11,0	8,0
W3M - 65 - 85 - 7 - PU	65,0	85,0	10,0	7,0
W3M - 70 - 80 - 7 - PU	70,0	80,0	10,0	7,0
W3M - 70 - 84 - 8 - PU	70,0	84,0	11,0	8,0

Wiper/Scraper ring Type

Dimension

Material/Type

Ordering example: **Wiper/Scraper Ring** **∅ d 70 x 85 x 7** **Polyurethane**

Order designation: **W3M -** **70 x 85 x 7** **- PU**

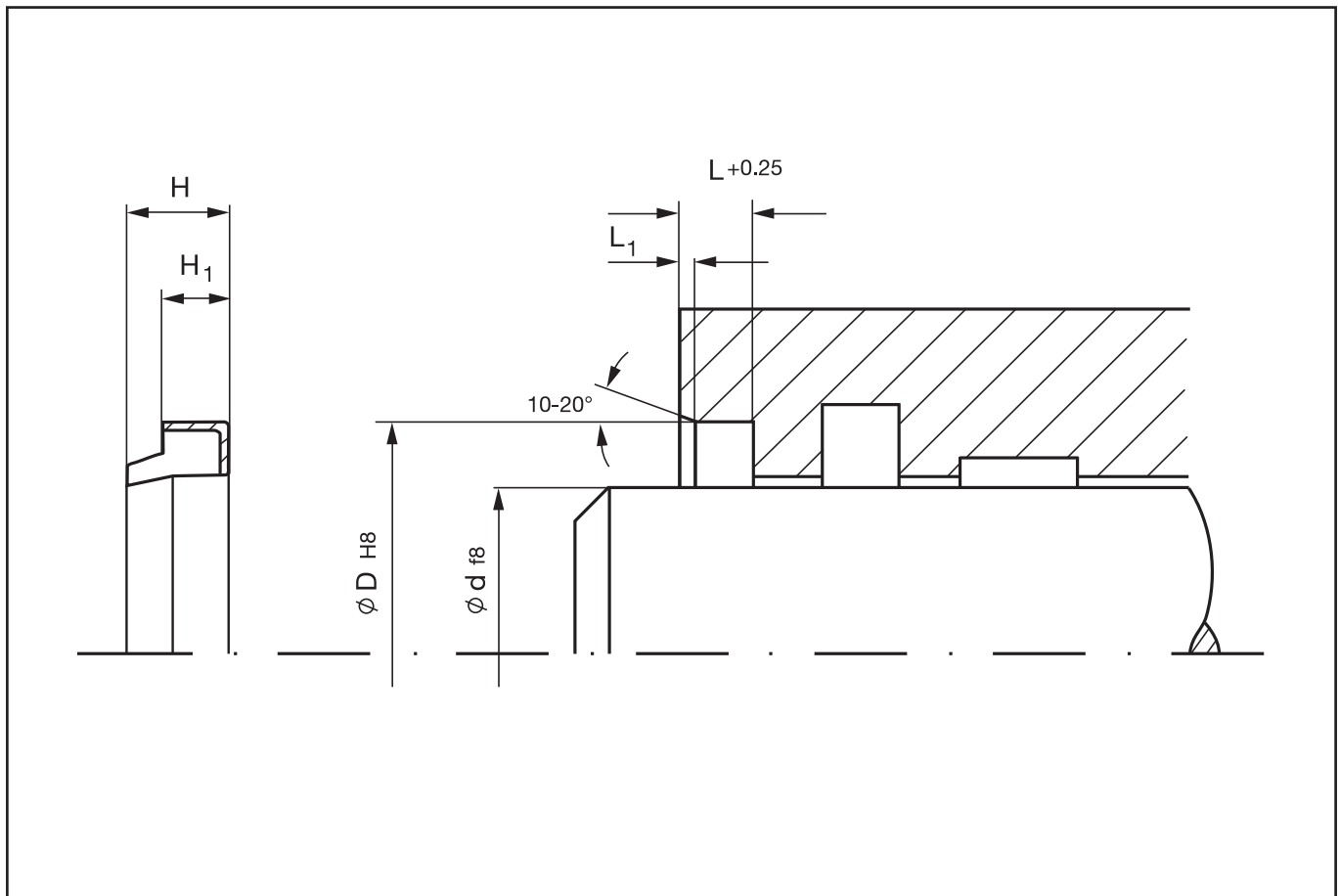
Designation of material: **PU - Polyurethane**

W3M

Wiper/Scraper Ring

Type designation	∅ d	∅ D	H	L
W3M - 70 - 85 - 7 - PU	70,0	85,0	10,0	7,0
W3M - 75 - 89 - 8 - PU	75,0	89,0	11,0	8,0
W3M - 75 - 95 - 7 - PU	75,0	95,0	10,0	7,0
W3M - 80 - 94 - 8 - PU	80,0	94,0	11,0	8,0
W3M - 85 - 99 - 8 - PU	85,0	99,0	11,0	8,0
W3M - 90 - 104 - 8 - PU	90,0	104,0	11,0	8,0
W3M - 95 - 109 - 8 - PU	95,0	109,0	11,0	8,0
W3M - 100 - 114 - 8 - PU	100,0	114,0	11,0	8,0
W3M - 105 - 121 - 9 - PU	105,0	121,0	12,0	9,0
W3M - 110 - 126 - 9 - PU	110,0	126,0	12,0	9,0
W3M - 120 - 136 - 9 - PU	120,0	136,0	12,0	9,0
W3M - 125 - 141 - 9 - PU	125,0	141,0	12,0	9,0
W3M - 130 - 146 - 9 - PU	130,0	146,0	12,0	9,0
W3M - 140 - 160 - 10 - PU	140,0	160,0	14,0	10,0
W3M - 236 - 261 - 12 - PU	236,0	261,0	17,0	12,0

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.



Max. Operating Conditions

Temperature (°C)	- 30 / + 110 / + 200
Speed (m/s)	≤ 1
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	≤ 1,6 µm	≤ 16 µm
Groove flanks	≤ 1,6 µm	≤ 16 µm
Running surface	≤ 0,3 µm	≤ 3 µm

Material

NBR	N
FKM (Viton®)	V

Technical Description

The wiper/scraper ring **W4** is manufactured in NBR as standard.

This wiper/scraper ring has a metal cage on the outside diameter. The overdimension on the outside diameter of the wiper/scraper ring provides for a tight seating in the groove.

The energised wiping edge lying on the piston rod prevents the penetration of foreign matters and water.

The wiper/scraper ring is also available in FPM (Viton®) and appropriate for temperatures of up to +200 °C.

Type designation	∅ d	∅ D	H ₁	H	L	L ₁
W4 - 6 - 13 - N	6	13	3,0	4,5	3,0	0,6
W4 - 8 - 15 - N	8	15	3,5	5,0	3,0	0,6
W4 - 8 - 22 - N	8	22	3,0	4,5	3,0	0,6
W4 - 10 - 16 - N	10	16	3,0	4,5	3,0	0,6
W4 - 10 - 20 - N	10	20	5,0	8,0	5,0	1,0
W4 - 12 - 20 - N	12	20	4,0	6,0	4,0	0,8
W4 - 12 - 22 - N	12	22	5,0	8,0	5,0	1,0
W4 - 14 - 22 - N	14	22	3,0	4,0	3,0	0,6
W4 - 15 - 25 - N	15	25	5,0	8,0	5,0	1,0
W4 - 16 - 22 - N	16	22	3,0	4,0	3,0	0,6
W4 - 16 - 26 - N	16	26	5,0	8,0	5,0	1,0
W4 - 18 - 28 - N	18	28	5,0	7,0	5,0	0,8
W4 - 18 - 28/1 - N	18	28	7,0	10,0	7,0	1,4
W4 - 18 - 28/2 - N	18	28	7,0	12,0	7,0	1,4
W4 - 18 - 32 - N	18	32	5,0	9,0	5,0	1,2
W4 - 19 - 27 - N	19	27	6,4	9,5	6,4	1,2
W4 - 20 - 28 - N	20	28	3,5	5,0	3,5	0,8
W4 - 20 - 30 - N	20	30	4,0	6,0	4,0	0,8
W4 - 20 - 30/1 - N	20	30	5,0	8,0	5,0	1,0
W4 - 20 - 30/2 - N	20	30	7,0	10,0	7,0	1,4
W4 - 20 - 35 - N	20	35	7,0	10,0	7,0	1,4
W4 - 21 - 28 - N	21	28	3,5	5,0	3,5	0,8
W4 - 22 - 28 - N	22	28	5,0	9,0	5,0	1,0
W4 - 22 - 32 - N	22	32	5,0	7,0	5,0	0,8
W4 - 22 - 32/1 - N	22	32	7,0	10,0	7,0	1,4
W4 - 22 - 35 - N	22	35	5,0	8,0	5,0	1,0
W4 - 24 - 32 - N	24	32	5,0	7,0	5,0	0,8
W4 - 25 - 35 - N	25	35	5,0	8,0	5,0	1,0

Wiper/Scraper ring Type

Dimension

Material/Type

Ordering example: **Wiper/Scraper Ring** ∅ d 20 x 30 4 / 6 **NBR**

Order designation: **W4 - 20 x 30 x 4,0 / 6 - N**

Designation of material: **N - NBR**
 V - FKM (Viton®)

Type designation	∅ d	∅ D	H ₁	H	L	L ₁
W4 - 25 - 35/1 - N	25	35	7,0	10,0	7,0	1,4
W4 - 28 - 38 - N	28	38	5,0	8,0	5,0	1,0
W4 - 28 - 38/1 - N	28	38	7,0	10,0	7,0	1,4
W4 - 28 - 40 - N	28	40	7,0	10,0	7,0	1,4
W4 - 30 - 40 - N	30	40	5,0	8,0	5,0	1,0
W4 - 30 - 40/1 - N	30	40	7,0	10,0	7,0	1,4
W4 - 32 - 40 - N	32	40	4,0	7,0	4,0	0,8
W4 - 32 - 42 - N	32	42	5,0	7,0	5,0	1,0
W4 - 32 - 42/1 - N	32	42	7,0	10,0	7,0	1,4
W4 - 32 - 45 - N	32	45	4,0	8,0	4,0	0,8
W4 - 32 - 45/1 - N	32	45	5,0	7,0	5,0	1,0
W4 - 32 - 45/2 - N	32	45	7,0	10,0	7,0	1,4
W4 - 35 - 45 - N	35	45	5,0	8,0	5,0	1,0
W4 - 35 - 45/1 - N	35	45	7,0	10,0	7,0	1,4
W4 - 35 - 52 - N	35	52	7,0	10,0	7,0	1,4
W4 - 36 - 45 - N	36	45	7,0	10,0	7,0	1,4
W4 - 36 - 46 - N	36	46	5,0	8,0	5,0	1,0
W4 - 40 - 50 - N	40	50	5,0	8,0	5,0	1,0
W4 - 40 - 50/1 - N	40	50	7,0	10,0	7,0	1,4
W4 - 40 - 52 - N	40	52	5,0	8,0	5,0	1,0
W4 - 42 - 52/1 - N	42	52	7,0	10,0	7,0	1,4
W4 - 45 - 55 - N	45	55	7,0	10,0	7,0	1,4
W4 - 45 - 57 - N	45	57	7,0	10,0	7,0	1,4
W4 - 45 - 60 - N	45	60	7,0	10,0	7,0	1,4
W4 - 48 - 60 - N	48	60	7,0	10,0	7,0	1,4
W4 - 50 - 56 - N	50	56	5,0	8,0	5,0	1,0
W4 - 50 - 60 - N	50	60	5,0	7,0	5,0	1,0
W4 - 50 - 60/1 - N	50	60	7,0	10,0	7,0	1,4
W4 - 50 - 65 - N	50	65	7,0	10,0	7,0	1,4
W4 - 52 - 62 - N	52	62	7,0	10,0	7,0	1,4
W4 - 55 - 63 - N	55	63	7,0	10,0	7,0	1,4
W4 - 55 - 65 - N	55	65	7,0	10,0	7,0	1,4
W4 - 56 - 65 - N	56	65	7,0	10,0	7,0	1,4
W4 - 56 - 66 - N	56	66	7,0	10,0	7,0	1,4
W4 - 60 - 70 - N	60	70	7,0	10,0	7,0	1,4
W4 - 60 - 74 - N	60	74	5,0	8,0	5,0	1,0
W4 - 60 - 75 - N	60	75	7,0	10,0	7,0	1,4
W4 - 60 - 80 - N	60	80	7,0	10,0	7,0	1,4

Type designation	∅ d	∅ D	H ₁	H	L	L ₁
W4 - 63 - 75 - N	63	75	7,0	10,0	7,0	1,4
W4 - 65 - 75 - N	65	75	7,0	10,0	7,0	1,4
W4 - 70 - 80 - N	70	80	7,0	10,0	7,0	1,4
W4 - 70 - 90 - N	70	90	7,0	10,0	7,0	1,4
W4 - 75 - 85 - N	75	85	7,0	10,0	7,0	1,4
W4 - 75 - 87 - N	75	87	5,0	7,0	5,0	1,0
W4 - 78 - 88 - N	78	88	7,0	10,0	7,0	1,4
W4 - 80 - 90 - N	80	90	7,0	10,0	7,0	1,4
W4 - 85 - 95 - N	85	95	7,0	10,0	7,0	1,4
W4 - 90 - 100 - N	90	100	7,0	10,0	7,0	1,4
W4 - 95 - 105 - N	95	105	7,0	10,0	7,0	1,4
W4 - 100 - 110 - N	100	110	7,0	10,0	7,0	1,4
W4 - 105 - 115 - N	105	115	7,0	10,0	7,0	1,4
W4 - 110 - 120 - N	110	120	7,0	10,0	7,0	1,4
W4 - 115 - 125 - N	115	125	7,0	10,0	7,0	1,4
W4 - 120 - 130 - N	120	130	7,0	10,0	7,0	1,4
W4 - 125 - 140 - N	125	140	9,0	12,0	9,0	1,8
W4 - 130 - 145 - N	130	145	9,0	12,0	9,0	1,8
W4 - 135 - 145 - N	135	145	7,0	10,0	7,0	1,4
W4 - 135 - 150 - N	135	150	9,0	12,0	9,0	1,8
W4 - 140 - 150 - N	140	150	7,0	10,0	7,0	1,4
W4 - 140 - 155 - N	140	155	9,0	12,0	9,0	1,8
W4 - 150 - 165 - N	150	165	9,0	12,0	9,0	1,8
W4 - 160 - 175 - N	160	175	9,0	12,0	9,0	1,8
W4 - 163 - 175 - N	163	175	7,0	10,0	7,0	1,4
W4 - 170 - 185 - N	170	185	9,0	14,0	9,0	2,0
W4 - 180 - 195 - N	180	195	10,0	14,0	10,0	2,0
W4 - 200 - 220 - N	200	220	12,0	16,0	12,0	2,4
W4 - 210 - 230 - N	210	230	12,0	16,0	12,0	2,4
W4 - 220 - 240 - N	220	240	9,0	12,0	9,0	1,8
W4 - 220 - 240/1 - N	220	240	12,0	16,0	12,0	2,4
W4 - 245 - 265 - N	245	265	12,0	16,0	12,0	2,4
W4 - 270 - 295 - N	270	295	12,0	16,0	12,0	2,4
W4 - 275 - 300 - N	275	300	12,0	16,0	12,0	2,4
W4 - 280 - 300 - N	280	300	12,0	16,0	12,0	2,4
W4 - 310 - 340 - N	310	340	16,0	22,0	16,0	2,8
W4 - 320 - 340 - N	320	340	12,0	16,0	12,0	2,4
W4 - 360 - 380 - N	360	380	15,0	18,0	15,0	2,6

W4

Wiper/Scraper Ring

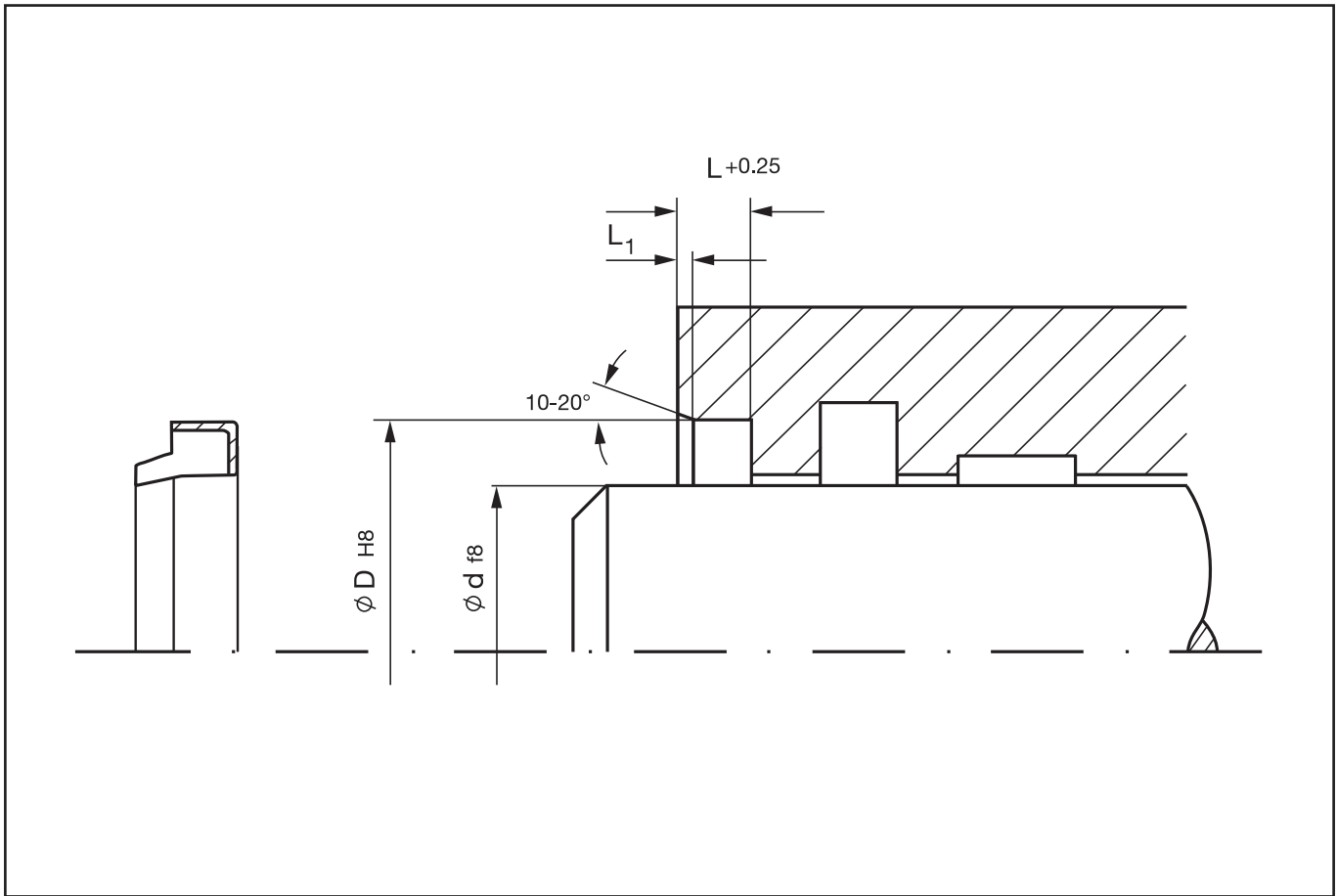
Type designation	∅ d	∅ D	H ₁	H	L	L ₁
W4 - 390 - 420 - N	390	420	16,0	22,0	16,0	2,8
W4 - 400 - 420 - N	400	420	12,0	16,0	12,0	2,4
W4 - 490 - 520 - N	490	520	16,0	22,0	16,0	2,8

Further dimension and in-between sizes upon request.

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.

W4-PU

Wiper/Scraper Ring



Max. Operating Conditions

Temperature (°C)	- 30 / + 110
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Speed (m/s)	≤ 1
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Media: Hydraulic fluids upon oil-basis,
hardly inflaming hydraulic fluids,
HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	≤ 1,6 μm	≤ 16 μm
Groove flanks	≤ 1,6 μm	≤ 16 μm
Running surface	≤ 0,3 μm	≤ 3 μm

Material

Polyurethane	PU
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Technical Description

The wiper/scraper ring **W4-PU** is manufactured in Polyurethane as standard.

This wiper/scraper ring has a metal cage on the outside diameter. The overdimension on the outside diameter of the wiper/scraper ring provides for a tight seating in the groove.

The energised wiping edge lying on the piston rod prevents the penetration of foreign matters and water. The wiper is eligible for difficult applications, e.g. like earth-movement machines

The wiper is also available as W4-PUK with an introverted wiping edge.

Please kindly send us your request for quotation for available and required sites.

Type designation	∅ d	∅ D	L
W4 - 20 - 30 - PU	20	30	7,0
W4 - 25 - 35 - PU	25	35	7,0
W4 - 28 - 38 - PU	28	38	7,0
W4 - 30 - 40/1 - PU	30	40	7,0
W4 - 32 - 42 - PU	32	42	7,0
W4 - 32 - 45 - PU	32	45	7,0
W4 - 35 - 45 - PU	35	45	7,0
W4 - 36 - 45 - PU	36	45	7,0
W4 - 36 - 46 - PU	36	46	7,0
W4 - 40 - 50 - PU	40	50	7,0
W4 - 45 - 55 - PU	45	55	7,0
W4 - 50 - 65 - PU	50	65	7,0
W4 - 55 - 70 - PU	55	70	7,0
W4 - 56 - 66 - PU	56	66	7,0
W4 - 60 - 70 - PU	60	70	7,0
W4 - 63 - 73 - PU	63	73	7,0
W4 - 63 - 75 - PU	63	75	7,0
W4 - 63 - 78 - PU	63	78	7,0
W4 - 65 - 75 - PU	65	75	7,0
W4 - 70 - 80 - PU	70	80	7,0
W4 - 75 - 85 - PU	75	85	7,0
W4 - 80 - 90 - PU	80	90	7,0
W4 - 85 - 95 - PU	85	95	7,0
W4 - 90 - 100 - PU	90	100	7,0
W4 - 100 - 110 - PU	100	110	7,0
W4 - 105 - 115 - PU	105	115	7,0
W4 - 110 - 120 - PU	110	120	7,0
W4 - 120 - 130 - PU	120	130	7,0

Wiper/Scraper ring Type

Dimension

Material/Type

Ordering example: **Wiper/Scraper Ring** **∅ d 40 x 50 x 7** **Polyurethane**

Order designation: **W4 -** **40 x 50 x 7,0** **- PU**

Designation of material: **PU - Polyurethane**

W4-PU

Wiper/Scraper Ring

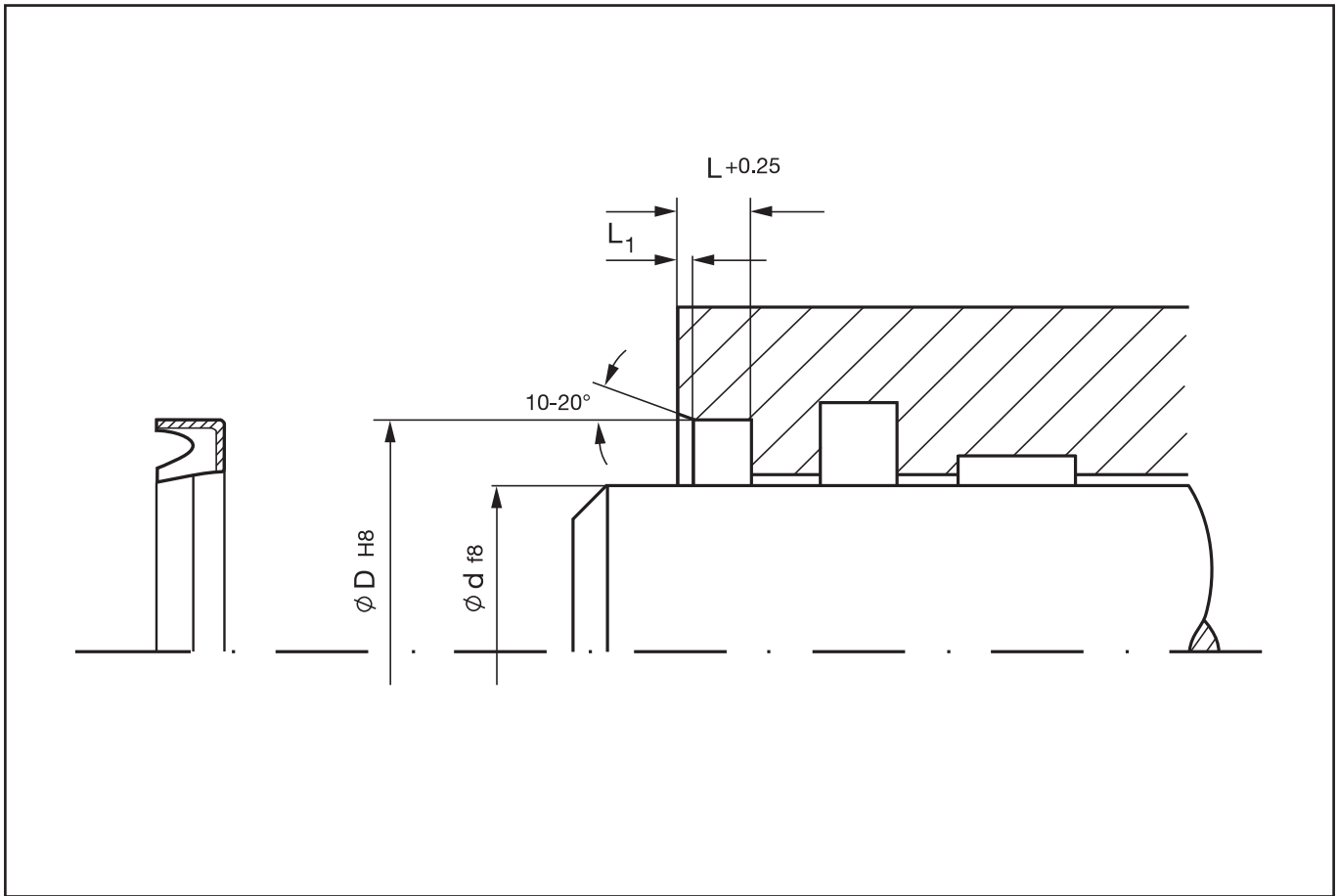
Type designation	∅ d	∅ D	L
W4 - 125 - 140 - PU	125	140	7,0
W4 - 140 - 155 - PU	140	155	7,0
W4 - 180 - 195 - PU	180	195	7,0

Further dimension and in-between sizes upon request.

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.

W4-PUK

Wiper/Scraper Ring



Max. Operating Conditions

Temperature (°C)	- 30 / + 100
Speed (m/s)	≤ 1
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	≤ 1,6 μm	≤ 16 μm
Groove flanks	≤ 1,6 μm	≤ 16 μm
Running surface	≤ 0,3 μm	≤ 3 μm

Material

Polyurethane	PU
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Technical Description

The wiper/scraper ring **W4-PUK** is manufactured in Polyurethane as standard.

This wiper/scraper ring has a metal cage on the outside diameter. The overdimension on the outside diameter of the wiper/scraper ring provides for a tight seating in the groove.

The energised wiping edge lying on the piston rod prevents the penetration of foreign matters and water.

The finish **W4-PUK** has an introversived wiping edge and is eligible for difficult applications, e.g. like earth-movement machines.

Please kindly send us your request for quotation for available and required sites.

Type designation	∅ d	∅ D	L
W4 - 12 - 20 - PUK	12	20	4,0
W4 - 15 - 21 - PUK	15	21	5,0
W4 - 15,9 - 23 - PUK	15,9	23	5,0
W4 - 20 - 28 - PUK	20	28	5,0
W4 - 25 - 32 - PUK	25	32	7,0
W4 - 25 - 38 - PUK	25	38	7,5
W4 - 30 - 40 - PUK	30	40	4,0
W4 - 30 - 40/1 - PUK	30	40	4,5
W4 - 30 - 43 - PUK	30	43	7,5
W4 - 35 - 45 - PUK	35	45	4,0
W4 - 35 - 45/1 - PUK	35	45	4,5
W4 - 35 - 50 - PUK	35	50	7,5
W4 - 36 - 46 - PUK	36	46	7,0
W4 - 36 - 48 - PUK	36	48	6,0
W4 - 40 - 50 - PUK	40	50	4,0
W4 - 40 - 50/1 - PUK	40	50	4,5
W4 - 40 - 52 - PUK	40	52	6,0
W4 - 45 - 55 - PUK	45	55	4,0
W4 - 45 - 55/1 - PUK	45	55	5,0
W4 - 45 - 55/2 - PUK	45	55	3,2
W4 - 45 - 60 - PUK	45	60	7,5
W4 - 50 - 60 - PUK	50	60	4,0
W4 - 50 - 60/1 - PUK	50	60	7,0
W4 - 50 - 63 - PUK	50	63	4,0
W4 - 50 - 65 - PUK	50	65	7,5
W4 - 55 - 65 - PUK	55	65	3,2
W4 - 55 - 70 - PUK	55	70	7,5
W4 - 56 - 70 - PUK	56	70	7,5
W4 - 60 - 70 - PUK	60	70	7,0
W4 - 60 - 70/1 - PUK *	60	70	5,0

Wiper/Scraper ring Type

Dimension

Material/Type

Ordering example: **Wiper/Scraper Ring** **∅ d 40 x 50 x 4** **Polyurethane**

Order designation: **W4 -** **40 x 50 x 4,0** **- PUK**

Designation of material: **PU - Polyurethane**

W4-PUK

Wiper/Scraper Ring

Type designation	∅ d	∅ D	L
W4 - 60 - 75 - PUK	60	75	7,5
W4 - 60 - 75/1 - PUK	60	75	4,0
W4 - 63 - 78 - PUK	63	78	7,5
W4 - 65 - 75 - PUK	65	75	7,0
W4 - 65 - 75/1 - PUK *	65	75	4,5
W4 - 65 - 80 - PUK	65	80	7,5
W4 - 65 - 80/1 - PUK	65	80	5,0
W4 - 70 - 80 - PUK *	70	80	4,5
W4 - 70 - 80/1 - PUK	70	80	5,0
W4 - 70 - 80/2 - PUK	70	80	7,0
W4 - 70 - 84 - PUK	70	84	8,0
W4 - 70 - 85 - PUK	70	85	7,5
W4 - 70 - 85/1 - PUK	70	85	4,0
W4 - 71 - 86 - PUK	71	86	5,0
W4 - 75 - 90 - PUK	75	90	4,5
W4 - 75 - 90/1 - PUK	75	90	7,5
W4 - 75 - 95 - PUK	75	95	10,0
W4 - 76,5 - 96,5 - PUK *	76,5	96,5	10,0
W4 - 80 - 90 - PUK *	80	90	4,5
W4 - 80 - 90/1 - PUK	80	90	7,0
W4 - 80 - 95 - PUK *	80	95	6,0
W4 - 80 - 95/1 - PUK	80	95	7,0
W4 - 80 - 95/2 - PUK	80	95	7,5
W4 - 80 - 95/3 - PUK	80	95	5,0
W4 - 80 - 100 - PUK	80	100	10,0
W4 - 85 - 95 - PUK	85	95	7,0
W4 - 85 - 100 - PUK	85	100	6,0
W4 - 85 - 100/2 - PUK *	85	100	4,0
W4 - 85 - 105 - PUK	85	105	10,0
W4 - 90 - 100 - PUK *	90	100	4,5
W4 - 90 - 100/1 - PUK	90	100	7,0
W4 - 90 - 104 - PUK	90	104	8,0
W4 - 90 - 105 - PUK	90	105	6,0
W4 - 90 - 110 - PUK	90	110	10,0
W4 - 100 - 110 - PUK *	100	110	4,5
W4 - 100 - 110/1 - PUK	100	110	7,0
W4 - 100 - 115 - PUK	100	115	7,5
W4 - 100 - 115/1 - PUK	100	115	7,0

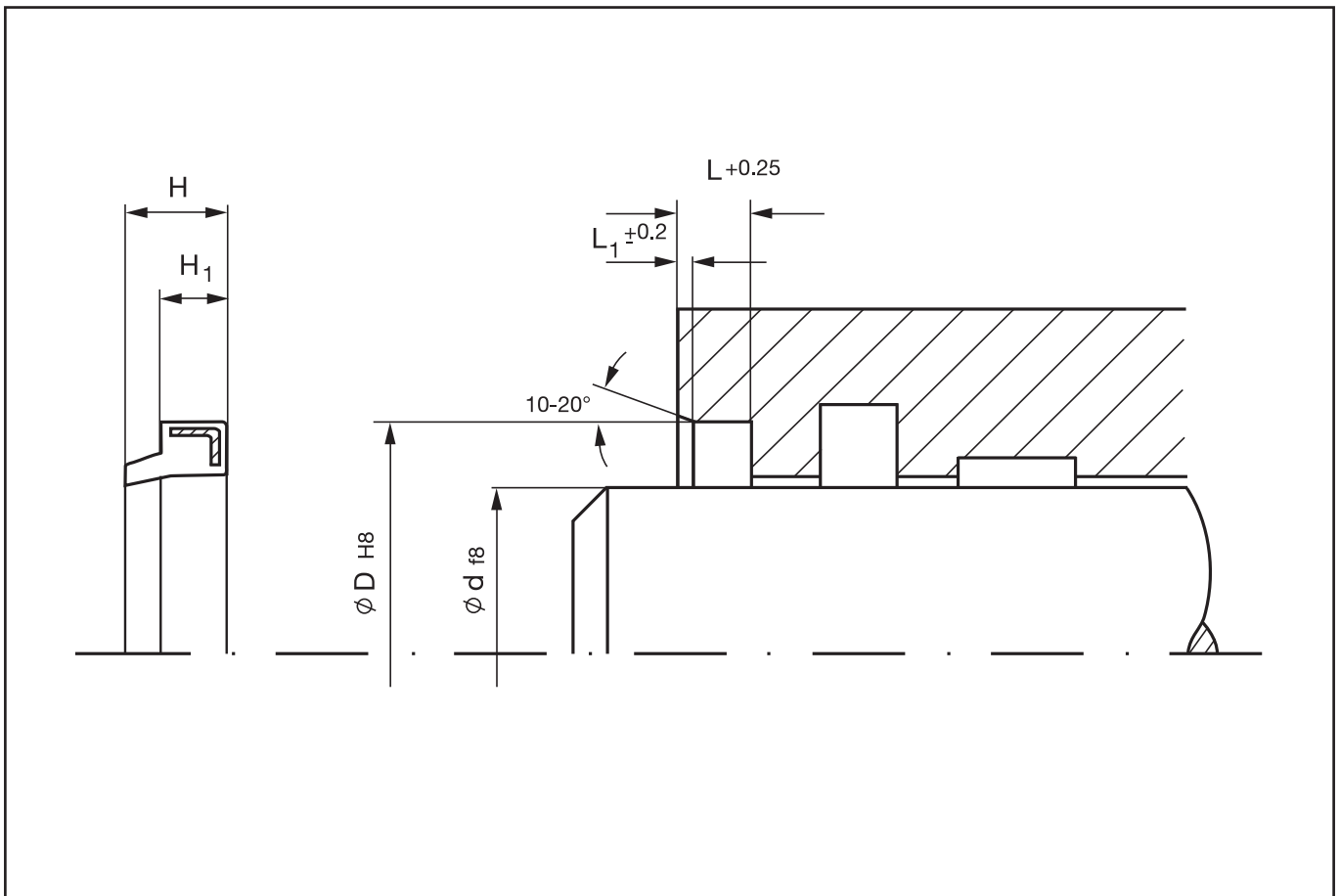
Type designation	∅ d	∅ D	L
W4 - 100 - 115/2 - PUK	100	115	4,0
W4 - 100 - 120 - PUK	100	120	10,0
W4 - 110 - 120 - PUK	110	120	7,0
W4 - 110 - 125 - PUK	110	125	9,0
W4 - 110 - 125/1 - PUK *	110	125	7,0
W4 - 110 - 125/2 - PUK	110	125	4,0
W4 - 110 - 130 - PUK	110	130	10,0
W4 - 120 - 130 - PUK	120	130	7,0
W4 - 120 - 140 - PUK	120	140	10,0
W4 - 130 - 140 - PUK	130	140	7,0
W4 - 130 - 145 - PUK	130	145	7,5
W4 - 140 - 155 - PUK	140	155	7,0
W4 - 140 - 155/1 - PUK	140	155	9,0
W4 - 150 - 160 - PUK	150	160	7,0
W4 - 160 - 175 - PUK	160	175	9,0
W4 - 170 - 185 - PUK	170	185	7,0
W4 - 190 - 210 - PUK	190	210	10,0

Further dimension and in-between sizes upon request.

* These sizes are available upon request only.

W5

Wiper/Scraper Ring



Max. Operating Conditions

Temperature (°C)	- 30 / + 110 / + 200
Speed (m/s)	≤ 1
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R _a	R _t
Groove bottom	≤ 1,6 µm	≤ 16 µm
Groove flanks	≤ 1,6 µm	≤ 16 µm
Running surface	≤ 0,3 µm	≤ 3 µm

Material

NBR	N
FKM (Viton®)	V

Technical Description

The wiper/scraper ring **W5** is manufactured in NBR as standard.

The steel cage of this wiper lies inwards and is sheathed.

The overdimension on the outside diameter of the wiper/scraper ring provides for a tight seating in the groove.

The preset wiping edge lying on the piston rod prevents the penetration of foreign matters and water.

The scraper is also available in FPM (Viton®) and appropriate for temperatures of up to +200 °C.

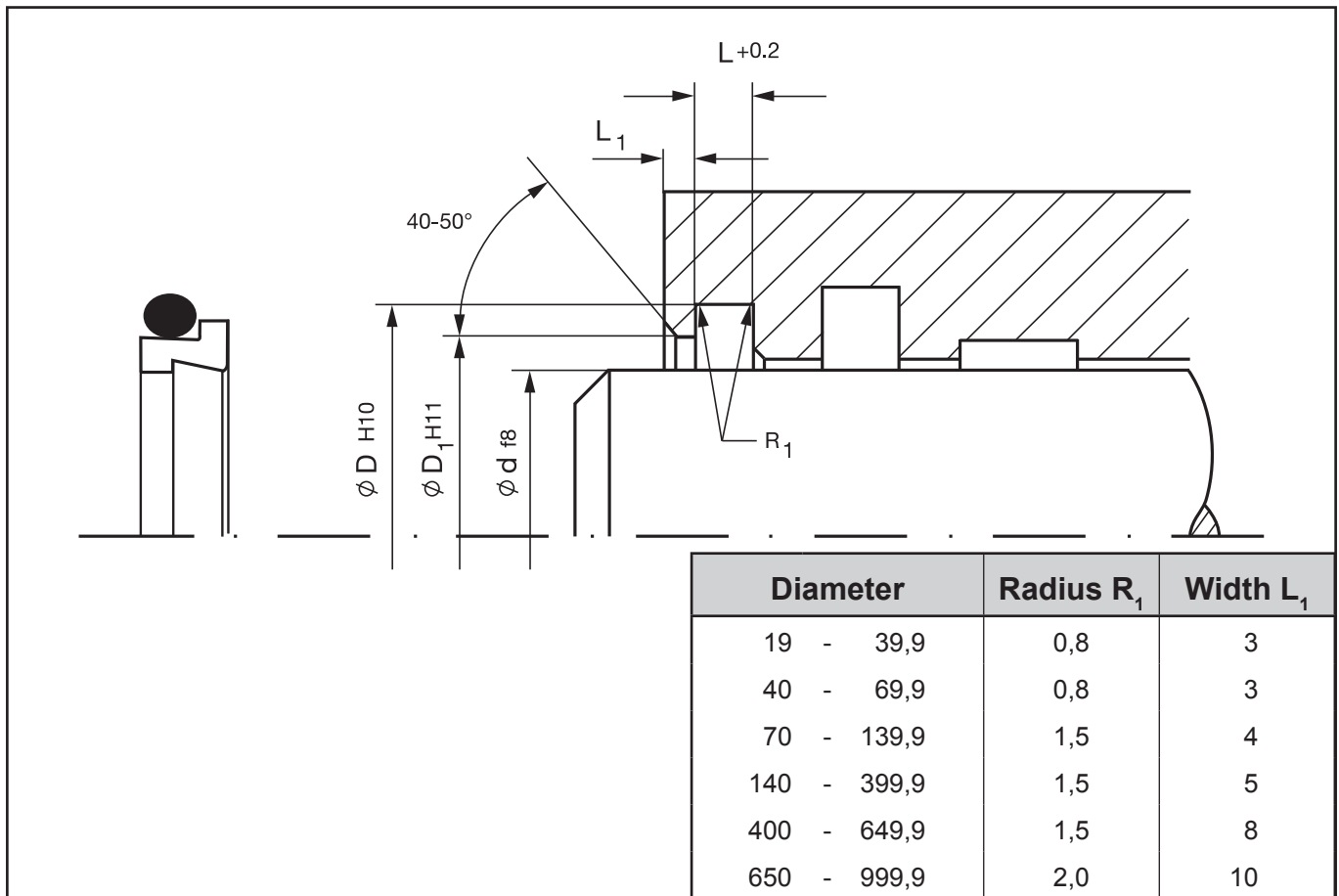
W5

Wiper/Scraper Ring

Type designation	∅ d	∅ D	H ₁	H	L	L ₁
W5 - 36 - 45 - N	36	45	7,0	10,0	7,0	1,0
W5 - 36 - 46 - N	36	46	5,0	7,0	5,0	1,0
W5 - 38 - 48 - N	38	48	7,0	10,0	7,0	1,0
W5 - 40 - 50 - N	40	50	5,0	8,0	5,0	1,0
W5 - 40 - 50/1 - N	40	50	7,0	10,0	7,0	1,0
W5 - 42 - 52 - N	42	52	5,0	7,0	5,0	1,0
W5 - 42 - 52/1 - N	42	52	7,0	10,0	7,0	1,0
W5 - 45 - 55 - N	45	55	5,0	7,0	5,0	1,0
W5 - 45 - 55/1 - N	45	55	7,0	10,0	7,0	1,0
W5 - 48 - 60 - N	48	60	7,0	10,0	7,0	1,0
W5 - 50 - 56 - N	50	56	5,0	7,0	5,0	1,0
W5 - 50 - 60 - N	50	60	5,0	7,0	5,0	1,0
W5 - 50 - 60/1 - N	50	60	7,0	10,0	7,0	1,0
W5 - 52 - 62 - N	52	62	7,0	10,0	7,0	1,0
W5 - 55 - 65 - N	55	65	5,0	7,0	5,0	1,0
W5 - 55 - 65/1 - N	55	65	7,0	10,0	7,0	1,0
W5 - 56 - 66 - N	56	66	5,0	7,0	5,0	1,0
W5 - 60 - 70 - N	60	70	5,0	7,0	5,0	1,0
W5 - 60 - 70/1 - N	60	70	7,0	10,0	7,0	1,0
W5 - 63 - 73 - N	63	73	5,0	7,0	5,0	1,0
W5 - 65 - 75 - N	65	75	5,0	7,0	5,0	1,0
W5 - 65 - 75/1 - N	65	75	7,0	10,0	7,0	1,0
W5 - 70 - 80 - N	70	80	5,0	7,0	5,0	1,0
W5 - 70 - 80/1 - N	70	80	7,0	10,0	7,0	1,0
W5 - 75 - 83 - N	75	83	7,0	10,0	7,0	1,0
W5 - 75 - 85 - N	75	85	7,0	10,0	7,0	1,0
W5 - 80 - 88 - N	80	88	7,0	10,0	7,0	1,0
W5 - 80 - 90 - N	80	90	7,0	10,0	7,0	1,0
W5 - 85 - 95 - N	85	95	7,0	10,0	7,0	1,0
W5 - 90 - 100 - N	90	100	5,0	7,0	5,0	1,0
W5 - 90 - 100/1 - N	90	100	7,0	10,0	7,0	1,0
W5 - 95 - 105 - N	95	105	7,0	10,0	7,0	1,0
W5 - 100 - 110 - N	100	110	7,0	10,0	7,0	1,0
W5 - 105 - 115 - N	105	115	7,0	10,0	7,0	1,0
W5 - 110 - 120 - N	110	120	7,0	10,0	7,0	1,0
W5 - 115 - 125 - N	115	125	7,0	10,0	7,0	1,0
W5 - 120 - 130 - N	120	130	7,0	10,0	7,0	1,0
W5 - 125 - 140 - N	125	140	9,0	12,0	9,0	1,2

Type designation	∅ d	∅ D	H ₁	H	L	L ₁
W5 - 130 - 145 - N	130	145	9,0	12,0	9,0	1,2
W5 - 140 - 155 - N	140	155	9,0	12,0	9,0	1,2
W5 - 150 - 165 - N	150	165	9,0	12,0	9,0	1,2
W5 - 160 - 175 - N	160	175	9,0	12,0	9,0	1,2
W5 - 170 - 185 - N	170	185	10,0	14,0	10,0	1,4
W5 - 180 - 195 - N	180	195	10,0	14,0	10,0	1,4
W5 - 200 - 220 - N	200	220	12,0	16,0	12,0	1,8
W5 - 220 - 240 - N	220	240	12,0	16,0	12,0	1,8

Further dimension and in-between sizes upon request.



Max. Operating Conditions *

Temperature (°C)	- 30 / + 110 / + 200
Speed (m/s)	≤ 15 (2)**
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	≤ 1,6 μm	≤ 16 μm
Groove flanks	≤ 1,6 μm	≤ 16 μm
Running surface	≤ 0,3 μm	≤ 3 μm

Material

PTFE-bronze / -carbon / glass fiber (+MoS ₂)	PB/PK/PG(M)
PTFE-compound turquoise	PT
PTFE-Econol	PEK
Polyurethane	PU **

Technical Description

The wiper/scraper ring **W6** is a double lipped wiper consisting of a wiping element energised by an elastomer ring.

The PTFE material stands out for excellent sliding characteristics, low attrition rate as well as high extrusion resistance.

The thermal and chemical stability of the PTFE material allows for the use in a wide range of applications.

The wiper/scraper ring **W6** is also available in polyurethane with a hardness of app. 72° shore D. It is appropriate for exceptionally rough duty applications to wipe off even strongly adherent dirt.

The standard material of the **W6** is PTFE bronze filled with an O-Ring in NBR 70° shore A.

*Max. operating conditions:

The instance of application and service conditions are decisive for the choice of the PTFE-compound, respectively of the material qualities. Temperature range and chemical stability depending on chosen O-Ring material.

Type designation	∅ d	∅ D	L	∅ D ₁	O-Ring
W6 - 20 - PB	20	27,6	4,2	21,5	118
W6 - 22 - PB	22	29,6	4,2	23,5	120
W6 - 25 - PB	25	32,6	4,2	26,5	122
W6 - 28 - PB	28	35,6	4,2	29,5	123
W6 - 30 - PB	30	37,6	4,2	31,5	125
W6 - 32 - PB	32	39,6	4,2	33,5	126
W6 - 35 - PB	35	42,6	4,2	36,5	128
W6 - 36 - PB	36	43,6	4,2	37,5	129
W6 - 38 - PB	38	45,6	4,2	39,5	130
W6 - 40 - PB	40	48,8	6,3	41,5	132
W6 - 42 - PB	42	50,8	6,3	43,5	133
W6 - 45 - PB	45	53,8	6,3	46,5	135
W6 - 48 - PB	48	56,8	6,3	49,5	137
W6 - 50 - PB	50	58,8	6,3	51,5	138
W6 - 52 - PB	52	60,8	6,3	53,5	139
W6 - 54 - PB	54	62,8	6,3	55,5	141
W6 - 55 - PB	55	63,8	6,3	56,5	141
W6 - 56 - PB	56	64,8	6,3	57,5	142
W6 - 57 - PB	57	65,8	6,3	58,5	142
W6 - 60 - PB	60	68,8	6,3	61,5	144
W6 - 63 - PB	63	71,8	6,3	64,5	146
W6 - 65 - PB	65	73,8	6,3	66,5	147
W6 - 70 - PB	70	82,2	8,1	72,0	234
W6 - 75 - PB	75	87,2	8,1	77,0	235
W6 - 80 - PB	80	92,2	8,1	82,0	237
W6 - 85 - PB	85	97,2	8,1	87,0	239
W6 - 90 - PB	90	102,2	8,1	92,0	240
W6 - 95 - PB	95	107,2	8,1	97,0	242

Wiper/Scraper ring Type

Dimension

Material/Type

Ordering example: Wiper/Scraper Ring ∅ d 70 x 82,2 x 8,1 PTFE-bronze

Order designation: W6 - 70 x 82,2 x 8,1 - PB

Designation of material:

PB - PTFE-bronze

PU - Polyurethane

(Standard O-Ring: NBR, Viton, EPDM, Silicone feasible)

PK - PTFE-carbon

PT - PTFE compound turquoise

PEK - PTFE-Econol

PG(M) - PTFE-glass fiber (+MoS₂)

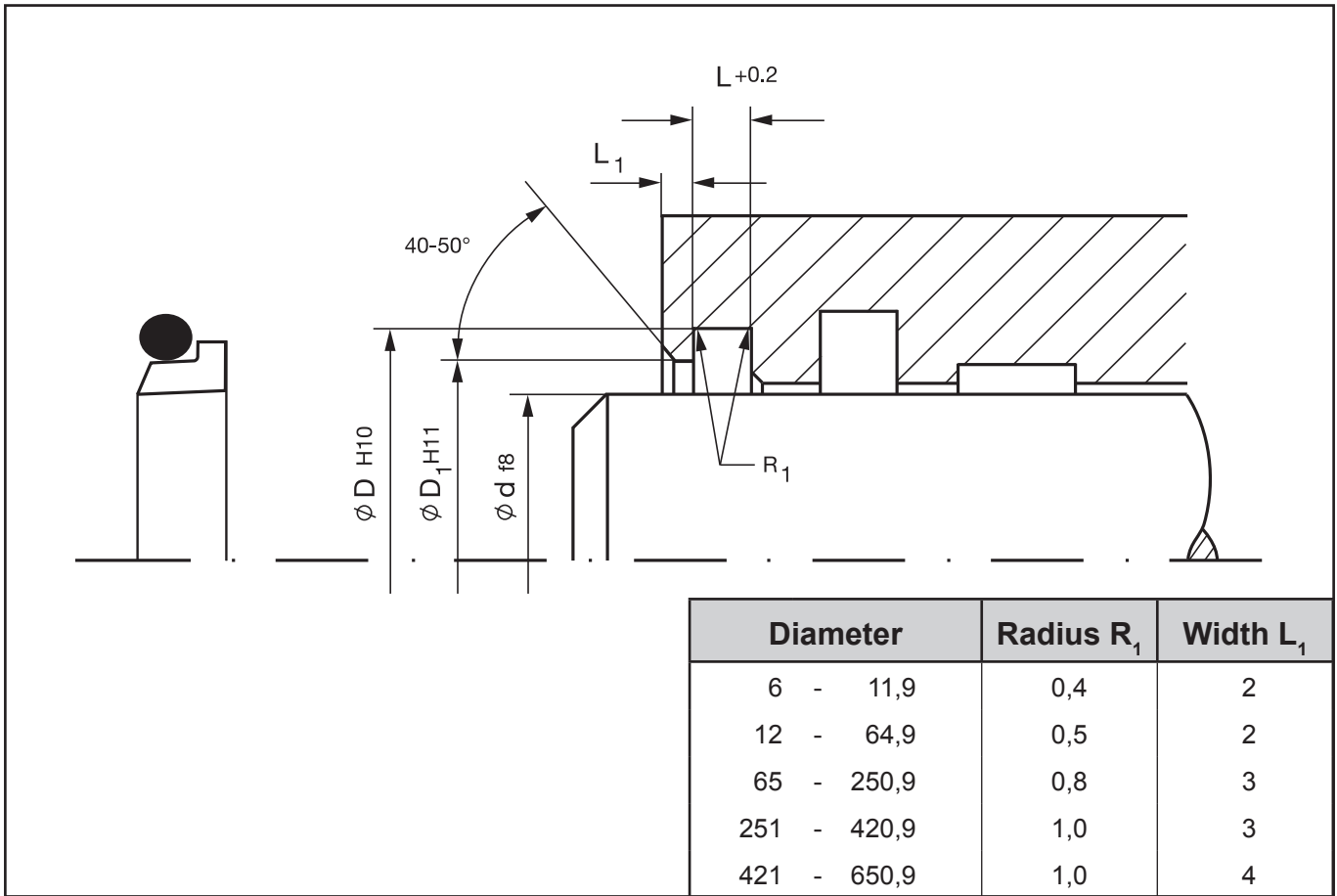
W6

Wiper/Scraper Ring

Type designation	∅ d	∅ D	L	∅ D ₁	O-Ring
W6 - 100 - PB	100	112,2	8,1	102,0	243
W6 - 105 - PB	105	117,2	8,1	107,0	245
W6 - 110 - PB	110	122,2	8,1	112,0	246
W6 - 115 - PB	115	127,2	8,1	117,0	248
W6 - 120 - PB	120	132,2	8,1	122,0	249
W6 - 125 - PB	125	137,2	8,1	127,0	251
W6 - 130 - PB	130	142,2	8,1	132,0	253
W6 - 135 - PB	135	147,2	8,1	137,0	254
W6 - 140 - PB	140	156,0	9,5	142,5	359
W6 - 150 - PB	150	166,0	9,5	152,5	361
W6 - 160 - PB	160	176,0	9,5	162,5	363
W6 - 170 - PB	170	186,0	9,5	172,5	365
W6 - 180 - PB	180	196,0	9,5	182,5	366
W6 - 190 - PB	190	206,0	9,5	192,5	368
W6 - 200 - PB	200	216,0	9,5	202,5	369
W6 - 205 - PB	205	221,0	9,5	207,5	370
W6 - 210 - PB	210	226,0	9,5	212,5	371
W6 - 220 - PB	220	236,0	9,5	222,5	373
W6 - 230 - PB	230	246,0	9,5	232,5	374
W6 - 235 - PB	235	251,0	9,5	237,5	375
W6 - 240 - PB	240	256,0	9,5	242,5	376
W6 - 250 - PB	250	266,0	9,5	252,5	377
W6 - 260 - PB	260	276,0	9,5	262,5	378
W6 - 270 - PB	270	286,0	9,5	272,5	379
W6 - 280 - PB	280	296,0	9,5	282,5	379
W6 - 290 - PB	290	306,0	9,5	292,5	380
W6 - 300 - PB	300	316,0	9,5	302,5	381
W6 - 310 - PB	310	326,0	9,5	312,5	381
W6 - 320 - PB	320	336,0	9,5	322,5	382
W6 - 350 - PB	350	366,0	9,5	352,5	383
W6 - 360 - PB	360	376,0	9,5	362,5	383
W6 - 370 - PB	370	386,0	9,5	372,5	384
W6 - 400 - PB	400	424,0	14,0	402,5	461
W6 - 440 - PB	440	464,0	14,0	442,5	464
W6 - 500 - PB	500	524,0	14,0	502,5	469
W6 - 550 - PB	550	574,0	14,0	552,5	471

Further dimension and in-between sizes upon request.

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.



Max. Operating Conditions*

Temperature (°C)	- 30 / + 110 / + 200
Speed (m/s)	≤ 15 (2)**
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	≤ 1,6 μm	≤ 16 μm
Groove flanks	≤ 1,6 μm	≤ 16 μm
Running surface	≤ 0,3 μm	≤ 3 μm

Material

PTFE-bronze / -carbon / glass fiber (+MoS ₂)	PB/PK/PG(M)
PTFE-compound turquoise	PT
PTFE-Econol	PEK
Polyurethane	PU **

Technical Description

The wiper/scraper ring **W7** consists of a wiping element preset by an elastomer ring.

The PTFE material stands out for excellent sliding characteristics, low attrition rate as well as high extrusion resistance.

The thermal and chemical stability of the PTFE material allows for the use in a wide range of applications.

The wiper/scraper ring **W7** is also available in polyurethane with a hardness of app. 72° shore D. It is appropriate for exceptionally rough duty applications to wipe off even strongly adherent dirt.

The standard material of the **W7** is PTFE + bronze with an O-Ring in NBR 70° shore A.

*Max. operating conditions:

The instance of application and service conditions are decisive for the choice of the PTFE-compound, respectively of the material qualities. Temperature range and chemical stability depending on chosen O-Ring material.

Type designation	∅ d	∅ D	L	∅ D ₁	O-Ring
W7 - 10 - PB	10	14,8	3,7	12,7	013
W7 - 20 - PB	20	26,8	5,0	23,5	118
W7 - 22 - PB	22	28,8	5,0	25,5	119
W7 - 25 - PB	25	31,8	5,0	28,5	121
W7 - 28 - PB	28	34,8	5,0	31,5	123
W7 - 30 - PB	30	36,8	5,0	33,5	124
W7 - 32 - PB	32	38,8	5,0	35,5	126
W7 - 35 - PB	35	41,8	5,0	38,5	127
W7 - 36 - PB	36	42,8	5,0	39,5	129
W7 - 38 - PB	38	44,8	5,0	41,5	130
W7 - 40 - PB	40	46,8	5,0	43,5	131
W7 - 42 - PB	42	48,8	5,0	45,5	132
W7 - 45 - PB	45	51,8	5,0	48,5	134
W7 - 48 - PB	48	54,8	5,0	51,5	136
W7 - 50 - PB	50	56,8	5,0	53,5	137
W7 - 52 - PB	52	58,8	5,0	55,5	138
W7 - 55 - PB	55	61,8	5,0	58,5	140
W7 - 56 - PB	56	62,8	5,0	59,5	141
W7 - 60 - PB	60	66,8	5,0	63,5	143
W7 - 63 - PB	63	69,8	5,0	66,5	145
W7 - 65 - PB	65	73,8	6,0	69,0	231
W7 - 70 - PB	70	78,8	6,0	74,0	233
W7 - 75 - PB	75	83,8	6,0	79,0	234
W7 - 80 - PB	80	88,8	6,0	84,0	236
W7 - 85 - PB	85	93,8	6,0	89,0	238
W7 - 90 - PB	90	98,8	6,0	94,0	239

Wiper/Scrapper ring Type

Dimension

Material/Type

Ordering example: **Wiper/Scrapper Ring** ∅ d 40 x 46,8 x 5,0 **PTFE-bronze**

Order designation: **W7 - 40 x 46,8 x 5,0 - PB**

Designation of material:

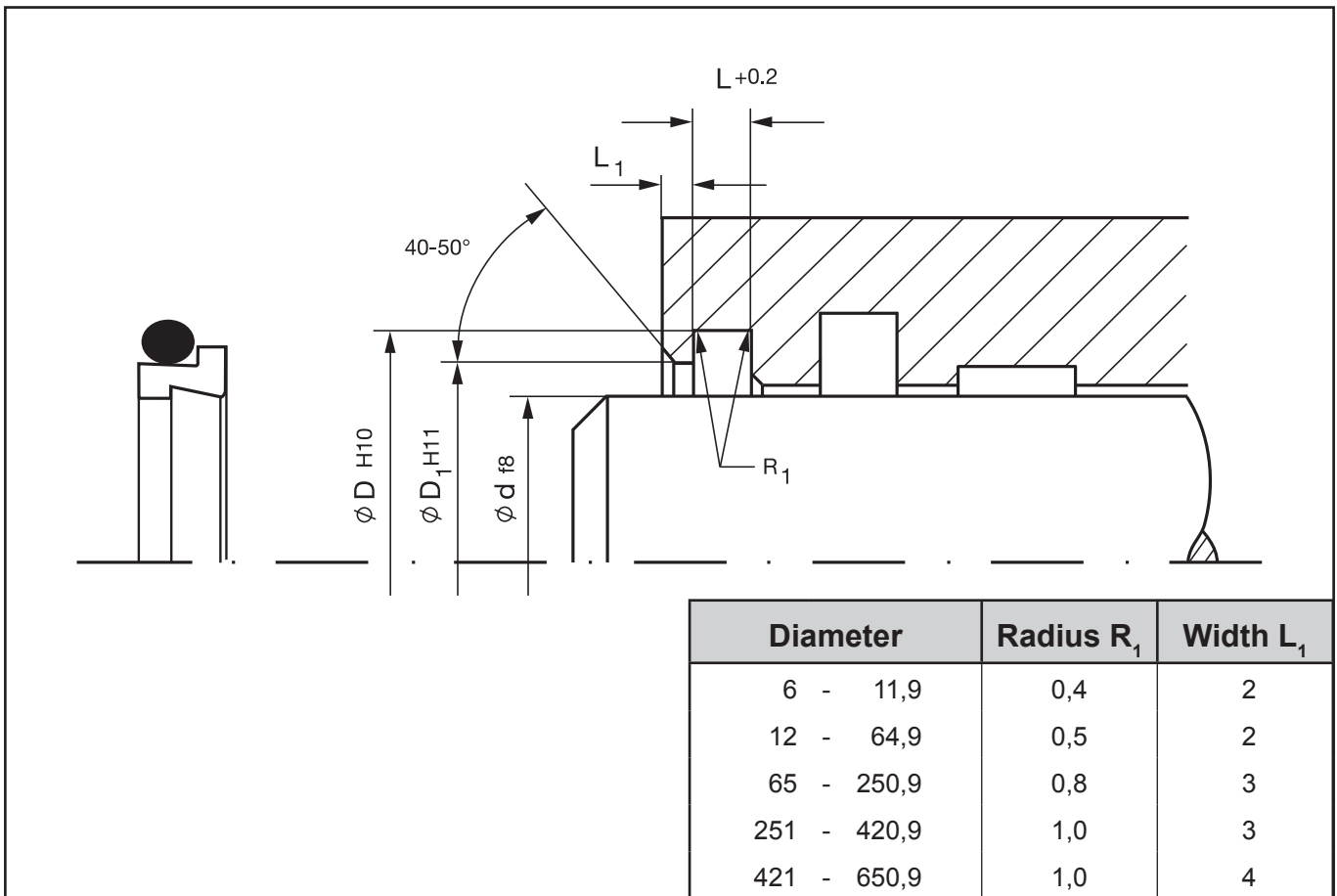
(Standard O-Ring: NBR, Viton, EPDM, Silicone feasible)

- PB** - PTFE-bronze
- PK** - PTFE-carbon
- PG(M)** - PTFE-glass fiber (+MoS₂)
- PU** - Polyurethane
- PT** - PTFE compound turquoise
- PEK** - PTFE-Econol

Type designation	∅ d	∅ D	L	∅ D ₁	O-Ring
W7 - 95 - PB	95	103,8	6,0	99,0	241
W7 - 100 - PB	100	108,8	6,0	104,0	242
W7 - 105 - PB	105	113,8	6,0	109,0	244
W7 - 110 - PB	110	118,8	6,0	114,0	245
W7 - 115 - PB	115	123,8	6,0	119,0	247
W7 - 120 - PB	120	128,8	6,0	124,0	248
W7 - 125 - PB	125	133,8	6,0	129,0	250
W7 - 130 - PB	130	138,8	6,0	134,0	252
W7 - 135 - PB	135	143,8	6,0	139,0	253
W7 - 140 - PB	140	148,8	6,0	144,0	255
W7 - 150 - PB	150	158,8	6,0	154,0	258
W7 - 155 - PB	155	163,8	6,0	159,0	259
W7 - 160 - PB	160	168,8	6,0	164,0	259
W7 - 170 - PB	170	178,8	6,0	174,0	261
W7 - 175 - PB	175	183,8	6,0	179,0	262
W7 - 180 - PB	180	188,8	6,0	184,0	263
W7 - 190 - PB	190	198,8	6,0	194,0	264
W7 - 200 - PB	200	208,8	6,0	204,0	266
W7 - 210 - PB	210	218,8	6,0	214,0	267
W7 - 220 - PB	220	228,8	6,0	224,0	269
W7 - 230 - PB	230	238,8	6,0	234,0	270
W7 - 240 - PB	240	248,8	6,0	244,0	272
W7 - 250 - PB	250	258,8	6,0	254,0	274
W7 - 260 - PB	260	272,2	8,4	264,5	377
W7 - 270 - PB	270	282,2	8,4	274,5	378
W7 - 280 - PB	280	292,2	8,4	284,5	379
W7 - 290 - PB	290	302,2	8,4	294,5	380
W7 - 300 - PB	300	312,2	8,4	304,5	381

Further dimension and in-between sizes upon request.

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.



Max. Operating Conditions *

Temperature (°C) - 30 / + 110 / + 200

Speed (m/s) ≤ 15 (2)**

Media: Hydraulic fluids upon oil-basis,
hardly inflaming hydraulic fluids,
HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	≤ 1,6 μm	≤ 16 μm
Groove flanks	≤ 1,6 μm	≤ 16 μm
Running surface	≤ 0,3 μm	≤ 3 μm

Material

PTFE-bronze / -carbon / glass fiber (+MoS ₂)	PB/PK/PG(M)
PTFE-compound turquoise	PT
PTFE-Econol	PEK
Polyurethane	PU **

Technical Description

The wiper/scraper ring **W8** is a double lipped wiper consisting of a wiping element preset by an elastomer ring.

The PTFE material stands out for excellent sliding characteristics, low attrition rate as well as high extrusion resistance.

The thermal and chemical stability of the PTFE material allow for the use in a wide range of applications.

The wiper/scraper ring **W8** is also available in polyurethane with a hardness of app. 72° shore D. It is appropriate for exceptionally rough duty applications to wipe off even strongly adherent dirt.

The standard material of the **W8** is PTFE + bronze with an O-Ring in NBR 70 shore A.

*Max. operating conditions:

Field of application and service conditions are decisive for the selection of the PTFE-compounds, respectively the material qualities. Temperature range and chemical stability depending on chosen O-Ring material.

Type designation	∅ d	∅ D	L	∅ D ₁	O-Ring
W8 - 10 - PB	10	14,8	3,7	11,5	013
W8 - 20 - PB	20	26,8	5,0	21,5	118
W8 - 22 - PB	22	28,8	5,0	23,5	120
W8 - 25 - PB	25	31,8	5,0	26,5	122
W8 - 28 - PB	28	34,8	5,0	29,5	123
W8 - 30 - PB	30	36,8	5,0	31,5	125
W8 - 32 - PB	32	38,8	5,0	33,5	125
W8 - 35 - PB	35	41,8	5,0	36,5	128
W8 - 36 - PB	36	42,8	5,0	37,5	129
W8 - 38 - PB	38	44,8	5,0	39,5	130
W8 - 40 - PB	40	46,8	5,0	41,5	131
W8 - 42 - PB	42	48,8	5,0	43,5	132
W8 - 45 - PB	45	51,8	5,0	46,5	134
W8 - 48 - PB	48	54,8	5,0	49,5	136
W8 - 50 - PB	50	56,8	5,0	51,5	137
W8 - 52 - PB	52	58,8	5,0	53,5	138
W8 - 55 - PB	55	61,8	5,0	56,5	141
W8 - 56 - PB	56	62,8	5,0	57,5	142
W8 - 60 - PB	60	66,8	5,0	61,5	143
W8 - 63 - PB	63	69,8	5,0	64,5	146
W8 - 65 - PB	65	73,8	6,0	66,5	231
W8 - 70 - PB	70	78,8	6,0	71,5	233
W8 - 75 - PB	75	83,8	6,0	76,5	235
W8 - 80 - PB	80	88,5	6,0	81,5	236
W8 - 85 - PB	85	93,8	6,0	86,5	238
W8 - 90 - PB	90	98,8	6,0	91,5	239

Wiper/Scraper ring Type

Dimension

Material/Type

Ordering example: **Wiper/Scraper Ring** ∅ d 70 x 78,8 x 6,0 **PTFE-bronze**

Order designation: **W8 - 70 x 78,8 x 6,0 - PB**

Designation of material:

(Standard O-Ring: NBR, Viton, EPDM, Silicone möglich)

- PB** - PTFE-bronze
- PK** - PTFE-carbon
- PG(M)** - PTFE-glass fiber (+MoS₂)
- PU** - Polyurethane
- PT** - PTFE compound turquoise
- PEK** - PTFE-Econol

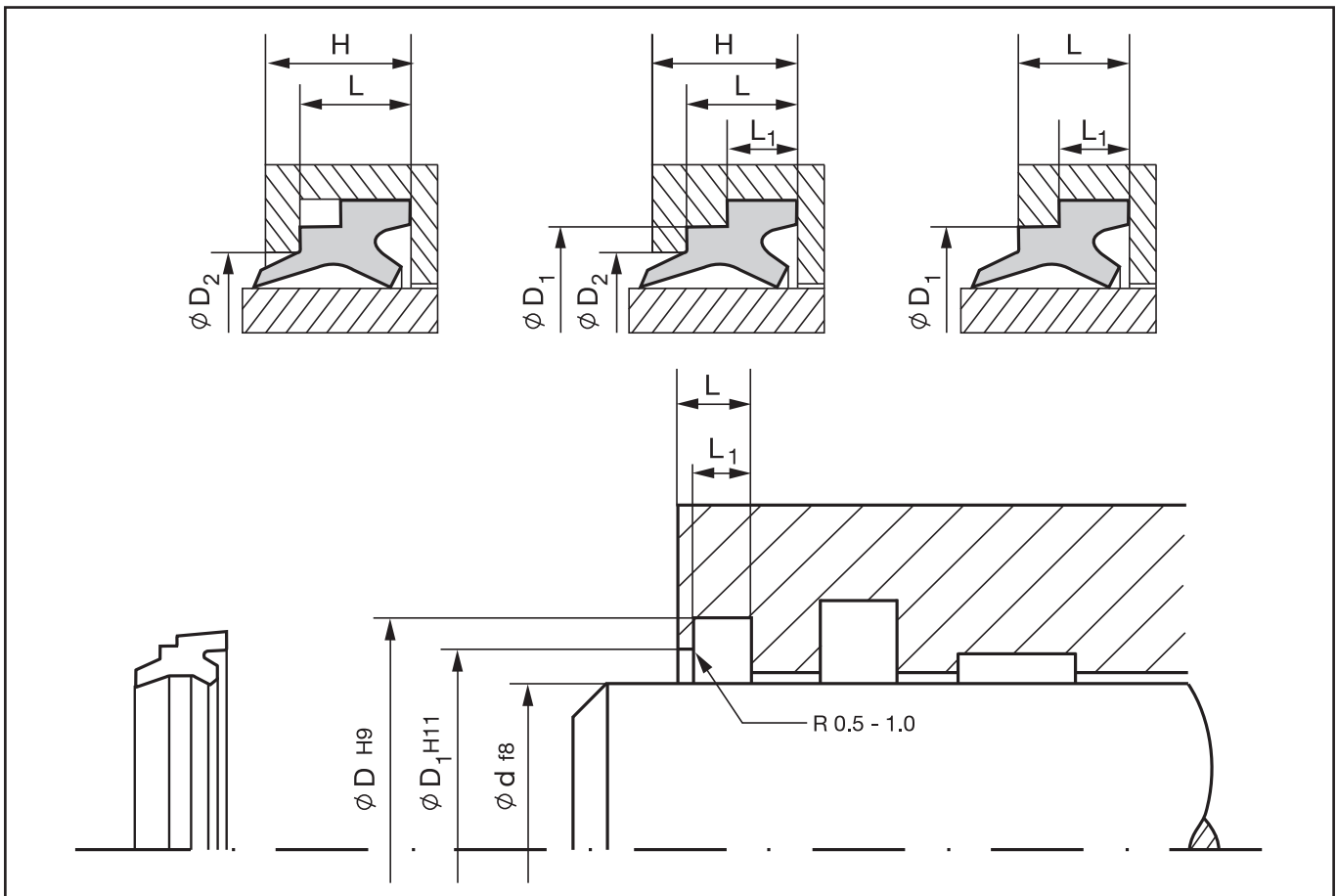
Type designation	∅ d	∅ D	L	∅ D ₁	O-Ring
W8 - 95 - PB	95	103,8	6,0	96,5	241
W8 - 100 - PB	100	108,8	6,0	101,5	243
W8 - 105 - PB	105	113,8	6,0	106,5	244
W8 - 110 - PB	110	118,8	6,0	111,5	246
W8 - 115 - PB	115	123,8	6,0	116,5	247
W8 - 120 - PB	120	128,8	6,0	121,5	249
W8 - 125 - PB	125	133,8	6,0	126,5	251
W8 - 130 - PB	130	138,8	6,0	131,5	252
W8 - 135 - PB	135	143,8	6,0	136,5	254
W8 - 140 - PB	140	148,8	6,0	141,5	255
W8 - 150 - PB	150	158,8	6,0	151,5	258
W8 - 155 - PB	155	163,8	6,0	156,5	259
W8 - 160 - PB	160	168,8	6,0	161,5	260
W8 - 170 - PB	170	178,8	6,0	171,5	261
W8 - 175 - PB	175	183,8	6,0	176,5	262
W8 - 180 - PB	180	188,8	6,0	181,5	263
W8 - 190 - PB	190	198,8	6,0	191,5	264
W8 - 200 - PB	200	208,8	6,0	201,5	266
W8 - 210 - PB	210	218,8	6,0	211,5	268
W8 - 220 - PB	220	228,8	6,0	221,5	269
W8 - 230 - PB	230	238,8	6,0	231,5	270
W8 - 240 - PB	240	248,8	6,0	241,5	272
W8 - 250 - PB	250	258,8	6,0	251,5	274
W8 - 260 - PB	260	272,2	8,4	262,0	378
W8 - 270 - PB	270	282,2	8,4	272,0	378
W8 - 280 - PB	280	292,2	8,4	282,0	379
W8 - 290 - PB	290	302,2	8,4	292,0	380
W8 - 300 - PB	300	312,2	8,4	302,0	381

Further dimension and in-between sizes upon request.

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.

W9/SAD

Wiper/Scraper Ring



Max. Operating Conditions

Temperature (°C)	- 30 / + 100 / + 200
Speed (m/s)	≤ 1
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	≤ 1,6 μm	≤ 16 μm
Groove flanks	≤ 1,6 μm	≤ 16 μm
Running surface	≤ 0,3 μm	≤ 3 μm

Material

Polyurethane	PU
NBR	N
FKM (Viton [®])	V

Technical Description

The double lipped wiper/scraper ring **W9/SAD** reliably prevents the penetration of foreign matters and water.

Additional tightness is provided through the geometry and shape of the wiper/scraper ring. The wiper/scraper lip towards the fluid side retains the sweeping oil in the system. It has to be assured that the fluid is recirculated over the rod seal or through other constructive measures.

The wiper/scraper ring can be installed in the groove without using auxiliary devices.

The polyurethane material stands out for increased abrasion resistance and good resistance to ozone.

The double lipped wiper/scraper ring is available in polyurethane or NBR, alternatively.

The wiper/scraper ring **W9** is also available in FPM (Viton[®]) and appropriate for temperatures of up to +200 °C.

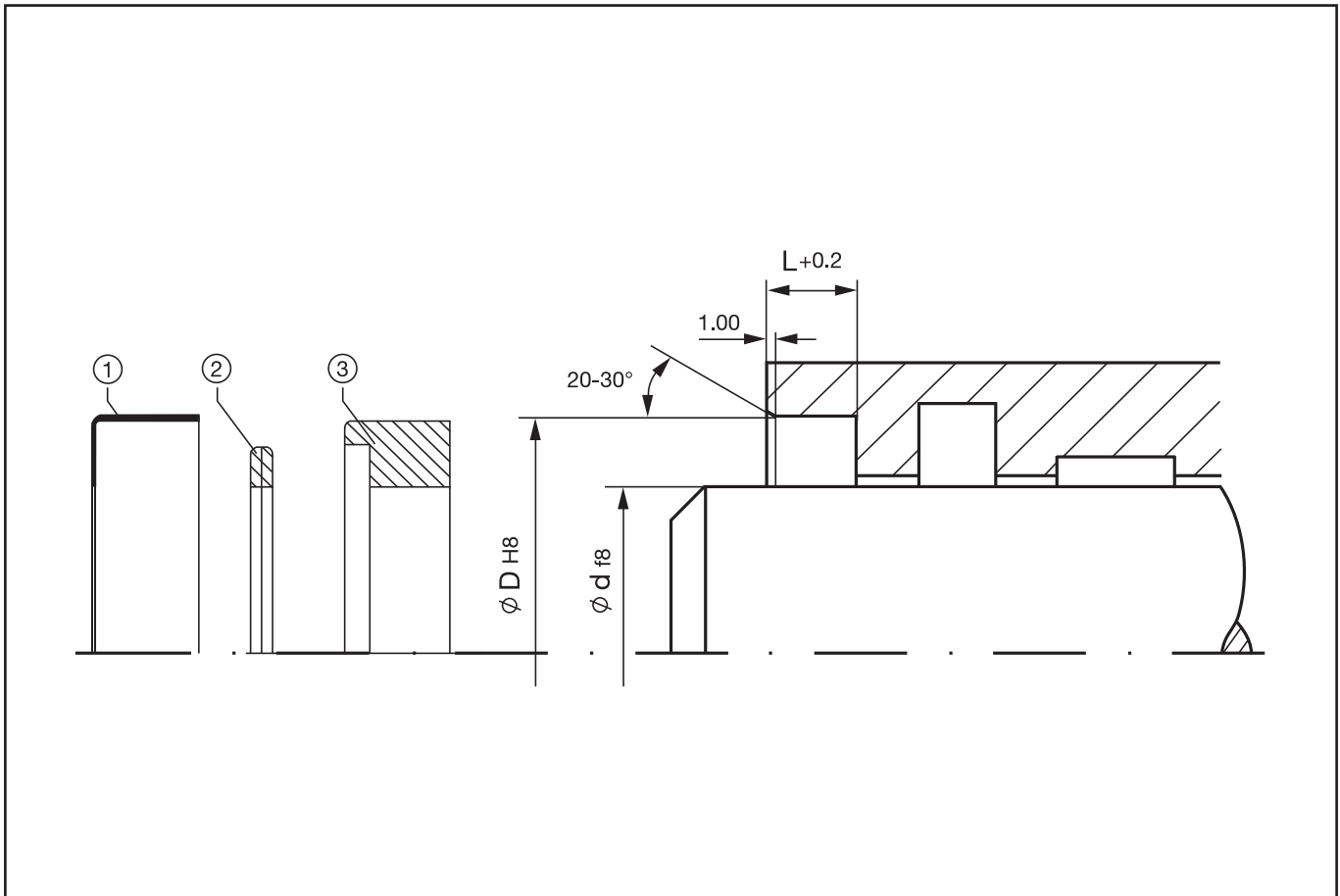
W9/SAD

Wiper/Scraper Ring

Type designation	∅ d	∅ D	H	L	L ₁	∅ D ₁	∅ D ₂
W9 - 105 - PU	105	117	11	8,2	5,5	114	110,0
W9 - 110 - PU	110	122	11	8,2	5,5	119	115,0
W9 - 115 - PU	115	127	11	8,2	5,5	124	120,0
W9 - 120 - PU	120	132	11	8,2	5,5	129	125,0
W9 - 125 - PU	125	137	11	8,2	5,5	134	130,0
W9 - 130 - PU	130	142	11	8,2	5,5	139	135,0
W9 - 135 - PU	135	147	11	8,2	5,5	144	140,0
W9 - 140 - PU	140	152	11	8,2	5,5	149	145,0
W9 - 150 - PU	150	162	11	8,2	5,5	159	155,0
W9 - 160 - PU	160	172	11	8,2	5,5	169	165,0
W9 - 170 - PU	170	182	11	8,2	5,5	179	175,0
W9 - 180 - PU	180	192	11	8,2	5,5	189	185,0
W9 - 200 - PU	200	212	11	8,2	5,5	209	205,0

Further dimension and in-between sizes upon request.

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.



Max. Operating Conditions

Depend on compound	Standard (PTFE-bronze)
Temperature (°C)	- 60 / + 200
Speed (m/s)	≤ 15
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	≤ 1,6 μm	≤ 16 μm
Groove flanks	≤ 1,6 μm	≤ 16 μm
Running surface	≤ 0,3 μm	≤ 3 μm

Material

Metal cage	corrosion-protected
Metal wiper rings	chrome-nickel-alloy
carrier ring and support ring	PTFE-bronze PB / FHG

Technical Description

The wiper of the type **W10** consists of a corrosion-protected metal case, a metal wiper ring and a carrier ring.

The **metal case (1)** is for the reception for the metal wiper ring and the carrier-part.

The **metal wiper ring (2)** takes over the actual wiping-function and features through a save wiping-performance of intense adhesive dirt or ice, which cannot adduced by other systems.

Through a suitable choice of material for the **carrier ring (3)**, the existing service conditions can be taken into account.

In ist standard finish for hydraulic applications, the wiper W10 which is delivered with a carrier part which is made of PTFE-Bronze. It is especially eligible at high temperatures, aggressive media and high upstroke speed.

Further dimensions and in-between-sizes as well as carrier materials are available on request.

W10

Metal | Ice Wiper/Scraper

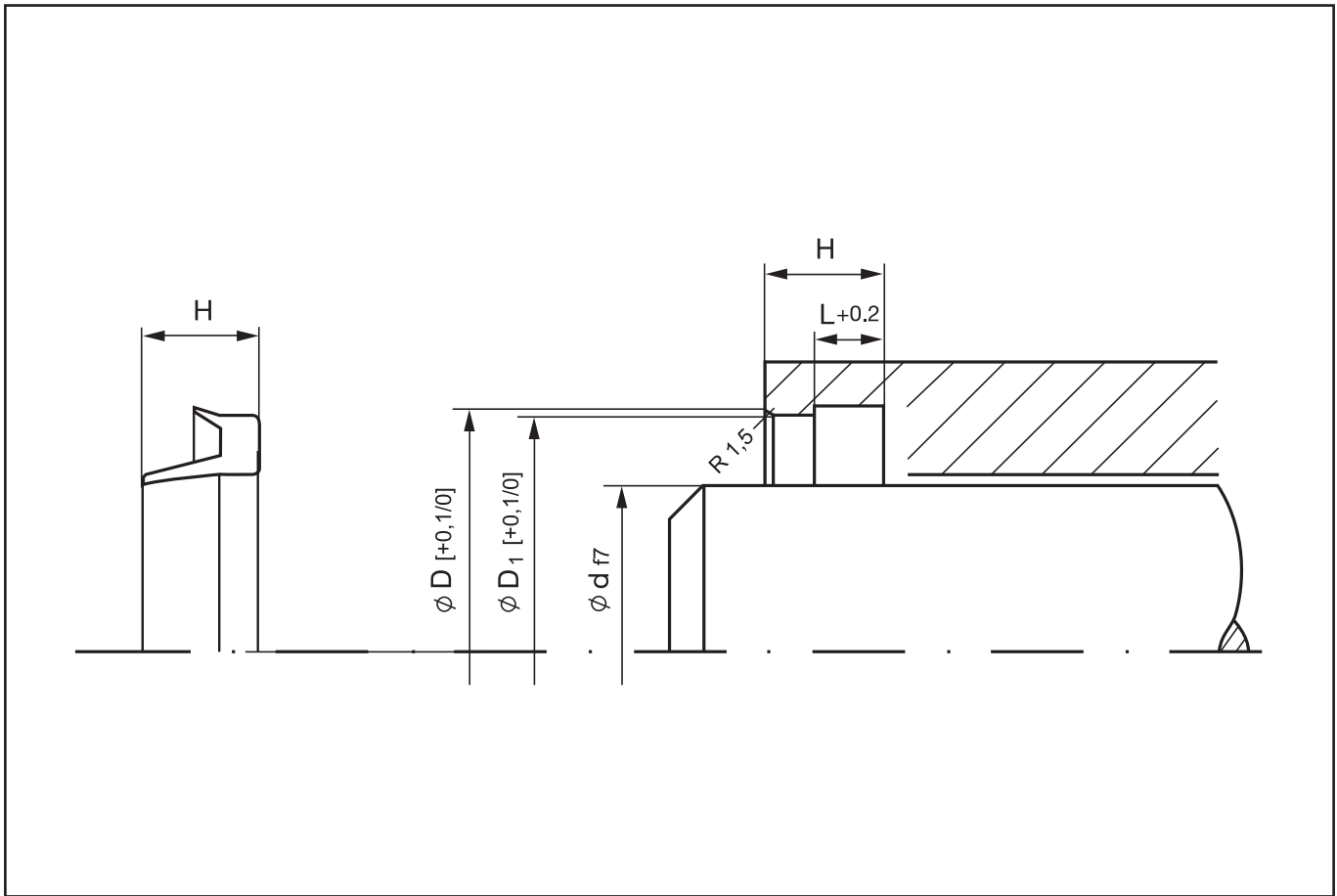
Type designation	∅ d	∅ D	L
W10 - 90 - 104 - PB	90	104	8,0
W10 - 95 - 105 - PB	95	105	7,0
W10 - 100 - 110 - PB	100	110	7,0
W10 - 100 - 114 - PB	100	114	8,0
W10 - 105 - 115 - PB	105	115	7,0
W10 - 110 - 120 - PB	110	120	7,0
W10 - 110 - 124 - PB	110	124	8,0
W10 - 115 - 125 - PB	115	125	7,0
W10 - 120 - 130 - PB	120	130	7,0
W10 - 125 - 139 - PB	125	139	8,0
W10 - 125 - 140 - PB	125	140	9,0
W10 - 160 - 177 - PB	160	177	11,0

Further dimension and in-between sizes upon request.

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.

W12

Wiper/Scraper



Max. Operating Conditions

Temperature (°C)	- 30 / + 100
Speed (m/s)	≤ 2,0
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	≤ 1,6 μm	≤ 6,3 μm
Groove flanks	≤ 3,0 μm	≤ 15 μm
Running surface	≤ 0,3 μm	≤ 2,5 μm

Material

Polyamide	PA
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Technical Description

The wiper/scraper ring **W12** is manufactured in polyamide by default.

The geometry and shape of the wiper/scraper ring enables a snap in place installation.

The wiper/scraper is suitable for heavy duty applications and ensures a stripping of most abrasive impurities.

The main advantages are a very good stripping of adherent and abrasive contaminants even under heavy conditions, a simple installation procedure and a high resistance.

Typical applications are in the heavy duty hydraulic industries, forklifts and crane trucks.

Type designation	∅ d	∅ D	∅ D ₁	H	L
W12 - 16 - 26 - 4,5	16,00	26,00	24,50	6,50	4,50
W12 - 20 - 33 - 6,0	20,00	33,00	31,50	8,50	6,00
W12 - 25 - 38 - 6,0	25,00	38,00	36,50	8,50	6,00
W12 - 28 - 41 - 6,0	28,00	41,00	39,50	8,50	6,00
W12 - 30 - 43 - 6,0	30,00	43,00	41,50	8,50	6,00
W12 - 32 - 45 - 6,0	32,00	45,00	43,50	8,50	6,00
W12 - 36 - 49 - 6,0	36,00	49,00	47,50	8,50	6,00
W12 - 40 - 53 - 6,0	40,00	53,00	51,50	8,50	6,00
W12 - 45 - 58 - 6,0	45,00	58,00	56,50	8,50	6,00
W12 - 50 - 63 - 6,0	50,00	63,00	61,50	8,50	6,00
W12 - 55 - 68 - 6,0	55,00	68,00	66,50	8,50	6,00
W12 - 56 - 69 - 6,0	56,00	69,00	67,50	8,50	6,00
W12 - 60 - 73 - 6,0	60,00	73,00	71,50	8,50	6,00
W12 - 63 - 76 - 6,0	63,00	76,00	74,50	8,50	6,00
W12 - 70 - 83 - 6,0	70,00	83,00	81,50	8,50	6,00
W12 - 75 - 88 - 6,0	75,00	88,00	86,50	8,50	6,00
W12 - 80 - 93 - 6,0	80,00	93,00	91,50	8,50	6,00
W12 - 90 - 103 - 6,0	90,00	103,00	101,50	8,50	6,00
W12 - 100 - 113 - 6,0	100,00	113,00	111,50	8,50	6,00

Wiper/Scraper ring Type

Dimension

Material/Type

Ordering example: **Wiper/Scraper Ring** ∅ d 80 x 93 x 6 **PA**

Order designation: **W12 - 80 x 93 x 6 / 8,5 - PA**

Designation of material: **PA - Polyamide**

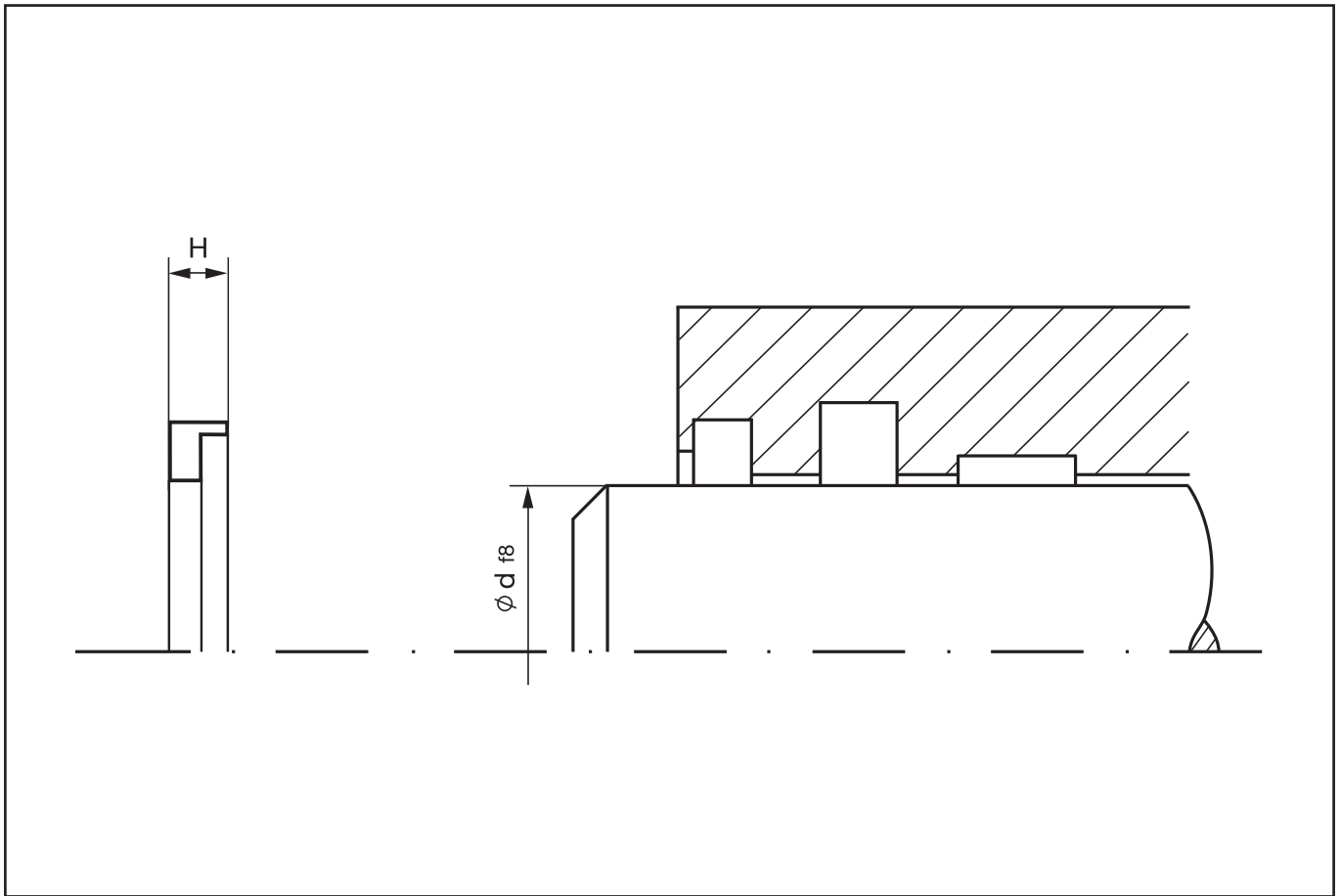
W12

Wiper/Scraper

Inch-Dimensions

Type designation	∅ d	∅ D	∅ D ₁	H	L
W12 - 12,70 - 22,22 - 4,36	12,70	22,22	20,63	6,35	4,36
W12 - 15,87 - 25,40 - 4,36	15,87	25,40	23,82	6,35	4,36
W12 - 19,05 - 31,75 - 5,94	19,05	31,75	30,15	8,76	5,94
W12 - 22,22 - 34,92 - 5,94	22,22	34,92	33,33	8,76	5,94
W12 - 25,40 - 38,10 - 5,94	25,40	38,10	36,50	8,76	5,94
W12 - 28,57 - 41,27 - 5,94	28,57	41,27	39,67	8,76	5,94
W12 - 31,75 - 44,45 - 5,94	31,75	44,45	42,85	8,76	5,94
W12 - 34,92 - 47,62 - 5,94	34,92	47,62	46,02	8,76	5,94
W12 - 38,10 - 50,80 - 5,94	38,10	50,80	49,20	8,76	5,94
W12 - 41,27 - 53,98 - 5,94	41,27	53,98	52,37	8,76	5,94
W12 - 44,45 - 57,15 - 5,94	44,45	57,15	55,55	8,76	5,94
W12 - 50,80 - 63,50 - 5,94	50,80	63,50	61,90	8,76	5,94
W12 - 53,98 - 66,67 - 5,94	53,98	66,67	65,07	8,76	5,94
W12 - 57,15 - 69,85 - 5,94	57,15	69,85	68,25	8,76	5,94
W12 - 63,50 - 76,20 - 5,94	63,50	76,20	74,60	8,76	5,94
W12 - 69,85 - 82,55 - 5,94	69,85	82,55	80,95	8,76	5,94
W12 - 76,20 - 88,90 - 5,94	76,20	88,90	87,30	8,76	5,94
W12 - 82,55 - 95,25 - 5,94	82,55	95,25	93,65	8,76	5,94
W12 - 88,90 - 101,60 - 5,94	88,90	101,60	100,00	8,76	5,94
W12 - 95,25 - 107,95 - 5,94	95,25	107,95	106,35	8,76	5,94
W12 - 101,60 - 114,30 - 5,95	101,60	114,30	112,70	8,77	5,95

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.



Technical Description

The function of the **SFA** is to protect the wiper and the rod (for a length of 3mm) during the painting process. This ensures a neat workmanship without varnish spots.

The slotted construction allows a fast assembling and disassembling and a multiple use is possible.

Material

Polypropylene

PP

Protective Cover for Wiper/Scraper Rings

Type designation	∅ d	∅ D	H
SFA - 20 - 30	20,00	30,00	7,0
SFA - 25 - 35	25,00	35,00	7,0
SFA - 28 - 38	28,00	38,00	7,0
SFA - 30 - 40	30,00	40,00	7,0
SFA - 32 - 42	32,00	42,00	7,0
SFA - 3492 - 4760	34,92	47,60	7,0
SFA - 35 - 45	35,00	45,00	7,0
SFA - 36 - 46	36,00	46,00	7,0
SFA - 38 - 48	38,00	48,00	7,0
SFA - 3810 - 5080	38,10	50,80	7,0
SFA - 40 - 50	40,00	50,00	7,0
SFA - 4415 - 5715	44,15	57,15	7,0
SFA - 45 - 55	45,00	55,00	7,0
SFA - 50 - 60	50,00	60,00	7,0
SFA - 5080 - 6350	50,80	63,50	7,0
SFA - 52 - 62	52,00	62,00	7,0
SFA - 55 - 65	55,00	65,00	7,0
SFA - 56 - 66	56,00	66,00	7,0
SFA - 5715 - 6985	57,15	69,85	7,0
SFA - 60 - 70	60,00	70,00	7,0
SFA - 6350 - 7620	63,50	76,20	7,0
SFA - 65 - 75	65,00	75,00	7,0
SFA - 65 - 79	65,00	79,00	7,0
SFA - 70 - 80	70,00	80,00	7,0
SFA - 70 - 84	70,00	84,00	7,0
SFA - 75 - 85	75,00	85,00	7,0
SFA - 7620 - 8890	76,20	88,90	7,0
SFA - 80 - 90	80,00	90,00	7,0

Type

Dimension

Material/Type

Ordering example: **Protective Cover** ∅ d **55 x 65 x 7** **PP**

Order designation: **SFA -** **55 x 65 x 7**

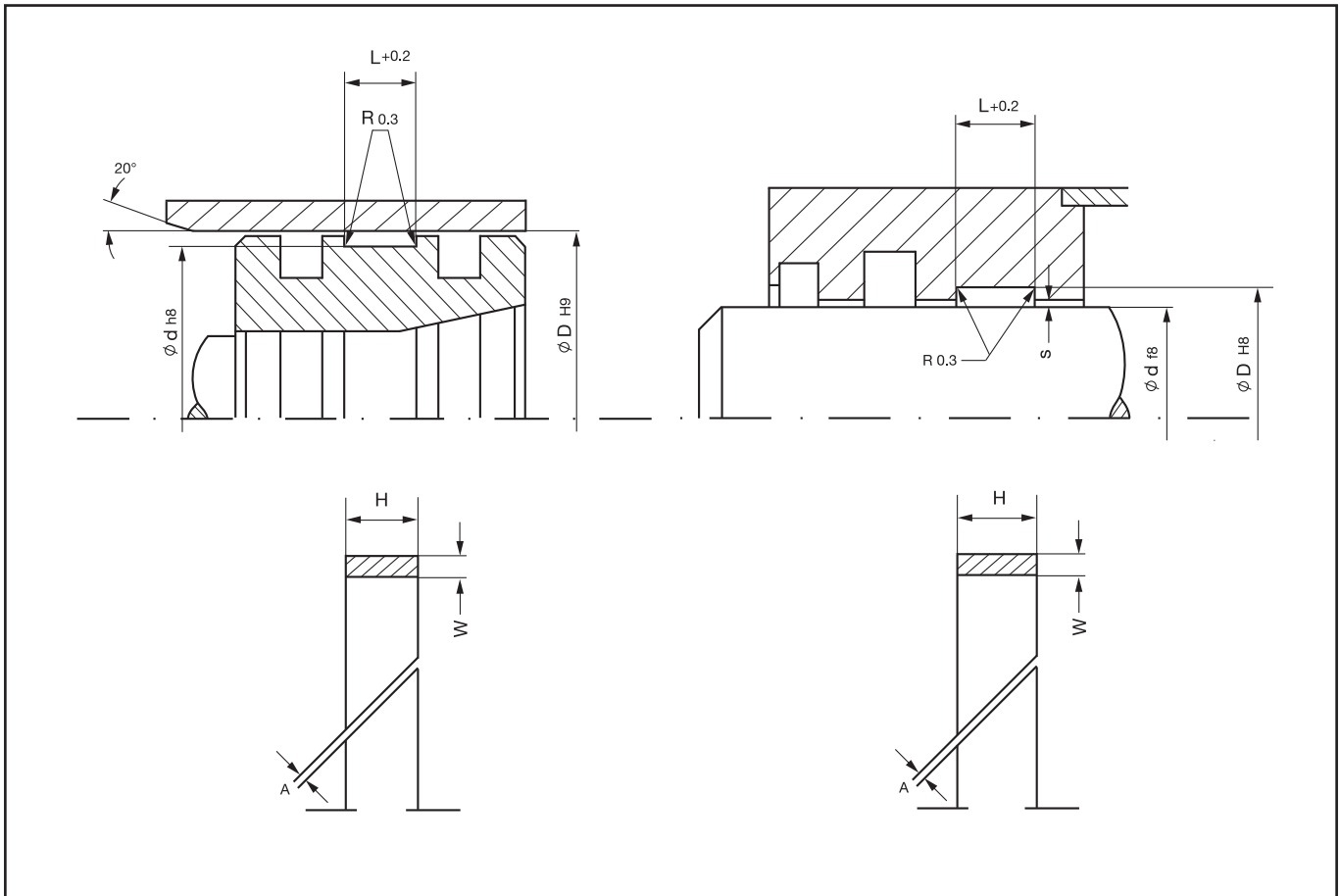
Designation of material: **PP - Polypropylene**

SFA

Protective Cover for Wiper/Scraper Rings

Type designation	∅ d	∅ D	H
SFA - 80 - 94	80,00	94,00	7,0
SFA - 85 - 95	85,00	95,00	7,0
SFA - 8890 - 10480	88,90	104,80	7,0
SFA - 90 - 100	90,00	100,00	7,0
SFA - 90 - 104	90,00	104,00	7,0
SFA - 95 - 105	95,00	105,00	7,0
SFA - 100 - 110	100,00	110,00	7,0
SFA - 100 - 114	100,00	114,00	7,0
SFA - 10160 - 11740	101,60	117,40	7,0
SFA - 120 - 130	120,00	130,00	7,0
SFA - 130 - 14500	130,00	145,00	7,0

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Max. Operating Conditions

Compressive strength (N/mm ²)	≤ 40
Temperature (°C)	- 40 / + 110
Speed (m/s)	≤ 1,0
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R _a	R _t
Groove bottom	≤ 1,6 µm	≤ 16 µm
Groove flanks	≤ 1,6 µm	≤ 16 µm
Running surface	≤ 0,3 µm	≤ 3 µm

Material

Polyacetal with glass fiber	POM
-----------------------------	-----

Technical Description

The guide rings type **FR** are to guide the piston and the rod of a hydraulic cylinder, as well as take the occurring lateral forces.

Yet, no metallic contact of the sliding components must occur between the piston and the cylinder wall, or the rod and the cylinder head.

The guide rings type **FR** are designed for the medium duty applications and stand out for gentle running behaviour towards the sliding surfaces and for high restoring forces.

Other characteristics:

- good sliding characteristics
- high bearing capacity
- wear-resistant, therefore long operating life
- easy installation by clipping into the groove

The indicated dimensions of the guide rings type **FR** are also available in the modified laminated fabric materials with higher bearing capacity.

Type designation	∅ d	∅ D	L
FR - 12 - 16/1	12	16	9,6
FR - 14 - 18/1	14	18	9,6
FR - 15 - 19/1	15	19	9,6
FR - 16 - 19	16	19	6,3
FR - 16 - 19,1	16	19,1	4,0
FR - 16 - 20/1	16	20	9,6
FR - 16 - 20	16	20	5,6
FR - 16 - 20	16	20	8,0
FR - 18 - 22/1	18	22	9,6
FR - 19 - 25	19	25	9,6
FR - 20 - 24/1	20	24	9,6
FR - 20 - 25	20	25	5,6
FR - 20 - 25/1	20	25	9,6
FR - 20 - 26/1	20	26	9,6
FR - 21 - 25	21	25	8,2
FR - 21 - 25/1	21	25	9,6
FR - 22 - 26/1	22	26	9,6
FR - 22 - 27	22	27	5,6
FR - 22 - 27/6	22	27	6,3
FR - 24 - 28/1	24	28	9,6
FR - 25 - 29/1	25	29	9,6
FR - 25 - 30	25	30	5,6
FR - 25 - 30/1	25	30	9,7
FR - 25 - 31/1	25	31	9,6
FR - 26 - 30/1	26	30	9,6
FR - 27 - 32	27	32	4,2
FR - 27 - 32	27	32	5,6
FR - 27 - 32/1	27	32	9,7
FR - 28 - 31	28	31	5,6
FR - 28 - 32/1	28	32	9,6

	Guide Ring	Dimension	Material
Ordering example:	Guide Ring	∅ d 45 x 50 x 5,6	POM glass fiber
Order designation:	FR -	45 x 50 x 5,6	

Designation of material: **POM** - Polyacetal with glass fiber

FR

Guide Rings

Type designation	∅ d	∅ D	L
FR - 28 - 33	28	33	5,6
FR - 28 - 33/1	28	33	9,7
FR - 30 - 33	30	33	5,6
FR - 30 - 34/1	30	34	9,6
FR - 30 - 35	30	35	5,6
FR - 30 - 36	30	36	9,6
FR - 30 - 35/1	30	35	9,7
FR - 30 - 35	30	35	19,4
FR - 31 - 35/1	31	35	9,6
FR - 32 - 35,1	32	35,1	4,0
FR - 32 - 36/1	32	36	9,6
FR - 32 - 37	32	37	5,6
FR - 32 - 37/1	32	37	9,7
FR - 32 - 37/7	32	37	6,3
FR - 32 - 38	32	38	10,0
FR - 33 - 38	33	38	5,6
FR - 34 - 38/1	34	38	9,6
FR - 34 - 40/1	34	40	9,6
FR - 35 - 39/1	35	39	9,6
FR - 35 - 39	35	39	12,8
FR - 35 - 40	35	40	4,5
FR - 35 - 40	35	40	5,6
FR - 35 - 40	35	40	6,3
FR - 35 - 40/1	35	40	9,7
FR - 35 - 41	35	41	9,6
FR - 36 - 40/1	36	40	9,6
FR - 36 - 41	36	41	5,6
FR - 36 - 41/1	36	41	9,7
FR - 36 - 42	36	42	9,6
FR - 37 - 41/1	37	41	9,7
FR - 38 - 42/1	38	42	9,6
FR - 38 - 43	38	43	9,7
FR - 40 - 36/5	40	36	8,0
FR - 40 - 44/1	40	44	9,6
FR - 40 - 45	40	45	5,6
FR - 40 - 45/1	40	45	9,7
FR - 40 - 46/1	40	46	9,6
FR - 40 - 46	40	46	12,8

Type designation	∅ d	∅ D	L
FR - 41 - 45/1	41	45	9,6
FR - 42 - 46/1	42	46	9,6
FR - 42 - 48	42	48	9,6
FR - 43 - 49	43	49	9,6
FR - 44 - 50/1	44	50	9,6
FR - 44,45 - 50,80	44,45	50,80	12,7
FR - 45 - 50	45	50	5,6
FR - 45 - 50	45	50	6,3
FR - 45 - 50/1	45	50	9,7
FR - 45 - 50	45	50	19,4
FR - 45 - 51/1	45	51	9,6
FR - 45 - 51/2	45	51	12,8
FR - 45,4 - 50	45,4	50	6,7
FR - 46 - 50/1	46	50	9,7
FR - 46 - 50/1	46	50	10,2
FR - 46 - 52/1	46	52	9,6
FR - 47,62 - 53,97	47,62	53,97	19,05
FR - 48 - 54	48	54	9,6
FR - 49 - 55	49	55	9,6
FR - 49 - 55/2	49	55	12,8
FR - 50 - 54/6	50	54	10,0
FR - 50 - 55	50	55	5,6
FR - 50 - 55/1	50	55	9,7
FR - 50 - 56/1	50	56	9,6
FR - 50 - 56/2	50	56	12,8
FR - 50,25 - 57,16	50,25	57,16	6,1
FR - 52 - 58/1	52	58	9,6
FR - 53 - 59	53	59	9,6
FR - 54 - 60	54	60	12,8
FR - 54 - 60/1	54	60	9,6
FR - 54 - 60/2	54	60	12,8
FR - 50 - 55	50	55	15,0
FR - 55 - 51/1	51	55	9,7
FR - 55 - 51/6	51	55	10,0
FR - 55 - 60	55	60	5,6
FR - 55 - 60/1	55	60	9,7
FR - 55 - 61/1	55	61	9,6
FR - 55 - 61/2	55	61	12,8

FR

Guide Rings

Type designation	∅ d	∅ D	L
FR - 56 - 60/6	56	60	10,2
FR - 56 - 61/1	56	61	9,7
FR - 56 - 62/2	56	62	12,8
FR - 57 - 63	57	63	10,0
FR - 57 - 63/2	57	63	12,8
FR - 57,15 - 63,50	57,15	63,50	12,7
FR - 57,18 - 62,18	57,18	62,18	19,8
FR - 58 - 63	58	63	5,6
FR - 58 - 63/1	58	63	9,7
FR - 59 - 63/5	59	63	8,0
FR - 59 - 63/6	59	63	10,0
FR - 59 - 65/2	59	65	12,8
FR - 60 - 65	60	65	5,6
FR - 60 - 65/1	60	65	9,7
FR - 60 - 65	60	65	15,0
FR - 60 - 65	60	65	19,4
FR - 60 - 66/1	60	66	9,6
FR - 60 - 66/2	60	66	12,8
FR - 63 - 57/2	63	57	12,8
FR - 63 - 68/1	63	68	9,7
FR - 63 - 69/2	63	69	12,8
FR - 63,50 - 69,85	63,50	69,85	12,70
FR - 63,50 - 69,85	63,50	69,85	19,05
FR - 64 - 70/1	64	70	9,7
FR - 64 - 70/2	64	70	12,8
FR - 65 - 70	65	70	5,6
FR - 65 - 70/1	65	70	9,7
FR - 65 - 71/2	65	71	12,8
FR - 66 - 70/6	66	70	10,2
FR - 66 - 70/7	66	70	26,0
FR - 66 - 72	66	72	12,8
FR - 67 - 72	67	72	5,6
FR - 68 - 74	68	74	12,8
FR - 69 - 75	69	75	9,6
FR - 69 - 75/2	69	75	12,8
FR - 70 - 75	70	75	5,6
FR - 70 - 75/1	70	75	9,7
FR - 70 - 76/1	70	76	9,7

Type designation	∅ d	∅ D	L
FR - 70 - 76/2	70	76	12,8
FR - 71 - 75	71	75	15,1
FR - 71,2 - 76,2	71,2	76,2	20,0
FR - 72 - 78	72	78	12,8
FR - 73 - 79	73	79	12,8
FR - 74 - 80/2	74	80	12,8
FR - 75 - 80	75	80	5,6
FR - 75 - 80/1	75	80	9,7
FR - 75 - 80	75	80	19,4
FR - 75 - 81/2	75	81	12,8
FR - 76 - 80/6	76	80	10,0
FR - 76 - 82	76	82	12,8
FR - 76,20 - 82,55	76,20	82,55	12,8
FR - 76 - 84	76	84	12,8
FR - 79 - 85/2	79	85	12,8
FR - 80 - 85	80	85	5,6
FR - 80 - 85/1	80	85	9,7
FR - 80 - 85/6	80	85	10,0
FR - 80 - 85	80	85	15,0
FR - 80 - 86/2	80	86	12,8
FR - 80 - 86	80	86	19,2
FR - 84 - 90	84	90	10,0
FR - 84 - 90/2	84	90	12,8
FR - 85 - 90	85	90	5,6
FR - 85 - 90/1	85	90	9,7
FR - 85 - 91/2	85	91	12,8
FR - 86 - 90/7	86	90	15,0
FR - 86 - 92	86	92	12,8
FR - 88 - 94	88	94	12,8
FR - 88,9 - 93,9	88,9	93,9	19,8
FR - 89 - 95/2	89	95	12,8
FR - 90 - 95	90	95	5,6
FR - 90 - 95/1	90	95	9,7
FR - 90 - 95/6	90	95	10,0
FR - 90 - 95	90	95	19,4
FR - 90 - 96/2	90	96	12,8
FR - 90 - 96/4	90	96	19,2
FR - 92 - 97	92	97	9,7

FR

Guide Rings

Type designation	∅ d	∅ D	L
FR - 94 - 100/2	94	100	12,8
FR - 95 - 100	95	100	5,6
FR - 95 - 100/1	95	100	9,7
FR - 95 - 101/2	95	101	12,8
FR - 95 - 101/4	95	101	19,2
FR - 96 - 100/6	96	100	10,0
FR - 96 - 100/7	96	100	15,0
FR - 99 - 105/2	99	105	12,8
FR - 100 - 95/1	100	95	9,7
FR - 100 - 105	100	105	5,6
FR - 100 - 105/1	100	105	9,7
FR - 100 - 105/3	100	105	15,0
FR - 100 - 106/2	100	106	12,8
FR - 103 - 108	103	108	20,0
FR - 104 - 110/2	104	110	12,8
FR - 105 - 110/1	105	110	9,7
FR - 105 - 110	105	110	15,0
FR - 105 - 110	105	110	19,4
FR - 105 - 111/2	105	111	12,8
FR - 109 - 115/2	109	115	12,8
FR - 110 - 115/1	110	115	9,7
FR - 110 - 115/3	110	115	15,0
FR - 110 - 116/2	110	116	12,8
FR - 114 - 120/2	114	120	12,8
FR - 115 - 120/1	115	120	9,7
FR - 115 - 121/2	115	121	12,8
FR - 119 - 125/2	119	125	12,8
FR - 120 - 125	120	125	5,6
FR - 120 - 125/1	120	125	9,7
FR - 120 - 126/2	120	126	12,8
FR - 120 - 126	120	126	19,2
FR - 120 - 126	120	126	25,4
FR - 122 - 127	122	127	9,7
FR - 122 - 127	122	127	19,4
FR - 123 - 129	123	129	12,8
FR - 125 - 130/6	125	130	40,0
FR - 125 - 131/2	125	131	12,8
FR - 128 - 134/2	128	134	12,8

Type designation	∅ d	∅ D	L
FR - 129 - 135	129	135	12,8
FR - 124 - 130/2	124	130	12,8
FR - 130 - 135	130	135	9,7
FR - 130 - 136/2	130	136	12,8
FR - 130 - 136	130	136	25,4
FR - 134 - 140/2	134	140	12,8
FR - 135 - 129/4	135	129	19,2
FR - 135 - 140	135	140	15,0
FR - 135 - 141/2	135	141	12,8
FR - 139 - 145	139	145	12,8
FR - 139 - 145/4	139	145	19,2
FR - 140 - 146/2	140	146	12,8
FR - 141 - 147	141	147	12,8
FR - 143 - 149	143	149	12,8
FR - 144 - 150/2	144	150	12,8
FR - 145 - 150	145	150	19,4
FR - 145 - 150	145	150	20,0
FR - 145 - 151/2	145	151	12,8
FR - 146,05 - 152,40	146,05	152,40	12,7
FR - 150 - 156/2	150	156	12,8
FR - 154 - 160/4	154	160	19,2
FR - 155 - 149/4	149	155	19,2
FR - 155 - 160	155	160	15,0
FR - 159 - 165	159	165	19,2
FR - 160 - 166/4	160	166	19,2
FR - 164 - 170/4	164	170	19,2
FR - 165 - 171	165	171	19,2
FR - 169 - 175	169	175	19,2
FR - 170 - 176/4	170	176	19,2
FR - 171,45 - 177,80	171,45	177,80	12,7
FR - 174 - 180/4	174	180	19,2
FR - 175 - 180	175	180	15,0
FR - 175 - 181	175	181	19,2
FR - 176 - 180/5	176	180	25,0
FR - 179 - 185	179	185	19,2
FR - 180 - 185/7	180	185	16,5
FR - 180 - 186/4	180	186	19,2
FR - 184 - 190/4	184	190	19,2

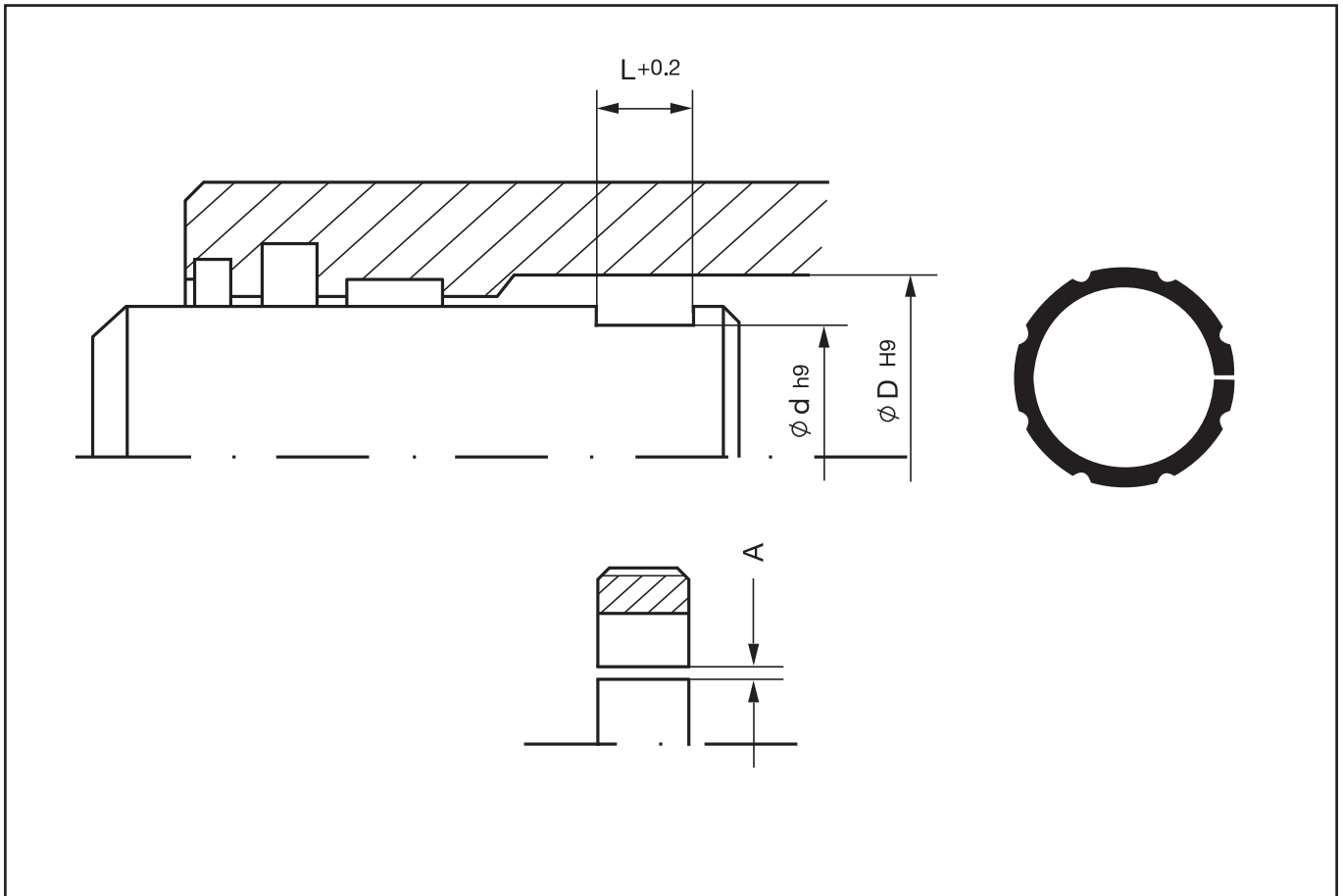
FR

Guide Rings

Type designation	∅ d	∅ D	L
FR - 185 - 191	185	191	19,2
FR - 189 - 195	189	195	19,2
FR - 190 - 184/4	184	190	19,2
FR - 190 - 196/4	190	196	19,2
FR - 192 - 198	192	198	19,2
FR - 194 - 200/4	194	200	19,2
FR - 195 - 200	195	200	15,0
FR - 195 - 201	195	201	19,2
FR - 199 - 205	199	205	19,2
FR - 200 - 206/4	200	206	19,2
FR - 204 - 210/4	204	210	19,2
FR - 205 - 211	205	211	19,2
FR - 209 - 215	209	215	19,2
FR - 210 - 216/4	210	216	19,2
FR - 214 - 220/4	214	220	19,2
FR - 215 - 221	215	221	19,2
FR - 219 - 225	219	225	19,2
FR - 220 - 226/4	220	226	19,2
FR - 224 - 230/4	224	230	19,2
FR - 225 - 231/4	225	231	19,2
FR - 229 - 235	229	235	19,2
FR - 230 - 236/4	230	236	19,2
FR - 234 - 240/4	234	240	19,2
FR - 235 - 241	235	241	19,2
FR - 239 - 245	239	245	19,2
FR - 240 - 246	240	246	19,2
FR - 244 - 250/4	244	250	19,2
FR - 245 - 251	245	251	19,2
FR - 249 - 255	249	255	19,2
FR - 250 - 256/4	250	256	19,2
FR - 254 - 260	254	260	19,2
FR - 255 - 261	255	261	19,2
FR - 259 - 265	259	265	19,2
FR - 260 - 266	260	266	19,2
FR - 264 - 270	264	270	19,2
FR - 265 - 271	265	271	19,2
FR - 269 - 275	269	275	19,2
FR - 270 - 276	270	276	19,2

Type designation	∅ d	∅ D	L
FR - 274 - 280/4	274	280	19,2
FR - 275 - 281	275	281	19,2
FR - 279 - 285	279	285	19,2
FR - 280 - 286/4	280	286	19,2
FR - 284 - 290	284	290	19,2
FR - 285 - 291	285	291	19,2
FR - 289 - 295	289	295	19,2
FR - 290 - 296	290	296	19,2
FR - 294 - 300/4	294	300	19,2
FR - 295 - 301	295	301	19,2
FR - 300 - 306/4	300	306	19,2

Further dimension and in-between sizes upon request.



Max. Operating Conditions

Compressive strength (N/mm ²)	≤ 40
Temperature (°C)	- 40 / + 100
Speed (m/s)	≤ 0,8
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R _a	R _t
Groove bottom	≤ 1,6 µm	≤ 16 µm
Groove flanks	≤ 1,6 µm	≤ 16 µm
Running surface	≤ 0,3 µm	≤ 3 µm

Material

Polyacetal with glass fiber	POM
-----------------------------	-----

Technical Description

The guide rings type **FRS** are made of polyacetal with glass fiber reinforcement, and are used to guide plunger cylinders.

Due to the longitudinal grooves on the outside diameter, an overflow of the fluid is assured.

Other characteristics:

- good sliding characteristics
- high bearing capacity
- wear-resistant, therefore long operating life
- easy installation by snapping in the groove

The indicated dimensions of the guide rings type **FRS** as well as individual dimensions may also be manufactured in the modified laminated fabric materials with best bearing capacity.

Type designation	∅ D	∅ d	L
FR-S - 25 - 16	25	16	13,0
FR-S - 30 - 20	30	20	13,0
FR-S - 33,5 - 24,5	33,5	24,5	13,0
FR-S - 35 - 25	35	25	13,0
FR-S - 40 - 30	40	30	13,0
FR-S - 42 - 32	42	32	13,0
FR-S - 45 - 35	45	35	13,0
FR-S - 49 - 41	49	41	9,0
FR-S - 49,90 - 40,92	49,90	40,92	12,7
FR-S - 50 - 40	50	40	16,0
FR-S - 50 - 41	50	41	12,0
FR-S - 54,5 - 45	54,5	45	20,0
FR-S - 55 - 45	55	45	16,0
FR-S - 55 - 46	55	46	12,0
FR-S - 60 - 45	60	45	16,0
FR-S - 60 - 50	60	50	16,0
FR-S - 60 - 51	60	51	12,0
FR-S - 60 - 54	60	54	12,7
FR-S - 65 - 55	65	55	16,0
FR-S - 65 - 56	65	56	12,0
FR-S - 65 - 57	65	57	9,0
FR-S - 70 - 59	70	59	12,0
FR-S - 70 - 60	70	60	15,0
FR-S - 70 - 64	70	64	12,7
FR-S - 75 - 65	75	65	13,0
FR-S - 75 - 65	75	65	16,0
FR-S - 75 - 66	75	66	12,0
FR-S - 80 - 71	80	71	11,0
FR-S - 80 - 74	80	74	12,0
FR-S - 85 - 75	85	75	16,0

	Guide Ring	Dimension	Width	Material
Ordering example:	Guide Ring	∅ D 55 x 45	x 16	POM glass fiber
Order designation:	FRS - 55 x 45 x 16,0			

Designation of material: **POM** - Polyacetal with glass fiber

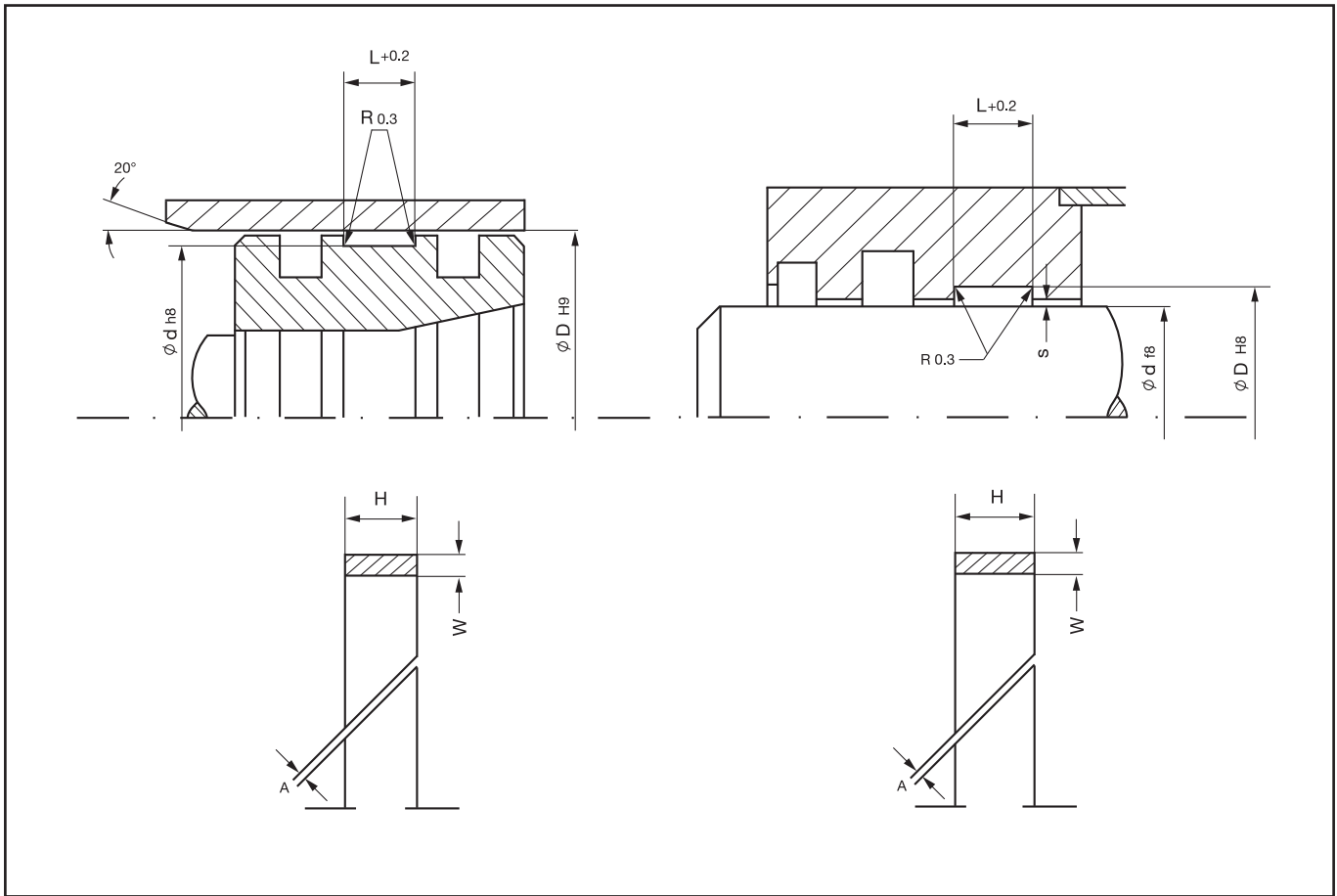
FRS

Guide Rings

Type designation	∅ D	∅ d	L
FR-S - 85 - 76	85	76	15,0
FR-S - 95 - 86	95	86	11,0
FR-S - 100 - 94	100	94	12,7
FR-S - 125 - 119	125	119	12,7

Further dimension and in-between sizes upon request.

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.



Max. Operating Conditions

Compression resistance normal to lamination	depending on chosen material (see table)
Temperature (°C)	- 40 / + 130
Media: Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids	

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$
Groove flanks	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$
Running surface	$\leq 0,3 \mu\text{m}$	$\leq 3 \mu\text{m}$

Range of production and tolerances

Inside diameters (mm)	15 - 600
Wall thicknesses W (mm)	1,5 - 25
Widths (mm)	> 3
Tolerances (mm)	0,03 - 0,08

Technical Description

The guide rings type **FHG / FHM / FHO** are to guide the piston and the rod of a hydraulic cylinder as well as take the occurring lateral forces.

Yet, no metallic contact of the sliding components must occur between the piston and the cylinder wall, or the rod and the cylinder head.

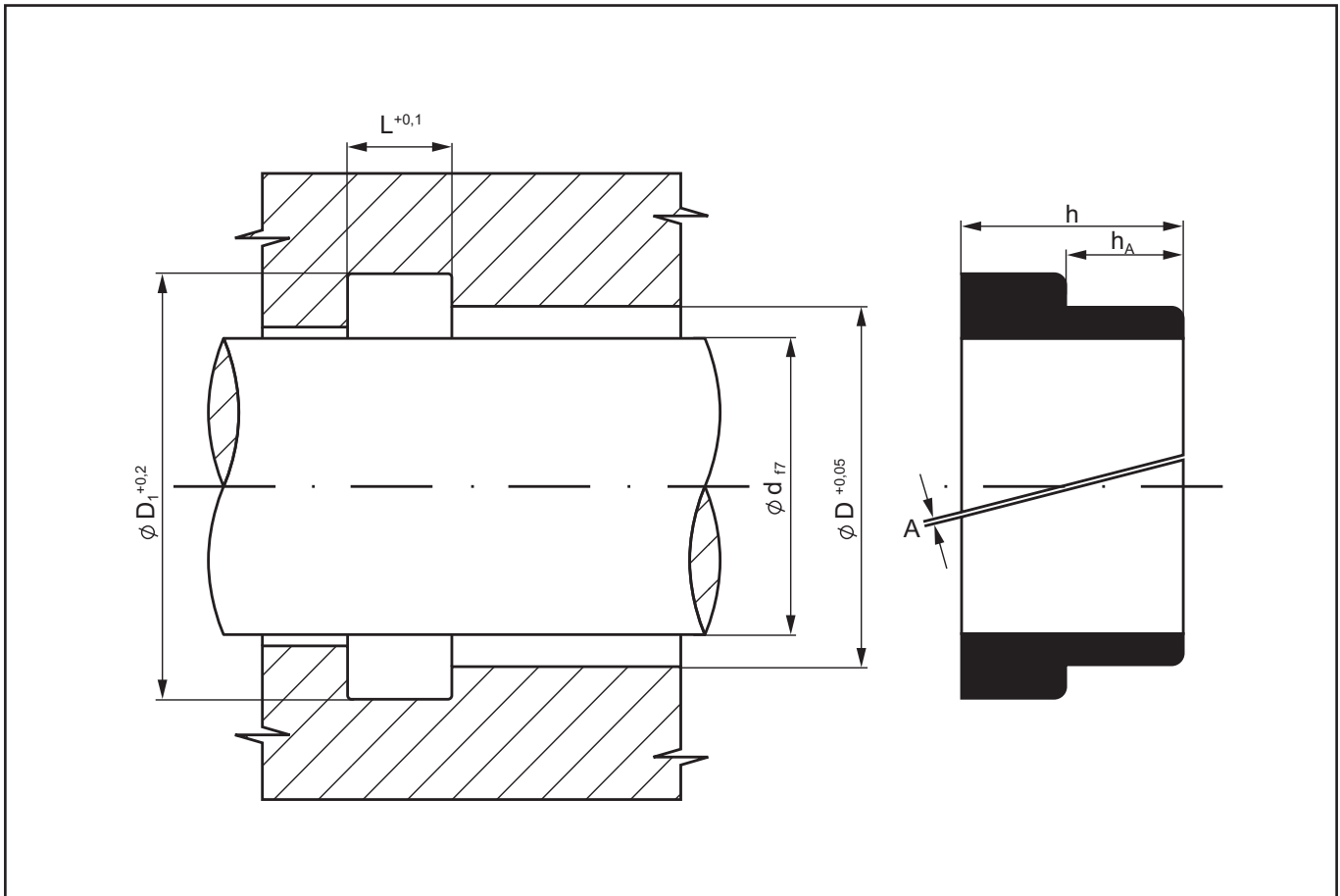
The guide rings stand out for a gentle running behaviour towards the sliding surfaces and a high binding strength for smaller dirt particles.

Other characteristics:

- high bearing capacity
- wear-resistant, therefore long operating life
- impact pressures are cushioned
- easy assembly

Besides the standard material phenolic cotton of the type **FHG** we also provide further modified hard fabric-compounds, e.g. type **FHM**. For your choice of material for your specific application please ask for our advise or according data-sheets.

Our **guide rings** are delivered as preformed rings, ready-to-install.



Max. Operating Conditions

Compressive strength (N/mm ²)	40 at 20°C/30 at 70°C
Temperature (°C)	- 40 / + 110
Speed (m/s)	≤ 1,0
Media: Hydraulic fluids upon oil-basis	

Recommended Surface Finish

Surface roughness	R _a	R _t
Groove bottom	≤ 2,0 μm	≤ 10 μm
Groove flanks	≤ 2,0 μm	≤ 10 μm
Running surface	≤ 0,3 μm	≤ 2,5 μm

Material

Polyacetal with glass fiber	POM
-----------------------------	-----

Technical Description

The guide rings type **FIL** are made of polyacetal with glass fiber reinforcement. They are bent in an “L” shape and slotted.

The guide rings type **FIL** have been developed to substitute traditional bronze guides in hydraulic cylinders. They guide the piston rod and prevent metallic contact with the cylinder head in case of occurring radial forces.

Chamfered edges prevent from damages during assembly and grant easy and smooth installation

Advantages of the guide ring type **FIL**:

- Wear-resistant, therefore long operating life
- Easy installation and simple installation space requirements
- Low-vibration running
- Good sliding characteristics
- High bearing capacity

Type designation	∅ d	∅ D	∅ D ₁	L	h	h _A
FIL - 60 - 66 - 16	60,0	66,0	71,0	5,0	16,0	11,0
FIL - 65 - 70 - 16	65,0	70,0	73,0	5,0	16,0	11,0
FIL - 72 - 77 - 16	72,0	77,0	82,4	5,0	16,0	11,0
FIL - 78 - 84 - 16	78,0	84,0	89,0	5,0	16,0	11,0
FIL - 85 - 90 - 16	85,0	90,0	93,0	5,0	16,0	11,0
FIL - 91 - 96 - 16	91,0	96,0	101,4	5,0	16,0	11,0
FIL - 99 - 105 - 16	99,0	105,0	110,0	5,0	16,0	11,0
FIL - 110 - 115 - 16	110,0	115,0	120,4	5,0	16,0	11,0
FIL - 120 - 126 - 16	120,0	126,0	131,0	5,0	16,0	11,0
FIL - 129 - 136 - 16	129,0	136,0	139,4	5,0	16,0	11,0
FIL - 141 - 147 - 16	141,0	147,0	152,0	5,0	16,0	11,0
FIL - 162 - 168 - 16	162,0	168,0	173,0	5,0	16,0	11,0
FIL - 183 - 189 - 16	183,0	189,0	194,0	5,0	16,0	11,0
FIL - 207 - 213 - 16	207,0	213,0	218,0	5,0	16,0	11,0

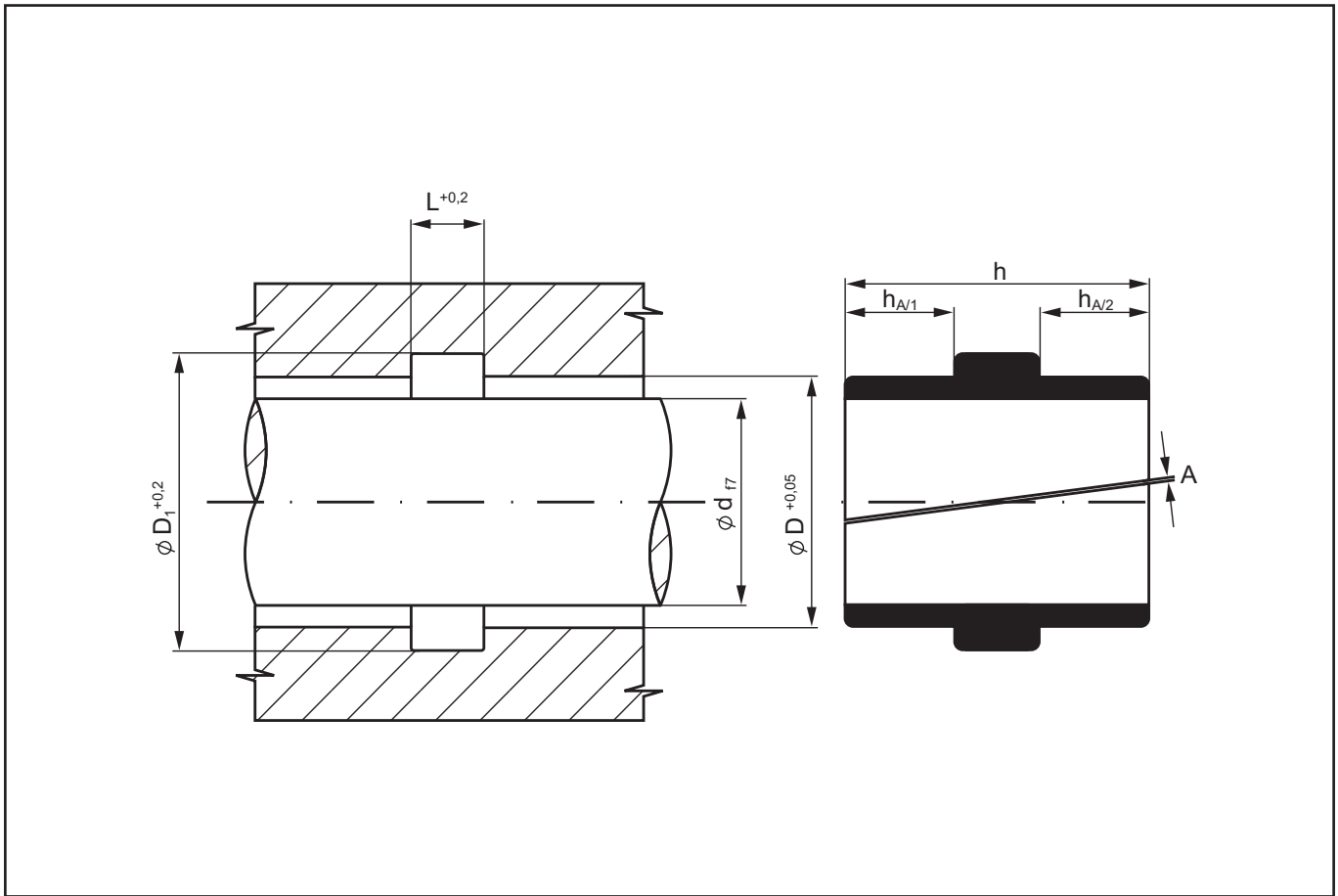
Further dimension and in-between sizes upon request.

	Guide Ring	Dimension	Material
Ordering example:	Guide Ring	∅ d 60 x ∅ D 66 x h 16	POM glass fiber
Order designation:	FIL -	60 x 66 x 16	

Designation of material: **POM** - Polyacetal with glass fiber

FIT

Guide Rings



Max. Operating Conditions

Compressive strength (N/mm ²)	40 at 20°C/30 at 70°C
Temperature (°C)	- 40 / + 110
Speed (m/s)	≤ 1,0
Media:	Hydraulic fluids upon oil-basis

Recommended Surface Finish

Surface roughness	R _a	R _t
Groove bottom	≤ 2,0 μm	≤ 10 μm
Groove flanks	≤ 2,0 μm	≤ 10 μm
Running surface	≤ 0,3 μm	≤ 2,5 μm

Material

Polyacetal with glass fiber	POM
-----------------------------	-----

Technical Description

The guide rings type **FIT** are made of polyacetal with glass fiber reinforcement. They are bent in a "T" shape and slotted.

The guide rings type **FIT** have been developed to substitute traditional bronze guides in hydraulic cylinders. They guide the piston rod and prevent metallic contact with the cylinder head in case of occurring radial forces.

Chamfered edges prevent from damages during assembly and grant easy and smooth installation

Advantages of the guide ring type FIT:

- Wear-resistant, therefore long operating life
- Easy installation and simple installation space requirements
- Low-vibration running
- Good sliding characteristics
- High bearing capacity

Type designation	∅ d	∅ D	∅ D ₁	L	h	h _A
FIT - 30 - 34 - 10	30,0	34,0	37,0	4,0	10,0	6,0
FIT - 38 - 42 - 12,5	38,0	42,0	44,0	4,5	12,5	8,0
FIT - 45 - 46,8 - 8,8	45,0	46,8	49,8	2,5	8,8	6,3
FIT - 45 - 49 - 10	45,0	49,0	53,0	4,0	10,0	6,0
FIT - 50 - 54 - 20	50,0	54,0	58,0	7,0	20,0	13,0
FIT - 55 - 60 - 16	55,0	60,0	64,5	8,0	16,0	8,0
FIT - 60 - 61,8 - 8,8	60,0	61,8	64,8	3,0	8,8	5,8
FIT - 61 - 65 - 10	61,0	65,0	69,0	4,0	10,0	6,0
FIT - 70 - 74 - 20	70,0	74,0	78,0	7,0	20,0	13,0
FIT - 72 - 79 - 31	72,0	79,0	82,0	8,0	31,0	23,0
FIT - 75 - 80 - 16	75,0	80,0	84,5	8,0	16,0	8,0
FIT - 75,3 - 80,5 - 30	75,3	80,5	85,0	8,1	30,0	21,9
FIT - 76 - 80 - 12	76,0	80,0	84,0	5,0	12,0	7,0
FIT - 85 - 90 - 27	85,0	90,0	95,0	8,0	27,0	19,0
FIT - 90 - 96 - 26	90,0	96,0	100,0	7,0	26,0	19,0
FIT - 91 - 95 - 15	91,0	95,0	100,0	6,0	15,0	9,0
FIT - 95 - 100 - 16	95,0	100,0	104,5	8,0	16,0	8,0
FIT - 97 - 103 - 30	97,0	103,0	107,5	10,0	30,0	20,0
FIT - 105 - 111 - 31	105,0	111,0	115,0	8,0	31,0	23,0
FIT - 108,5 - 112,5 - 20	108,5	112,5	116,5	7,0	20,0	13,0
FIT - 110 - 116 - 26	110,0	116,0	120,0	7,0	26,0	19,0
FIT - 115 - 120 - 16	115,0	120,0	124,5	8,0	16,0	8,0
FIT - 118 - 124 - 30	118,0	124,0	128,5	10,0	30,0	20,0
FIT - 125 - 130 - 29	125,0	130,0	134,0	8,0	29,0	21,0
FIT - 128,5 - 132,5 - 20	128,5	132,5	136,5	7,0	20,0	13,0
FIT - 132 - 138 - 26	132,0	138,0	142,0	7,0	26,0	19,0
FIT - 135 - 140 - 16	135,0	140,0	144,5	8,0	16,0	8,0
FIT - 140 - 146 - 30	140,0	146,0	150,5	10,0	30,0	20,0

	Guide Ring	Dimension	Material
Ordering example:	Guide Ring	∅ d 45 x ∅ D 49 x h 10	POM glass fiber
Order designation:	FIT -	45 x 49 x 10	

Designation of material: **POM** - Polyacetal with glass fiber

FIT

Guide Rings

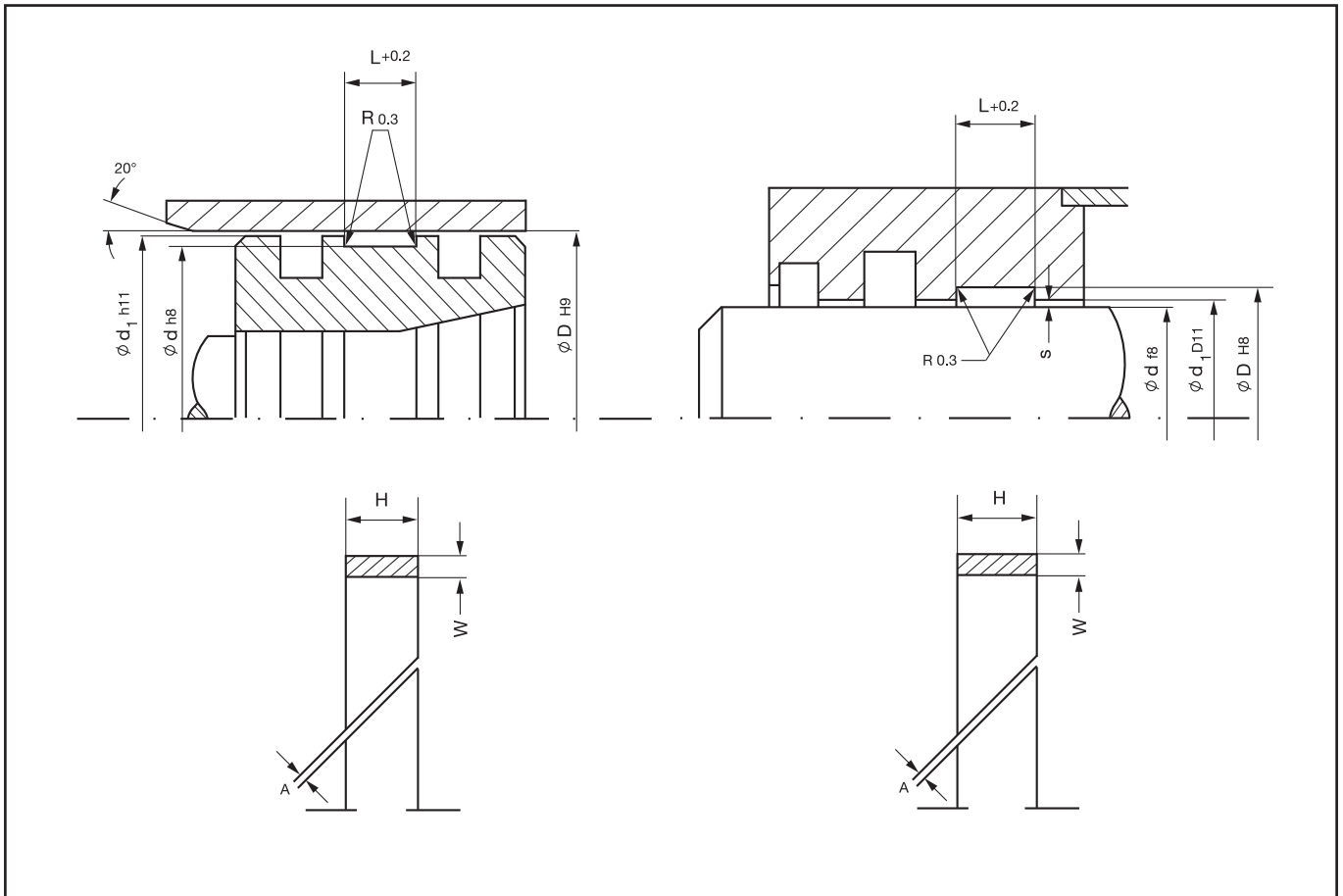
Type designation	∅ d	∅ D	∅ D ₁	L	h	h _A
FIT - 148,5 - 152,5 - 20	148,5	152,5	156,5	7,0	20,0	13,0
FIT - 152 - 158 - 26	152,0	158,0	162,0	7,0	26,0	19,0
FIT - 171,5 - 175,5 - 20	171,5	175,5	179,5	7,0	20,0	13,0
FIT - 172 - 178 - 26	172,0	178,0	182,0	7,0	26,0	19,0
FIT - 194 - 200 - 26	194,0	200,0	204,0	7,0	26,0	19,0
FIT - 194,5 - 198,5 - 20	194,5	198,5	202,5	7,0	20,0	13,0

Further dimension and in-between sizes upon request.

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.

FB

Guide Band



Max. Operating Conditions

Compressive strength (N/mm ²)	20 °C	20
	100 °C	10
	150 °C	5

Media: Hydraulic fluids upon oil-basis,
hardly inflaming hydraulic fluids,
HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R _a	R _t
Groove bottom	≤ 1,6 µm	≤ 16 µm
Groove flanks	≤ 1,6 µm	≤ 16 µm
Running surface	≤ 0,3 µm	≤ 3 µm

Material

PTFE-bronze	PB
PTFE-carbon	PK
PTFE-compound turquoise	PT
PTFE-virginal	PR

Technical Description

The **guide band** type **FB** is manufactured in PTFE bronze compound and PTFE carbon compound as standard. All those materials quality works stick-slip free and stands out for good sliding characteristics, high abrasion resistance, high temperature stability as well as good resistance to fluids.

Besides the standard dimensions the PTFE-strip are also available in other dimensions.

Upon request, these bands are cut to the given piston and rod diameters.

Gap dimensions (mm)

Diameter range	s	A
< 20	0,2	2
< 40	0,4	2,5 - 3,0
< 80	0,5	3 - 4
< 130	0,5	5 - 7
< 200	0,6	6 - 8

Type designation	Material		L	W	m/Roll
	PB	PK			
FB - 150/2	x	x	4,0	1,5	20,5
FB - 156	x	x	5,0	1,5	22,0
FB - 151	x	x	5,6	1,5	21,0
FB - 152	x	x	6,0	1,5	21,0
FB - 153	x	x	8,0	1,5	21,0
FB - 157	x	x	9,7	1,5	21,0
FB - 154	x	x	10,0	1,5	21,0
FB - 155	x	x	12,0	1,5	21,0
FB - 155/1	x	x	15,0	1,5	21,0
FB - 150/3	x	x	2,4	1,55	11,0
FB - 150/1	x	x	3,9	1,55	21,0
FB - 150	x	x	4,0	1,55	21,0
FB - 200	x	x	5,0	2,0	15,75
FB - 213	x	x	6,0	2,0	15,75
FB - 201	x	x	8,0	2,0	15,75
FB - 212	x	x	9,7	2,0	16,5
FB - 202	x	x	10,0	2,0	15,75
FB - 203	x	x	12,0	2,0	15,75
FB - 204	x	x	15,0	2,0	15,75
FB - 205	x	x	20,0	2,0	15,75
FB - 206	x	x	25,0	2,0	15,75
FB - 210	x	x	30,0	2,0	16,0
FB - 214	x	x	35,0	2,0	15,25

Guide bands are cutted upon request, see ordering example on last page FB. (Page 313)

	Guide Band	Width	Thickness	Material
Ordering example:	Guide Band	L 9,7 mm	W 2,5 mm	PTFE-bronze
Order designation:	FB -	254	-	PB

Designation of material:

- PB** - PTFE-bronze
- PK** - PTFE-carbon
- PT** - PTFE compound turquoise
- PR** - PTFE-virginal

Type designation	Material		L	W	m/Roll
	PB	PK			
FB - 207	x	x	40,0	2,0	15,75
FB - 208	x	x	45,0	2,0	15,25
FB - 209	x	x	50,0	2,0	15,75
FB - 270	x	x	2,5	2,5	13,0
FB - 265/1	x	x	4,0	2,5	12,5
FB - 265	x	x	4,2	2,5	12,25
FB - 267	x	x	5,0	2,5	12,25
FB - 251	x	x	5,6	2,5	12,5
FB - 252	x	x	6,0	2,5	12,25
FB - 264	x	x	6,2	2,5	12,5
FB - 253	x	x	8,0	2,5	12,5
FB - 254	x	x	9,7	2,5	12,5
FB - 255	x	x	10,0	2,5	12,5
FB - 256	x	x	12,0	2,5	12,5
FB - 266	x	x	12,8	2,5	12,5
FB - 257	x	x	15,0	2,5	12,5
FB - 258	x	x	20,0	2,5	12,5
FB - 259	x	x	25,0	2,5	12,5
FB - 250	x	x	30,0	2,5	13,0
FB - 261	x	x	35,0	2,5	12,5
FB - 263	x	x	50,0	2,5	12,25
FB - 301	x	x	4,0	3,0	10,0
FB - 312	x	x	8,0	3,0	10,0
FB - 307	x	x	9,7	3,0	10,0
FB - 300	x	x	10,0	3,0	10,0
FB - 305	x	x	12,0	3,0	10,0
FB - 302	x	x	15,0	3,0	10,0
FB - 303	x	x	20,0	3,0	10,0
FB - 304	x	x	25,0	3,0	10,0
FB - 306	x	x	30,0	3,0	10,0
FB - 308	x	x	40,0	3,0	10,0
FB - 310	x	x	50,0	3,0	10,0
FB - 401	x	x	9,7	4,0	7,0
FB - 405	x	x	15,0	4,0	7,0
FB - 407	x	x	20,0	4,0	7,0
FB - 406	x	x	25,0	4,0	7,0

Type designation	Material		L	W	m/Roll
	PB	PK			
FB - 409	x	x	50,0	4,0	7,0
FB - 501	x	x	20,0	5,0	5,0
FB - 502	x	x	40,0	5,0	4,6

Further dimensions and sizes as well materials upon request.

**Ordering example: Guide Band cut to length
(Standard Dimensions)**

for rod \varnothing d 50
with thickness W 2,5 mm
and width L 9,7 mm

Guide Band Dimension Width Material

Order designation: FB - 50 x 55 / 9,7 PB

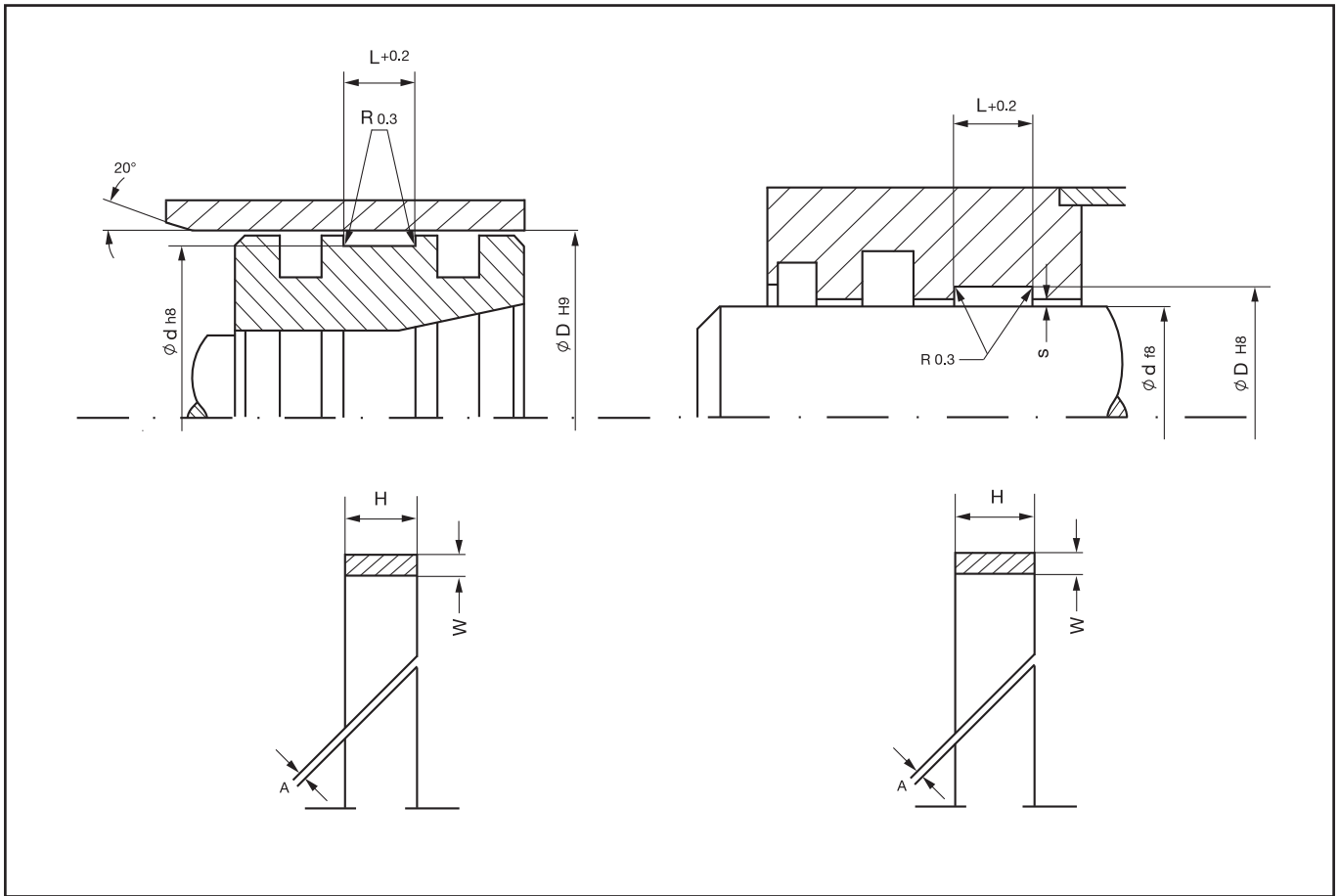
for piston \varnothing D 80
with thickness W 2,0 mm
and width L 15,0 mm

Guide Band Dimension Width Material

Order designation: FB - 80 x 76 / 15 PK

FHCB/FHOB

Guide Band



Max. Operating Conditions

	static	dynamic
Compressive strength	345 N/mm ²	90 N/mm ²
Temperature (°C)	- 40 / + 130	- 40 / + 130
Speed (m/s)		1
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids	

Recommended Surface Finish

Surface roughness	R _a	R _t
Groove bottom	≤ 1,6 μm	≤ 16 μm
Groove flanks	≤ 1,6 μm	≤ 16 μm
Running surface	≤ 0,3 μm	≤ 3 μm

Material

Synthetic fiber with polyester resin	FHCB/FHOB
--------------------------------------	-----------

Technical Description

Guide bands of the types **FHOB/FHCB** consist of a fabric-compound made of synthetic fibre and polyester-resin. They are supposed to guide the piston and piston rod of a hydraulik cylinder and to adopt shear forces. Withal there be no metallic contact of the guiding components between piston and cylinder panel, respectively rod and cylinder head.

High compressive strength, positive sliding characteristics and a very high abrasion resistance are the advantages of these guide bands.

Our **guide bands** are available in meters or cut for rod-, or piston guides. Guide rings of the types FHG / FHM / FHO are available preshaped in standard or special dimensions.

Type designation	L	W	m/Roll
FHCB 150 - 200	15,0	2,0	5,0
FHCB 056 - 250	5,6	2,5	5,0
FHOB 056 - 250	5,6	2,5	10,0
FHCB 097 - 250	9,7	2,5	5,0
FHOB 097 - 250	9,7	2,5	10,0
FHCB 127 - 250	12,7	2,5	5,0
FHCB 150 - 250	15,0	2,5	5,0
FHOB 150 - 250	15,0	2,5	10,0
FHCB 200 - 250	20,0	2,5	5,0
FHOB 200 - 250	20,0	2,5	10,0
FHCB 250 - 250	25,0	2,5	5,0
FHOB 250 - 250	25,0	2,5	10,0
FHCB 300 - 250	30,0	2,5	5,0
FHCB 056 - 300	5,6	3,0	5,0
FHCB 097 - 300	9,7	3,0	5,0
FHCB 150 - 300	15,0	3,0	5,0
FHCB 200 - 300	20,0	3,0	5,0
FHCB 250 - 300	25,0	3,0	5,0
FHCB 300 - 300	30,0	3,0	5,0
FHCB 400 - 300	40,0	3,0	5,0
FHCB 500 - 300	50,0	3,0	5,0
FHCB 600 - 300	60,0	3,0	5,0
FHCB 056 - 350	5,6	3,5	5,0
FHCB 097 - 350	9,7	3,5	5,0
FHCB 150 - 350	15,0	3,5	5,0
FHCB 200 - 350	20,0	3,5	5,0
FHCB 250 - 350	25,0	3,5	5,0
FHCB 056 - 400	5,6	4,0	5,0
FHCB 097 - 400	9,7	4,0	5,0
FHCB 150 - 400	15,0	4,0	5,0

	Guide Band	Width	Dicke	Material
Ordering example:	Guide Band	L 9,7 mm	W 2,5 mm	FHCB
Order designation:	FHCB	097 - 250		

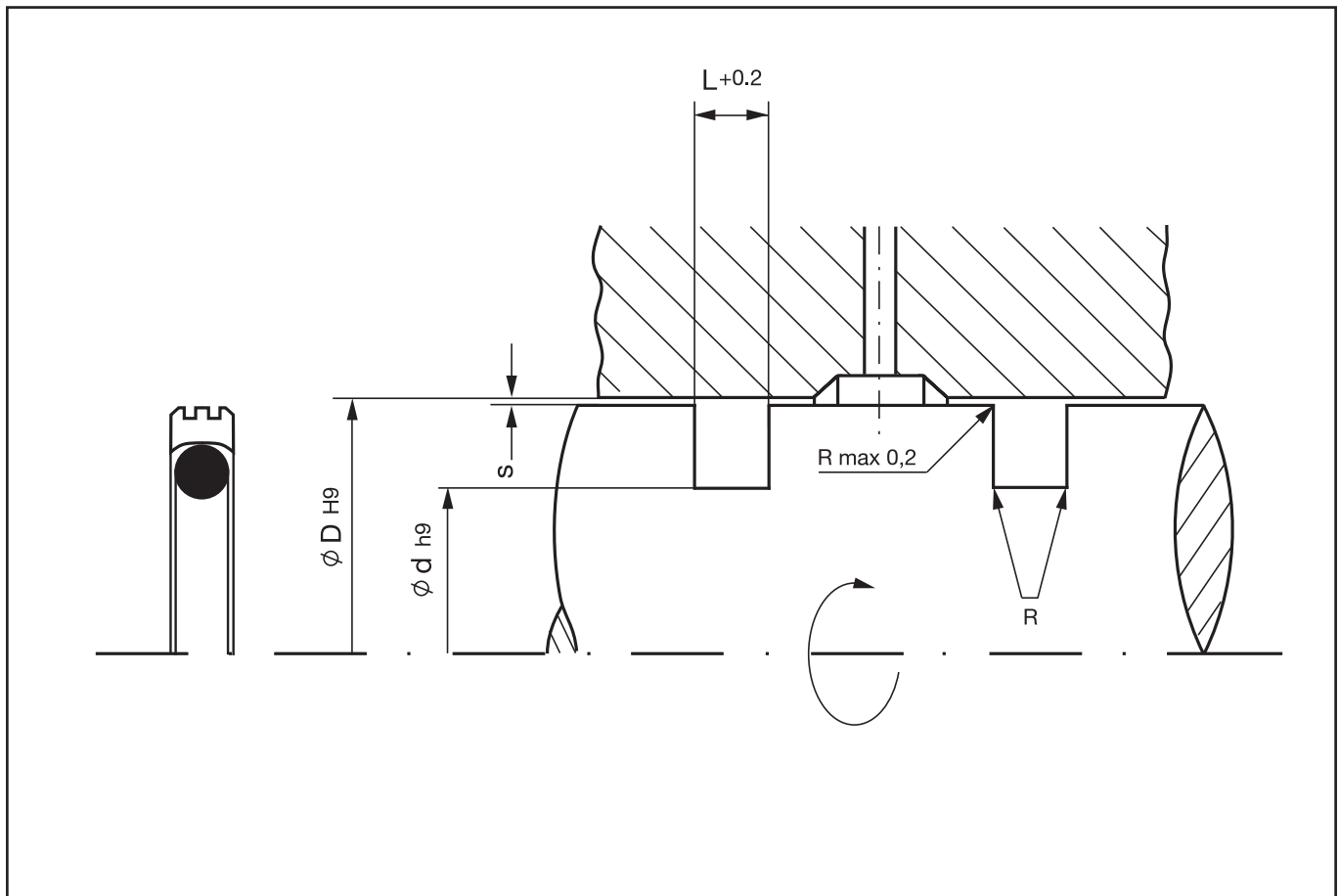
FHCB/FHOB

Guide Band

Type designation	L	W	m/Roll
FHCB 200 - 400	20,0	4,0	5,0
FHCB 250 - 400	25,0	4,0	5,0
FHCB 300 - 400	30,0	4,0	5,0
FHCB 600 - 400	60,0	4,0	5,0
FHCB 700 - 400	70,0	4,0	5,0

Further dimension and in-between sizes upon request.

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Max. Operating Conditions *

Pressure (MPa)	≤ 30 (300 bar)
Temperature (°C)	- 30 / + 110 / + 200
Speed (m/s)	≤ 2 (0,5)**

Media: Hydraulic fluids upon oil-basis,
hardly inflaming hydraulic fluids,
HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$
Groove flanks	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$
Running surface	$\leq 0,3 \mu\text{m}$	$\leq 3 \mu\text{m}$

Material

PTFE-bronze / -carbon	PB / PK
PTFE compound turquoise	PT
Polyethylen-ultrahochmolekular	PE-UHMW
Polyurethane	PU **

Technical Description

The external rotary seal **NPG** consists of a PTFE compound sealing ring preset by a O-Ring.

The seal serves for the reciprocal sealing of rotary transmissions, slew drive units, etc.

The PTFE material stands out for excellent sliding characteristics, low attrition rate as well as high extrusion resistance.

The thermal and chemical stability of the PTFE material allows for the use in a wide range of applications.

The standard material used for the NPG rotary seal is PTFE + carbon with an O-Ring in NBR 70° shore A.

*Max. operating conditions:

Field of application and service conditions are decisive for the selection of the PTFE compound, respectively the material qualities. Temperature and chemical resistiveness in reliance of the chosen O-Ring material.

Assembly dimensions

Diameter \varnothing D		Groove bottom \varnothing d	L.dim.	Notches	O-Ring \varnothing
Standard	Extended Range / 1				
8 - 39,9	8 - 135,0	\varnothing D - 4,9	2,2	1	1,78
40 - 79,9	14 - 250,0	\varnothing D - 7,5	3,2	1	2,62
80 - 132,9	22 - 460,0	\varnothing D - 11,0	4,2	1	3,53
133 - 329,9	40 - 675,0	\varnothing D - 15,5	6,3	2	5,33
330 - 669,9	133 - 690,0	\varnothing D - 21,0	8,1	2	7,00
670 - 999,9	670 - 999,9	\varnothing D - 28,0	9,5	2	8,40

If the groove width (L dim.) differs from the standard series, the complementary number /1 is added to the order designation. (recommended up to 100 bar)
Subject to the diameter (D) the corresponding groove bottom diameters (d) and assembly dimensions (L dim.) are to be taken from the above table.

Gap dimensions s (mm)

L.dim.	0 - 10 MPa	20 - 30 MPa	Radius R
2,2	0,15	0,10	0,40
3,2	0,20	0,15	0,60
4,2	0,25	0,20	1,00
6,3	0,30	0,25	1,30
8,1	0,30	0,25	1,80
9,5	0,45	0,30	2,50

	Seal type	Dimension	Material
Ordering example:	Rotary Seal	\varnothing D 80 x 69,0 x 4,2	PTFE-carbon
Order designation:	NPG -	80 x 69,0 x 4,2	- PK

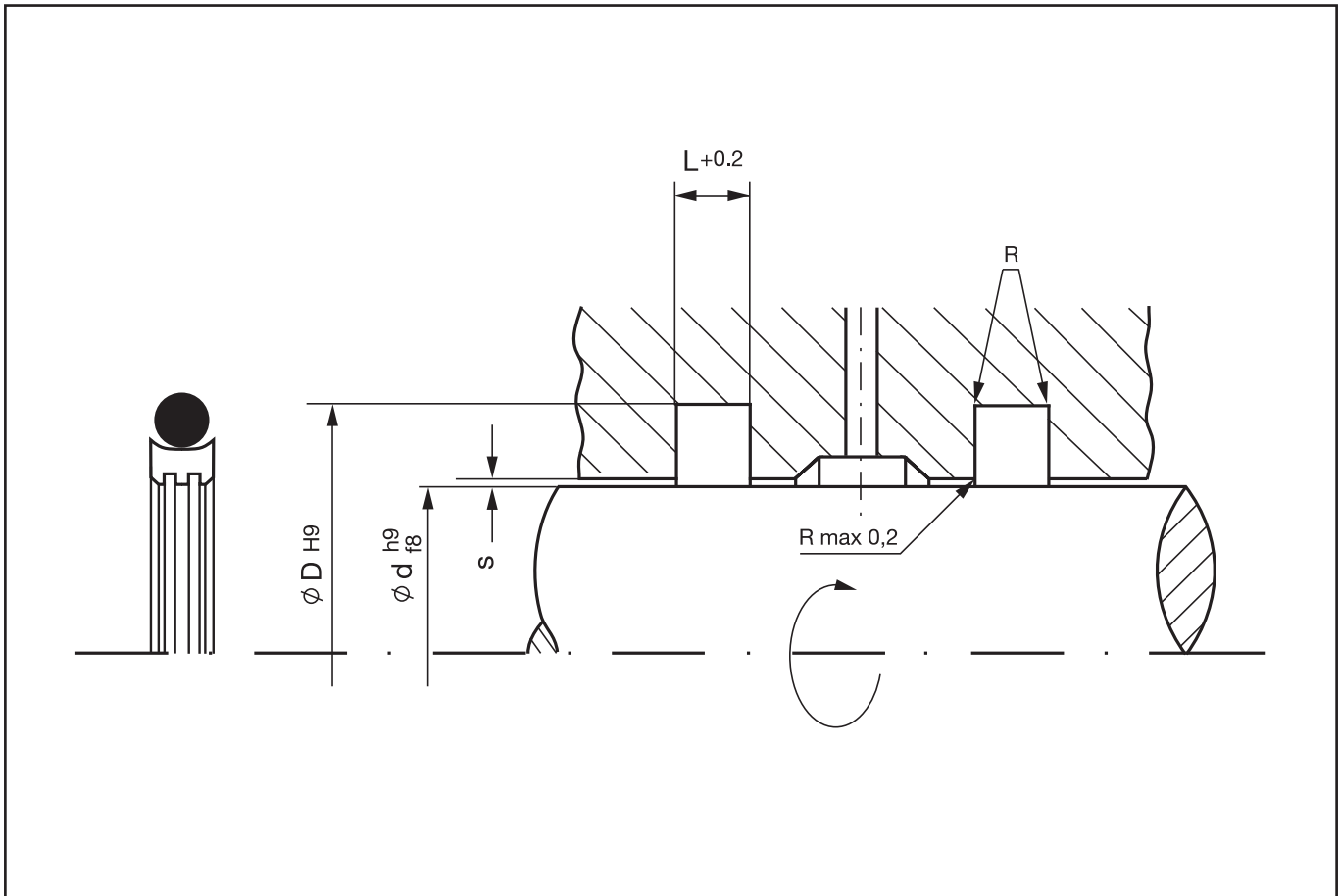
Designation of material:

- PB** - PTFE-bronze
- PK** - PTFE-carbon
- PT** - PTFE compound turquoise
- PE-UHMW** - Polyethylen-ultrahochmolekular
- PU** - Polyurethane

Type designation	∅ D	∅ d	L	O-Ring
NPG - 008 - PK	8	3,1	2,2	006
NPG - 010 - PK	10	5,1	2,2	009
NPG - 012 - PK	12	7,1	2,2	011
NPG - 015 - PK	15	10,1	2,2	012
NPG - 016 - PK	16	11,1	2,2	013
NPG - 018 - PK	18	13,1	2,2	014
NPG - 020 - PK	20	15,1	2,2	016
NPG - 022 - PK	22	17,1	2,2	017
NPG - 025 - PK	25	20,1	2,2	019
NPG - 028 - PK	28	23,1	2,2	021
NPG - 030 - PK	30	25,1	2,2	022
NPG - 032 - PK	32	27,1	2,2	023
NPG - 035 - PK	35	30,1	2,2	025
NPG - 038 - PK	38	33,1	2,2	027
NPG - 040 - PK	40	32,5	3,2	125
NPG - 042 - PK	42	34,5	3,2	126
NPG - 045 - PK	45	37,5	3,2	128
NPG - 048 - PK	48	40,5	3,2	130
NPG - 050 - PK	50	42,5	3,2	131
NPG - 052 - PK	52	44,5	3,2	132
NPG - 055 - PK	55	47,5	3,2	134
NPG - 060 - PK	60	52,5	3,2	137
NPG - 063 - PK	63	55,5	3,2	139
NPG - 065 - PK	65	57,5	3,2	141
NPG - 070 - PK	70	62,5	3,2	144
NPG - 075 - PK	75	67,5	3,2	147
NPG - 080 - PK	80	69,0	4,2	232
NPG - 085 - PK	85	74,0	4,2	234
NPG - 090 - PK	90	79,0	4,2	235
NPG - 095 - PK	95	84,0	4,2	236
NPG - 100 - PK	100	89,0	4,2	238
NPG - 105 - PK	105	94,0	4,2	240
NPG - 110 - PK	110	99,0	4,2	241
NPG - 115 - PK	115	104,0	4,2	243
NPG - 120 - PK	120	109,0	4,2	244
NPG - 125 - PK	125	114,0	4,2	246
NPG - 130 - PK	130	119,0	4,2	247
NPG - 135 - PK	135	119,5	6,3	350

Type designation	∅ D	∅ d	L	O-Ring
NPG - 140 - PK	140	124,5	6,3	352
NPG - 150 - PK	150	134,5	6,3	355
NPG - 160 - PK	160	144,5	6,3	358
NPG - 170 - PK	170	154,5	6,3	361
NPG - 180 - PK	180	164,5	6,3	363
NPG - 190 - PK	190	174,5	6,3	364
NPG - 200 - PK	200	184,5	6,3	366
NPG - 210 - PK	210	194,5	6,3	367
NPG - 220 - PK	220	204,5	6,3	369
NPG - 230 - PK	230	214,5	6,3	371
NPG - 240 - PK	240	224,5	6,3	372
NPG - 250 - PK	250	234,5	6,3	374
NPG - 280 - PK	280	264,5	6,3	377
NPG - 300 - PK	300	284,5	6,3	379
NPG - 320 - PK	320	304,5	6,3	381
NPG - 350 - PK	350	329,0	8,1	455
NPG - 360 - PK	360	335,5	8,1	456
NPG - 400 - PK	400	379,0	8,1	458
NPG - 420 - PK	420	399,0	8,1	460
NPG - 450 - PK	450	429,0	8,1	463
NPG - 480 - PK	480	459,0	8,1	465
NPG - 500 - PK	500	479,0	8,1	467
NPG - 520 - PK	520	499,0	8,1	468
NPG - 550 - PK	550	529,0	8,1	470
NPG - 600 - PK	600	579,0	8,1	472
NPG - 650 - PK	650	629,0	8,1	474
NPG - 700 - PK	700	672,0	9,5	670 x 8,4
NPG - 750 - PK	750	722,0	9,5	720 x 8,4

Further dimension and in-between sizes upon request.



Max. Operating Conditions *

Pressure (MPa)	≤ 30 (300 bar)
Temperature (°C)	- 30 / + 110 / + 200
Speed (m/s)	≤ 2 (0,5)**

Media: Hydraulic fluids upon oil-basis,
hardly inflaming hydraulic fluids,
HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$
Groove flanks	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$
Running surface	$\leq 0,3 \mu\text{m}$	$\leq 3 \mu\text{m}$

Material

PTFE-bronze / -carbon	PB / PK
PTFE compound turquoise	PT
Polyethylen-ultrahochmolekular	PE-UHMW
Polyurethane	PU **

Technical Description

The internal rotary seal **NCG** consists of a PTFE compound sealing ring preset by a O-Ring.

The seal serves for the reciprocal sealing of rotary transmissions, slew drive units, etc.

The PTFE material stands out for very good sliding characteristics, low attrition rate as well as high extrusion resistance.

The thermal and chemical stability of the PTFE material allows for the use in a wide range of different applications.

The standard material for the **NCG** rotary seal is PTFE + carbon with an O-Ring in NBR 70° shore A.

*Max. operating conditions:

Field of application and service conditions are decisive for the selection of the PTFE compound, respectively the material qualities. Temperature and chemical resistiveness in reliance of the chosen O-Ring material.

Assembly dimensions

Diameter \varnothing d		Groove bottom \varnothing D	L.dim.	Notches	O-Ring \varnothing
Standard	Extended Range / 1				
6 - 18,9	6 - 130,0	\varnothing d + 4,9	2,2	1	1,78
19 - 37,9	10 - 245,0	\varnothing d + 7,5	3,2	1	2,62
38 - 199,9	19 - 455,0	\varnothing d + 11,0	4,2	1	3,53
200 - 255,9	38 - 655,0	\varnothing d + 15,5	6,3	2	5,33
256 - 649,9	120 - 655,0	\varnothing d + 21,0	8,1	2	7,00
650 - 999,9	650 - 999,9	\varnothing d + 28,0	9,5	2	8,40

If the groove width (L dim.) differs from the standard series, the complementary number /1 is added to the order designation. (recommended up to 100 bar)

Subject to the diameter (D) the corresponding groove bottom diameters (d) and assembly dimensions (L dim.) are to be taken from the above table.

Gap dimensions s (mm)

L.dim.	0 - 20 MPa	20 - 40 MPa	Radius R
2,2	0,40 - 0,20	0,20 - 0,10	0,5
3,2	0,40 - 0,20	0,20 - 0,10	0,5
4,2	0,60 - 0,30	0,30 - 0,20	0,5
6,3	0,80 - 0,40	0,40 - 0,20	0,9
8,1	1,00 - 0,50	0,50 - 0,30	0,9
9,5	1,00 - 0,50	0,50 - 0,30	0,9

	Rotary Seal Type	Dimension	Material
Ordering example:	Rotary Seal	\varnothing d 80 x 91,0 x 4,2	PTFE-carbon
Order designation:	NCG -	80 x 91,0 x 4,2	- PK

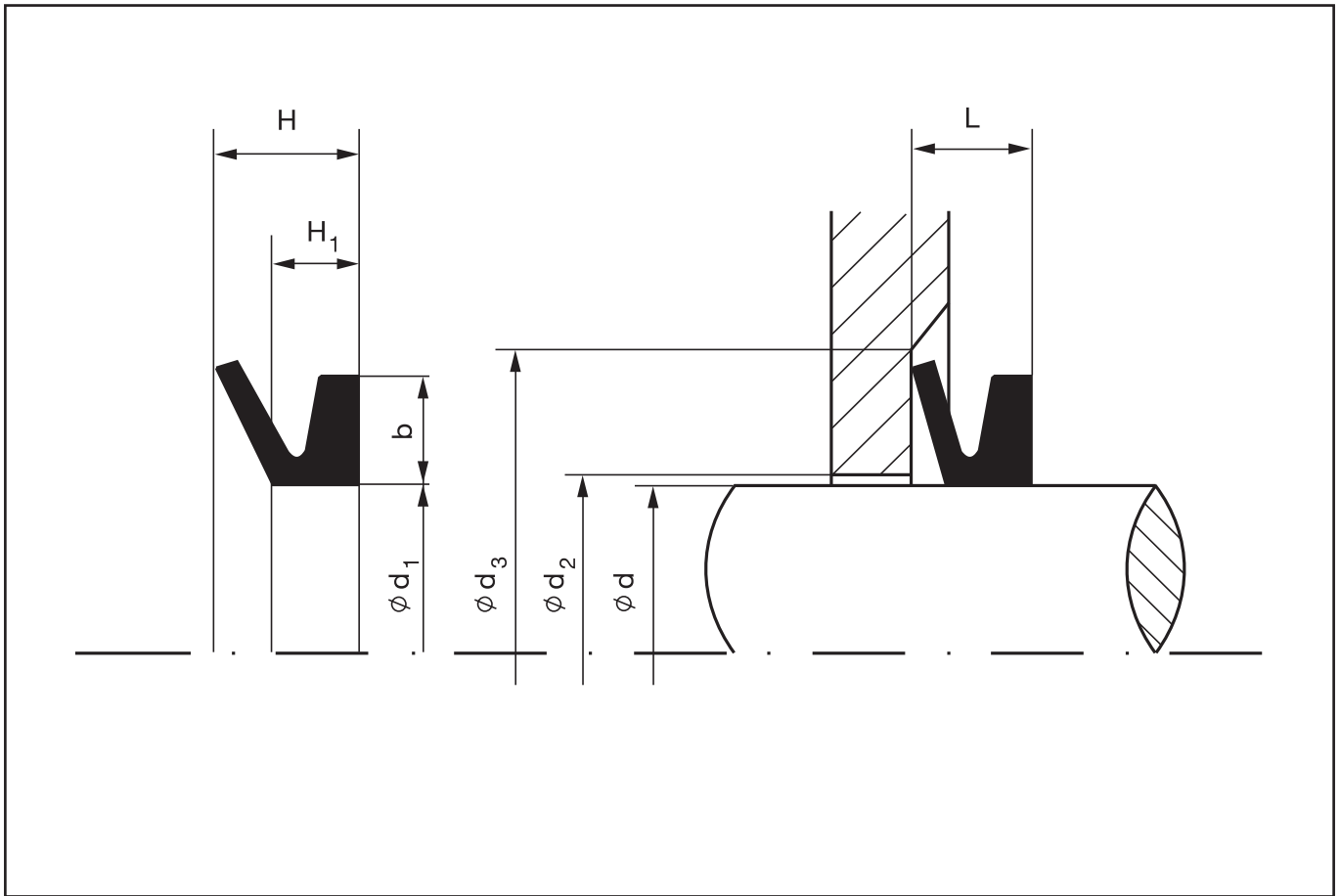
Designation of material:

- PB** - PTFE-bronze
- PK** - PTFE-carbon
- PT** - PTFE compound turquoise
- PE-UHMW** - Polyethylen-ultrahochmolekular
- PU** - Polyurethane

Type designation	∅ d	∅ D	L	O-Ring
NCG - 006 - PK	6	10,9	2,2	011
NCG - 008 - PK	8	12,9	2,2	012
NCG - 010 - PK	10	14,9	2,2	014
NCG - 012 - PK	12	16,9	2,2	015
NCG - 014 - PK	14	18,9	2,2	016
NCG - 015 - PK	15	19,9	2,2	017
NCG - 016 - PK	16	20,9	2,2	017
NCG - 018 - PK	18	22,9	2,2	019
NCG - 020 - PK	20	27,5	3,2	119
NCG - 022 - PK	22	29,5	3,2	120
NCG - 025 - PK	25	32,5	3,2	122
NCG - 028 - PK	28	35,5	3,2	124
NCG - 030 - PK	30	37,5	3,2	125
NCG - 032 - PK	32	39,5	3,2	126
NCG - 035 - PK	35	42,5	3,2	128
NCG - 036 - PK	36	43,5	3,2	129
NCG - 038 - PK	38	49,0	4,2	224
NCG - 040 - PK	40	51,0	4,2	224
NCG - 042 - PK	42	53,0	4,2	224
NCG - 045 - PK	45	56,0	4,2	226
NCG - 048 - PK	48	59,0	4,2	229
NCG - 050 - PK	50	61,0	4,2	227
NCG - 052 - PK	52	63,0	4,2	227
NCG - 055 - PK	55	66,0	4,2	228
NCG - 056 - PK	56	67,0	4,2	229
NCG - 060 - PK	60	71,0	4,2	230
NCG - 063 - PK	63	74,0	4,2	231
NCG - 065 - PK	65	76,0	4,2	232
NCG - 070 - PK	70	81,0	4,2	233
NCG - 075 - PK	75	86,0	4,2	235
NCG - 080 - PK	80	91,0	4,2	236
NCG - 085 - PK	85	96,0	4,2	238
NCG - 090 - PK	90	101,0	4,2	239
NCG - 095 - PK	95	106,0	4,2	240
NCG - 100 - PK	100	111,0	4,2	242
NCG - 105 - PK	105	116,0	4,2	244
NCG - 110 - PK	110	121,0	4,2	246
NCG - 115 - PK	115	126,0	4,2	247

Type designation	∅ d	∅ D	L	O-Ring
NCG - 120 - PK	120	131,0	4,2	249
NCG - 125 - PK	125	136,0	4,2	250
NCG - 130 - PK	130	141,0	4,2	252
NCG - 135 - PK	135	146,0	4,2	253
NCG - 140 - PK	140	151,0	4,2	255
NCG - 150 - PK	150	161,0	4,2	258
NCG - 160 - PK	160	171,0	4,2	259
NCG - 170 - PK	170	181,0	4,2	261
NCG - 180 - PK	180	191,0	4,2	263
NCG - 190 - PK	190	201,0	4,2	264
NCG - 200 - PK	200	215,5	6,3	369
NCG - 210 - PK	210	225,5	6,3	371
NCG - 220 - PK	220	235,5	6,3	373
NCG - 240 - PK	240	255,5	6,3	375
NCG - 250 - PK	250	265,5	6,3	377
NCG - 280 - PK	280	301,0	8,1	452
NCG - 300 - PK	300	321,0	8,1	453
NCG - 320 - PK	320	341,0	8,1	455
NCG - 330 - PK	330	354,0	8,1	456
NCG - 350 - PK	350	371,0	8,1	457
NCG - 360 - PK	360	381,0	8,1	458
NCG - 400 - PK	400	421,0	8,1	461
NCG - 420 - PK	420	441,0	8,1	462
NCG - 450 - PK	450	471,0	8,1	465
NCG - 480 - PK	480	501,0	8,1	467
NCG - 500 - PK	500	521,0	8,1	469
NCG - 520 - PK	520	541,0	8,1	470
NCG - 550 - PK	550	571,0	8,1	471
NCG - 600 - PK	600	621,0	8,1	473
NCG - 650 - PK	600	678,0	9,5	660x8,4
NCG - 700 - PK	700	728,0	9,5	710x8,4

Further dimension and in-between sizes upon request.



Max. Operating Conditions

Pressure (MPa)	-	
Temperature (°C)	- 30 / + 110 / + 200	
Speed (m/s)	≤ 12	
Media:	mineral and synthetic oils, air, water, emulsions and grease	

Recommended Surface Finish

Surface roughness	R_a	R_t
Running surface	≤ 3,2 μm	≤ 16 μm

Material

NBR	N
FKM (Viton®)	V

Technical Description

The V-Ring type **VA** is an axially acting shaft sealing ring made of elastomer, appropriate for sealing against water, oil, grease, dust and dirt. The ring is seated on the shaft and turns with the shaft. The sealing lip slides and seals on a counterrotation surface that is normal to the shaft. A secure sealing action is given even if the shaft is slightly inclined or turning eccentrically.

From a peripheral speed of 8 m/s it is recommended to axially support the V-Ring.

From 12 m/s the V-Ring should be further secured with a strap retainer or through chambering.

At high peripheral speeds of over 20 m/s the sealing lip clears the counterrotation surface. Then the V-Ring acts as a centrifugal ring.

Type designation		Ø d ₁	Profile- height b	Profile width before / after installation			Diameter max. min.	
				H ₁	H	L	Ø d ₂	Ø d ₃
d min. - max.								
VA - 3	2,7 - 3,5	2,5	1,5	2,1	3,0	2,5+/-0,3	d+1	d+4
VA - 4	3,5 - 4,5	3,2	2	2,4	3,7	3,0+/-0,4	d+1	d+6
VA - 5	4,5 - 5,5	4,0	2	2,4	3,7	3,0+/-0,4	d+1	d+6
VA - 6	5,5 - 6,5	5,0	2	2,4	3,7	3,0+/-0,4	d+1	d+6
VA - 7	6,5 - 8,0	6,0	2	2,4	3,7	3,0+/-0,4	d+1	d+6
VA - 8	8,0 - 9,5	7,0	2	2,4	5,5	3,0+/-0,4	d+1	d+6
VA - 10	9,5 - 11,5	9,0	3	3,4	5,5	4,5+/-0,6	d+2	d+9
VA - 12	11,5 - 12,5	10,5	3	3,4	5,5	4,5+/-0,6	d+2	d+9
VA - 13	12,5 - 13,5	11,7	3	3,4	5,5	4,5+/-0,6	d+2	d+9
VA - 14	13,5 - 15,5	12,5	3	3,4	5,5	4,5+/-0,6	d+2	d+9
VA - 16	15,5 - 17,5	14,0	3	3,4	5,5	4,5+/-0,6	d+2	d+9
VA - 18	17,5 - 19,0	16,0	3	3,4	5,5	4,5+/-0,6	d+2	d+9
VA - 20	19,0 - 21	18,0	4	4,7	7,5	6,0+/-0,8	d+2	d+12
VA - 22	21,0 - 24	20,0	4	4,7	7,5	6,0+/-0,8	d+2	d+12
VA - 25	24,0 - 27	22,0	4	4,7	7,5	6,0+/-0,8	d+2	d+12
VA - 28	27,0 - 29	25,0	4	4,7	7,5	6,0+/-0,8	d+3	d+12
VA - 30	29,0 - 31	27,0	4	4,7	7,5	6,0+/-0,8	d+3	d+12
VA - 32	31,0 - 33	29,0	4	4,7	7,5	6,0+/-0,8	d+3	d+12
VA - 35	33,0 - 36	31,0	4	4,7	7,5	6,0+/-0,8	d+3	d+12
VA - 38	36,0 - 38	34,0	4	4,7	7,5	6,0+/-0,8	d+3	d+12
VA - 40	38,0 - 43	36,0	5	5,5	9,0	7,0+/-1,0	d+3	d+15
VA - 45	43,0 - 48	40,0	5	5,5	9,0	7,0+/-1,0	d+3	d+15
VA - 50	48,0 - 53	45,0	5	5,5	9,0	7,0+/-1,0	d+3	d+15
VA - 55	53,0 - 58	49,0	5	5,5	9,0	7,0+/-1,0	d+3	d+15
VA - 60	58,0 - 63	54,0	5	5,5	9,0	7,0+/-1,0	d+3	d+15

V-Ring Type

Dimension

Material

Ordering example: V-Ring 20 for shaft

Ø 19 - 21

NBR

Order designation:

VA -

20

- N

Designation of material:

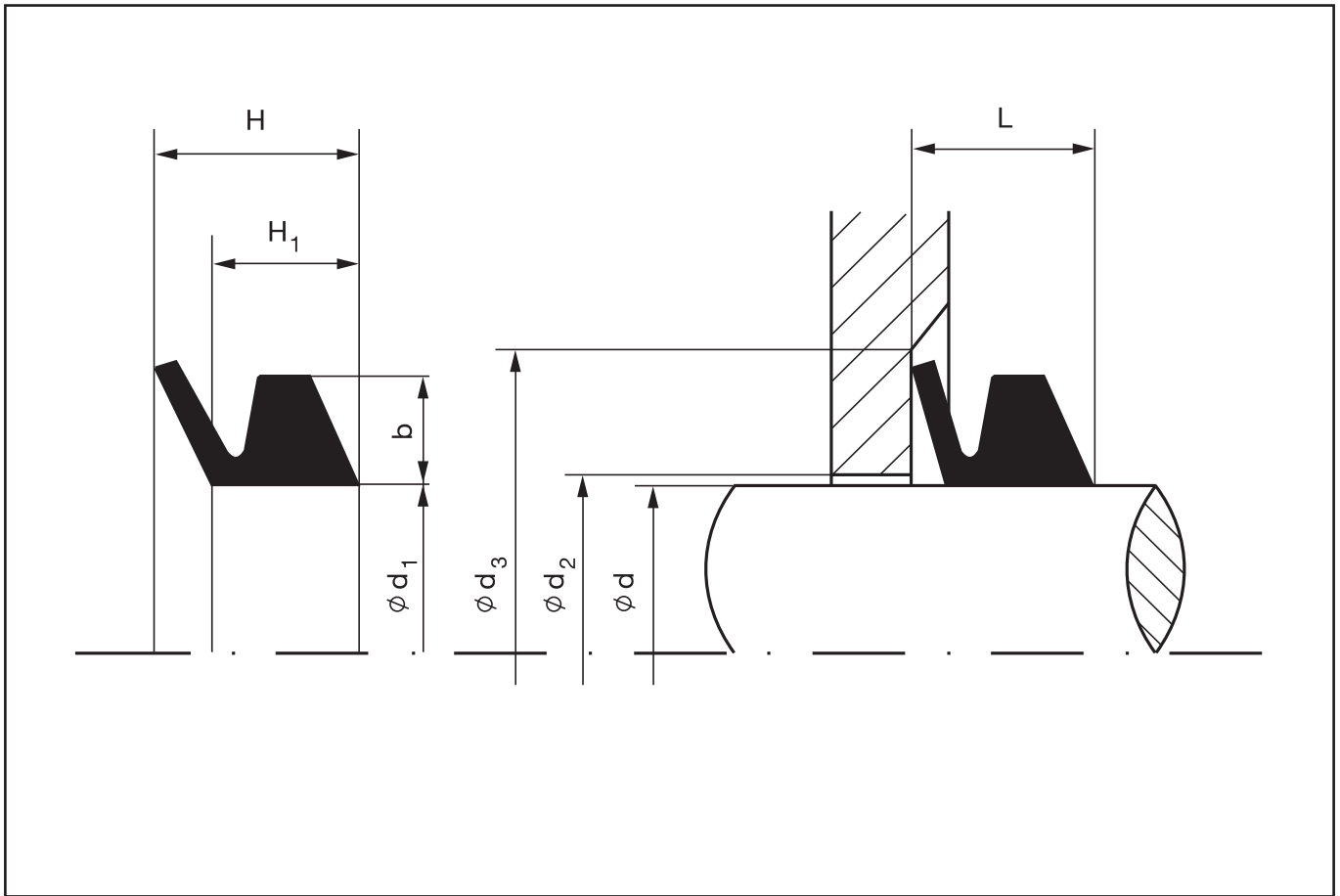
N - NBR

V - FKM (Viton®)

Type designation	d min. - max.	Ø d ₁	Profile- height b	Profile width before / after installation			Diameter max. min.	
				H ₁	H	L	Ø d ₂	Ø d ₃
VA - 65	63 - 68	58	5	5,5	9,0	7,0+/-1,0	d+3	d+15
VA - 70	68 - 73	63	6	6,8	11,0	9,0+/-1,2	d+4	d+18
VA - 75	73 - 78	67	6	6,8	11,0	9,0+/-1,2	d+4	d+18
VA - 80	78 - 83	72	6	6,8	11,0	9,0+/-1,2	d+4	d+18
VA - 85	83 - 88	76	6	6,8	11,0	9,0+/-1,2	d+4	d+18
VA - 90	88 - 93	81	6	6,8	11,0	9,0+/-1,2	d+4	d+18
VA - 95	93 - 98	85	6	6,8	11,0	9,0+/-1,2	d+4	d+18
VA - 100	98 - 105	90	6	6,8	11,0	9,0+/-1,2	d+4	d+18
VA - 110	105 - 115	99	7	7,9	12,8	10,5+/-1,5	d+4	d+21
VA - 120	115 - 125	108	7	7,9	12,8	10,5+/-1,5	d+4	d+21
VA - 130	125 - 135	117	7	7,9	12,8	10,5+/-1,5	d+4	d+21
VA - 140	135 - 145	126	7	7,9	12,8	10,5+/-1,5	d+4	d+21
VA - 150	145 - 155	135	7	7,9	12,8	10,5+/-1,5	d+4	d+21
VA - 160	155 - 165	144	8	9,0	14,5	12,0+/-1,8	d+5	d+24
VA - 170	165 - 175	153	8	9,0	14,5	12,0+/-1,8	d+5	d+24
VA - 180	175 - 185	162	8	9,0	14,5	12,0+/-1,8	d+5	d+24
VA - 190	185 - 195	171	8	9,0	14,5	12,0+/-1,8	d+5	d+24
VA - 199	195 - 210	180	8	9,0	14,5	12,0+/-1,8	d+5	d+24
VA - 200	190 - 210	180	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 220	210 - 235	198	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 250	235 - 265	225	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 275	265 - 290	247	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 300	290 - 310	270	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 325	310 - 335	292	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 350	335 - 365	315	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 375	365 - 390	337	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 400	390 - 430	360	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 450	430 - 480	405	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 500	480 - 530	450	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 550	530 - 580	495	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 600	580 - 630	540	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 650	630 - 665	600	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 700	665 - 705	630	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 725	705 - 745	670	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 750	745 - 785	705	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 800	785 - 830	745	15	14,3	25,0	20,0+/-4,0	d+10	d+45

Type designation			Profile- height	Profile width before / after installation			Diameter max. min.	
	d min. - max.	∅ d ₁	b	H ₁	H	L	∅ d ₂	∅ d ₃
VA - 850	830 - 875	785	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 900	875 - 920	825	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 950	920 - 965	865	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 1000	965 - 1015	910	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 1050	1015 - 1065	955	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 1100	1065 - 1115	1000	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 1150	1115 - 1165	1045	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 1200	1165 - 1215	1090	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 1250	1215 - 1270	1135	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 1300	1270 - 1320	1180	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 1350	1320 - 1370	1225	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 1400	1370 - 1420	1270	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 1450	1420 - 1470	1315	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 1500	1470 - 1520	1360	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 1550	1520 - 1570	1405	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 1600	1570 - 1620	1450	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 1650	1620 - 1670	1495	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 1700	1670 - 1720	1540	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 1750	1720 - 1770	1585	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 1800	1770 - 1820	1630	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 1850	1820 - 1870	1675	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 1900	1870 - 1920	1720	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 1950	1920 - 1970	1765	15	14,3	25,0	20,0+/-4,0	d+10	d+45
VA - 2000	1970 - 2020	1810	15	14,3	25,3	20,0+/-4,0	d+10	d+45

Further dimension and in-between sizes upon request.



Max. Operating Conditions

Pressure (MPa)	-	
Temperature (°C)	- 30 / + 110 (NBR)	- 20 / + 200 (FKM)
Speed (m/s)	≤ 12	
Media:	mineral and synthetic oils, air, water, pemulsions and grease	

Recommended Surface Finish

Surface roughness	R_a	R_t
Running surface	≤ 3,2 μm	≤ 16 μm

Material

NBR	N
FKM (Viton®)	V

Technical Description

The V-Ring type **VS** is an axially acting shaft sealing ring made of elastomer, appropriate for sealing against water, oil, grease, dust and dirt. The ring is seated on the shaft and turns with the shaft. The sealing lip slides and seals on a counterrotation surface that is normal to the shaft. A secure sealing is given even if the shaft is slightly inclined or turning eccentrically.

From a peripheral speed of 8 m/s it is recommended to axially support the V-Ring.

From 12 m/s the V-Ring should be further secured with a strap retainer or through chambering.

At high peripheral speeds of over 20 m/s the sealing lip clears the counterrotation surface. Then the V-Ring acts as a centrifugal ring.

Type designation		Ø d ₁	Profile- height b	Profile width before / after installation			Diameter max. min.	
				d min. - max.	H ₁	H	L	Ø d ₂
VS - 5	4,5 - 5,5	4,0	2	3,9	5,2	4,5+/-0,4	d+1	d+6
VS - 6	5,5 - 6,5	5,0	2	3,9	5,2	4,5+/-0,4	d+1	d+6
VS - 7	6,5 - 8,0	6,0	2	3,9	5,2	4,5+/-0,4	d+1	d+6
VS - 8	8,0 - 9,5	7,0	2	3,9	5,2	4,5+/-0,4	d+1	d+6
VS - 10	9,5 - 11,5	9,0	3	5,6	7,7	6,7+/-0,6	d+2	d+9
VS - 12	11,5 - 13,5	10,5	3	5,6	7,7	6,7+/-0,6	d+2	d+9
VS - 14	13,5 - 15,5	12,5	3	5,6	7,7	6,7+/-0,6	d+2	d+9
VS - 16	15,5 - 17,5	14,0	3	5,6	7,7	6,7+/-0,6	d+2	d+9
VS - 18	17,5 - 19,0	16,0	3	5,6	7,7	6,7+/-0,6	d+2	d+9
VS - 20	19,0 - 21,0	18,0	4	7,9	10,5	9,0+/-0,8	d+2	d+12
VS - 22	21,0 - 24,0	20,0	4	7,9	10,5	9,0+/-0,8	d+2	d+12
VS - 25	24,0 - 27,0	22,0	4	7,9	10,5	9,0+/-0,8	d+2	d+12
VS - 28	27,0 - 29,0	25,0	4	7,9	10,5	9,0+/-0,8	d+3	d+12
VS - 30	29,0 - 31,0	27,0	4	7,9	10,5	9,0+/-0,8	d+3	d+12
VS - 32	31,0 - 33,0	29,0	4	7,9	10,5	9,0+/-0,8	d+3	d+12
VS - 35	33,0 - 36,0	31,0	4	7,9	10,5	9,0+/-0,8	d+3	d+12
VS - 38	36,0 - 38,0	34,0	4	7,9	10,5	9,0+/-0,8	d+3	d+12
VS - 40	38,0 - 43,0	36,0	5	9,5	13,0	11,0+/-1,0	d+3	d+15
VS - 45	43,0 - 48,0	40,0	5	9,5	13,0	11,0+/-1,0	d+3	d+15
VS - 50	48,0 - 53,0	45,0	5	9,5	13,0	11,0+/-1,0	d+3	d+15
VS - 55	53,0 - 58,0	49,0	5	9,5	13,0	11,0+/-1,0	d+3	d+15
VS - 60	58,0 - 63,0	54,0	5	9,5	13,0	11,0+/-1,0	d+3	d+15
VS - 65	63,0 - 68,0	58,0	5	9,5	13,0	11,0+/-1,0	d+3	d+15
VS - 70	68,0 - 73,0	63,0	6	11,3	15,5	13,5+/-1,2	d+4	d+18
VS - 75	73,0 - 78,0	67,0	6	11,3	15,5	13,5+/-1,2	d+4	d+18
VS - 80	78,0 - 83,0	72,0	6	11,3	15,5	13,5+/-1,2	d+4	d+18

V-Ring Type

Dimension

Material

Ordering example: V-Ring 20 for shaft

Ø 19 - 21

NBR

Order designation:

VS -

20

- N

Designation of material:

N - NBR

V - FKM (Viton®)

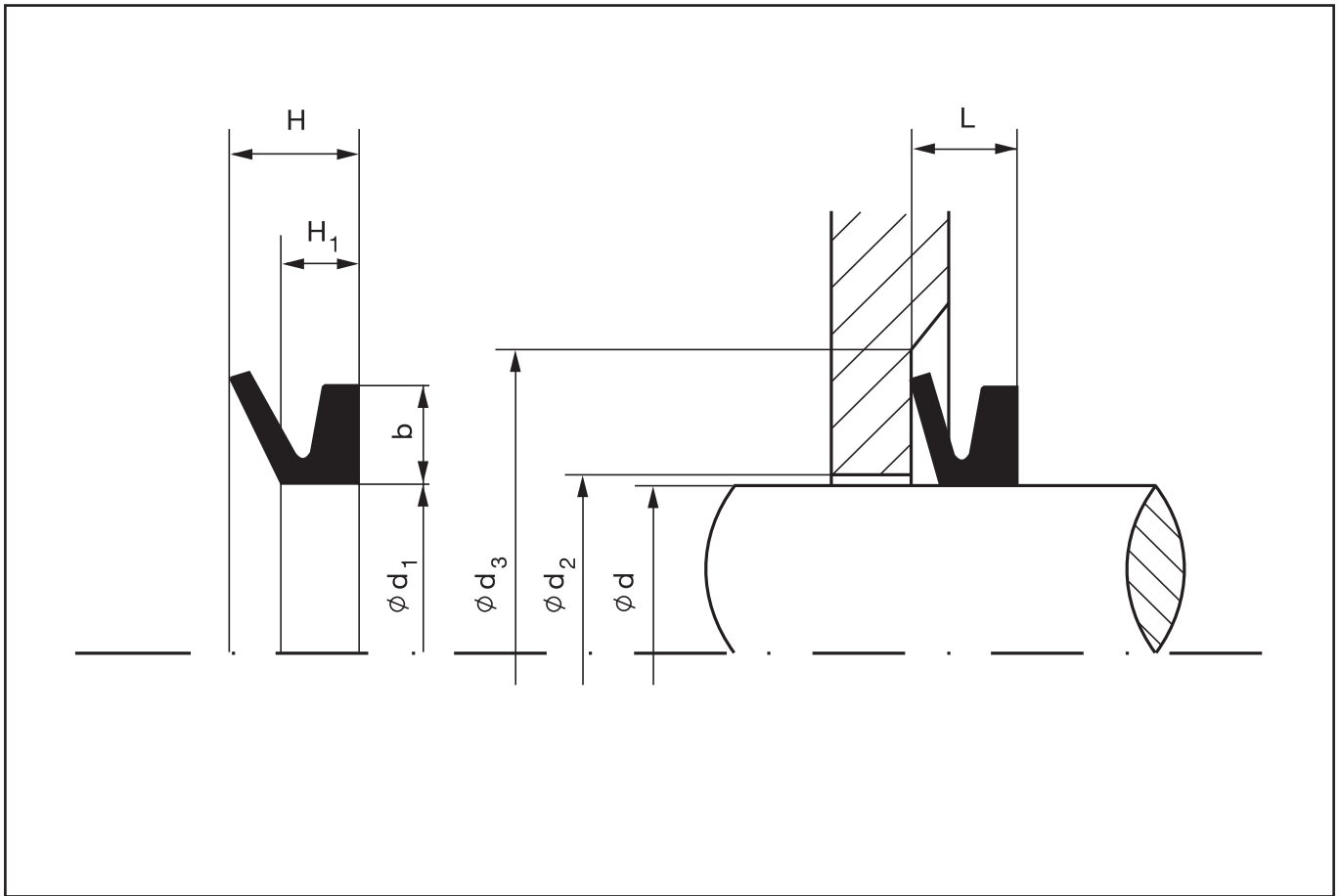
VS

V-Ring

Type designation		Ø d ₁	Profile- height b	Profile width before / after installation			Diameter max. min.	
	d min. - max.			H₁	H	L	Ø d ₂	Ø d ₃
VS - 85	83,0 - 88,0	76,0	6	11,3	15,5	13,5+/-1,2	d+4	d+18
VS - 90	88,0 - 93,0	81,0	6	11,3	15,5	13,5+/-1,2	d+4	d+18
VS - 95	93,0 - 98,0	85,0	6	11,3	15,5	13,5+/-1,2	d+4	d+18
VS - 100	98,0 - 105,0	90,0	6	11,3	15,5	13,5+/-1,2	d+4	d+18
VS - 110	105,0 - 115,0	99,0	7	13,1	18,0	15,5+/-1,5	d+4	d+21
VS - 120	115,0 - 125,0	108,0	7	13,1	18,0	15,5+/-1,5	d+4	d+21
VS - 130	125,0 - 135,0	117,0	7	13,1	18,0	15,5+/-1,5	d+4	d+21
VS - 140	135,0 - 145,0	126,0	7	13,1	18,0	15,5+/-1,5	d+4	d+21
VS - 150	145,0 - 155,0	135,0	7	13,1	18,0	15,5+/-1,5	d+4	d+21
VS - 160	155,0 - 165,0	144,0	8	15,0	20,5	18,0+/-1,8	d+5	d+24
VS - 170	165,0 - 175,0	153,0	8	15,0	20,5	18,0+/-1,8	d+5	d+24
VS - 180	175,0 - 185,0	162,0	8	15,0	20,5	18,0+/-1,8	d+5	d+24
VS - 190	185,0 - 195,0	171,0	8	15,0	20,5	18,0+/-1,8	d+5	d+24
VS - 199	195,0 - 210,0	180,0	8	15,0	20,5	18,0+/-1,8	d+5	d+24

Further dimension and in-between sizes upon request.

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.



Max. Operating Conditions

Pressure (MPa)	-	
Temperature (°C)	- 30 / + 110 (NBR)	- 20 / + 200 (FKM)
Speed (m/s)	≤ 12	
Media:	mineral and synthetic oils, air, water, emulsions and grease	

Recommended Surface Finish

Surface roughness	R_a	R_t
Running surface	≤ 3,2 µm	≤ 16 µm

Material

NBR	N
FKM (Viton®)	V

Technical Description

The V-Ring type **VL** is an axially acting shaft sealing ring made of elastomer, appropriate for sealing against water, oil, grease, dust and dirt. The ring is seated on the shaft and turns with the shaft. The sealing lip slides and seals on a counterrotation surface that is normal to the shaft. A secure sealing is given even if the shaft is slightly inclined or turning eccentrically.

Die Bauform **VL** hat eine kleine Profilgeometrie und ist daher für Konstruktionen geeignet, in denen begrenzte Einbauträume zur Verfügung stehen. Die Profilgröße ist im angegebenen Durchmesserbereich gleich.

From a peripheral speed of 8 m/s it is recommended to axially support the V-Ring.

From 12 m/s the V-Ring should be further secured with a strap retainer or through chambering.

At high peripheral speeds of over 20 m/s the sealing lip clears the counterrotation surface. Then the V-Ring acts as a centrifugal ring.

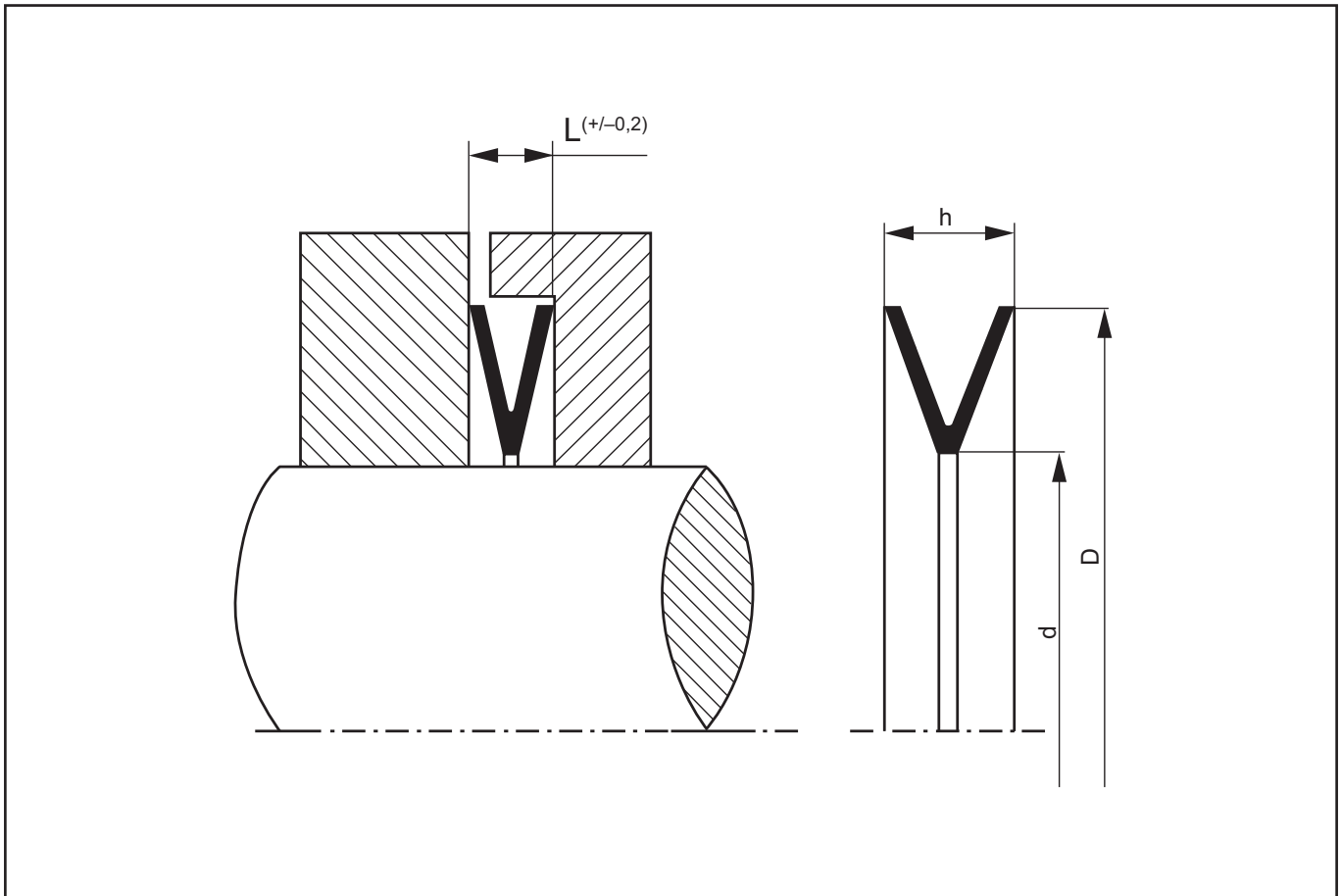
Type designation			Profile- height	Profile width before / after installation			Diameter max. min.	
	d min. - max.	∅ d ₁	b	H ₁	H	L	∅ d ₂	∅ d ₃
VL - 140	135 - 145	126	6,5	6,0	10,5	8,0+/-1,5	d+5	d+20
VL - 150	145 - 155	135	6,5	6,0	10,5	8,0+/-1,5	d+5	d+20
VL - 160	155 - 165	144	6,5	6,0	10,5	8,0+/-1,5	d+5	d+20
VL - 170	165 - 175	153	6,5	6,0	10,5	8,0+/-1,5	d+5	d+20
VL - 180	175 - 185	162	6,5	6,0	10,5	8,0+/-1,5	d+5	d+20
VL - 190	185 - 195	171	6,5	6,0	10,5	8,0+/-1,5	d+5	d+20
VL - 200	195 - 210	182	6,5	6,0	10,5	8,0+/-1,5	d+5	d+20
VL - 220	210 - 233	198	6,5	6,0	10,5	8,0+/-1,5	d+5	d+20
VL - 250	233 - 260	225	6,5	6,0	10,5	8,0+/-1,5	d+5	d+20
VL - 275	260 - 285	247	6,5	6,0	10,5	8,0+/-1,5	d+5	d+20
VL - 300	285 - 310	270	6,5	6,0	10,5	8,0+/-1,5	d+5	d+20
VL - 325	310 - 335	292	6,5	6,0	10,5	8,0+/-1,5	d+5	d+20
VL - 350	335 - 365	315	6,5	6,0	10,5	8,0+/-1,5	d+5	d+20
VL - 375	365 - 385	337	6,5	6,0	10,5	8,0+/-1,5	d+5	d+20
VL - 400	385 - 410	360	6,5	6,0	10,5	8,0+/-1,5	d+5	d+20
VL - 425	410 - 440	382	6,5	6,0	10,5	8,0+/-1,5	d+5	d+20
VL - 450	440 - 475	405	6,5	6,0	10,5	8,0+/-1,5	d+5	d+20

Further dimension and in-between sizes upon request.

V-Ring Type	Dimension	Material
Ordering example: V-Ring 140 for shaft	∅ 135 - 145	NBR
Order designation: VL -	140	- N

Designation of material:
N - NBR
V - FKM (Viton®)

DV V-Ring



Max. Operating Conditions

Pressure (MPa)	without compression
Temperature (°C)	- 40 / + 100
Speed (m/s)	-
Media:	mineral and synthetic oils, air, water, emulsions and grease

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$
Groove flanks	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$
Running surface	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$

Material

Polyurethane	PU
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Technical Description

The V-Ring type **DV** prevents the intrusion of dust, dirt and other foreign particles and therefore shields the application from damage.

The adequate initial tension of the PU seal guarantees a reliable sealing.

The V-Ring has a slight axial tolerance and tolerates a misalignment of $\leq 2^\circ$.

The applied material polyurethane grants a long service time and has excellent dry running qualities.

Type designation	∅ D	∅ d	h	L
DV - 27,5	27,5	22,5	4,0	2,0
DV - 32	32,0	26,0	4,0	2,0
DV - 38,5	38,5	31,0	4,5	2,0
DV - 43	43,0	36,0	5,0	2,0
DV - 51	51,0	42,0	6,0	2,5
DV - 57,5	57,5	47,5	7,0	3,0
DV - 64	64,0	54,0	7,0	3,5
DV - 71	71,0	59,0	7,0	3,5
DV - 80	80,0	65,0	7,0	3,5
DV - 86 71	86,0	71,0	9,0	4,0
DV - 86 70	86,0	70,0	9,0	4,0
DV - 88,8	88,8	70,0	8,0	3,5
DV - 95	95,0	85,0	6,0	2,5
DV - 100	100,0	82,0	9,0	4,5
DV - 105	105,0	90,0	9,0	4,5
DV - 112	112,0	96,0	10,0	5,0
DV - 142	142,0	116,0	16,5	7,5
DV - 152	152,0	127,0	16,5	7,5
DV - 162	162,0	137,0	15,0	7,5
DV - 186	186,0	160,0	16,0	7,5

Further dimension and in-between sizes upon request.

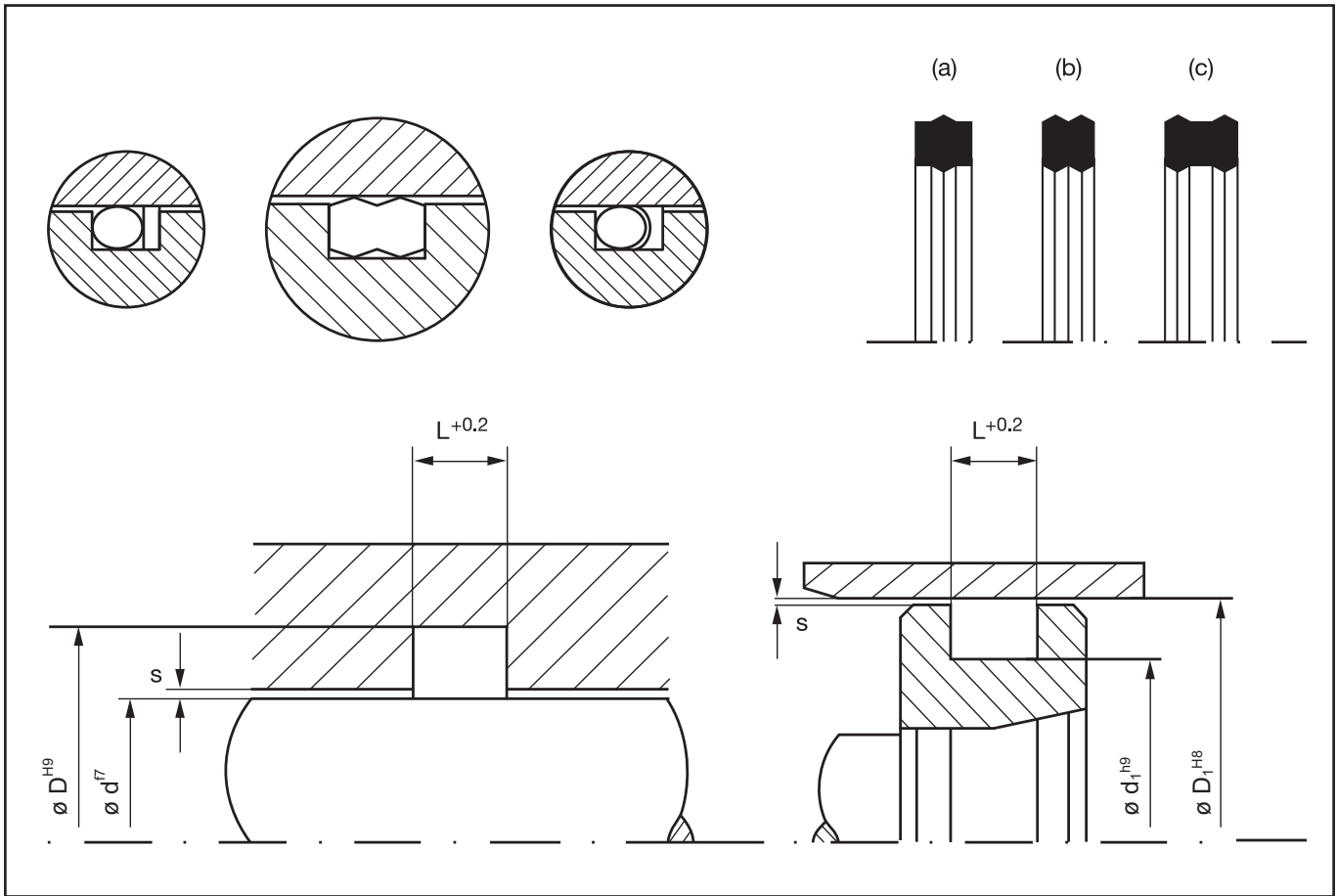
	V-Ring Type	Dimension	Material
Ordering example:	V-Ring DV	∅ 43	Polyurethane
Order designation:	DV -	36 x 43 x 2 / 5	- PU

Designation of material: PU - Polyurethane

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OP

Static Seal



Max. Operating Conditions

Pressure (MPa)	≤ 50 (500 bar)
Temperature (°C)	- 40 / + 100
Speed (m/s)	Static Seal
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface rough-	R_a	R_t
Groove bottom	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$
Groove flanks	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$

Material

Polyurethane	PU
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Technical Description

The static seal **OP**, made of polyurethane, is applied as an alternative to O-Ring, respectively to O-Ring/support ring combinations.

The advantages of the **OP** type as one-piece sealing element are its easy installation, its high twisting immunity, longer running life compared to O-Ring solutions, as well as the high extrusion resistance of the applied polyurethane.

The **OP** seal may be applied for sealings in hydraulic cylinders for easy and medium heavy mobile hydraulics in die-casting machines, hydraulic presses and machine tools.

The hardness of the polyurethane applied in the OP type is about 93° Shore A.

Gap dimensions	Pressure MPa (bar)
0,60	5 (50)
0,40	10 (100)
0,20	20 (200)
0,125	30 (300)
0,08	40 (400)
0,05	50 (500)

Type designation	Rod		Piston		L ^{+0,2}	Profile
	∅ d ^{f7}	∅ D ^{H9}	∅ d ₁ ^{h9}	∅ D ₁ ^{H8}		
OP - 009	5	8,1	5,9	9	2,5	a
OP - 109	8	12,5	8,5	13	3,5	b
OP - 012	9	12,1	9,9	13	2,5	a
OP - 013	11	14,1	10,9	14	2,5	a
OP - 806	11	14,1	11,9	15	2,5	a
OP - 614	12	16,8			3,5	b
OP - 014	13	16,1	12,9	16	2,5	a
OP - 014/A			13,07	15,93	3,5	b
OP - 113	14	18,5	14,5	19	3,5	b
OP - 015	14	17,1	14,9	18	2,5	a
OP - 015/A			14,67	17,53	3,5	b
OP - 616	15	19,5	15,5	20	3,5	b
OP - 016	16	19,1	15,9	17	2,5	a
OP - 016/A			16,25	19,12	2,5	b
OP - 16,0 - 20,0	16	20,0			3,5	b
OP - 16,0 - 30,0	16	30,0			11,0	b
OP - 115	17	21,5	17,5	22	5,5	b
OP - 209	17	23,2	17,8	24	4,5	b
OP - 617	18	22,8			3,5	b
OP - 210	19	25,2	19,8	26	4,5	b
OP - 116/A	19	23,6			3,5	b
OP - 117	20	24,5	20,5	25	3,5	b
OP - 119	24	28,5	24,5	29	3,5	b
OP - 26,6 - 35,0	26,6	35,0			6,5	b
OP - 27,5 - 33,6	27,5	33,6			4,5	b
OP - 121	28	32,5	27,5	32	3,5	b
OP - 216	28	34,2	28,8	35	4,5	b
OP - 216/A	28	34,3			6,5	b

The metric dimensions follow on page 344.

	OP Type	Dimension	Material
Ordering example:	OP for Rod	∅ 17 x 21,5 x 5,5	Polyurethane
Order designation:	OP -	115	- PU

Designation of material: PU - Polyurethane

OP

Static Seal

Type designation	Rod		Piston		L ^{+0,2}	Profile
	∅ d ^{f7}	∅ D ^{H9}	∅ d ₁ ^{h9}	∅ D ₁ ^{H8}		
OP - 28,4 - 32,6	28,4	32,6			3,5	b
OP - 123	30	34,5	30,5	35	3,5	b
OP - 217	30	36,2	30,8	37	4,5	b
OP - 217/A	30	36,3			6,5	b
OP - 218	31	37,2	31,8	38	4,5	b
OP - 219	33	39,2	33,8	40	4,5	b
OP - 34,6 - 40,7	34,6	40,7			4,5	b
OP - 126	35	39,5	35,5	40	3,5	b
OP - 35,1 - 40,6	35,1	40,6			4,5	b
OP - 35,1 - 41,0	35,1	41,0			6,5	b
OP - 824	40	46,2	39,8	46	4,5	b
OP - 826	43	49,2	43,8	50	4,5	b
OP - 132	44	48,5	44,5	49	3,5	b
OP - 031	44	47,1	44,9	48	2,5	a
OP - 44,6 - 50,0	44,6	50,0			6,2	b
OP - 133	46	50,5	46,5	51	3,5	b
OP - 47,5 - 52,0	47,5	52,0			3,5	b
OP - 225/829	48	54,2	47,8	54	4,5	b
OP - 50,5 - 55,0	50,5	55,0			3,5	b
OP - 832	52	58,2	53,8	60	4,5	b
OP - 227/833	54	60,2	54,8	61	4,5	b
OP - 034	54	57,1	54,9	58	3,5	a
OP - 834	56	62,2	55,8	62	4,5	b
OP - 835	57	63,2	57,8	64	4,5	b
OP - 331/A	57	66,4	58,6	68	9,5	c
OP - 836	59	65,2	58,8	65	4,5	b
OP - 61,5 - 66,0	61,5	66,0			3,5	b
OP - 230	64	70,2	63,8	70	4,5	b
OP - 839	64	70,2	63,8	70	4,5	b
OP - 64,3 - 70,0	64,3	70,0			6,7	b
OP - 147	68	72,5	68,5	73	3,5	b
OP - 336/A	73	82,4	73,6	83	9,5	c
OP - 233	73	79,2	73,8	80	4,5	b
OP - 845	73	79,2	73,8	80	4,5	b
OP - 74,5 - 80,0	74,5	80,0			4,5	b
OP - 337/A	76	85,4	76,6	86	9,5	c
OP - 234	76	82,2	76,8	83	4,5	b

Type designation	Rod		Piston		L ^{+0,2}	Profile
	∅ d ^{f7}	∅ D ^{H9}	∅ d ₁ ^{h9}	∅ D ₁ ^{H8}		
OP - 76,6 - 86,0	76,6	86,0			9,5	c
OP - 79,3 - 85,0	79,3	85,0			6,7	b
OP - 620	80	89,4	80,6	90	7,0	c
OP - 236	82	88,2	82,8	89	4,5	b
OP - 84,3 - 90,0	84,3	90,0			6,7	b
OP - 238	89	95,2	88,8	95	4,5	b
OP - 153	89	93,5	89,5	94	3,5	b
OP - 621	90	99,4	90,6	100	7,0	c
OP - 342/A	92	101,4	92,6	102	9,5	c
OP - 239	92	98,2	92,8	99	4,5	b
OP - 101,4 - 110,0	101,4	110,0			9,0	c
OP - 101,7 - 111,0	101,7	111,0			8,5	c
OP - 105,0 - 111,0	105,0	111,0			6,5	b
OP - 106,7 - 116,0	106,7	116,0			8,5	c
OP - 156	108	112,5	108,5	113	4,5	b
OP - 623/A	110	119,4	110,6	120	9,5	c
OP - 110,0 - 116,0	110	116,0			6,5	b
OP - 349/A	114	123,4	115,6	125	9,5	c
OP - 247	117	123,2	117,8	124	4,5	b
OP - 430	130	142,2	130,8	143	9,5	c
OP - 132,8 - 145,0	132,8	145,0			9,5	c
OP - 134,0 - 140,3	134	140,3			6,0	b
OP - 145,0 - 151,0	145	151,0			6,0	c
OP - 436	149	161,2	149,8	162	9,5	c
OP - 165,0 - 171,0	165	171,0			6,0	c
OP - 876	168	180,2	169,8	182	9,5	c
OP - 185,0 - 191,0	185	191,0			6,0	c
OP - 443	190	202,2	190,8	203	9,5	c
OP - 196,4 - 205,0	196,4	205,0			9,0	b
OP - 207,0 - 213,0	207	213,0			6,0	c
OP - 233,5 - 240,5	233,5	240,5			9,0	c
OP - 262,0 - 272,0	262	272,0			9,5	c
OP - 293,0 - 303,0	293	303,0			9,5	c

Metric Dimensions

Type designation	∅ d ^{f7}	∅ D ^{H8}	H	L ^{+0,2}	Profile
OP - 9 - 11,5 - 2,1	9	11,5	2,1	2,5	a
OP - 10 - 14,4 - 3,0	10	14,4	3,0	3,5	b
OP - 12 - 16,6 - 2,6	12	16,6	2,6	3,1	b
OP - 12 - 18 - 6,0	12	18	6,0	7,0	b
OP - 16 - 20 - 3,0	16	20	3,0	3,5	b
OP - 16 - 30 - 10,0	16	30	10,0	11,0	b
OP - 17 - 22 - 4,0	17	22	4,0	4,5	b
OP - 18,7 - 21,5 - 3,0	18,7	21,5	3,0	3,5	b
OP - 19,9 - 22,5 - 3,0	19,9	22,5	3,0	3,5	b
OP - 23 - 28 - 4,5	23	28	4,5	5,0	b
OP - 25,4 - 30 - 4,9	25,4	30	4,9	5,4	b
OP - 26,6 - 35 - 5,5	26,6	35	5,5	6,5	b
OP - 27,5 - 33,6 - 4,0	27,5	33,6	4,0	4,5	b
OP - 28,4 - 32,6 - 3,0	28,4	32,6	3,0	3,6	b
OP - 29 - 34 - 4,0	29	34	4,0	4,5	b
OP - 33,2 - 36 - 3,2	33,2	36	3,2	3,6	b
OP - 33,2 - 36 - 4,25	33,2	36	4,25	4,75	b
OP - 34,6 - 40,7 - 4,0	34,6	40,7	4,0	4,5	b
OP - 35,1 - 40,6 - 4,0	35,1	40,6	4,0	4,6	b
OP - 35,1 - 41 - 5,5	35,1	41	5,5	6,5	b
OP - 35,2 - 38 - 4,25	35,2	38	4,25	4,75	b
OP - 40 - 45 - 4,9	40	45	4,9	5,4	b
OP - 44,6 - 50 - 5,2	44,6	50	5,2	6,2	b
OP - 45,5 - 50,5 - 3,5	45,5	50,5	3,5	4,0	b
OP - 47,5 - 52 - 3,0	47,5	52	3,0	3,5	b
OP - 50,5 - 55 - 3,0	50,5	55	3,0	3,5	b
OP - 52,2 - 57 - 3,5	52,2	57	3,5	4,0	b
OP - 56 - 61 - 4,0	56	61	4,0	4,5	b
OP - 58,4 - 63 - 4,9	58,4	63	4,9	5,4	b
OP - 60,5 - 65 - 3,0	60,5	65	3,0	3,5	b
OP - 61,4 - 66 - 3,5	61,4	66	3,5	4,0	b
OP - 61,5 - 66 - 3,0	61,5	66	3,0	3,5	b
OP - 64,3 - 70 - 5,7	64,3	70	5,7	6,7	b
OP - 69,4 - 75 - 4,8	69,4	75	4,8	5,3	b
OP - 73 - 78 - 4,0	73	78	4,0	4,5	b
OP - 73 - 81 - 5,6	73	81	5,6	6,6	b
OP - 73,8 - 80 - 5,9	73,8	80	5,9	6,9	c

Type designation	∅ d ^{f7}	∅ D ^{H8}	H	L ^{+0,2}	Profile
OP - 74,4 - 80 - 4,8	74,4	80	4,8	5,3	b
OP - 74,5 - 80 - 4,0	74,5	80	4,0	4,5	b
OP - 78,5 - 83 - 3,0	78,5	83	3,0	3,5	b
OP - 78,9 - 85,2 - 5,5	78,9	85,2	5,5	6,0	b
OP - 79,3 - 85 - 5,7	79,3	85	5,7	6,7	b
OP - 84,3 - 90 - 5,7	84,3	90	5,7	6,7	b
OP - 85,5 - 90,5 - 4,5	85,5	90,5	4,5	5,0	b
OP - 88 - 96 - 5,6	88	96	5,6	6,6	b
OP - 91,4 - 100 - 8,0	91,4	100	8,0	9,0	c
OP - 93,8 - 100 - 5,9	93,8	100	5,9	6,9	c
OP - 101 - 106 - 4,5	101	106	4,5	5,0	b
OP - 101,4 - 110 - 8,0	101,4	110	8,0	9,0	c
OP - 101,7 - 111 - 7,5	101,7	111	7,5	8,5	c
OP - 103 - 111 - 5,6	103	111	5,6	6,6	b
OP - 105 - 111 - 5,5	105	111	5,5	6,5	b
OP - 106,2 - 112 - 5,1	106,2	112	5,1	6,0	c
OP - 106,7 - 116 - 7,5	106,7	116	7,5	8,5	c
OP - 107,2 - 113 - 5,1	107,2	113	5,1	6,0	c
OP - 110 - 116 - 5,5	110	116	5,5	6,5	b
OP - 115,5 - 120,25 - 3,7	115,5	120,25	3,7	4,2	b
OP - 118 - 126 - 5,6	118	126	5,6	6,6	b
OP - 125,2 - 131 - 5,1	125,2	131	5,1	6,0	c
OP - 129,2 - 135 - 5,1	129,2	135	5,1	6,0	c
OP - 132,8 - 145 - 8,5	132,8	145	8,5	9,5	c
OP - 134 - 140,3 - 5,0	134	140,3	5,0	6,0	b
OP - 140,2 - 146 - 4,0	140,2	146	4,0	4,5	b
OP - 143 - 152 - 8,1	143	152	8,1	9,1	c
OP - 144 - 155,5 - 9,5	144	155,5	9,5	10,5	c
OP - 145 - 151 - 5,0	145	151	5,0	6,0	c
OP - 160,2 - 166 - 4,0	160,2	166	4,0	4,5	b
OP - 165 - 171 - 5,0	165	171	5,0	6,0	c
OP - 165,8 - 175 - 8,8	165,8	175	8,8	9,8	b
OP - 166,4 - 175 - 8,1	166,4	175	8,1	9,1	c
OP - 168 - 179,5 - 9,5	168	179,5	9,5	10,5	c
OP - 185 - 191 - 5,0	185	191	5,0	6,0	c
OP - 185,8 - 195 - 8,9	185,8	195	8,9	9,9	b
OP - 188,4 - 200 - 11,3	188,4	200	11,3	12,3	c
OP - 192 - 198 - 5,0	192	198	5,0	6,0	c

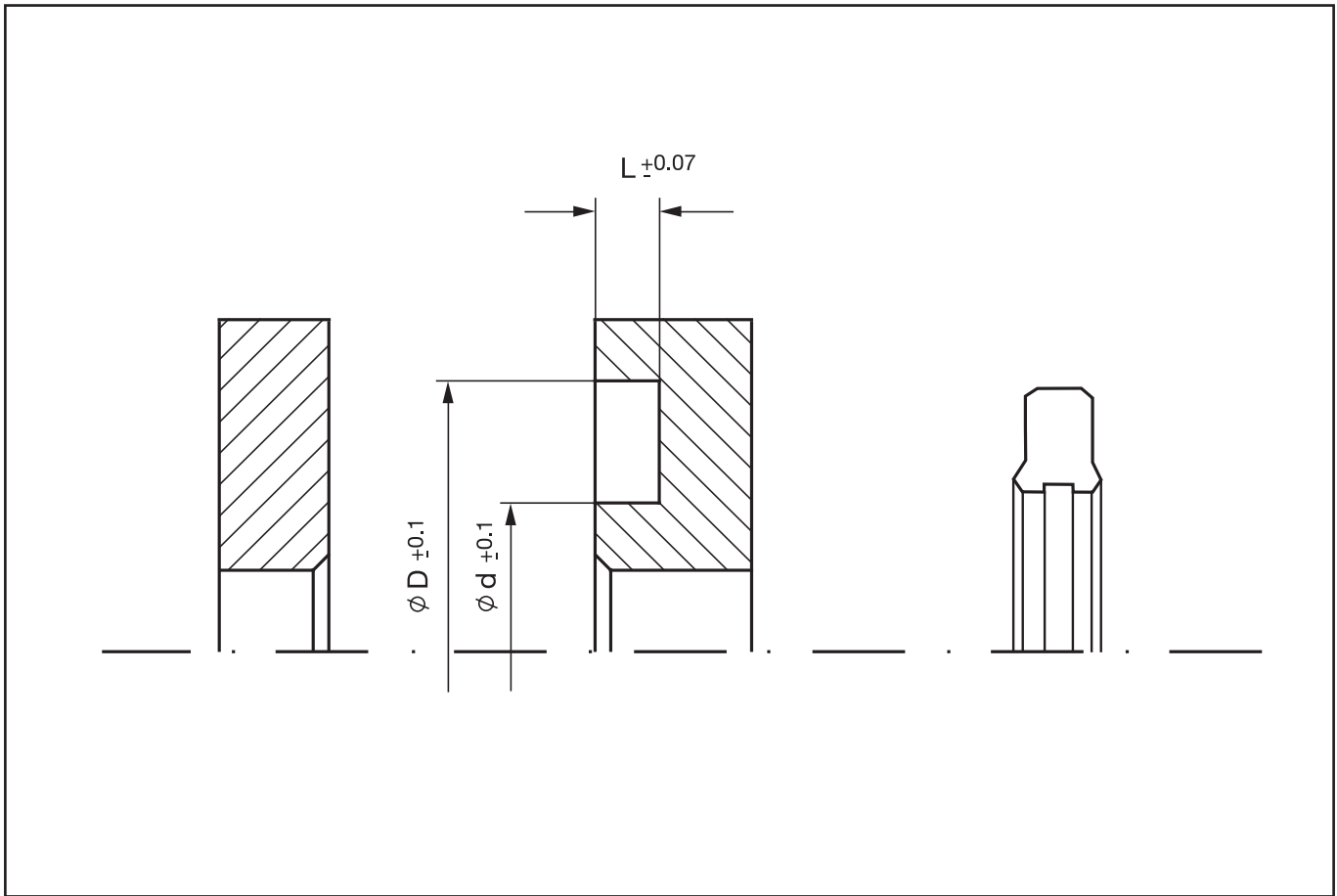
OP

Static Seal

Type designation	∅ d ^{f7}	∅ D ^{H8}	H	L ^{+0,2}	Profile
OP - 196,4 - 205 - 8,0	196,4	205	8,0	9,0	b
OP - 207 - 213 - 5,0	207	213	5,0	6,0	c
OP - 217,4 - 229 - 11,0	217,4	229	11,0	12,0	c
OP - 231 - 244 - 7,5	231	244	7,5	8,5	c
OP - 233,5 - 240,5 - 8,0	233,5	240,5	8,0	9,0	c
OP - 262 - 272 - 8,5	262	272	8,5	9,5	c
OP - 293 - 303 - 8,5	293	303	8,5	9,5	c

Further dimension and in-between sizes upon request.

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.



Max. Operating Conditions

Pressure (MPa)	≤ 50 (500 bar)
Temperature (°C)	- 40 / + 100
Speed (m/s)	statisch
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	≤ 1,6 µm	≤ 16 µm
Groove flanks	≤ 1,6 µm	≤ 16 µm
Running surface	≤ 0,3 µm	≤ 3 µm

Material

Polyurethane	PU
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Technical Description

The seal **PFS** is a low priced sealing element for sealing of SAE-flanges.

The flange-sealing has a symmetrical groove-profile made of polyurethane. Because of its construction, the seal – in an attached conditions - is stable within its fitting groove.

Because of the low compression-set-value of the applied polyurethane, a preeminent sealing function will be obtained.

Furthermore, the applied polyurethane-material features through extrusion-firmness, whereby even when the flange sprays under pressure, a spraying extrusion will be antagonized.

Type designation	∅ d	∅ D	L
PFS 8,0	8,0	12,0	1,40
PFS 10,3	10,3	16,9	2,20
PFS 12,2	12,2	19,2	2,20
PFS 15,4	15,4	22,4	2,20
PFS 1/2"	17,0	25,4	2,85
PFS 3/4"	23,4	31,8	2,85
PFS 1"	31,2	39,6	2,85
PFS 1 1/4"	36,1	44,5	2,85
PFS 1 1/2"	45,3	53,7	2,85
PFS 2"	55,0	63,4	2,85

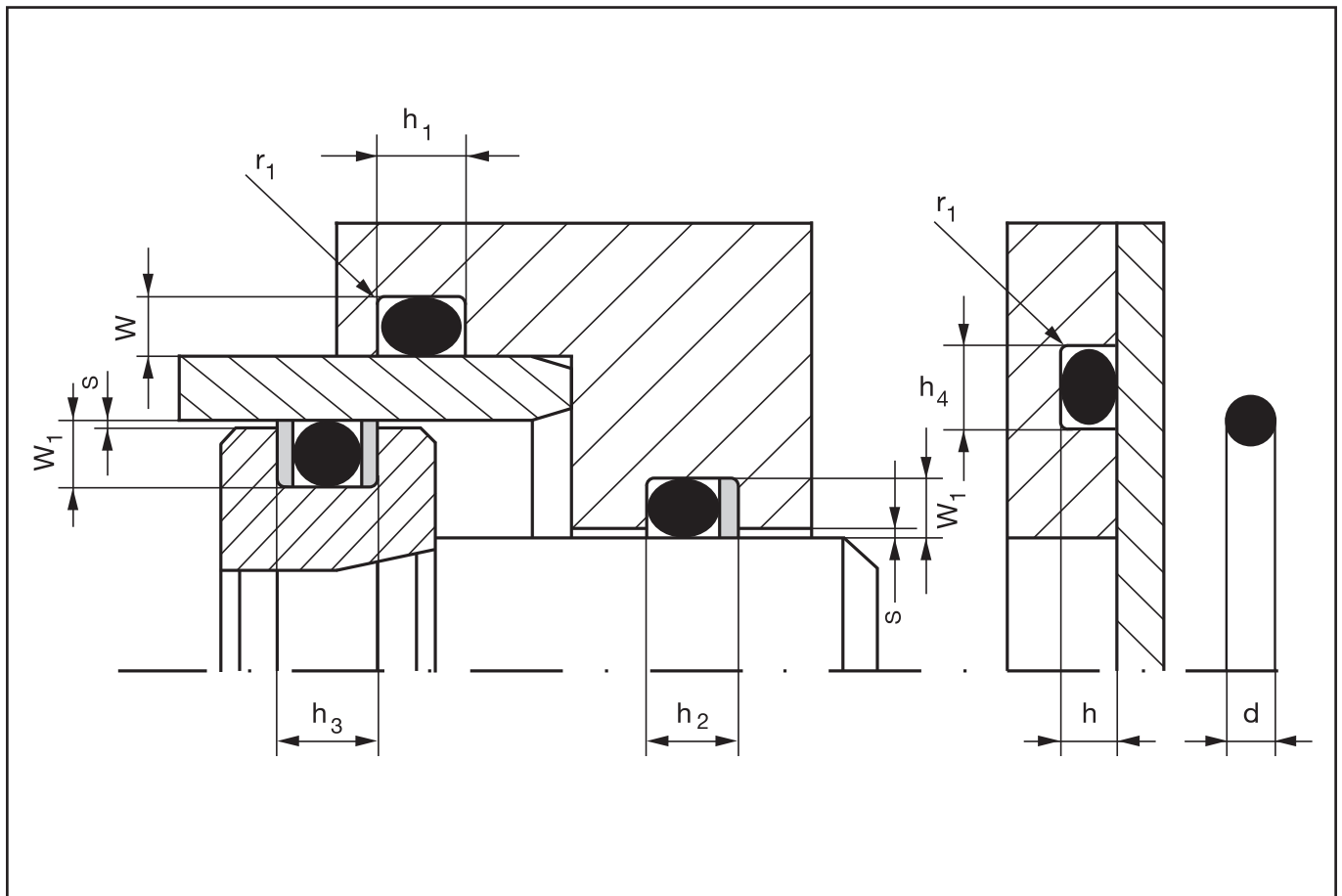
Further dimension and in-between sizes upon request.

	Type	Dimension	Material
Ordering example:	PFS 1"	∅ D 39,6 x 2,85	Polyurethane
Order designation:	PFS 1" -	39,6 x 2,85	- PU

Designation of material: PU - Polyurethane

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.

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Recommended Surface Finish

Surface roughness	R_a	R_t
Groove bottom	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$
Groove flanks	$\leq 1,6 \mu\text{m}$	$\leq 16 \mu\text{m}$

Technical Description

Due to their simple design and low pricing, O-Rings are mainly used as sealing elements on static and dynamic applications to prevent the loss of fluids and gases. With selection of suitable materials they cover a wide range of hydraulic and pneumatic systems. They are available in a wide range of sizes and materials.

Seal Concept GmbH provides the most frequent sizes and materials like NBR 70/80/90 and Viton as well round cords ex stock. Further O-Rings made of materials as PTFE, EPDM and Silicone are available upon request. Besides O-Rings we also keep a wide range of X-Rings ex stock available.

The following housing sizes are seen as directions for most sealing applications. In case of questions for special applications please contact our application engineers.

*Max. operating conditions:

Field of application and service conditions are decisive for the selection of the PTFE compound, respectively the material qualities. Temperature and chemical resistiveness in reliance of the chosen O-Ring material.

Material

NBR 70 Shore A	NBR 70
NBR 80 Shore A	NBR 80
NBR 90 Shore A	NBR 90
FPM 80 Shore A (Viton)	FPM 80
VMQ 70 Shore A	VMQ 70
EPDM 70 Shore A	EPDM 70
PU 93 Shore A	PU 93

Gap s

O-Ring d \varnothing	to 2 mm	2 - 3 mm	3 - 5 mm	5 - 7 mm	> 7 mm
O-Rings with hardness 70 Shore A					
Pressure (MPa)	Gap s				
≤ 3,50	0,08	0,09	0,10	0,13	0,15
≤ 7,00	0,05	0,07	0,08	0,09	0,10
≤ 10,50	0,03	0,04	0,05	0,07	0,08
O-Rings with hardness 90 Shore A					
Pressure (MPa)	Gap s				
≤ 3,50	0,13	0,15	0,20	0,23	0,25
≤ 7,00	0,10	0,13	0,15	0,18	0,20
≤ 10,50	0,07	0,09	0,10	0,13	0,15
≤ 14,00	0,05	0,07	0,08	0,09	0,10
≤ 17,50	0,04	0,05	0,07	0,08	0,09
≤ 21,00	0,03	0,04	0,05	0,07	0,08
≤ 35,00	0,02	0,03	0,03	0,04	0,04

	O-Ring	Dimension	Material
Ordering example:	O-Ring	ID x Cross-Section	NBR 70
Order designation:	OR -	50,80 x 5,53	- NBR 70

Designation of material:

- NBR 70** - NBR 70 Shore A
- NBR 80** - NBR 80 Shore A
- NBR 90** - NBR 90 Shore A
- FPM 80** - FPM 80 Shore A
- VMQ 70** - VMQ 70 Shore A
- EPDM 70** - EPDM 70 Shore A
- PU 93** - PU 93 Shore A

Assembly dimensions

Cross-Section-∅		Radial Usage					Axial Usage		Radius
d		Gland depth		Gland width			Gland depth	Gland width	R ± 0,5
		dynamic W ₁ + 0,05	static W + 0,05	h ₁ + 0,2	h ₂ + 0,2	h ₃ + 0,2	h + 0,05	h ₄ + 0,2	
0,50		-	0,35	0,80	-	-	0,35	0,80	0,20
0,74		-	0,50	1,00	-	-	0,50	1,00	0,20
1,00	1,02	-	0,70	1,40	-	-	0,70	1,40	0,20
1,20		-	0,85	1,70	-	-	0,85	1,70	0,20
1,25	1,27	-	0,90	1,70	-	-	0,90	1,80	0,20
1,30		-	0,95	1,80	-	-	0,95	1,80	0,20
1,42		-	1,05	1,90	-	-	1,05	2,00	0,30
1,50	1,52	1,25	1,10	2,00	3,00	4,00	1,10	2,10	0,30
1,60	1,63	1,30	1,20	2,10	3,10	4,10	1,20	2,20	0,30
1,78	1,80*	1,45	1,30	2,40	3,80	5,20	1,30	2,60	0,30
1,83		1,50	1,35	2,50	3,90	5,30	1,35	2,60	0,30
1,90		1,55	1,40	2,60	4,00	5,40	1,40	2,70	0,30
1,98	2,00	1,65	1,50	2,70	4,10	5,50	1,50	2,80	0,30
2,08	2,10	1,75	1,55	2,80	4,20	5,60	1,55	2,90	0,30
2,20		1,85	1,60	3,00	4,40	5,50	1,60	3,00	0,30
2,26		1,90	1,70	3,00	4,40	5,80	1,70	3,10	0,30
2,30	2,34	1,95	1,75	3,10	4,50	5,90	1,75	3,10	0,30
2,40		2,05	1,80	3,20	4,60	6,00	1,80	3,30	0,30
2,46		2,10	1,85	3,30	4,70	6,10	1,85	3,40	0,30
2,50		2,15	1,85	3,30	4,70	6,10	1,85	3,40	0,30
2,62	2,65*	2,25	2,00	3,60	5,00	6,40	2,00	3,80	0,30
2,70		2,30	2,05	3,60	5,00	6,40	2,05	3,80	0,30
2,80		2,40	2,10	3,70	5,10	6,50	2,10	3,90	0,60
2,92	2,95	2,50	2,20	3,90	5,30	6,70	2,20	4,00	0,60
3,00		2,60	2,30	4,00	5,40	6,80	2,30	4,00	0,60
3,10		2,70	2,40	4,10	5,50	6,90	2,40	4,10	0,60
3,50		3,05	2,65	4,60	6,00	7,40	2,65	4,70	0,60
3,53	3,55*	3,10	2,70	4,80	6,20	7,60	2,70	5,00	0,60
3,60		3,15	2,80	4,80	6,20	7,60	2,80	5,10	0,60
4,00		3,50	3,10	5,20	6,90	8,60	3,10	5,30	0,60
4,50		4,00	3,50	5,80	7,50	9,20	3,50	5,90	0,60
5,00		4,40	4,00	6,60	8,30	10,00	4,00	6,70	0,60
5,33	5,30*	4,70	4,30	7,10	9,00	10,90	4,30	7,30	0,60

Assembly dimensions

Cross-Section-∅	Radial Usage					Axial Usage		Radius
	Gland depth		Gland width			Gland depth	Gland width	
d	dynamic W ₁ + 0,05	static W + 0,05	h ₁ + 0,2	h ₂ + 0,2	h ₃ + 0,2	h + 0,05	h ₄ + 0,2	R ± 0,5
5,50	4,80	4,50	7,10	9,00	10,90	4,50	7,30	0,60
5,70	5,00	4,60	7,20	9,00	11,00	4,60	7,40	0,60
6,00	5,30	4,90	7,40	9,30	11,20	4,90	7,60	0,60
6,50	5,70	5,40	8,00	9,90	11,90	5,40	8,20	1,00
6,99 7,00*	6,10	5,80	9,50	12,30	15,10	5,80	9,70	1,00
7,50	6,60	6,30	9,70	12,50	15,30	6,30	9,90	1,00
8,00	7,10	6,70	9,80	12,60	15,40	6,70	10,00	1,00
8,40	7,50	7,10	10,00	12,80	15,60	7,10	10,30	1,00
9,00	8,10	7,70	10,60	13,40	16,30	7,70	10,90	1,50
9,50	8,60	8,20	11,00	13,80	16,70	8,20	11,40	1,50
10,00	9,10	8,60	11,60	14,50	17,40	8,60	12,00	2,00
12,00	11,00	10,60	13,50	16,40	19,40	10,60	14,00	2,00

* ISO 3601 Recommendation

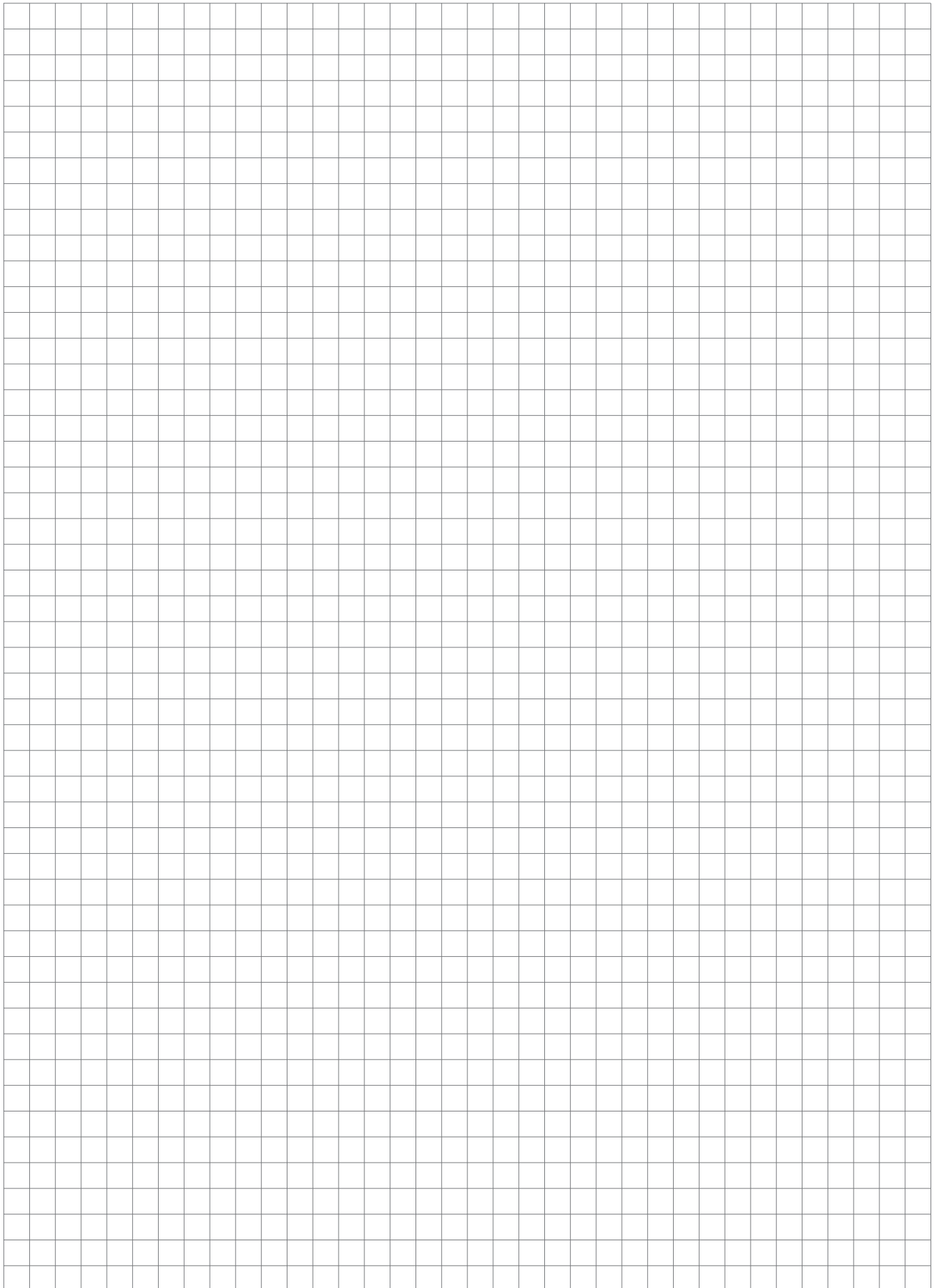
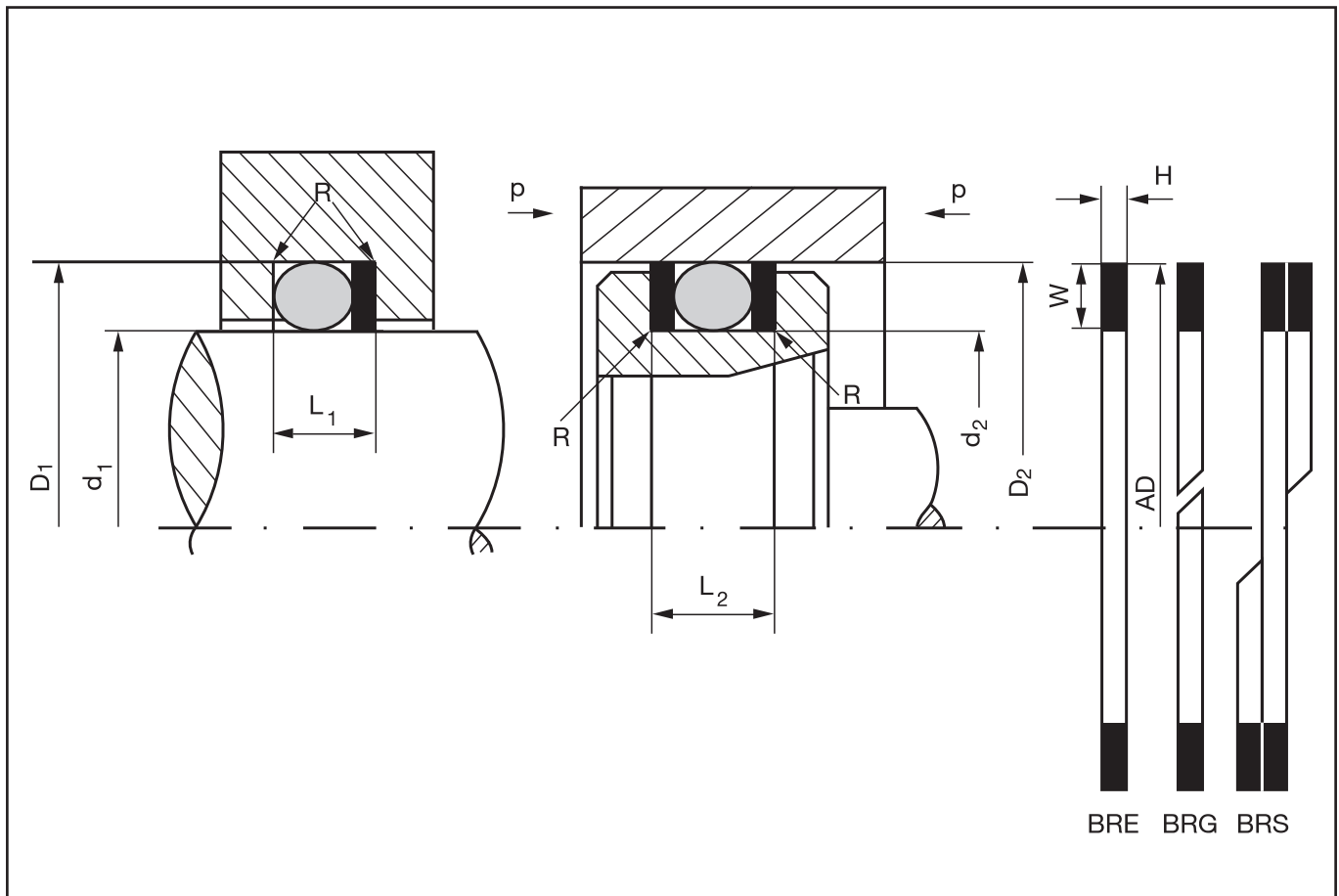


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BRE-M

Back Up Rings



Max. Operating Conditions	
Pressure (MPa)	static application: up to 250 (2500 bar) depending on material and gap dynamic application: up to 40 (400 bar)
Temperature (°C) *	- 200 / - 30 / + 110 / +200
Speed (m/s)	≤ 2 depending on material and gap
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Material	
Polyurethane	PU
PTFE-bronze / glass fiber (+MoS ₂) / Rein	PB/PG(M)/PR
Hytrel ®	HY
Polyacetal	POM
NBR	N

Technical Description
<p>Back-up Rings BRE-M and BRE-I are used as well for radial-static and radial-dynamic applications in connection with O-Rings but are in themselves not a seal. Back-up Rings are used to restrict extrusion of O-Rings into the gap.</p> <p>Back-up Rings of type BRE-M and BRE-I have a square design and are endless. They are mounted by simple snap assembly to provide a tight seat into housing with direction towards the gap and insure that the O-Rings remain round under high pressure. In applications of changing pressure directions two back-up rings are used on both sides of an O-Ring. As an alternative for O-Rings and Back-up Ring solutions the PU-type OP can be recommended, see pages 340 ff. Seal Concept GmbH provides Back-up rings made of PTFE, Polyurethane, PTFE-compounds and in custom sizes with short delivery times upon request or ex stock.</p> <p>*Max. operating conditions:</p> <p>Field of application and service conditions are decisive for the selection of the PTFE compound, respectively the material qualities. Temperature and chemical resistiveness in reliance of the chosen O-Ring material.</p>

Type designation	O-Ring	d ^{f7}	D ^{H9}	H	L ₁ ^{+0,2}	L ₂ ^{+0,2}
BRE - 3,8 - 6,5 - M	4,1 x 1,6	3,8	6,5	1,0	3,1	4,1
BRE - 6 - 10 - M	5,3 x 2,4	6,0	10,0	1,4	4,6	6,0
BRE - 6 - 10,5 - M	5,23 x 2,62	6,0	10,5	0,8	4,4	5,3
BRE - 7 - 11 - M	6,3 x 2,4	7,0	11,0	1,4	4,6	6,0
BRE - 10 - 14 - M	9,3 x 2,4	10,0	14,0	1,3	4,5	5,8
BRE - 11 - 15 - M	10,3 x 2,4	11,0	15,0	1,4	4,6	6,0
BRE - 12 - 16 - M	11,3 x 2,4	12,0	16,0	1,3	4,5	5,8
BRE - 14 - 18 - M	13,3 x 2,4	14,0	18,0	1,4	4,6	6,0
BRE - 15 - 19 - M	14,3 x 2,4	15,0	19,0	1,4	4,6	6,0
BRE - 16 - 20 - M	15,3 x 2,4	16,0	20,0	1,3	4,5	5,8
BRE - 17 - 21 - M	16,3 x 2,4	17,0	21,0	1,3	4,5	5,8
BRE - 18 - 22 - M	17,3 x 2,4	18,0	22,0	1,4	4,6	6,0
BRE - 20 - 25 - M	19,2 x 3,0	20,0	25,0	1,3	5,3	6,6
BRE - 23 - 28 - M	22,2 x 3,0	23,0	28,0	1,4	5,4	6,8
BRE - 25 - 30 - M	24,2 x 3,0	25,0	30,0	1,3	5,3	6,6
BRE - 25 - 32 - M	24 x 4,0	25,0	32,0	1,3	6,7	8,2
BRE - 27 - 32 - M	26,2 x 3,0	27,0	32,0	1,3	5,3	6,6
BRE - 30 - 35 - M	29,2 x 3,0	30,0	35,0	1,3	5,3	6,6
BRE - 33 - 38 - M	32,2 x 3,0	33,0	38,0	1,4	5,4	6,8
BRE - 35 - 40 - M	34,2 x 3,0	35,0	40,0	1,3	5,3	6,6
BRE - 36 - 41 - M	34,5 x 3,0	36,0	41,0	1,75	5,75	7,5

Back Up Ring

Dimension

Type

Material

Ordering example: BRE-M for O-Ring ∅ 39,2 x 3,0 Hytrel®

Order designation: BRE - 40 x 45 - M

Back Up Ring

Dimension

Type

Material

Ordering example: BRE-I for O-Ring ∅ 69,22 x 5,34 Hytrel®

Order designation: BRE - 335 - I

Part-No. according to american norm

Designation of material:

PU - Polyurethane

PB/PG(M)/PR - PTFE-bronze / glass fiber (+MoS₂) / Rein

HY - Hytrel®

POM - Polyacetal

N - NBR

BRE-M

Back Up Rings

Type designation	O-Ring	d ^{f7}	D ^{H9}	H	L ₁ ^{+0,2}	L ₂ ^{+0,2}
BRE - 37 - 42 - M	36,2 x 3,0	37,0	42,0	1,4	5,4	6,8
BRE - 40 - 45 - M	39,2 x 3,0	40,0	45,0	1,3	5,3	6,6
BRE - 40 - 50 - M	39,2 x 5,7	40,0	50,0	1,7	9,0	11,0
BRE - 42,5 - 50 - M	42 x 4,5	42,5	50,0	2,0	7,8	9,8
BRE - 43 - 48 - M	42,2 x 3,0	43,0	48,0	1,4	5,4	6,8
BRE - 45 - 50 - M	44,2 x 3,0	45,0	50,0	1,3	5,3	6,6
BRE - 45 - 55 - M	44,2 x 5,7	45,0	55,0	1,7	9,0	11,0
BRE - 48 - 53 - M	48,0 x 3,0	48,0	53,0	1,4	5,4	6,8
BRE - 50 - 55 - M	49,5 x 3,0	50,0	55,0	1,3	5,3	6,6
BRE - 50 - 60 - M	49,2 x 5,7	50,0	60,0	1,7	9,5	11,5
BRE - 53 - 63 - M	52,3 x 5,7	53,0	63,0	1,7	9,5	11,5
BRE - 54 - 59 - M	53,1 x 3,0	54,0	59,0	1,4	5,4	6,8
BRE - 55 - 60 - M	54,5 x 3,0	55,0	60,0	1,3	5,3	6,6
BRE - 55 - 65 - M	54,2 x 5,7	55,0	65,0	1,7	9,5	11,5
BRE - 56,5 - 61 - M	55,25 x 2,62	56,5	61,0	1,4	5,0	6,4
BRE - 58 - 63 - M	57,0 x 3,0	58,0	63,0	1,3	5,3	6,6
BRE - 60 - 65 - M	59,5 x 3,0	60,0	65,0	1,3	5,3	6,6
BRE - 60 - 67 - M	59 x 4,0	60,0	67,0	1,5	6,9	8,4
BRE - 60 - 70 - M	59,2 x 5,7	60,0	70,0	1,7	9,5	11,5
BRE - 63 - 68 - M	62,0 x 3,0	63,0	68,0	1,4	5,4	6,8
BRE - 64 - 70 - M	63,5 x 3,53	64,0	70,0	1,4	6,0	7,5
BRE - 65 - 70 - M	64,5 x 3,0	65,0	70,0	1,3	5,3	6,6
BRE - 65 - 75 - M	64,2 x 5,7	65,0	75,0	1,7	9,5	11,5
BRE - 66 - 71 - M	64,5 x 3,0	66,0	71,0	1,5	5,5	7,0
BRE - 66,4 - 72 - M	65,09 x 3,53	66,4	72,0	1,4	6,0	7,4
BRE - 69 - 75 - M	68,26 x 3,53	69,0	75,0	1,5	6,1	7,6
BRE - 70 - 75 - M	69,5 x 3,0	70,0	75,0	1,3	5,3	6,6
BRE - 70 - 77 - M	69 x 4,0	70,0	77,0	1,5	6,9	8,4
BRE - 70 - 80 - M	69,2 x 5,7	70,0	80,0	1,7	9,5	11,5
BRE - 74 - 80 - M	72,62 x 3,53	74,0	80,0	1,5	6,1	7,6
BRE - 74,1 - 81 - M	74 x 4,0	74,1	81,0	1,5	6,8	8,3
BRE - 75 - 80 - M	74,6 x 3,0	75,0	80,0	1,3	5,3	6,6
BRE - 75 - 85 - M	74,2 x 5,7	75,0	85,0	1,7	9,5	11,5
BRE - 79,4 - 85 - M	78,97 x 3,53	79,4	85,0	1,3	6,0	7,5
BRE - 80 - 85 - M	79,5 x 3,0	80,0	85,0	1,3	5,3	6,6
BRE - 80 - 87 - M	79 x 4,0	80,0	87,0	1,5	6,9	8,4
BRE - 80 - 90 - M	79,2 x 5,7	80,0	90,0	1,7	9,5	11,5
BRE - 83 - 90 - M	83 x 4,0	83,0	90,0	1,5	6,8	8,3

Type designation	O-Ring	d ^{f7}	D ^{H9}	H	L ₁ ^{+0,2}	L ₂ ^{+0,2}
BRE - 85 - 90 - M	84,5 x 3,0	85,0	90,0	1,3	5,3	6,6
BRE - 85 - 95 - M	84,1 x 5,7	85,0	95,0	1,7	9,5	11,5
BRE - 89,4 - 100 - M	88 x 6,0	89,4	100,0	2,5	10,7	13,2
BRE - 90 - 95 - M	89,5 x 3,0	90,0	95,0	1,3	5,3	6,6
BRE - 90 - 100 - M	89,1 x 5,7	90,0	100,0	1,7	9,5	11,5
BRE - 93,5 - 100 - M	91,67 x 3,53	93,5	100,0	1,4	6,0	7,4
BRE - 94,5 - 101 - M	94,84 x 3,53	94,5	101,0	1,5	6,1	7,6
BRE - 95 - 100 - M	94,5 x 3,0	95,0	100,0	1,3	5,3	6,6
BRE - 95 - 105 - M	94,1 x 5,7	95,0	105,0	1,7	9,5	11,5
BRE - 100 - 105 - M	99,5 x 3,0	100,0	105,0	1,3	5,3	6,6
BRE - 100 - 110 - M	99,1 x 5,7	100,0	110,0	1,7	9,5	11,5
BRE - 105 - 110 - M	104,5 x 3,0	105,0	110,0	1,3	5,3	6,6
BRE - 105 - 115 - M	104,1 x 5,7	105,0	115,0	1,7	9,5	11,5
BRE - 110 - 115 - M	109,5 x 3,0	110,0	115,0	1,3	5,3	6,6
BRE - 110 - 120 - M	109,1 x 5,7	110,0	120,0	1,7	9,5	11,5
BRE - 115 - 120 - M	114,5 x 3,0	115,0	120,0	1,3	5,3	6,6
BRE - 115 - 125 - M	114,3 x 5,7	115,0	125,0	1,7	9,5	11,5
BRE - 120 - 125 - M	119,5 x 3,0	120,0	125,0	1,3	5,3	6,6
BRE - 120 - 130 - M	119,3 x 5,7	120,0	130,0	1,7	9,5	11,5
BRE - 125 - 130 - M	124,5 x 3,0	125,0	130,0	1,3	5,3	6,6
BRE - 125 - 135 - M	124,3 x 5,7	125,0	135,0	1,7	9,5	11,5
BRE - 130 - 135 - M	129,5 x 3,0	130,0	135,0	1,4	5,4	6,8
BRE - 130 - 140 - M	129,3 x 5,7	130,0	140,0	1,7	9,5	11,5
BRE - 135 - 140 - M	134,5 x 3,0	135,0	140,0	1,4	5,4	6,8
BRE - 135 - 145 - M	134,3 x 5,7	135,0	145,0	1,7	9,5	11,5
BRE - 140 - 145 - M	139,5 x 3,0	140,0	145,0	1,4	5,4	6,8
BRE - 140 - 150 - M	139,3 x 5,7	140,0	150,0	1,7	9,5	11,5
BRE - 142 - 151 - M	140 x 5,3	142,0	151,0	1,8	9,0	10,8
BRE - 145 - 150 - M	144,5 x 3,0	145,0	150,0	1,4	5,4	6,8
BRE - 145 - 155 - M	144,3 x 5,7	145,0	155,0	1,7	9,5	11,5
BRE - 150 - 160 - M	149,3 x 5,7	150,0	160,0	1,7	9,5	11,5
BRE - 152 - 161 - M	150 x 5,3	152,0	161,0	1,8	9,0	10,8
BRE - 155 - 165 - M	154,3 x 5,7	155,0	160,0	1,7	9,0	11,0
BRE - 160 - 170 - M	159,3 x 5,7	160,0	170,0	1,7	9,0	11,0
BRE - 165 - 175 - M	164,2 x 5,7	165,0	175,0	1,7	9,0	11,0
BRE - 170 - 180 - M	169,2 x 5,7	170,0	180,0	1,7	9,0	11,0
BRE - 175 - 185 - M	174,3 x 5,7	175,0	185,0	1,7	9,0	11,0
BRE - 180 - 190 - M	179,2 x 5,7	180,0	190,0	1,7	9,0	11,0

BRE-M

Back Up Rings

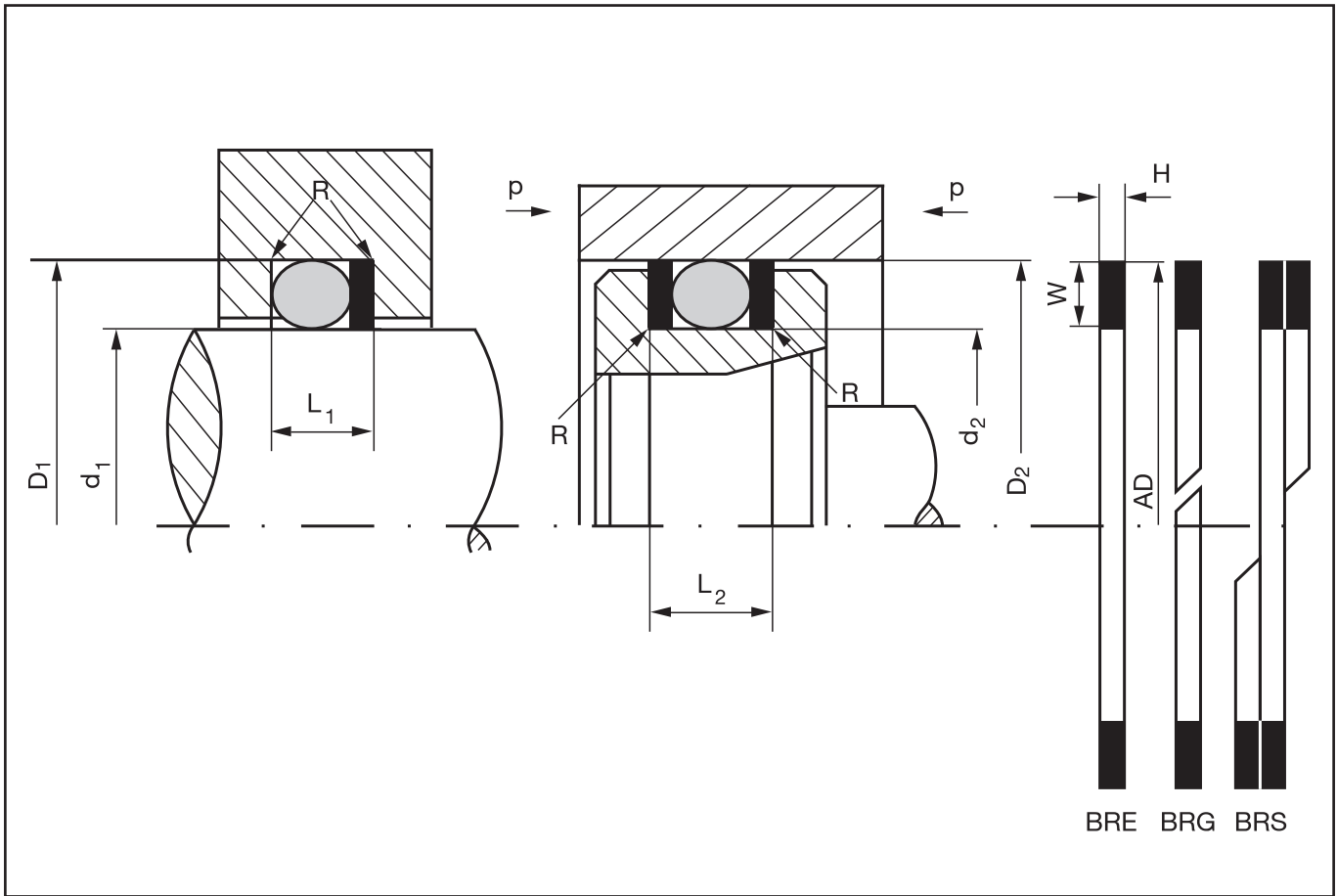
Type designation	O-Ring	d ^{f7}	D ^{H9}	H	L ₁ ^{+0,2}	L ₂ ^{+0,2}
BRE - 185 - 195 - M	184,3 x 5,7	185,0	195,0	1,7	9,0	11,0
BRE - 190 - 200 - M	189,3 x 5,7	190,0	200,0	1,7	9,0	11,0
BRE - 195 - 205 - M	194,3 x 5,7	195,0	205,0	1,7	9,0	11,0
BRE - 200 - 210 - M	199,3 x 5,7	200,0	210,0	1,7	9,0	11,0
BRE - 210 - 220 - M	209,2 x 5,7	210,0	220,0	1,7	9,0	11,0
BRE - 220 - 230 - M	219,3 x 5,7	220,0	230,0	1,7	9,0	11,0
BRE - 230 - 240 - M	229,3 x 5,7	230,0	240,0	1,7	9,0	11,0
BRE - 240 - 250 - M	239,3 x 5,7	240,0	250,0	1,7	9,0	11,0
BRE - 250 - 260 - M	249,3 x 5,7	250,0	260,0	1,7	9,0	11,0

Further dimension and in-between sizes upon request.

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.

BRE-I

Back Up Rings



Max. Operating Conditions	
Pressure (MPa)	static application: up to 250 (2500 bar) depending on material and gap dynamic application: up to 40 (400 bar)
Temperature (°C) *	- 200 / - 30 / + 110 / +200
Speed (m/s)	≤ 2 depending on material and gap
Media:	Hydraulic fluids upon oil-basis, hardly inflaming hydraulic fluids, HFA-, HFB-Liquids

Technical Description
<p>Back-up Rings BRE-M and BRE-I are used as well for radial-static and radial-dynamic applications in connection with O-Rings but are in themselves not a seal. Back-up Rings are used to restrict extrusion of O-Rings into the gap.</p> <p>Back-up Rings of type BRE-M and BRE-I have a square design and are endless. They are mounted by simple snap assembly to provide a tight seat into housing with direction towards the gap and insure that the O-Rings remain round under high pressure. In applications of changing pressure directions two back-up rings are used on both sides of an O-Ring. As an alternative for O-Rings and Back-up Ring solutions the PU-type OP can be recommended, see pages 340 ff. Seal Concept GmbH provides Back-up rings made of PTFE, Polyurethane, PTFE-compounds and in custom sizes with short delivery times upon request or ex stock.</p> <p>*Max. operating conditions:</p> <p>Field of application and service conditions are decisive for the selection of the PTFE compound, respectively the material qualities. Temperature and chemical resistiveness in reliance of the chosen O-Ring material.</p>

Material	
Polyurethane	PU
PTFE-bronze / glass fiber (+MoS ₂) / Rein	PB/PG(M)/PR
Hytrel [®]	HY
Polyacetal	POM
NBR	N

O-Ring Cross- Section-d	Back Up Ring section			Groove Dimensions				
	Back Up Ring height W		Thickness H	Gland depth-Ø		Gland width		Radius R ± 0,2
	dynamic	static		dynamic d ₂ ^{h9}	static d ₁ ^{f7}	L ₁ ^{+0,2}	L ₂ ^{+0,2}	
1,50	1,25	1,10	1,0	D - 2,5	D - 2,2	3,0	4,0	0,3
1,60	1,30	1,20	1,0	D - 2,6	D - 2,4	3,1	4,1	0,3
1,78 1,80	1,45	1,30	1,4	D - 2,9	D - 2,6	3,8	5,2	0,3
2,00	1,65	1,50	1,4	D - 3,3	D - 3,0	4,1	5,5	0,3
2,40	2,05	1,80	1,4	D - 4,1	D - 3,6	4,6	6,0	0,3
2,50	2,15	1,90	1,4	D - 4,3	D - 3,8	4,7	6,1	0,3
2,62 2,65	2,25	2,00	1,4	D - 4,5	D - 4,0	5,0	6,4	0,3
3,00	2,60	2,30	1,4	D - 5,2	D - 4,6	5,4	6,8	0,6
3,53 3,55	3,10	2,70	1,4	D - 6,2	D - 5,4	6,2	7,6	0,6
4,00	3,50	3,10	1,7	D - 7,0	D - 6,2	6,9	8,6	0,6
5,00	4,40	4,00	1,7	D - 8,8	D - 8,0	8,3	10,0	0,6
5,33 5,30	4,70	4,30	1,7	D - 9,4	D - 8,6	9,0	10,9	0,6
5,70	5,00	4,60	1,7	D - 10,0	D - 9,2	9,0	11,0	0,6
6,00	5,30	4,90	1,7	D - 10,6	D - 9,8	9,3	11,2	0,6
7,00	6,10	5,80	2,5	D - 12,2	D - 11,6	12,3	15,1	1,0
8,00	7,10	6,70	2,5	D - 14,2	D - 13,4	12,6	15,4	1,0
8,40	7,50	7,10	2,5	D - 15,0	D - 14,2	12,8	15,6	1,0

Stützring

Abmessung

Typ

Material

Ordering example: BRE-I for O-Ring Ø 69,22 x 5,34 Hytrel®

Order designation: BRE - 335 - I

Part-No. according to american norm

Designation of material:

PU - Polyurethane

PB/PG(M)/PR - PTFE-bronze / glass fiber (+MoS₂) / Rein

HY - Hytrel®

POM - Polyacetal

N - NBR

BRE-I

Back Up Rings

Type designation	O-Ring	H	d ₁ ^{f7}	D ₁ ^{H9}	d ₂ ^{h9}	D ₂ ^{H8}	L ₁ ^{+0,2}	L ₂ ^{+0,2}
BRE - 010 - I	6,07 x 1,78	1,4	6,0	9,1	6,9	10,0	4,0	5,5
BRE - 610 - I	6,75 x 1,78	1,4	7,0	10,1	6,9	10,0	4,0	5,5
BRE - 011 - I	7,65 x 1,78	1,4	8,0	11,1	7,9	11,0	4,0	5,5
BRE - 611 - I	8,73 x 1,78	1,4	9,0	12,1	9,9	13,0	4,0	5,5
BRE - 012 - I	9,25 x 1,78	1,4	9,0	12,1	9,9	13,0	4,0	5,5
BRE - 013 - I	10,82 x 1,78	1,4	11,0	14,1	10,9	14,0	4,0	5,5
BRE - 806 - I	11,11 x 1,78	1,4	11,0	14,1	10,9	14,0	4,0	5,5
BRE - 014 - I	12,42 x 1,78	1,4	13,0	16,1	12,9	16,0	4,0	5,5
BRE - 015 - I	14,00 x 1,78	1,4	14,0	17,1	14,9	18,0	4,0	5,5
BRE - 016 - I	15,60 x 1,78	1,4	16,0	19,1	15,9	19,0	4,0	5,5
BRE - 017 - I	17,17 x 1,78	1,4	17,0	20,1	17,9	21,0	4,0	5,5
BRE - 018 - I	18,77 x 1,78	1,4	19,0	22,1	18,9	22,0	4,0	5,5
BRE - 019 - I	20,35 x 1,78	1,4	21,0	24,1	20,9	24,0	4,0	5,5
BRE - 020 - I	21,95 x 1,78	1,4	22,0	25,1	22,9	26,0	4,0	5,5
BRE - 022 - I	25,12 x 1,78	1,4	25,0	28,1	25,9	29,0	4,0	5,5
BRE - 023 - I	26,70 x 1,78	1,4	27,0	30,1	26,9	30,0	4,0	5,5
BRE - 024 - I	28,30 x 1,78	1,4	28,0	31,1	28,9	32,0	4,0	5,5
BRE - 025 - I	29,87 x 1,78	1,4	30,0	33,1	29,9	33,0	4,0	5,5
BRE - 026 - I	31,47 x 1,78	1,4	32,0	35,1	31,9	35,0	4,0	5,5
BRE - 029 - I	37,82 x 1,78	1,4	38,0	41,1	37,9	41,0	4,0	5,5
BRE - 030 - I	41,00 x 1,78	1,4	41,0	44,1	41,9	45,0	4,0	5,5
BRE - 032 - I	47,35 x 1,78	1,4	48,0	51,1	47,9	51,0	4,0	5,5
BRE - 109 - I	7,60 x 2,62	1,4	8,0	12,5	8,5	13,0	5,0	6,5
BRE - 110 - I	9,19 x 2,62	1,4	9,0	13,5	10,5	15,0	5,0	6,5
BRE - 613 - I	9,92 x 2,62	1,4	10,0	14,5	10,5	15,0	5,0	6,5
BRE - 111 - I	10,77 x 2,62	1,4	11,0	15,5	11,5	16,0	5,0	6,5
BRE - 614 - I	11,91 x 2,62	1,4	12,0	16,5	12,5	17,0	5,0	6,5
BRE - 112 - I	12,37 x 2,62	1,4	12,5	17,0	13,5	18,0	5,0	6,5
BRE - 113 - I	13,94 x 2,62	1,4	14,0	18,5	14,5	19,0	5,0	6,5
BRE - 616 - I	15,08 x 2,62	1,4	15,0	19,5	15,5	20,0	5,0	6,5
BRE - 114 - I	15,54 x 2,62	1,4	15,5	20,0	16,5	21,0	5,0	6,5
BRE - 809 - I	15,88 x 2,62	1,4	16,0	20,5	16,5	21,0	5,0	6,5
BRE - 115 - I	17,12 x 2,62	1,4	17,0	21,5	17,5	22,0	5,0	6,5
BRE - 617 - I	17,86 x 2,62	1,4	18,0	22,5	18,5	23,0	5,0	6,5
BRE - 116 - I	18,72 x 2,62	1,4	19,0	23,5	19,5	24,0	5,0	6,5
BRE - 117 - I	20,29 x 2,62	1,4	20,0	24,5	20,5	25,0	5,0	6,5
BRE - 812 - I	20,63 x 2,62	1,4	21,0	25,5	21,5	26,0	5,0	6,5
BRE - 118 - I	21,89 x 2,62	1,4	22,0	26,5	22,5	27,0	5,0	6,5

Type designation	O-Ring	H	d ₁ ^{f7}	D ₁ ^{H9}	d ₂ ^{h9}	D ₂ ^{H8}	L ₁ ^{+0,2}	L ₂ ^{+0,2}
BRE - 813 - I	22,22 x 2,62	1,4	22,0	26,5	22,5	27,0	5,0	6,5
BRE - 119 - I	23,47 x 2,62	1,4	24,0	28,5	24,5	29,0	5,0	6,5
BRE - 814 - I	23,81 x 2,62	1,4	24,0	28,5	24,5	29,0	5,0	6,5
BRE - 120 - I	25,07 x 2,62	1,4	25,0	29,5	25,5	30,0	5,0	6,5
BRE - 121 - I	26,64 x 2,62	1,4	28,0	32,5	27,5	32,0	5,0	6,5
BRE - 122 - I	28,24 x 2,62	1,4	28,0	32,5	28,5	33,0	5,0	6,5
BRE - 123 - I	29,82 x 2,62	1,4	30,0	34,5	30,5	35,0	5,0	6,5
BRE - 124 - I	31,42 x 2,62	1,4	32,0	36,5	32,5	37,0	5,0	6,5
BRE - 125 - I	32,99 x 2,62	1,4	33,0	37,5	33,5	38,0	5,0	6,5
BRE - 126 - I	34,60 x 2,62	1,4	35,0	39,5	35,5	40,0	5,0	6,5
BRE - 127 - I	36,14 x 2,62	1,4	36,0	40,5	36,5	41,0	5,0	6,5
BRE - 128 - I	37,77 x 2,62	1,4	38,0	42,5	38,5	43,0	5,0	6,5
BRE - 129 - I	39,34 x 2,62	1,4	40,0	44,5	40,5	45,0	5,0	6,5
BRE - 130 - I	40,95 x 2,62	1,4	41,0	45,5	41,5	46,0	5,0	6,5
BRE - 131 - I	42,52 x 2,62	1,4	43,0	47,5	43,5	48,0	5,0	6,5
BRE - 132 - I	44,12 x 2,62	1,4	44,0	48,5	44,5	49,0	5,0	6,5
BRE - 133 - I	45,69 x 2,62	1,4	46,0	50,5	46,5	51,0	5,0	6,5
BRE - 134 - I	47,30 x 2,62	1,4	48,0	52,5	48,5	53,0	5,0	6,5
BRE - 135 - I	48,90 x 2,62	1,4	49,0	53,5	49,5	54,0	5,0	6,5
BRE - 136 - I	50,47 x 2,62	1,4	51,0	55,5	51,5	56,0	5,0	6,5
BRE - 137 - I	52,07 x 2,62	1,4	52,0	56,5	52,5	57,0	5,0	6,5
BRE - 138 - I	53,65 x 2,62	1,4	54,0	58,5	54,5	59,0	5,0	6,5
BRE - 139 - I	55,25 x 2,62	1,4	55,0	59,5	56,5	61,0	5,0	6,5
BRE - 140 - I	56,82 x 2,62	1,4	57,0	61,5	57,5	62,0	5,0	6,5
BRE - 141 - I	58,42 x 2,62	1,4	59,0	63,5	59,5	64,0	5,0	6,5
BRE - 142 - I	60,00 x 2,62	1,4	60,0	64,5	60,5	65,0	5,0	6,5
BRE - 143 - I	61,60 x 2,62	1,4	62,0	66,5	62,5	67,0	5,0	6,5
BRE - 144 - I	63,17 x 2,62	1,4	63,0	67,5	63,5	68,0	5,0	6,5
BRE - 145 - I	64,77 x 2,62	1,4	65,0	69,5	65,5	70,0	5,0	6,5
BRE - 146 - I	66,35 x 2,62	1,4	67,0	71,5	67,5	72,0	5,0	6,5
BRE - 147 - I	67,95 x 2,62	1,4	68,0	72,5	68,5	73,0	5,0	6,5
BRE - 148 - I	69,52 x 2,62	1,4	70,0	74,5	70,5	75,0	5,0	6,5
BRE - 149 - I	71,12 x 2,62	1,4	71,0	75,5	71,5	76,0	5,0	6,5
BRE - 150 - I	72,69 x 2,62	1,4	73,0	77,5	73,5	78,0	5,0	6,5
BRE - 151 - I	75,87 x 2,62	1,4	76,0	80,5	77,5	82,0	5,0	6,5
BRE - 152 - I	82,22 x 2,62	1,4	82,0	86,5	83,5	88,0	5,0	6,5
BRE - 153 - I	88,57 x 2,62	1,4	89,0	93,5	89,5	94,0	5,0	6,5
BRE - 154 - I	94,92 x 2,62	1,4	95,0	99,5	96,5	101,0	5,0	6,5

BRE-I

Back Up Rings

Type designation	O-Ring	H	d ₁ ^{f7}	D ₁ ^{H9}	d ₂ ^{h9}	D ₂ ^{H8}	L ₁ ^{+0,2}	L ₂ ^{+0,2}
BRE - 156 - I	107,63 x 2,62	1,4	108,0	112,5	108,5	113,0	5,0	6,5
BRE - 157 - I	113,97 x 2,62	1,4	114,0	118,5	115,5	120,0	5,0	6,5
BRE - 210 - I	18,64 x 3,53	1,4	19,0	25,2	19,8	26,0	6,0	7,5
BRE - 211 - I	20,22 x 3,53	1,4	20,0	26,2	21,8	28,0	6,0	7,5
BRE - 212 - I	21,82 x 3,53	1,4	22,0	28,2	22,8	29,0	6,0	7,5
BRE - 213 - I	23,40 x 3,53	1,4	23,0	29,2	23,8	30,0	6,0	7,5
BRE - 214 - I	24,99 x 3,53	1,4	25,0	31,2	25,8	32,0	6,0	7,5
BRE - 618 - I	25,80 x 3,53	1,4	26,0	32,2	26,8	33,0	6,0	7,5
BRE - 215 - I	26,58 x 3,53	1,4	27,0	33,2	27,8	34,0	6,0	7,5
BRE - 216 - I	28,17 x 3,53	1,4	28,0	34,2	28,8	35,0	6,0	7,5
BRE - 217 - I	29,75 x 3,53	1,4	30,0	36,2	30,8	37,0	6,0	7,5
BRE - 218 - I	31,34 x 3,53	1,4	31,0	37,2	31,8	38,0	6,0	7,5
BRE - 219 - I	32,92 x 3,53	1,4	33,0	39,2	33,8	40,0	6,0	7,5
BRE - 220 - I	34,52 x 3,53	1,4	35,0	41,2	35,8	42,0	6,0	7,5
BRE - 221 - I	36,09 x 3,53	1,4	36,0	42,2	36,8	43,0	6,0	7,5
BRE - 222 - I	37,69 x 3,53	1,4	38,0	44,2	38,8	45,0	6,0	7,5
BRE - 824 - I	39,69 x 3,53	1,4	40,0	46,2	39,8	46,0	6,0	7,5
BRE - 223 - I	40,87 x 3,53	1,4	42,0	48,2	41,8	48,0	6,0	7,5
BRE - 825 - I	41,28 x 3,53	1,4	42,0	48,2	41,8	48,0	6,0	7,5
BRE - 826 - I	42,86 x 3,53	1,4	43,0	49,2	43,8	50,0	6,0	7,5
BRE - 224 - I	44,04 x 3,53	1,4	45,0	51,2	44,8	51,0	6,0	7,5
BRE - 827 - I	44,45 x 3,53	1,4	45,0	51,2	44,8	51,0	6,0	7,5
BRE - 828 - I	46,04 x 3,53	1,4	46,0	52,2	46,8	53,0	6,0	7,5
BRE - 225 - I	47,22 x 3,53	1,4	48,0	54,2	47,8	54,0	6,0	7,5
BRE - 829 - I	47,63 x 3,53	1,4	48,0	54,2	47,8	54,0	6,0	7,5
BRE - 830 - I	49,21 x 3,53	1,4	49,0	55,2	49,8	56,0	6,0	7,5
BRE - 226 - I	50,39 x 3,53	1,4	51,0	57,2	51,8	58,0	6,0	7,5
BRE - 831 - I	50,80 x 3,53	1,4	51,0	57,2	51,8	58,0	6,0	7,5
BRE - 832 - I	52,39 x 3,53	1,4	52,0	58,2	53,8	60,0	6,0	7,5
BRE - 227 - I	53,57 x 3,53	1,4	54,0	60,2	54,8	61,0	6,0	7,5
BRE - 833 - I	53,98 x 3,53	1,4	54,0	60,2	54,8	61,0	6,0	7,5
BRE - 834 - I	55,56 x 3,53	1,4	56,0	62,2	55,8	62,0	6,0	7,5
BRE - 228 - I	56,74 x 3,53	1,4	57,0	63,2	57,8	64,0	6,0	7,5
BRE - 835 - I	57,15 x 3,53	1,4	57,0	63,2	57,8	64,0	6,0	7,5
BRE - 836 - I	58,74 x 3,53	1,4	59,0	65,2	58,8	65,0	6,0	7,5
BRE - 229 - I	59,92 x 3,53	1,4	60,0	66,2	60,8	67,0	6,0	7,5
BRE - 837 - I	60,33 x 3,53	1,4	60,0	66,2	60,8	67,0	6,0	7,5
BRE - 838 - I	61,91 x 3,53	1,4	62,0	68,2	62,8	69,0	6,0	7,5

Type designation	O-Ring	H	d ₁ ^{f7}	D ₁ ^{H9}	d ₂ ^{h9}	D ₂ ^{H8}	L ₁ ^{+0,2}	L ₂ ^{+0,2}
BRE - 230 - I	63,09 x 3,53	1,4	64,0	70,2	63,8	70,0	6,0	7,5
BRE - 840 - I	65,09 x 3,53	1,4	65,0	71,2	65,8	72,0	6,0	7,5
BRE - 231 - I	66,27 x 3,53	1,4	67,0	73,2	66,8	73,0	6,0	7,5
BRE - 841 - I	66,68 x 3,53	1,4	67,0	73,2	66,8	73,0	6,0	7,5
BRE - 842 - I	68,26 x 3,53	1,4	68,0	74,2	68,8	75,0	6,0	7,5
BRE - 232 - I	69,44 x 3,53	1,4	70,0	76,2	70,8	77,0	6,0	7,5
BRE - 843 - I	69,85 x 3,53	1,4	70,0	76,2	70,8	77,0	6,0	7,5
BRE - 844 - I	71,44 x 3,53	1,4	72,0	78,2	71,8	78,0	6,0	7,5
BRE - 233 - I	72,62 x 3,53	1,4	73,0	79,2	73,8	80,0	6,0	7,5
BRE - 845 - I	73,03 x 3,53	1,4	73,0	79,2	73,8	80,0	6,0	7,5
BRE - 846 - I	74,61 x 3,53	1,4	75,0	81,2	74,8	81,0	6,0	7,5
BRE - 234 - I	75,79 x 3,53	1,4	76,0	82,2	76,8	83,0	6,0	7,5
BRE - 235 - I	78,97 x 3,53	1,4	79,0	85,2	79,8	86,0	6,0	7,5
BRE - 236 - I	82,14 x 3,53	1,4	82,0	88,2	82,8	89,0	6,0	7,5
BRE - 237 - I	85,32 x 3,53	1,4	85,0	91,2	85,8	92,0	6,0	7,5
BRE - 238 - I	88,49 x 3,53	1,4	89,0	95,2	88,8	95,0	6,0	7,5
BRE - 239 - I	91,67 x 3,53	1,4	92,0	98,2	92,8	99,0	6,0	7,5
BRE - 240 - I	94,84 x 3,53	1,4	95,0	101,2	95,8	102,0	6,0	7,5
BRE - 241 - I	98,02 x 3,53	1,4	98,0	104,2	98,8	105,0	6,0	7,5
BRE - 242 - I	101,19 x 3,53	1,4	101,0	107,2	101,8	108,0	6,0	7,5
BRE - 243 - I	104,37 x 3,53	1,4	105,0	111,2	104,8	111,0	6,0	7,5
BRE - 244 - I	107,54 x 3,53	1,4	108,0	114,2	107,8	114,0	6,0	7,5
BRE - 245 - I	110,72 x 3,53	1,4	111,0	117,2	111,8	118,0	6,0	7,5
BRE - 246 - I	113,89 x 3,53	1,4	114,0	120,2	114,8	121,0	6,0	7,5
BRE - 247 - I	117,07 x 3,53	1,4	117,0	123,2	117,8	124,0	6,0	7,5
BRE - 248 - I	120,24 x 3,53	1,4	120,0	126,2	120,8	127,0	6,0	7,5
BRE - 249 - I	123,42 x 3,53	1,4	123,0	129,2	123,8	130,0	6,0	7,5
BRE - 250 - I	126,59 x 3,53	1,4	127,0	133,2	126,8	133,0	6,0	7,5
BRE - 251 - I	129,77 x 3,53	1,4	130,0	136,2	129,8	136,0	6,0	7,5
BRE - 252 - I	132,94 x 3,53	1,4	133,0	139,2	133,8	140,0	6,0	7,5
BRE - 253 - I	136,12 x 3,53	1,4	136,0	142,2	136,8	143,0	6,0	7,5
BRE - 254 - I	139,29 x 3,53	1,4	140,0	146,2	139,8	146,0	6,0	7,5
BRE - 255 - I	142,47 x 3,53	1,4	143,0	149,2	142,8	149,0	6,0	7,5
BRE - 256 - I	145,64 x 3,53	1,4	146,0	152,2	145,8	152,0	6,0	7,5
BRE - 257 - I	148,82 x 3,53	1,4	149,0	155,2	148,8	155,0	6,0	7,5
BRE - 258 - I	151,99 x 3,53	1,4	152,0	158,2	152,8	159,0	6,0	7,5
BRE - 263 - I	183,75 x 3,53	1,4	184,0	190,2	184,8	191,0	6,0	7,5
BRE - 264 - I	190,09 x 3,53	1,4	190,0	196,2	190,8	197,0	6,0	7,5

BRE-I

Back Up Rings

Type designation	O-Ring	H	d ₁ ^{f7}	D ₁ ^{H9}	d ₂ ^{h9}	D ₂ ^{H8}	L ₁ ^{+0,2}	L ₂ ^{+0,2}
BRE - 325 - I	37,47 x 5,34	1,7	38,0	47,4	38,6	48,0	9,0	10,5
BRE - 326 - I	40,65 x 5,34	1,7	41,0	50,4	42,6	52,0	9,0	10,5
BRE - 327 - I	43,82 x 5,34	1,7	44,0	53,4	45,6	55,0	9,0	10,5
BRE - 328 - I	47,00 x 5,34	1,7	47,0	56,4	48,6	58,0	9,0	10,5
BRE - 329 - I	50,16 x 5,34	1,7	50,0	59,4	51,6	61,0	9,0	10,5
BRE - 330 - I	53,34 x 5,34	1,7	53,0	62,4	54,6	64,0	9,0	10,5
BRE - 331 - I	56,52 x 5,34	1,7	57,0	66,4	58,6	68,0	9,0	10,5
BRE - 332 - I	59,69 x 5,34	1,7	60,0	69,4	60,6	70,0	9,0	10,5
BRE - 333 - I	62,87 x 5,34	1,7	63,0	72,4	63,6	73,0	9,0	10,5
BRE - 334 - I	66,04 x 5,34	1,7	66,0	75,4	67,6	77,0	9,0	10,5
BRE - 335 - I	69,22 x 5,34	1,7	69,0	78,4	70,6	80,0	9,0	10,5
BRE - 336 - I	72,39 x 5,34	1,7	73,0	82,4	73,6	83,0	9,0	10,5
BRE - 619 - I	74,63 x 5,34	1,7	75,0	84,4	75,6	85,0	9,0	10,5
BRE - 337 - I	75,57 x 5,34	1,7	76,0	85,4	76,6	86,0	9,0	10,5
BRE - 338 - I	78,74 x 5,34	1,7	79,0	88,4	80,6	90,0	9,0	10,5
BRE - 620 - I	79,77 x 5,34	1,7	80,0	89,4	81,6	91,0	9,0	10,5
BRE - 339 - I	81,92 x 5,34	1,7	82,0	91,4	82,6	92,0	9,0	10,5
BRE - 340 - I	85,09 x 5,34	1,7	85,0	94,4	85,6	95,0	9,0	10,5
BRE - 341 - I	88,27 x 5,34	1,7	88,0	97,4	88,6	98,0	9,0	10,5
BRE - 621 - I	89,69 x 5,34	1,7	90,0	99,4	90,6	100,0	9,0	10,5
BRE - 342 - I	91,44 x 5,34	1,7	92,0	101,4	92,6	102,0	9,0	10,5
BRE - 343 - I	94,62 x 5,34	1,7	95,0	104,4	95,6	105,0	9,0	10,5
BRE - 344 - I	97,79 x 5,34	1,7	98,0	107,4	98,6	108,0	9,0	10,5
BRE - 622 - I	100,00 x 5,34	1,7	100,0	109,4	100,6	110,0	9,0	10,5
BRE - 345 - I	100,97 x 5,34	1,7	101,0	110,4	101,6	111,0	9,0	10,5
BRE - 346 - I	104,14 x 5,34	1,7	104,0	113,4	105,6	115,0	9,0	10,5
BRE - 347 - I	107,32 x 5,34	1,7	107,0	116,4	108,6	118,0	9,0	10,5
BRE - 623 - I	109,50 x 5,34	1,7	110,0	119,4	110,6	120,0	9,0	10,5
BRE - 348 - I	110,50 x 5,34	1,7	111,0	120,4	111,6	121,0	9,0	10,5
BRE - 349 - I	113,67 x 5,34	1,7	114,0	123,4	115,6	125,0	9,0	10,5
BRE - 350 - I	116,84 x 5,34	1,7	117,0	126,4	118,6	128,0	9,0	10,5
BRE - 860 - I	117,50 x 5,34	1,7	118,0	127,4	118,6	128,0	9,0	10,5
BRE - 351 - I	120,02 x 5,34	1,7	121,0	130,4	122,6	132,0	9,0	10,5
BRE - 861 - I	120,70 x 5,34	1,7	121,0	130,4	122,6	132,0	9,0	10,5
BRE - 862 - I	123,80 x 5,34	1,7	124,0	133,4	125,6	135,0	9,0	10,5
BRE - 353 - I	126,37 x 5,34	1,7	127,0	136,4	127,6	137,0	9,0	10,5
BRE - 863 - I	127,00 x 5,34	1,7	127,0	136,4	127,6	137,0	9,0	10,5
BRE - 354 - I	129,54 x 5,34	1,7	130,0	139,4	130,6	140,0	9,0	10,5

Type designation	O-Ring	H	d ₁ ^{f7}	D ₁ ^{H9}	d ₂ ^{h9}	D ₂ ^{H8}	L ₁ ^{+0,2}	L ₂ ^{+0,2}
BRE - 864 - I	130,20 x 5,34	1,7	130,0	139,4	130,6	140,0	9,0	10,5
BRE - 865 - I	133,40 x 5,34	1,7	134,0	143,4	135,6	145,0	9,0	10,5
BRE - 356 - I	135,90 x 5,34	1,7	137,0	146,4	137,6	147,0	9,0	10,5
BRE - 866 - I	136,50 x 5,34	1,7	137,0	146,4	137,6	147,0	9,0	10,5
BRE - 357 - I	139,07 x 5,34	1,7	140,0	149,4	140,6	150,0	9,0	10,5
BRE - 867 - I	139,70 x 5,34	1,7	140,0	149,4	140,6	150,0	9,0	10,5
BRE - 358 - I	142,24 x 5,34	1,7	143,0	152,4	143,6	153,0	9,0	10,5
BRE - 868 - I	142,90 x 5,34	1,7	143,0	152,4	143,6	153,0	9,0	10,5
BRE - 360 - I	148,60 x 5,34	1,7	150,0	159,4	150,6	160,0	9,0	10,5
BRE - 870 - I	149,20 x 5,34	1,7	150,0	159,4	150,6	160,0	9,0	10,5
BRE - 361 - I	151,77 x 5,34	1,7	152,0	161,4	153,6	163,0	9,0	10,5
BRE - 362 - I	158,12 x 5,34	1,7	158,0	167,4	159,6	169,0	9,0	10,5
BRE - 363 - I	164,47 x 5,34	1,7	165,0	174,4	165,6	175,0	9,0	10,5
BRE - 364 - I	170,82 x 5,34	1,7	171,0	180,4	172,6	182,0	9,0	10,5
BRE - 365 - I	177,17 x 5,34	1,7	178,0	187,4	178,6	188,0	9,0	10,5
BRE - 367 - I	189,87 x 5,34	1,7	190,0	199,4	190,6	200,0	9,0	10,5
BRE - 370 - I	208,92 x 5,34	1,7	209,0	218,4	210,6	220,0	9,0	10,5
BRE - 425 - I	113,67 x 6,99	2,5	114,0	126,2	114,8	127,0	12,0	14,5
BRE - 426 - I	116,84 x 6,99	2,5	117,0	129,2	117,8	130,0	12,0	14,5
BRE - 428 - I	123,20 x 6,99	2,5	123,0	135,2	124,8	137,0	12,0	14,5
BRE - 429 - I	126,37 x 6,99	2,5	126,0	138,2	127,8	140,0	12,0	14,5
BRE - 431 - I	132,72 x 6,99	2,5	133,0	145,2	133,8	146,0	12,0	14,5
BRE - 432 - I	135,90 x 6,99	2,5	136,0	148,2	137,8	150,0	12,0	14,5
BRE - 433 - I	139,07 x 6,99	2,5	139,0	151,2	140,8	153,0	12,0	14,5
BRE - 435 - I	145,42 x 6,99	2,5	145,0	157,2	147,8	160,0	12,0	14,5
BRE - 872 - I	155,60 x 6,99	2,5	156,0	168,2	157,8	170,0	12,0	14,5
BRE - 628 - I	166,70 x 6,99	2,5	167,0	179,2	167,8	180,0	12,0	14,5
BRE - 442 - I	183,52 x 6,99	2,5	184,0	196,2	184,8	197,0	12,0	14,5
BRE - 443 - I	189,87 x 6,99	2,5	190,0	202,2	190,8	203,0	12,0	14,5
BRE - 444 - I	196,22 x 6,99	2,5	196,0	208,2	197,8	210,0	12,0	14,5
BRE - 684 - I	272,40 x 6,99	2,5	272,0	284,2	274,8	287,0	12,0	14,5

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